

Jackson County Multi-Jurisdictional Natural Hazard Mitigation Plan

Jackson County and the Cities of:
Ashland, Butte Falls, Eagle Point, Jacksonville, Phoenix, Rogue River,
Shady Cove and Talent



Photo Credit: Gary Halvorson, Oregon State Archives

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Volume I: Basic Plan

Prepared for:

Jackson County Emergency Management

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Oregon Partnership for Disaster Resilience



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Special thanks to Sara Rubrecht, Jackson County Emergency Manager for her vision, passion and positive outlook throughout the plan update process.

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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 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.

Plan Template Disclaimer

This Natural Hazard Mitigation Plan is based in part on a plan template developed by the Oregon Partnership for Disaster Resilience. The template is structured to address the requirements contained in 44 CFR 201.6; where language is applicable to communities throughout Oregon, OPDR encourages the use of standardized language. As part of this regional planning initiative, OPDR provided copies of the plan templates to communities for use in developing or updating their hazards mitigation plans. OPDR hereby authorizes the use of all content and language provided to Jackson County in the plan template.

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PLAN SUMMARY

Jackson County updated this Multi-Jurisdictional Natural Hazard Mitigation Plan (MNHMP, NHMP) in an effort to prepare for the long-term effects resulting from hazards. It is impossible to predict exactly when these hazards will occur, or the extent to which they will affect the community. However, with careful planning and collaboration among public agencies, private sector organizations and citizens within the community, it is possible to create a resilient community that will benefit from long-term recovery planning efforts.

The Federal Emergency Management Agency (FEMA) defines mitigation as “. . . the effort to reduce loss of life and property by lessening the impact of disasters . . . through risk analysis, which results in information that provides a foundation for mitigation activities that reduce risk.” Said another way, hazard mitigation is a method of permanently reducing or alleviating the losses of life, property and injuries resulting from hazards through long and short-term strategies. Example strategies include policy changes, such as updated ordinances, projects, such as seismic retrofits to critical facilities; and education and outreach to targeted audiences, such as non-English speaking residents or the elderly. Hazard mitigation is the responsibility of the “Whole Community.” FEMA defines Whole Community as, “private and nonprofit sectors, including businesses, faith-based and disability organizations and the general public, in conjunction with the participation of local, tribal, state, territorial and Federal governmental partners.”

44 CFR 201.6 – The local mitigation plan is the representation of the jurisdiction’s commitment to reduce risks from natural hazards, serving as a guide for decision makers as they commit resources to reducing the effects of natural hazards. . . .

Why Develop this Mitigation Plan?

The Disaster Mitigation Act of 2000 (DMA2K) and the regulations contained in 44 CFR 201 require that jurisdictions (counties, cities, special districts, etc.) maintain an approved Natural Hazard Mitigation Plan (NHMP) to receive FEMA Hazard Mitigation Assistance funds for mitigation projects. To that end, Jackson County is involved in a broad range of hazard and emergency management planning activities. Local and federal approval of this NHMP ensures that the County and listed jurisdictions will (1) remain eligible for pre- and post-disaster mitigation project grants and (2) promote local mechanisms to accomplish risk reduction strategies.

44 CFR 201.6(a)(1) – A local government must have a mitigation plan approved pursuant to this section in order to receive HMGP project grants . . .

What is Mitigation?

“Any sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event.”

- U.S. Federal Emergency Management Agency

Who Participated in Developing the NHMP?

The Jackson County NHMP is the result of a collaborative effort between the County, cities, special districts, citizens, public agencies, non-profit organizations, the private sector and regional organizations. County and City steering committees guided the NHMP development process.

For a list of individual County steering committee participants, refer to the acknowledgements section above. The update process included representatives from the following jurisdictions and agencies:

- Jackson County Emergency Management
- Jackson County Development Services
- Jackson County GIS
- Jackson County Health and Human Services
- Jackson County Roads and Parks
- Cow Creek Band of the Umpqua Tribe of Indians
- Rogue Valley Council of Governments
- City of Ashland
- Town of Butte Falls
- City of Central Point
- City of Eagle Point
- City of Jacksonville
- City of Medford
- City of Phoenix
- City of Rogue River
- City of Shady Cove
- City of Talent
- American Red Cross
- Applegate Valley Fire District
- Asante
- Ashland School District
- Emergency Communications of Southern Oregon

44 CFR 201.6(c)(1) – Documentation of the planning process used to develop the plan, including how it was prepared, who was involved in the process and how the public was involved.

- Jackson County Library District
- Jackson County Soil and Water Conservation District
- Jackson County Vector Control District
- Medford Fire and Rescue
- Medford Water Commission
- Rogue Community College
- Rogue Valley Sewer
- Rogue Valley Transportation District
- Rogue Waste, Inc.
- Oregon Department of Transportation
- Oregon Water Resources Department, District 13
- National Weather Service
- U.S. Army Corps of Engineers

The Jackson County Emergency Manager convened the planning process and will take the lead in implementing, maintaining and updating the County NHMP. Each of the participating cities have also named a local convener who is responsible for implementing, maintaining and updating the City Addenda (see addenda for specific names and positions). Jackson County is dedicated to directly involving the public in the continual review and update of the Natural Hazards Mitigation Plan. The County achieves this through systematic engagement of a wide variety of active groups, organizations or committees, including but not limited to: The Rogue Valley Emergency Management Advisory Group (EMAG), Rogue Valley Fire Chiefs

Association, public and private infrastructure partners, watershed and neighborhood groups and numerous others. Although members of the Steering Committee represent the public to some extent, the public will also have the opportunity to continue to provide feedback about the NHMP throughout the implementation and maintenance period.

How Does this Mitigation Plan Reduce Risk?

The NHMP is intended to assist Jackson County reduce the risk from hazards by identifying resources, information and strategies for risk reduction. It is also intended to guide and coordinate mitigation activities throughout the County. A risk assessment consists of three phases: hazard identification, vulnerability assessment and risk analysis, as illustrated in the following graphic.

44 CFR 201.6(c)(2) – A Risk Assessment that provides the factual basis for activities proposed in the strategy

Figure PS-I Understanding Risk



Source: Oregon Partnership for Disaster Resilience.

By identifying and understanding the relationship between hazards, vulnerable systems and existing capacity, Jackson County is better equipped to identify and implement actions aimed at reducing the overall risk to hazards. Notably, Jackson County took the unique step of directly engaging representatives in four critical lifeline sectors: Communication, Energy, Transportation and Water. Because these four lifeline sectors are critical to virtually all other activity in the county, this approach was used to better understand each sector's unique vulnerabilities, threats and hazards. The County utilized the information collected to inform specific, targeted actions aimed at reducing risks across each of the four lifeline sectors.

What is Jackson County’s Overall Risk to Hazards?

Jackson County reviewed and updated the risk assessment to evaluate the probability of each hazard as well as the vulnerability of the community to that hazard. Table PS-1 below summarizes hazard probability and vulnerability as determined by the County steering committee (Volume I, Section 3).

Table PS-1 Hazard and Vulnerability Assessment Summary

Hazard	Maximum				Total Threat Score	Hazard Rank	Hazard Tiers
	History	Vulnerability	Threat	Probability			
Earthquake (Cascadia)	2	50	100	70	222	#1	Top Tier
Emerging Infectious Disease	12	50	100	49	211	#2	
Wildfire	20	35	60	70	185	#3	
Winter Storm	20	30	60	70	180	#4	
Flood	20	20	60	70	170	#5	Middle Tier
Drought	20	30	50	63	163	#6	
Windstorm	20	20	50	70	160	#7	
Landslide	10	15	30	70	125	#8	
Earthquake (Crustal)	2	25	50	21	98	#9	Bottom Tier
Volcano	2	5	50	7	64	#10	

Source: Jackson County NHMP Steering Committee, 2017

What is the NHMP’s Mission?

The mission of the Jackson County NHMP is to:

Protect life, property and the environment, reduce risk and prevent loss from natural hazard events through coordination and cooperation among public and private partners.

44 CFR 201.6(c)(3)(i) – A description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

What are the NHMP Goals?

The NHMP goals describe the overall direction that the participating jurisdiction’s agencies, organizations and citizens can take toward mitigating risk from all-hazards. Below is a list of the NHMP goals (note: although numbered the goals are not prioritized):

GOAL 1: EMERGENCY SERVICES

Minimize life safety issues by promoting, strengthening and coordinating emergency response plans.

GOAL 2: EDUCATION AND OUTREACH

Further the public’s awareness and understanding of natural hazards and potential risk, including economic vulnerability and mitigation efforts.

GOAL 3: PREVENTION

Reduce the threat of loss of life and property from natural hazards by incorporating information on known hazards and providing incentives to make hazard mitigation planning a priority in land use policies and decisions, including NHMP implementation.

GOAL 4: PROPERTY PROTECTION

Lessen impact from natural disaster on individual properties, businesses and public facilities by increasing awareness at the individual level and encouraging activities that can prevent damage and loss of life from natural hazards.

GOAL 5: PARTNERSHIP AND COORDINATION

Identify mitigation or risk reduction measures that address multiple areas (i.e., environment, transportation, telecommunications); Coordinate public/private sector participation in planning and implementing mitigation projects throughout the County; and seek funding and resource partnerships for future mitigation efforts.

GOAL 6: NATURAL RESOURCE PROTECTION

Preserve and rehabilitate natural systems to serve natural hazard mitigation functions (i.e., floodplains, wetlands, watershed and urban interface areas).

GOAL 7: STRUCTURAL PROTECTIONS

When applicable, utilize structural mitigation activities to minimize risks associated with natural hazards.

How are the Action Items Organized?

The action items are organized within an action matrix included within Volume I, Section 4.

Data collection, research and the public participation process resulted in the development of the action items. The Action Item Matrix portrays the overall NHMP framework and identifies linkages between the NHMP goals and actions. The matrix documents the title of each action along with, the coordinating organization, timeline and the NHMP goals addressed. City specific action items are included in Volume III, City Addenda.

44 CFR 201.6(c)(3)(ii) – A section that identifies and analyzes a comprehensive range of specific mitigation actions . . .

Comprehensive Action Plan

The following lists and tables summarizes specific **priority** NHMP actions. Refer to Volume I, Section 4 for a complete list of County action and Volume III for a complete list of City actions. The matrix contains detailed information for all action items, including potential partners, proposed timeline and estimated budget.

Table PS-2 Jackson County High Priority NHMP Actions

Priority Mitigation Actions	
Multi-Hazard (MH)	
MH #1	Sustain an education and outreach program for local jurisdictions about natural hazards and assist them in developing emergency operations, public information, and hazard mitigation plans.
MH #2	Develop and maintain a GIS inventory of all critical facilities, large employers/public assembly areas and lifelines, and use GIS to evaluate their vulnerability by comparing them with hazard-prone areas.
Wildfire (WF)	
WF #1	Coordinate fire mitigation action items through the Rogue Valley Integrated Community Wildfire Protection Plan.

Source: Jackson County NHMP Steering Committee (2017)

Table PS-3 Ashland High Priority NHMP Actions

Priority Mitigation Actions	
Earthquake (EQ)	
EQ #1	Emergency Operations Center Upgrades
EQ #2	Seismic Retrofit for Critical Infrastructure
Landslide (LS)	
LS #1	Water Treatment Plant Relocation Assessment
Wildfire (WF)	
WF #1 (new)	Ashland Defensible Space Initiative
WF #2	Ashland Forest Resiliency Project

Source: Ashland NHMP Steering Committee (2017)

Table PS-4 Butte Falls High Priority NHMP Actions

Priority Mitigation Actions	
Multi-Hazard (MH)	
MH #1	Explore funding sources and grant opportunities for community-wide natural hazard mitigation and resiliency activities
MH #2	Obtain generators to provide power to maintain water and sewer systems.
Drought (DR)	
DR #1	Obtain and connect a pump for emergency water connection to Medford Water Commission system.
Earthquake (EQ)	
EQ #1	Implement structural and non-structural retrofits to critical and essential facilities.
Wildfire (WF)	
WF #1	Remove fuels from vacant lots/ alleys.
WF #2	Mutual aid agreement with Rogue Valley Fire Chiefs Association

Source: Butte Falls NHMP Steering Committee (2017)

Table PS-5 Eagle Point High Priority NHMP Actions

Priority Mitigation Actions	
Drought (DR)	
DR #1	Develop a drought preparedness and response plan to include a city ordinance restricting water during periods of low water availability.
Flood (FL)	
FL #1	Promote and enhance the use of natural flood prone open space or wetlands as flood storage areas. Add potential open space preservation areas within the north segment of the City where floodways are identified as wide and potential contributors to flooding and flood effects.
FL #2	Protect City facilities in flood prone areas.
FL #3 (New)	Increase street drainage system capacity on new road improvements in flood prone areas.
FL #4 (New)	Improve water retention capacity through new headwall design to reduce water flow in flood prone areas.

Source: Eagle Point NHMP Steering Committee (2017)

Table PS-6 Jacksonville High Priority NHMP Actions

Priority Mitigation Actions	
Multi-Hazard (MH)	
MH #1	Integrate the Mitigation Plan findings into planning and regulatory documents and programs including the Comprehensive Plan (particularly Goal 7) and development code. Particular attention will be paid to the wildfire hazard.
Landslide (LS)	
LS #1	Investigate the development and implementation of a city landslide ordinance.
Wildfire (WF)	
WF #1	Coordinate fire mitigation action items through the recommendations of the Rogue Valley Integrated Community Wildfire Protection Plan.

Source: Jacksonville NHMP Steering Committee (2017)

Table PS-7 Phoenix High Priority NHMP Actions

Priority Mitigation Actions	
Multi-Hazard (MH)	
MH #1	Integrate the Mitigation Plan findings into planning and regulatory documents and programs including the Comprehensive Plan (particularly Goal 7).
Earthquake (EQ)	
EQ #1	Implement structural and non-structural retrofits to critical and essential facilities.
Flood (FL)	
FL #1	Ensure continued compliance in the National Flood Insurance Program (NFIP) through enforcement of local floodplain management ordinances and take steps to participate in the Community Rating System (CRS).
Wildfire (WF)	
WF #1	Coordinate fire mitigation action items through the Jackson County Integrated Fire Plan

Source: Phoenix NHMP Steering Committee (2017)

Table PS-8 Rogue River High Priority NHMP Actions

Priority Mitigation Actions	
Multi-Hazard (MH)	
MH #1 (New)	Wire schools to use city's portable generators
MH #2 (New)	Incorporate hazard-resilient development design and siting of infrastructure into development code and ordinances.
Drought (DR)	
DR #1 (New)	Ensure that the water quantity held in established water storage facilities is at an amount adequate for drought preparedness.
Earthquake (EQ)	
EQ #1	Implement structural and non-structural retrofits to critical and essential facilities. Including water reservoir (500,000) built in 1974 and bridges.
Flood (FL)	
FL #1 (New)	Mitigate streambank erosion near "New Beginnings"
FL #2	Ensure continued compliance in the National Flood Insurance Program (NFIP) through enforcement of local floodplain management ordinances.
Wildfire (WF)	
WF #1	Partner with Jackson County on Implementation of the Rogue Valley Integrated Community Wildfire Protection Plan and outreach projects

Source: Rogue River NHMP Steering Committee (2017)

Table PS-9 Shady Cove High Priority NHMP Actions

Priority Mitigation Actions	
Flood (FL)	
FL #1	Ensure continued compliance in the National Flood Insurance Program (NFIP) through enforcement of local floodplain management ordinances.
Severe Weather (SW, Windstorm and Winter Storm)	
SW #1	Encourage critical facilities to secure emergency power.
Wildfire (WF)	
WF #1	Promote public awareness campaigns for individual property owners living in the Wildland/Urban Interface (WUI).
WF #2	Partner with Jackson County on Implementation of Rogue Valley Integrated Community Wildfire Protection Plan and outreach projects

Source: Shady Cove NHMP Steering Committee (2017)

Table PS-10 Talent High Priority NHMP Actions

Priority Mitigation Actions	
Multi-Hazard (MH)	
MH #1	Pursue funding to replace existing water tank.
MH #2	Pursue funding for enhancement of city resources including emergency water supply system, critical infrastructure retrofitting, and emergency generators both traditional and solar.
MH #3	Identify and pursue funding and personnel to enhance communication efforts including radio equipment, HAM radio operation/ equipment, and community warning system.
MH #4	Develop and enhance current education programs aimed at mitigating natural hazards. Programs should focus on evacuations, disaster awareness, simulated training with partner agencies, and identifying vulnerable populations.
MH #5	Develop emergency fuel supply plan including supplying, management, rationing and identifying essential needs.
Flood (FL)	
FL #1	Review the City of Talent Flood Plan to ensure corrective and preventative measures for reducing flooding and flood damage are current.

Source: Talent NHMP Steering Committee (2017)

How will the NHMP be implemented?

Volume I, Section 5 of this NHMP details the formal process that will ensure that the Jackson County NHMP remains an active and relevant document. The NHMP will be implemented, maintained and updated by a designated convener. The Jackson County Emergency Manager is the designated convener (NHMP Convener) and is responsible for overseeing the review and implementation processes (see City Addenda for city conveners). The NHMP

maintenance process includes a schedule for monitoring and evaluating the NHMP quarterly and producing a NHMP revision every five years. This section also describes how the communities will integrate public participation throughout the NHMP maintenance process.

44 CFR 201.6(c)(3)(iii) – An action plan describing how the actions . . . will be prioritized, implemented and administered . . .

44 CFR 201.6(c)(4) – A plan maintenance process . . .

NHMP Adoption

Once the NHMP is locally reviewed and deemed complete the NHMP Convener (or their designee) submits it to the State Hazard Mitigation Officer at the Oregon Military Department – Office of Emergency Management (OEM). OEM reviews the NHMP and submits it to the Federal Emergency Management Agency (FEMA – Region X) for review. This review will address the federal criteria outlined in FEMA Interim Final

44 CFR 201.6(c)(5) – Documentation that the plan has been formally adopted by the governing body of the jurisdiction . . .

44 CFR 201.6(d) – Plan review [process] . . .

Rule 44 CFR Part 201.6. Once the NHMP is pre-approved by FEMA, the County and cities formally adopt the NHMP via resolution. The Jackson County NHMP Convener will be responsible for ensuring local adoption of the NHMP and providing the support necessary to ensure NHMP implementation. Once the resolution is executed at the local level and documentation is provided to FEMA, the NHMP is formally acknowledged by FEMA and the County (and participating cities) will maintain eligibility for the Pre-Disaster Mitigation Grant Program, the Hazard Mitigation Grant Program funds and the Flood Mitigation Assistance program funds.

The accomplishment of the NHMP goals and actions depends upon regular Steering Committee participation and adequate support from County and City leadership. Thorough familiarity with this NHMP will result in the efficient and effective implementation of appropriate mitigation activities and a reduction in the risk and the potential for loss from future natural hazard events.

The Steering Committees for Jackson County and participating cities each met to review the NHMP update process and their governing bodies adopted the NHMP as shown below:

Jackson County adopted the NHMP on [DATE], 2018

The City of **Ashland** adopted their addendum to the NHMP on [DATE], 2018...

The Town of **Butte Falls** adopted their addendum to the NHMP on [DATE], 2018...

The City of **Eagle Point** adopted their addendum to the NHMP on [DATE], 2018...

The City of **Jacksonville** adopted their addendum to the NHMP on [DATE], 2018...

The City of **Phoenix** adopted their addendum to the NHMP on [DATE], 2018...

The City of **Rogue River** adopted their addendum to the NHMP on [DATE], 2018...

The City of **Shady Cove** adopted their addendum to the NHMP on [DATE], 2018...

The City of **Talent** adopted their addendum to the NHMP on [DATE], 2018...

FEMA Region X approved the Jackson County NHMP on [DATE], 2018. With approval of this NHMP, the entities listed above are now eligible to apply for the Robert T. Stafford Disaster Relief and Emergency Assistance Act's hazard mitigation project grants through [DATE], 2023.

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**Volume I:
Basic Plan**

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SECTION I: INTRODUCTION

This section provides a general introduction to natural hazard mitigation planning in Jackson County. In addition, it addresses the planning process requirements contained in 44 CFR 201.6(b) thereby meeting the planning process documentation requirement contained in 44 CFR 201.6(c)(1). The section concludes with a general description of how the NHMP is organized.

What is Natural Hazard Mitigation?

The Federal Emergency Management Agency (FEMA) defines mitigation as “. . . the effort to reduce loss of life and property by lessening the impact of disasters . . . through risk analysis, which results in information that provides a foundation for mitigation activities that reduce risk.”¹ Said another way, natural hazard mitigation is a method of permanently reducing or alleviating the losses of life, property and injuries resulting from natural hazards through long and short-term strategies. Example strategies include policy changes, such as updated ordinances, projects, seismic retrofits to critical facilities and education and outreach to targeted audiences, such as Spanish speaking residents or the elderly. Natural hazard mitigation is the responsibility of the “Whole Community”; individuals, private businesses and industries, state and local governments and the federal government.

Engaging in mitigation activities provides jurisdictions (counties, cities, special districts, etc.) with many benefits, including reduced loss of life, property, essential services, critical facilities and economic hardship; reduced short-term and long-term recovery and reconstruction costs; increased cooperation and communication within the community through the planning process; and increased potential for state and federal funding for recovery and reconstruction projects.

Why Develop a Mitigation Plan?

Jackson County updated this Multi-Jurisdictional Natural Hazard Mitigation Plan (MNHMP, NHMP) in an effort to reduce future loss of life and damage to property resulting from natural hazards. It is impossible to predict exactly when natural hazard events will occur, or the extent to which they will affect community assets. However, with careful planning and collaboration among public agencies, private sector organizations and citizens within the community, it is possible to minimize the losses that can result from natural hazards.

In addition to establishing a comprehensive community-level mitigation strategy, the Disaster Mitigation Act of 2000 (DMA2K) and the regulations contained in 44 CFR 201, require that jurisdictions maintain an approved NHMP in order to receive federal funds for mitigation projects. Local and federal approval of this NHMP ensures that the County and listed cities will remain eligible for pre- and post-disaster mitigation project grants.

¹ FEMA, *What is Mitigation?* <http://www.fema.gov/what-mitigation>

What Federal Requirements Does This NHMP Address?

DMA2K is the latest federal legislation addressing mitigation planning. It reinforces the importance of mitigation planning and emphasizes planning for natural hazards before they occur. As such, this Act established the Pre-Disaster Mitigation (PDM) grant program and new requirements for the national post-disaster Hazard Mitigation Grant Program (HMGP). Section 322 of the Act specifically addresses mitigation planning at the state and local levels. State and local jurisdictions must have approved mitigation plans in place in order to qualify to receive post-disaster HMGP funds. Mitigation plans must demonstrate that State and local jurisdictions' proposed mitigation measures are based on a sound planning process that accounts for the risk to the individual and State and local jurisdictions' capabilities.

Chapter 44 Code of Federal Regulations (CFR), section 201.6, also requires a local government to have an approved mitigation plan in order to receive HMGP project grants.² Pursuant of Chapter 44 CFR, the Natural Hazard Mitigation Plan planning processes shall include opportunity for the public to comment on the NHMP during review and the updated NHMP shall include documentation of the public planning process used to develop the NHMP.³ The Natural Hazard Mitigation Plan update must also contain a risk assessment, mitigation strategy and a NHMP maintenance process that has been formally adopted by the governing body of the jurisdiction.⁴ Lastly, the Natural Hazard Mitigation Plan must be submitted to Oregon Military Department – Office of Emergency Management (OEM) for initial review and then sent to FEMA for federal approval.⁵ Additionally, a recent change in the way OEM administers the Emergency Management Performance Grant (EMPG), which helps fund local emergency management programs, also requires a FEMA-approved NHMP.

What is the Policy Framework for Natural Hazards Planning in Oregon?

Planning for natural hazards is an integral element of Oregon's statewide land use planning program, which began in 1973. All Oregon cities and counties have comprehensive plans (Comprehensive Plans) and implementing ordinances that are required to comply with the statewide planning goals. The challenge faced by state and local governments is to keep this network of local plans coordinated in response to the changing conditions and needs of Oregon communities.

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. Goal 7, along with other land use planning goals, has helped to reduce losses from natural hazards. Through risk identification and the recommendation of risk-reduction actions, this NHMP aligns with the goals of the jurisdiction's Comprehensive Plan and helps each jurisdiction meet the requirements of statewide land use planning Goal 7.

The primary responsibility for the development and implementation of risk reduction strategies and policies lies with local jurisdictions. However, additional resources exist at the state and federal levels. Some of the key agencies in this area include Oregon Military

² Code of Federal Regulations, Chapter 44. Section 201.6, subsection (a), 2015

³ *ibid*, subsection (b). 2015

⁴ *ibid*, subsection (c). 2015

⁵ *ibid*, subsection (d). 2015

Department – Office of Emergency Management (OEM), Oregon Building Codes Division (BCD), Oregon Department of Forestry (ODF), Oregon Department of Geology and Mineral Industries (DOGAMI) and the Department of Land Conservation and Development (DLCD).

How was the NHMP Developed?

The NHMP was developed by the Jackson County Natural Hazard Mitigation Plan Steering Committee and the Steering Committees for the cities of Ashland, Butte Falls, Eagle Point, Jacksonville, Phoenix, Rogue River, Shady Cove and Talent. *Note: The cities of Central Point and Medford have stand-alone NHMPs.* The Jackson County Steering Committee formally convened on several occasions to discuss and revise the NHMP. Each of the participating city Steering Committees met at least once formally. Steering Committee members contributed data and maps, reviewed and updated the community profile, risk assessment, action items and implementation and maintenance plan.

An open public involvement process is essential to the development of an effective NHMP. In order to develop a comprehensive approach to reducing the effects of natural disasters, the planning process shall include opportunity for the public, neighboring communities, local and regional agencies, as well as, private and non-profit entities to comment on the NHMP during review.⁶ Jackson County provide a publicly accessible project website for the general public to provide feedback on the draft NHMP. In addition, Jackson County provided a press release on their website to encourage the public to offer feedback on the NHMP update. The County and city websites continue to be a focal point for distribution natural hazard information through the use of hazard viewers, emergency alerts, hazard preparation and annual natural hazard progress reports.

How is the NHMP Organized?

Each volume of the NHMP provides specific information and resources to assist readers in understanding the hazard-specific issues facing county and city residents, businesses and the environment. Combined, the sections work in synergy to create a mitigation plan that furthers the community's mission to reduce or eliminate long-term risk to people and their property from hazards and their effects. This NHMP structure enables stakeholders to use the section(s) of interest to them.

Volume I: Basic Plan

Plan Summary

The NHMP summary provides an overview of the FEMA requirements, planning process and highlights the key elements of the risk assessment, mitigation strategy and implementation and maintenance strategy.

⁶ Code of Federal Regulations, Chapter 44. Section 201.6, subsection (b). 2015

Section 1: Introduction

The Introduction briefly describes the countywide mitigation planning efforts and the methodology used to develop the NHMP.

Section 2: Community Profile

The community profile describes the County and participating cities from a number of perspectives in order to help define and understand the region's sensitivity and resilience to natural hazards. The information in this section represents a snapshot in time of the current sensitivity and resilience factors in the region when the plan was updated.

Section 3: Hazard Identification and Risk Assessment

This section provides the factual basis for the mitigation strategies contained in Volume I, Section 4. (Additional information is included within Volume I, Section 2, which contains an overall description of Jackson County and the 11 incorporated cities.) This section includes a brief description of community sensitivities and vulnerabilities. The Risk Assessment allows readers to gain an understanding of each jurisdiction's vulnerability and resilience to natural hazards.

A hazard summary is provided for each of the hazards addressed in the NHMP. The summary includes hazard history, location, extent, vulnerability, impacts and probability. This NHMP addresses the following hazards:

- Drought
- Earthquake
- Emerging Infectious Disease
- Flood
- Landslide
- Volcano
- Wildfire
- Windstorm
- Winter Storm

Additionally, this section provides information on each jurisdictions' participation in the National Flood Insurance Program (NFIP).

Section 4: Mitigation Strategy

This section documents the NHMP vision, mission, goals and actions (mitigation strategy) and also describes the components that guide implementation of the identified actions. Actions are based on community sensitivity and resilience factors and the risk assessments in Volume I, Section 3 and Volume III.

Section 5: Plan Implementation and Maintenance

This section provides information on the implementation and maintenance of the NHMP. It describes the process for prioritizing projects and includes a suggested list of tasks for updating the NHMP, to be completed at the semi-annual and five-year review meetings.

Volume II: Appendices

The appendices are designed to provide the users of the Jackson County NHMP with additional information to assist them in understanding the contents of the NHMP and provide them with potential resources to assist with NHMP implementation.

Appendix A: Glossary and Acronyms

This appendix includes a list of terms, and their acronyms, related to natural hazard mitigation that are found throughout this NHMP.

Appendix B: Planning and Public Process

This appendix includes documentation of all the countywide public processes utilized to develop the NHMP. It includes invitation lists, agendas, sign-in sheets and summaries of Steering Committee meetings as well as any other public involvement methods.

Appendix C: Hazard Analysis

This appendix includes the OEM Hazard Vulnerability Assessment that was updated with the development of this NHMP. The hazard analysis is a useful early step in planning for hazard mitigation, response and recovery. The information in this appendix was used to inform Volume I, Section 3.

Appendix D: Economic Analysis of Natural Hazard Mitigation Projects

This appendix describes the Federal Emergency Management Agency's (FEMA) requirements for benefit cost analysis in natural hazards mitigation, as well as various approaches for conducting economic analysis of proposed mitigation activities.

Appendix E: Grant Programs and Resources

This appendix lists state and federal resources and programs by hazard.

Appendix F: Community Survey

This appendix includes the survey instrument and results from the community survey implemented by OPDR.

Appendix G: City of Ashland Hazard Mitigation, Green Infrastructure, and Low Impact Development

The purpose of this pilot project was to identify opportunities to incorporate green infrastructure (GI) and low impact development (LID) best management practices (BMPs) into NHMP Action Items. The project resulted in two recommended NHMP action items for Ashland, OR. These action items use GI and LID best management practices (BMPs) to mitigate risk from natural hazards and to provide water quality, habitat, and community benefits.

Volume III: City Addenda

Volume III of this NHMP is reserved for any city and special district addenda developed in this multi-jurisdictional planning process. Eight of the cities within the County created an addendum. As such, the five-year update cycle will be the same for these eight cities and the County. The cities of Central Point and Medford have stand-alone NHMPs. Future updates to the MNHMP will seek to incorporate Central Point, Gold Hill and Medford.

Note: Special districts did not create addenda for this version of the NHMP, however, they may be included in future updates. See acknowledgements for a list of special districts that participated in the development of this NHMP.

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SECTION 2: COMMUNITY PROFILE

Community resilience can be defined as the community's ability to manage risk and adapt to natural hazard impacts. In order to help define and understand the County's sensitivity and resilience to natural hazards, the following capacities must be examined:

- **Natural Environment**
- **Socio-Demographic**
- **Economic**
- **Built Environment**
- **Community Connectivity**
- **Political**

The Community Profile describes the sensitivity and resilience to natural hazards of Jackson County, its incorporated cities and unincorporated areas, as they relate to each capacity. It provides a snapshot in time when the NHMP was developed and will assist in preparation for a more resilient county. The information in this section, along with the hazard assessments located in Volume I, Section 3 and Volume II, Appendix C should be used as the local level rationale for the risk reduction actions identified in Volume I, Section 4.

Natural Environment Capacity

Natural environment capacity is recognized as the geography, climate and land cover of the area such as, urban, water and forested lands that maintain clean water, air and a stable climate.¹ Natural resources such as wetlands and forested hill slopes play significant roles in protecting communities and the environment from weather-related hazards, such as flooding and landslides. However, natural systems are often impacted or depleted by human activities adversely affecting community resilience.

Geography

Jackson County occupies the upper Rogue River Valley in southwestern Oregon, covering about 2,800 square miles. The area is rich in natural resources: forests, mountains, rivers and lakes dominate the landscape. Three major mountain ranges characterize Jackson County boundaries: the Klamath Mountains to the west and south, Western Cascades in the north and the High Cascades to the east with the Bear Creek Valley within the central lowlands. The Rogue River and its tributaries cut through each of these regions on its journey towards the Pacific Ocean. This river corridor through the mountains provides an avenue for westerly winds and Pacific Storms to travel into Jackson County with relative ease.

Slopes are generally steep and topsoil, unique to the Northwest in structure and chemistry, is susceptible to landslides, torrential flooding and sheet erosion. Those mountains subjected to extensive weathering, large-scale faulting, or consisting of softer parent rock

¹ Mayunga, J. 2007. Understanding and Applying the Concept of Community Disaster Resilience: A capital-based approach. Summer Academy for Social Vulnerability and Resilience Building.

have gentler slopes, in which earthflow (debris flow) and slump (creep) are common natural hazards.²

The Klamath Mountains encompass approximately 12,000 square miles and consist of several north-south-trending belts of rock that formed in an ocean setting (terrain) and subsequently collided with the North American crustal plate about 150 million years ago. The area is rugged with narrow canyons. Mt. Ashland, at 7,530 feet, is the county's second highest peak.

Cascade Mountains

The geologic story of the Cascades begins around 40 million years ago when the Pacific [Juan de Fuca] plate began moving beneath the North American crustal plate. Convergence of these crustal plates has slowed considerably, from an estimated 3 inches per year 35 million years ago to only ½ inch at present; less subduction means less volcanic activity.

The tallest point in Jackson County, Mt. McLoughlin, a young and dormant volcano, rises to 9,499 feet. It lies just within the county's eastern boundary in the High Cascades and although it is the tallest volcanic peak between Crater Lake and Mt. Shasta, it is dwarfed by their bulk. The entire northwest slope of the mountain is the catchment area for Big Butte Springs. These large-volume springs gush from the end of the lava flows and are the domestic water source for Medford and other towns in the Bear Creek Valley.³

Nearby volcanic neighbors include Mt. Bailey, Mt. Thielsen and the remnants of Mt. Mazama (Crater Lake) to the north. While dramatic eruptions have been absent during the last century, continued subduction and presence of numerous faults indicate that a significant seismic or volcanic event could occur at any time. Seismic activity can also trigger landslides and cause flashflood events due to breached dams, jeopardizing the safety of downstream communities.

Bear Creek Valley

This broad valley separates the older Klamath Mountains from the Cascade Range. Bear Creek, along with the Rogue River and other river valleys in the county, contain soft sediments over bedrock. Hazards include ponding, high ground water, flooding and stream bank erosion.⁴ Much of the development in Jackson County has occurred in the Bear Creek Valley and the I-5 corridor, which includes the cities of Ashland, Central Point, Medford, Phoenix and Talent.

Current and Projected Climate

Late October marks the beginning of the rainy season in Jackson County. Surrounding mountain ranges help moderate the area's annual rainfall, which averages 18 inches in the Medford area.⁵ This is in sharp contrast to the 37 to 50 inches normally seen in other parts of the Pacific Northwest. In most winters, there are one or two severe windstorms and in

² Beaulieu, John D. and Paul W. Hughes, Land Use Geology of Central Jackson County, Department of Geology and Mineral Industries, Oregon, (1977).

³ United States Geological Survey, Cascades Volcano Observatory, <http://vulcan.wr.usgs.gov/home.html>.

⁴ Ibid.

⁵ The Oregon Climate Service, George Taylor, State Climatologist "1971-2000 Climate of Jackson County." http://www.ocs.orst.edu/county_climate/Jackson_files/Jackson.html#table1

some years, accompanying heavy rains cause serious flooding. Summer precipitation is very low, increasing the risk of wildfire and requiring irrigation for crops.

Temperature

Climate models project that the annual average temperatures in Jackson County and the Rogue River Basin are likely to increase by 1 to 3°F by around 2040 and 4 to 8° F by around 2080. Summer temperatures may increase dramatically reaching 7 to 15° above baseline temperatures by 2080, while winter temperatures may increase 3 to 8°F.⁶

Precipitation and Snowpack

Total precipitation may remain similar to historic levels but it is increasingly likely to fall in the mid-winter months rather than in the spring, summer and fall. Rising temperatures will cause snow to turn to rain in lower elevations and decrease average January snowpack significantly; this corresponds with a decline in runoff and stream flows. Worst-case scenario as projected by climate models, is a reduction of snowpack by 75% by 2040.⁷

Table 2-1 Average Rainfall and Temperatures

Ecoregion	Ecoregion ID	Mean Annual Rainfall Range (Inches)	Range (°F) January min/max	Mean Temperature Range (°F) July min/max
Cascades				
Western Cascades Montane Highlands	4b	70-120	26/37	44/75
Cascades Subalpine/Alpine	4d	75-140	16/31	38/65
High Southern Cascades Montane Forest	4e	45-70	23/37	44/74
Southern Cascades	4f	45-80	30/45	49/85
Klamath Mountains				
Rogue/Illinois Valleys	78a	20-60	31/47	51/89
Oak Savanna Foothills	78b	25-45	28/45	50/87
Serpentine Siskiyou	78d	45-120	32/44	49/82
Inland Siskiyou	78e	35-70	29/44	50/86
Klamath River Ridges	78g	25-35	24/42	49/88
Eastern Cascades Slopes and Foothills				
Southern Cascades Slope	9i	25-40	20/34	47/82

Source: US EPA. Ecoregions of Oregon Klamath Mountains

Hazard Severity

The dynamic geography, climate and land cover across Jackson County are significant indicators of hazard vulnerability when combined with projected climate change and severe weather-related events. The Rogue River Basin is likely to experience more severe storm events, variable weather, higher and flashier winter and spring runoff events and increased flooding. Both wet and dry cycles are likely to last longer and be more extreme, leading to periods of deeper drought and more extensive flooding. The reduced snowpack and subsequently lower soil moisture with hotter temperatures will likely increase the amount of vegetation consumed by wildfire.⁸

⁶ Doppelt, B., R. Hamilton, C. Deacon Williams & M. Koopman. 2008. Preparing for Climate Change in the Rogue River Basin of Southwest Oregon. In Stressors, Risks and Recommendations for Increasing Resilience and Resistance in Human, Built, Economic and Natural Systems. Climate Leadership Initiative Institute for a Sustainable Environment, National Center for Conservation Science and Policy, MAPSS Team at the U.S. Forest Service: Pacific Northwest Research Station.

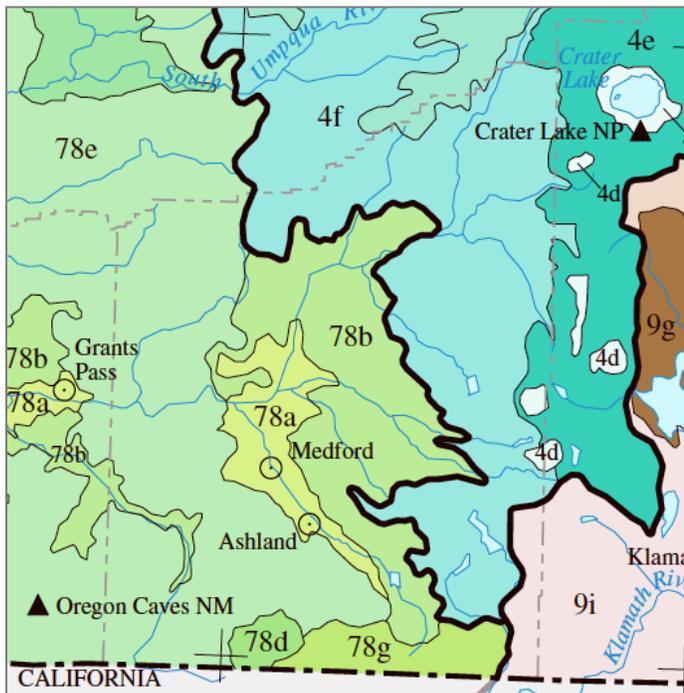
⁷ Ibid.

⁸ Ibid.

Land Cover

Due to the topography and climate described above, land is used most intensively by people in the Bear Creek, middle Rogue and to a lesser extent, the Applegate Valleys. Development has followed the land use patterns of the early settlers; farmers located on the rich valley floors and miners and woodsmen claimed the foothill areas.⁹ Agriculture, rural, suburban, urban, industrial and rural service center land uses are concentrated in these fertile valleys, whereas forest and open space and pockets of agriculture occur in surrounding mountainous regions of the county. Consequently, intense valley development is subject to increased risk from associated flood hazards. Forested mountains and steep slopes surrounding these valleys pose a significant risk to the entire region from wildfire and landslide events.

Figure 2-1 Ecoregions of Jackson County



Source: Thorson, Thor D. "Ecoregions of Oregon." Map. Ecoregions of Oregon. Reston, VA: U.S. Dept. of the Interior, U.S. Geological Survey, 2004. 1-2. Print. Note: For more information on the Ecoregion ID (e.g., 78a, 4f, etc.) see Table 2-1.

Synthesis

The physical geography, weather, climate and land cover of an area represent various interrelated systems that affect overall risk and exposure to natural hazards. The projected climate change models representing Southern Oregon indicate the potential for increased effects of hazards due to the unique terrain and climate of the region. These factors combined with a growing population and development intensification can lead to increasing risk of hazards, threatening loss of life, property and long-term economic disruption if land management is inadequate.

⁹ Jackson County Comprehensive Plan. 1989. Section 5-1.

Social/Demographic Capacity

Social/demographic capacity is a significant indicator of community hazard resilience. The characteristics and qualities of the community population such as language, race and ethnicity, age, income, educational attainment and health are significant factors that can influence the community's ability to cope, adapt to and recover from natural disasters. Population vulnerabilities can be reduced or eliminated with proper outreach and community mitigation planning.

Population

Approximately two-thirds of Jackson County's population is located within incorporated cities. Medford accounts for about 37% of the county's population, followed by Ashland (10%) and Central Point (8%). About one-third of the population is in unincorporated areas of the county (including Prospect and White City). Between 2012 and 2016, Jackson County experienced a 4.5% increase in population.

Table 2-2 Population Estimates for Jackson County and Incorporated Cities

Jurisdiction	2012		2016		Change (2012-2016)		AAGR
	Number	Percent	Number	Percent	Number	Percent	
Jackson County	204,630	100%	213,765	100%	9,135	4.5%	1.1%
Incorporated	141,905	69.3%	146,170	68.4%	4,265	3.0%	0.8%
Ashland	20,325	9.9%	20,620	9.6%	295	1.5%	0.4%
Butte Falls	425	0.2%	430	0.2%	5	1.2%	0.3%
Central Point	17,275	8.4%	17,585	8.2%	310	1.8%	0.4%
Eagle Point	8,550	4.2%	8,765	4.1%	215	2.5%	0.6%
Gold Hill	1,220	0.6%	1,220	0.6%	0	0.0%	0.0%
Jacksonville	2,815	1.4%	2,920	1.4%	105	3.7%	0.9%
Medford	75,545	36.9%	78,500	36.7%	2,955	3.9%	1.0%
Phoenix	4,570	2.2%	4,585	2.1%	15	0.3%	0.1%
Rogue River	2,145	1.0%	2,200	1.0%	55	2.6%	0.6%
Shady Cove	2,920	1.4%	3,040	1.4%	120	4.1%	1.0%
Talent	6,115	3.0%	6,305	2.9%	190	3.1%	0.8%
Unincorporated	62,725	30.7%	67,595	31.6%	4,870	7.8%	1.9%

Source: Portland State University, Population Research Center, "Annual Population Estimates", 2016; and, Portland State University, Population Research Center, Oregon Population Forecast Program, "Jackson Final Forecasts 201506"

The county's coordinated population forecast projects that, by 2035, Jackson County's population will increase to 255,840, a 20% increase from the 2016 estimate (30% of the increase is expected to be within incorporated cities).¹⁰

¹⁰ Portland State University, Population Research Center, "Oregon Population Forecast Program – Region 1", 2017.

Table 2-3 Population Forecast for Jackson County and Incorporated Cities

	2035 Population		Change (2016-2035)		AAGR
	Number	Percent	Number	Percent	
Jackson County	255,840	100%	42,075	19.7%	1.0%
Incorporated	190,735	74.6%	44,565	30.5%	1.6%
Ashland UGB	23,183	9.1%	2,563	12.4%	0.7%
Butte Falls Town UGB	437	0.2%	7	1.6%	0.1%
Central Point UGB	22,680	8.9%	5,095	29.0%	1.5%
Eagle Point UGB	14,839	5.8%	6,074	69.3%	3.6%
Gold Hill UGB	1,496	0.6%	276	22.6%	1.2%
Jacksonville UGB	4,316	1.7%	1,396	47.8%	2.5%
Medford UGB	99,835	39.0%	21,335	27.2%	1.4%
Phoenix UGB	6,883	2.7%	2,298	50.1%	2.6%
Rogue River UGB	3,705	1.4%	1,505	68.4%	3.6%
Shady Cove UGB	4,343	1.7%	1,303	42.9%	2.3%
Talent UGB	9,020	3.5%	2,715	43.1%	2.3%
Outside UGBs	65,104	25.4%	-2,491	-3.7%	-0.2%

Source: Portland State University, Population Research Center, "Annual Population Estimates", 2016; and, Portland State University, Population Research Center, Oregon Population Forecast Program, "Jackson Final Forecasts 201506"

Population size itself is not an indicator of vulnerability. More important is the location, composition and capacity of the population within the community. Research by social scientists demonstrates that human capital indices such as language, race, age, income, education and health can affect the integrity of a community. Therefore, these human capitals can impact community resilience to natural hazards.

Tourists

Tourists are not counted in population statistics; and are therefore considered separately in this analysis. The table below shows the estimated number of person nights in private homes, hotels and motels and other types of accommodations. The table shows that, between 2014-2016, approximately half of all visitors to Jackson County lodged in private homes, with about one-third staying in hotels/motels and the remaining visitors staying on other accommodations (vacation homes/campgrounds). For hazard preparedness and mitigation purposes, outreach to residents in Jackson County will likely be transferred to these visitors in some capacity. Visitors staying at hotel/motels are less likely to benefit from local preparedness outreach efforts aimed at residents.

Table 2-4 Annual Visitor Estimates in Person Nights

	2014		2015		2016p	
	Person-Nights (1,000's)	Percent	Person-Nights (1,000's)	Percent	Person-Nights (1,000's)	Percent
All Overnight	5,159	100%	5,287	100%	5,422	100%
Hotel/Motel	1,653	32.0%	1,713	32.4%	1,790	33.0%
Private Home	2,698	52.3%	2,750	52.0%	2,794	51.5%
Other	808	15.7%	824	15.6%	838	15.5%

Source: Oregon Tourism Commission, Oregon Travel Impacts: 1992-2016p, Dean Runyan Associates

Tourists are specifically vulnerable due to the difficulty of locating or accounting for travelers within the region. Tourists are often at greater risk during a natural disaster because of unfamiliarity with evacuation routes, communication outlets, or even the type of hazard that may occur. Knowing whether the region’s visitors are staying in friends/relatives homes in hotels/motels, or elsewhere can be useful when developing outreach efforts.¹¹

Language

Special consideration should be given to populations who do not speak English as their primary language. Language barriers can be a challenge when disseminating hazard planning and mitigation resources to the general public and it is less likely they will be prepared if special attention is not given to language and culturally appropriate outreach techniques.

There are various languages spoken across Jackson County; the primary language is English. However, 4% (6,991 people) of the total population in Jackson County is not proficient in English. Medford (3,775 people, 5%) has the largest population of residents who have limited or no English proficiency while Talent has the largest percentage (6%, 340 people).

Table 2-5 Jackson County Language Barriers

	Population 5 years and over	English Only		Multiple Languages		Limited or No English	
		Number	Percent	Number	Percent	Number	Percent
Jackson County	196,398	177,633	90%	18,765	10%	6,991	4%
Ashland	19,916	18,554	93%	1,362	7%	267	1%
Butte Falls	371	368	99%	3	1%	2	1%
Central Point	16,467	15,355	93%	1,112	7%	267	2%
Eagle Point	8,036	7,942	99%	94	1%	0	0%
Gold Hill	1,123	1,110	99%	13	1%	2	< 1%
Jacksonville	2,778	2,576	93%	202	7%	11	< 1%
Medford	71,988	63,420	88%	8,568	12%	3,775	5%
Phoenix	4,278	3,911	91%	367	9%	185	4%
Rogue River	2,223	2,070	93%	153	7%	0	0%
Shady Cove	2,636	2,499	95%	137	5%	27	1%
Talent	5,968	5,010	84%	958	16%	340	6%

Source: U.S. Census Bureau, 2011-2015 American Community Survey Estimates, Table S1601

Outreach materials used to communicate with, plan for and respond to non-English speaking populations and those who do not speak English very well, should take into consideration the language needs of these populations.

Race

The impact in terms of loss and the ability to recover may also vary among minority population groups following a disaster. Studies have shown that racial and ethnic minorities can be more vulnerable to natural disaster events. This is not reflective of individual characteristics; instead, historic patterns of inequality along racial or ethnic divides have often resulted in minority communities that are more likely to have inferior building stock,

¹¹ MDC Consultants (n.d.). When Disaster Strikes – Promising Practices.

degraded infrastructure, or less access to public services. The table below describes Jackson County’s population by race and ethnicity.

The majority of the population in Jackson County is racially white (92%); Rogue River has the largest percentage of non-white population (12%), followed closely by Eagle Point and Phoenix. Approximately 12% of the county population is Hispanic or Latino; with the largest Hispanic or Latino populations located in Medford (10,846 people, 14% of population) and Central Point (1,899 people, 11% of population).

Table 2-6 Race and Hispanic or Latino Origin

Race	Jackson County			Central		
	Jackson County	Ashland	Butte Falls	Point	Eagle Point	Gold Hill
Total Population	208,363	20,556	391	17,604	8,701	1,194
White	92%	91%	91%	93%	89%	97%
Black	1%	2%	0%	< 1%	0%	< 1%
AIAN	1%	< 1%	< 1%	1%	< 1%	1%
Asian	1%	2%	0%	< 1%	1%	< 1%
NHPI	0%	0%	0%	< 1%	0%	0%
Some Other Race	1%	1%	< 1%	1%	1%	0%
Two or More Races	4%	4%	8%	4%	9%	2%
Hispanic or Latino	24,496	860	3	1,899	578	24
Percent	12%	4%	1%	11%	7%	2%

Race	Jacksonville	Medford	Phoenix	Rogue River	Shady Cove	Talent
	Total Population	2,827	77,579	4,500	2,442	2,960
White	95%	91%	89%	88%	94%	92%
Black	1%	1%	0%	< 1%	2%	1%
AIAN	0%	1%	1%	2%	1%	2%
Asian	2%	1%	2%	2%	0%	1%
NHPI	0%	1%	< 1%	1%	0%	0%
Some Other Race	0%	2%	1%	2%	< 1%	< 1%
Two or More Races	2%	4%	8%	5%	3%	3%
Hispanic or Latino	16	10,846	467	252	147	771
Percent	1%	14%	10%	10%	5%	12%

Source: Social Explorer, Table T12, U.S. Census Bureau, 2011-2015 American Community Survey Estimates
 AIAN = American Indian and Alaskan Native, NHPI = Native Hawaiian and Other Pacific Islanders.

It is important to identify specific ways to support all portions of the community through hazard mitigation, preparedness and response. For example, connecting to historically disenfranchised populations through already trusted sources or providing preparedness handouts and presentations in the languages spoken by the population will go a long way to increase overall community resilience.

Gender

Jackson County is evenly split between females and males (Male: 50%, Female 50%). It is important to recognize that women tend to have more institutionalized obstacles than men during recovery due to sector-specific employment, lower wages and family care responsibilities.¹²

¹² Social Explorer, Table 4, U.S. Census Bureau, 2011-2015 American Community Survey Estimates

Age

Of the factors influencing socio demographic capacity, the most significant indicator in Jackson County may be age of the population. Depicted in the table below, as of 2015, 19% of the county population is over the age of 64, a percentage that is projected to rise to 27% by 2035. The county age dependency ratio¹³ is 58.7 (Jacksonville has the largest age dependency ration at 104.1 due to a large number of older people). The age dependency ratio indicates a higher percentage of dependent aged people to that of working age. The Oregon Office of Economic Analysis projects that, in 2035, there will be a higher percentage of the county population over the age of 64. As the population ages, the County may need to consider different mitigation and preparedness actions to address the specific needs of this group. The age dependency ratio for the county is expected to rise to 74.9 in 2035, largely because of the rise in the older age cohorts.

Table 2-7 Population by Vulnerable Age Groups

2015		< 15 Years Old		> 64 Years Old		15 to 64 Years Old	Age Dependency Ratio
Jurisdiction	Total	Number	Percent	Number	Percent		
Oregon	3,939,233	712,967	18%	606,877	15%	2,619,389	50.4
Jackson County	208,363	36,457	18%	40,589	19%	131,317	58.7
Ashland	20,556	2,670	13%	4,180	20%	13,706	50.0
Butte Falls	391	58	15%	60	15%	273	43.2
Central Point	17,604	3,953	23%	3,053	17%	10,598	66.1
Eagle Point	8,701	1,913	22%	1,244	14%	5,544	56.9
Gold Hill	1,194	230	19%	192	16%	772	54.7
Jacksonville	2,827	205	7%	1,237	44%	1,385	104.1
Medford	77,579	15,644	20%	12,807	17%	49,128	57.9
Phoenix	4,500	557	12%	1,251	28%	2,692	67.2
Rogue River	2,442	426	18%	661	27%	1,355	80.2
Shady Cove	2,960	488	17%	800	27%	1,672	77.0
Talent	6,244	1,227	20%	1,098	18%	3,919	59.3
2035							
Oregon	4,995,200	865,889	17%	1,082,781	22%	3,046,530	64.0
Jackson County	265,624	42,722	16%	71,069	27%	151,833	74.9

Source: Social Explorer, Table 17, U.S. Census Bureau, 2011-2015 American Community Survey Estimates, Office of Economic Analysis, Long-Term County Population Forecast, 2010-2050 (2013 release).

The age profile of an area has a direct impact both on what actions are prioritized for mitigation and how response to hazard incidents is carried out. School age children rarely make decisions about emergency preparedness. Therefore, a larger youth population in an area will increase the importance of outreach to schools and parents on effective ways to teach children about fire safety, earthquake response and evacuation plans. Furthermore, children are more vulnerable to the heat and cold, have few transportation options and require assistance to access medical facilities. Older populations may also have special needs prior to, during and after a natural disaster. Older populations may require assistance

¹³ The age dependency ratio is derived by dividing the combined under 15 and 65-and-over populations by the 15-to-64 population and multiplying by 100. A number close to 50 indicates about twice as many people are of working age than non-working age. A number that is closer to 100 implies an equal number of working age population as non-working age population. A higher number indicates greater sensitivity.

in evacuation due to limited mobility or health issues. Additionally, older populations may require special medical equipment or medications and can lack the social and economic resources needed for post-disaster recovery.¹⁴

Families and Living Arrangements

Two ways the census defines households are by type of living arrangement and family structure. A householder may live in a “family household” (a group related to one another by birth, marriage or adoption living together); in a “nonfamily household” (a group of unrelated people living together); or alone. Jackson County is predominately comprised of family households (64%). Of all households, 29% are one-person non-family households (householder living alone). Rogue River (513, 44%) has the highest percentage of householders living alone.

Table 2-8 Family vs. Non-Family Households

Jurisdiction	Total Households	Family Households		Nonfamily Households		Householder Living Alone	
	Estimate	Estimate	Percent	Estimate	Percent	Estimate	Percent
Jackson County	83,487	53,375	64%	30,112	36%	24,128	29%
Ashland	9,446	4,654	49%	4,792	51%	3,797	40%
Butte Falls	151	71	47%	80	53%	54	36%
Central Point	6,565	4,668	71%	1,897	29%	1,576	24%
Eagle Point	3,171	2,067	65%	1,104	35%	859	27%
Gold Hill	477	326	68%	151	32%	118	25%
Jacksonville	1,539	926	60%	613	40%	594	39%
Medford	29,751	18,967	64%	10,784	36%	8,420	28%
Phoenix	2,176	1,016	47%	1,160	53%	901	41%
Rogue River	1,171	627	54%	544	46%	513	44%
Shady Cove	1,377	954	69%	423	31%	317	23%
Talent	2,705	1,534	57%	1,171	43%	939	35%

Source: U.S. Census Bureau, 2011-2015 American Community Survey Estimates, Table S2501

Income

Household income and poverty status are indicators of socio demographic capacity and the stability of the local economy. Household income can be used to compare economic areas, but does not reflect how the income is divided among the area residents. Between 2012 and 2015 the share of households making less than \$15,000 increased more than other income cohorts; no other income cohort saw a gain of 1% or more.

¹⁴ Wood, Nathan. Variations in City Exposure and Sensitivity to Tsunami Hazards in Oregon. U.S. Geological Survey, Reston, VA, 2007.

Table 2-9 Household Income

Household Income	2012 [^]		2015		Change in Share	
	Households	Percent	Households	Percent	Households	Percent
Less than \$15,000	11,480	14%	12,485	15%	1,005	1%
\$15,000-\$29,999	15,946	19%	15,648	19%	-298	< -1%
\$30,000-\$44,999	14,078	17%	14,455	17%	377	< 1%
\$45,000-\$59,999	10,405	13%	10,577	13%	172	< 1%
\$60,000-\$74,999	9,076	11%	9,085	11%	9	< 1%
\$75,000-\$99,999	9,888	12%	9,027	11%	-861	-1%
\$100,000-\$199,999	10,297	12%	10,374	12%	77	0%
\$200,000 or more	2,202	3%	1,836	2%	-366	< -1%

Source: Social Explorer, Table 56, U.S. Census Bureau, 2011-2015 American Community Survey and 2008-2012 American Community Survey

[^] 2012 dollars are adjusted for 2015 using the Social Explorers Inflation Calculator.

The 2015 median household income across Jackson County is \$44,028; this is lower than the inflation adjusted 2012 figure, representing a 2% decline in real incomes. Eagle Point and Central Point have the highest median household incomes, while Rogue River and Butte Falls have the lowest median household incomes. The table below shows decreases in real incomes across Jackson County and cities, except for Ashland and Jacksonville which both gained in real median income.

Table 2-10 Median Household Income

	Median Household Income		Percent Change
	2012 [^]	2015	
Jackson County	\$45,088	\$44,028	-2%
Ashland	\$44,718	\$45,704	2%
Butte Falls	\$40,548	\$29,375	-28%
Central Point	\$49,420	\$48,984	-1%
Eagle Point	\$57,322	\$55,474	-3%
Gold Hill	\$38,594	\$39,688	3%
Jacksonville	\$42,383	\$46,901	11%
Medford	\$43,622	\$41,931	-4%
Phoenix	\$32,287	\$32,035	-1%
Rogue River	\$33,484	\$26,753	-20%
Shady Cove	\$36,859	\$31,058	-16%
Talent	\$34,036	\$36,528	7%

Source: Social Explorer, Table 57, U.S. Census Bureau, 2011-2015 American Community Survey Estimates and 2008-2012 American Community Survey Estimates

Note: [^] - 2012 dollars adjusted for 2015 via Social Explorer's Inflation Calculator

The table below identifies the percentage of individuals and cohort groups that are below the poverty level in 2015. It is estimated that about 19% of individuals, 27% of children under 18 and 8% of seniors live below the poverty level across the county. Butte Falls (34%) has the highest poverty rate. Overall, 8% of Jackson County residents live in “deep poverty”

(having incomes below half the federal poverty level), the percent is greatest in Butte Falls at 34%.¹⁵

Table 2-11 Poverty Rates

	Total Population in Poverty		Children Under 18 in Poverty		18 to 64 in Poverty		65 or over in Poverty	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Jackson County	39,122	19%	11,479	27%	24,273	20%	3,370	8%
Ashland	3,767	18%	749	23%	2,779	23%	239	6%
Butte Falls	146	34%	48	53%	89	38%	9	15%
Central Point	2027	12%	838	19%	1,047	11%	142	5%
Eagle Point	1891	22%	949	42%	867	17%	75	6%
Gold Hill	191	16%	59	21%	112	16%	20	10%
Jacksonville	121	4%	0	0%	73	6%	48	4%
Medford	17,596	23%	5,759	32%	10,686	23%	1,151	9%
Phoenix	1,160	25%	256	31%	829	34%	75	6%
Rogue River	616	28%	191	38%	325	26%	100	15%
Shady Cove	692	23%	92	19%	507	31%	93	12%
Talent	1283	20%	425	31%	755	20%	103	9%

Source: Social Explorer, Tables T114, T115, T116, U.S. Census Bureau, 2011-2015 American Community Survey Estimates.

Cutter’s research suggests that lack of wealth contributes to social vulnerability because individual and community resources are not as readily available. Affluent communities are more likely to have both the collective and individual capacity to rebound more quickly from a hazard event, while impoverished communities and individuals may not have this capacity –leading to increased vulnerability. Wealth can help those affected by hazard incidents to absorb the impacts of a disaster more easily. Conversely, poverty, at both an individual and community level, can drastically alter recovery time and quality.¹⁶

Federal assistance programs such as food stamps are another indicator of poverty or lack of resource access. Statewide social assistance programs like the Supplemental Nutritional Assistance Program (SNAP) and Temporary Assistance for Needy Families (TANF) aid individuals and families. In Jackson County, TANF reaches approximately 1,154 families per month and SNAP helps to feed about 16,036 people per month.¹⁷ Those reliant on state and federal assistance are more vulnerable in the wake of disaster because of a lack of personal financial resources and reliance on government support.

Education

Educational attainment of community residents is also identified as an influencing factor in socio-demographic capacity. Educational attainment often reflects higher income and therefore higher self-reliance. Widespread educational attainment is also beneficial for the

¹⁵ Social Explorer, Table 117, U.S. Census Bureau, 2011-2015 American Community Survey Estimates

¹⁶ Cutter, S. L. (2003). Social Vulnerability to Environmental Hazards. *Social Science Quarterly*.

¹⁷ Sabatino, J. (2016). Oregon TANF Caseload FLASH, “One and Two Parent Families Combined”, District 8 (Ashland and Medford); June 2017 data and Sabatino, J. (2016). Oregon SNAP Program Activity, “SSP, APD and AAA Combined”, District 3 (Ashland and Medford); June 2017 data. Retrieved from State of Oregon Office of Business Intelligence website: <http://www.oregon.gov/DHS/ASSISTANCE/Pages/Data.aspx>, June 21, 2017.

regional economy and employment sectors as there are potential employees for professional, service and manual labor workforces. An oversaturation of either highly educated residents or low educational attainment can have negative effects on the resiliency of the community.

According to the U.S. Census, 89% of the Jackson County population over 25 years of age has graduated from high school or received a high school equivalency, with 24% going on to earn a Bachelor's or higher degree. Ashland and Jacksonville (97%) have the highest percentage of high school graduates. Medford (14%) and Central Point (13%) have the highest percentage of people without a high school degree.

Table 2-12 Educational Attainment

	Jackson County	Ashland	Butte Falls	Central Point	Eagle Point	Gold Hill
Population 25 years and over	147,024	14,433	261	11,587	5,454	864
Less than high school	16,400	459	18	1,521	396	60
High school graduate or GED	40,327	1,912	95	3,349	1,819	305
Some college, no degree	41,472	2,972	110	3,477	2,060	258
Bachelor's degree	23,319	4,286	22	1,473	625	123
Graduate or professional degree	12,609	3,336	2	723	162	26
Percent without Highschool Degree	11%	3%	7%	13%	7%	7%
Percent High School Graduate or Higher	89%	97%	93%	87%	93%	93%
Percent Bachelor's Degree or Higher	24%	53%	9%	19%	14%	17%
	Jacksonville	Medford	Phoenix	Rogue River	Shady Cove	Talent
Population 25 years and over	2,442	52,263	3,459	1,741	2,353	4,246
Less than high school	82	7,112	377	207	280	409
High school graduate or GED	611	14,298	1,150	610	806	1,030
Some college, no degree	580	14,582	882	468	695	1,110
Bachelor's degree	620	8,270	505	112	305	833
Graduate or professional degree	415	3,544	274	98	109	420
Percent without Highschool Degree	3%	14%	11%	12%	12%	10%
Percent High School Graduate or Higher	97%	86%	89%	88%	88%	90%
Percent Bachelor's Degree or Higher	42%	23%	23%	12%	18%	30%

Source: U.S. Census Bureau, 2011-2015 American Community Survey Estimates, TableB15003

Health

Individual and community health play an integral role in community resiliency, as indicators such as health insurance, people with disabilities, dependencies, homelessness and crime rate, paint an overall picture of a community's well-being. These factors translate to a community's ability to prepare, respond to and cope with the impacts of a disaster.

The Resilience Capacity Index recognizes those who lack health insurance or are impaired with sensory, mental or physical disabilities, have higher vulnerability to hazards and will likely require additional community support and resources. Talent (18%) has the highest percentage of population in Jackson County without health insurance. The percentage of uninsured changes with age; the highest rates of uninsured are within the 18 to 64-year category. Talent also has the highest rate of this age group (18 to 64) that is uninsured (16%) while Medford (10,509) has the largest number. Rogue River (4%) has the highest percentage of individuals under 18 without health insurance, while Medford (911) and

Central Point (534) have the largest number. The ability to provide services to the uninsured populations may burden local providers following a natural disaster.

Table 2-13 Health Insurance Coverage

Jurisdiction	Population	Without Health Insurance							
		Total Population		Under 18 years		18 to 64 years		65+	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent
Jackson County	207,284	30,468	15%	3,506	2%	26,841	13%	121	<1%
Ashland	20,474	2,709	13%	264	1%	2,429	12%	16	<1%
Butte Falls	391	52	13%	1	0%	47	12%	4	1%
Central Point	17,585	1,186	7%	534	3%	652	4%	0	0%
Eagle Point	8,701	1,060	12%	73	1%	987	11%	0	0%
Gold Hill	1,194	115	10%	3	0%	112	9%	0	0%
Jacksonville	2,827	100	4%	0	0%	100	4%	0	0%
Medford	76,779	11,460	15%	911	1%	10,509	14%	40	<1%
Phoenix	4,500	430	10%	53	1%	377	8%	0	0%
Rogue River	2,442	372	15%	87	4%	285	12%	0	0%
Shady Cove	2,960	345	12%	34	1%	311	11%	0	0%
Talent	6,244	1,150	18%	122	2%	1,028	16%	0	0%

Source: U.S. Census Bureau, 2011-2015 American Community Survey Estimates, Table S2701.

The table below describes disability status of the population. As of 2015, 17% of the Jackson County non-institutionalized population identifies with one or more disabilities. Jacksonville shows a higher rate (19%) of individuals 65 and over with a disability than the entire county (7%).

Table 2-14 Disability Status

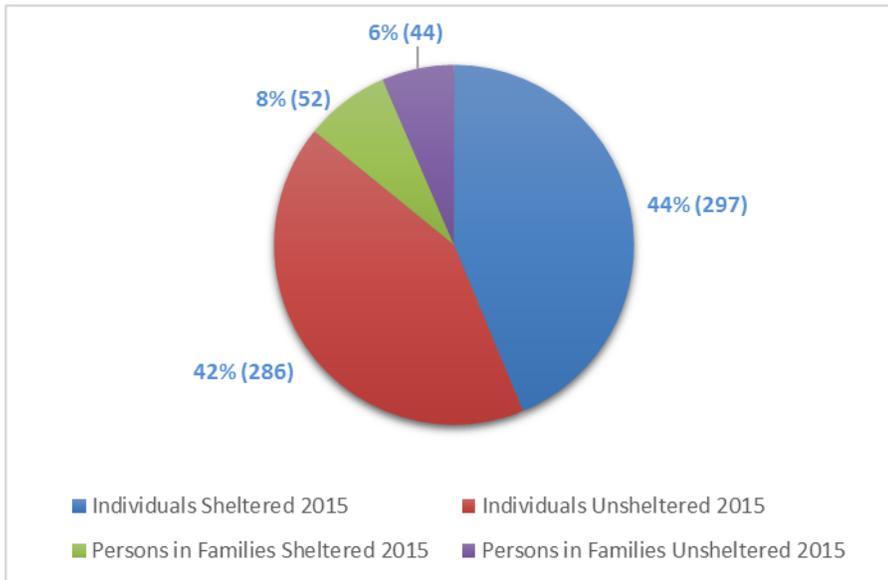
Jurisdiction	Total Population Estimate	With a disability		Under 18 years with a disability		65 years and over with a disability	
		Estimate	Percent	Estimate	Percent	Estimate	Percent
Jackson County	210,975	35,422	17%	2,424	1%	15,760	7%
Ashland	20,405	2,409	12%	20	0%	1,070	5%
Butte Falls	430	101	23%	4	1%	18	4%
Central Point	17,485	2,856	16%	271	2%	1,485	8%
Eagle Point	8,695	1,635	19%	102	1%	641	7%
Gold Hill	1,220	221	18%	11	1%	66	5%
Jacksonville	2,880	705	24%	57	2%	549	19%
Medford	77,655	12,943	17%	1,226	2%	5,219	7%
Phoenix	4,585	940	21%	66	1%	411	9%
Rogue River	2,175	525	24%	10	0%	227	10%
Shady Cove	3,025	692	23%	6	0%	364	12%
Talent	6,270	1,143	18%	20	0%	639	10%

Source: U.S. Census Bureau, 2011-2015 American Community Survey Estimates, Table DP02.

In 2015, Oregon Housing and Community Services (OHCS) conducted a point-in-time homeless count to identify the number of homeless, their age and their family type. The

OHCS study found that 679 individuals and persons in families in Jackson County identify as homeless; 349 were sheltered (52 in families), 330 were unsheltered (44 in families).

Figure 2-2 Jackson County PIT Homeless Count (2015)



Source: Oregon Housing and Community Services, 2015 Point-in-Time Homeless Count

The homeless have little resources to rely on, especially during an emergency. It will likely be the responsibility of the County and local non-profit entities to provide services such as shelter, food and medical assistance. Therefore, it is critical to foster collaborative relationships with agencies that will provide additional relief such as the American Red Cross and homeless shelters. It will also be important to identify how to communicate with these populations, since traditional means of communication may not be appropriate or available.

Synthesis

For planning purposes, it is essential Jackson County consider both immediate and long-term socio-demographic implications of hazard resilience. Immediate concerns include the growing elderly population, declining incomes and language barriers associated with a culturally diverse community. Even though the vast majority of the population is reported as proficient in English, there is still a segment of the population not proficient in English. These populations would serve to benefit from mitigation outreach, with special attention to cultural, visual and technology sensitive materials. The current status of other socio-demographic capacity indicators such as graduation rate, poverty level and median household income can have long-term impacts on the economy and stability of the community ultimately affecting future resilience.

Economic Capacity

Economic capacity refers to the financial resources present and revenue generated in the community to achieve a higher quality of life. Income equality, housing affordability, economic diversification, employment and industry are measures of economic capacity. However, economic resilience to natural disasters is far more complex than merely restoring employment or income in the local community. Building a resilient economy requires an understanding of how the component parts of employment sectors, workforce, resources and infrastructure are interconnected in the existing economic picture. Once any inherent strengths or systematic vulnerabilities become apparent, both the public and private sectors can act to increase the resilience of the local economy.

Regional Affordability

The evaluation of regional affordability supplements the identification of socio-demographic capacity indicators, i.e. median income and is a critical analysis tool to understanding the economic status of a community. This information can capture the likelihood of individuals' ability to prepare for hazards, through retrofitting homes or purchasing insurance. If the community reflects high-income inequality or housing cost burden, the potential for homeowners and renters to implement mitigation can be drastically reduced. Therefore, regional affordability is a mechanism for generalizing the abilities of community residents to get back on their feet without Federal, State or local assistance.

Income Equality

Income equality is a measure of the distribution of economic resources, as measured by income, across a population. It is a statistic defining the degree to which all persons have a similar income. The table below illustrates the county and city level of income inequality. The Gini index is a measure of income inequality. The index varies from zero to one. A value of one indicates perfect inequality (only one household has any income). A value of zero indicates perfect equality (all households have the same income).¹⁸

The cities within the county vary with the greatest income equality within the cities of Central Point and Gold Hill, while Butte Falls has the greatest income inequality. Based on social science research, the region's cohesive response to a hazard event may be affected by the distribution of wealth in communities that have less income equality.¹⁹

¹⁸University of California Berkeley. Building Resilient Regions, Resilience Capacity Index. <http://brr.berkeley.edu/rci/>.

¹⁹ Susan Cutter, Christopher G. Burton and Christopher T. Emrich. 2010. "Disaster Resilience Indicators for Benchmarking Baseline Conditions," *Journal of Homeland Security and Emergency Management* 7, no.1: 1-22

Table 2-15 Regional Income Equality

Jurisdiction	Income Inequality Coefficient
Jackson County	0.46
Ashland	0.49
Butte Falls	0.51
Central Point	0.37
Eagle Point	0.39
Gold Hill	0.37
Jacksonville	0.48
Medford	0.45
Phoenix	0.47
Rogue River	0.47
Shady Cove	0.42
Talent	0.44

Source: Social Explorer, Table 157, U.S. Census Bureau, 2011-2015 American Community Survey Estimates

Housing Affordability

Housing affordability is a measure of economic security gauged by the percentage of an area's households paying less than 30% of their income on housing.²⁰ Households spending more than 30% are considered housing cost burdened. The table below displays the percentage of homeowners and renters reflecting housing cost burden across the region.

Among homeowners without a mortgage, Rogue River (32%), Shady Cove (31%) and Talent (31%) have the highest housing cost burdens. Amongst homeowners with a mortgage, Shady Cove (65%), Jacksonville (63%), Rogue River (56%) and Talent (53%) have the highest housing cost burdens. Among renters, Shady Cove (79%) renters have the highest housing cost burdens. In general, the population that spends more of their income on housing has proportionally fewer resources and less flexibility for alternative investments in times of crisis.²¹ This disparity imposes challenges for a community recovering from a disaster as housing costs may exceed the ability of residents to repair or move to a new location. These populations may live paycheck to paycheck and are extremely dependent on their employer; in the event their employer is also impacted, it will further the detriment experienced by these individuals and families.

²⁰ University of California Berkeley. Building Resilient Regions, Resilience Capacity Index. <http://brr.berkeley.edu/rci/>.

²¹ Ibid.

Table 2-16 Households Spending > 30% of Income on Housing

Jurisdiction	Owners		Renters
	With Mortgage	Without Mortgage	
Jackson County	41%	19%	56%
Ashland	44%	15%	58%
Butte Falls	34%	19%	54%
Central Point	37%	22%	52%
Eagle Point	26%	25%	59%
Gold Hill	45%	18%	51%
Jacksonville	63%	24%	59%
Medford	41%	15%	59%
Phoenix	42%	21%	63%
Rogue River	56%	32%	52%
Shady Cove	65%	31%	79%
Talent	53%	31%	47%

Source: U.S. Census Bureau, 2011-2015 American Community Survey Estimates, Tables B25070 and B25091

Economic Diversity

Economic diversity is a general indicator of an area’s fitness for weathering difficult financial times. Business activity in the Southwestern Oregon region is fairly homogeneous and consists mostly of small businesses.

Economic diversity is a general indicator of an area’s fitness for weathering difficult financial times. One method for measuring economic diversity is through use of the Herfindahl Index, a formula that compares the composition of county and regional economies with those of states or the nation. Using the Herfindahl Index, a diversity ranking of 1 indicates the Oregon County with the most diverse economic activity compared to the state, while a ranking of 36 corresponds with the least diverse county economy. The table below describes the Herfindahl Index Scores for counties in the region.

Table 2-17 shows that Jackson County has an economic diversity rank of 8 (2013), this is on a scale between all 36 counties in the state where 1 is the most diverse economic county in Oregon and 36 is the least diverse.

Table 2-17 Regional Herfindahl Index Scores

County	2008			2013		
	Employment	Number of Industries	State Rank	Employment	Number of Industries	State Rank
Jackson	70,479	243	7	67,092	243	8
Douglas	28,888	207	13	26,933	199	14
Josephine	21,103	205	6	19,716	196	12
Klamath	18,345	191	15	16,826	190	15

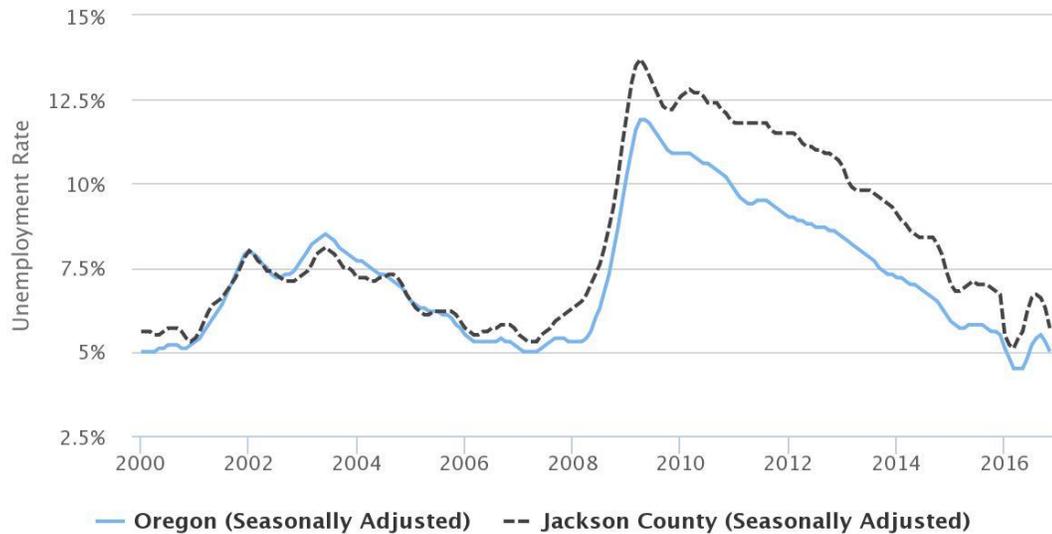
Source: Oregon Employment Department

While illustrative, economic diversity is not a guarantor of economic vitality or resilience. Jackson County, as of 2017, is listed as an economically distressed community as prescribed by Oregon Law. The economic distress measure is based on indicators of decreasing new jobs, average wages and income and is associated with an increase of unemployment.²²

Employment and Wages

According to the Oregon Employment Department, the unemployment rate in Jackson County has declined from 12.8% in 2009 to 5.8% in 2016 but remains higher than the rate for Oregon (4.9%).

Figure 2-3 Unemployment Rate



Source: Oregon Employment Department, “Local Area Employment Statistics”.

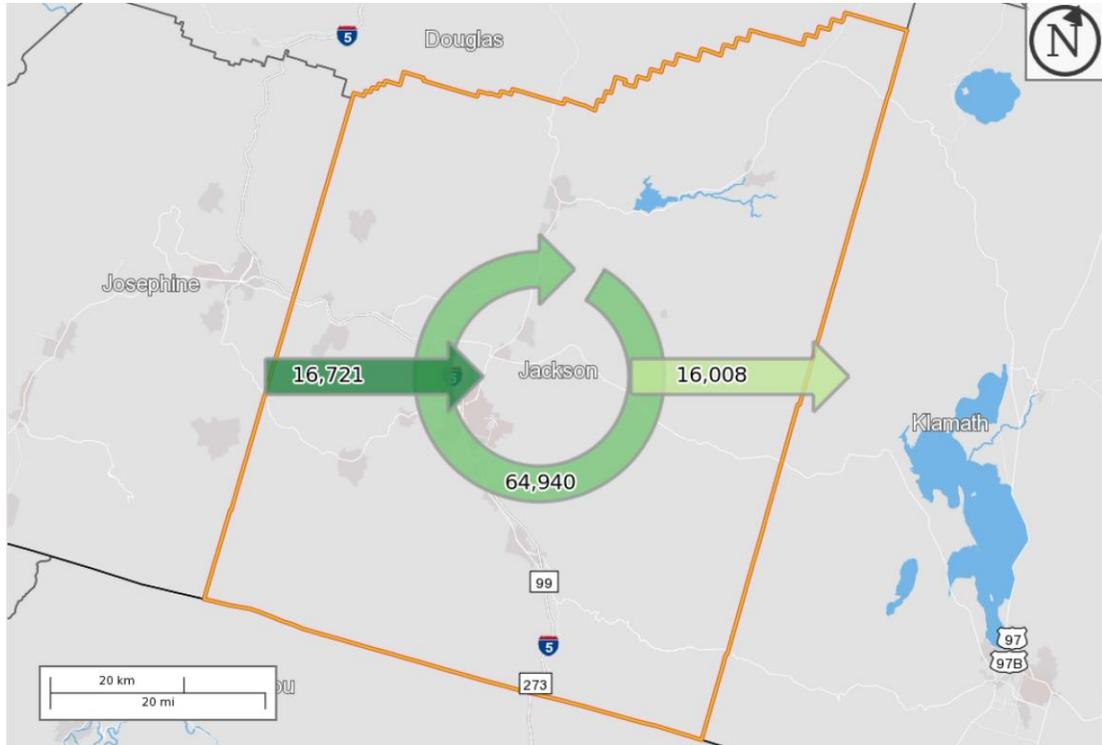
Table 2-18 displays the payroll and employee figures for Jackson County. As of 2016, there were 85,195 individuals employed in the county, with an average wage of \$40,311.

Labor Shed

The Jackson County economy is a cornerstone of regional economic vitality. Figure 2-4 shows the county’s labor shed; the map shows that about 80% of workers live and work in the county (64,940), 20% of workers come from outside the county (16,721) and about 20% of residents work outside of the county (16,008).

²² Business Oregon – Oregon Economic Data “Distressed Communities List”, <http://www.oregon4biz.com/Publications/Distressed-List/>

Figure 2-4 Jackson County Laborshed



Source: U.S. Bureau of the Census (2015), [On The Map](#), accessed October 12, 2017.

Mitigation activities are needed at the business level to ensure the health and safety of workers and limit damage to industrial infrastructure. Employees are highly mobile, commuting from all over the surrounding area to industrial and business centers. As daily transit rises, there is an increased risk that a natural hazard event will disrupt the travel plans of residents across the region and seriously hinder the ability of the economy to meet the needs of Jackson County residents and businesses.

Industry

Key industries are those that represent major employers and are significant revenue generators. Different industries face distinct vulnerabilities to natural hazards, as illustrated by the industry specific discussions below. Identifying key industries in the region enables communities to target mitigation activities towards those industry's specific sensitivities. It is important to recognize that the impact a natural hazard event has on one industry can reverberate throughout the regional economy.

This is of specific concern when the businesses belong to the basic sector industry. Basic sector industries are those that are dependent on sales outside of the local community; they bring money into a local community via employment. The farm and ranch, information and wholesale trade industries are all examples of basic industries. Non-basic sector industries are those that are dependent on local sales for their business, such as retail trade, construction and health services.

Employment by Industry

Economic resilience to natural disasters is particularly important for the major employment industries in the region. If these industries are negatively impacted by a natural hazard, such that employment is affected, the impact will be felt throughout the regional economy. Thus, understanding and addressing the sensitivities of these industries is a strategic way to increase the resiliency of the entire regional economy.

The table below identifies employment by industry. The top five industry sectors in Jackson County with the most employees, as of 2016, are Trade, Transportation & Utilities (22%, 19,125), Education and Health Services (18%, 14,926), Retail Trade (16%, 13,503), Leisure and Hospitality (13%, 10,774) and Manufacturing (9%, 7,676). While Jackson County has some basic industries, such as natural resources and mining and manufacturing; three out of their five largest employers are of the non-basic nature and thus they rely on local sales and services. Trending towards basic industries can lead to higher community resilience.

Table 2-18 Total Employment by Industry 2016, Expected Growth 2024

Employment Sector	2016				Percent Change in Employment (2010-2016)	Employment Forecast* (2014-2024)
	Firms	Employees	Percent Workforce	Average Wage		
Total Payroll Employment	7,112	85,195	100%	\$ 40,311	13%	9%
Total Private	6,892	73,859	87%	\$ 39,132	15%	10%
Natural Resources and Mining	186	2,413	3%	\$ 34,014	7%	8%
Construction	716	3,932	5%	\$ 44,467	41%	12%
Manufacturing	328	7,676	9%	\$ 46,389	27%	11%
Trade, Transportation & Utilities	1,291	19,125	22%	\$ 35,675	11%	6%
Wholesale Trade	340	2,452	3%	\$ 50,249	13%	6%
Retail Trade	764	13,503	16%	\$ 30,087	7%	6%
Information	122	1,252	1%	\$ 50,115	-25%	-9%
Financial Activities	643	3,253	4%	\$ 52,636	2%	4%
Professional and Business Services	964	6,872	8%	\$ 44,940	2%	12%
Education and Health Services	796	14,926	18%	\$ 50,640	20%	15%
Leisure and Hospitality	720	10,774	13%	\$ 18,695	23%	12%
Other Services	1,083	3,613	4%	\$ 26,003	28%	7%
Private Non-Classified	41	23	< 1%	\$ 40,644	109%	0%
Government	220	11,336	13%	\$ 47,991	-1%	2%
Federal	46	1,791	2%	\$ 66,132	1%	-1%
State	38	1,694	2%	\$ 39,312	-27%	0%
Local	136	7,851	9%	\$ 45,726	7%	3%

Source: Oregon Employment Department, "2010 and 2016 Covered Employment and Wages Summary Reports" and "Regional Employment Projections by Industry & Occupation 2014-2024". <http://www.qualityinfo.org>. Accessed June 2017.

*Based on 2024 projections for Jackson and Josephine Counties

High Revenue Sectors

In 2012, the three sectors with the highest revenue were Retail Trade, Manufacturing and Health Care and Social Assistance. The table below shows the revenue generated by each economic sector (Note: not all sectors are reported). All of the sectors combined generated more than \$8.6 billion in revenue for the county.

Jackson County relies on both basic and non-basic sector industries and it is important to consider the effects each may have on the economy following a disaster. Basic sector businesses have a multiplier effect on a local economy that can spur the creation of new jobs, some of which may be non-basic. The presence of basic sector jobs can help speed the

local recovery; however, if basic sector production is hampered by a natural hazard event, the multiplier effect could be experienced in reverse. In this case, a decrease in basic sector purchasing power results in lower profits and potential job losses for the non-basic businesses that are dependent on them.

Table 2-19 Revenue of Top Sectors

Sector Meaning (NAICS code)	Sector Revenue (\$1,000)
Retail trade	\$ 3,202,715
Manufacturing	\$ 1,624,646
Health Care and social assistance	\$ 1,443,797
Wholesale trade	\$ 828,368
Transportation and warehousing	\$ 530,570
Accommodation and food services	\$ 382,194
Administrative and support and waste management and remediation services	\$ 177,572
Real estate and rental and leasing	\$ 164,113
Other Services (Except Public Administration)	\$ 157,310
Arts, Entertainment, and Recreation	\$ 98,347
Educational Services	\$ 16,550
Professional, Scientific, and Technical Services	D

Source: Source: U.S. Census Bureau, 2012 Economic Census, Table EC1200A1.

D = Withheld to avoid disclosing data for individual companies; data are included in higher level totals

The *Retail Trade* sector generated \$3.2 billion making it the largest earning sector in Jackson County. The *Retail Trade* sector typically relies on residents and tourists and their discretionary spending ability. Residents' discretionary spending diminishes after a natural disaster when they must pay to repair their homes and properties. In this situation, residents will likely concentrate their spending on essential items that would benefit some types of retail (e.g., grocery) but hurt others (e.g., gift shops). The potential income from tourists also diminishes after a natural disaster as people are deterred from visiting the impacted area. Retail trade is also largely dependent on wholesale trade and the transportation network for the delivery of goods for sale. Disruption of the transportation system could have severe consequences for retail businesses. In summary, depending on the type and scale, a disaster could affect specific segments of retail trade, or all segments.

The *Manufacturing* sector was the second largest revenue generator with \$1.6 billion. It is highly dependent upon the transportation network to access supplies and send finished products to outside markets. As a base industry, manufacturers are not dependent on local markets for sales, which contribute to the economic resilience of this sector.

Healthcare and Social Assistance generated about \$1.4 billion. Healthcare and Social Assistance provides essential medical, social and other services to local and even regional residents. Disruptions from a natural hazard may put an exaggerated strain on the ability to provide needed services to the community at a time when they are most needed. Distanced

residents may have difficulty connecting to the provided services due to transportation and personnel disruptions from a natural disaster.

If any of these primary sectors are impacted by a disaster, Jackson County may experience a significant disruption of economic productivity.

Future Employment in Industry

Between 2010 and 2016, the sectors that experienced the largest percent growth were Private Non-Classified (109%), Construction (41%), Other Services (28%), Manufacturing (27%), Leisure and Hospitality (23%) and Education and Health Services (20%). Some of these sectors often require more training and education, while others require less education and have lower wages. Education and Health Services (14,926 employees) and Manufacturing (7,676) are among the largest employers.

Sectors that are anticipated to be major employers in the future also warrant special attention in the hazard mitigation planning process. As shown in Table 2-18, between 2014 and 2024, the largest employment growth in the region (Jackson and Josephine Counties) is anticipated within Education and Health Services (15%), Construction (12%), Professional and Business Services (12%), Leisure and Hospitality (12%) and Manufacturing (11%).²³

Synthesis

The current and anticipated financial conditions of a community are strong determinants of community resilience, as a strong and diverse economic base increases the ability of individuals, families and the community to absorb disaster impacts for a quick recovery. Because education and health services and manufacturing are key to post-disaster recovery efforts, the region is bolstered by its major employment sectors. The county's economy is expected to grow by 2024, with much of the growth within the industries of Education and Health Services. It is important to consider what might happen to the county economy if a disaster impacts the largest revenue generators and employers. Areas with less income equality, particularly in the smaller cities, higher housing costs and overall low economic diversity are factors that may contribute to slower recovery from a disaster.

²³ Oregon Employment Department, "Employment Projections by Industry and Occupations: 2014-2024 Oregon and Regional Summary", <https://www.qualityinfo.org/documents/10182/92203/Mid-Valley+Industry+Employment+Projections+2014-2024?version=1.5>, January 2017.

Built Environment Capacity

Built Environment Capacity refers to the built environment and infrastructure that supports the community. The various forms, quantity and quality of built capital mentioned above contribute significantly to community resilience. Physical infrastructures, including utility and transportation lifelines, are critical during a disaster and are essential for proper functioning and response. The lack or poor condition of infrastructure can negatively affect a community's ability to cope, respond and recover from a natural disaster. Following a disaster, communities may experience isolation from surrounding cities and counties due to infrastructure failure. These conditions force communities to rely on local and immediately available resources.

Land Use and Development Patterns

Jackson County was created by the territorial legislature on January 12, 1852, from the southwestern portion of Lane County and the unorganized area south of Douglas and Umpqua Counties. It was named for President Andrew Jackson and was the twelfth county created in Oregon.

When white settlement began in southern Oregon, several Indian tribes already lived in the area. Modocs, Shastas, Rogue Rivers and Umpquas all lived within the present boundaries of Jackson County. In the early 1850s, both the Klickitats from the north and the Deschutes from the south raided and settled in the area.

Jackson County's borders originally ran south to California, west to the Pacific Ocean, east to Lane County and north to Umpqua and Douglas Counties. In 1853, Coos County was created from the western portions of Jackson, Douglas and Umpqua Counties. In 1854, Wasco County was created and given all the land in Oregon Territory lying east of the summit of the Cascades.

Due to the topography and climate of Jackson County, land is used most intensively by people in the Bear Creek, middle Rogue and to a lesser extent, the Applegate Valleys. Development has followed the land use patterns of the early settlers; farmers located on the rich valley floors and miners and woodsmen claimed the foothill areas.²⁴ Agriculture, rural, suburban, urban, industrial and rural service center land uses are concentrated in these fertile valleys, whereas forest and open space and pockets of agriculture occur in surrounding mountainous regions of the county. Consequently, intense valley development is subject to increased risk from associated flood hazards. Forested mountains and steep slopes surrounding these valleys pose a significant risk to the entire region from wildfire and landslide events.²⁵

Historically, the county, region and state economy are based on timber, mining, tourism and agriculture. This, along with the large portions of the county that are public lands, impacted the land use and development patterns in the county. The Board of County Commissioners began adopting land use regulations in 1956. Then, in 1973, the Oregon Legislature adopted mandatory requirement for local jurisdictions commonly referred to as Oregon's 19 Statewide Planning Goals. The Goals express the state's policies on land use and related

²⁴ Jackson County Comprehensive Plan. 1989. Section 5-1.

²⁵ Oregon Secretary of State. (n.d.). Retrieved January 7, 2017, from <http://sos.oregon.gov/archives/Pages/default.aspx>

topics, such as citizen involvement, housing and natural resources. Local jurisdictions including Counties and incorporated cities must prepare and adopt comprehensive plans, zoning regulations, land use permitting regulations. As part of the 19 Goals Urban Growth Boundaries (UGBs) were established to separate areas planned for urban use as opposed to rural uses. Urban Growth Boundaries are not necessarily city boundaries and, unlike a city boundary, must contain enough land to meet estimated 20-year employment and population growth.

Additionally, the UGB must be reviewed periodically to assess the land capacity. Much of Jackson County is publicly owned including portions of the Klamath National Forest, the Umpqua National Forest, the Winema National Forest, Cascade-Siskiyou National Monument and Bureau of Land Management lands in the Ashland and Butte Falls Resource Areas.

Regulatory Context

Oregon land use laws require land outside Urban Growth Boundaries (UGBs) to be protected for farm, forest and aggregate resource values. For the most part, this law limits the amount of development in the rural areas. However, the land use designation can change from resource protection in one of two ways:

- The requested change could qualify as an exception to Statewide Planning Goals, in which case the city/county must demonstrate to the State that the change meets requirements for an exception. These lands, known as exception lands, are predominantly designated for residential use.
- Resource land can also be converted to non-resource use when it can be demonstrated that the land is no longer suitable for farm or forest production.

Local and state policies currently direct growth away from rural lands into UGBs and, to a lesser extent, into rural communities. If development follows historical development trends, urban areas will expand their UGBs, rural unincorporated communities will continue to grow and overall rural residential density will increase slightly with the bulk of rural lands kept in farm and forest use. The existing pattern of development in the rural areas, which is radiating out from the urban areas along rivers and streams, is likely to continue. Most "easy to develop" land is already developed. Natural features or hazards, such as floodplains, steep slopes or wildfire prone landscapes, often constrain the remaining undeveloped land.

Since 1973, Oregon has maintained a strong statewide program for land use planning. The foundation of that program is a set of 19 statewide planning goals that express the state's policies on land use and on related topics, such as citizen involvement, land use planning and natural resources.

Most of the goals are accompanied by "guidelines," which are suggestions about how a goal may be applied. Oregon's statewide goals are achieved through local comprehensive planning. State law requires each county and city to adopt a comprehensive plan and the zoning and land-division ordinances needed to put the plan into effect. The local comprehensive plans must be consistent with the statewide planning goals. Plans are reviewed for such consistency by the state's Land Conservation and Development Commission (LCDC). When LCDC officially approves a local government's plan, the plan is said to be "acknowledged." It then becomes the controlling document for land use in the area covered by that plan.

Statewide Land Use Planning Goal 7: Natural Hazards

Goal 7: Areas Subject to Natural Disasters and Hazards has the overriding purpose to “protect people and property from natural hazards.” Goal 7 requires local governments to adopt comprehensive plans (inventories, policies and implementing measures) to reduce risk to people and property from natural hazards. Natural hazards include among others: floods, landslides, earthquakes, tsunamis, coastal erosion and wildfires.

To comply with Goal 7, local governments are required to respond to new hazard inventory information from federal or state agencies. The local government must evaluate the hazard risk and assess the:

- Frequency, severity and location of the hazard;
- Effects of the hazard on existing and future development;
- Potential for development in the hazard area to increase the frequency and severity of the hazard; and
- Types and intensities of land uses to be allowed in the hazard area.

Local governments must adopt or amend comprehensive plan policies and implementing measures to avoid development in hazard areas where the risk cannot be mitigated. In addition, the siting of essential facilities, major structures, hazardous facilities and special occupancy structures should be prohibited in hazard areas where the risk to public safety cannot be mitigated. The state recognizes compliance with Goal 7 for coastal and riverine flood hazards by adopting and implementing local floodplain regulations that meet the minimum National Flood Insurance Program (NFIP) requirements.

In adopting plan policies and implementing measures for protection from natural hazards local governments should consider:

- The benefits of maintaining natural hazard areas as open space, recreation and other low density uses;
- The beneficial effects that natural hazards can have on natural resources and the environment; and
- The effects of development and mitigation measures in identified hazard areas on the management of natural resources.

Local governments should coordinate their land use plans and decisions with emergency prevention, protection, mitigation, response and recovery programs. Given the numerous waterways and forested lands throughout much of Jackson County, special attention should be given to problems associated with river bank erosion and potential for wildland/ urban interface fires.

Goal 7 guides local governments to give special attention to emergency access when considering development in identified hazard areas, including:

- Consider programs to manage storm water runoff as a means to address flood and landslide hazards;
- Consider non-regulatory approaches to help implement the goal;
- When reviewing development requests in high hazard areas, require site specific reports, appropriate for the level and type of hazards. Site specific reports should evaluate the risk to the site, as well as the risk the proposed development may pose to other properties; and
- Consider measures exceeding the National Flood Insurance Program.

Housing

In addition to location, the characteristics of the housing stock affect the level of risk posed by natural hazards. The table below identifies the types of housing most common throughout the county. Of particular interest are mobile homes, which account for about 14% of the housing in Jackson County (40% in Shady Cove and 32% in Butte Falls). Mobile homes are particularly vulnerable to certain natural hazards, such as windstorms and special attention should be given to securing the structures because they are more prone to wind damage than wood-frame construction. In other natural hazard events, such as earthquakes and floods, moveable structures like mobile homes are more likely to shift on their foundations and create hazardous conditions for occupants.

Table 2-20 Housing Profile

	Housing Units	Single Family		Multi-Family		Mobile Homes*	
		Estimate	Percent	Estimate	Percent	Estimate	Percent
Jackson County	91,782	63,145	69%	16,022	17%	12,615	14%
Ashland	10,372	7,369	71%	2,687	26%	316	3%
Butte Falls	200	110	55%	26	13%	64	32%
Central Point	7,162	5,651	79%	999	14%	512	7%
Eagle Point	3,458	2,595	75%	571	17%	292	8%
Gold Hill	535	438	82%	38	7%	59	11%
Jacksonville	1,608	1,018	63%	359	22%	231	14%
Medford	32,209	21,866	68%	8,810	27%	1,533	5%
Phoenix	2,299	1,236	54%	582	25%	481	21%
Rogue River	1,336	671	50%	481	36%	184	14%
Shady Cove	1,504	751	50%	145	10%	608	40%
Talent	2,843	1,833	64%	535	19%	475	17%

Source: U.S. Census Bureau, 2011-2015 American Community Survey Estimates, Table DP04

* Also includes boats, RVs, vans, etc. that are used as a residence.

Note: the percentages listed in the table above do not reflect the number of structures that are built within special flood hazard areas, or that are at risk of seismic damage or that are vulnerable to other hazards.

Aside from location and type of housing, the year structures were built has implications. Seismic building standards were codified in Oregon building code starting in 1974; more rigorous building code standards were passed in 1993 that accounted for the Cascadia earthquake fault.²⁶ Therefore, homes built before 1993 are more vulnerable to seismic events. Also, in the 1970's, FEMA began assisting communities with floodplain mapping as a response to administer the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. Upon receipt of floodplain maps, communities started to develop floodplain management ordinances to protect people and property from flood loss and damage.

The table below illustrates the number and percent of homes built between 1970 and 2015. Countywide, about one-third (30%) of the housing stock was built prior to 1970, before the implementation of floodplain management ordinances; however, Butte Falls has the highest

²⁶ State of Oregon Building Codes Division. *Earthquake Design History: A summary of Requirements in the State of Oregon*, February 7, 2012. http://www.oregon.gov/OMD/OEM/ossnac/docs/history_seismic_codes_or.pdf

percentage of housing units built prior to 1970 (52%). Countywide, 62% of the housing stock was built before 1990 and the codification of seismic building standards. Approximately 39% of the county's housing stock was built after 1990; Eagle Point (62%) has the highest percentage of housing units built after 1990; conversely, about 75% of Rogue River's housing stock was built before 1990.

Table 2-21 Year Structure Built

	Total Housing Units	Pre 1970		1970 to 1989		1990 or later	
		Number	Percent of Total	Number	Percent of Total	Number	Percent of Total
Jackson County	91,782	27,204	30%	29,011	32%	35,567	39%
Ashland	10,372	4,073	39%	2,966	29%	3,333	32%
Butte Falls	200	103	52%	28	14%	69	35%
Central Point	7,162	1,382	19%	1,648	23%	4,132	58%
Eagle Point	3,458	448	13%	864	25%	2,146	62%
Gold Hill	535	199	37%	172	32%	164	31%
Jacksonville	1,608	526	33%	488	30%	594	37%
Medford	32,209	10,528	33%	9,590	30%	12,091	38%
Phoenix	2,299	288	13%	1,114	48%	897	39%
Rogue River	1,336	222	17%	760	57%	354	26%
Shady Cove	1,504	250	17%	346	23%	908	60%
Talent	2,843	561	20%	769	27%	1,513	53%

Source: U.S. Census Bureau, 2011-2015 American Community Survey Estimates, Table DP04

The National Flood Insurance Program's (NFIP's) Flood Insurance Rate Maps (FIRMs) delineate flood-prone areas. They are used to assess flood insurance premiums and to regulate construction so that in the event of a flood, damage is minimized. The table below shows the initial and current FIRM effective dates for Jackson County communities.

Table 2-22 Community Flood Map History

Jurisdiction	Initial FIRM	Current FIRM
Jackson County	April 1, 1982	May 3, 2011
Ashland	June 1, 1981	May 3, 2011
Butte Falls	June 30, 1976	June 30, 1976 (M)
Central Point	Sept 30, 1980	May 3, 2011
Eagle Point	Sept 30, 1980	May 3, 2011
Gold Hill	Sept 17, 1980	May 3, 2011
Jacksonville	Dec 4, 1979	May 3, 2011
Medford	April 15, 1981	May 3, 2011
Phoenix	May 3, 1982	May 3, 2011
Rogue River	Jan 2, 1980	May 3, 2011
Shady Cove	Sept 30, 1980	May 3, 2011
Talent	Feb 1, 1980	May 3, 2011

Source: Federal Emergency Management Agency, Community Status Book Report*

M = No Elevation Determined - All Zone A, C and X

Critical Facilities

Critical facilities are those facilities that are essential to government response and recovery activities (e.g., hospitals, police, fire and rescue stations, school districts and higher education institutions). The interruption or destruction of any of these facilities would have a debilitating effect on incident response.

Critical facilities in Jackson County are identified below and within Volume III.

Hospitals:

- Asante Rogue Regional Medical Center (Medford)
- Asante Ashland Community Hospital
- Providence Medford Medical Center

Law Enforcement:

- Jackson County Sheriff's Office
- Ashland Police Department
- Butte Falls Police Department
- Central Point Police Department
- Central Point Police Department
- Eagle Point Police Department
- Gold Hill Police Department
- Jacksonville Police Department
- Medford Police Department
- Phoenix Police Department
- Rogue River Police Department
- Shady Cove Police Department
- Talent Police Department

Fire Districts:

- Applegate Valley Fire District #9
- Ashland Fire & Rescue
- Butte Falls Volunteer Fire Department
- Colestin Rural Fire Protection District
- Evans Valley Fire District #6
- Greensprings Fire & Rescue
- Jackson County Fire District #3
- Jackson County Fire District #4 (Shady Cove)
- Jackson County Fire District #5 (Phoenix/Talent)
- Jacksonville Fire Department
- Lake Creek Fire District #8
- Medford Fire and Rescue (to include Jackson County Fire District #2)
- Prospect Rural Fire Protection District
- Rogue River Fire District #1
- Rogue Valley International Airport Fire & Rescue

School Districts:

- Ashland School District 5
- Butte Falls School District 91
- Central Point School District 6
- Jackson County School District 9
- Medford School District 549C
- Phoenix-Talent School District 4
- Pinehurst School District 94
- Prospect School District 59
- Rogue River School District 35

Dependent Facilities

In addition to the critical facilities mentioned above there are other facilities that are vital to the continued delivery of health services and may significantly impact the public's ability to recover from emergencies. Assisted living centers, nursing homes and residential mental health facilities are important to identify within the community because of the dependent nature of the residents; and also these facilities can serve as secondary medical facilities as they are equipped with nurses, medical supplies and beds.

Jackson County has 28 assisted living centers, five registered nursing homes and seven residential mental health facilities.²⁷ There are no reported psychiatric hospitals in the Jackson, or surrounding, counties. Of all of the dependent facilities identified in the county, 16 (57%) assisted living centers, four (80%) nursing homes and six (86%) residential mental health facilities are located in Medford. In summary, there are 26 of 40 (65%) dependent care facilities located in one city across the county.

Correctional Facilities

Correctional facilities are incorporated into physical infrastructure as they play an important role in everyday society by maintaining a safe separation from the public. There are three correctional facilities located in Jackson County. The Jackson County Jail (292 inmate capacity, 787 W. 8th, Medford), Jackson County Community Justice Transition Center (169 beds, average daily population 130, 5505 S. Pacific Highway, in County between Phoenix and Talent) and Jackson County Juvenile Detention (40 beds, 609 W. 10th, Medford).²⁸ While correctional facilities are built to code to resist structural failure and institutions will have back up power to sustain regulation of inmates following the immediate event of an emergency, logistical planning becomes more of a challenge when the impacts of the event continue over a long duration.

Infrastructure Profile

Physical infrastructure such as dams, levees, roads, bridges, railways and airports support Jackson County communities and economies. Due to the fundamental role that physical infrastructure plays both in pre- and post-disaster, they deserve special attention in the context of creating resilient communities.

Utility systems such as potable water, wastewater, natural gas, telecommunications and electric power are all networked systems. That is, they consist of nodes and links. Nodes are centers where something happens - such as a pumping plant, a treatment plant, a substation, a switching office and the like. Links are the connections (pipes or lines) between nodes. Pacific Power is the utility provider for the Jackson County.

Utility Lifelines

Utility lifelines are the resources the public relies on daily, (i.e., electricity, fuel and communication lines). If these lines fail or are disrupted, the essential functions of the community can become severely impaired. Utility lifelines are closely related to physical

²⁷ Online Google Based Query, October 2011.

²⁸ Jackson County Community Justice, <http://jacksoncountyor.org/community-justice/Transition-Center/Overview>, accessed October 2017.

infrastructure, (i.e., dams and power plants) as they transmit the power generated from these facilities.

The network of transmission lines running through the county may be vulnerable to severe, but infrequent natural hazards, such as windstorm, winter storms and earthquakes.

Electric Power Systems

The Bonneville Power Administration is the region's wholesale electricity distributor. Pacific Power (PacifiCorp) is the primary investor-owned utility company serving Jackson County (including the cities of Butte Falls, Central Point, Eagle Point, Jacksonville, Medford, Phoenix, Rogue River, Shady Cove, Talent and the unincorporated community of White City). Other utilities include: Ashland Municipal Electric Utility which serves the City of Ashland,

Most of the electrical power in the region is generated through hydropower. Dams operated by the Bonneville Power Administration (BPA) and Pacific Power (PacifiCorp) provide hydro-generated electricity, including from dams situated on the Applegate River and Rogue River. There is one additional power plant located in White City, which uses biomass as its energy source.²⁹

The electric power system is central to community function. The impacts of loss of electric power are large: residential, commercial and public customers are all heavily dependent on electric power for normal functioning. Furthermore, other utility systems, especially water and wastewater systems, are heavily dependent on electric power for normal operations. Loss of electric power may have large impacts on affected communities, especially if outages are prolonged.

Natural Gas Systems

Jackson County's primary natural gas provider is investor-owned Avista Utilities. Natural gas transmission and distribution pipes are not usually affected by flooding, because the pipes are pressurized. However, compressor stations may be subject to inundation damage or loss of electrical power to run electrical and mechanical equipment.

Transmission and distribution pipes are also subject to rupture in slide areas and in earthquakes. Buried utility pipes are very subject to failure in small ground movements. Movements as small as an inch or two are often sufficient to break the pipes, especially for older cast-iron pipe which is more brittle than welded steel or polyethylene pipe. Possible mitigation actions include pipe upgrades for a few critical locations and nonstructural seismic mitigation for control equipment.

Telecommunications Systems

Telephone (land lines and cellular) systems, broadcast radio and TV systems and cable TV systems may all be vulnerable to damages and services outages from hazards. However, in general, such systems have proved to be somewhat less vulnerable to service outages than other utility systems. System nodes (broadcast studios, switching offices and such) are subject to flooding if located in flood-prone areas. However, because of the importance of such facilities, few are located in highly flood-prone sites.

²⁹ Loy, W. G., ed. 2001. Atlas of Oregon, 2nd Edition. Eugene, OR: University of Oregon Press

Similarly, few such facilities are likely to be located in landslide prone areas. Cellular towers in hilly areas, however, may be more subject to landslide hazards.

Buried communications (copper and fiber optic) and cable television cables are usually flexible enough to accommodate several feet of ground movement before failure. While major landslides may rupture such cables, minor settlements or small slides are not nearly as likely to impact such cables as they are to break buried gas or water pipes. Such lines typically perform relatively well in earthquakes.

Above ground communications and cable television cables are subject to wind- induced failures from tree falls and pole failures. However, such failures are a less common than failures of electric power lines. The better performance of communications cables arises in part because the electrical cables are always highest on the poles, thus a falling branch is usually first resisted by the power cables. Also, because the voltage levels in communications cables are much lower than those in power cables, the communication cables are not subject to “burn down” or shorting if wind-swayed cables touch each other or get too close.

Some telecommunications facilities are subject to failure as a result of loss of electric power. However, key facilities almost always have backup battery power and/or generators. Therefore, telecommunications facilities are generally much less vulnerable to outages from loss of electric power than are water or wastewater systems.

Potable Water

Water treatment plants are often located in flood prone areas and are subject to inundation when untreated water enters the filters, sedimentation or flocculation basins, resulting in loss of capability to treat incoming untreated water properly. Water system control buildings and pump stations may also be subject to flood damages. Public or private water systems with wells as the water source are subject to outages when flood waters contaminate well heads; this is a common problem for smaller water systems.

Water transmission or distribution pipes are rarely damaged by flood waters, unless there are soil settlements or major erosion, because the lines are sufficiently pressurized (for water quality) to prevent intrusion of flood waters. Water transmission or distribution pipes are, however, subject to breakage when they cross landslide areas or in earthquakes. Water treatment plants are also subject to earthquake damages to the building and to process and control equipment.

Water systems are also highly vulnerable to electric power outages. Many water systems include pumped storage systems where water is pumped to storage tanks which are typically located 60 to 200 feet above the elevation of water system customers. Such tanks generally contain no more than 1 or 2 days of storage beyond typical daily usage (for reasons of water quality). Thus, electric power outages of more than 1 or 2 days may result in loss of potable water due to the inability of pumping plants to pump water. The most logical mitigation projects to minimize such outages are to provide back-up generators at key pumping plants or to provide quick connects so that portable generators (if available) can be quickly installed. Water treatment plants are also subject to outages due to loss of electric power.

Wastewater Systems

Wastewater systems are often highly vulnerable to flood impacts. Rising water may cause collection pipes to backup and overflow. Intrusion of storm water into collection systems may result in flows that exceed treatment plant capacities, resulting in release of untreated or only partially treated flows. Treatment plants are often located in floodplains, at low elevations, to facilitate gravity flow. However, such locations also facilitate flood damages.

Lift stations and treatment plants are also subject to loss of function due to electric power outages, with resulting overflows or releases. Collection pipes are also subject to breakage due to landslides. However, such impacts are not particularly common, since most wastewater collection systems are in more urbanized areas with only selected areas subject to slides. Wastewater pipes are, however, subject to breakage in earthquakes. Wastewater treatment plants are also subject to earthquake damages to the building and to process and control equipment.

Dams

Dams are manmade structures built to impound water. Dams are built for many purposes including water storage for potable water supply, livestock water supply, irrigation or fire suppression. Other dams are built for flood control, recreation, navigation, hydroelectric power or to contain mine tailings. Dams may also be multifunction, serving two or more of these purposes.

The National Inventory of Dams, NID, which is maintained by the United States Army Corps of Engineers, is a database of approximately 76,000 dams in the United States. The NID does not include all dams in the United States. Rather, the NID includes dams that are deemed to have a high or significant hazard potential and dams deemed to pose a low hazard if they meet inclusion criteria based on dam height and storage volume. Low hazard potential dams are included only if they meet either of the following selection criteria:

- Exceeds 25 feet in height and 15 acre-feet of storage, or
- Exceeds 6 feet in height and 50-acre feet of storage.

There are many thousands of dams too small to meet the NID selection criteria. However, these small dams are generally too small to have significant impacts if they fail and thus are generally not considered for purposes of risk assessment or mitigation planning.

This NID potential hazard classification is solely a measure of the probable impacts if a dam fails. Thus, a dam classified as High Potential Hazard does not mean that the dam is unsafe or likely to fail. The level of risk (probability of failure) of a given dam is not even considered in this classification scheme. Rather, the High Potential Hazard classification simply means that there are people at risk downstream from the dam in the inundation area, if the dam were to fail.

Dams assigned the low hazard potential classification are those where failure or mis-operation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the dam owner's property.

Dams assigned to the significant hazard potential classification are those where failure or mis-operation results in no probable loss of human life but can cause economic loss,

environmental damage or disruption of lifeline facilities. Significant hazard potential dams are often located in predominantly rural or agricultural areas.

Dams assigned to the high hazard potential classification are those where failure or mis-operation will probably cause loss of human life. Failure of dams in the high classification will generally also result in economic, environmental or lifeline losses, but the classification is based solely on probable loss of life.

Dam failures can occur at any time in a dam's life; however, failures are most common when water storage for the dam is at or near design capacity. At high water levels, the water force on the dam is higher and several of the most common failure modes are more likely to occur. Correspondingly, for any dam, the probability of failure is much lower when water levels are substantially below the design capacity for the reservoir.

For embankment dams, the most common failure mode is erosion of the dam during prolonged periods of rainfall and flooding. When dams are full and water inflow rates exceed the capacity of the controlled release mechanisms (spillways and outlet pipes), overtopping may occur. When overtopping occurs, scour and erosion of either the dam itself and/ or of the abutments may lead to partial or complete failure of the dam. Especially for embankment dams, internal erosion, piping or seepage through the dam, foundation, or abutments can also lead to failure. For smaller dams, erosion and weakening of dam structures by growth of vegetation and burrowing animals is a common cause of failure.

For embankment dams, earthquake ground motions may cause dams to settle or spread laterally. Such settlement does not generally lead, by itself, to immediate failure. However, if the dam is full, relatively minor amounts of settling may cause overtopping to occur, with resulting scour and erosion that may progress to failure. For any dam, improper design, construction, or inadequate preparation of foundations and abutments can also cause failures. Improper operation of a dam, such as failure to open gates or valves during high flow periods can also trigger dam failure. For any dam, unusual hydrodynamic (water) forces can also initiate failure. Landslides into the reservoir, which may occur on their own or be triggered by earthquakes, may lead to surge waves which overtop dams or hydrodynamic forces which cause dams to fail under the unexpected load. Earthquakes can also cause seiches (waves) in reservoirs that may overtop or overload dam structures. In rare cases, high winds may also cause waves that overtop or overload dam structures.

Concrete dams are also subject to failure due to seepage of water through foundations or abutments. Dams of any construction type are also subject to deliberate damage via sabotage or terrorism. For waterways with a series of dams, downstream dams are also subject to failure induced by the failure of an upstream dam. If an upstream dam fails, then downstream dams also fail due to overtopping or due to hydrodynamic forces.

Table 2-23 shows that there are 15 dams categorized as high hazard and 20 dams categorized as a significant hazard.

Table 2-23 Jackson County Dam Inventory

Threat Potential	Number of Dams	Rivers
High	15	Fish Lake & Tributaries; Ashland Creek; Willow & Four Bit Creeks; Yankee Creek; Lake Creek & Tributaries; Maple Creek; Lake Creek; East Fork Sams, West Fork Sams, & Minera; Osbourne Creek; Dry Creek & Antelope Creek; Snider Creek; S Fork Little Butte Creek Tributaries; Hyatt & Howard Prairie Reservoirs; Rogue River; Applegate River
Significant	20	Keene Creek, Long Branch (South Fork), Upper Table Rock Run-Off, School House Creek, Murderers Gulch, Fork of Lake Creek, Lost Creek, Harrison Creek, Snyder Creek, Branch of Whetstone Creek, North Fork Rogue River, Emigrant Creek, Tributary to Rogue River
Low	28	Dry Creek, Dailey Creek, North Fork Grizzley Creek, Indian & Dyer Creeks, Bear Gulch, Little Butte Creek, Coal Mine Creek, Lick Creek, Ramsey Canyon, Squaw Creek, Keene Creek, Jackson Creek, South Fork Rogue River, Sams Creek, Iron Gulch Creek, South Fork of Grizzley Creek, Ashland Creek, Stimpson Gulch, Evans Creek, Pleasant Creek Tributary
Total	63	

Source: Oregon Water Resources Department, "Dam Inventory Query"

Dam failures can occur rapidly and with little warning. Fortunately, most failures result in minor damage and pose little or no risk to life safety. However, the potential for severe damage still exists. The Oregon Water and Resources Department has inventoried all dams located in Oregon and Jackson County.

Transportation

Due to the fundamental role that transportation infrastructure plays both pre-and post-disaster, it deserves special attention in the context of creating more resilient communities. The information documented in this section of the profile can provide the basis for informed decisions about how to reduce the vulnerability of Jackson County’s transportation infrastructure to natural hazards.

Rail Ways

Railroads are major providers of regional and national cargo trade flows. The Central Oregon & Pacific and the White City Terminal Railroad run through Jackson County.³⁰ The Central Oregon & Pacific Line follows I-5 through the Jackson County, it then runs west through Lane County and loops back into Douglas County through Reedsport. The White City Terminal Railroad is a short spur off the Central Oregon & Pacific Line in Jackson County.

Rails are sensitive to icing from winter storms that can occur in the Southwest Oregon region. For industries in the region that utilize rail transport, these disruptions in service can result in economic losses. The potential for rail accidents caused by natural hazards can also have serious implications for the local communities if hazardous materials are involved.

³⁰ Oregon Department of Transportation, State of Oregon, Oregon Railways.
<http://www.oregon.gov/ODOT/TD/TDATA/gis/docs/statemaps/railroads.pdf?ga=t>

Airports

Jackson County has one commercial service airport, three other public airports and 17 private airports.³¹ The Rogue Valley International Airport in Medford is the only commercial service airport in surrounding Douglas, Josephine and Klamath Counties. Access to these airports face the potential for closure from a number of natural hazards, including wind and winter storms common to the region. Another important consideration in identifying area air resources is the type and condition of runway surfaces at these various facilities, as they will impact the ability to utilize the airport. Common runway surface types in Jackson County are turf, dirt, asphalt, concrete and gravel.

Roads

The region's major expressway is Interstate 5. It runs north/south through Jackson County and is the main passage for automobiles and trucks traveling along the west coast. Other major highways that service this region include:

- US Highway 66 connects Ashland Municipal Airport with Ashland and Klamath Falls.
- US Highway 62 connects Medford to Central Oregon.
- Highway 227 joins Highway 62 near Shady Cove and eventually merges with I-5 north near Roseburg.
- US Highway 199 intersects with I-5 in Grants Pass, just outside of Jackson County and runs south to the North Coast of California.
- Highway 238 connects the Applegate Valley including the communities of Jacksonville, Ruch, Applegate, and Provolt to Medford and Grants Pass.
- Highway 140 connects Medford to Klamath Falls.
- Highway 99 runs parallel to Interstate 5 and provides a secondary transportation route for cities within the Rogue Valley.

Daily, transportation infrastructure capacity in the Southwest Oregon region is stressed by maintenance, congestion and oversized loads. Natural hazards can further disrupt automobile traffic and create gridlock this is of specific concern in periods of evacuation.³²

Seismic lifeline routes help maintain transportation facilities for public safety and resilience in the case of natural disasters. Following a major earthquake, it is important for response and recovery agencies to know which roadways are most prepared for a major seismic event. The Oregon Department of Transportation has identified lifeline routes to provide a secure lifeline network of streets, highways and bridges to facilitate emergency services response after a disaster.³³

System connectivity and key geographical features were used to identify a three-tiered seismic lifeline system. Routes identified as Tier 1 are considered to be the most significant and necessary to ensure a functioning statewide transportation network. The Tier 2 system provides additional connectivity to the Tier 1 system; it allows for direct access to more

³¹ FAA Airport Master Record. 2011.

http://www.faa.gov/airports/airport_safety/airportdata_5010/menu/index.cfm.

³² State of Oregon Natural Hazard Mitigation Plan, Region 4 Southwest Oregon Regional Profile.

³³ CH2MHILL, Prepared for Oregon Department of Transportation. Oregon Seismic Lifeline Routes Identification Project, *Lifeline Selection Summary Report*, May 15 2012.

locations and increased traffic volume capacity. The Tier 3 lifeline routes provide additional connectivity to the systems provided by Tiers 1 and 2.

The Lifeline Routes in the SouthI-5 and Cascades Regions affecting Jackson County consist of the following:

- Tier I: Interstate 5
- Tier II: Oregon Route 140

Bridges

Because of earthquake risk, the seismic vulnerability of the county’s bridges is an important issue. Non-functional bridges can disrupt emergency operations, sever lifelines and disrupt local and freight traffic. These disruptions may exacerbate local economic losses if industries are unable to transport goods. The county’s bridges are part of the state and interstate highway system, which is maintained by the Oregon Department of Transportation (ODOT), or are part of regional and local systems, maintained by the region’s counties and cities.

Table 2-24 shows the structural condition of bridges in the region. A distressed bridge (Di) is a condition rating used by the Oregon Department of Transportation (ODOT) indicating that a bridge has been identified as having a structural or other deficiency, while a deficient bridge (De) is a federal performance measure used for non-ODOT bridges; the ratings do not imply that a bridge is unsafe.³⁴ The table shows that the county has a lower percentage of bridges that are distressed and/ or deficient (16%), than does the state (21%). About 13% of the total county and city owned bridges are distressed, compared to 21% of State owned (ODOT) bridges.

Table 2-24 Bridge Inventory

	Oregon Region 4		Jackson	
State Owned	Distressed	610	64	24
	Sub-total	2,718	362	128
	Percent Distressed	22%	18%	21%
County Owned	Deficient	633	81	16
	Sub-total	3,420	508	152
	Percent Distressed	19%	16%	11%
City Owned	Deficient	160	14	8
	Sub-total	614	56	32
	Percent Deficient	26%	25%	25%
Other Owned	Deficient	40	4	0
	Sub-total	115	10	0
	Percent Deficient	35%	40%	-
Area Total	Deficient	1,443	163	48
	Sub-total	6,769	905	300
	Percent Deficient	21%	18%	16%
Historic Covered		334	11	4

“Distressed” = ODOT bridges Identified as distressed with structural or other deficiencies; “Deficient” = Non-ODOT bridge Identified with a structural deficiency or as functionally obsolete;
 Area Total = Total of ODOT “Distressed” and Non-ODOT “Deficient” bridges;

Note: ODOT bridge classifications overlap and total is not used to calculate percent distressed, calculation for ODOT distressed bridges accounts for this overlap.

Source: Oregon Department of Transportation, 2014; Oregon Department of Transportation (2013), Oregon’s Historic Bridge Field Guide

³⁴ Oregon. Bridge Engineering Section (2012). 2012 Bridge Condition Report. Salem, Oregon: Bridge Section, Oregon Department. of Transportation.

The bridges in Jackson County require ongoing management and maintenance due to the age and types of bridges. Modern bridges, which require minimum maintenance and are designed to withstand earthquakes, consist of pre-stressed reinforced concrete structures set on deep steel piling foundations.

The County's bridge maintenance and engineering divisions work in coordination to inspect and maintain the bridges within the county. Bridges within Jackson County are inspected at two-year intervals or more frequently if special conditions exist. Bridges that are found to be in critical condition during an inspection are prioritized for immediate replacement.

Synthesis

The planning considerations seemingly most significant for the County are contingency planning for medical resources and lifeline systems due to the imminent need for these resources. As mentioned above, functionality of hospitals and dependent care facilities are a significant priority in providing for Jackson County residents. One factor that is critical to consider in planning is the availability of medical beds in local hospitals and dependent care facilities. In the event of a disaster, medical beds may be at a premium providing not just for the growing elderly population, but the entire county. Some of these facilities may run at almost full capacity on a daily basis, hospitals should consider medical surge planning and develop memorandums with surrounding counties for medical transport and treatment. Other facilities to consider are utility lifelines and transportation lifelines such as, airports, railways, roads and bridges with surrounding counties to acquire utility service and infrastructure repair.

While these elements are traditionally recognized as part of response and recovery from a natural disaster, it is essential to start building relationships and establishing contractual agreements with entities that may be critical in supporting community resilience.

Community Connectivity Capacity

Community connectivity capacity places strong emphasis on social structure, trust, norms and cultural resources within a community. In terms of community resilience, these emerging elements of social and cultural capital will be drawn upon to stabilize the recovery of the community. Social and cultural capitals are present in all communities; however, it may be dramatically different from one city to the next as these capitals reflect the specific needs and composition of the community residents.

Social Systems and Service Providers

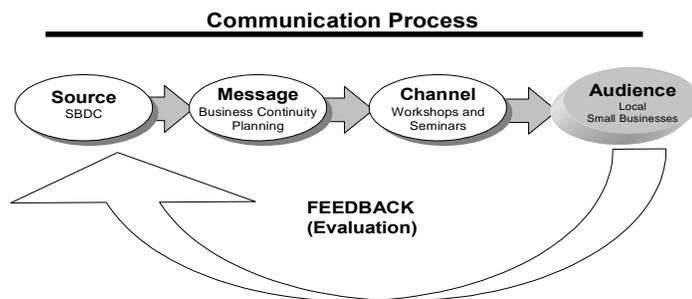
Social systems include community organizations and programs that provide social and community-based services, such as employment, health, senior and disabled services, professional associations and veterans' affairs for the public. In planning for natural hazard mitigation, it is important to know what social systems exist within the community because of their existing connections to the public. Often, actions identified by the NHMP involve communicating with the public or specific subgroups within the population (e.g. elderly, children, low income, etc.). The County can use existing social systems as resources for implementing such communication-related activities because these service providers already work directly with the public on a number of issues, one of which could be natural hazard preparedness and mitigation. The presence of these services are more predominantly located in urbanized areas of the county, this is synonymous with the general urbanizing trend of local residents.

The following is a brief explanation of how the communication process works and how the community's existing social service providers could be used to provide natural hazard related messages to their clients.

There are five essential elements for communicating effectively to a target audience:

- The source of the message must be credible;
- The message must be appropriately designed;
- The channel for communicating the message must be carefully selected;
- The audience must be clearly defined; and
- The recommended action must be clearly stated and a feedback channel established for questions, comments and suggestions.

Figure 2-5 Communication Process



Source: Adapted from the U.S. Environmental Protection Agency Radon Division's outreach program

Civic Engagement

Civic engagement and involvement in local, state and national politics are important indicators of community connectivity. Those who are more invested in their community may have a higher tendency to vote in political elections. The 2016 Presidential General Election resulted in 75% voter turnout in the county as of November 28th, 2016.³⁵ Other indicators such as volunteerism, participation in formal community networks and community charitable contributions are examples of other civic engagement that may increase community connectivity.

Historic and Cultural Resources

Historic and cultural resources such as historic structures and landmarks can help to define a community and may also be sources for tourism revenue. Protecting these resources from the impact of disasters is important because they have an important role in defining and supporting the community. According to the National Register Bulletin, "a contributing resource is a building, site, structure, or object that adds to the historic associations, historic architectural qualities, or archeological values for which a property is significant because it was present during the period of significance, related to the documented significance of the property and possesses historical integrity or is capable of yielding important information about the period; or it independently meets the National Register criteria."³⁶ If a structure does not meet these criteria, it is considered to be non-contributing.

Overall, there are a total of 1,498 historically recognized places in Jackson County. 214 are considered to be eligible/significant (ES) and 1,284 are considered to be eligible-contributing (EC). Table 2-25 identifies historic features present in Jackson County according to the National Register of Historic Places. Overall there are a total of 149 historically registered places.

Table 2-25 Historic Places

Type	Number
Houses, Hotels, Resorts and Cabins	80
Districts	11
Municipal Buildings, Libraries and Schools	9
Cemetaries	4
Parks, Campgrounds, Ranches and Openspace	6
Military Posts, Ranger Stations and Guard Lookouts	11
Bridges	2
Churces	2
Misc. Buildings	24
Total	149

Source: Oregon Historic Sites Database

³⁵ Daily Ballot Return, <http://www.Jacksonco.org/dailyballotreturn>, accessed March 2013.

³⁶ U.S. Department of the Interior, National Park Service, Cultural Resources, National Register Bulletin 16A: "How to Complete the National Register Registration Form".

Libraries and Museums

Libraries and museums develop cultural capacity and community connectivity as they are places of knowledge and recognition, they are common spaces for the community to gather and can serve critical functions in maintaining the sense of community during a disaster. They are recognized as safe places and reflect normalcy in times of distress. There are currently 15 libraries in Jackson County located in each incorporated city and in the unincorporated communities of Applegate, Prospect, Ruch, and White City.³⁷ The museums across Jackson County cater to varying audiences; they range from historical, science, art and biology museums.

Cultural Events

Other such institutions that can strengthen community connectivity are the presence of festivals and organizations that engage diverse cultural interests. Jackson County is particularly recognized for the Oregon Shakespeare Festival in Ashland. Examples of other events and institutions include the Britt Festival in Jacksonville, the County Fair in Central Point and the Southern Oregon Historical Society in Medford. Not only do these events bring revenue into the community, they can improve cultural competence and enhance the sense of place. Cultural connectivity is important to community resilience, as people may be more inclined to remain in the community because they feel part of the community and culture.

Community Stability

Community stability is a measure of rootedness in place. It is hypothesized that resilience to a disaster stems in part from familiarity with place, not only for navigating the community during a crisis, but also accessing services and other supports for economic or social challenges.³⁸ The table below estimates residential stability across the region. It is calculated by the number of people who have lived in the same house and those who have moved within the same county a year ago, compared to the percentage of people who have migrated into the region. Jackson County overall has a geographic stability rating of about 93% (i.e., 93% of the population lived in the same house or moved within the county). The figures of community stability are relatively consistent across the region with the smaller cities having greater geographic stability. Rogue River has the lowest geographic stability rating (80%).

³⁷ Jackson County Library Services, http://jcls.org/hours_locations

³⁸ Cutter, Susan, Christopher Burton, Christopher Emrich. "Disaster Resilience Indicators for Benchmarking Baseline Conditions". *Journal of Homeland Security and Emergency Management*.

Table 2-26 Regional Residential Stability

Jurisdiction	Population	Geographic Stability	Same House	Moved Within Same County
Jackson County	206,562	93%	81%	13%
Ashland	20,414	89%	74%	16%
Butte Falls	387	96%	72%	24%
Central Point	17,357	95%	85%	11%
Eagle Point	8,605	91%	79%	12%
Gold Hill	1,183	98%	87%	11%
Jacksonville	2,827	98%	86%	12%
Medford	76,727	94%	78%	16%
Phoenix	4,488	95%	89%	6%
Rogue River	2,395	80%	73%	7%
Shady Cove	2,903	98%	84%	14%
Talent	6,226	94%	80%	15%

Source: U.S. Census Bureau, 2011-2015 American Community Survey Estimates, Table B07003.

Homeownership

Housing tenure describes whether residents rent or own the housing units they occupy. Homeowners are typically more financially stable but are at risk of greater property loss in a post-disaster situation. People may rent because they choose not to own, they do not have the financial resources for home ownership, or they are transient.

Collectively, 62% of the occupied housing units in Jackson County are owner-occupied and about 38% are renter occupied. Rogue River (54%) has the highest rate of renter-occupied units. Gold Hill (74%) has the highest percentage of owner-occupied units. The number and percent of vacant units is derived from subtracting the number of seasonal and recreational vacant units from the total number of vacant units. Butte Falls (19%) has the highest vacancy rates within the county. In addition, seasonal or recreational housing accounts for approximately 2% of the county's vacant housing stock (6% in Butte Falls).³⁹

³⁹ U.S. Census Bureau, 2011-2015 American Community Survey Estimates, Table B25004.

Table 2-27 Housing Tenure and Vacancy

	Housing Units	Occupied Housing Units	Owner-occupied		Renter-occupied		Vacant*	
			Estimate	Percent	Estimate	Percent	Estimate	Percent
Jackson County	91,782	83,487	51,746	62%	31,741	38%	6,118	7%
Ashland	10,372	9,446	5,131	54%	4,315	46%	609	6%
Butte Falls	200	151	90	60%	61	40%	37	19%
Central Point	7,162	6,565	4,139	63%	2,426	37%	525	7%
Eagle Point	3,458	3,171	2,042	64%	1,129	36%	287	8%
Gold Hill	535	477	354	74%	123	26%	43	8%
Jacksonville	1,608	1,539	1,077	70%	462	30%	69	4%
Medford	32,209	29,751	14,977	50%	14,774	50%	2,037	6%
Phoenix	2,299	2,176	1,375	63%	801	37%	123	5%
Rogue River	1,336	1,171	536	46%	635	54%	111	8%
Shady Cove	1,504	1,377	1,013	74%	364	26%	90	6%
Talent	2,843	2,705	1,546	57%	1,159	43%	95	3%

Source: U.S. Census Bureau, 2011-2015 American Community Survey Estimates, Tables DP04 and B25004.

* = Functional vacant units, computed after removing seasonal, recreational, or occasional housing units from vacant housing units.

According to Cutter, wealth increases resiliency and recovery from disasters. Renters often do not have personal financial resources or insurance to assist them post-disaster. On the other hand, renters tend to be more mobile and have fewer assets at risk of natural hazards.⁴⁰ In the most extreme cases, renters lack sufficient shelter options when lodging becomes uninhabitable or unaffordable post-disaster.

Synthesis

Jackson County has distinct social and cultural resources that work in favor to increase community connectivity and resilience. Sustaining social and cultural resources, such as social services and cultural events, may be essential to preserving community cohesion and a sense of place. The presence of larger communities makes additional resources and services available for the public. However, it is important to consider that these amenities may not be equally distributed to the rural portions of the county and may produce implications for recovery in the event of a disaster.

In the long-term, it may be of specific interest to the County to evaluate community stability. A community experiencing instability and low homeownership may hinder the effectiveness of social and cultural resources, distressing community coping and response mechanisms.

⁴⁰ Cutter, S. L. (2003). Social Vulnerability to Environmental Hazards. *Social Science Quarterly*.

Political Capacity

Political capacity is recognized as the government and planning structures established within the community. In terms of hazard resilience, it is essential for political capital to encompass diverse government and non-government entities in collaboration; as disaster losses stem from a predictable result of interactions between the physical environment, social and demographic characteristics and the built environment.⁴¹ Resilient political capital seeks to involve various stakeholders in hazard planning and works towards integrating the Natural Hazard Mitigation Plan with other community plans, so that all planning approaches are consistent.

Government Structure

A three-member Board of Commissioners governs Jackson County. The Commissioners serve as the Executive Branch and perform legislative and quasi-judicial functions of the County. Commissioners are responsible for the planning, formation and implementation of the annual budget. In addition, Commissioners serve on other federal, state and local mandated governmental panels, boards and commissions with fiscal duties and authority over public monies.⁴² A County Administrator is staff to the Board of Commissioners and is responsible for County management, policy implementation, and financial planning.

Beyond Emergency Management, all the departments within the County governance structure have some degree of responsibility in building overall community resilience. Each plays a role in ensuring that County functions and normal operations resume after an incident and the needs of the population are met.

County departments and divisions that are most involved with natural hazard mitigation include the following:

- **Sheriff's Office:** The mission of the Jackson County Sheriff's Office is "Serving our Community through values-oriented law enforcement: character, competence, courage, compassion". Public Safety interacts with the vulnerable aspects of the community on a day-to-day basis and can help identify areas for focused mitigation.
- **Emergency Management:** The Jackson County emergency management program is responsible for emergency management planning and operations for that portion of the county outside the limits of the incorporated municipalities of the county. The [Jackson County Emergency Operations Plan](#) provides detail on the organization and operations of emergency management.
- **Development Services - Planning:** conducts both short and long-range plans that determine much of the built, physical community. Through the County Comprehensive Plan and subsequent policies, this department guides decisions about growth, development and conservation of natural resources. The Planning Department can be partners in mitigation by developing, implementing and monitoring policies that incorporate hazard mitigation principles such as ensuring homes, businesses and other buildings are built to current seismic code and out of the flood zones.

⁴¹ Mileti, D. 1999. Disaster by Design: a Reassessment of Natural Hazards in the United States. Washington D.C.: Joseph Henry Press.

⁴² Jackson County. <http://www.co.jackson.or.us/Departments.asp>.

- **Development Services - Building:** Assists citizens with permitting and building code applications. This department could collaborate to do outreach to the owners of structures that were not built up to modern, resilient code. Professionals from this department could even be called on to help survey buildings after an incident.
- **Fairgrounds/Expo:** Serves as an entertainment venue but can be considered a staging site for response efforts. Mitigation could include specific actions to ensure the facilities could be used during response, such as extra power should it need to be used as a shelter.
- **Geographic Information Systems:** Develops and maintains a Geographic Information System (GIS) for Jackson County. The GIS is composed of computer maps and associated databases. Examples of the maps include soils, flood hazard areas and streams. In all phases of the disaster cycle, information is key. Building robust data that catalogues not only the County's risk and vulnerability, but also resources and response capability can ensure that efficient and effective mitigation activities.
- **Information Technology:** focuses on providing the various other County departments with the information systems and telecommunications technology to conduct daily business. Without this critical component, the County could not effectively serve the residents. Mitigation efforts from this department would not likely involve citizens at all, but would go a long way to ensuring uninterrupted services during hazard incidents.
- **Health and Human Services:** Jackson County Health and Human Services provides quality public health services consistent with laws, available resources and community support through, the prevention of disease, health education and promotion and protection of the community and the environment. As an inherently mitigation focused department, Public Health can be an ally in preparing the community for natural hazards. Public Health likely has a distribution network established for information and supplies and these connections to the community will be to encourage personal preparedness and also during incident response.
- **Jackson County Roads and Parks:** The Roads Department addresses the transportation needs and policies of the County to assure that roads, bridges, traffic signs and rights-of-way are designed, built and maintained to provide users with the best possible, safest transportation system. This department can help to prioritize projects for mitigation and will be a key partner in implementation as well.

Existing Plans and Policies

Communities often have existing plans and policies that guide and influence land use, land development and population growth. Such existing plans and policies can include comprehensive plans, zoning ordinances and technical reports or studies. Plans and policies already in existence have support from local residents, businesses and policy makers. Many land-use, comprehensive and strategic plans get updated regularly and can adapt easily to changing conditions and needs.⁴³

The Jackson County Natural Hazard Mitigation Plan includes a range of recommended action items that, when implemented, will reduce the County's vulnerability to natural hazards. Many of these recommendations are consistent with the goals and objectives of the County's existing plans and policies. Linking existing plans and policies to the Natural Hazard Mitigation Plan helps identify what resources already exist that can be used to implement the action items identified in the Plan. Implementing the Natural Hazards Mitigation Plan's action items through existing plans and policies increases their likelihood of being supported and getting updated and maximizes the County's resources. In addition to the plans listed below the County and incorporated cities also have zoning ordinances (including floodplain development regulations) and building regulations.

Jackson County's current plans and policies include the following:

[Jackson County Comprehensive Plan](#)

- Date of Last Revision: 2006
- Author/ Owner: Jackson County
- Description: The Comprehensive Plan is the official policy guide for decisions about growth, development and conservation of natural resources in Jackson County.
- Relationship to Natural Hazard Mitigation Planning: The Goal 7 Policies within Jackson County's Comprehensive Plan provide the framework for evaluating land use actions for their exposure to potential harm from natural hazards. The policies guide the identification of areas subject to natural hazards, regulation of development in those areas and protection of citizens, property and the environment from the effects of natural hazards. The protection methods prescribed by these policies include prevention and preparedness, land use regulation, use of natural systems to mitigate hazards, public education and collaboration with other organizations. These policies also guide development of this Natural Hazards Mitigation Plan. Likewise, the risk assessment and mitigation action items identified within this Natural Hazards Mitigation Plan should also influence the Comprehensive Plan's findings and land use policies.

⁴³ Burby, Raymond J., ed. 1998. Cooperating with Nature: Confronting Natural Hazards with Land-Use Planning for Sustainable Communities.

[Rogue Valley Integrated Community Wildfire Protection Plan](#)

- Date of Last Revision: 2017
- Author/ Owner: Jackson County/Josephine County
- Description: The mission of the RVIFP is to “Reduce the risk of wildfire to life, property, and natural resources in the Rogue Valley by encouraging coordination among public agencies, community organizations, private landowners, and the public to increase their awareness of, and responsibility for, fire issues”.
- Relationship to Natural Hazard Mitigation Planning: The Community Wildfire Protection Plan (CWPP) is intended to be adopted for incorporation within the Jackson County Natural Hazard Mitigation Plan. The CWPP contains goals and actions that seek to minimize the County’s risk to wildfire hazards.

[Jackson County Emergency Operations Plan](#)

- Date of Last Revision: 2011
- Author/ Owner: Jackson County
- Description: The Jackson County Emergency Operations Plan (EOP) is based on a thorough analysis of the natural and human-made hazards that could affect the county. This analysis is the first step in planning for mitigation, response and recovery actions. The method used in this analysis provides a sense of hazard priorities, or relative risk. It does not predict the occurrence of a particular hazard, but it does “quantify” the risk of one hazard compared with another. By doing this analysis, planning can then be focused where the risk is the greatest.
- Relationship to Natural Hazard Mitigation Planning: the EOP includes information that is relevant to the Jackson County Natural Hazard Mitigation Plan and vice versa. Hazard rankings from the EOP were included in the Natural Hazard Mitigation Plan’s Hazard Chapters. Ideally, the EOP and Natural Hazard Mitigation Plan will eventually share and benefit from one risk assessment. As such, information from the NHMP may be integrated into the EOP.

[Jackson County Transportation Systems Plan](#)

- Date of Last Revision: 2005
- Author/ Owner: Kittleson and Associates/Jackson County
- Description: Establishes the County’s goals, policies and action strategies for developing the transportation system within Jackson County.
- Relation to Natural Hazard Mitigation Planning: Transportation systems are important in evacuating and responding to natural disasters. Mitigation actions that focus on strengthening the transportation system can be incorporated into the Transportation Systems Plan.

Other plans are available via the [County website](#) or by contacting staff.

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SECTION 3:

HAZARD IDENTIFICATION AND RISK ASSESSMENT

This section of the NHMP addresses 44 CFR 201.6(b)(2) - Risk Assessment. The Risk Assessment applies to Jackson County and the city addenda included in the NHMP. We address city specific information where relevant. In addition, this chapter can assist with addressing Oregon Statewide Planning Goal 7 – Areas Subject to Natural Hazards.

We use the information presented in this section, along with community characteristics presented in Volume I, Section 2 to inform the risk reduction actions identified Volume I, Section 4. Figure 3-1 below shows how we conceptualize risk in this NHMP. Ultimately, the goal of hazard mitigation is to reduce the area where hazards and vulnerable systems overlap.

Figure 3-1 Understanding Risk



Source: Oregon Partnership for Disaster Resilience.

What is a Risk Assessment?

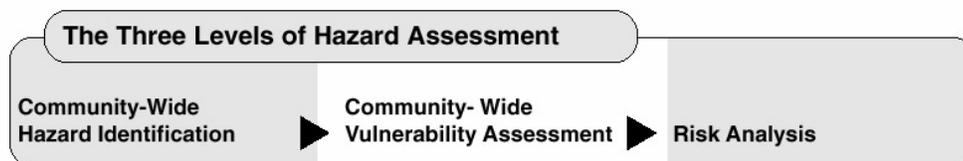
A risk assessment consists of three phases: hazard identification, vulnerability assessment and risk analysis.

- **Phase 1:** Identify hazards that can affect the jurisdiction. This includes an evaluation of potential hazard impacts – type, location, extent, etc.
- **Phase 2:** Identify important community assets and system vulnerabilities. Example vulnerabilities include people, businesses, homes, roads, historic places and drinking water sources.

- **Phase 3:** Evaluate the extent to which the identified hazards overlap with, or have an impact on, the important assets identified by the community.

The following figure illustrates the three-phase risk assessment process:

Figure 3-2 Three Phases of a Risk Assessment



Source: Planning for Natural Hazards: Oregon Technical Resource Guide, 1998

This three-phase approach to developing a risk assessment should be conducted sequentially because each phase builds upon data from prior phases. However, gathering data for a risk assessment need not occur sequentially.

Hazard Identification

Jackson County identifies nine natural hazards that could have an impact on the County and participating cities. Table 3-1 lists the hazards identified in the county in comparison to the hazards identified in the Oregon NHMP for the Southwest Oregon (Region 4), which includes Jackson County.

Table 3-1 Jackson County Hazard Identification

Jackson County	State of Oregon NHMP Region 4: Southwest Oregon
Drought	Drought
Earthquake	Earthquake
Emerging Infectious Disease	N/A
Flood	Flood
Landslide	Landslide
Volcano	Volcano
Wildfire	Wildfire
Windstorm	Windstorm
Winter Storm	Winter Storm

Source: Jackson County NHMP Steering Committee (2017) and State of Oregon NHMP, Region 4: Southwest Oregon (2015)

The following subsections briefly describe relevant information for each hazard. For additional background on the hazards, vulnerabilities and general risk assessment information for hazards in Southwest Oregon (Region 4), refer to the [State of Oregon NHMP, Region 4, Southwest Oregon Risk Assessment \(2015\)](#).

Drought

Significant Changes since Previous NHMP:

Two (2) significant drought events have occurred since the previous NHMP.

Table 3-2 Drought Summary

Hazard	Drought
Type	Climatic
Speed of Onset	Slow
Location	Varies, Countywide
Extent	Moderate to Severe Drought*
Prior Occurrence	Four > 6 month duration since 1983
Probability	~12%

Sources: Oregon NHMP; NRCS; analysis by OPDR

Note: *Defined as between -2 and -4 on the National Resource Conservation Service (NRCS) Surface Water Supply Index (SWSI)

Characteristics

A drought is a period of drier than normal conditions. Drought occurs in virtually every climatic zone, but its characteristics vary significantly from one region to another. Drought is a temporary condition; it differs from aridity, which is restricted to low rainfall regions and is a permanent feature of climate. The extent of drought events depends upon the degree of moisture deficiency and the duration and size of the affected area. Typically, droughts occur as regional events and often affect more than one city and county.

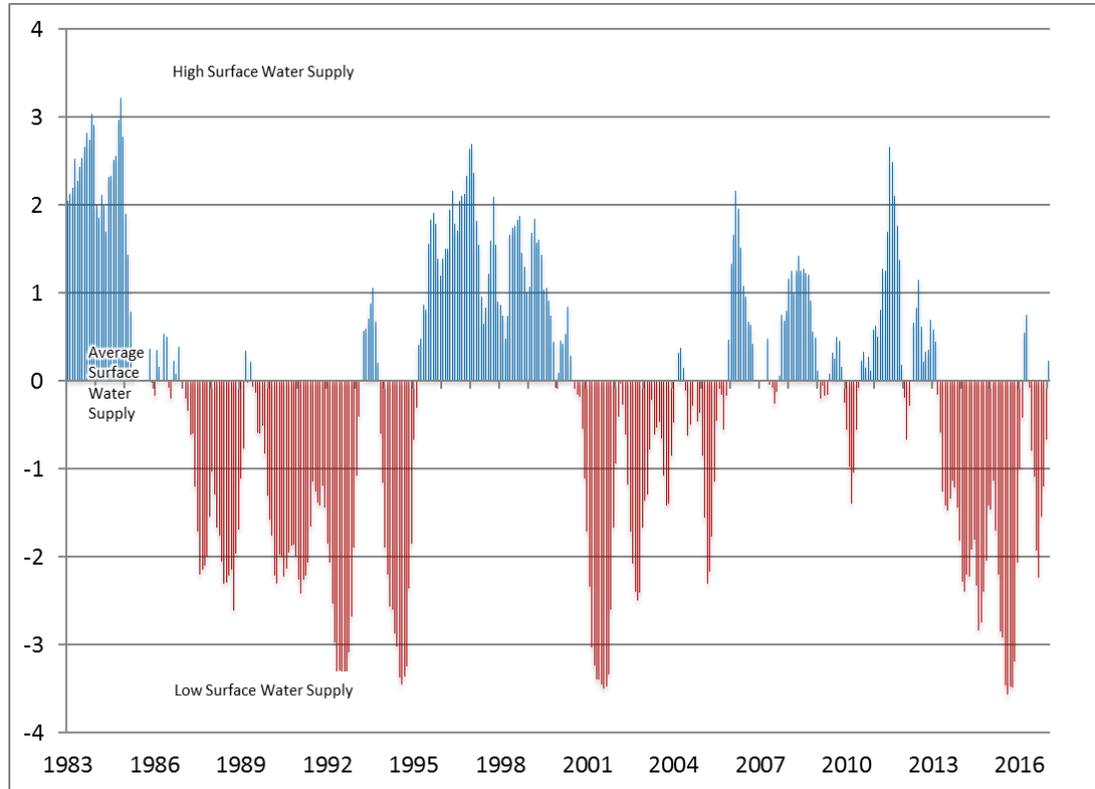
Location and Extent

Droughts occur in every climate zone and can vary from region to region. Drought may occur throughout Jackson County and may have profound effects on the economy, particularly the agricultural and hydro-power sectors. Drought is typically measured in terms of water availability in a defined geographical area. It is common to express drought with a numerical index that ranks severity. Most federal agencies use the Palmer Method which incorporates precipitation, runoff, evaporation and soil moisture. However, the Palmer Method does not incorporate snowpack as a variable. Therefore, it is not believed to provide a very accurate indication of drought conditions in Oregon and the Pacific Northwest.

The Surface Water Supply Index (SWSI) from the Natural Resources Conservation Service is an index of current water conditions throughout the state. The index utilizes parameters derived from snow, precipitation, reservoir and stream flow data. NRCS collects data each month from key stations in each basin. The lowest SWSI value, -4.2, indicates extreme drought conditions (Low Surface Water Supply ranges from -1.6 to -4.2). The highest SWSI value, +4.2, indicates extreme wet conditions (High Surface Water Supply ranges from +1.6 to +4.2). The mid-point is 0.0, which indicates an average water supply (Average Water Supply ranges from +1.5 to -1.5). Figure 3-3 below shows the monthly history of SWSI values from 1982 to 2017 for the Rogue and Umpqua Basin which includes Jackson County.

Research shows that the periods of drought have fluctuated; recent drought periods occurred (SWSI <-3.0 for four or more months) in 1992, 1994, 2001 and 2015. In addition, seven (7) executive orders declaring drought emergencies have occurred since 1991, the two most recent in 2014 and 2015; the 2015 drought was also federally declared.¹

Figure 3-3 SWSI Values for the Rogue & Umpqua Basin (1983-2016)



Source: Department of Agriculture-Natural Resources Conservation Service, "Surface Water Supply Index, Rogue/Umpqua Basin" www.or.nrcs.usda.gov. Accessed January 2018.

History

- **1904-1905:** Statewide drought period for about 18 months.
- **1928-1941:** A significant drought affected all of Oregon from 1928 to 1941. The prolonged statewide drought created significant problems for the agricultural industry. The first of the three Tillamook Forest burns occurred during this drought in 1933.
- **1976-1981:** Low stream flows prevailed in western Oregon during the period from 1976-1981, but the worst year by far was 1976-1977, the single driest year of the century.
- **1985-1997:** A dry period lasting from 1985 to 1994 caused significant problems statewide. The peak year was 1992 when the state declared a drought emergency. In the seven-year period from 1986-1992, Medford received only five years' worth of precipitation and other areas of southern Oregon were also significantly affected. Forests throughout Oregon suffered from a lack of moisture with fires common and

¹ Oregon Water Resources Department Public Declaration Status Report, http://apps.wrd.state.or.us/apps/wr/wr_drought/declaration_status_report.aspx, accessed July 19, 2017.

insect pests flourishing. *Drought status was declared by the governor in 1991 ([EO-91-05](#)), 1992 ([EO-92-21](#)) and 1994 ([EO-94-09](#)).*

- **2000-2001:** Klamath drought intensifies; low snowpack in mountains worsen conditions. Draw down at Detroit Lake, all but curtails lake recreation. Drought status was declared by the governor in 2001 ([EO-01-11](#)).
- **2005:** February 2005 was the driest month on record since 1977, surpassing 2001 conditions. Above normal temperatures contributed to decreased water availability for the summer. Stream and river levels dropped significantly and watermasters regulated live flow use by irrigators. Drought conditions also led to the use of stored water, when it was available.
- **2010:** *Determination of a State of Drought Emergency in Klamath County and adjacent counties (including Jackson County) due to Drought and Low Water Conditions ([EO-10-03](#)).*
- **2014:** *Determination of a State of Drought Emergency in Jackson County due to Drought and Low Water Conditions ([EO-14-04](#)).*
- **2015:** *Determination of a state of drought emergency in Deschutes, Grant, Jackson, Josephine, Lane, Morrow, Umatilla and Wasco counties due to drought, low snow pack levels and low water conditions. Drought status was also declared by the President ([EO-15-05](#)).*

El Niño/La Nina

El Niño Southern Oscillation (ENSO) weather patterns can increase the frequency and severity of drought. During El Niño periods, alterations in atmospheric pressure in equatorial regions yield an increase in the surface temperature off the west coast of North America. This gradual warming sets off a chain reaction affecting major air and water currents throughout the Pacific Ocean; La Niña periods are the reverse with sustained cooling of these same areas. In the North Pacific, the Jet Stream is pushed north, carrying moisture laden air up and away from its normal landfall along the Pacific Northwest coast. In Oregon, this shift results in reduced precipitation and warmer temperatures, normally experienced several months after the initial onset of the El Niño. These periods tend to last nine to twelve months, after which surface temperatures begin to trend back towards the long-term average. El Niño periods tend to develop between March and June and peak from December to April. ENSO generally follows a two to seven-year cycle, with El Niño or La Niña periods occurring every three to five years. However, the cycle is highly irregular and no set pattern exists. The last major El Niño was during 1997-1998 and in 2015-2016 Oregon experience a “super” El Niño (the strongest in 15 years, the two previous events occurred in 1982-1983 and 1997-1998) that included record rainfall and snowpack in areas of the state.²

Future Climate Variability³

Climate models for Oregon suggest, future regional climate changes include increases in temperature around 0.2-1°F per decade in the 21st Century, along with warmer and drier summers and some evidence that extreme precipitation will increase in the future. Increased droughts may occur in the Rogue Valley under various climate change scenarios as

² Cho, Renne. “El Nino and global warming – what’s the connection.” Phys.org, February 3, 2016. <https://phys.org/news/2016-02-el-nino-global-warmingwhat.html>

³ Oregon Climate Change Research Institute (OCCRI), Oregon Climate Assessment Report (2010) and Northwest Climate Assessment Report (2013). <http://occri.net/reports>

a result of various factors, including reduced snowpack, rising temperatures and likely reductions in summer precipitation. Climate models suggest that as the region warms, winter snow precipitation will likely shift to higher elevations and snowpack will be diminished as more precipitation falls as rain altering surface flows. The negative effect of climate change on winter snow precipitation plays a significant role in anticipating drought risk in Jackson County as periods of drought (see Figure 3-3) occur during the winter seasons.

Probability Assessment

Droughts are not uncommon in the State of Oregon, nor are they just an “east of the mountains” phenomenon. They occur in all parts of the state, in both summer and winter. Oregon’s drought history reveals many short-term and a few long-term events. The average recurrence interval for severe droughts in Oregon is somewhere between 8 and 12 years. According to SWSI analysis there have been four (4) droughts between 1983 and 2017 (see Figure 3-3). Based on the available data and research for Jackson County the NHMP Steering Committee assessed the **probability of experiencing a locally severe drought as “High,”** meaning one incident is likely within the next 10 to 35 years; *this rating has increased since the previous NHMP.*

Vulnerability Assessment

The environmental and economic consequences can be significant, especially for the agricultural sector. Drought also increases the probability of wildfires – a major natural hazard concern for Jackson County. Drought can affect all segments of Jackson County’s population, particularly those employed in water-dependent activities (e.g., agriculture, hydroelectric generation, recreation, etc.). Also, domestic water-users may be subject to stringent conservation measures (e.g., rationing) as per the County’s water management plan.

All parts of Jackson County are susceptible to drought, however, the following areas and issues are of particular concern:

- Drinking water system
- Power and water enterprises
- Residential and community wells in rural areas
- Fire response capabilities
- Fish and wildlife

Major county water supplies include the Rogue River, Bear Creek and Big Butte Creek. Potential impacts to these water supplies and the agriculture industry are the greatest threats. Additionally, long-term drought periods of more than a year can impact forest conditions and set the stage for potentially destructive wildfires. The NHMP Steering Committee rated the County as having a **“moderate” vulnerability to drought hazards,** meaning 1 - 10% of the region’s population or assets would be affected by a major drought emergency or disaster; *this rating has not changed since the previous NHMP.*

More information on this hazard can be found in the [Risk Assessment for Region 4, Southwest Oregon, of the Oregon NHMP \(2015\).](#)

Earthquake

Significant Changes since Previous NHMP:

The Oregon Resilience Plan (2013) and Upper Rogue Watershed Multi-Hazard Risk Report have been cited and incorporated where applicable. The probability and vulnerability ratings were updated to distinguish between a Cascadia Subduction Zone event and a crustal event.

Table 3-3 Earthquake Summary - Crustal

Hazard	Earthquake - Crustal
Type	Geologic
Location	No active faults in county
Speed of Onset	Rapid
Extent	Very Strong to Severe shaking ~ 500 yrs
Prior Occurrence	Two over Magnitude 5 last 100 yrs*
Probability	Approximately 1% annual

Sources: Oregon NHMP; DOGAMI; analysis by OPDR

Notes: *1993 Klamath Falls earthquakes east of Jackson County

Table 3-4 Earthquake Summary - Subduction

Hazard	Earthquake - Subduction
Type	Geologic
Location	Primarily west of the Cascades; CA - BC
Speed of Onset	Rapid
Extent	Catastrophic
Prior Occurrence	One over Magnitude 9 last 500 yrs
Probability	Magnitude 9+ is 7% - 12% over 50 yrs

Sources: Oregon NHMP; DOGAMI; analysis by OPDR

Characteristics

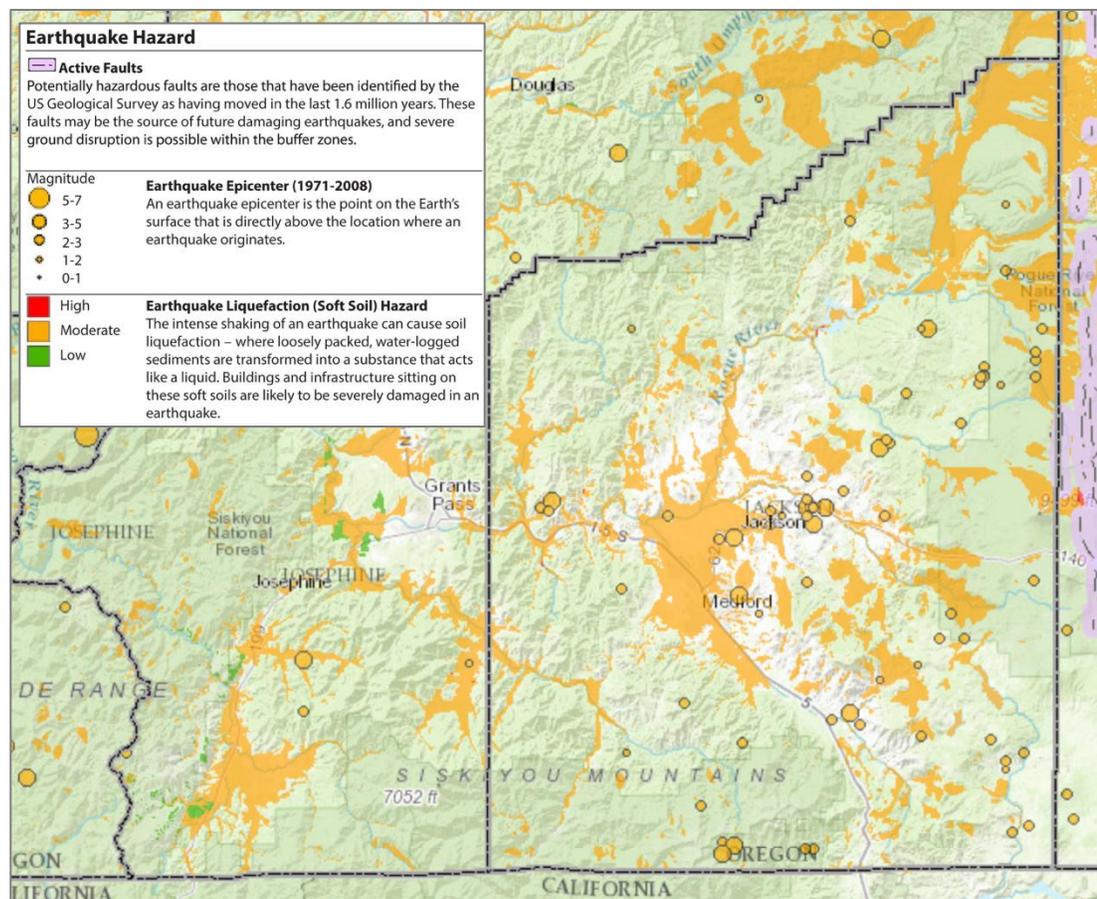
The Pacific Northwest in general is susceptible to earthquakes from four sources: 1) the offshore Cascadia Subduction Zone; 2) deep intraplate events within the subducting Juan de Fuca Plate; 3) shallow crustal events within the North American Plate and 4) earthquakes associated with volcanic activity.

According to the Oregon NHMP, the return period for the largest of the CSZ earthquakes (Magnitude 9.0+) is 530 years with the last CSZ event occurring 314 years ago in January of 1700. The probability of a 9.0+ CSZ event occurring in the next 50 years ranges from 7 - 12%. Notably, 10 - 20 "smaller" Magnitude 8.3 - 8.5 earthquakes occurred over the past 10,000 years that primarily affected the southern half of Oregon and northern California. The average return period for these events is roughly 240 years. The combined probability of any CSZ earthquake occurring in the next 50 years is 37 - 43%.

Location and Extent

Figure 3-4 shows a generalized geologic map of Jackson County and includes the areas for potential low and moderate liquefaction. These areas of moderate liquefiable soft soil hazards are concentrated around corridors of the Rogue and Applegate Rivers and the Rogue River tributaries of Evans Creek and Bear Creek. The central-county region around Medford, Jacksonville, Eagle Point, Central Point, Gold Hill, Phoenix, Rogue River, Shady Cove and surrounding Ashland. The majority of the earthquakes shown in the figure below are low-impact events below M 3.0, although 6 mapped events are shown with M 3-5. The larger events may have been slightly felt but little to no structural/property damage resulted. Thus, the seismic hazard for Jackson County arises predominantly from major earthquakes on the Cascadia Subduction Zone. Smaller, crustal earthquakes in or near Jackson County could be locally damaging, but would not be expected to produce widespread or major damage.

Figure 3-4 Earthquake Epicenters (1971-2008), Active Faults and Soft Soils



Source: [Oregon HazVu: Statewide Geohazards Viewer \(HazVu\)](#)

Note: [To view detail click the link above to access Oregon HazVu.](#)

The Oregon Department of Geology and Mineral Industries (DOGAMI), in partnership with other state and federal agencies, has undertaken a rigorous program in Oregon to identify seismic hazards, including active fault identification, bedrock shaking, tsunami inundation zones, ground motion amplification, liquefaction and earthquake induced landslides. DOGAMI has published a number of seismic hazard maps that are available for communities

to use. The maps show liquefaction, ground motion amplification, landslide susceptibility and relative earthquake hazards. OPDR used the DOGAMI Statewide Geohazards Viewer to present a visual map of recent earthquake activity, active faults and liquefaction; ground shaking is generally expected to be higher in the areas marked by soft soils in the map above. The severity of an earthquake is dependent upon a number of factors including: 1) the distance from the earthquake's source (or epicenter); 2) the ability of the soil and rock to conduct the earthquake's seismic energy; 3) the degree (i.e., angle) of slope materials; 4) the composition of slope materials; 5) the magnitude of the earthquake; and 6) the type of earthquake.

For more information, see the following reports:

[Open-File-Report: O-2003-02 – Map of Selected earthquakes for Oregon \(1841-2002\), 2003](#)

[Open-File-Report: O-2007-02 - Statewide seismic needs assessment: Implementation of Oregon 2005 Senate Bill 2 relating to public safety, earthquakes, and seismic rehabilitation of public buildings, 2007](#)

[Interpretive Map Series: IMS-9 - Relative earthquake hazard maps for selected urban areas in western Oregon 2000](#)

[Open-File-Report: O-2013-22 - Cascadia Subduction Zone earthquakes: A magnitude 9.0 earthquake scenario, 2013](#)

Additional reports are available via DOGAMI's Publications Search website:
<http://www.oregongeology.org/pubs/search.php>

Other agency/ consultant reports:

[Oregon Resilience Plan \(2013\)](#)

[The Impacts of the Cascadia Subduction Zone Earthquake on Oregon – Jackson and Josephine Counties](#)

History

Jackson County has not experienced any major earthquake events in recent history. Seismic events do, however, pose a significant threat. There have been several significant recent earthquakes in the region, primarily located in Klamath and Lake Counties in southern Oregon. The region has also been shaken historically by crustal and intraplate earthquakes and prehistorically by subduction zone earthquakes centered outside Central Oregon. In particular, a Cascadia Subduction Zone (CSZ) event could produce catastrophic damage and loss of life in Jackson County.

While Jackson County has not experienced any significant earthquakes in recent history, earthquakes in Oregon that have affected the county are listed below⁴ (there have not been any significant earthquake events since the previous NHMP):

- **1700 (January 26):** Offshore, Cascadia Subduction Zone (CSZ)- Approximate 9.0 magnitude earthquake generated a tsunami that struck Oregon, Washington and

⁴ Ivan Wong and Jacqueline D.J. Bolt, 1995, "A Look Back at Oregon's Earthquake History, 1841-1994", Oregon Geology, pp. 125-139.

Japan; destroyed Native American villages along the coast (additional CSZ events occurred approximately in 1400 BCE, 1050 BCE, 600 BCE, 400, 750 and 900)

- **1873 (November 23)**: 6.75 quake near California Border. Damage was reported along the coast and in Josephine and Jackson Counties. Source is speculated to be originated from the Cascadia Subduction Zone.
- **1920 (April 14)**: Quake centered near Crater Lake – No record of reported damage.
- **1993 (September 20)**: Klamath Falls Earthquakes, two (2) magnitude 5.9 and 6.0 earthquakes that caused \$7.5 million in damages and killed two (2; one heart attack, one crushed by a boulder while driving); felt in Southern Oregon.
- **1999 (November 28)**: This earthquake's epicenter was located 13.9 miles west-northwest of Klamath Falls, almost precisely where two earthquakes originated six years prior. Ground motion was felt in Medford, 45 miles away, but there were no reported injuries or damages.

Probability Assessment

Jackson County is susceptible to deep intraplate events within the Cascadia Subduction Zone (CSZ), where the Juan de Fuca Plate is diving beneath the North American Plate and shallow crustal events within the North American Plate.

Establishing a probability for crustal earthquakes is difficult given the small number of historic events in the region. Earthquakes generated by volcanic activity in Oregon's Cascade Range are possible, but likewise unpredictable. For more information, see DOGAMI reports linked above.

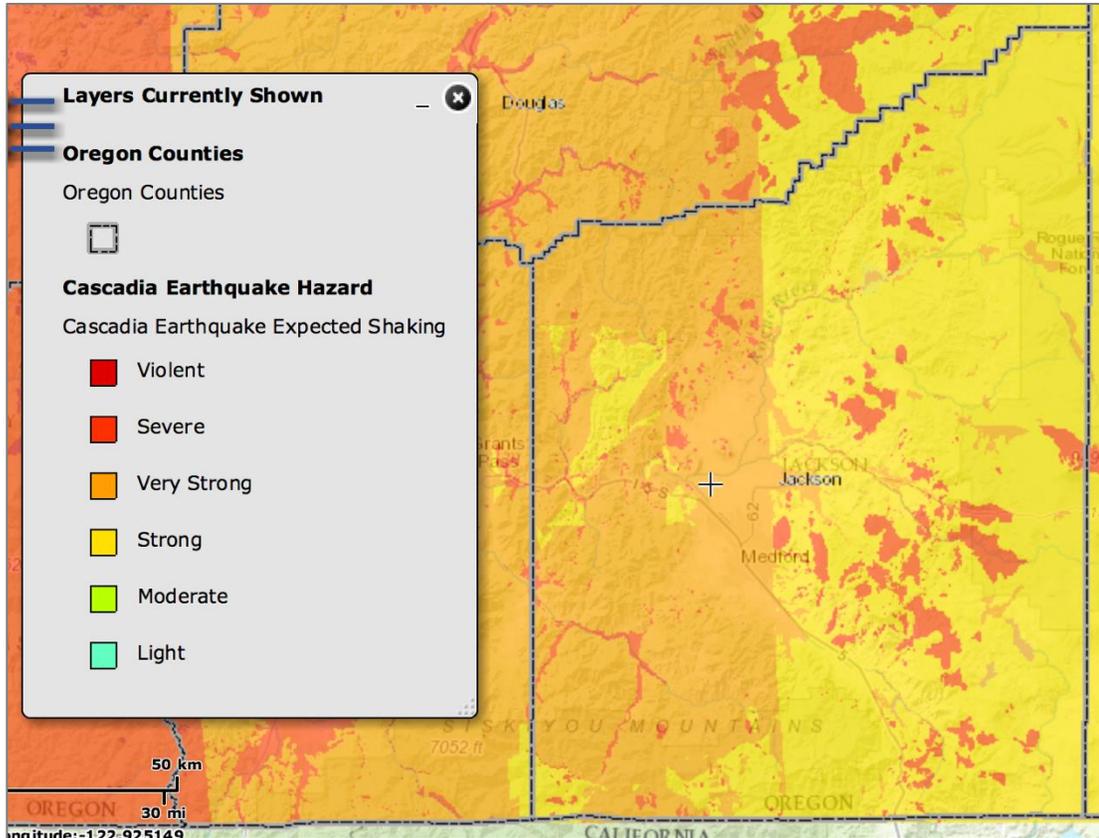
Based on the available data and research for Jackson County the NHMP Steering Committee determined the **probability of experiencing a Cascadia Subduction Zone (CSZ) is "high"**, meaning one incident is likely within the next 10 to 35 years. Additionally, the **probability of a crustal earthquake is "low"**, meaning one incident is likely within the next 75 to 100 years. *The previous NHMP rated the earthquake probability as "moderate" but did not distinguish between the crustal and CSZ events.*

Vulnerability Assessment

The local faults, the county's proximity to the Cascadia Subduction Zone, potential slope instability and the prevalence of certain soils subject to liquefaction and amplification combine to give the county a high-risk profile. Due to the expected pattern of damage resulting from a CSZ event, the Oregon Resilience Plan divides the State into four distinct zones and places Jackson County predominately within the "Valley Zone" (Valley Zone, from the summit of the Coast Range to the summit of the Cascades). Within the Southwest Oregon region, damage and shaking is expected to be strong and widespread - an event will be disruptive to daily life and commerce and the main priority is expected to be restoring services to business and residents.

Figure 3-5 below shows the expected shaking/ damage potential for Jackson County as a result of a Cascadia Subduction Zone (CSZ) earthquake event. The figure shows that the county will experience "strong" to "severe" shaking that will last two to four minutes. The strong shaking will be extremely damaging to lifeline transportation routes including I-5, Highway 140 and Highway 238. For more information on expected losses due to a CSZ event see the [Oregon Resilience Plan](#) (note, several of the County and City mitigation actions utilize the analysis within the ORP as justification and to inform their rationale).

Figure 3-5 Cascadia Subduction Zone Damage Potential



Source: [Oregon HazVu: Statewide Geohazards Viewer \(HazVu\)](#)
Note: To view detail click the link above to access Oregon HazVu.

The NHMP Steering Committee rated the County as having a **“high” vulnerability to the Cascadia Subduction Zone (CSZ) earthquake hazard** meaning that more than 10% of the region’s population or assets would be affected by a major CSZ event. Additionally, the Steering Committee rated the County as having a **“moderate” vulnerability to a crustal earthquake event**, meaning that less than 1-10% of the region’s population or assets would be affected by a major crustal earthquake event. *The previous NHMP rated the earthquake vulnerability as “high” but did not distinguish between the crustal and CSZ events.*

Natural Hazard Risk Report: Upper Rogue Watershed

The Oregon Department of Geology and Mineral Industries (DOGAMI) conducted a multi-hazard risk assessment (Risk Report) for portions of unincorporated Jackson County within the Upper Rogue Watershed, including the town of Prospect. The study was funded through the FEMA Risk MAP program and was completed in 2018. The Risk Report provides a quantitative risk assessment that informs communities of their risks related to certain natural hazards. The County hereby incorporates the Risk Report into this NHMP by reference to provide greater detail to hazard sensitivity and exposure ([DOGAMI, Open-File Report O-18-XX](#)).

The **Risk Report** identifies that during a CSZ Earthquake approximately 924 buildings may be damaged (3 critical facilities; Jackson County Fire District No. 3, Elk Trail Elementary School and Trail Community Church School) for a total loss of \$24.9 million (a loss ratio of 4.5%). In

addition, about 289 residents may be displaced (2.7% of the population). Within Prospect, nine (9) buildings may be damaged for a total loss of \$331,000 (a loss ratio of 1.7%).

1999 Assessment

Factors included in an assessment of earthquake risk include population and property distribution in the hazard area, the frequency of earthquake events, landslide susceptibility, buildings, infrastructure and disaster preparedness of the region. This type of analysis can generate estimates of the damages to the county due to an earthquake event in a specific location.

Seismic activity can cause great loss to businesses, either a large-scale corporation or a small retail shop. Losses not only result in rebuilding cost, but fragile inventory and equipment can be destroyed. When a company is forced to stop production for just a day, business loss can be tremendous. Residents, businesses and industry all suffer temporary loss of income when their source of finances is damaged or disrupted.

The potential losses from an earthquake in Jackson County extend beyond those to human life, homes, property and the landscape. A recent earthquake damage model has not been conducted for Jackson County, however, based upon data from a 1999 DOGAMI report rough loss estimates are available. The economic base in Jackson County is estimated at \$7.829 billion in 1999 dollars (\$11.5 billion in 2017 dollars), ranking it 6 of 36 Oregon counties in 1999). It is expected that the County will incur total direct losses valuing \$538 million in 1999 dollars (\$791 million in 2017 dollars) for the Cascadia model and \$1.191 billion in 1999 dollars (\$1.751 billion in 2017 dollars) for the 500-year model. The CSZ event direct losses amount to a loss ratio of 4-percent, while the 500-year model event direct losses amount to a loss ratio of 8%.⁵ Table 3-5 adjusts the economic loss estimates from DOGAMI's 1999 report to account for inflation and reflect potential economic loss in 2017 dollars (increases in population or additional infrastructure have not been accounted for within the tables).

⁵ DOGAMI, Special Papers: SP-29, Earthquake Damage in Oregon Preliminary Estimates of Future Earthquake Losses (1999). The loss ratio is determined as a percentage of the expected losses to the county's economic base.

Table 3-5 Jackson County Earthquake Damage Summary

Jackson County	8.5 Cascadia Subduction Zone Event	500-year model	
Injuries	428	930	These figures have a high degree of uncertainty and should be used only for general planning purposes. Because of rounding, numbers may not add up to 100%.
Death	8	18	
Displaced households	650	1,458	
Short-term shelter needs	489	1,080	
Economic losses for buildings	538 million (\$791 million*)	\$1.2 billion (\$1.8 billion*)	
Operational the day after the quake			Because the 500 year model includes several earthquakes, the number of facilities operational the "day after" cannot be calculated.
Fires Stations	75%	n/a	
Police Stations	62%	n/a	
Schools	70%	n/a	
Bridges	84%	n/a	
Economic losses to			
Highways	\$10 million (\$14.7 million*)	\$34 million (\$50 million*)	
Airports	\$2 million (\$2.9 million*)	\$8 million (\$11.8 million*)	
Communication Systems			
Economic losses	\$2 million (\$2.9 million*)	\$9 million (\$13.2 million*)	
Operating the day of the quake	81%	n/a	
Debris generated (<i>thousands of tons</i>)	434	889	

8.5 Cascadia event Building type	Percentage of buildings in damage categories				
	None	Slight	Moderate	Extensive	Complete
Agriculture	61	10	10	7	5
Commercial	58	11	13	9	6
Education	51	9	10	8	5
Government	55	11	14	10	7
Industrial	54	11	14	10	7
Residential	75	12	6	3	1

500 year model Building type	Percentage of buildings in damage categories				
	None	Slight	Moderate	Extensive	Complete
Agriculture	39	15	17	13	10
Commercial	29	15	23	18	13
Education	29	12	17	14	11
Government	29	14	22	18	14
Industrial	27	14	23	19	14
Residential	54	21	13	5	3

Source: Y. Wang & J.L. Clark, Special Paper 29, Earthquake Damage in Oregon: Preliminary Estimates of Future Earthquake Losses. 1999. DOGAMI.

Note: * - 1999 dollars were adjusted for inflation to represent estimated economic loss in 2017 dollars using the State of Oregon Employment Department Inflation Calculator.

While the expected losses have increased due to increased development and population in the county, as well as inflation, the loss ratio and relative damage for the county is expected to be similar. Local business economies are at substantial risk if an earthquake damages or otherwise necessitates the closure of any of the major transportation routes.

For more information, see: [Special Papers: SP-29, Earthquake damage in Oregon Preliminary estimates of future earthquake losses \(1999\)](#)

2007 Rapid Visual Survey

In 2007, DOGAMI completed a rapid visual screening (RVS) of educational and emergency facilities in communities across Oregon, as directed by the Oregon Legislature in Senate Bill 2 (2005). RVS is a technique used by the Federal Emergency Management Agency (FEMA), known as FEMA 154, to identify, inventory and rank buildings that are potentially vulnerable to seismic events. DOGAMI ranked each building surveyed with a 'low,' 'moderate,' 'high,' or 'very high' potential for collapse in the event of an earthquake. It is important to note that these rankings represent a probability of collapse based on limited observed and analytical data and are therefore approximate rankings. To fully assess a buildings potential for collapse, a more detailed engineering study completed by a qualified professional is required, but the RVS study can help to prioritize which buildings to survey.

As noted in the community profile approximately 61% of residential buildings were built prior to 1990, which increases the county's vulnerability to the earthquake hazard. Information on specific public buildings' (schools and public safety) estimated seismic resistance, determined by DOGAMI in 2007, is shown in Table 3-6; each "X" represents one building within that ranking category. Of the facilities evaluated by DOGAMI using a Rapid Visual Survey (RVS), 12 have a high (greater than 10% chance) collapse potential (one has been mitigated) and one (1) has a very high (100% chance) collapse potential.

Table 3-6 Rapid Visual Survey Scores

Facility	Site ID*	Level of Collapse Potential			
		Low (< 1%)	Moderate (>1%)	High (>10%)	Very High (100%)
Schools					
Table Rock Elementary (Eagle Point SD 9) (2830 Maple Court Dr, White City)	Jack_sch16	MITIGATED (2015-17 SRGP, Phase 1)			
Mountain View Elementary (Eagle Point SD 9) (7837 Hale Way)	Jack_sch17	X,X,X		X	
White Mountain Middle (Eagle Point SD 9) (550 Wilson Way)	Jack_sch40	X			
Ruch Elementary School (Medford SD 549C) (156 Upper Applegate Rd)	Jack_sch48	MITIGATED (2015-17 SRGP, Phase 1)			
Prospect School (Prospect SD 59) (160 Mill Creek Rd)	Jack_sch49	X,X,X		X	
Evans Valley School (Rogue River SD 35) (8205 E Evans Creek Rd)	Jack_sch50	X		X	
Elk Elementary (Eagle Point SD 9) (591 Elk Creek Rd)	Jack_sch51	X		X	
Applegate Elementary School (Three Rivers/Josephine County SD) (14188 Highway 238)	Jack_sch53	X		X,X	

Source: [DOGAMI 2007. Open File Report 0-07-02. Statewide Seismic Needs Assessment Using Rapid Visual Assessment.](#) "*" – Site ID is referenced on the [RVS Jackson County Map](#)

Table 3-6 Rapid Visual Survey Scores (continued)

Facility	Site ID*	Level of Collapse Potential			
		Low (< 1%)	Moderate (>1%)	High (>10%)	Very High (100%)
Community Colleges					
Table Rock - Table Rock Campus (Rogue CC) (7800 Pacific Avenue)	Jack_coc06	X			
Table Rock - Workforce Training Center (Rogue CC) (7800 Pacific Avenue)	Jack_coc07			X	
Table Rock - Crater Lake Center (Rogue CC) (7800 Pacific Avenue)	Jack_coc08			X	
Public Safety					
Applegate Valley RFPD 9 (Applegate Valley RFPD) (1095 Upper Applegate Rd)	Jack_fir19	X,X			
Applegate Valley RFPD 9 (Applegate Valley RFPD) (2170 Hwy 238)	Jack_fir04	X			
Applegate Valley RFPD 9 (Applegate Valley RFPD) (7774 Upper Applegate Rd)	Jack_fir05	X			
Evans Valley Fire District #6 (86777 E Evans Creek Rd)	Jack_fir07	X			
Jackson County Fire District #3 (8333 Agate Rd)	Jack_fir02			X	
Jackson County Fire District #5 (716 S Pacific Hwy)	Jack_fir15	X			
Lake Creek Rural Fire District (Lake Creek RFPD) (1584 S Fork Little Butte)	Jack_fir17	X			
Prospect Fire Department (276 Mill Creek Dr)	Jack_fir25			X	
Prospect Police Department (300 Mill Creek Dr)	Jack_pol10	X			
Rogue River RFPD (5474 N River Rd)	Jack_fir06			X	

Source: [DOGAMI 2007. Open File Report 0-07-02. Statewide Seismic Needs Assessment Using Rapid Visual Assessment.](#) "*" – Site ID is referenced on the [RVS Jackson County Map](#)

In addition to building damages, utility (electric power, water, wastewater, natural gas) and transportation systems (bridges, pipelines) are also likely to experience significant damage. In addition, there is a low probability that a major earthquake will result in failure of upstream dams.

Utility systems will be significantly damaged, including damaged buildings and damage to utility infrastructure, including water and wastewater treatment plants and equipment at high voltage substations (especially 230 kV or higher which are more vulnerable than lower voltage substations). Buried pipe systems will suffer extensive damage with approximately one break per mile in soft soil areas. There would be much lower rate of pipe breaks in other areas. Restoration of utility services will require substantial mutual aid from utilities outside of the affected area.⁶

⁶ Regional All Hazard Mitigation Master Plan for Jackson, Lane and Linn Counties: Phase II (2001)

Mitigation Successes

Seismic retrofit grant awards per the [Seismic Rehabilitation Grant Program](#)⁷ have been funded to retrofit Table Rock Elementary (Phase One of 2015-2017 grant award, \$1,495,500), Ruch Elementary (Phase One of 2015-2017 grant award, \$1,477,100), Jackson County Fire District 3 - Agate Lake Fire Station (Phase Two of 2015-2017 grant award, \$79,340), Jackson County Fire District 3 - Dodge Bridge Fire Station (Phase Two of 2015-2017 grant award, \$113,275) and Jackson County Fire District 3 - Sams Valley Fire Station Phase Two of 2015-2017 grant award, \$124,433).

See city addenda for mitigation successes within each city.

For more information, see: [Open-File-Report: O-2007-02 - Statewide seismic needs assessment: Implementation of Oregon 2005 Senate Bill 2 relating to public safety, earthquakes and seismic rehabilitation of public buildings, 2007](#) and

[DOGAMI Statewide Seismic Needs Assessment Using Rapid Visual Screening \(RVS\)](#)

More information on this hazard can be found in the [Risk Assessment for Region 4, Southwest Oregon, of the Oregon NHMP \(2015\)](#).

⁷ The Seismic Rehabilitation Grant Program (SRGP) is a state of Oregon competitive grant program that provides funding for the seismic rehabilitation of critical public buildings, particularly public schools and emergency services facilities.

Emerging Infectious Disease

Significant Changes since Previous NHMP:

This section is new, the County did not assess the emerging infectious disease hazard in the previous NHMP.

Table 3-7 Emerging Infectious Disease Summary

Hazard	Emerging Infectious Disease
Type	Biologic
Location	Countywide
Speed of Onset	Rapid
Extent	Minor to severe
Prior Occurrence	Minor events annually
Probability	Moderate, significant event likely within 75 years

Sources: Jackson County Public Health, CDC, analysis by OPDR

Characteristics

Emerging infectious diseases are those that have recently appeared in a population, or those whose incidence or geographic range is rapidly increasing or threatens to increase in the near future. Emerging infections may be caused by biological pathogens (e.g., virus, parasite, fungus, or bacterium) and may be: previously unknown or undetected biological pathogens, biological pathogens that have spread to new geographic areas or populations, previously known biological pathogens whose role in specific diseases was previously undetected and biological pathogens whose incidence of disease was previously declining but whose incidence of disease has reappeared (re-emerging infectious disease).⁸

The emergence and re-emergence of infectious disease may occur from a variety of factors including the evolution of biological pathogens and human behavior and practices. Population growth, travel (particularly air travel), rural to urban migration, ecological change associated with development and poverty are all examples of contributing factors. For an infectious disease to become established it needs to: be introduced into a population, have the ability to spread from person to person and cause disease and needs to sustain itself by infecting more and more people.⁹ Emerging infectious diseases may emerge when biological pathogens are transmitted to humans (zoonoses), through climate change (changes to habitats may allow diseases to spread into new geographic areas) and through acquired resistance of biological pathogens to antimicrobial medications. Emerging and re-emerging infectious diseases include: influenza, SARS and MERS, cryptosporidiosis, salmonella, norovirus, pertussis (whooping cough), West Nile Virus, Lyme disease, dengue, Zika virus, Ebola virus, hepatitis, tuberculosis, Chikungunya.

⁸ Baylor College of Medicine, *Emerging Infectious Disease*, URL: <https://www.bcm.edu/departments/molecular-virology-and-microbiology/emerging-infections-and-biodefense/emerging-infectious-diseases>, accessed September 17, 2017.

⁹ Ibid.

Location and Extent

Due to the nature and transmission of emerging infectious disease all areas within Jackson County are vulnerable. Areas that have higher concentrations of population are particularly vulnerable.

History

Jackson County regularly experiences outbreaks of infectious disease. Recent history of infectious disease is listed below:

- **1970s, Medford/Jackson County**, Outbreaks of hepatitis related to sewage disposal and septic systems that failed in clay soils.
- **1980s, Medford/Jackson County**, Outbreaks of bacterial infection and illnesses associated with E.coli related to food preparation in restaurants.
- **1992, Medford/Jackson County**, People became ill with cryptosporidiosis, a waterborne parasite. Between January and June of 1992, approximately 15,000 people had diarrheal illness lasting at least 4-days.
- **1992-present, Medford/Jackson County**, Periodic outbreaks of Norovirus and salmonella in nursing homes, assisting living facilities, and restaurants.
- **2003, Medford/Jackson County**, Outbreak of pertussis (aka whooping cough) in children. The County had the highest rate in Oregon with 53.8 cases per 100,000 residents.
- **2004, Oregon**, West Nile Virus arrives in Oregon.
- **2009, Medford/Jackson County**, H1N1 outbreak.
- **2010, Jackson County**, Outbreak of pertussis (aka whooping cough). Jackson County incidence rate was between 8.0 and 19.1 cases per 100,000 people.
- **2010-2015, Jackson County**, 23 outbreaks of Norovirus during this period.
- **2014-2015, Jackson County**, 18 communicable disease outbreaks during this period.
- **2017, Ashland/Jackson County**, Outbreak of pertussis (aka whooping cough).

Probability Assessment

Based on the available data and research for Jackson County the NHMP Steering Committee determined the **probability of experiencing an emerging infectious disease event is “moderate”**, meaning one incident is likely within the next 35 to 75-year period; *The County did not assess the emerging infectious disease hazard in the previous version of their NHMP.*

Vulnerability Assessment

The Steering Committee also determined that the County’s **vulnerability to emerging infectious disease is “high”** meaning that greater than 10% of the region’s population would be affected by a major disaster. *The County did not assess the emerging infectious disease hazard in the previous version of their NHMP.*

More information on this hazard can be found at the Centers for Disease Control and Prevention [website](#). For more detail on regional events see the Medford NHMP and visit the Jackson County Public Health [website](#).

Flood

Significant Changes since Previous NHMP:

Seven significant flood events have been added since the previous NHMP. Updated data from the Upper Rogue Watershed Multi-Hazard Risk Report, FIS and FIRM is included.

Table 3-8 Flood Summary

Hazard	Flood (Riverine)
Type	Climatic
Speed of Onset	Slow to moderate
Location	Mapped flood zones, floodplain
Extent	Moderate to severe
Prior Occurrence	17 significant events since 1964
Probability	~34% overall; 1% annual within SFHA

Sources: Oregon NHMP, DOGAMI, FEMA, analysis by OPDR

Characteristics

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.¹⁰ The principal types of floods that occur in Jackson County include: riverine floods, shallow area floods and urban floods.

Location and Extent

Jackson County lies within the Rogue River Valley between the Coastal Range to the west, the Cascade Range to the east and the Siskiyou Range to the south. Melting snow and winter rains combine to produce flood events because of the watersheds alluvial floodplain topography on the main valley floor. The main soil types of the valley are clay-loams and silty clay-loams along with extensive gravel deposits along the Rogue River and Bear Creek. These waterways easily exceed their banks in areas of flat terrain.

Floods frequently occur in Jackson County during periods of heavy rainfall and/or snowmelt. The primary sources of riverine flooding include the Rogue River, Applegate River, Bear Creek and Evans Creek along with many lesser creeks and tributaries including Ashland Creek (Ashland) and Little Butte Creek (Eagle Point). Communities near these waterways are all susceptible to flood damage during a flood event. A common thread from these water courses is their potential to disrupt infrastructure by causing landslides, inundating roads and eroding river banks and bridge abutments.

¹⁰ Taylor, George H. and Chris Hannan. *The Oregon Weather Book*. Grants Pass, OR: Oregon State University Press. 1999

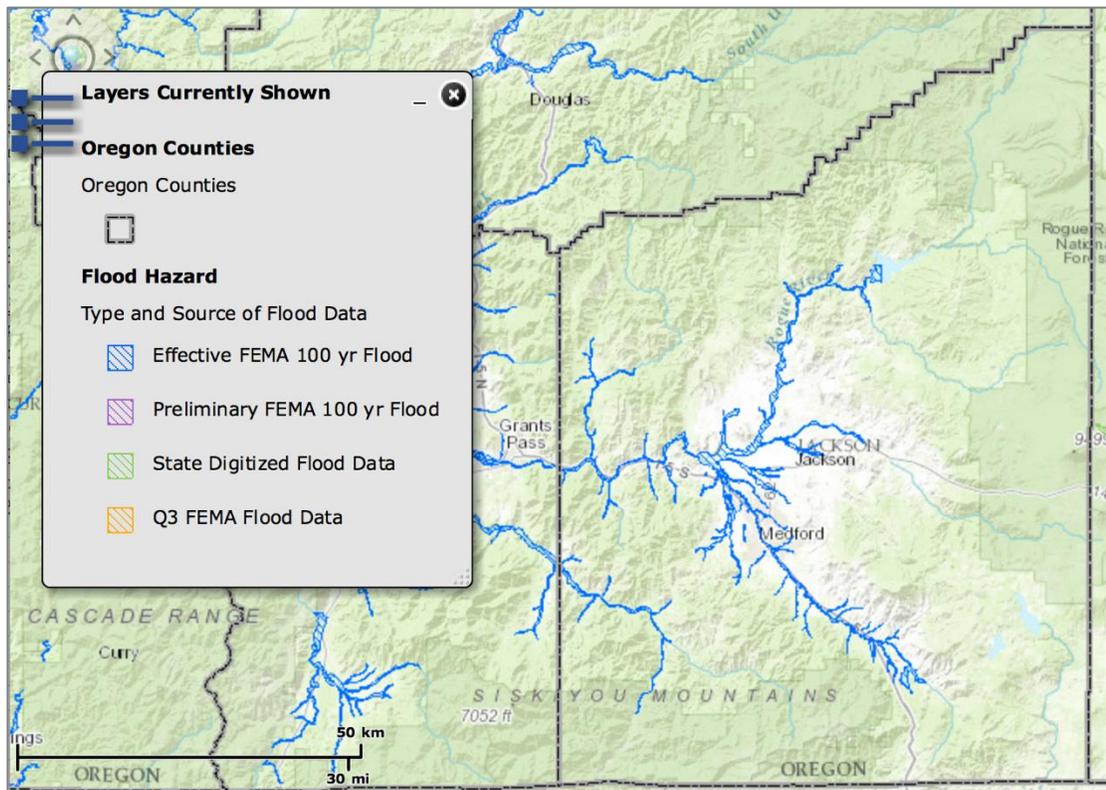
Floods are described in terms of their extent (including the horizontal area affected and the vertical depth of floodwaters) and the related probability of occurrence. Flood studies often use historical records, such as streamflow gages, to determine the probability of occurrence for floods of different magnitudes. The probability of occurrence is expressed in percentages as the chance of a flood of a specific extent occurring in any given year.

The magnitude of flood used as the standard for floodplain management in the United States is a flood having a one percent probability of occurrence in any given year. This flood is also known as the 100-year flood or base flood. The most readily available source of information regarding the 100-year flood is the system of Flood Insurance Rate Maps (FIRMs) prepared by FEMA. These maps are used to support the National Flood Insurance Program (NFIP). The FIRMs show 100-year floodplain boundaries for identified flood hazards. These areas are also referred to as Special Flood Hazard Areas (SFHAs) and are the basis for flood insurance and floodplain management requirements.

Areas with significant development in the mapped Rogue River floodplain include Gold Hill, Eagle Point, Rogue River, Shady Cove and White City (unincorporated); and areas of the Bear Creek floodplain within the cities of Ashland, Central Point, Jacksonville, Medford, Phoenix and Talent along I-5 (Bear Creek). For more information, refer to the following Flood Insurance Study (FIS) and associated Flood Insurance Rate Maps (FIRM):

- [Jackson County FIS \(2018\) - Part 1](#)
- [Jackson County FIS \(2018\) - Part 2](#)
- [Jackson County FIS \(2018\) - Part 3](#)

Figure 3-6 Special Flood Hazard Area



Source: [Oregon HazVu: Statewide Geohazards Viewer \(HazVu\)](#)

Note: To view detail click the link above to access Oregon HazVu.

Additional reports are available via FEMA's Flood Map Service Center website:

<https://msc.fema.gov/portal>

Refer to the following DOGAMI report for additional information:

- Natural Hazard Risk Report for the Upper Rogue Watershed, Oregon: Including the cities of Eagle Creek, Shady Cove, Butte Falls, and the Unincorporated Community of Prospect ([DOGAMI, Open-File Report O-18-XX](#))

Additional reports are available via DOGAMI's Publications Search website:

<http://www.oregongeology.org/pubs/search.php>

History

Between the 1850's and the present, human activity significantly changed the hydrology of the Rogue and Umpqua watershed, including dams and flood control systems constructed throughout the drainage basin. More recently, increasing urbanization has contributed to changes in basin hydrology. Prior to human alteration of the river system, rivers in the region flooded larger areas more often.

Listed below are historical flooding events that affected the Rogue/Umpqua River Basin and including events related to the Rogue River and its main tributaries, Bear Creek, Evans Creek and the Applegate River. Six significant flood events have been added since the previous NHMP (shown in *italics below*):

- **1931 (March)**: Wet, mild weather consisting of rain-on-snow (ROS) with bridges and homes destroyed.
- **1950 (October)**: Severe flooding and ROS in Region 4. Six fatalities. Bridges and roads destroyed.
- **1962 (January)**: Heavy rain (3"-4" in Rogue Valley); 84 people evacuated. Great loss of farmland.
- **1964 (December)**: Infamous 1964 flood that has become an Oregon flood of record. Record flows on Rogue and Umpqua Rivers.
- **1974 (January)**: Series of storms with mild temperatures; large snowmelt with rapid runoff. Two fatalities.
- **1986 (January)**: Significant flooding in western Oregon attributable to warm, intense rain.
- **1990 (January)**: Significant flooding in western Oregon.
- **1996 (February)**: Severe storm, flooding. \$280 million in damage.
- **1996 (November)**: Tropical air mass; intense rain; landslides; power outages. (FEMA-1149-DR-OR).
- **1996 (December) – 1997 (January)**: Mild weather continues. Severe flooding in Ashland. (FEMA-1160-DR-OR).
- **2005 (December)**: \$2,840,000 in flood damage centered in Douglas, Jackson and Josephine counties.
- **2006 (June)**: Heavy rain brought flash flooding and riverine to Jacksonville, but no reported damages.
- **2007 (August)**: Heavy rains caused flash flooding and riverine floods near Ashland, no major estimated damages.

- **2010 (August):** Heavy rains in Central Point caused riverine flooding.
- **2012 (December 2)** - *The Rogue River at Gold Ray exceeded flood stage during this interval.*
- **2014 (February 14)** - *Heavy rains caused a brief flood on Little Butte Creek at Eagle Point.*
- **2014 (March 9)** - *Heavy rains led to flooding of some small streams near Eagle Point including Little Butte Creek.*
- **2015 (February 6)** – *Near the community of Wimer, ODOT reported that a portion of OR 66 from milepost 1 to 14 was closed by floodwaters and mudslides on Friday afternoon. Downed trees blocked other roads in the area. Tyler Creek road, Wagner Creek road, Savage Creek road and several BLM roads were washed out or covered by mudslides.*
- **2015 (December 13)** - *Jackson County Dispatch reported flood waters between 4 inches and 1-foot deep entering 3 homes in Shady Cove and entering one home in White City and one home in Eagle Point.*
- **2016 (January 17)** – *Evans Creek flowed out of its banks as a result of heavy regional rains.*

Probability Assessment

The Federal Emergency Management Agency (FEMA) has mapped the 10, 50, 100 and 500-year floodplains in portions of Jackson County (see referenced 2011 FIS for more information). This corresponds to a 10%, 2%, 1% and 0.2% chance of a certain magnitude flood in any given year. The 100-year flood is the benchmark upon which the National Flood Insurance Program (NFIP) is based.

Based on the available data and research for Jackson County, the NHMP Steering Committee determined the **probability of experiencing a flood is “high”**, meaning one incident is likely within the next 10 to 35-year period; *this rating has not changed since the previous NHMP.*

Vulnerability Assessment

Flooding can occur every year depending on rainfall, snowmelt or how runoff from development impacts streams and rivers. Surveys by the Department of Geology and Mineral Industries (DOGAMI), the County and FEMA have established the 100-year floodplain.

The floodplains in Jackson County are generally located along the Rogue and Applegate Rivers, Bear Creek and Evans Creek. Jackson County development regulations restrict, but do not prohibit, new development in areas identified as floodplain. This reduces the impact of flooding on future buildings. As new land has been brought into the regional Urban Growth Boundary, the applicable development codes have been applied to prevent the siting of new structures in flood prone areas.

Natural Hazard Risk Report: Upper Rogue Watershed

The **Risk Report (DOGAMI, Open-File Report O-18-XX)** identifies that during a “1% Annual Chance” Flood event (100-Year Flood) approximately 185 buildings will be damaged (0 critical facilities) for a total loss of \$323,000 (a loss ratio of 0.1%). In addition, about 157 residents may be displaced (about 1% of the population). For the town of Prospect, no buildings, infrastructure or population are expected to be at risk to flood.

For mitigation planning purposes, it is important to recognize that flood risk for a community is not limited only to areas of mapped floodplains. Other portions of the county outside of the mapped floodplains may also be at relatively high risk from over bank flooding from streams too small to be mapped by FEMA or from local storm water drainage.

The NHMP Steering Committee rated the county as having a **“moderate” vulnerability to flood hazards**, meaning that between 1-10% of the region’s population or assets would be affected by a major flood event; *this rating has not changed since the previous NHMP.*

More information on this hazard can be found in the [Risk Assessment for Region 4, Southwest Oregon, of the Oregon NHMP \(2015\).](#)

National Flood Insurance Program (NFIP) Vulnerability

FEMA updated the Flood Insurance Study (FIS) and Flood Insurance Rate Maps (FIRMs) in 2018 (effective January 19, 2018). The last Community Assistance Visit (CAV) for Jackson County was on September 19, 2006. The County is a member of the Community Rating System (CRS) and has a Class 7 rating. The table shows that the majority of flood insurance policies are for residential structures, primarily single-family homes. Table 3-9, Table 3-10, and Figure 3-7 show that as of November 2016, Jackson County (including NFIP participating incorporated cities) has 1,828 National Flood Insurance Program (NFIP) policies in force (713 within the unincorporated county). Of those, 809 are for properties that were developed before development of the initial FIRM (402 within the unincorporated county).

Flood insurance covers only the improved land, or the actual building structure. There have been 197 paid claims in the county totaling just under \$2.3 million (\$1.3 million within the unincorporated county); 132 Pre-FIRM claims paid (63 within the unincorporated county) and ten (10) substantial damage claims paid to date (7 within the unincorporated county). Repetitive loss structures (RL) are defined as a National Flood Insurance Program (NFIP)-insured structure that has had at least two paid flood losses of more than \$1,000 each in any 10-year period since 1978. Severe repetitive loss properties (SRL) is defined as a residential property that is covered under an NFIP flood insurance property and has had at least four paid flood losses of more than \$5,000 each or for which at least two separate building claims payments with the cumulative amount exceeding the market value of the building. Repetitive loss and severe repetitive loss properties are troublesome because they continue to expose lives and valuable property to the flooding hazard. Local governments as well as federal agencies such as FEMA attempt to address losses through floodplain insurance and attempts to remove the risk from repetitive loss of properties through projects such as acquiring land and improvements, relocating homes or elevating structures. Continued repetitive loss claims from flood events lead to an increased amount of damage caused by floods, higher insurance rates, and contribute to the rising cost of taxpayer funded disaster relief for flood victims.

The community repetitive flood loss record identifies eight (8) RL properties (three in the unincorporated area) countywide, two in Eagle Point, one each in Central Points, Jacksonville, and Shady Cove. Six of the RL properties are not insured. There have been 18 paid repetitive loss claims totaling \$289,151. There are no SRL properties identified in Jackson County. Substantially damaged buildings located in the Special Flood Hazard Area do not require benefit-cost analysis to qualify for mitigation funds.

Table 3-9 and Figure 3-7 provide information on the identified RL properties. The table shows that figure shows that the vast majority of RL properties are located on the Siletz River upstream from Lincoln City.

Table 3-9 Repetitive Flood Loss Detail

RL or SRL Property	Location	Jurisdiction Name	Insured?	Flood Zone	Occupancy	Historic Building	Total Paid Claims	Total Paid Amount
RL	See Map	Unincorporated	Yes	C	Single-Family	No	2	\$134,944.34
RL	See Map	Unincorporated	No	A	Single-Family	No	3	\$46,682.64
RL	See Map	Unincorporated	No	B	Assmd Condo	No	2	\$37,335.94
RL	See Map	Central Point	No	X	2-4 Family	No	2	\$17,441.69
RL	See Map	Eagle Point	No	B	Single-Family	No	2	\$3,769.74
RL	See Map	Eagle Point	No	A07	Single-Family	No	2	\$5,298.00
RL	See Map	Jacksonville	No	A06	Single-Family	No	2	\$2,941.45
RL	See Map	Shady Cove	Yes	C	Single-Family	No	3	\$40,737.55
Total							18	\$289,151.35

Source: Information compiled by Department of Land Conservation and Development, March 2018.

Map = For location details see Figure 3-7

The County complies with the NFIP through enforcement of their flood damage prevention ordinance and their floodplain management program.

Table 3-10 Flood Insurance Detail

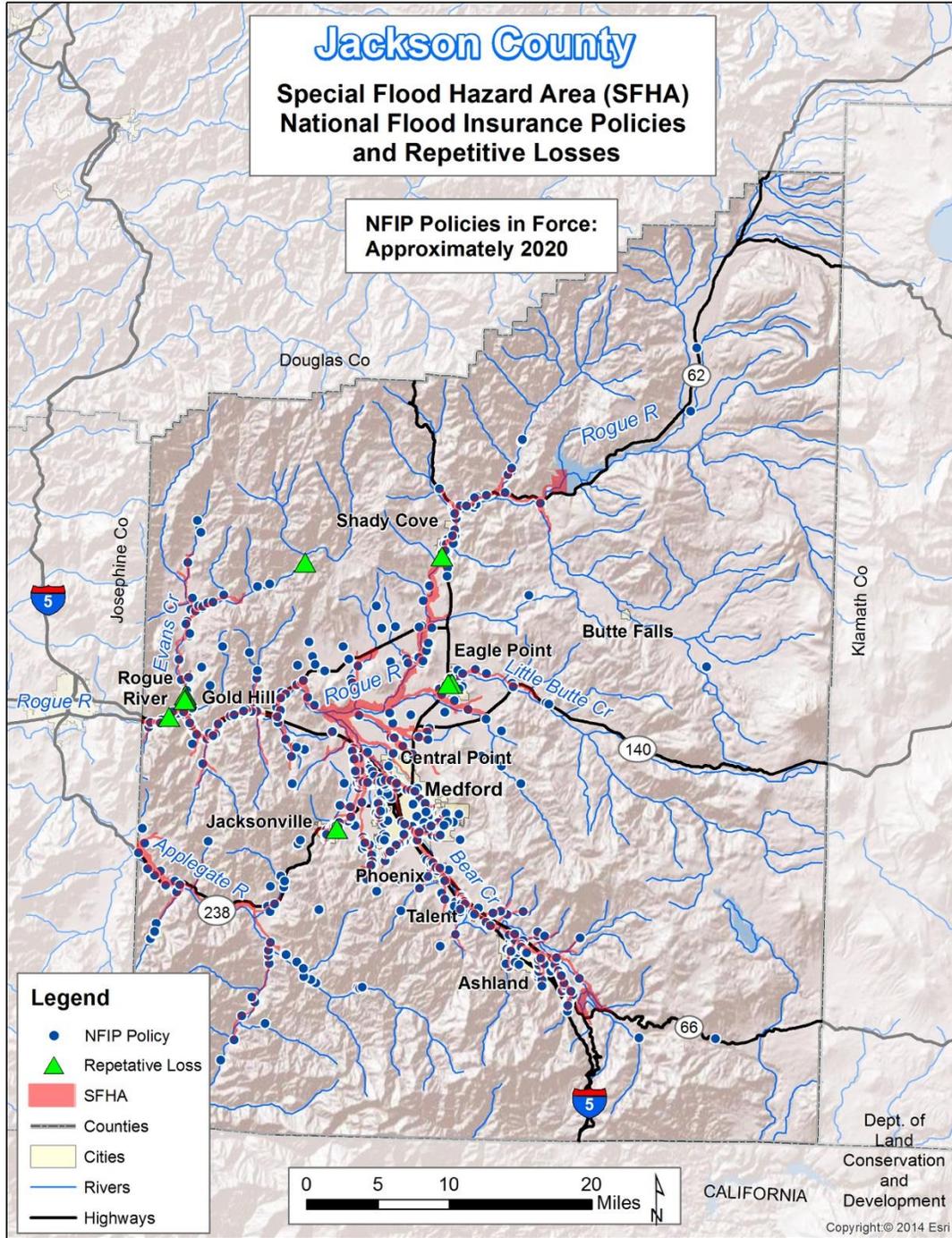
Jurisdiction	Effective FIRM and FIS	Initial FIRM Date	Total Policies	Pre-FIRM Policies	Policies by Building Type				Minus Rated A Zone
					Single Family	2 to 4 Family	Other Residential	Non-Residential	
Jackson County	-	-	1,828	809	1,568	44	91	125	126
Unincorporated	1/19/2018	4/1/1982	713	402	646	13	2	52	36
Ashland	1/19/2018	6/1/1981	114	32	78	1	22	13	3
Butte Falls	6/30/1976	6/30/1976	1	0	1	0	0	0	0
Central Point	1/19/2018	9/30/1980	288	139	277	8	0	3	21
Eagle Point	1/19/2018	9/30/1980	84	42	74	10	0	0	6
Gold Hill	1/19/2018	9/17/1980	5	2	5	0	0	0	0
Jacksonville	1/19/2018	12/4/1979	49	17	32	0	14	3	8
Medford	1/19/2018	4/15/1981	282	117	217	8	24	33	22
Phoenix	1/19/2018	5/3/1982	21	13	18	1	0	2	1
Rogue River	1/19/2018	1/2/1980	60	14	26	0	29	5	1
Shady Cove	1/19/2018	9/30/1980	115	22	104	0	0	11	16
Talent	1/19/2018	2/1/1980	96	9	90	3	0	3	12

Jurisdiction	Insurance in Force	Total Paid Claims	Pre-FIRM Claims Paid	Substantial Damage Claims	Total Paid Amount	Repetitive Loss Structures	Severe Repetitive Loss Properties	CRS Class Rating	Last Community Assistance Visit
Jackson County	\$ 442,723,400	197	132	10	\$ 2,337,660	8	0	-	-
Unincorporated	\$ 164,294,800	95	63	7	\$ 1,263,051	3	0	7	9/19/2006
Ashland	\$ 34,959,700	16	12	0	\$ 369,591	0	0	7	9/24/1997
Butte Falls	\$ 42,000	0	0	0	\$ -	0	0		8/31/2011
Central Point	\$ 70,739,100	28	20	0	\$ 149,792	1	0	6	6/16/2004
Eagle Point	\$ 20,526,500	28	17	0	\$ 264,770	2	0		4/5/1995
Gold Hill	\$ 1,370,000	0	0	0	\$ -	0	0		9/27/2011
Jacksonville	\$ 10,990,700	3	3	0	\$ 6,498	1	0		8/15/1994
Medford	\$ 74,010,700	13	9	1	\$ 88,145	0	0	8	9/29/2011
Phoenix	\$ 2,850,800	2	2	1	\$ 36,200	0	0		3/3/2002
Rogue River	\$ 10,984,900	6	3	1	\$ 103,241	0	0	8	7/11/2011
Shady Cove	\$ 28,628,300	5	2	0	\$ 41,847	1	0		5/18/2001
Talent	\$ 23,325,900	1	1	0	\$ 14,525	0	0	9	9/28/2011

Source: Information compiled by Department of Land Conservation and Development, November 2016.

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Figure 3-7 NFIP Policies, Repetitive Loss, & Severe Repetitive Loss Properties



Source: Department of Land Conservation and Development, data circa 2014, October 2016

Landslide

Significant Changes since Previous NHMP:

One (1) significant landslide event has been added since the previous NHMP. New landslide susceptibility information based on updated Lidar data provided by DOGAMI (O-16-02) has also been included. Analysis from the Upper Rogue Watershed Multi-Hazard Risk Report is also included. This section has also been reformatted.

Table 3-11 Landslide Summary

Hazard	Landslide
Type	Climatic/Geologic
Speed of Onset	Slow to rapid
Location	Steep slopes, weak geology
Extent	Minor to severe, most highly concentrated in southeastern, central, and centraleastern portions of the county including areas east of I-5 and along the North Fork Little Butte Creek
Prior Occurrence	10 significant events since 1974
Probability	~24% overall

Sources: Oregon NHMP, DOGAMI, analysis by OPDR

Characteristics

A landslide is any detached mass of soil, rock, or debris that falls, slides or flows down a slope or a stream channel. Landslides are classified according to the type and rate of movement and the type of materials that are transported. In a landslide, two forces are at work: 1) the driving forces that cause the material to move down slope, and 2) the friction forces and strength of materials that act to retard the movement and stabilize the slope. When the driving forces exceed the resisting forces, a landslide occurs.

Jackson County is subject to landslides or debris flows (mudslides), especially in the Cascade Range to the east of the county, which may affect buildings, roads and utilities.

Additionally, landslides often occur together with other natural hazards, thereby exacerbating conditions, as described below:

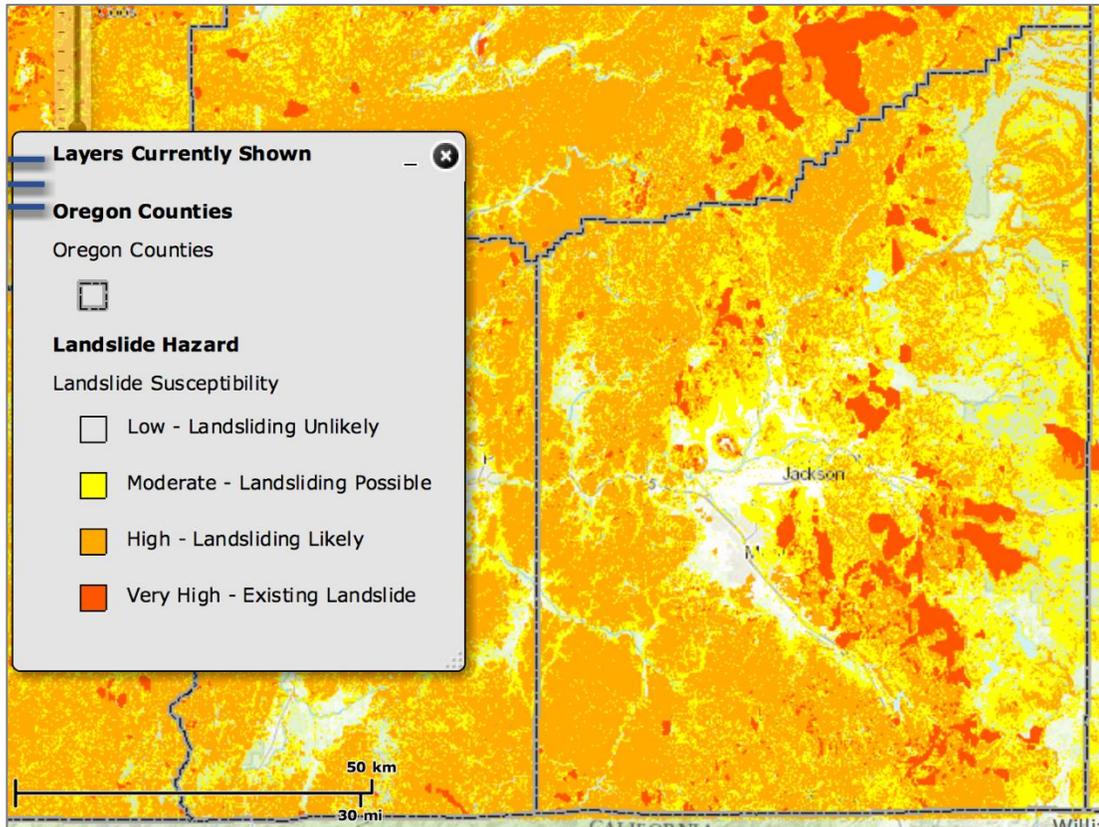
- Shaking due to earthquakes can trigger events ranging from rockfalls and topples to massive slides.
- Intense or prolonged precipitation that causes flooding can also saturate slopes and cause failures leading to landslides.
- Landslides into a reservoir can indirectly compromise dam safety and a landslide can even affect the dam itself.
- Wildfires can remove vegetation from hillsides, significantly increasing runoff and landslide potential.

Location and Extent

The characteristics of the minerals and soils present in Jackson County indicate the potential types of hazards that may occur. Rock hardness and soil characteristics can determine whether an area will be prone to geologic hazards such as landslides.

Landslides and debris flows are possible in any of the higher slope portions of Jackson County, including much of the central and eastern portions of the county. Landslide prone areas also include portions of the communities of Ashland, Gold Hill, Jacksonville, Phoenix and Talent.

Figure 3-8 Landslide Susceptibility Exposure



Source: [Oregon HazVu: Statewide Geohazards Viewer \(HazVu\)](#)

Note: To view detail click the link above to access Oregon HazVu or visit the following link: [DOGAMI Statewide Landslide Information Layer for Oregon \(SLIDO\)](#)

More detailed landslide hazard assessment at specific locations requires a site-specific analysis of the slope, soil/rock and groundwater characteristics at a specific site. Such assessments are often conducted prior to major development projects in areas with moderate to high landslide potential, to evaluate the specific hazard at the development site.

For Jackson County, many high landslide potential areas are in hilly-forested areas. Landslides in these areas may damage or destroy some timber and impact logging roads. Many of the major highways in Jackson County are at risk for landslides at one or more locations with a high potential for road closures and damage to utility lines. Especially in the

central-eastern portions of Jackson County, with a limited redundancy of road network, such road closures may isolate some communities.

In addition to direct landslide damages to roads and highways, affected communities are also subject to the economic impacts of road closures due to landslides, which may disrupt access to/egress from communities. Table 3-12 shows landslide susceptibility exposure for Jackson County and the incorporated cities. Approximately 51% of the county land has high or very high landslide susceptibility exposure. Cities within the county show no rating of very high landslide exposure susceptibility except for Ashland (0.1%) and Medford (2.6%). The majority of Jackson County cities have ratings of low to moderate landslide exposure. Gold Hill has the highest percentage of high landslide susceptibility (21%), followed by Ashland (18%) and Jacksonville (18%). Note that even if a County or city has a high percentage of area in a high or very high landslide exposure susceptibility zone, this does not mean there is a high risk, because risk is the intersection of hazard and assets.

Table 3-12 Landslide Susceptibility Exposure

Jurisdiction	Area, ft ²	Low	Moderate	High	Very High
Jackson County	78,133,339,144	17.8%%	31.3%	44.5%	6.4%
Ashland	182,893,560	39.5%	42.6%	17.8%	0.1%
Butte Falls	10,731,642	83.7%	9.8%	6.5%	0.0%
Central Point	107,071,293	91.9%	7.5%	0.6%	0.0%
Eagle Point	81,613,814	32.5%	62.1%	5.4%	0.0%
Gold Hill	20,166,729	51.1%	27.9%	21.0%	0.0%
Jacksonville	53,163,321	50.4%	31.9%	17.7%	0.0%
Medford	715,933,475	58.7%	32.6%	6.2%	2.6%
Phoenix	37,694,474	76.0%	20.8%	3.2%	0.0%
Rogue River	26,623,249	62.1%	26.5%	11.5%	0.0%
Shady Cove	56,666,101	53.2%	33.7%	13.1%	0.0%
Talent	36,432,983	75.3%	21.3%	3.5%	0.0%

Source: DOGAMI [Open-File Report, O-16-02](#), Landslide Susceptibility Overview Map of Oregon (2016)

The severity or extent of landslides is typically a function of geology and the landslide triggering mechanism. Rainfall initiated landslides tend to be smaller and earthquake induced landslides may be very large. Even small slides can cause property damage, result in injuries or take lives.

For more information, refer to the following report and maps provided by DOGAMI:

- [Open File Report: O-16-02, Landslide Susceptibility Overview Map of Oregon](#)
- [Open File Report: O-15-01, Landslide Susceptibility analysis of lifeline routes in the Oregon Coast Range \(2015\)](#)
- [Special Paper 34: Slope failures in Oregon: GIS inventory for three 1996/97 storm events, 2000](#)
- [Open File Report: O-06-11, Preliminary Geologic Map of the Sexton Mountain, Murphy, Applegate and Mount Isabelle 7.5' Quadrangles, Jackson and Josephine Counties, Oregon \(2006\)](#)
- [Open File Report: O-2009-02, Preliminary geologic map of the Robinson Butte 7.5' quadrangle, Jackson County, Oregon \(2009\)](#)

- [Open File Report: O-2011-11, Geologic database and generalized geologic map of Bear Creek Valley, Jackson County, Oregon \(2011\)](#)

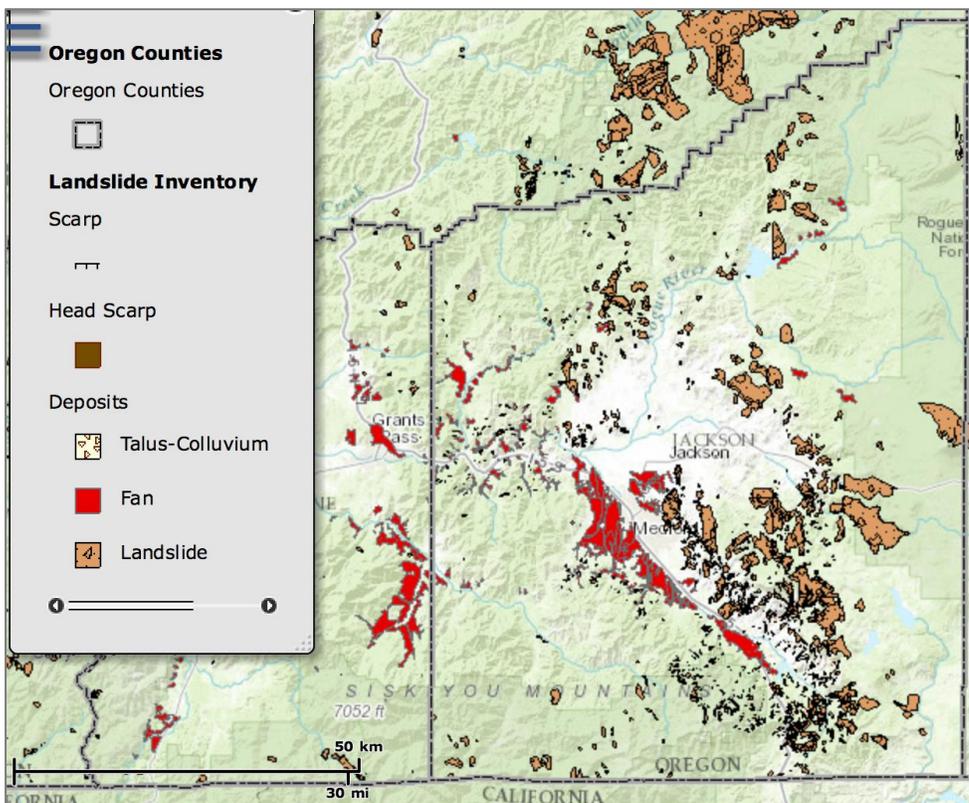
Additional reports are available via DOGAMI's Publications Search website:
<http://www.oregongeology.org/pubs/search.php>

History

Landslides may happen at any time of the year. In addition to landslides triggered by a combination of slope stability and water content, earthquakes may also trigger landslides. Areas prone to seismically triggered landslides are generally the same as those prone to ordinary (i.e., non-seismic) landslides. As with ordinary landslides, seismically triggered landslides are more likely for earthquakes that occur when soils are saturated with water.

Debris flows and landslides are a very common occurrence in hilly areas of Oregon, including portions of Jackson County. Many landslides occur in undeveloped areas and thus may go unnoticed or unreported. For example, DOGAMI conducted a statewide survey of landslides from four winter storms in 1996 and 1997 and found 9,582 documented landslides, with the actual number of landslides estimated to be many times the documented number. For the most part, landslides become a problem only when they impact developed areas and have the potential to damage buildings, roads or utilities. Figure 3-9 shows the landslide inventory for Jackson County, for additional information see the [Statewide Landslide Information Database for Oregon](#).

Figure 3-9 Landslide Inventory



Source: [Oregon HazVu: Statewide Geohazards Viewer \(HazVu\)](#)

Note: To view detail click the link above to access Oregon HazVu or visit the following link: [DOGAMI Statewide Landslide Information Layer for Oregon \(SLIDO\)](#)

Below are listed the most severe landslide events, one (1) landslide event has been added since the previous NHMP (as shown in *italics* below):

- **1997 (January):** New Year's flood caused a broad series of landslides in Jackson County resulting from heavy rain and flood conditions. Road damages near Butte Falls and other areas of the county caused a total of \$1,740,000 in damage.
- **2015 (February 6):** *ODOT reported that a portion of OR 66 from milepost 1 to 14 was closed by floodwaters and mudslides on Friday afternoon. Downed trees blocked other roads in the area. Tyler Creek road, Wagner Creek road, Savage Creek road and several BLM roads were washed out or covered by mudslides.*

For additional history see flood section above for events that included landslides.

Probability Assessment

The probability of rapidly moving landslide occurring depends on a number of factors, including steepness of slope, slope materials, local geology, vegetative cover, human activity and water. There is a strong correlation between intensive winter rainstorms and the occurrence of rapidly moving landslides (debris flows). Consequently, the National Weather Service tracks storms during the rainy season, monitors rain gauges and snow melt and issues warnings as conditions warrant. Given the correlation between precipitation, snowmelt and rapidly moving landslides, it would be feasible to construct a probability curve. The installation of slope indicators or the use of more advanced measuring techniques could provide information on slower moving slides.

Geo-engineers with the Oregon Department of Geology and Mineral Industries (DOGAMI) estimate widespread landslides about every 20 years; landslides at a local level can be expected every two or three years.¹¹

Based on the available data and research for Jackson County the NHMP Steering Committee determined the **probability of experiencing a landslide or debris flow is "high"**, meaning at least one incident is likely within the next 10 to 35-year period; *this rating has not changed since the previous NHMP.*

Vulnerability Assessment

To a large degree, landslides are very difficult to predict. Vulnerability assessments assist in predicting how different types of property and population groups will be affected by a hazard.¹² The optimum method for doing this analysis at the city or county level is to use parcel-specific assessment data on land use and structures.¹³ Data that includes specific landslide-prone and debris flow locations in the county can be used to assess the population and total value of property at risk from future landslide occurrences.

Landslides can impact major transportation arteries, blocking residents from essential services and businesses. Many aspects of the county are vulnerable to landslides. This includes land use and development patterns, the economy, population segments, ecosystem services and cultural assets.

¹¹Mills, K. 2002. Oregon's Debris Flow Warning System. Cordilleran Section—98th Annual Meeting. Corvallis.

¹² Burby, R., ed. 1998. Cooperating with Nature. Washington D.C.: Joseph Henry Press.

¹³ Burby, R., ed. 1998. Cooperating with Nature. Washington D.C.: Joseph Henry Press.

A quantitative landslide hazard assessment requires overlay of landslide hazards (frequency and severity of landslides) with the inventory exposed to the hazard (value and vulnerability) by considering:

- Extent of landslide susceptible areas;
- Inventory of buildings and infrastructure in landslide susceptible areas;
- Severity of earthquakes or winter storm event (inches of rainfall in 24 hours);
- Percentage of landslide susceptible areas that will move and the range of movements (displacements) likely; and
- Vulnerability (amount of damage for various ranges of movement).

Currently, no countywide data is available, however, data is available for the Upper Rogue Watershed.

Natural Hazard Risk Report: Upper Rogue Watershed

The **Risk Report** ([DOGAMI, Open-File Report O-18-XX](#)) identifies that there are 1,098 buildings (0 critical facilities) exposed to high or very high landslide susceptibility for a total potential loss of \$61.4 million (a loss ratio of just over 11%). In addition, about 950 residents may be displaced (about 9% of the population). For the town of Prospect, no buildings, infrastructure or population are expected to be at risk to landslide.

As such, the NHMP Steering Committee rated the County as having a **“low” vulnerability to landslide hazards**, meaning that less than 1% of the region’s population or assets would be affected by a major disaster; *this rating has not changed since the previous NHMP.*

More information on this hazard can be found in the [Risk Assessment for Region 4, Southwest Oregon, of the Oregon NHMP \(2015\)](#).

Severe Weather

Severe weather in Jackson County can account for a variety of intense and potentially damaging weather events. These events include windstorms and winter storms. The following section describes the unique probability and vulnerability of each identified weather hazard. Other more abrupt or irregular events such as hail are also described in this section.

Windstorm

Significant Changes since Previous NHMP:

The windstorm hazard section has been edited to reference new history since the previous NHMP. This section has also been reformatted.

Previously, windstorms were not rated individually, instead being included in the collective severe weather probability and vulnerability ratings.

Table 3-13 Windstorm Summary

Hazard	Severe Weather/Windstorm
Type	Climatic
Speed of Onset	Slow to moderate
Location	Countywide
Extent	Minor to severe
Prior Occurrence	Minor events occur annually; ~63 moderate to severe events since 2006
Probability	100% for minor events, ~50% for moderate to severe events

Sources: Oregon NHMP, National Weather Service, analysis by OPDR

Characteristics

A windstorm is generally a short duration event involving straight-line winds and/or gusts in excess of 50 mph. Although windstorms can affect the entirety of Jackson County, they are especially dangerous near developed areas with large trees or tree stands. The extent of any particular windstorm is determined by its track, intensity and local terrain.¹⁴ In the southwest Oregon, wind speed is typically 60 mph for 25-year storm events, 70 mph for 50-year storm events and 80 mph for 100-year storm events. Jackson County has experienced multiple 25-, 50- and 100-year windstorm events over the past century with impacts often occurring countywide. A windstorm will frequently knock down trees and power lines, damage homes, businesses, public facilities and create tons of storm related debris. Windstorms are a common, chronic hazard in Jackson County.

¹⁴ State of Oregon Natural Hazard Mitigation Plan (2015)

Location and Extent

The most common type of wind pattern affecting Jackson County is straight-line winds, which originate as a downdraft of rain-cooled air and reach the ground and spread out rapidly. Straight-line winds can produce gusts of 100 mph or greater. Records of major Pacific windstorms are documented by state agencies and weather stations throughout Oregon, including several official weather stations in Jackson County's lower valleys. Jackson County experienced record-setting Pacific windstorms in December 1951 (peak gust 72 mph), a storm in February 1958 came close with peak gusts of 71 mph.¹⁵ During the 1958 storm, every major highway in Oregon was at some point blocked by fallen trees.¹⁶ During the Columbus Day Storm (November 1962), considered by many to be Oregon's most powerful windstorm, top wind speeds in Medford reached 58 mph.

Oregon's second most powerful windstorm occurred in December of 1995.¹⁷ This storm caused massive damage throughout the state. The 113 mph gusts measured in Portland illustrate the force of the 1995 storm.¹⁸ However, in Medford the sustained one-minute wind speeds from this storm did not reach 44 mph, which was the local record for the month of December, set thirty years earlier in 1965.¹⁹

Typically, mountainous terrain slows down wind movement, which is why Oregon's sheltered valley areas have the slowest wind speed in the state. However, in the foothills, the wind speeds may increase due to down-sloping winds from the mountains. Although windstorms can affect the entirety of the county, they are especially dangerous in developed areas with significant tree stands and major infrastructure, especially above ground utility lines. A windstorm will frequently knock down trees and power lines, damage homes, businesses, public facilities and create tons of storm related debris.

History

Windstorms occur yearly; more destructive storms occur once or twice per decade, most recently in April 2016.²⁰ Table 3-14 shows windstorms that occurred within and/or near Jackson County between 2007-2012²¹

¹⁵ Wolf, Read. The Strongest Windstorms in the Western Pacific Northwest 1950-2007, <http://www.climate.washington.edu/stormking/PNWStormRanks.html>. Accessed January 26, 2018.

¹⁶ Taylor, George H. The Oregon Weather Book. Corvallis, OR, OSU Press, 1999.

¹⁷ Oregon Climate Service website: <http://www.ocs.orst.edu>.

¹⁸ Ibid.

¹⁹ City of Medford weather data book, Table 28.

²⁰ NOAA, National Centers for Environmental Information, <https://www.ncdc.noaa.gov/stormevents/>

²¹ Taylor, George H. and Ray Hatton, 1999, The Oregon Weather Book; The Spatial Hazard Events and Losses Database for the United States, [Online Database]. Columbia, SC: University of South Carolina. Available at <http://www.sheldus.org>; U.S. Department of Commerce. National Climatic Data Center. Available at <http://www4.ncdc.noaa.gov/cgi-win/wwwcgi.dll?wwevent~storms>; National Weather Service Forecast Office. Available at <http://www.wrh.noaa.gov/pqr/paststorms/wind.php>

Table 3-14 History of Windstorms (2007-2012)

Location	Date	Type	Snow/ Rain Accumulation (inches)	Wind Speed (knots)	Deaths	Injuries
Rogue River	7/11/2007	Thunderstorm Wind	-	52	0	0
Ashland	8/30/2007	Hail	3.0-4.0	52	0	0
Ashland	8/30/2007	High Wind	3.0-4.0	52	0	0
Prospect	10/26/2007	High Wind	-	52	0	0
Jackson County	1/3-1/4/08	High Wind	-	70	1	0
Rogue River	6/28/2008	Thunderstorm Hail/ Wind	0.9	-	0	0
Pinehurst	8/17/2008	Thunderstorm Hail	0.9	-	0	0
Jackson County	5/31/2009	Thunderstorm/ Lightning	-	-	0	1
Applegate/ Ashland	6/2/2009	Hail	1.5-1.75	-	0	0
Prospect	7/27/2010	Hail	1.0	-	0	0
Jackson County	8/17/2010	Hail	0.75-1.5	-	0	0
Jackson County	3/13/2011	Thunderstorm Wind	-	61	0	0
Medford	6/4/2012	Hail	1.0 Hail	-	0	0

Source: National Climatic Data Center. Storm Events Database.

<http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=41%2COREGON>

There have been 26 significant windstorm events, emergency declarations, or presidential disaster declarations since the previous NHMP:

- **2012 (Dec 16):** After a lull in storm activity, a strong cold front brought high winds back to portions of southern Oregon. 85 mph gusts.
- **2012 (Dec 19):** The stormy pattern continued as another cold front brought high winds to portions of southern Oregon. Peak gusts of 99 mph in some areas.
- **2013 (Sept 28):** The first strong system of the season brought high winds to portions of southern Oregon. Average gusts of 75 mph with peak gusts of 92 mph. The Oregon Department of Transportation reported 8-9 trees down across Oregon Highway 230, 12 trees down across Oregon Highway 62 and numerous trees down across Oregon Highway 138. Based on all this, it is assumed that the winds in ORZ027 met high wind warning criteria. Average gusts of 75 mph with peak gusts of 89 mph.
- **2014 (Feb 15):** An incoming front brought high winds to several areas around southern Oregon. Average gusts between 75-80 mph.
- **2014 (Mar 5-6):** An incoming front brought strong winds to portions of southern Oregon. Peak gusts of 92 mph.
- **2014 (Oct 22):** A member of the public reported wind gusts estimated at 50-60 mph downed several trees in the Dark Hollow area southwest of Medford. The tops of two large healthy trees were broken, one an oak and the other a poplar. No property damage. The high winds lasted around 45 minutes. Peak gust of 79 mph.
- **2014 (Oct 24-25):** A strong front brought high winds to many parts of southwest and south central Oregon. Peak gusts of 105 mph.
- **2014 (Dec 10):** An incoming front on 12/10/14 brought strong winds to many parts of southern Oregon and northern California. A rapidly developing low pressure system behind the first front brought another round of high winds on 12/11/14. Both of these events were covered by a long duration High Wind Warning. Average gusts of 79 mph with peak gusts of 84 mph.
- **2014 (Dec 11):** An incoming front on 12/10/14 brought strong winds to many parts of southern Oregon and northern California. A rapidly developing low pressure

system behind the first front brought another round of high winds on 12/11/14. Both of these events were covered by a long duration High Wind Warning. Peak gusts of 117 mph. ODOT reported that a truck was blown over on Highway 140 near Meridian Road.

- **2015 (Feb 5-6):** The Medford Mail Tribune reported numerous trees down across southern Jackson County. There were power outages due to trees falling across power lines. A falling tree fell on a house and car in Ashland, damaging both. Peak gust of 124 mph.
- **2015 (Feb 7):** The second in a series of fronts brought strong winds to many areas in Southern Oregon. Peak gusts of 116 mph.
- **2015 (Feb 8-9):** The third in a series of fronts brought strong winds to many areas in Southern Oregon. Peak gusts of 94 mph.
- **2015 (Dec 3-3):** A strong front brought high winds to parts of southwest and south central Oregon. Peak gusts of 107 mph.
- **2015 (Dec 5-21):** A series of 5 distinct windstorm events impacted many regions in Southwest and south central Oregon. Peak gusts ranged from 76-88 mph.
- **2016 (Jan 16):** Another in a series of cold fronts brought high winds to portions of the southern Oregon coast and the higher terrain of the Cascades and Siskiyou. Peak gusts of 82 mph.
- **2016 (Jan 19):** Another in a series of cold fronts brought high winds to portions of the southern Oregon coast and the higher terrain of the Cascades and Siskiyou. Peak gusts of 102 mph.
- **2016 (Jan 21-22):** The peak gust was 92 mph recorded at 2200 PST. Earlier that evening, strong winds were reported at Mount Ashland ski park. Kids were blown over in the parking lot. A ski lift was also closed due to winds. A chaperone stated that this was the first time he has ever been scared for the safety of skiers and snowboarders at Mount Ashland due to the weather.
- **2016 (Feb 17):** One of the last of a series of fronts brought high winds to portions of southwest and south central Oregon. Peak gust of 79 mph.
- **2016 (Feb 19):** The last of a series of fronts brought high winds to portions of southwest and south central Oregon. Peak gust of 91 mph.
- **2016 (Mar 1):** A strong front brought high winds to portions of southwest and south central Oregon. Peak gust of 87 mph.
- **2016 (Apr 13):** Central Point reported a measured gust to 45 mph. A storage shed on the property was blown apart by the winds. Large branches down. A spotter in Applegate reported 2 inch branches coming off of trees. Winds were estimated gusting to 45 mph. An estimated 998 customers were without power.

Additionally, Jackson County has experienced some severe weather events (not considered windstorms or winter storms) that do not necessarily exhibit windstorm conditions. Three (3) severe weather events were added to this hazard history section since the previous NHMP:

- **2013 (Aug 7):** Hail - Monsoonal moisture combined with passing upper level disturbances to create thunderstorms over southern Oregon. Some of these storms became severe. 1-inch hail reported on Squires Peak and near the community of Ruch. An orchardist from a orchard near Talent reported a 50% loss of the pear crop due to hail damage. Estimated hail size was 0.5 to 1.0 inches judging from holes in the ground. The monetary value of the loss is not known.

- **2015 (July 7):** Thunderstorm/Hail - A strong thunderstorm developed at the head of the Rogue Valley on the evening of 7/7/15. This storm spawned damaging winds from Ashland to Medford and small hail as well. A member of the public reported trees down at the Church of Jesus Christ of Latter Day Saints (Medford). The Mail Tribune newspaper and the police scanner indicated that numerous trees were knocked down in the Medford area. Some fell into power lines, causing multiple power outages. Other fell into vehicles and homes. Lightning also was the suspected cause of at least one structure fire.
- **2016 (Jun 6):** Thunderstorm - KDRV-TV reported a large tree was blown down, closing Highway 62 until it was cleared.

Several additional, small windstorm events have occurred since the previous NHMP, see the [Storm Events Database](#) provided by the National Oceanic and Atmospheric Administration for more information.

Probability Assessment

Windstorms in the county usually occur in the winter from October to March and their extent is determined by their track, intensity (the air pressure gradient they generate) and local terrain. Summer thunderstorms may also bring high winds along with heavy rain and/or hail. The National Weather Service uses weather forecast models to predict oncoming windstorms, while monitoring storms with weather stations in protected valley locations throughout Oregon.

Table 3-15 shows the wind speed probability intervals that structures 33 feet above the ground would expect to be exposed to within a 25, 50 and 100-year period. The table shows that structures in Region 4, which includes Jackson County, can expect to be exposed to 60 mph winds in a 25-year recurrence interval (4% annual probability).

Table 3-15 Probability of Severe Wind Events (Region 4)

	25-Year Event (4% annual probability)	50-Year Event (2% annual probability)	100-Year Event (1% annual probability)
Region 4: Southwest Oregon	60 mph	70 mph	80 mph

Source: Oregon State Natural Hazard Mitigation Plan, 2009

Based on the available data and research for Jackson County the NHMP Steering Committee determined the **probability of experiencing a windstorm is “high”**, meaning one incident is likely within the next 10 to 35-year period; *this rating has not changed since the previous NHMP. Previously, windstorms were not rated individually, instead being included in the collective severe weather rating.*

Vulnerabilities

Many buildings, utilities and transportation systems within Jackson County are vulnerable to wind damage. This is especially true in open areas, such as natural grasslands or farmlands. It is also true in forested areas, along tree-lined roads and electrical transmission lines and on residential parcels where trees have been planted or left for aesthetic purposes.

Structures most vulnerable to high winds include insufficiently anchored manufactured homes and older buildings in need of roof repair.

Fallen trees are especially troublesome. They can block roads and rails for long periods of time, impacting emergency operations. In addition, up-rooted or shattered trees can down power and/or utility lines and effectively bring local economic activity and other essential facilities to a standstill. Much of the problem may be attributed to a shallow or weakened root system in saturated ground. In Jackson County, trees are more likely to blow over during the winter (wet season).

As such, the NHMP Steering Committee rated the county as having a **“moderate” vulnerability to windstorm hazards**, meaning that between 1-10% of the region’s population or assets would be affected by a major disaster; *this rating has decreased since the previous NHMP. Previously, windstorms were not rated individually, instead being included in the collective severe weather rating.*

More information on this hazard can be found in the [Risk Assessment for Region 4, Southwest Oregon, of the Oregon NHMP \(2015\)](#).

Winter Storm

Significant Changes since Previous NHMP:

The winter storm hazard section has been edited to reference new history since the previous NHMP. This section has also been reformatted.

Previously, winter storms were not rated individually, instead being included in the collective severe weather probability and vulnerability ratings.

Table 3-16 Winter Storm Summary

Hazard	Severe Weather/Winter Storm
Type	Climatic
Speed of Onset	Slow to moderate
Location	Countywide
Extent	Minor to severe
Prior Occurrence	7 moderate to severe events from 2012-2016
Probability	100% for minor events, ~15% for moderate to severe events

Sources: Oregon NHMP, National Weather Service, analysis by OPDR

Characteristics

Winter storms affecting Jackson County are generally characterized by a combination of heavy rains and high winds throughout the county, sometimes with snowfall, especially at higher elevations. Heavy rains can result in localized or widespread flooding, as well as debris slides and landslides. High winds commonly result in tree falls which primarily affect the electric power system, but which may also affect roads, buildings and vehicles. This chapter deals primarily with the snow and ice effects of winter storms.

The winter storms that affect Jackson County typically are not local events affecting only small geographic areas. Rather, winter storms are usually large cyclonic low-pressure systems that move in from the Pacific Ocean and affect large areas of Oregon and/or the whole Pacific Northwest. These storms are most common from October through March.

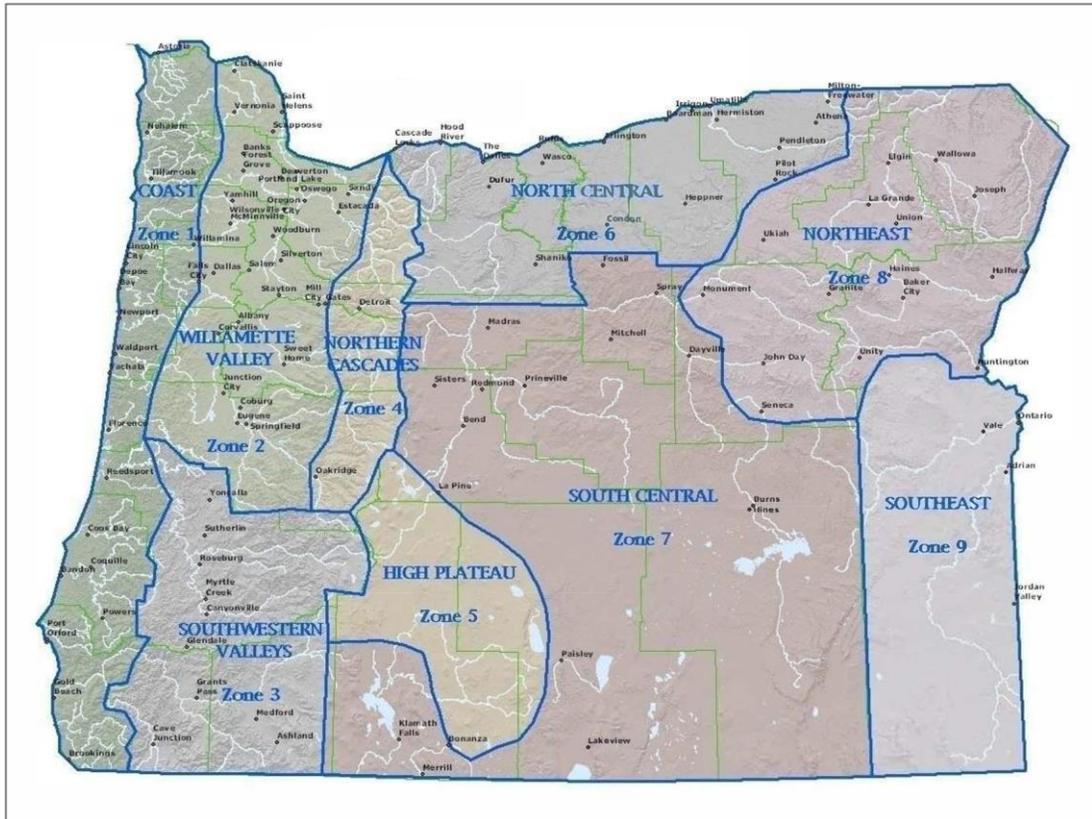
Ice storms are comprised of cold temperatures and moisture, but subtle changes can result in varying types of ice formation which may include freezing rain, sleet and hail. Of these, freezing rain can be the most damaging of ice formations.

Outside of mountainous areas, significant snow accumulations are much less likely in western Oregon than on the east side of the Cascades. However, if a cold air mass moves northwest through the Columbia Gorge and collides with a wet Pacific storm, then a larger than average snow fall may result.

Location and Extent

The National Climatic Data Center has established climate zones in the United States for areas that have similar temperature and precipitation characteristics. Oregon's latitude, topography and proximity to the Pacific Ocean give the state diversified climates. Figure 3-10 shows that Jackson County is located within Zone 3: Southwestern Valleys.

Figure 3-10 Oregon Climate Divisions



Source: Oregon Climate Service,

The principal types of winter storms that occur include:

- **Snowstorms:** require three ingredients: cold air, moisture and air disturbance. The result is snow, small ice particles that fall from the sky. In Oregon, the further inland and north one moves, the more snowfall can be expected. Blizzards are included in this category.
- **Ice storms:** are a type of winter storm that forms when a layer of warm air is sandwiched by two layers of cold air. Frozen precipitation melts when it hits the warm layer and refreezes when hitting the cold layer below the inversion. Ice storms can include sleet (when the rain refreezes before hitting the ground) or freezing rain (when the rain freezes once hitting the ground).
- **Extreme Cold:** Dangerously low temperatures accompany many winter storms. This is particularly dangerous because snow and ice storms can cause power outages, leaving many people without adequate heating.

Unlike most other hazards, it is not simple to systematically map winter storm hazard zones. The entire County is susceptible to damaging severe weather. Winter storms that bring snow and ice can impact infrastructure, business and individuals. Those resources that exist at higher elevations will experience more risk of snow and ice, but the entire County can face damage from winter storms and, for example, the hail or life threateningly cold temperatures that winter storms bring.

History

Winter storms occur yearly; more destructive storms occur once or twice per decade, most recently in 2015.²² Table 3-17 shows winter storms that occurred within and/or near Jackson County between 2007 and 2012²³

Table 3-17 History of Winter Storms (2007-2012)

Location	Date	Type	Snow/ Rain Accumulation (inches)	Wind Speed (knots)	Deaths	Injuries
Jackson County	1/16/2007	Heavy Snow	4.5	-	0	0
Jackson County	2/21/2007	Heavy Snow	6.0-9.0	-	0	0
Jackson County	2/22/2007	Heavy Snow	4.0-6.0	-	0	0
Jackson County	12/25-12/26/07	Heavy Snow	3.5	-	0	0
Jackson County	12/27/2007	Heavy Snow	3.5	-	0	0
Prospect	1/6-1/8/08	Heavy Snow	6.0-8.0	-	0	0
Jackson County	1/27/2008	Heavy Snow	4.0-10.0	-	0	0
Jackson County	2/2/2008	Heavy Snow	4.5	-	0	0
Jackson County	12/13/2008	Heavy Snow	5.5	-	0	0
Jackson County	12/15/2008	Heavy Snow	4.5	-	0	0
Jackson County	12/18-12/19/08	Heavy Snow	3.5-9.0	-	0	0
Jackson County	12/21/2008	Heavy Snow	Up to 12.0	-	0	0
Jackson County	2/12-2/13/09	Heavy Snow	4.0-7.0	-	0	0
Jackson County	12/5-12/11/09	Extreme Cold/ Ice	-	-	1	0
Jackson County	11/22-11/23/10	Heavy Snow	5.0	-	0	0
Jackson County	12/29/2010	Heavy Snow	4.0-8.5	-	0	0
Jackson County	2/23-2/25/11	Heavy Snow	4.0-12.0	-	0	0
Jackson County	2/29/2012	Heavy Snow	6.0-12.0	-	0	0
Jackson County	3/12-3/13/12	Heavy Snow	5.0-6.0	-	0	0

Source: National Climatic Data Center. Storm Events Database.

<http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=41%2COREGON>

There have been seven (7) winter storm events, emergency declarations, or presidential disaster declarations since the previous NHMP (as shown in *italics* below):²⁴

²² <https://www.ncdc.noaa.gov/stormevents/listevents>

²³ Taylor, George H. and Ray Hatton, 1999, *The Oregon Weather Book; The Spatial Hazard Events and Losses Database for the United States*, [Online Database]. Columbia, SC: University of South Carolina. Available at <http://www.sheldus.org>; U.S. Department of Commerce. National Climatic Data Center. Available at <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms>; National Weather Service Forecast Office. Available at <http://www.wrh.noaa.gov/pqr/paststorms/wind.php>

²⁴ Taylor, George H. and Ray Hatton, 1999, *The Oregon Weather Book; The Spatial Hazard Events and Losses Database for the United States*, [Online Database]. Columbia, SC: University of South Carolina. Available at <http://www.sheldus.org>; U.S. Department of Commerce. National Climatic Data Center. Available at <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms>; National Weather Service Forecast Office. Available at <http://www.wrh.noaa.gov/pqr/paststorms/wind.php>

- **2012 (Dec 20 – Dec 21):** A long lasting winter storm occurred during this interval, caused by a series of closely spaced storms. Trail and Ashland reported 6.5 inches of snow in 24 hours while Gold Hill reported 5.9 inches in 24 hours. Significant snow was reported in the mountains during this period, causing numerous highway closures including Interstate 5 through Siskiyou Summit.
- **2013 (Dec 6 – Dec 7):** A long lasting winter storm occurred during this interval, caused by a series of closely spaced storms. The communities of Gold Hill, Trail, Eagle Point, Phoenix, Ashland, Rogue River, Shady Cove, Ruch, White City, Butte Falls and Prospect reported between 3.5 and 14 inches of snow within 24 hours. Multiple vehicle accidents resulting from winter conditions occurred along Old Highway 99 from Grants Pass to Gold Hill and on Highway 62 from Medford to Eagle Point.
- **2014 (Jan 11):** A strong front brought strong winds and heavy snow to portions of the southern Oregon Cascades.
- **2015 (Nov 24 – Nov 25):** The first big winter storm of the season brought heavy snow to some locations in southern Oregon.
- **2015 (Dec 12 – Dec 13):** A series of systems brought heavy precipitation to southern Oregon. The communities of Applegate, Phoenix, Medford, Ashland and Butte Falls reported between 3 and 9 inches of snow within 24 hours. Numerous power outages were reported around the county and area roads were closed due to snow and fallen trees.
- **2015 (Dec 21 – Dec 24):** A series of storms made for a long lasting winter storm over southwest and south central Oregon. At first, the snow was limited to higher elevations but lowered with time to some of the west side valley floors.
- **2016-2017 (Dec.-Jan):** A series of storms impacted the Rogue Valley including high winds, ice, freezing temperatures, and snow accumulation of 12-24 inches in parts of the valley floor.

Probability Assessment

The recurrence interval for a moderate to severe winter storm is about once every year; however, there can be many localized storms between these periods. Severe winter storms occur in western Oregon regularly from November through February. Jackson County experiences winter storms a couple times every year, to every other year.

Based on the available data and research for Jackson County the NHMP Steering Committee determined the **probability of experiencing a winter storm is “high”**, meaning one incident is likely within the next 10 to 35-year period; *this rating has not changed since the previous NHMP’s severe weather rating. Previously, winter storms were not rated individually, instead being included in the collective severe weather rating.*

Vulnerabilities

Given current available data, no quantitative assessment of the risk of winter storm was possible at the time of this NHMP update. However, assessing the risk to the County from winter storms should remain an ongoing process determined by community characteristics and physical vulnerabilities. Weather forecasting can give County resources (emergency vehicles, warming shelters) time to prepare for an impending storm, but the changing character of the County population and resources will determine the impact of winter storms on life and property in Jackson County.

The most likely impact of snow and ice events on Jackson County are road closures limiting access/egress to/from some areas, especially roads to higher elevations. Winter storms with heavy wet snow or high winds and ice storms may also result in power outages from downed transmission lines and/or poles.

Winter storms which bring snow, ice and high winds can cause significant impacts on life and property. Many severe winter storm deaths occur as a result of traffic accidents on icy roads, heart attacks may occur from exertion while shoveling snow and hypothermia from prolonged exposure to the cold. The temporary loss of home heating can be particularly hard on the elderly, young children and other vulnerable individuals.

Property is at risk due to flooding and landslides that may result if there is a heavy snowmelt. Additionally, ice, wind and snow can affect the stability of trees, power and telephone lines and TV and radio antennas. Down trees and limbs can become major hazards for houses, cars, utilities and other property. Such damage in turn can become major obstacles to providing critical emergency response, police, fire and other disaster recovery services.

Severe winter weather also can cause the temporary closure of key roads and highways, air and train operations, businesses, schools, government offices and other important community services. Below freezing temperatures can also lead to breaks in un-insulated water lines serving schools, businesses, industries and individual homes. All of these effects, if lasting more than several days, can create significant economic impacts for the affected communities and the surrounding region. In the rural areas of Oregon severe winter storms can isolate small communities, farms and ranches.

At the time of this update, sufficient data was not available to determine winter storm vulnerability in terms of explicit types and numbers of existing and future buildings, infrastructure or critical infrastructure.

As such, the NHMP Steering Committee rated the County as having a “**moderate**” **vulnerability to winter storm hazards**, meaning that between 1 and 10% of the region’s population or assets would be affected by a major disaster; *this rating has decreased since the previous NHMP. Previously, winter storms were not rated individually, instead being included in the collective severe weather rating.*

More information on this hazard can be found in the [Risk Assessment for Region 4, Southwest Oregon, of the Oregon NHMP \(2015\)](#).

Volcano

Significant Changes since Previous NHMP:

There have been no significant changes to this section since the previous NHMP.

Table 3-18 Volcano Summary

Hazard	Volcano
Type	Geologic
Speed of Onset	Slow to rapid
Location	Cascade Mountains
Extent	Moderate to severe
Prior Occurrence	0 events from 2012-2017
Probability	<1% annual

Sources: Oregon NHMP, USGS, analysis by OPDR

Characteristics

The Pacific Northwest, lies within the “ring of fire,” an area of very active volcanic activity surrounding the Pacific Basin. Volcanic eruptions occur regularly along the ring of fire, in part because of the movement of the Earth’s tectonic plates. The Earth’s outermost shell, the lithosphere, is broken into a series of slabs known as tectonic plates. These plates are rigid, but they float on a hotter, softer layer in the Earth’s mantle. As the plates move about on the layer beneath them, they spread apart, collide, or slide past each other. Volcanoes occur most frequently at the boundaries of these plates and volcanic eruptions occur when molten material, or magma, rises to the surface.

The primary threat to lives and property from active volcanoes is from violent eruptions that unleash tremendous blast forces, generate mud and debris flows, or produce flying debris and ash clouds. The immediate danger area in a volcanic eruption generally lies within a 20-mile radius of the blast site.

Location and Extent

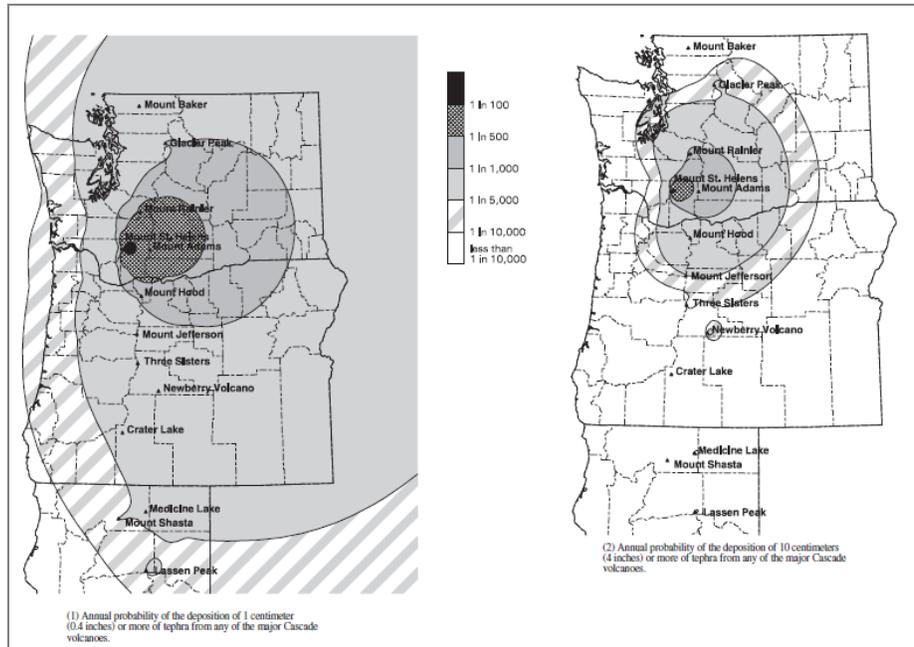
Volcanic eruption is not an immediate threat to the residents of Jackson County, as there are no active volcanoes within the county. Nevertheless, the secondary threats caused by volcanoes in the Cascade region must be considered. Volcanic ash can contaminate water supplies, cause electrical storms, create health problems and collapse roofs.

Jackson County is located on the Pacific Rim. Tectonic movement within the earth's crust can renew nearby dormant volcanoes resulting in ash fallout. Volcanic activity is possible from Mount Hood and Mount Saint Helens, Three Sisters, Mount Bachelor and the Newberry Crater areas. Because the distance to these potentially active volcanic areas is so great, the only adverse effect that would impact areas of Jackson County is ash fallout, with perhaps some impact on water supplies. The area affected by ash fallout depends upon the height attained by the eruption column and the atmospheric conditions at the time of the eruption.

Geologic hazard maps have been created for most of the volcanoes in the Cascade Range by the USGS Volcano Program at the Cascade Volcano Observatory in Vancouver, WA and are available at http://vulcan.wr.usgs.gov/Publications/hazards_reports.html.

Scientists use wind direction to predict areas that might be affected by volcanic ash; during an eruption that emits ash, the ash fall deposition is controlled by the prevailing wind direction. The predominant wind pattern over the Cascades originates from the west and previous eruptions seen in the geologic record have resulted in most ash fall drifting to the east of the volcanoes. Regional tephra fall shows the annual probability of ten centimeters or more of ash accumulation from Pacific Northwest volcanoes. Figure 3-11 depicts the potential and geographical extent of volcanic ash fall in excess of ten centimeters from a large eruption of Mt. St. Helens. Additionally, Lassen Peak and Mount Shasta are active and potentially active volcanoes, respectively located in northern California. The proximity of these volcanic features suggests that, in the rare event of an eruption, Jackson County could be affected by ash fall and other air quality impacts.

Figure 3-11 Regional Tephra-fall Maps



Source: USGS “Volcano Hazards in the Mount Jefferson Region, Oregon”

History

Mount Hood and Mount St. Helens are two active volcanoes near Jackson County. Mount Hood is several hundred miles north of the county and is more than 500,000 years old. It has had two significant eruptive periods, one about 1,500 years ago and another about 200 years ago. Mount St. Helens is in southern Washington State and has been active throughout its 50,000-year lifetime. In the past 200 years, seven of the Cascade volcanoes have erupted, including (from north to south): Mt. Baker, Glacier Peak, Mt. Rainier, Mount St. Helens (Washington), Mt. Hood (Oregon), Mt. Shasta and Mt. Lassen (California).

There has been no recent volcanic activity near the county. The 1980 explosion of Mount St. Helens in southern Washington State is the latest on record; both Mount St. Helens and Mount Hood remain listed as active volcanoes.

Probability Assessment

The United States Geological Survey-Cascades Volcano Observatory (CVO) produced volcanic hazard zonation reports for Mount St. Helens and Mount Hood in 1995 and 1997. The reports include a description of potential hazards that may occur to immediate communities. The CVO created an updated annual probability of tephra (ash) fall map for the Cascade region in 2001, which could be a rough guide for Jackson County in forecasting potential tephra hazard problems. The map identifies the location and extent of the hazard.

The CVO Volcanic tephra fall map is based on the combined likelihood of tephra-producing eruptions occurring at Cascade volcanoes. Probability zones extend farther east of the range because winds blow from westerly directions most of the time. The map shows annual probabilities for a fall of one centimeter (about 0.4 inch). The patterns on the map show the dominating influence of Mount St. Helens as a tephra producer. Because small eruptions are more numerous than large eruptions, the probability of a thick tephra fall at a given locality is lower than that of a thin tephra fall. The annual probability of a fall of one centimeter or more of tephra is about 1 in 10,000 for Jackson County. This is small when compared to other risks faced by the County. The USGS map on the previous page illustrates potential tephra fall in the region.

Based on the available data and research for Jackson County the NHMP Steering Committee determined the **probability of experiencing volcanic activity is “low”**, meaning one incident is likely within the next 75 to 100-year period; *this rating has not changed since the previous NHMP.*

Vulnerabilities

Risks for Jackson County associated with regional volcanic activity would be ash fall, air quality and possible economic or social disruption due to air traffic issues due to the ash cloud.

At the time of this update, sufficient data was not available to determine volcanic eruption vulnerability in terms of explicit types and numbers of existing and future buildings, infrastructure or critical infrastructure.

Though unlikely, the impacts of a significant ash fall are substantial. Persons with respiratory problems are endangered, transportation, communications and other lifeline services are interrupted, drainage systems become overloaded/clogged, buildings can become structurally threatened and the economy takes a major hit. Any future eruption of a nearby volcano (e.g., Hood, St. Helens, or Adams) occurring during a period of easterly winds would likely have adverse consequences for the county.

As such, the NHMP Steering Committee rated the county as having a **“low” vulnerability to volcanic activity**, meaning that less than 1% of the region’s population or assets would be affected by a major disaster (volcanic ash); *this rating has not changed since the previous NHMP.*

More information on this hazard can be found in the [Risk Assessment for Region 4, Southwest Oregon, of the Oregon NHMP \(2015\)](#).

Wildfire

Significant Changes since Previous NHMP:

The wildfire hazard has been edited to reference the recently updated Rogue Valley Integrated Community Wildfire Protection Plan (RVIFP) and analysis from the Upper Rogue Watershed Multi-Hazard Risk Report. This section has also been reformatted.

Table 3-19 Wildfire Summary

Hazard	Wildfire
Type	Climatic, Human Caused
Speed of Onset	Moderate to rapid
Location	Countywide, Wildland Urban Interface
Extent	Minor to extreme
Prior Occurrence	6 major events from 2012-2017
Probability	100% for minor-moderate events, 70-80% for extreme events

Sources: Oregon NHMP, Rogue Valley Integrated Community Wildfire Protection Plan (2017), analysis by OPDR

Characteristics

Wildfires occur in areas with large amounts of flammable vegetation that require a suppression response due to uncontrolled burning. 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. Wildfire can be divided into three categories: interface, wildland and firestorms. The increase in residential development in interface areas has resulted in greater wildfire risk. Fire has historically been a natural wildland element and can sweep through vegetation that is adjacent to a combustible home. New residents in remote locations are often surprised to learn that in moving away from built-up urban areas, they have also left behind readily available fire services providing structural protection. Recent fires in Oregon and across the western United States have increased public awareness over the potential losses to life, property and natural and cultural resources that fire can pose.

The following three factors contribute significantly to Wildfire behavior and can be used to identify Wildfire hazard areas.

Topography: As slope increases, the rate of wildfire spread increases. South-facing slopes are also subject to more solar radiation, making them drier and thereby intensifying wildfire behavior. However, ridgetops may mark the end of wildfire spread, since fire spreads more slowly or may even be unable to spread downhill.

Fuel: The type and condition of vegetation plays a significant role in the occurrence and spread of wildfires. Certain types of plants are more susceptible to burning or will burn with greater intensity. Dense or overgrown vegetation increases the amount of combustible material available to fuel the fire (referred to as the "fuel load"). The ratio of living to dead

plant matter is also important. The risk of fire is increased significantly during periods of prolonged drought as the moisture content of both living and dead plant matter decreases. The fuel's continuity, both horizontally and vertically, is also an important factor.

Weather: The most variable factor affecting wildfire behavior is weather. Temperature, humidity, wind and lightning can affect chances for ignition and spread of fire. Extreme weather, such as high temperatures and low humidity, can lead to extreme wildfire activity. By contrast, cooling and higher humidity often signals reduced Wildfire occurrence and easier containment.

The frequency and severity of wildfires is also dependent upon other hazards, such as lightning, drought, equipment use, railroads, recreation use, arson and infestations. If not promptly controlled, wildfires may grow into an emergency or disaster. Even small fires can threaten lives and resources and destroy improved properties. In addition to affecting people, wildfires may severely affect livestock and pets. Such events may require emergency watering/feeding, evacuation and shelter.

The indirect effects of wildfires can be catastrophic. In addition to stripping the land of vegetation and destroying forest resources, large, intense fires can harm the soil, waterways and the land itself. Soil exposed to intense heat may lose its capability to absorb moisture and support life. Exposed soils erode quickly and enhance siltation of rivers and streams, thereby enhancing flood potential, harming aquatic life and degrading water quality. Lands stripped of vegetation are also subject to increased debris flow hazards, as described above.

Location and Extent

Wildfire hazard areas are commonly identified in regions of the Wildland Urban Interface (WUI). The interface is the urban-rural fringe where homes and other structures are built into a densely forested or natural landscape. If left unchecked, it is likely that fires in these areas will threaten lives and property. One challenge Jackson County faces is from the increasing number of houses being built in the urban/rural fringe as compared to twenty years ago. The "interface" between urban or suburban areas and the resource lands has significantly increased the threat to life and property from fires. Responding to fires in the expanding Wildland Urban Interface area may tax existing fire protection systems beyond original design or current capability.

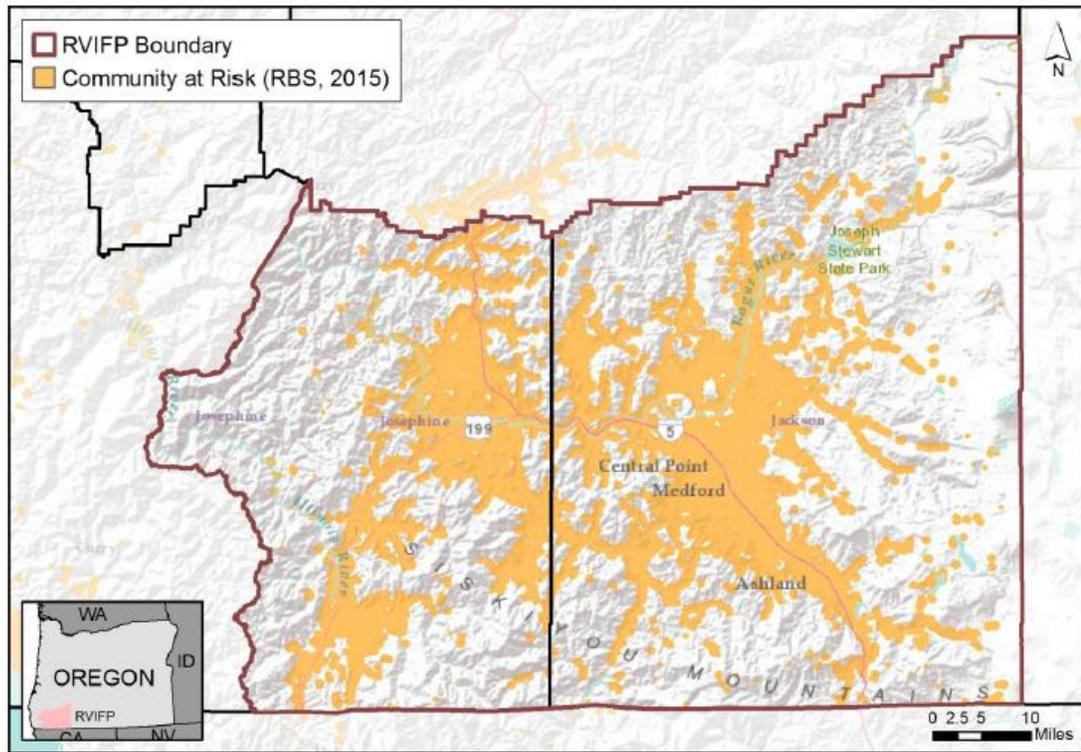
The ease of fire ignition further determines ranges of the wildfire hazard due to natural or human conditions and the difficulty of fire suppression. The wildfire hazard is also magnified by several factors related to fire suppression/control, such as the surrounding fuel load, weather, topography and property characteristics.

Fire susceptibility throughout the county dramatically increases in late summer and early autumn as summer thunderstorms with lightning strikes increases and vegetation dries out, decreasing plant moisture content and increasing the ratio of dead fuel to living fuel. However, various other factors, including humidity, wind speed and direction, fuel load and fuel type and topography can contribute to the intensity and spread of wildland. In addition, common causes of wildfires include arson and negligence from industrial and recreational activities.

The RVIFP defines a *Community at Risk*, utilizing the definition provided by the Health Forests Restoration Act (2003), "as a geographic area within and surrounding permanent

dwellings (at least 1 home per 40 acres) with basic infrastructure and services, under a common fire protection jurisdiction, government, or tribal trust or allotment, for which there is a significant threat due to wildfire.”²⁵ The CAR designation for the RVIFP is based on the RBS which follows the uniform CAR framework for Oregon that is augmented with data on where people live from the Westwide Wildfire Risk Assessment and 2010 Decennial Census data (see Figure 3-12).²⁶

Figure 3-12 Wildfire Risk Assessment – Communities at Risk



Source: Rogue Valley Integrated Community Wildfire Protection Plan (2017)

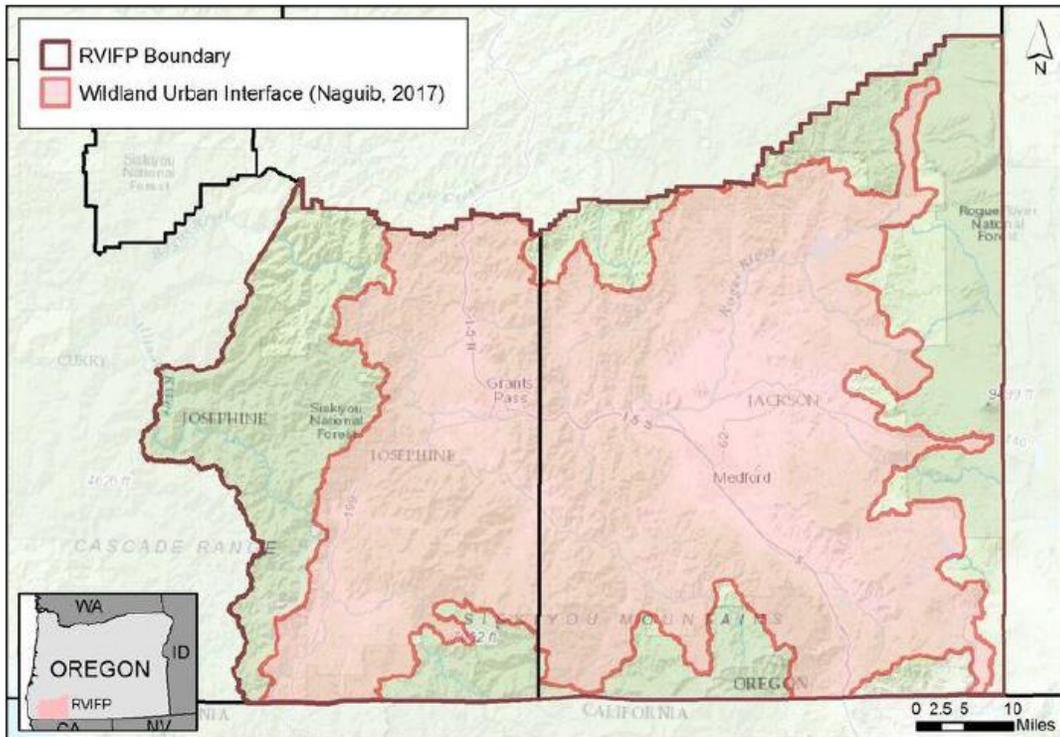
The Wildland-Urban Interface (WUI) was developed using the 2004 Southwest Oregon Interagency Fire Management Plan (SWOFMP) as a starting point due to its ability to provide strategically defensible positions for wildfire suppression at the county level.²⁷ The WUI boundary is based off of where people live or could live and is based on zoning rather than the arbitrary ½ and 1 ½ miles buffers used in the CAR designations which did not provide for adequate fuel treatment opportunities to protect communities from large wildfires. The WUI as delineated in the RVIFP is shown in Figure 3-13.

²⁵ Rogue Valley Integrated Community Wildfire Protection Plan (2017)

²⁶ Ibid.

²⁷ Ibid.

Figure 3-13 Wildland-Urban Interface



Source: Rogue Valley Integrated Community Wildfire Protection Plan (2017)

History

Jackson County has a long history of wildfires in the county. In May of 1987, strong thunderstorms brought 60 to 70-mph winds to Jackson County, damaging buildings in Eagle Point and fanning multiple fires. In July of that same summer, intense thunderstorms brought hail, lightning and rain.²⁸ Lightning started numerous fires in the Umpqua and Rogue River National Forests. One fire lasted for five days. A third round of thunderstorms struck in late August of that summer. Over 900 fires were reported in the Siskiyou and Cascade Mountains, which destroyed more than 130,000 acres of forest and continued to burn well into September. That year, tens of thousands of acres in Jackson County were blackened and 218,000 acres burned throughout Oregon.²⁹ Often, accurate records of wildfire history do not exist. For instance, before the early 1960's, only those fires that were especially damaging were recorded.

The RVIFP used United States Forest Service (USFS) and Oregon Department of Forestry (ODF) data to generate ignition history from 1992-2016 for Jackson and Josephine counties. For the period studied there were an average of 296 wildfires with an average of 7,808 acres burned.³⁰ The number of fire starts ranged from 186 to 598 per year, with a standard deviation of 104; from that the RVIFP deduced that the number of fires for any future year

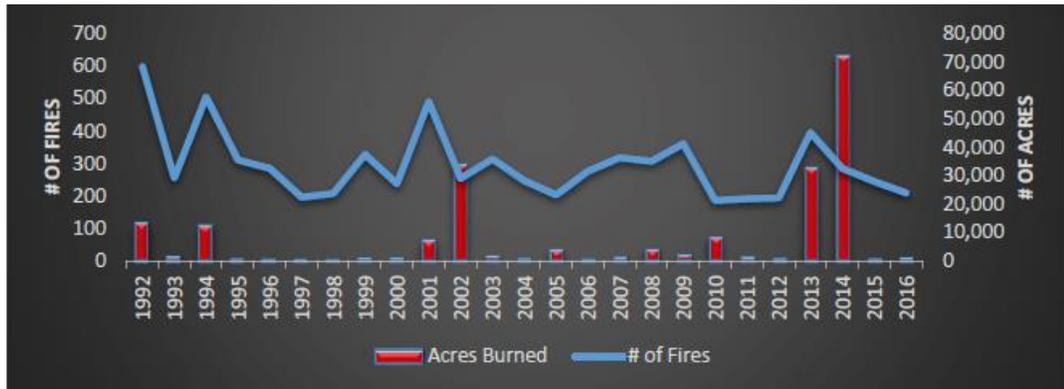
²⁸ Taylor, George and Hatton, Raymond, *The Oregon Weather Book: A State of Extremes*, Corvallis, Oregon: Oregon State University Press, pp. 174, (1999).

²⁹ *Planning for Natural Hazards: Oregon Technical Resource Guide, Community Planning Workshop*, (July 2000).

³⁰ *Rogue Valley Integrated Community Wildfire Protection Plan* (2017)

would range from 89 to 503. The number of fire ignitions reported from 1992 to 2016 and total acres burned for Jackson and Josephine counties is shown in Figure 3-14.

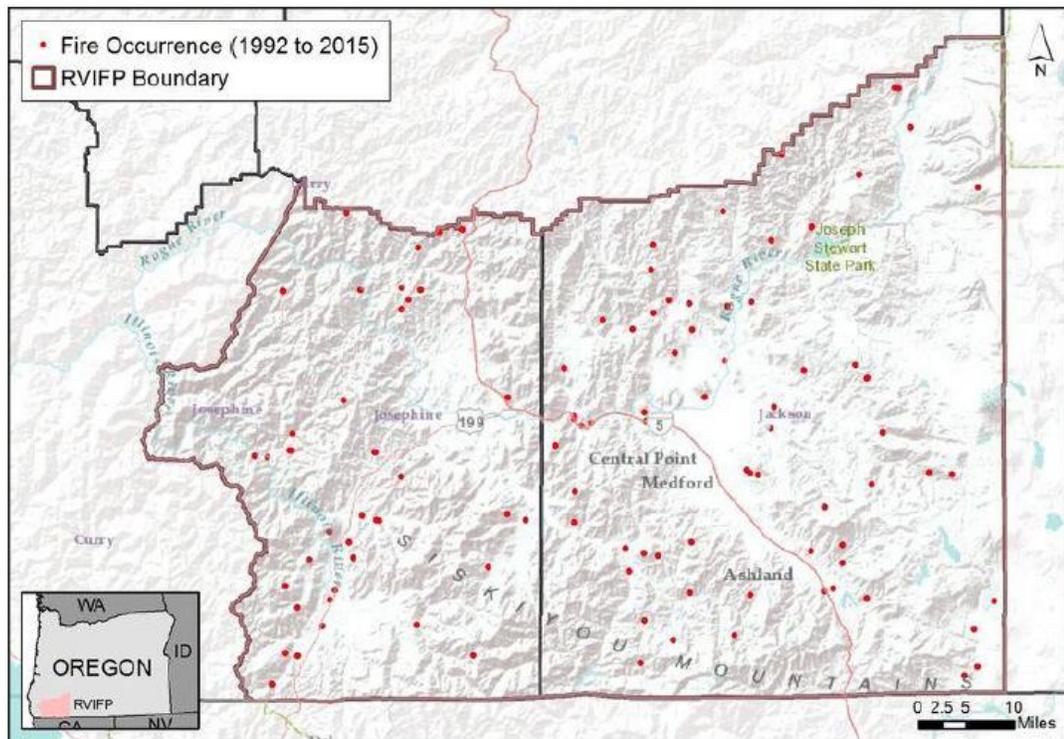
Figure 3-14 All Fire Reported in Jackson and Josephine Counties (1992-2016)



Source: Rogue Valley Integrated Community Wildfire Protection Plan (2017)

Data for fires that reached to 36 acres or more (about 64 fires since 1992) show that most fires have been successfully suppressed. However, where fires have escaped the initial suppression efforts they have grown large and accounted for the majority of acres burned in the fire season.³¹ While the majority of fire ignitions occurred along travel corridors and the edges of major urban areas, the fires that escape initial suppression efforts tend to be in more remote areas and are more likely to occur in some portions of the landscape than others (see Figure 3-15).

Figure 3-15 Large (>= 36 acres) Fire Occurrence (1992-2015)



Source: Rogue Valley Integrated Community Wildfire Protection Plan (2017)

³¹ Ibid.

Since the creation of the previous NHMP in 2012, there have been six (6) documented wildfire events varying in impact and extent, presidential emergency declarations and statewide states of emergency. Significant wildfire events between 2000 and 2011 are shown in Table 3-20. More recent wildfire information is provided after the table. The East Evans Creek (1992), Hull Mountain (1994) and Squires Peak (2002) fires are considered to be three of Oregon’s most destructive Wildland/ Urban Interface fires; burning over 20,800 acres, costing \$20.2 million and burning 54 structures.³²

Table 3-20 Significant Fires in Jackson County (2000-2011)

Name	Date	FEMA	Acres	Conflagration			Cause
				Communities Threatened	Mobilization Cost	Federal Funding	
North River Road	8/18/2011	-	-	Rogue River	\$80,951	\$0	Undetermined
Oak Knoll	8/24/2010	-	20	Ashland	-	-	Human - Arson
South County Complex	8/28/2009	-	-	Ashland, Medford	\$423,811	\$312,666	Undetermined
Doubleday	2008	-	1,244	Butte Falls	-	-	Lightning
Wasson	2005	-	1,500	-	-	-	Traffic Accident
Cove Road	2003	FEMA-2496-FMAGP	700	-	-	-	Lightning
Timbered Rock	7/27/2002	FEMA-2454-FMAGP	27,111	north Shady Cove	\$237,457	\$169,576	Lightning
Squire Peak/ Wall Creek/ Lost Creek	7/16/2002	FEMA-2445-FMAGP	3,125	east of Ruch	\$266,918	\$191,787	Lightning
East Antelope	2002	-	1,947	-	-	-	Power Line
Quartz	2001	-	6,162	-	-	-	Lightning
Antioch	8/8/2000	-	376	Antioch	\$15,319	\$0	Human - burning vehicle

Source: OPDR, “State of Oregon Natural Hazard Mitigation Plan: Fire Chapter”, 2012.

There have been six (6) significant wildfire events, emergency declarations, or presidential disaster declarations since the previous NHMP (as shown in *italics* below):

- **2014 (July 30 – July 31):** *The Beaver Complex was made up of the Salt Creek and Oregon Gulch fires, both of which were started by lightning on the evening of 07/30/2014. Both fires were active and threatening residences. [Executive Order No. 14-08](#) - Invocation of Emergency Conflagration Act for the Beaver Complex Fire in Jackson County. The fires covered 35,302 acres and cost \$22.2 million to contain. ([FEMA FMA-5066 – Oregon Gulch Fire](#))*
- **2014 (Aug 11 – Aug 20):** *The Rogue River Drive Wildfire was started by lightning on 08/11/2014. The fire covered about 500 acres and cost \$1.9 million dollars to contain. [Executive Order No. 14-10](#) - Invocation of Emergency Conflagration Act for the Rogue River Drive Fire in Jackson County.*
- **2014 (Sept 1 – Sept 26):** *The 790 Wildfire was started by lightning in the Sky Lakes Wilderness Area on 07/31/2014. Since it was in a wilderness area, it was allowed to burn until it reached National Forest land. The fire covered 2,277 acres and cost \$2.7 million dollars to contain.*
- **2015 (June 26 – July 10):** *The Bunker Hill Complex fire was initiated by lightning on 06/26/2015. The fire covered 388 acres and cost \$5.0 million dollars to contain.*

³² Jackson County BOC, Jackson County Integrated Fire Plan (2006)

- **2015 (Aug 1 – Sept 23):** The National Creek Complex wildfire consisted of two fires (the National Fire and the Crescent Fire) initiated by dry lightning on 08/01/2015. The fire covered 20,945 acres and cost \$20.9 million to contain.
- **2017 (Aug. 14 – current):** The Miller Complex wildfire consisted of four fires (the Abney, Burnt Peak, Creedence and Knox) initiated by dry lightning on 08/14/2017. The fire covered 39,250+ acres.

Table 3-21 shows that roughly one-third of all fires were caused by lightning between 1992 and 2016), while two-thirds of fires are human caused (ranging from arson and debris burning to equipment use and fires caused along powerlines).

Table 3-21 Fires by Cause with Number of fires and acres burned (1992-2016)

FIRE CAUSE	1992 - 2016		FIRE CAUSE	1992 - 2016	
	# OF ACRES	COUNT		# OF ACRES	COUNT
Arson	5,697	374	Miscellaneous	10,780	912
Campfire	418	395	Missing/Undefined	2,276	143
Children	1,395	319	Powerline	1,953	16
Debris Burning	2,551	653	Railroad	24	26
Equipment Use	15,404	1488	Recreationist	47	66
Fireworks	259	24	Smoking	547	445
Juveniles	5	14	Structure	8	23
Lightning	153,303	2503			

Source: Rogue Valley Integrated Community Wildfire Protection Plan (2017)

Probability Assessment

Certain conditions must be present for significant interface fires to occur. The most common are hot, dry and windy weather; the inability of fire protection forces to contain or suppress the fire; the occurrence of multiple fires that overwhelm committed resources; and a large fuel load (dense vegetation). Once a fire has started, several conditions influence its behavior, including fuel, topography, weather, drought and development. Many of these conditions are demonstrated across large areas within Jackson County, creating a significant collective risk.

Based on the available data and research for Jackson County, the NHMP Steering Committee determined the **probability of experiencing a Wildfire is “high”**, meaning one incident is likely within the next 10 to 35-year period; *this rating has not changed since the previous NHMP.*

Vulnerability Assessment

The Rogue Valley Integrated Community Wildfire Protection Plan (2017, RVIFP) profiles communities throughout the county to determine which face the highest risk of a wildfire event. The RVIFP used the Rogue Basin Cohesive Forest Restoration Strategy: A collaborative Vision for Resilient Landscapes and Fire Adapted Communities (RBS) to assess wildfire risk with mitigation to enhance forest ecology.

Utilizing the RBS the RVIFP Risk Assessment Committee approaches the yearly wildfire risk assessment with a comprehensive review of risk assessment methods and examples from communities throughout the United States. The committee also conducts an inventory of existing data for risk, hazard, values, structural vulnerability and protection capability.

The analysis takes into consideration a combination of factors defined below:

- Ignition Risk: Potential and frequency for wildfire ignitions (based on past occurrences);
- Hazard: Conditions that may contribute to wildfire (vegetative fuels, crown fire potential, weather/ climate, topography, insect and disease);
- Values: People, property, natural and other resources that could suffer losses in a wildfire event.; and
- Protection Capability: Ability to mitigate losses, prepare for, respond to and suppress wildland and structural fires.

In 2009, Jackson and Josephine counties collaborated on developing an updated wildfire risk assessment that was updated in 2015 with the RBS risk assessment spearheaded by the Southern Oregon Forest Restoration Collaborative:

***Two-County Risk Assessment.** In 2009, Jackson and Josephine County wildfire partners collaborated on an update of the joint risk assessment using the two-county fuel-mapping project data completed in 2008. With support from Jackson County GIS staff and Title III funds, updates of all the key data sets (ignition risk, hazard, protection capability and values at risk) were completed for both Jackson and Josephine Counties. Both county risk/fuels committees reviewed the data and model parameters. The primary goals of the assessment update that were accomplished in 2009 included incorporation of the new calibrated Landfire data and advanced fire modeling tools and consistent use of the assessment methodology across the two-county area. The two counties also share a Mutual Aid Agreement for fire response.*

The RVIFP is updated annually and contains extensive analysis. Therefore, the current RVIFP risk assessment is incorporated herein by reference. In accordance with CFR 401.6 and as part of the 2017 NHMP update process, the NHMP Steering Committee considered fire risk using the same evaluation method as other hazards included in the NHMP to allow for a comparative analysis of hazard risk.

The update of the RVIFP includes updates to the Risk Assessment, mitigation activities, priority fuels actions and highest priority areas for mitigation. The Integrated Fire Plan development process also included an analysis of Jackson County’s relative fire hazard risk. For more information on wildfire risk and fuels reduction projects see the [Rogue Valley Integrated Community Wildfire Protection Plan \(2017\)](#).

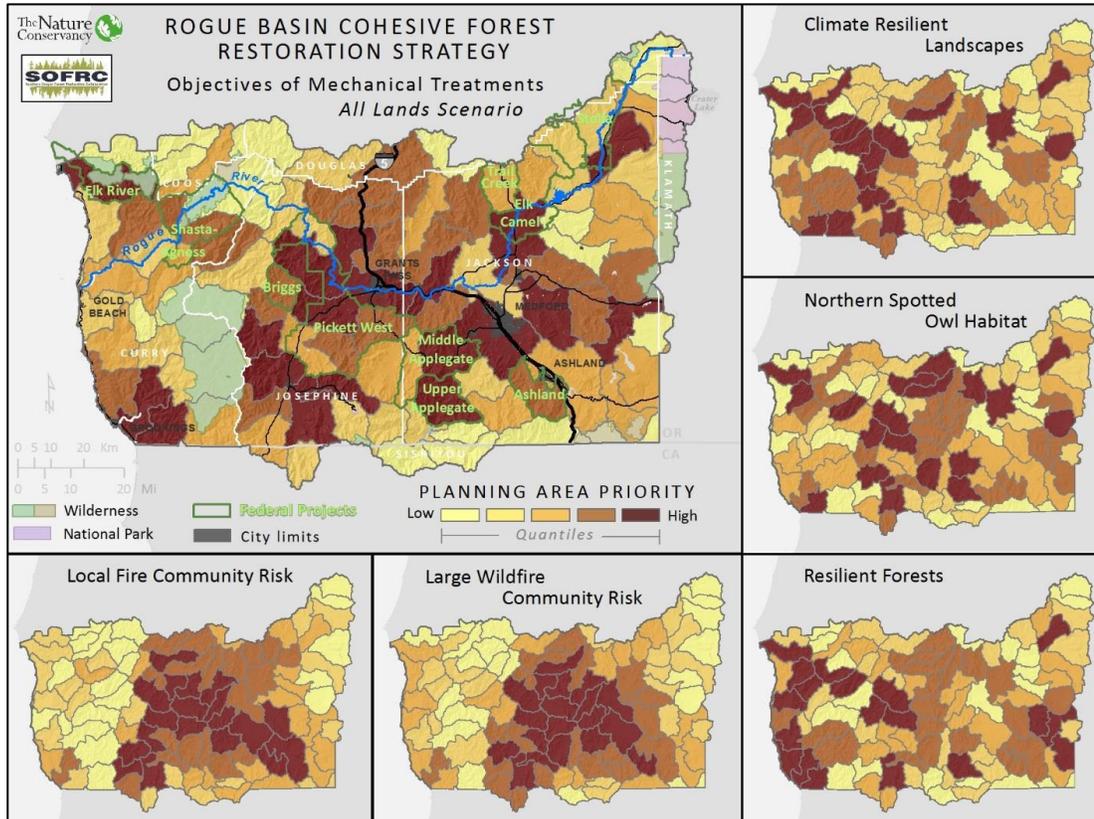
To prioritize the location of treatments the RBS modeling efforts evaluated five different landscape level objectives to optimize the resulting fuel treatment:³³

- Local fire community risk (to prioritize fuel treatments within fire risk communities);
- Large wildfire community risk (to prioritize fuels reduction in the landscapes that deliver fires that threaten community assets with fires larger than 35 acres);
- Landscape resilience (to prioritize treatments that balance open and closed forest habitats);
- Protecting and promoting Northern Spotted Owl habitat (to prioritize to maintain existing habitat and reduce adjacent wildfire risk while promoting complex forest structure), and
- Climate resilient landscapes (to prioritize landscapes that are most climate resilient).

³³ Rogue Valley Integrated Community Wildfire Protection Plan (2017)

Using the landscape objectives priority planning areas are identified in the following maps (Figure 3-16), darker browns indicate greater priority. The larger map shows priority if all landscape objectives are combined in a single entry.

Figure 3-16 Rogue Basin Cohesive Forest Restoration Strategy Priority Planning Areas



Source: Rogue Valley Integrated Community Wildfire Protection Plan (2017)

Natural Hazard Risk Report: Upper Rogue Watershed

The **Risk Report** ([DOGAMI, Open-File Report O-18-XX](#)) identifies that there are 2,545 buildings (0 critical facilities) exposed to High wildfire risk for a total potential loss of \$129.3 million (a loss ratio of 23%). In addition, about 3,042 residents may be displaced (29% of the population). For the town of Prospect 235 buildings (3 critical facilities; Prospect Charter School, Prospect Rural Fire Protection District and Upper Rogue Rural Action Team) are exposed to high wildfire risk for a total potential loss of \$10 million (a loss ratio of 50%) and about 408 people may be displaced (90% of the population).

As such, the NHMP Steering Committee rated the county as having a **“moderate” vulnerability to wildfire hazards**, meaning that between 1-10% of the County’s population or assets would be affected by a major disaster; *this rating has not changed since the previous NHMP.*

More information on this hazard can be found in the [Rogue Valley Integrated Community Wildfire Protection Plan \(2017\)](#) and the [Risk Assessment for Region 4, Southwest Oregon, of the Oregon NHMP \(2015\).](#)

Federal Disaster and Emergency Declarations

Reviewing past events can provide a general sense of the hazards that have caused significant damage in the county. Where trends emerge, disaster declarations can help inform hazard mitigation project priorities.

President Dwight D. Eisenhower approved the first federal disaster declaration in May 1953 following a tornado in Georgia. Since then, federally declared disasters have been approved within every state as a result of natural hazard related events. As of June 2017, FEMA has approved a total of 33 major disaster declarations, 69 fire management assistance declarations and two (2) emergency declarations in Oregon.³⁴ When governors ask for presidential declarations of major disaster or emergency, they stipulate which counties in their state they want included in the declaration. Table 3-22 summarizes the major disasters declared in Oregon that affected Jackson County, since 1955. The table shows that there have been four (4) major disaster declarations for the County. All of which were related to weather events resulting primarily in flooding, snow and landslide related damage.

Table 3-22 FEMA Major Disaster (DR) for Jackson County

Declaration Number	Declaration Date	Incident Period		Incident	Individual Assistance	Public Assistance Categories
		From	To			
DR-184	12/24/1964	12/24/1964	12/24/1964	Heavy rains and flooding	Yes	A, B, C, D, E, F, G
DR-413	1/25/1974	1/25/1974	1/25/1974	Severe Storms, Snowmelt, Flooding	Yes	A, B, C, D, E, F, G
DR-1160	1/23/1997	12/25/1996	1/6/1997	Severe Winter Storms/Flooding	Yes	A, B, C, D, E, F, G
DR-1632	3/20/2006	12/18/2005	1/21/2006	Severe Storms, Flooding, Landslides, and Mudslides	None	A, B, C, D, E, F, G

Source: FEMA, Oregon Disaster History. Major Disaster Declarations.

Table 3-23 summarizes fire management assistance and emergency declarations. Fire Management Assistance may be provided after a State submits a request for assistance to the FEMA Regional Director at the time a "threat of major disaster" for a fire emergency exists. There are ten (10) fire management assistance declarations on record for the county.

An Emergency Declaration is more limited in scope and without the long-term federal recovery programs of a Major Disaster Declaration. Generally, federal assistance and funding are provided to meet a specific emergency need or to help prevent a major disaster from occurring. Jackson County has two recorded Emergency Declarations related to the 1977 Drought and 2005 Hurricane Katrina evacuation.

³⁴FEMA, *Declared Disasters by Year or State*, http://www.fema.gov/news/disaster_totals_annual.fema#markS. Accessed March 2, 2016.

Table 3-23 FEMA Emergency (EM) and Fire Management Assistance (FMA) Declarations for Jackson County

Declaration Number	Declaration Date	Incident Period		Incident	Individual Assistance	Public Assistance Categories
		From	To			
FM-2014	9/7/1973	9/7/1973	-	Hillsview Fire	None	-
FM-2063	9/2/1987	8/30/1987	-	Savage Creek Fire	None	-
FM-2064	9/2/1987	8/30/1987	-	Sykes Creek Fire	None	-
FM-2083	8/4/1992	8/3/1992	-	East Evans Creek Fire	None	-
FM-2112	8/24/1994	8/24/1994	-	Hull Mountain Fire	None	-
FM-2445	7/17/2002	7/16/2002	7/21/2002	Squires Peak Fire	None	B
FM-2454	7/28/2002	7/27/2002	8/5/2002	Timbered Rock Fire	None	B
FM-2496	9/6/2003	9/5/2003	9/8/2003	Cove Road Fire	None	B, H
FM-2838	9/22/2009	9/21/2009	9/24/2009	South County Fire Complex	None	B, H
FM-5066	8/1/2014	7/31/2014	7/31/2014	Oregon Gulch Fire	None	-
EM-3039	4/29/1977	4/29/1977	4/29/1977	Drought	None	A, B
EM-3228	9/7/2005	8/29/2005	10/1/2005	Hurricane Katrina Evacuation	None	B

Source: FEMA, Oregon Disaster History. Major Disaster Declarations.

Vulnerability Summary

Community vulnerabilities are an important component of the NHMP risk assessment. For more in-depth information regarding specific community vulnerabilities see Volume I, Section 2 and Volume III. Changes to population, economy, built environment, critical facilities, and infrastructure have not significantly influenced vulnerability. New development has complied with the standards of the Oregon Building Code and the county's development code including their floodplain ordinance. Data sources for the following community vulnerability information can be found in Volume I, Section 2 unless otherwise noted below.

Population

The socio-demographic qualities of the community population such as language, race and ethnicity, age, income and educational attainment are significant factors that can influence the community's ability to cope, adapt to and recover from natural disasters. Historically, 80 percent of the disaster burden falls on the public.³⁵ Of this number, a disproportionate burden is placed upon special needs groups, particularly children, the elderly, the disabled, minorities and low-income persons. Population vulnerabilities can be reduced or eliminated with proper outreach and community mitigation planning.

³⁵ Hazards Workshop Session Summary #16, *Disasters, Diversity and Equity*, University of Colorado, Boulder (2000).

Population Vulnerabilities

- As of 2015, approximately 19% of Jackson County's population is over the age of 64; that number is projected to rise to about 27% (or roughly 71,000 individuals) by 2035.
- The Jackson County age dependency ratio³⁶ is 58.7, which is higher than that of the State of Oregon (50.4) indicating a higher percentage of dependent aged people to that of working aged. The ratio is expected to rise to 74.9 by 2035.
- Approximately 29% of Jackson County population lives alone; this percentage is greatest in Rogue River (44%).
- Jackson County and the majority of incorporated cities show that real median income is decreasing, with the largest rates of decrease in Butte Falls (-28%), Rogue River (-20%) and Shady Cove (-16%).
- Jacksonville, differing from county trend, has shown a 11% increase in median household income.
- Approximately 19% of the total Jackson County population lived at or below the poverty line in 2015, with 27% are children. Butte Falls has the highest percentage of total population in poverty (34%, 146).
- While over 89% of the population over 25 has graduated high school or higher, about 24% have a bachelor's degree or higher.
- Approximately 17% of the Jackson County population is estimated to have a disability. Of that, 15,760 individuals over 65 (7% of total county population) are disabled.
- Approximately 48% of all homeless individuals and families in Jackson County are unsheltered as of 2015.

Economy

Economic diversification, employment and industry are measures of economic capacity. However, economic resilience to natural disasters is far more complex than merely restoring employment or income in the local community. Building a resilient economy requires an understanding of how the component parts of employment sectors, workforce, resources and infrastructure are interconnected in the existing economic picture. The current and anticipated financial conditions of a community are strong determinants of community resilience, as a strong and diverse economic base increases the ability of individuals, families and the community to absorb disaster impacts for a quick recovery.

Economic Vulnerabilities

- Over 56% of Jackson County renters spend more than 30% of their income on housing. The city with the highest percentage of renters spending 30% or more of their income on housing is Shady Cove (79%).
- According to the Oregon Employment Department, Jackson County unemployment has decreased from ~13% in 2009 to about 6% in 2016.
- About 20% of the workforce comes into the county from outside of the county and about 18% of the population travels to outside of the county for work.

³⁶ Dependency Ratio: the ratio of population typically not in the work force (less than 15, greater than 64)

- The top five industry sectors in Jackson County with the most employees, as of 2016, are Trade, Transportation & Utilities (22%, 19,125), Education and Health Services (18%, 14,926), Retail Trade (16%, 13,503), Leisure and Hospitality (13%, 10,774) and Manufacturing (9%, 7,676).
- The largest revenue sectors in Jackson County are Retail Trade (\$3.2 billion), Manufacturing (\$1.6 billion) and Healthcare and Social Assistance (\$1.4 billion).
- The Education and Health Services sector is expected to have the most growth from 2014 to 2024 at 15%. Construction (12%) and Professional and Business Services (12%) are the next closest growth sectors in terms of employment.

Environment

The capacity of the natural environment is essential in sustaining all forms of life including human life, yet it often plays an underrepresented role in community resiliency to natural hazards. The natural environment includes land, air, water and other natural resources that support and provide space to live, work and recreate.³⁷ Natural capital such as wetlands and forested hill slopes play significant roles in protecting communities and the environment from weather-related hazards, such as flooding and landslides. When natural systems are impacted or depleted by human activities, those activities can adversely affect community resilience to natural hazard events.

Environmental Vulnerabilities

- Forest ecosystems are vulnerable to drought, wildfire and severe storm impacts.
- Water and air quality may be affected in both long and short-term measures as a result of direct and indirect impacts from natural hazards.

Built Environment, Critical Facilities and Infrastructure

Critical facilities (i.e. police, fire and government facilities), housing supply and physical infrastructure are vital during a disaster and are essential for proper functioning and response. The lack or poor condition of infrastructure can negatively affect a community's ability to cope, respond and recover from a natural disaster. Following a disaster, communities may experience isolation from surrounding cities and counties due to infrastructure failure. These conditions force communities to rely on local and immediately available resources.

Housing Vulnerabilities

- Mobile home and other non-permanent residential structures account for 14% of the housing in Jackson County. In Shady Cove, mobile homes account for about 40% and 32% within Butte Falls. These structures are particularly vulnerable to certain natural hazards, such as earthquake, windstorms and heavy flooding events.
- Based on U.S. Census data, approximately 61% of the residential housing in Jackson County was built before the current seismic building standards of 1990.³⁸

³⁷ Mayunga, J. "Understanding and Applying the Concept of Community Disaster Resilience: A capital-based approach. Summer Academy for Social Vulnerability and Resilience Building," (2007).

³⁸ Ibid.

- Approximately 30% of residential structures were constructed prior to the local implementation of the flood elevation requirements of the 1970's (county Flood Insurance Rate Maps –FIRMs- were not completed until the late 1970s and early 1980s).
- The housing vacancy rate in Jackson County was estimated at 7% in 2015. Approximately 19% of the housing units in Butte Falls (37 units) and 8% in Eagle Point (287 units), Gold Hill (43 units) and Rogue River (111 units) were estimated to be vacant.

Critical Facilities and Infrastructure Vulnerabilities

- Virtually all state and county roads and bridges in Jackson County are vulnerable to multiple hazards including flood, landslide and earthquake. Impacts to the transportation system can result in the isolation of vulnerable populations, limit access to critical facilities such as hospitals and adversely impact local commerce, employment and economic activity.
- There are three (3) general hospitals in the county with 24/7 emergency room and inpatient services, located in Ashland and Medford.
- There are three power plants located in Jackson County including one located in White City, which uses biomass as its energy source. There is some redundancy in power transmission but limited redundancy in the power distribution network, especially in relation to the more rural or unincorporated areas of the county.
- There are fifteen (15) “high threat potential” dams (Volume I, Section 2) and twenty (20) “significant threat potential” dams; the county has twenty-eight (28) dams categorized as “low threat potential.”

Risk Assessment

Multi-jurisdictional Risk Assessment - §201.6(c) (2) (iii): For multi-jurisdictional plans, the risk assessment must assess each jurisdiction’s risks where they vary from the risks facing the entire planning area.

Probability Summary

Table 3-24 presents the probability scores for each of the natural hazards present in Jackson County for which descriptions are provided herein and in Volume III with detail for the participating cities.

Table 3-24 Natural Hazard Probability Assessment Summary

Hazard	Jackson County	Ashland	Butte Falls	Eagle Point	Jacksonville
Drought	High	High	High	High	High
Earthquake (Cascadia)	High	High	High	High	High
Earthquake (Crustal)	Low	Low	Low	Low	Low
Emerging Infectious Disease	Moderate	Moderate	Moderate	Moderate	Moderate
Flood	High	High	Low	High	Moderate
Landslide	High	High	Low	Low	High
Volcano	Low	Low	Low	Low	Low
Wildfire	High	High	High	Moderate	High
Windstorm	High	High	High	High	High
Winter Storm	High	High	High	High	High

Hazard	Phoenix	Rogue River	Shady Cove	Talent
Drought	High	High	High	High
Earthquake (Cascadia)	High	High	High	High
Earthquake (Crustal)	Low	Low	Low	Low
Emerging Infectious Disease	Moderate	Moderate	Moderate	Moderate
Flood	High	High	High	High
Landslide	High	Low	High	High
Volcano	Low	Low	Low	Low
Wildfire	Moderate	High	High	High
Windstorm	High	High	High	High
Winter Storm	High	High	High	High

Source: Jackson County and City NHMP Steering Committees 2017.

Vulnerability Summary

Vulnerability assesses the extent to which people are susceptible to injury or other impacts resulting from a hazard as well as the exposure of the built environment or other community assets (social, environmental, economic, etc.) to hazards. The exposure of community assets to hazards is critical in the assessment of the degree of risk a community has to each hazard. Identifying the populations, facilities and infrastructure at risk from various hazards can assist the County in prioritizing resources for mitigation and can assist in directing damage assessment efforts after a hazard event has occurred. The exposure of County and City assets to each hazard and potential implications are explained in each hazard section.

Vulnerability includes the percentage of population and property likely to be affected under an “average” occurrence of the hazard. Jackson County evaluated the best available vulnerability data to develop the vulnerability scores presented below. For the purposes of this NHMP, the County and cities utilized the Oregon Military Department – Office of Emergency Management (OEM) Hazard Analysis methodology vulnerability definitions to determine hazard probability.

Table 3-25 presents the vulnerability scores for each of the natural hazards present in Jackson County and the participating cities.

Table 3-25 Community Vulnerability Assessment Summary

Hazard	Jackson County	Ashland	Butte Falls	Eagle Point	Jacksonville
Drought	Moderate	High	Moderate	Moderate	Low
Earthquake (Cascadia)	High	High	High	High	High
Earthquake (Crustal)	Moderate	Moderate	Low	Moderate	Moderate
Emerging Infectious Disease	High	High	High	High	High
Flood	Moderate	Moderate	Low	Moderate	Low
Landslide	Low	High	Low	Low	Moderate
Volcano	Low	Low	Low	Low	Low
Wildfire	Moderate	High	High	Moderate	High
Windstorm	Moderate	Moderate	Moderate	Moderate	High
Winter Storm	Moderate	Moderate	High	High	High

Hazard	Phoenix	Rogue River	Shady Cove	Talent
Drought	Moderate	High	High	Moderate
Earthquake (Cascadia)	High	High	High	High
Earthquake (Crustal)	Moderate	Moderate	Moderate	Moderate
Emerging Infectious Disease	High	High	High	High
Flood	Moderate	Moderate	High	Moderate
Landslide	Low	Low	High	Moderate
Volcano	Low	Low	Low	Low
Wildfire	Low	High	High	Low
Windstorm	Moderate	Moderate	High	Moderate
Winter Storm	High	Moderate	High	Moderate

Source: Jackson County and City NHMP Steering Committees 2017.

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.

Hazard Analysis Matrix

The hazard analysis matrix involves estimating the damage, injuries and costs likely to be incurred in a geographic area over a period of time. Risk has two measurable components: (1) the magnitude of the harm that may result, defined through the vulnerability assessment (assessed in the previous sections) and (2) the likelihood or probability of the harm occurring. Table 3-26 presents the entire updated hazard analysis matrix for Jackson County. 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 past historical events, the probability or likelihood of a hazard event occurring, the vulnerability to the community and the maximum threat or worst-case scenario, earthquake (Cascadia), Pandemic/Epidemic and Wildland Fire events rank as the top hazard threats to the County (top tier). Drought, winter storm and windstorm events rank in the middle (middle tier). Flood, Earthquake (Crustal), Landslide and Volcano comprise the lowest ranked hazards in the county (bottom tier).

Table 3-26 Hazard Analysis Matrix – Jackson County

Hazard	Maximum				Total Threat Score	Hazard Rank	Hazard Tiers
	History	Vulnerability	Threat	Probability			
Earthquake (Cascadia)	2	50	100	70	222	#1	Top Tier
Emerging Infectious Disease	12	50	100	49	211	#2	
Wildfire	20	35	60	70	185	#3	
Winter Storm	20	30	60	70	180	#4	
Flood	20	20	60	70	170	#5	Middle Tier
Drought	20	30	50	63	163	#6	
Windstorm	20	20	50	70	160	#7	
Landslide	10	15	30	70	125	#8	
Earthquake (Crustal)	2	25	50	21	98	#9	Bottom Tier
Volcano	2	5	50	7	64	#10	

Source: Jackson County Steering Committee (2017); Analysis and Ranking by OPDR

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 a sense of hazard priorities, but does not predict the occurrence of a particular hazard.

City Specific Risk Assessment

Multi-jurisdictional Risk Assessment - §201.6(c) (2) (iii): For multi-jurisdictional plans, the risk assessment must assess each jurisdiction’s risks where they vary from the risks facing the entire planning area.

The eight (8) participating cities in Jackson County held Steering Committee meetings and completed a jurisdiction specific hazard analysis. The multi-jurisdictional risk assessment information is located herein and within the Risk Assessment of each city’s addendum.

Hazard Analysis Methodology

The hazard analysis methodology in Oregon (primarily to inform Emergency Operations Planning) was first developed by FEMA circa 1983 and gradually refined by the Oregon Military Department’s Office of Emergency Management over the years.

The methodology produces scores that range from 24 (lowest possible) to 240 (highest possible). Vulnerability and probability are the two key components of the methodology. Vulnerability examines both typical and maximum credible events and probability endeavors to reflect how physical changes in the jurisdiction and scientific research modify the historical record for each hazard. Vulnerability accounts for approximately 60% of the total score and probability approximately 40%. We include the hazard analysis summary here to ensure consistency between the EOP and NHMP.

The Oregon method provides the jurisdiction with a sense of hazard priorities, or relative risk. It doesn't predict the occurrence of a hazard, but it does "quantify" the risk of one hazard compared with another. By doing this analysis, planning can first be focused where the risk is greatest.

In this analysis, severity ratings and weight factors, are applied to the four categories of history, vulnerability, maximum threat (worst-case scenario) and probability (Volume II, Appendix C).

SECTION 4: MITIGATION STRATEGY

This section outlines Jackson County's strategy to reduce or avoid long-term vulnerabilities to the identified hazards. Specifically, this section presents a mission and specific goals and actions thereby addressing the mitigation strategy requirements contained in 44 CFR 201.6(c). The NHMP Steering Committee reviewed and updated the mission, goals and action items documented in this NHMP. Additional planning process documentation is in Volume II, Appendix B.

Mitigation Plan Mission

The NHMP mission states the purpose and defines the primary functions of Jackson County's NHMP. It is intended to be adaptable to any future changes made to the NHMP and need not change unless the community's environment or priorities change.

The mission of the Jackson County NHMP is:

Protect life, property and the environment, reduce risk and prevent loss from natural hazard events through coordination and cooperation among public and private partners.

The 2017 NHMP Steering Committee reviewed the previous NHMP's mission statement and agreed to retain it without modifications.

Mitigation Plan Goals

Mitigation plan goals are more specific statements of direction that Jackson County citizens and public and private partners can take while working to reduce the County's risk from natural hazards. These statements of direction form a bridge between the broad mission statement and action items. The goals listed here serve as checkpoints as agencies and organizations begin implementing mitigation action items.

Stakeholder participation was a key aspect in developing the original NHMP goals in 2006. Meetings with the project Steering Committee, stakeholder interviews and public workshops all served as methods to obtain input and priorities in developing goals for reducing risk and preventing loss for natural hazards in Jackson County.

The 2017 Jackson County NHMP Steering Committee reviewed the previous NHMP goals in comparison to the State Natural Hazard Mitigation Plan (2015) goals and determined that they would retain their original goals without modifications.

All the NHMP goals are important and are listed below in no order of priority. Establishing community priorities within action items neither negates nor eliminates any goals, but it establishes which action items to consider implementing first, should funding become available.

Below is a list of the NHMP goals:

GOAL 1: EMERGENCY SERVICES

Minimize life safety issues by promoting, strengthening and coordinating emergency response plans.

GOAL 2: EDUCATION AND OUTREACH

Further the public's awareness and understanding of natural hazards and potential risk, including economic vulnerability and mitigation efforts.

GOAL 3: PREVENTION

Reduce the threat of loss of life and property from natural hazards by incorporating information on known hazards and providing incentives to make hazard mitigation planning a priority in land use policies and decisions, including plan implementation.

GOAL 4: PROPERTY PROTECTION

Lessen impact from natural disasters on individual properties, businesses and public facilities by increasing awareness at the individual level and encouraging activities that can prevent damage and loss of life from natural hazards.

GOAL 5: PARTNERSHIP AND COORDINATION

Identify mitigation or risk reduction measures that address multiple areas (i.e., environment, transportation, telecommunications); Coordinate public/private sector participation in planning and implementing mitigation projects throughout the county; and seek funding and resource partnerships for future mitigation efforts.

GOAL 6: NATURAL RESOURCE PROTECTION

Preserve and rehabilitate natural systems to serve natural hazard mitigation functions (i.e., floodplains, wetlands, watershed and urban interface areas).

GOAL 7: STRUCTURAL PROTECTIONS

When applicable, utilize structural mitigation activities to minimize risks associated with natural hazards.

Action Item Development Process

Development of action items was a multi-step, iterative process that involved brainstorming, discussion, review and revisions. Action items can be developed through many sources. The figure below illustrates some of these sources.

Figure 4-I Development of Action Items



Most of the action items were first created during the previous NHMP planning processes. During these processes, steering committees developed maps of local vulnerable populations, facilities and infrastructure in respect to each identified hazard. Review of these maps generated discussion around potential actions to mitigate impacts to the vulnerable areas. The Oregon Partnership for Disaster Resilience (OPDR) provided guidance in the development of action items by presenting and discussing actions that were used in other communities. OPDR also took note of ideas that came up in Steering Committee meetings and drafted specific actions that met the intent of the Steering Committee. All actions were then reviewed by the Steering Committee, discussed at length and revised as necessary before becoming a part of this document.

Priority Actions

Action items identified through the planning process are an important part of the mitigation plan. Action items are detailed recommendations for activities that local departments, citizens and others could engage in to reduce risk. Due to resource constraints, Jackson County and participating cities are listing a set of high priority actions (Table 4-1) to focus attention on an achievable set of high leverage activities over the next five-years. This NHMP identifies priority actions based on an evaluation of high impact hazards, resource availability and FEMA identified best practices.

See Volume III for the Priority Actions for each participating city.

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Table 4-1 Jackson County Priority Action Items

Action Item ID	Mitigation Action Item	Timeline	Lead Organization	Partner Organization(s)	Potential Funding Source(s)
Priority Actions					
Multi-Hazard (MH)					
MH #1	Sustain an education and outreach program for local jurisdictions about natural hazards and assist them in developing emergency operations, public information, and hazard mitigation plans.	Ongoing	Local Emergency Management	ARC, CERT, RVCOG, Emergency Response Agencies, Utilities and Telecommunications Companies, RVCOG, OEM, FEMA, Media, HHS, NWS, ODOT, OSU, RVFPC, SAR, Schools	General Fund, FEMA, DLCD
MH #2	Develop and maintain a GIS inventory of all critical facilities, large employers/public assembly areas and lifelines, and use GIS to evaluate their vulnerability by comparing them with hazard-prone areas.	Ongoing	County GIS	County and City Emergency Management Agencies, County Roads, ODOT, City Public Works, Emergency Response Agencies, RVCOG, ODF, BLM, USFS, OWRD	General Fund
Wildfire (WF)					
WF #1	Coordinate fire mitigation action items through the Rogue Valley Integrated Community Wildfire Protection Plan.	Ongoing	Local Emergency Management	Fire and Rescue Districts, State Office of Emergency Management, Oregon Department of Forestry	General Fund, ODF

Source Jackson County NHMP Steering Committee, updated 2017

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Action Item Pool

The action item pool (Table 4-2) presents additional mitigation actions. Most of these actions carry forward from prior versions of this NHMP. This expanded list of actions is available for local consideration as resources, capacity, technical expertise and/or political support become available.

See Volume III for the Action Item Pool for each participating city.

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Table 4-2 Jackson County Action Item Pool

Action Item ID	Mitigation Action Item	Timeline	Lead Organization	Partner Organization(s)	Potential Funding Source(s)
Action Item Pool					
Multi-Hazard (MH)					
MH #3	Integrate the Mitigation Plan findings into planning and regulatory documents and programs including the Comprehensive Plan (particularly Goal 7).	Ongoing	County Planning	County GIS, FEMA, DLCDC	General Fund, DLCDC Technical Assistance Grant
MH #4	Enhance hazard resistant construction methods (wind, winter storm, landslide, etc.) where possible to reduce damage to utilities and critical facilities. In part, this may be accomplished by encouraging electric utility providers to convert existing overhead lines to underground lines.	Ongoing	County Roads, Local Planning, PP&L	Utility and Telecommunications Companies, ODOT, City Public Works, USFS, BLM, ODF, Fire	General Fund
Drought (DR)					
DR #1	Support Local Agencies Training on Water Conservation Measures and Drought Management Practices and ensure long-range Water Resources Development and adaptation strategies.	Long Term	Jackson Soil and Water Conservation District, Jackson County Watermaster	County Agencies, Medford Water Commission, OSU Extension Service, Fruit Growers, Water Districts, SWCD	General Fund, OWRD
Earthquake (EQ)					
EQ #1	Implement structural and non-structural retrofits to critical and essential facilities.	Ongoing	Local Administration, Building Owners	Building Officials, Local Planning, Emergency Response Agencies, Builder's Association, American Red Cross, DOGAMI, OEM, IFA	General Fund, PDM, HMGP, SRGP
Emerging Infectious Disease (EID)					
	No specific action item developed for this hazard. See multi-hazard actions for applicable mitigation strategies.				

Source Jackson County NHMP Steering Committee, updated 2017

Table 4-2 Jackson County Action Item Pool (continued)

Action Item ID	Mitigation Action Item	Timeline	Lead Organization	Partner Organization(s)	Potential Funding Source(s)
Action Item Pool					
Flood (FL)					
FL #1	Conduct workshops for target audiences on National Flood Insurance Programs, mitigation activities, and potential assistance from FEMA's Flood Mitigation Assistance and Hazard Mitigation Grant Programs.	Ongoing	Local Planning	Local Emergency Management	General Fund, FMA, HMGP
FL #2	Update the Flood Insurance Rate (FIRM) Maps for Jackson County as funding becomes available.	Mid-Term (3-5 Years)	County Planning	Local Planning, DOGAMI, County GIS, FEMA	FEMA (Risk MAP), DLCDD
FL #3	Encourage private property owners to restore natural systems within the floodplain, and to manage riparian areas and wetlands for flood abatement and upland function (vegetation management).	Long Term (5+ years)	Local Planning	County Parks and Planning, FEMA, Watershed Councils, DLCDD, RVCOG, Cities, USACE, DSL, DEQ, EPA, ODFW, JSWCD	General Fund, FEMA, DEQ
FL #4	Use local, state, and federal grant funds to acquire or elevate individual properties adjacent to/ within 100-year floodplain as opportunities arise.	Ongoing	Local Planning	FEMA, Local Emergency Management, County Administrator's Office, OEM, DLCDD, OECDD	General Fund, PDM, HMGP
FL #5	Continue to increase Jackson County's CRS (Community Rating System) rating over time through activities outlined by FEMA.	Ongoing	Local Emergency Management, Local Planning	Watershed Councils, OEM, DLCDD, OECDD, USACE, FEMA	General Fund, DLCDD Technical Assistance Grant
FL #6	Preserve water quantity and quality by using storm water best management practices (Low Impact Development/ Green Infrastructure)	Ongoing	County Roads, RVCOG, DEQ, County and City Planning	Watershed Councils, WRD, USACE, Irrigation Districts, State Parks, Rogue Valley Sewer Services, JCSWD	General Fund, DEQ, PDM, HMGP, FMA

Source Jackson County NHMP Steering Committee, updated 2017

Table 4-2 Jackson County Action Item Pool (continued)

Action Item ID	Mitigation Action Item	Timeline	Lead Organization	Partner Organization(s)	Potential Funding Source(s)
Action Item Pool					
Landslide (LS)					
LS #1	Utilize the updated regional landslide risk maps (DOGAMI O-16-02) to identify hazard areas and collaborate with the Oregon Department of Geology and Mineral Industries to work on landslide risk reduction efforts; determine areas and buildings at risk to landslides and propose Comprehensive Plan and land use policies accordingly.	Short Term (1-2 years)	County GIS	DOGAMI, County Planning, County Emergency Management, ODF, SOU	General Fund, PDM, HMGP, FEMA (Risk MAP), DLCD
Severe Weather (SW, Windstorm and Winter Storm)					
	No specific action item developed for this hazard. See multi-hazard actions for applicable mitigation strategies.				
Volcano (VE)					
	No specific action item developed for this hazard. See multi-hazard actions for applicable mitigation strategies.				
Wildfire (WF)					
	See priority actions and multi-hazard actions for applicable mitigation strategies.				

Source Jackson County NHMP Steering Committee, updated 2017

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SECTION 5:

PLAN IMPLEMENTATION AND MAINTENANCE

This section details the formal process that will ensure that the NHMP remains an active and relevant document. The plan implementation and maintenance process includes a schedule for monitoring and evaluating the NHMP semi-annually, as well as producing an updated plan every five years. Finally, this section describes how the County will integrate public participation throughout the NHMP maintenance and implementation process.

Implementing the NHMP

The success of the Jackson County NHMP depends on how well the outlined action items are implemented. In an effort to ensure that the activities identified are implemented, the following steps will be taken: 1) the NHMP will be formally adopted, 2) a Steering Committee will be assigned, 3) a convener shall be designated, 4) semi-annual meetings will be held, 5) the identified activities will be prioritized and evaluated, and 6) the NHMP will be implemented through existing plans, programs and policies.

NHMP Adoption

The Jackson County NHMP was developed and will be implemented through a collaborative process. After the NHMP is locally reviewed and deemed complete, the Jackson County Emergency Manager, or their designee, shall submit it to the State Hazard Mitigation Officer (SHMO) at the Oregon Military Department – Office of Emergency Management (OEM). OEM submits the NHMP to FEMA-Region X for review. This review addresses the federal criteria outlined in the FEMA Interim Final Rule 44 CFR Part 201. Upon acceptance by FEMA, the County will adopt the NHMP via resolution. At that point, the County will gain eligibility for the Pre-Disaster Mitigation Grant Program, the Hazard Mitigation Grant Program and Flood Mitigation Assistance program funds. Following adoption by the County, the participating jurisdictions should convene local decision makers and adopt the Jackson County Multijurisdictional NHMP.

Convener

The Jackson County Emergency Manager will take responsibility for NHMP implementation and will facilitate the Hazard Mitigation Steering Committee meetings and will assign tasks such as updating and presenting the NHMP to the rest of the members of the Steering Committee (see City Addenda for city conveners). NHMP implementation and evaluation will be a shared responsibility among all of the assigned Steering Committee Members. The Convener's responsibilities include:

- Coordinate Steering Committee meeting dates, times, locations, agendas and member notification;
- Document the discussions and outcomes of committee meetings;
- Serve as a communication conduit between the Steering Committee and the public/stakeholders;
- Identify emergency management-related funding sources for natural hazard mitigation projects; and

- Utilize the Risk Assessment as a tool for prioritizing proposed natural hazard risk reduction projects.

Steering Committee

The Jackson County Convener will maintain a Natural Hazard Steering Committee for updating and implementing the NHMP. The Steering Committee responsibilities include:

- Attend future maintenance and NHMP update meetings (or designating a representative to serve in your place);
- Serve as the local evaluation committee for funding programs such as the Pre-Disaster Mitigation Grant Program, the Hazard Mitigation Grant Program funds and Flood Mitigation Assistance program funds;
- Prioritize and recommend funding for natural hazard risk reduction projects;
- Evaluate and update the NHMP in accordance with the prescribed maintenance schedule;
- Develop and coordinate ad hoc and/or standing subcommittees as needed; and
- Coordinate public involvement activities.

Members

The following jurisdictions, agencies and/or organizations were represented and served on the Steering Committee during the development of the Jackson County NHMP and may be represented during implementation and maintenance phase (for a list of individuals see *Acknowledgements*):

- Jackson County Emergency Management
- Jackson County Development Services
- Jackson County GIS
- Jackson County Health and Human Services
- Jackson County Roads and Parks
- Cow Creek Band of the Umpqua Tribe of Indians
- Rogue Valley Council of Governments
- City of Ashland
- Town of Butte Falls
- City of Central Point
- City of Eagle Point
- City of Jacksonville
- City of Medford
- City of Phoenix
- City of Rogue River
- City of Shady Cove
- City of Talent
- American Red Cross
- Applegate Valley Fire District
- Asante
- Ashland School District
- Emergency Communications of Southern Oregon
- Jackson County Library District
- Jackson County Soil and Water Conservation District
- Jackson County Vector Control District
- Medford Fire and Rescue
- Medford Water Commission
- Rogue Community College
- Rogue Valley Sewer
- Rogue Valley Transportation District
- Rogue Waste, Inc
- Oregon Department of Transportation
- Oregon Water Resources Department, District 13
- National Weather Service
- U.S. Army Corps of Engineers

To make the coordination and review of the Jackson County NHMP as broad and useful as possible, the Steering Committee will engage additional stakeholders and other relevant hazard mitigation organizations and agencies to implement the identified action items. Specific organizations have been identified as partners in the action item matrices.

Implementation through existing programs

The NHMP includes a range of action items that, when implemented, will reduce loss from hazard events in the county. Within the NHMP, FEMA requires the identification of existing programs that might be used to implement these action items. Jackson County and the participating cities currently address statewide planning goals and legislative requirements through their comprehensive land use plans, capital improvement plans, mandated standards and building codes. To the extent possible, Jackson County and participating cities will work to incorporate the recommended mitigation action items into existing programs and procedures.

Many of the recommendations contained in the NHMP are consistent with the goals and objectives of the participating City and County's existing plans and policies. Where possible, Jackson County and participating cities should implement the recommended actions contained in the NHMP through existing plans and policies. Plans and policies already in existence often have support from residents, businesses and policy makers. Many land-use, comprehensive and strategic plans get updated regularly and can adapt easily to changing conditions and needs. Implementing the action items contained in the NHMP through such plans and policies increases their likelihood of being supported and implemented.

Examples of plans, programs or agencies that may be used to implement mitigation activities include:

- City and County Budgets
- Community Wildfire Protection Plans
- Comprehensive Land Use Plans
- Economic Development Action Plans
- Zoning Ordinances and Building Codes

For additional examples of plans, programs or agencies that may be used to implement mitigation activities refer to list of plans in Volume I, Section 2.

NHMP Maintenance

NHMP maintenance is a critical component of the NHMP. Proper maintenance of the NHMP ensures that it will maximize the County and participating Cities' efforts to reduce the risks posed by natural hazards. This section was developed by OPDR and includes a process to ensure that a regular review and update of the NHMP occurs. The Steering Committee and local staff are responsible for implementing this process, in addition to maintaining and updating the NHMP through a series of meetings outlined in the maintenance schedule below.

Meetings

The Steering Committee will meet on a **semi-annual basis** to complete the following tasks. During the first meeting the Steering Committee will:

- Review existing action items to determine appropriateness for funding;
- Educate and train new members on the NHMP and mitigation in general;
- Identify issues that may not have been identified when the NHMP was developed; and
- Prioritize potential mitigation projects using the methodology described below.

During the second meeting, the Steering Committee will:

- Review existing and new risk assessment data;
- Discuss methods for continued public involvement; and
- Document successes and lessons learned during the year.

These meetings are an opportunity for the Cities to report back to the County on progress that has been made towards their components of the NHMP.

The convener will be responsible for documenting the outcome of the semi-annual meetings in Volume II, Appendix B. The process the Steering Committee will use to prioritize mitigation projects is detailed in the section below. The NHMP's format allows the County and participating Cities to review and update sections when new data becomes available. New data can be easily incorporated, resulting in a NHMP that remains current and relevant to the participating jurisdictions.

Project Prioritization Process

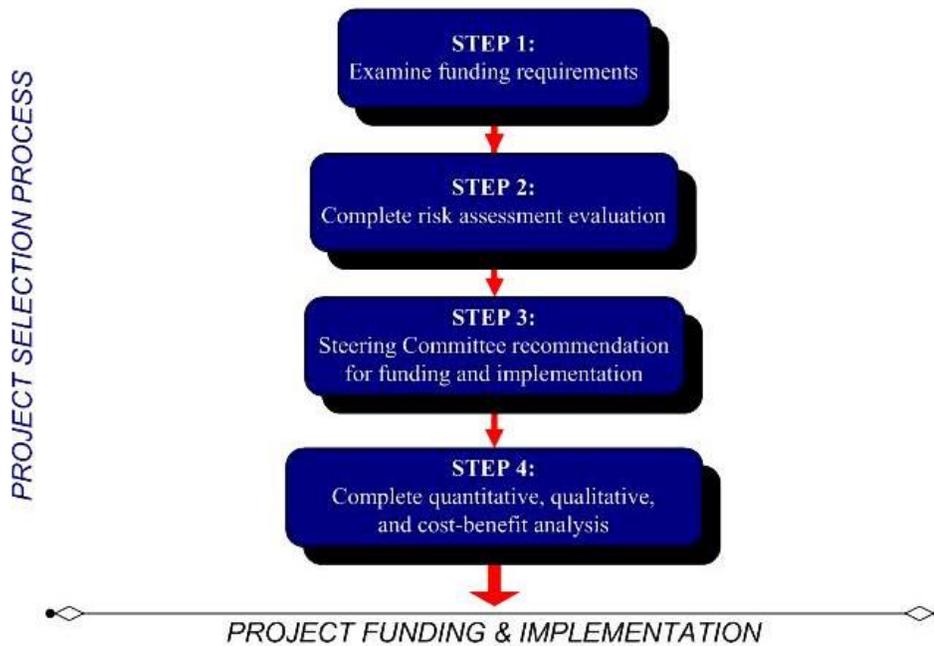
The Disaster Mitigation Act of 2000 requires that jurisdictions identify a process for prioritizing potential actions. Potential mitigation activities often come from a variety of sources; therefore, the project prioritization process needs to be flexible. Committee members, local government staff, other planning documents or the risk assessment may be the source to identify projects. Figure 5-1 illustrates the project development and prioritization process.

Step I: Examine funding requirements

The first step in prioritizing the NHMP's action items is to determine which funding sources are open for application. Several funding sources may be appropriate for the County's proposed mitigation projects. Examples of mitigation funding sources include but are not limited to: FEMA's Pre-Disaster Mitigation competitive grant program (PDM), Flood Mitigation Assistance (FMA) program, Hazard Mitigation Grant Program (HMGP), National Fire Plan (NFP), Community Development Block Grants (CDBG), local general funds and private foundations, among others. Please see Volume II, Appendix E for a more comprehensive list of potential grant programs.

Because grant programs open and close on differing schedules, the Steering Committee will examine upcoming funding streams' requirements to determine which mitigation activities would be eligible. The Steering Committee may consult with the funding entity, Oregon Military Department – Office of Emergency Management (OEM), or other appropriate state or regional organizations about project eligibility requirements. This examination of funding sources and requirements will happen during the Steering Committee's semi-annual NHMP maintenance meetings.

Figure 5-1 Action Item and Project Review Process



Source: Oregon Partnership for Disaster Resilience, 2008.

Step 2: Complete risk assessment evaluation

The second step in prioritizing the NHMP's action items is to examine which hazards the selected actions are associated with and where these hazards rank in terms of community risk. The Steering Committee will determine whether or not the NHMP's risk assessment supports the implementation of eligible mitigation activities. This determination will be based on the location of the potential activities, their proximity to known hazard areas and whether community assets are at risk. The Steering Committee will additionally consider whether the selected actions mitigate hazards that are likely to occur in the future, or are likely to result in severe/catastrophic damages.

Step 3: Steering Committee Recommendation

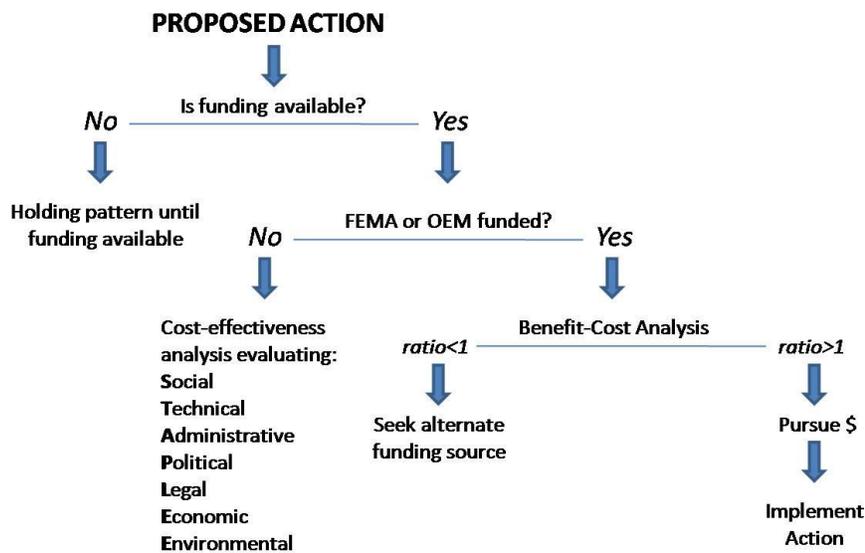
Based on the steps above, the Steering Committee will recommend which mitigation activities should be moved forward. If the Steering Committee decides to move forward with an action, the coordinating organization designated in the matrix will be responsible for taking further action and, if applicable, documenting success upon project completion. The Steering Committee will convene a meeting to review the issues surrounding grant applications and to share knowledge and/or resources. This process will afford greater coordination and less competition for limited funds.

Step 4: Complete quantitative and qualitative assessment and economic analysis

The fourth step is to identify the costs and benefits associated with the selected natural hazard mitigation strategies, measures or projects. Two categories of analysis that are used

in this step are: (1) cost-benefit analysis and (2) cost-effectiveness analysis. Conducting cost-benefit analysis for a mitigation activity assists in determining whether a project is worth undertaking now, in order to avoid disaster-related damages later. Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. Determining the economic feasibility of mitigating natural hazards provides decision makers with an understanding of the potential benefits and costs of an activity, as well as a basis upon which to compare alternative projects. Figure 5-2 shows decision criteria for selecting the appropriate method of analysis.

Figure 5-2 Benefit Cost Decision Criteria



Source: Oregon Partnership for Disaster Resilience, 2010.

If the activity requires federal funding for a structural project, the Steering Committee will use a FEMA-approved cost-benefit analysis tool to evaluate the appropriateness of the activity. A project must have a cost-benefit ratio of greater than one in order to be eligible for FEMA grant funding.

For non-federally funded or nonstructural projects, a qualitative assessment will be completed to determine the project's cost effectiveness. The Steering Committee will use a multivariable assessment technique called STAPLE/E to prioritize these actions. STAPLE/E stands for Social, Technical, Administrative, Political, Legal, Economic and Environmental. Assessing projects based upon these seven variables can help define a project's qualitative cost effectiveness. OPDR at the University of Oregon's Community Service Center has tailored the STAPLE/E technique for use in natural hazard action item prioritization.

Continued Public Involvement and Participation

The participating jurisdictions are dedicated to involving the public directly in the continual reshaping and updating of the Jackson County NHMP. Although members of the Steering Committee represent the public to some extent, the public will also have the opportunity to continue to provide feedback about the NHMP.

To ensure that these opportunities will continue, the County and participating jurisdictions will:

- Post copies of their plan on corresponding websites;
- Place articles in the local newspaper directing the public where to view and provide feedback; and
- Use existing newsletters such as schools and utility bills to inform the public where to view and provide feedback.

In addition to the involvement activities listed above, Jackson County will ensure continued public involvement by posting the Jackson County NHMP on the county's website (<http://www.Jackson.org/emergency>). The NHMP will also be archived and posted on the University of Oregon Libraries' Scholar's Bank Digital Archive (<https://scholarsbank.uoregon.edu>).

Five-Year Review of NHMP

This NHMP will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. **The Jackson County MNHMP is due to be updated by [date] 2023.** The Convener will be responsible for organizing the Steering Committee to address NHMP update needs. The Steering Committee will be responsible for updating any deficiencies found in the NHMP and for ultimately meeting the Disaster Mitigation Act of 2000's NHMP update requirements.

The following 'toolkit' can assist the Convener in determining which NHMP update activities can be discussed during regularly-scheduled NHMP maintenance meetings and which activities require additional meeting time and/or the formation of sub-committees.

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Table 5-1 Natural Hazard Mitigation Plan Update Toolkit

Question	Yes	No	Plan Update Action
Is the planning process description still relevant?			Modify this section to include a description of the plan update process. Document how the planning team reviewed and analyzed each section of the plan, and whether each section was revised as part of the update process. (This toolkit will help you do that).
Do you have a public involvement strategy for the plan update process?			Decide how the public will be involved in the plan update process. Allow the public an opportunity to comment on the plan process and prior to plan approval.
Have public involvement activities taken place since the plan was adopted?			Document activities in the "planning process" section of the plan update
Are there new hazards that should be addressed?			Add new hazards to the risk assessment section
Have there been hazard events in the community since the plan was adopted?			Document hazard history in the risk assessment section
Have new studies or previous events identified changes in any hazard's location or extent?			Document changes in location and extent in the risk assessment section
Has vulnerability to any hazard changed?			Document changes in vulnerability in the risk assessment section
Have development patterns changed? Is there more development in hazard prone areas?			Document changes in vulnerability in the risk assessment section
Do future annexations include hazard prone areas?			Document changes in vulnerability in the risk assessment section
Are there new high risk populations?			Document changes in vulnerability in the risk assessment section
Are there completed mitigation actions that have decreased overall vulnerability?			Document changes in vulnerability in the risk assessment section
Did the plan document and/or address National Flood Insurance Program repetitive flood loss properties?			Document any changes to flood loss property status

Source: Oregon Partnership for Disaster Resilience, 2010.

Table 5-1 Natural Hazard Mitigation Plan Update Toolkit (continued)

Question	Yes	No	Plan Update Action
Did the plan identify the number and type of existing and future buildings, infrastructure, and critical facilities in hazards areas?			1) Update existing data in risk assessment section, or 2) determine whether adequate data exists. If so, add information to plan. If not, describe why this could not be done at the time of the plan update
Did the plan identify data limitations?			If yes, the plan update must address them: either state how deficiencies were overcome or why they couldn't be addressed
Did the plan identify potential dollar losses for vulnerable structures?			1) Update existing data in risk assessment section, or 2) determine whether adequate data exists. If so, add information to plan. If not, describe why this could not be done at the time of the plan update
Are the plan goals still relevant?			Document any updates in the plan goal section
What is the status of each mitigation action?			Document whether each action is completed or pending. For those that remain pending explain why. For completed actions, provide a 'success' story.
Are there new actions that should be added?			Add new actions to the plan. Make sure that the mitigation plan includes actions that reduce the effects of hazards on both new and existing buildings.
Is there an action dealing with continued compliance with the National Flood Insurance Program?			If not, add this action to meet minimum NFIP planning requirements
Are changes to the action item prioritization, implementation, and/or administration processes needed?			Document these changes in the plan implementation and maintenance section
Do you need to make any changes to the plan maintenance schedule?			Document these changes in the plan implementation and maintenance section
Is mitigation being implemented through existing planning mechanisms (such as comprehensive plans, or capital improvement plans)?			If the community has not made progress on process of implementing mitigation into existing mechanisms, further refine the process and document in the plan.

Source: Oregon Partnership for Disaster Resilience, 2010.

Volume II: Appendices

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Appendix A: Glossary and Acronyms

Glossary

100-year flood means a flooding condition which has a one percent chance of occurring each year. The 100-year flood level is used as the base planning level for floodplain management in the National Flood Insurance Program. <https://www.fema.gov/flood-zones>

Cascadia Subduction Zone (CSZ) is the area where the seafloor plate (the Juan de Fuca and Gorda) is sliding down and below the North American plate. <https://pnsn.org/outreach/earthquakesources/csz>

Community Wildfire Protection Plan (CWPP) In 2003, Congress passed the federal Healthy Forests Restoration Act (HFRA), which encourages local communities to collaborate with federal land managers to develop comprehensive fuels reduction strategies. This is accomplished through the creation of a Community Wildfire Protection Plan (CWPP). <https://www.fs.fed.us/projects/hfi/field-guide/web/page15.php>

Disaster Mitigation Act of 2000 (DMA2K) amended the Stafford Act, including: establishing a national program for pre-disaster mitigation; streamlining the administration of disaster relief; changing FEMA's post-disaster programs for individuals and families, including creating the Individuals and Households Program; establishing minimum standards for public and private structures; requiring local and state natural hazards mitigation plans that meet a FEMA standard (Section 322); revising - in part - FEMA funding for the repair, restoration and replacement of damaged facilities (Section 406); revising FEMA's participation in the costs of WUI fire suppression through an expanded and renamed Fire Management Assistance Grant Program (Section 420); removing the requirement for post-disaster IHMT or HMST meetings and reports; and other amendments. <https://www.fema.gov/media-library/assets/documents/4596>

Disaster Resistant Community is a concept whereby individuals, businesses, private nonprofit organizations and government work in partnership by preparing in advance and taking actions to reduce the impact of natural hazards that will likely occur. <https://www.fema.gov/news-release/1999/11/22/project-impact-building-disaster-resistant-community>

El Niño-Southern Oscillation is a cycle in the Pacific Basin involving water and air temperatures that has a profound effect on weather patterns around the world, events typically last 6-18 months. <https://www.climate.gov/news-features/blogs/enso/what-el-ni%C3%B1o%E2%80%93southern-oscillation-enso-nutshell>

Firewise is a program developed by the National Fire Protection Association (NFPA) featuring templates to help communities reduce risk and protect property from the dangers of wildland fires, an interactive resource-rich website and training programs throughout the nation. <http://www.firewise.org>

Floodplain is a land area adjacent to a river, stream, lake, estuary or other water body that is subject to flooding. These areas, if left undisturbed, act to store excess flood water.

<https://www.fema.gov/flood-zones>

Floodplain Administrator/Manager is the person designated by the governing body in a flood-prone community who is responsible for making floodplain determinations for construction sites, issuing building permits for floodplain construction, ensuring compliance and other floodplain management activities. <https://www.fema.gov/floodplain-managers>

Floodway is the channel of a river and the portion of the floodplain that carries most of the flood flow. Floodways are usually the area where water velocities and forces are the greatest and most destructive. The National Flood Insurance Program (NFIP) definition of floodway is the channel of a river or other watercourse and adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot. NFIP regulations, adopted in local ordinances, require that floodway be kept open so that flood flows are not obstructed or diverted onto other properties. <https://www.fema.gov/flood-zones>

Goal 7 of the statewide land use planning program calls for local comprehensive plans to include inventories, policies and implementing measures to guide development in hazard areas thereby reducing losses from flooding, landslides, earthquakes, tsunamis, coastal erosion and wildfires. <http://www.oregon.gov/LCD/docs/goals/goal7.pdf>

Hazard is any situation that has the potential of causing damage to people, property or the environment.

Hazard mitigation is any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards. (44 CFR 201.2) <https://www.fema.gov/hazard-mitigation-planning>

Hazard Mitigation Grant Program is the program authorized under Section 404 of the Stafford Act and implemented at 44 CFR Part 206, Subpart N, which authorizes funding for certain mitigation measures identified through the evaluation of natural hazards conducted under Section 322 of the Stafford Act (44 CFR 201.2). <https://www.fema.gov/hazard-mitigation-grant-program>

Hazus-MH (HAZards United States Multi-Hazard) is a standardized loss estimation methodology that is also a FEMA software program using mathematical formulas and Geographical Information Systems (GIS) data about building stock, local geology, etc. and the location and size of potential hazards (earthquakes, floods and hurricanes) to estimate physical, economic and social impacts of disaster. <https://www.fema.gov/hazus>

Landslide is any detached mass of soil, rock or debris that moves down a slope or a stream channel. <http://www.oregongeology.org/sub/Landslide/Landslidehome.htm>

LiDAR (Light Detection and Ranging) is an optical remote sensing technology that can measure the distance to and other properties of a target, by illuminating the target with light, often using pulses from a laser. <http://www.oregongeology.org/lidar/>

Major disaster is any natural catastrophe including any hurricane, tornado, storm, high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm or drought, or, regardless of cause, any fire, flood, or explosion in any part of the

United States, which in the determination of the President causes damage of sufficient severity and magnitude to warrant major disaster assistance to supplement the efforts and available resources of states, local governments and disaster relief organizations in alleviating the damage, loss, hardship, or suffering caused thereby (44 CFR 206.2).

<https://www.fema.gov/disasters>

National Fire Plan is a federal program that helps manage the impact of wildfires on communities, it has five main components: (1) firefighting, (2) rehabilitation and restoration, (3) hazardous fuel reduction, (4) community assistance and (5) accountability.

<https://www.hsd.org/?abstract&did=480165>

National Flood Insurance Program is the program run by the federal government to improve floodplain management, to reduce flood-related disaster costs and to provide low cost flood insurance for residents of flood-prone communities.

<https://www.fema.gov/national-flood-insurance-program>

Natural Hazard Mitigation Plan is a plan resulting from a risk assessment of the nature and extent of vulnerability to the effects of natural hazards present in a geographic area and actions needed to minimize future vulnerability to those hazards, especially a plan developed and adopted which meets the requirements of 44 CFR Part 201.4/5/6.

<https://www.fema.gov/hazard-mitigation-planning>

Public Assistance is the part of the disaster assistance program in which the federal government supplements the efforts and available resources of state and local governments to restore certain public facilities or services. Public Assistance includes emergency assistance, debris removal, community disaster loans and the permanent repair, restoration or replacement of public and designated private nonprofit facilities damaged or destroyed by a major disaster and is further described under Section 406 of the Stafford Act.

<https://www.fema.gov/public-assistance-local-state-tribal-and-non-profit>

Rogue Valley Integrated Community Wildfire Protection Plan is the CWPP for Jackson and Josephine counties. <https://jacksoncountyor.org/emergency/County-Plans/Fire-Plan>

Senate Bill 360 in 1997 established the policy and framework for meeting the fire protection needs of the wildland-urban interface. The Bill is also known as the Oregon Forestland-Urban Interface Fire Protection Act and enlists the aid of property owners to better protect their homes and firefighters during encroaching wildfires.

<http://www.oregon.gov/ODF/Fire/Pages/UrbanInterface.aspx>

Special Flood Hazard Area is the land area covered by the floodwaters of the base flood and is where the NFIP's floodplain management regulations must be enforced; also the area where the mandatory purchase of flood insurance applies. <https://www.fema.gov/flood-zones>

Stafford Act is the Robert T. Stafford Disaster Relief and Emergency Assistance Act (PL 100-707, which amended PL 91-606 and PL 93-288; then was further amended by PL 106-390, the Disaster Mitigation Act of 2000; and PL 109-295, the Post-Katrina Emergency Reform Act). <https://www.fema.gov/robert-t-stafford-disaster-relief-and-emergency-assistance-act-public-law-93-288-amended>

State Hazard Mitigation Officer is the official representative of state government who is the primary point of contact with FEMA, other federal agencies and local governments in mitigation planning and implementation of mitigation programs and activities required under the Stafford Act. In Oregon, this person is on the staff of Oregon Emergency Management. <https://www.fema.gov/state-hazard-mitigation-officers>

State Interagency Hazard Mitigation Team is a team of state agency officials who, in 1997, Governor Kitzhaber directed Oregon Emergency Management to make a permanent body and establish regular meeting dates in order to understand losses arising from natural hazards and coordinate recommended strategies to mitigate loss of life, property and natural resources. <http://www.oregon.gov/oem/Councils-and-Committees/Pages/IHMT.aspx>

Subduction zone is the area between two converging plates, one of which is sliding down and below the other. <http://www.oregongeology.org/sub/publications/ims/ims-028/unit20.htm>

Subduction zone earthquake is an earthquake along the subduction zone. In Oregon, this refers to the Cascadia Subduction Zone (CSZ), which lies off shore of the Oregon, California and Washington Coasts. <http://www.oregongeology.org/sub/publications/ims/ims-028/unit20.htm>

Vulnerability is the susceptibility of life, property or the environment to damage if a hazard manifests to potential.

Wildfire hazard zone (OAR Chapter 629, Division 44) is the portion of a local government jurisdiction that has been determined to be at risk of a catastrophic wildfire. <https://secure.sos.state.or.us/oard/displayChapterRules.action?selectedChapter=82>

Wildland-urban interface (WUI) is an area where structures are adjacent to or are intermingled with natural vegetation fuels which is prone to the occurrence of wildland fires. <http://www.wildlandfirersg.org/About/Wildland-Urban-Interface>

Acronyms

ASFPM – Association of State Floodplain Managers
BLM – Bureau of Land Management
CSZ – Cascadia Subduction Zone
CWPP – Community Wildfire Protection Plan
DEQ – Department of Environmental Quality
DLCD – Oregon Department of Land Conservation and Development
DOGAMI – Oregon Department of Geology and Mineral Industries
FEMA – Federal Emergency Management Agency
FMA – Flood Mitigation Assistance
HMA – Hazard Mitigation Assistance
HMGP – Hazard Mitigation Grant Program
NFPA – National Fire Protection Association
OEM- Oregon Office of Emergency Management
OPRD – Oregon Parks and Recreation Department
OWRD – Oregon Water Resourced Department
PDM – Pre-Disaster Mitigation Grant Program
RVCOG – Rogue Valley Council of Governments
RVIFP – Rogue Valley Integrated Community Wildfire Protection Plan
SFHA – Special Flood Hazard Area
SRGP – Seismic Rehabilitation Grant Program
USFS – United States Forest Service

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APPENDIX B: PLANNING AND PUBLIC PROCESS

NHMP Update Changes

This memo describes the changes made to the 2012 Jackson County Natural Hazard Mitigation Plan (MNHMP) during the 2017 NHMP update process.

Project Background

Jackson County and the cities of Ashland, (Town of) Butte Falls, Eagle Point, Jacksonville, Phoenix, Rogue River, Shady Cove and Talent partnered with the Oregon Partnership for Disaster Resilience (OPDR) to update the multi-jurisdictional 2012 Jackson County NHMP. The Disaster Mitigation Act of 2000 requires communities to update their mitigation plans every five years to remain eligible for Pre-Disaster Mitigation (PDM) program funding, Flood Mitigation Assistance (FMA) program funding, and Hazard Grant Mitigation Program (HMGP) funding. A Federal Emergency Management Pre-Disaster Mitigation grant funded the CSC work with non-federal match provided by Jackson County.

OPDR and the committees made several changes to the previous NHMP to consolidate. The cities of (Town of) Butte Falls, Jacksonville, Phoenix and Talent were added to the MNHMP with this update. Major changes are documented and summarized in this memo.

2017 NHMP Update Changes

The sections below only discuss *major* changes made to the NHMPs during the 2017 NHMP update process. Major changes include the replacement or deletion of large portions of text, changes to the NHMP's organization, new mitigation action items, and the addition of city addenda to the NHMP. If a section is not addressed in this memo, then it can be assumed that no significant changes occurred.

The NHMP's format and organization have been altered to fit within OPDR's NHMP templates. Table B-1 below lists the 2012 Jackson County NHMP section names and the corresponding 2017 section names, as updated (major Volumes are highlighted). This memo will use the 2017 NHMP update section names to reference any changes, additions, or deletions within the NHMP.

Table B-I Changes to NHMP Organization

2012 Jackson County MNHMP	2017 Jackson County MNHMP
Acknowledgements	Acknowledgements
Table of Contents	Table of Contents
Approval Letters and Resolutions	Approval Letters and Resolutions
FEMA Review Tool	FEMA Review Tool
Volume I: Basic Plan	Volume I: Basic Plan
Plan Summary	Plan Summary of the NHMP
Section 1: Introduction	Section 1: Introduction
<i>(Appendix C, see below)</i>	Section 2: Community Profile
Section 2: Risk Assessment	Section 3: Hazard Identification and Risk Assessment
Section 3 Mitigation Strategy	Section 4: Mitigation Strategy
Section 4: Plan Implementation and Maintenance	Section 5: Plan Implementation and Maintenance
Volume II: City Addenda	Volume III: City Addenda
Ashland	Ashland
-	Butte Falls
Eagle Point	Eagle Point
-	Jacksonville
-	Phoenix
Rogue River	Rogue River
Shady Cove	Shady Cove
-	Talent
Volume IV: Appendices	Volume III: Appendices
-	Appendix A: Glossary and Acronyms
Appendix A: Action Items	Section 4: Mitigation Strategy
Appendix B: Planning and Public Process	Appendix B: Planning and Public Process
Appendix C: Profile	Section 2: Community Profile
-	Appendix C: Hazard Analysis
Appendix D: Economic Analysis	Appendix D: Economic Analysis
Appendix E: Grant Programs	Appendix E: Grant Programs
-	Appendix F: Community Survey
-	Appendix G: Ashland LID

As the table indicates the structure of the NHMP has changed significantly including the addition of several additional addenda. Content and changes are described below.

Front Pages

1. The NHMP’s cover has been updated.
2. Acknowledgements have been updated to include the 2017 project partners and planning participants.
3. The FEMA approval letter, review tool, and county and city resolutions of adoption are included.

Volume I: Basic Plan

Volume I provides the overall NHMP framework for the 2017 Multi-jurisdictional NHMP update. Volume I includes the following sections:

Plan Summary

The 2017 NHMP includes an updated NHMP summary that provides information about the purpose of Natural Hazard Mitigation planning and describes how the NHMP will be implemented.

Section 1: Introduction

Section 1 introduces the concept of Natural Hazard Mitigation planning and answers the question, “Why develop a mitigation plan?” Additionally, Section 1 summarizes the 2017 NHMP update process, and provides an overview of how the NHMP is organized. Major changes to Section 1 include the following:

- Most of Section 1 includes new information that replaces out of date text found in the 2012 NHMP. The new text describes the federal requirements that the NHMP addresses and gives examples of the policy framework for natural hazards planning in Oregon.
- Section 1 of the 2017 update, outlines the entire layout of the NHMP update, which has been altered as described above.

Section 2: Community Profile

The community profile has been updated to conform to the OPDR template and consolidates information for Jackson County and cities.

Section 3: Hazard Identification and Risk Assessment

This section consists of three phases: hazard identification, vulnerability assessment, and risk analysis. Hazard identification involves the identification of hazard geographic extent, its intensity, and probability of occurrence. The second phase, attempts to predict how different types of property and population groups will be affected by the hazard. The third phase involves estimating the damage, injuries, and costs likely to be incurred in a geographic area over a period of time. Changes include:

- The hazard information of the previous NHMP have been integrated into this section, Volume I, Section 2 and Volume III.
- Hazard identification, characteristics, history, probability, vulnerability, and hazard specific mitigation activities were updated. Outdated and extraneous information was removed and links to technical reports were added as a replacement. With this update the Oregon NHMP is cited heavily as a reference to the more technical hazard material.
- The recently completed a multi-hazard risk assessment (Risk Report, DOGAMI) for the Upper Rogue Watershed of Jackson County including unincorporated communities, Butte Falls, Eagle Point and Shady Cove is incorporated into this section and within applicable city addenda.
- Links to specific hazard studies and data are embedded directly into the NHMP where relevant and available.
- NFIP information was updated.

- The hazard vulnerability analysis has been updated for the county and cities (city information is included with more detail within Volume III).

Section 4: Mitigation Strategy

This section provides the basis and justification for the mission, goals, and mitigation actions identified in the NHMP. Major changes to Section 4 include the following:

- The mission and goals were reviewed in relation to the State NHMP. The County and cities agreed to retain the existing mission and goals with no changes.
- Action items were reviewed, revised and prioritized (indicated in **bold** text). Major changes are indicated below:
 - MH #1: ongoing action, revised and combined into 2017 action **MH #1** and prioritized.
 - MH #2: ongoing action, revised and combined into 2017 action **MH #1** and prioritized.
 - MH #3: ongoing action, revised and combined into 2017 action **MH #2** and prioritized.
 - MH #4: ongoing action, revised and combined into 2017 action **MH #1** and prioritized.
 - MH #5: this action was deleted. Technical coordination is achieved through State partners including DOGAMI, OEM, DLCDD and OSU.
 - MH #6: this action is considered complete. Disaster registry is established through RVCOG.
 - MH #7: this action is deleted. This activity occurs as part of the Implementation and Maintenance section of the NHMP.
 - MH #8: this action is complete. The State Building Codes Division operates this program which is administered locally.
 - MH #9: ongoing action, revised and combined into 2017 action MH #3
 - MH #10: this action was deleted.
 - MH #11: this action was deleted.
 - MH #12: ongoing action, revised into 2017 action MH #4
 - MH #13: this action was deleted.
 - MH #14: this action was deleted.
 - MH #15: this action was deleted. State agencies (e.g., DOGAMI) provide assistance with HAZUS. The county does not have resources for this activity.
 - DR #1: ongoing action, revised and combined into 2017 action DR #1
 - DR #2: ongoing action, revised and combined into 2017 action DR #1
 - EQ #1: ongoing action, revised and combined into 2017 action **MH #1** and prioritized.
 - EQ #2: ongoing action, revised and combined into 2017 action **MH #1** and prioritized.
 - EQ #3: this action is complete and is part of the National Dam Inventory.
 - EQ #4: complete, the DOGAMI and USGS have data that has been incorporated into this NHMP.
 - EQ #5: this action was deleted.
 - FL #1: this action was deleted.
 - FL #2: this action is complete and is part of the National Dam Inventory.
 - FL #3: ongoing action, revised into 2017 action FL #1

- FL #4: ongoing action, revised into 2017 action FL #2. New maps are in process for the Upper Rogue Watershed, Neil Creek has been updated, maps were modernized in 2011.
- FL #5: ongoing action, revised into 2017 action FL #3.
- FL #6: ongoing action, revised into 2017 action FL #4.
- FL #7: ongoing action, revised into 2017 action FL #5. Jackson County is currently CRS 7.
- FL #8: ongoing action, revised into 2017 action FL #6.
- LS #1: ongoing action, revised into 2017 action LS #1. DOGAMI released landslide susceptibility maps in 2016 as incorporated in this NHMP.
- LS #2: ongoing action, revised and combined into 2017 action **MH #1** and prioritized.
- LS #3: complete. The county has a steep slope and landslide section within their general development regulations ([section 9.3](#)).
- SW #1: this activity was deemed unnecessary and deleted.
- SW #2: ongoing action, revised and combined into 2017 action **MH #1** and prioritized.
- VE #1: ongoing action, revised and combined into 2017 action **MH #1** and prioritized.
- VE #2: this action is complete. Maps have been created by the USGS.
- VE #3: this action is complete. Ongoing activities occur as part of normal county business.
- WF #1: ongoing action, revised into 2017 action **WF #1** and prioritized. Jackson County maintains a combined CWPP with neighboring Josephine County as described in Volume I, Section 3.

Section 5: Plan Implementation and Maintenance

Jackson County Emergency Management will continue to convene and coordinate the County Steering Committee (documentation for the City Steering Committees is contained within the City addenda in Volume III).

Volume II: Appendices

Below is a summary of the appendices included in the 2017 NHMP:

Appendix A: Glossary and Acronyms

This appendix was added with this version of the NHMP and includes common words and their acronyms found throughout the NHMP.

Appendix B: Planning and Public Process

This planning and public process appendix reflects changes made to the Jackson County MNHMP and documents the 2017 planning and public process.

Appendix C: Hazard Analysis

Appendix C is Jackson County's hazard analysis and is the foundation upon which the County's EOP and departmental implementing procedures are developed. This hazard analysis was updated by members of the NHMP. The updates reflect changes to hazard conditions in Jackson County and serves as the basis for the hazard risk analysis throughout this version of the NHMP.

Appendix D: Economic Analysis of Natural Hazard Mitigation Projects

Updates are provided for the economic analysis of natural hazard mitigation projects.

Appendix E: Grant Programs and Resources

Some of the previously provided resources were deemed unnecessary since this material is covered within the Oregon NHMP and appropriate resources are provided within Volume I, Section 3 and Volume III). Updates were made to the remaining grant programs and resources.

Appendix F: Community Survey

This survey was conducted with the 2017 update of the NHMP and was utilized to inform the development of mitigation strategies and identification of community vulnerabilities. It is provided herein as documentation and to serve as a resource for future planning efforts.

Appendix G: City of Ashland Hazard Mitigation, Green Infrastructure, and Low Impact Development

This appendix is new and includes the results of the pilot project to incorporate green infrastructure (GI) and low impact development (LID) best management practices (BMPs) into NHMP Action Items.

Volume III: City Addenda

The cities of Ashland, (Town of) Butte Falls, Eagle Point, Jacksonville, Phoenix, Rogue River, Shady Cove and Talent opted to participate and include addenda in the Jackson NHMP. Ashland, Eagle Point, Rogue River and Shady Cove previously had addenda to the Jackson County MNHP.

Where appropriate, information has been consolidated and a reference is provided within the addenda to the appropriate NHMP section. New data and hazard information was included for the participating cities and actions were reviewed, revised and prioritized as described in the addenda. Other changes to the addenda are documented in this appendix and Volume III.

Ashland

- Action items were reviewed, revised and prioritized (indicated in **bold** text). Major changes are indicated below:
 - MH #1: ongoing action, revised and combined into 2017 action MH #1. Prep-CERTA training/Kits available at AIR (Ashland is Ready).
 - MH #2: this action was deleted. This is controlled by the State BCD and administered locally.
 - MH #3: ongoing action, revised and combined into 2017 action MH #1. Training offered three times per year. Student enrollment for equipment classes and trainings.
 - MH #4: this action is complete, funded and operational.
 - MH #5: this action was deleted. This activity occurs through other retained actions.
 - MH #6: this action is complete, funded and operational. At least one exercise occurs annually including EOC activation.
 - MH #7: this action was deleted.
 - MH #8: ongoing action, renumbered as 2017 action MH #2. Fire department has stocked food and water for two weeks, currently working on gathering additional supplies and provision.
 - MH #9: this action is considered complete. This activity occurs regularly with updates of the City's comprehensive plan, development ordinance and wildfire hazard zone.
 - MH #10: ongoing action, renumbered as 2017 action MH #3
 - EQ #1: this action is retained as 2017 action **EQ #1** and prioritized. There have been funding challenges.
 - EQ #2: action is retained, renumbered as 2017 action EQ #3.
 - EQ #3: this action is ongoing and considered part of 2017 action EQ #2.
 - EQ #4: this action is ongoing, renumbered as 2017 action **EQ #2** and prioritized. Seismic retrofits have been made to a number of public and private buildings.
 - EQ #5: action is retained, renumbered as 2017 action EQ #4.
 - FL #1: this action is considered complete and ongoing. Emergency preparedness education occurs through AIR (Ashland is Ready).
 - LS #1: this action is revised, retained as 2017 action **LS #1** and prioritized.
 - SW #1: this action is complete and ongoing. Warming shelters provided by NPOs most of the week. If not, the City can open an emergency shelter if temperatures are lower than 20F.
 - WF #1: ongoing action, renumbered as 2017 action **WF #2** and prioritized. Over 75% complete.
 - WF #2: ongoing action, renumbered as 2017 action WF #3. Nearing 25 certified communities, several in progress.

New Actions (2017):

- FL #1: this action is new.
- FL #2: this action is new.
- **WF #1**: this action is new and is a priority for the City.
- WF #4: this action is new.

Butte Falls

This city addendum is new with this version of the NHMP.

Eagle Point

- Action items were reviewed, revised and prioritized (indicated in **bold** text). Major changes are indicated below:
 - MH #1: ongoing action.
 - MH #2: ongoing action. Action is revised. Updates to some ordinances have occurred.
 - DR #1: this action is retained as 2017 action **DR #1** and prioritized.
 - EQ #1: this action is retained.
 - EQ #2: this action is ongoing.
 - EQ #3: this action is ongoing. Coordination occurs between multiple departments.
 - EQ #4: this action is ongoing.
 - FL #1: this action is ongoing. Renumbered as 2017 action FL #5. Floodplain management and regulatory oversight occurs by the planning and building department.
 - FL #2: this action is ongoing and is combined into 2017 action MH #1.
 - FL #3: this action is retained. Renumbered as 2017 action FL #6. The City does not currently participate in the CRS. City coordinates with floodplain managers group and is considering participation.
 - FL #4: this action is retained and revised as 2017 action **FL #1** and prioritized. Floodplain management and regulatory oversight occurs by the planning and building department. Various open space preserves and a golf course are used for this purpose.
 - FL #5: this action is retained and revised as 2017 action **FL #2** and prioritized.
 - FL #6: this action is ongoing and revised into 2017 action FL #7. This action developed out of the Ashland GI/LID project (Volume II, Appendix G).
 - SW #1: this action is retained and revised as 2017 action MH #4. Required by development code.
 - SW #2: this action is retained, revised and renumbered as 2017 action SW #1.
 - SW #3: this action is ongoing and is combined into 2017 action MH #1.
 - WF #1: this action is ongoing and is combined into 2017 action MH #1.
 - WF #2: this action is retained and renumbered as 2017 action WF #1. This City is included in the RVIFP.
 - WF #3: this action is retained and renumbered as 2017 action WF #2.

New Actions (2017):

- MH #3: this action is new.
- **FL #3**: this action is new and is a priority for the City.
- **FL #4**: this action is new and is a priority for the City.
- FL #8: this action is new and is a priority for the City. This action developed out of the FEMA *Areas of Mitigation Interest and Development of Mitigation Strategies for Shady Cove and Eagle Point, OR* project (Wright, Stacy, 2016).
- FL #9: this action is new and is a priority for the City. This action developed out of the FEMA *Areas of Mitigation Interest and Development of Mitigation Strategies for Shady Cove and Eagle Point, OR* project (Wright, Stacy, 2016).

Jacksonville

This city addendum is new with this version of the NHMP.

Phoenix

This city addendum is new with this version of the NHMP.

Rogue River

- Action items were reviewed, revised and prioritized (indicated in **bold** text). Major changes are indicated below:
 - MH #1: ongoing action. This action is renumbered as 2017 action MH #3. The city maintains a monthly newsletter and has educational information available.
 - MH #2: this action is ongoing. The City integrates the NHMP into city ordinances and regulatory documents when possible.
 - **EQ #1**: this action is ongoing. This action is revised and is considered a priority by the City.
 - EQ #2: this action is retained. The City provides information on earthquake insurance.
 - EQ #3: this action is ongoing. The City utilizes earthquake hazard information provided by DOGAMI and USGS.
 - FL #1: this action is deleted. Activities from this action are ongoing and considered part of 2017 action MH #3.
 - **FL #2**: this action is ongoing. The City currently participates in the NFIP. This is a priority action for the City.
 - FL #3: this action is ongoing. The City currently has a CRS rating of 8.
 - FL #4: this action is ongoing. The City utilizes open space, wetland and park land when available for flood storage.
 - FL #5: this action is ongoing and revised into 2017 action FL #7. This action developed out of the Ashland GI/LID project (Volume II, Appendix G).
 - FL #6: this action is ongoing. The City continues to protect city infrastructure from flood.
 - WF #1: this action is ongoing. This action is revised and renumbered as 2017 action WF #2.
 - WF #2: this action is retained, renumbered and prioritized as 2017 action **WF #1**. This City is included in the RVIFP.
 - WF #3: this action is ongoing.

New Actions (2017):

- **MH #1**: this action is new and is a priority for the City.
- **MH #2**: this action is new and is a priority for the City.
- **DR #1**: this action is new and is a priority for the City.
- **FL #1**: this action is new and is a priority for the City.
- FL #7: this action is new.
- FL #8: this action is new.

Shady Cove

- Action items were reviewed, revised and prioritized (indicated in **bold** text). Major changes are indicated below:
 - FL #1: this action is ongoing. This action is revised and renumbered as 2017 action FL #2. The City regularly conducts public outreach related to the flood hazard.
 - FL #2: this action is ongoing. This action is revised and renumbered as 2017 action FL #3.
 - FL #3: this action is ongoing. This action is revised and renumbered as 2017 action FL #4.
 - FL #4: this action is ongoing. This action is renumbered and prioritized as 2017 action **FL #1**. The City currently participates in the NFIP.
 - SW #1: this action is ongoing and is considered a component of 2017 action SW #1.
 - SW #2: this action is ongoing. This action is renumbered and prioritized as 2017 action **SW #1**. Some critical facilities have backup power.
 - SW #3: this action is ongoing. The City regularly educates residents about severe weather issues.
 - **WF #1**: this action is ongoing. The City works with the fire district to promote wildfire awareness and mitigation. This action is prioritized.
 - WF #2: this action is ongoing and renumbered as 2017 action WF #3.
 - WF #3: this action is ongoing and renumbered as 2017 action WF #4.

New Actions (2017):

- MH #1: this action is new.
- MH #2: this action is new.
- EQ #1: this action is new.
- FL #5: this action is new and developed out of the FEMA Risk MAP Resilience Workshop and Risk Report ([DOGAMI, Open-File Report O-18-XX](#)).
- FL #6: this action is new and developed out of the FEMA *Areas of Mitigation Interest and Development of Mitigation Strategies for Shady Cove and Eagle Point, OR* project (Wright, Stacy, 2016).
- **WF #2**: this action is new and is a priority for the City.
- WF #5: this action is new and developed out of the FEMA *Areas of Mitigation Interest and Development of Mitigation Strategies for Shady Cove and Eagle Point, OR* project (Wright, Stacy, 2016).

Talent

This city addendum is new with this version of the NHMP.

2017 NHMP PUBLIC PARTICIPATION PROCESS

2017 NHMP Update

Jackson County is dedicated to directly involving the public in the review and update of the natural hazard mitigation plan. Although members of the steering committee represent the public to some extent, the residents of Jackson County, Ashland, Butte Falls, Eagle Point, Jacksonville, Phoenix, Rogue River, Shady Cove and Talent were also given the opportunity to provide feedback about the NHMP. The NHMP will undergo review by the County NHMP steering committee on a semiannual basis and by the City steering committees on an annual basis.

Jackson County made the NHMP available via their website throughout the update process and the updated NHMP was made available for public review and comment through the FEMA review period. The participating cities were included within the press release that was provided (see following page).

Public Involvement Summary

An open house was held with the City of Medford on January 12, 2017. During this open house, the Jackson County NHMP team collaborated with the Medford NHMP team to provide information, and receive public feedback and comments, regarding natural hazard mitigation.

A survey was provided to the public during the early stages of the update cycle (Volume II, Appendix F). Information from this survey was used by the steering committee to help inform their risk assessment and mitigation strategies.

During the public review period (see next page) there was one emailed comment was received from a member of the League of Women Voters. Their inquiry regarded the post-dated Flood Insurance Studies (FIS) referenced on p. 3-22 of the plan and asked about water conservation planning in the County and cities. OPDR responded to the inquiry with an explanation of the FIS study effective date and pointing them to water conservation plans cited in the NHMP and County, city, and special district websites that detail water conservation resources and plans.

Members of the steering committee provided edits and updates to the NHMP prior to the public review period as reflected in the final document.

Work Session: Jackson County Board of Commissioners – January 2, 2018

On January 2, 2018 Jackson County staff briefed the Jackson County Board of Commissioners on the updates to the Multi-Jurisdictional Jackson County Natural Hazard Mitigation Plan.

Press Release



JACKSON COUNTY EMERGENCY MANAGEMENT PRESS RELEASE



Sara Rubrecht, Emergency Manager
rubrecsn@jacksoncounty.org

Released: 1.2.18

Public Input on Update to Natural Hazard Mitigation Plan

(Medford, OR) – Jackson County is currently in the process of updating their existing Natural Hazard Mitigation Plan (NHMP). This work is being performed in cooperation with the University of Oregon’s Community Service Center–Oregon Partnership for Disaster Resilience and the Oregon Military Department’s Office of Emergency Management utilizing funds obtained from the Federal Emergency Management Agency’s (FEMA) Pre-Disaster Mitigation Grant Program.

With the re-adoption of this plan, Jackson County will maintain its eligibility to apply for federal funding toward natural hazard mitigation projects. The local planning process includes a wide range of representatives from city and county government, emergency management personnel, and outreach to members of the public in the form of an electronic survey. This NHMP also affects the cities of Ashland, (Town of) Butte Falls, Eagle Point, Jacksonville, Phoenix, Rogue River, Shady Cove and Talent.

A Natural Hazard Mitigation Plan (NHMP) provides communities with a set of goals, action items, and resources designed to reduce risk from future natural disaster events. Engaging in mitigation activities provides jurisdictions with a number of benefits, including: reduced loss of life, property, essential services, critical facilities, and economic hardship; reduced short-term and long-term recovery and reconstruction costs; increased cooperation and communication within the community through the planning process; and increased potential for state and federal funding for recovery and reconstruction projects.

An electronic version of the updated draft Jackson County NHMP will be available for public comment beginning **January 2, 2018**. To view the draft please visit: <http://jacksoncountyor.org/emergency/County-Plans/NHMP>

If you have any additional input on this plan, or questions regarding the Jackson County NHMP or the update process in general, please contact: Sara Rubrecht, Jackson County Emergency Manager at (541) 774-6790 or rubrecsn@jacksoncounty.org; or Michael Howard, Assistant Program Director for the Oregon Partnership for Disaster Resilience at (541) 346-8413 or mrhoward@uoregon.edu.

5179 Crater Lake Highway, Central Point, Oregon 97502
www.co.jackson.or.us
www.facebook.com/jacksoncountyvoregonem

Jackson County Board of Commissioners: Work Session

 <h2>JACKSON COUNTY</h2> <p>Oregon</p>	Board of Commissioners Rick Dyer (541) 774-6118 Bob Strosser (541) 774-6119 Colleen Roberts (541) 774-6117 Fax: (541) 774-6705 10 South Oakdale, Room 214 Medford, Oregon 97501 www.jacksoncounty.org
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BOARD OF COMMISSIONERS
Work Session Agenda
January 2, 2018
9:00 a.m.
Jackson Room

1. Rogue Valley Community Television Annual Report – Brandon Givens, Manager/Instructor SOU Digital Media Center
2. Natural Hazard Mitigation Plan – Sara Rubrecht, Jackson County Emergency Manager
3. Discussion of Marijuana Advisory Committee
4. Discussion of United States Department of Agriculture, Forest Service Request for Comment – Colleen Roberts, Commissioner
5. Executive Session
ORS 192.660(2)(a) and (b), Employment of Employee
ORS 192.660(2)(d), Labor Negotiations-Press Excluded ORS 192.660(4)
ORS 192.660(2)(e), Real Property
ORS 192.660(2)(f), Information or Records Exempt from Public Disclosure
ORS 192.660(2)(h), Litigation

If a physical accommodation is needed to participate in a County meeting, please contact the Human Resources Office at 541-774-6036 or TTY/TDD 711 or 800-735-2900. Notification of at least 48 hours prior to the meeting, preferably in writing, will assist County staff in providing reasonable accommodation.

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Agenda for January 2, 2018
Page 1 of 1

Jackson County Steering Committee

Steering committee members possessed familiarity with the Jackson County community and how it's affected by natural hazard events. The steering committee guided the update process through several steps including goal confirmation and prioritization, action item review and development and information sharing to update the NHMP and to make the NHMP as comprehensive as possible. The steering committee met formally on the following dates:

Meeting #0: Open House, January 12, 2017

During this open house the Jackson County NHMP team collaborated with the Medford NHMP team to provide information, and receive public feedback and comments, regarding natural hazard mitigation.

Meeting #1: Kickoff, January 13, 2017

During this meeting, the steering committee reviewed the previous NHMP, and were provided updates on hazard mitigation planning, the NHMP update process, and project timeline. They also provided updates on the history of hazard events in the county and cities, reviewed and revised the NHMP's mission and goals, discussed progress made toward the previous NHMP's action items.

Meeting #2: Risk Assessment, Implementation and Maintenance, February 28, 2017

During this meeting, the steering committee reviewed the existing risk assessment including community vulnerabilities and hazard information. Information attained during this meeting was used to inform the update of the hazard analysis. The previous NHMP's implementation and maintenance program was reviewed and any changes that were necessary were made as indicated in this appendix and Volume I, Section 5.

Meeting #3: Mitigation Strategy, April 20, 2017

During this meeting, the steering committee reviewed changes they made to their action items and made any modifications and also prioritized the actions.

City Addenda Meetings: April 19, 20, 21 and May 9

The participating cities held at least one formal steering committee meeting with the County Emergency Manager and CSC staff in attendance. During these meetings, the steering committee provided comments on draft updates, revised and prioritized their actions, and reviewed the plan implementation and maintenance schedule.

Meeting #4: Risk MAP Resilience Workshop, May 10, 2017

Members of the County and City steering committees participated in the Upper Rogue Resilience Workshop and discussed resources to support community identified mitigation actions, implementation opportunities, and methods to strengthen networks and partnerships.

In addition to the meetings listed above, there were numerous informal meetings and email exchanges between steering committee members, OPDR, and other state agencies.

The following pages includes copies of meeting agendas and sign-in sheets.

Agenda

Meeting: Jackson County NHMP Update: Kick-off Meeting
Date: January 13, 2017
Time: 10:00 AM – Noon
Location: Jackson County Sheriff's Office – 5179 Crater Lake Hwy, Central Point
Sheriff's Office Training Room

I. Introduction and Background	10 minutes
a. Project Context	
b. Committee Introductions	
II. Natural Hazard Mitigation Planning	10 minutes
a. Brief Emergency Management Overview	
b. Brief Natural Hazard Mitigation Plan (NHMP) Overview	
c. Special District Addenda	
d. Project Timeline	
III. Community Profile Update	15 minutes
a. Community Profile information for update	
b. Identify critical facilities	
IV. Hazard History	15 minutes
a. Discussion of identified hazard events	
b. Other hazard events to be added?	
V. State and County Goals	15 minutes
a. Overview of County's alignment with State goals	
b. Identification of gaps in identified goals	
VI. Mitigation Actions Review	45 minutes
a. Discuss status of mitigation action items	
b. Discuss items added/removed/amended since last update	
VII. Public Outreach Strategy	5 minutes
a. Discuss outreach strategy for 2017 update process	
VIII. Wrap Up and Next Steps	5 minutes
a. Next Steps	
b. Future Meetings	



Meeting Sign-In

Jackson County NHMP Update: Meeting #1: Kickoff - January 13, 2017

Name	Email	Representing
Wendy Jones	wjones@rogue.edu	RCC
Travis DePew	tdepew@cowcreek.com	Cow Creek
Larry Masterman	Larry.Masterman@cityofmedford.org	MEDFORD EAP
Tim Lunders	jlunders@jcsud.org	JC Vector Control Dist
Shane Macaul	Smacaul@rvss.us	Rogue Valley Sewer
Cael Tappet	CTAPPET@RVSS.US	-1 9
Don Sullivan	jsullivan@rutds.org	RUTDS



Meeting Sign-In

Jackson County NHMP Update: Meeting #1: Kickoff - January 13, 2017

Name	Email	Representing
Tarik Rawlings	trawling@woregon.edu	OPRR/VO
Sara Rubrecht	rubrecht@jacksoncounty.org	Jackson Em
Mark E. Reagle	mreagle@cityofreguieriver.org	Regue River
Maureen Swift	mswift@jacksoncountyliberatedistrict.org	J.C. LibRARY District
Aaron Prunty	cityadmin@shadycove.net	City of Shady Cove
David Seave	city david.seave@cityofastoria.org	MedWaters Comm
Abraham Loeb	abraham.loeb@redcross.org	Red Cross



Meeting Sign-In

Jackson County NHMP Update: Meeting #1: Kickoff - January 12, 2017

Name	Email	Representing
Tricia Sears	tricia.sears@stn.or.us	DLCD
David Shepherd	shepherdcashland.or.us	AFOR
Derek Bowker	dbowker@pppd.org	City of Medford
Tanya Phillips	phillitt@parksoncountry.org	JCHHS
Aaron Ott	Aaron.Ott@Asante.org	Asante
MICHAEL CAVALARO	mcavalaro@rucog.org	RUCOG
CHRISTINA KROBBER KEVIN GARCIA	Christina.Fruger@pacificorp.com KEVIN.GARCIA@pacificorp.com	PACIFIC POWER



Meeting Sign-In

Jackson County NHMP Update: Meeting #1: Kickoff - January 12, 2017

Name	Email	Representing
Tricia Sears	tricia.sears@stato.or.us	DLED
David Shepherd	shepherdcashland.or.us	AFER
Derek Bowker	dbowker@pppd.org	City of Astoria
Tanya Phillips	phillitt@jacksoncountyoig.org	JCHHS
Aron Ott	Aron.Ott@Asante.org	Asante
MICHAEL CAVALARO	mcavalaro@rwcog.org	RWCog
CHRISTINA KROBBER KEVIN GACUN	Christina.Fruger@pacificorp.com KEVIN.GACUN@pacificorp.com	PACIFIC POWER

Agenda

Meeting: Jackson County Natural Hazard Mitigation Plan Update: Risk Assessment, Action Updates & Plan Implementation and Maintenance
Date: February 28, 2017
Time: 1:00 PM – 3:00 PM
Location: Jackson County Sheriff's Office – 5179 Crater Lake Hwy, Central Point

- | | |
|---|-------------------|
| I. Welcome and Meeting Goals | 5 minutes |
| a. Project Updates | |
| II. Risk Assessment Review | 45 minutes |
| a. Review Jackson County Risk Assessment | |
| b. Discuss any changes | |
| III. Action Item Update and Review | 45 minutes |
| a. Review Meeting 1 identified actions and develop additional actions | |
| b. Review changes to existing items | |
| c. Prioritize actions | |
| IV. Plan Implementation and Maintenance | 20 minutes |
| a. Recommended updates | |
| b. Discuss committee membership | |
| c. Discuss meeting schedule | |
| V. Wrap Up and Next Steps | 5 minutes |
| a. Next Steps | |
| b. City Meetings | |



Meeting Sign-In

Jackson County NHMP Update: Meeting #2: February 28th, 2017

Name	Email	Representing
MICHAEL CAVALIARO	mcavalaro@rucc.org	RUCC
Tim hunders	thunders@jucod.org	JUCOD
Tanya Phillips	phillitt@jacksoncounty.org	
WHITNEY JUSTICE	JUSTICE@JACKSONCOUNTY.ORG	
J Davis	Tom.S.JR@JACKSONCOUNTY.ORG	Jackson County Board
David W. Sommer	David.Sommer@Ashland.K12.OR.US	Ashland School District
JEREMIAH GRIFFIN	JEFFREY.M.GRIFFIN@ODOT.STATE.OR.US	ODOT

Ray DiPasquale
 Karim Nagnib
 BRAN FISHER
 LARRY MASTERMAN
 TIM BUCK

ray.dipasquale@phoenix.oregon.gov
 PHOENIX PWD
 Jackson Co. GIS
 MEDFORD FIRE-RESCUE
 MEDFORD EMT
 ARMY CORPS OF ENGINEERS



Meeting Sign-In

Jackson County NHMP Update: Meeting #2: February 28th, 2017

Name	Email	Representing
Aaron Ott	Aaron.Ott@asante.org	Asante
Kevin Harris	Kevin.harris@ecsd.com	ECSD
Laura Leebrick	lleebrik@roguedisposal.com	Rogue Waste Systems
Abraham Loeb	abraham.loeb@redcross.org	Red Cross
Michelle Taylor	m.taylor@redcross.org	
Ryan Sandler	ryan.sandler@noaa.gov	NWS
David Seavoy	david.seavoy@cityofmedford.org	Med Water Com
Aaron Priddy	cityadmin@shadyoove.net	City of Shady Cove
Stephanie Holtz	stephanie.holtz@centralpointoregon.gov	City of Central Point
Sharon Haynes	Sharon.L.Haynes@oregon.gov	OWED
Mark C. Reagle	MR.Reagle@cityofroguevalley.org	Rogue River

Agenda

Meeting: Jackson County NHMP Update: Mitigation Strategies
Date: April 20, 2017
Time: 3:00 – 4:30 PM
Location: Sheriff's Office, 5179 Crater Lake Highway, Central Point, OR

I. Jurisdiction Specific Mitigation Strategy

- a. Review Process and County Strategy
- b. Develop New Actions
- c. Prioritize Actions

II. Next Steps

- a. Resilience Meeting: May 10
- b. Public Survey
- c. Prepare final draft of the NHMP for County and City Review
- d. Provide the OMD-Office of Emergency Management a Review Opportunity
- e. Submit updated plan to FEMA for review



Meeting Sign-In

Jackson County NHMP Update: Meeting #3: Mitigation Strategies April 20, 2017

Name	Email	Representing
Laura Leebnick	lleebnick@roguedisposal.com	Dry Creek Landfill Rogue Disposal
Randy White	randy.white@jswd.org	Jackson Soil & Water Conservation District
Justin Grindspesges	jgindlep@jacksoncounty.org	Jackson County Development Services - Floodplain Mgmt
Tracy DeLew	tdelw@cowcreek.com	Cow Creek Band of Umpqua Tribe of Indians
✓ Domis	DOMISJ@JACKSONCOUNTY.ORG	JACK ROADS
Kevin Harris	Kevin.harris@ecsoill.com	Emergency Communications of Southern Oregon
Ted Zuk	ZUKT@JACKSONCOUNTY.ORG	J.C. Development Services

Agenda

Meeting: Jackson County NHMP Update: Ashland Addenda
Date: April 19, 2017
Time: 3:00 – 4:30 PM
Location: Ashland Fire Station 2, 70 Cedar Street, Ashland, OR

- I. Welcome and Introductions**
 - a. Overview of NHMP process
- II. Hazard Identification**
 - a. Review County Hazard Identification
 - b. Complete Jurisdiction Specific Hazard Inventories
- III. Review Existing Vulnerability Information**
 - a. Review County Identified Vulnerabilities
 - b. identify Jurisdiction Specific Assets and Vulnerabilities
- IV. Jurisdiction Specific Risk Assessment**
 - a. Review/ Revise City Specific Hazard Vulnerability Assessment (HVA)
- V. Jurisdiction Specific Mitigation Strategy**
 - a. Review Process and County Strategy
 - b. Develop Jurisdiction Specific Actions
 - c. Prioritize Actions
- VI. Overview of Implementation and Maintenance**
- VII. Next Steps**
 - a. Resilience Meeting: May 10
 - b. Public Survey
 - c. Prepare final draft of the NHMP for County and City Review
 - d. Provide the OMD-Office of Emergency Management a Review Opportunity
 - e. Submit updated plan to FEMA for review



Meeting Sign-In

Jackson County NHMP Update: City Meeting: Ashland April 19, 2017

Name	Email	Representing
Mike Morrison	morrism@ashland.or.us	Ashland - Public Works
Fred Creek	creekf@son.edu	SOY
Aaron Ott	Aaron.Ott@Asamtc.org	Asamtc
Bill Molnar	bill.molnar@ashland.or.us	Community Development
Meiwen Richards	meiwenrichards@gmail.com	Ashland Chamber of Commerce
David Shepherd	shepherd@ashland.or.us	Ashland Fire & Rescue
Sara Rubrecht		Jackson EM

OPDR
~~OPDR~~ Regional Liaison

jackson.knize@deg.state.or.us

Michael Howard
 Kate Sullivan

David W. Sommer
 David, Sommer@Ashland.K12.OR.US Ashland School District.

Agenda

Meeting: Jackson County NHMP Update: Butte Falls Addenda
Date: April 21, 2017
Time: 9:00 – 10:30 AM
Location: City Hall, 431 Broad Street, Butte Falls, OR

- I. Welcome and Introductions**
 - a. Overview of NHMP process
- II. Hazard Identification**
 - a. Review County Hazard Identification
 - b. Complete Jurisdiction Specific Hazard Inventories
- III. Review Existing Vulnerability Information**
 - a. Review County Identified Vulnerabilities
 - b. identify Jurisdiction Specific Assets and Vulnerabilities
- IV. Jurisdiction Specific Risk Assessment**
 - a. Review/ Revise City Specific Hazard Vulnerability Assessment (HVA)
- V. Jurisdiction Specific Mitigation Strategy**
 - a. Review Process and County Strategy
 - b. Develop Jurisdiction Specific Actions
 - c. Prioritize Actions
- VI. Overview of Implementation and Maintenance**
- VII. Next Steps**
 - a. Resilience Meeting: May 10
 - b. Public Survey
 - c. Prepare final draft of the NHMP for County and City Review
 - d. Provide the OMD-Office of Emergency Management a Review Opportunity
 - e. Submit updated plan to FEMA for review



Meeting Sign-In

Jackson County NHMP Update: City Meeting: Butte Falls April 21, 2017

Name	Email	Representing
Ahn's Bray 541 816 5784	bfwwtp@gmail.com	BF Public Works
Linda Spencer 541 865 3482	lindaquke@msn.com	Mayor
Fred Phillips 541-865-7872	fjphillips10@embargo.com	Volunteer
Trish Callahan 541-778-9302	trishercallahan@gmail.com	City Council / Restaurant Business Owner
Lori Paxton 541 865 3262 City Recorder	bfcityhall@gmail.com	City Recorder
Jeff Gorman 541-890-6939 Fire Chief	jgormanfire@gmail.com	Volunteer Fire Chief.

* send survey out with water bill May 4

Agenda

Meeting: Jackson County NHMP Update: Eagle Point Addenda
Date: April 20, 2017
Time: 10:00 – 11:30 AM
Location: City Hall, 17 Buchanan Avenue South, Eagle Point, OR

- I. Welcome and Introductions**
 - a. Overview of NHMP process
- II. Hazard Identification**
 - a. Review County Hazard Identification
 - b. Complete Jurisdiction Specific Hazard Inventories
- III. Review Existing Vulnerability Information**
 - a. Review County Identified Vulnerabilities
 - b. identify Jurisdiction Specific Assets and Vulnerabilities
- IV. Jurisdiction Specific Risk Assessment**
 - a. Review/ Revise City Specific Hazard Vulnerability Assessment (HVA)
- V. Jurisdiction Specific Mitigation Strategy**
 - a. Review Process and County Strategy
 - b. Develop Jurisdiction Specific Actions
 - c. Prioritize Actions
- VI. Overview of Implementation and Maintenance**
- VII. Next Steps**
 - a. Resilience Meeting: May 10
 - b. Public Survey
 - c. Prepare final draft of the NHMP for County and City Review
 - d. Provide the OMD-Office of Emergency Management a Review Opportunity
 - e. Submit updated plan to FEMA for review



Meeting Sign-In

Jackson County NHMP Update: City Meeting: Eagle Point April 20, 2017

Name	Email	Representing
Vern Thompson	vern.thompson@cityofeaglepoint.org	city of Eagle Point
Robert Miller	robertmiller@cityofeaglepoint.org	city of Eagle Point
MIKE UPSON	mikeupson@cityofeaglepoint.org	" "
Sara Rubrecht		
Michael Howard		

Agenda

Meeting: Jackson County NHMP Update: Jacksonville Addendum
Date: May 9, 2017
Time: 2:00 – 3:30 PM
Location: Old City Hall, Jacksonville, OR

- I. **Welcome and Introductions**
 - a. Overview of NHMP process
- II. **Hazard Identification**
 - a. Review County Hazard Identification
 - b. Complete Jurisdiction Specific Hazard Inventories
- III. **Review Existing Vulnerability Information**
 - a. Review County Identified Vulnerabilities
 - b. identify Jurisdiction Specific Assets and Vulnerabilities
- IV. **Jurisdiction Specific Risk Assessment**
 - a. Review/ Revise City Specific Hazard Vulnerability Assessment (HVA)
- V. **Jurisdiction Specific Mitigation Strategy**
 - a. Review Process and County Strategy
 - b. Develop Jurisdiction Specific Actions
 - c. Prioritize Actions
- VI. **Overview of Implementation and Maintenance**
- VII. **Next Steps**
 - a. Resilience Meeting: May 10
 - b. Public Survey
 - c. Prepare final draft of the NHMP for County and City Review
 - d. Provide the OMD-Office of Emergency Management a Review Opportunity
 - e. Submit updated plan to FEMA for review



Meeting Sign-In

Jackson County NHMP Update: City Meeting: Jacksonville May 9, 2017

Name	Email	Representing
Ira Foster	ifoster@jacksonville.or.us	Planning
Stacy Bray	treasurer@jacksonville.or.us	Administration
D. Hill	firechief@jacksonville.or.us	Fire Chief
Dick Conner	dconner@rccog.org	Planning

Agenda

Meeting: Jackson County NHMP Update: Phoenix Addenda
Date: April 19, 2017
Time: 1:00 – 2:30 PM
Location: Phoenix Public Works, 1000 S B Street, Phoenix, OR

- I. Welcome and Introductions**
 - a. Overview of NHMP process
- II. Hazard Identification**
 - a. Review County Hazard Identification
 - b. Complete Jurisdiction Specific Hazard Inventories
- III. Review Existing Vulnerability Information**
 - a. Review County Identified Vulnerabilities
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 - b. Develop Jurisdiction Specific Actions
 - c. Prioritize Actions
- VI. Overview of Implementation and Maintenance**
- VII. Next Steps**
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 - c. Prepare final draft of the NHMP for County and City Review
 - d. Provide the OMD-Office of Emergency Management a Review Opportunity
 - e. Submit updated plan to FEMA for review



Meeting Sign-In

Jackson County NHMP Update: City Meeting: Phoenix April 19, 2017

Name	Email	Representing
Micki Summerhays	Micki.S@ymail.com	Planning Comm.
Evan Mackenzie	evan.mackenzie@phoenix.oregon.gov	City
Mike Howard	v	Univ. of Oregon
DAVE KAMMER	dave.kammer@phoenix.oregon.gov	Co Ph
Derek Bowker	dbowker@pkpd.org	PHOENIX P.D.
RAY DIZASQUALE	ray.dizasquale@phoenix.oregon.gov	PHOENIX P-UL.
* Chris Luz	Chris.Luz@phoenix.oregon.gov	Phoenix - Mayor

Agenda

Meeting: Jackson County NHMP Update: Rogue River Addenda
Date: April 20, 2017
Time: 1:00 – 2:30 PM
Location: City Hall, 133 Broadway Street, Rogue River, OR

- I. Welcome and Introductions**
 - a. Overview of NHMP process
- II. Hazard Identification**
 - a. Review County Hazard Identification
 - b. Complete Jurisdiction Specific Hazard Inventories
- III. Review Existing Vulnerability Information**
 - a. Review County Identified Vulnerabilities
 - b. identify Jurisdiction Specific Assets and Vulnerabilities
- IV. Jurisdiction Specific Risk Assessment**
 - a. Review/ Revise City Specific Hazard Vulnerability Assessment (HVA)
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 - a. Review Process and County Strategy
 - b. Develop Jurisdiction Specific Actions
 - c. Prioritize Actions
- VI. Overview of Implementation and Maintenance**
- VII. Next Steps**
 - a. Resilience Meeting: May 10
 - b. Public Survey
 - c. Prepare final draft of the NHMP for County and City Review
 - d. Provide the OMD-Office of Emergency Management a Review Opportunity
 - e. Submit updated plan to FEMA for review



Meeting Sign-In

Jackson County NHMP Update: City Meeting: Rogue River April 20, 2017

Name	Email	Representing
James Price	jprice@rogue.river.f.d.com	Rogue River Fire Dist.
Bonnie Honca	bhonca@cityofrogue.river.org	City of RR
Mark E. Reagle	mreagle@cityofrogue.river.org	City of RR
Pam Vandersdale	mayor@cityofrogue.river.org	CITY OF RR
Michael Bollweg	mbollweg@cityofrogue.river.org	City of RR
Dean Stirm	dean@deanstirm.com	City of RR
Sara Rubrecht Michael Howard		

Agenda

Meeting: Jackson County NHMP Update: Shady Cove Addenda
Date: April 21, 2017
Time: 1:00 – 2:30 PM
Location: City Hall, 22451 Hwy 62, Shady Cove, OR

- I. Welcome and Introductions**
 - a. Overview of NHMP process
- II. Hazard Identification**
 - a. Review County Hazard Identification
 - b. Complete Jurisdiction Specific Hazard Inventories
- III. Review Existing Vulnerability Information**
 - a. Review County Identified Vulnerabilities
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 - b. Develop Jurisdiction Specific Actions
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- VI. Overview of Implementation and Maintenance**
- VII. Next Steps**
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 - b. Public Survey
 - c. Prepare final draft of the NHMP for County and City Review
 - d. Provide the OMD-Office of Emergency Management a Review Opportunity
 - e. Submit updated plan to FEMA for review



Meeting Sign-In

Jackson County NHMP Update: City Meeting: Shady Cove April 21, 2017

Name	Email	Representing
Paula Trudeau	pdeau@embarqmail.com	Shady Cove
ES MAYER	EDWINEMAYER@GMAIL.COM	SHADY COVE
Tom SANDERSON	TSSshadyCove@AOL.com	Shady Cove
Aaron Prunty	cityedmund@shadycove.net	SC
Dawn Edwards	dawnedwards09@gmail.com	SC

Agenda

Meeting: Jackson County NHMP Update: Talent Addenda
Date: April 19, 2017
Time: 10:00 – 11:30 AM
Location: Talent Police Department, 604 Talent Ave, Talent, OR

- I. Welcome and Introductions**
 - a. Overview of NHMP process
- II. Hazard Identification**
 - a. Review County Hazard Identification
 - b. Complete Jurisdiction Specific Hazard Inventories
- III. Review Existing Vulnerability Information**
 - a. Review County Identified Vulnerabilities
 - b. identify Jurisdiction Specific Assets and Vulnerabilities
- IV. Jurisdiction Specific Risk Assessment**
 - a. Review/ Revise City Specific Hazard Vulnerability Assessment (HVA)
- V. Jurisdiction Specific Mitigation Strategy**
 - a. Review Process and County Strategy
 - b. Develop Jurisdiction Specific Actions
 - c. Prioritize Actions
- VI. Overview of Implementation and Maintenance**
- VII. Next Steps**
 - a. Resilience Meeting: May 10
 - b. Public Survey
 - c. Prepare final draft of the NHMP for County and City Review
 - d. Provide the OMD-Office of Emergency Management a Review Opportunity
 - e. Submit updated plan to FEMA for review



Meeting Sign-In

Jackson County NHMP Update: City Meeting: Talent April 19, 2017

Name	Email	Representing
Jennifer Snook	Snook@cityoftalent.org	Talent PD
CURTIS WHIPPLE	CWHIPPLE@CITYOFTALENT.ORG	Talent PD
Sara Rubrecht	rubrec.s@jacksoncounty.org	Jack Co Em
Michael Howard		
Zac moody	Zmoody@cityoftalent.org	Talent

APPENDIX C

HAZARD ANALYSIS

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Jackson County

Hazard Analysis

April, 2017

Hazard Analysis

In the Hazard Analysis, each of the hazards and threats described below is scored using a formula that incorporates four independently weighted rating criteria (history, vulnerability, maximum threat, probability) and three levels of severity (low, moderate, and high). For each hazard, the score for a given rating criterion is determined by multiplying the criterion's severity rating by its weight factor. The four rating criteria scores for the hazard are then summed to provide a total risk score for that hazard. Note that while many hazards may occur together or as a consequence of others (e.g., dam failures cause flooding, and earthquakes may cause landslides), this analysis considers each discrete hazard as a singular event.

Hazard Definitions

All areas of the county may be subject to the effects of natural and human caused disasters including, but not limited to:

1. Natural Disasters
 - a. Weather emergencies may include floods, windstorms, droughts, snow or ice or tornadoes.
 - b. Geologic emergencies may include earthquakes, landslides, volcanic hazards or subsidence.
 - c. Epidemiological emergencies may include the infection of humans, animals or agricultural products.

2. Human-Caused Disaster
 - a. Fire and explosion emergencies may include industrial, structural, forest and range or transportation related incidents.
 - b. Transportation emergencies may include incidents involving aircraft, rail systems, watercraft, motor vehicles or pipelines.
 - c. Hazardous materials emergencies may include gases, explosives, corrosives, flammable liquids and solids, oxidizers poisons or radioactive materials involved in incidents at fixed sites or during transportation.
 - d. Civil disturbance emergencies may include unlawful demonstrations, riots and acts of terrorism or sabotage.
 - e. Utility emergencies may include failure or disruption of electrical, telephone, water, gas, fuel oil, sewer or sanitations systems.
 - f. Nuclear emergencies may include the accidental or deliberate detonation of nuclear weapons or an incident involving the use or transportation of nuclear materials.

Hazard Analysis Criteria

In analyzing the risk posed by specific hazards, rating criteria and weighting factor have been used. This formula is based on point value in which:

High	=	8 – 10 points
Moderate	=	4 – 7 points
Low	=	1 – 3 points

History is based on the number of incidents equivalent to a Level 2 emergency. Weighting factor is 2.

High	=	4 or more events in the past 100 years
Moderate	=	2 - 3 events in the past 100 years
Low	=	0 - 1 events in the past 100 years

Vulnerability is based on the percentage of population and property likely to be affected under an “average” occurrence of the hazard. Weighting factor is 5.

High	=	More than 10% affected
Moderate	=	1 – 10 % affected
Low	=	Less than 1% affected

Maximum Threat is based on the highest percentage of population and major infrastructure or property impacted under in a worst-case incident. Weighting factor is 10.

High	=	More than 25% could be affected
Moderate	=	5 - 25% could be affected
Low	=	Less than 5% could be affected

Probability is based on the likelihood of a future occurrence within a specified period of time. Weighting factor is 7.

High	=	One incident within a 10 to 35 year period
Moderate	=	One incident within a 35 to 75 year period
Low	=	One incident within a 75 to 100 year period

Jackson County Hazard Analysis Matrix (4/20/17)

Hazard	Rating Criteria with Weight Factors				Total Score
	History ¹ (WF=2)	Vulnerability ² (WF=5)	Max Threat ³ (WF=10)	Probability ⁴ (WF=7)	
<i>Score for each rating criteria = Rating Factor (High = 10 points; Moderate = 5 points; Low = 1 point) X Weight Factor (WF)</i>					
Earthquake (Cascadia)	1 x 2 = 2	10 x 5 = 50	10 x 10 = 100	10 x 7 = 70	222
Emerging Infectious Disease	6 x 2 = 12	10 x 5 = 50	10 x 10 = 100	7 x 7 = 49	211
Wildfire	10 x 2 = 20	7 x 5 = 35	6 x 10 = 60	10 x 7 = 70	185
Winter Storm	10 x 2 = 20	6 x 5 = 30	6 x 10 = 60	10 x 7 = 70	180
Flood	10 x 2 = 20	4 x 5 = 20	6 x 10 = 60	10 x 7 = 70	170
Hazardous Materials/Transportation	10 x 2 = 20	4 x 5 = 20	5 x 10 = 50	10 x 7 = 70	160
Drought	10 x 2 = 20	6 x 5 = 30	5 x 10 = 50	9 x 7 = 63	163
Windstorm	10 x 2 = 20	4 x 5 = 20	5 x 10 = 50	10 x 7 = 70	160
Terrorism	7 x 2 = 14	3 x 5 = 15	7 x 10 = 70	7 x 7 = 49	148
Landslide	5 x 2 = 10	3 x 5 = 15	3 x 10 = 30	10 x 7 = 70	125
Earthquake (Crustal)	1 x 2 = 2	5 x 5 = 25	5 x 10 = 50	3 x 7 = 21	98
Volcano	1 x 2 = 2	1 x 5 = 5	5 x 10 = 50	1 x 7 = 7	64

Community Profile of Jackson County

Jackson County is located in southwestern Oregon. It is bordered on the north by Douglas County, the south by the state of California, the east by Klamath County and the west by Josephine County. The total area of Jackson County is 2802 square miles. In 2016, the total population was 213,765. At that time, about 68% of Jackson County residents lived within incorporated cities, the other (32%) lived in unincorporated and rural areas.

There are eleven cities in Jackson County. Medford is the largest, with a population of 78,500 in 2016. Medford is also the county seat. Ashland is the second largest, with a population of 20,620 in 2016. This value includes the student population of Southern Oregon University, located in Ashland.

Major waterways in Jackson County include the Rogue River, Bear Creek and the Applegate River. The Rogue River originates in the mountains near Crater Lake. It runs southwest through the cities of Shady Cove and Gold Hill to the central portion of the county and then west through the City of Rogue River, located on the west central county border. Bear Creek originates in the Siskiyou Mountains in the southeastern portion of Jackson County. It runs west through several cities, including Ashland and Medford, to the City of Gold Hill where it meets the Rogue River. The Applegate River enters Jackson County from California and runs north and westward through the communities of Applegate and Ruch to Grants Pass in Josephine County.

Mountainous areas within Jackson County are part of the Cascade Range on the east and the Siskiyou Mountains to the south and west. Mt. McLoughlin, altitude 9,499 feet, is a member of the Cascade Range, and Mt. Ashland, altitude 7,530 feet, is a member of the Siskiyou Range. Both of these peaks are dormant volcanoes.

Interstate 5 and the Central Oregon & Pacific Railroad enter Jackson County southeast of Ashland, and extend northwest to the west central county border near the City of Rogue River. Most county residents live along this corridor, with Medford being the largest center of commercial activity.

Hazards and Threats

Jackson County and the cities and communities within its boundaries may experience major emergencies that endanger life and property.

The County faces a variety of possible disasters. The OEM Statewide Hazardous Analysis methodology has been applied to the variety of disasters facing the County.

#1 Cascadia Subduction Zone Earthquake and #11 Crustal Earthquake

Jackson County is vulnerable to earthquakes originating from the Cascadia Subduction Zone off of the Oregon coast and locally originating crustal earthquakes. Although no property damage or injury to persons due to earthquakes have been reported in Jackson County in the past 100 years, low-magnitude earthquakes (less than M3) occur in southern Oregon with alarming regularity. Shady Cove experienced an M3.1 in March of 2013. The neighboring area of Klamath Falls has experienced three earthquakes since 1993 with magnitudes ranging from 3.4 to 6.0.

Special Paper 29 by the Oregon Department of Geology and Mineral Industries (DOGAMI), entitled "Earthquake Damage in Oregon: Preliminary Estimates of Future Earthquake Losses" (1999), indicates that a severe earthquake, an M8.5 Cascadia Subduction Zone earthquake, is likely to occur off the Oregon Coast sometime in the next 100 years. The study's Executive Summary states that aspects of the computer model resulted in an underestimation of projected economic losses. Nonetheless, the estimates are useful for general planning purposes. The study predicts that economic losses in Jackson County related to damage to buildings, highways, airports, and communications systems could run as high as \$552 million. Few of the historic non-reinforced masonry buildings in the region's downtown centers would be left standing.

The study predicts slight to complete damage to 22% of Jackson County's homes, 32% of its educational buildings, 42% of government buildings, 39% of commercial structures and 42% of industrial buildings.

The day after such a quake, it is predicted that 25% of fire stations would be non-operational, as would be 38% of police stations, 30% of schools and 16% of bridges.

#2 Emerging Infectious Disease

The following information is from the Centers for Disease Control (CDC).

A pandemic occurs when a novel strain of influenza virus emerges that has the ability to infect and be passed efficiently between humans. Because humans have little immunity to the new virus, a worldwide epidemic, or pandemic, can ensue. The United States Department of Agriculture (USDA) and CDC closely monitor highly-pathogenic avian influenza (HPAI) A (H5N2), (H5N1), and (H5N1) viruses. There are concerns of the potential for human infection with HPAI, which would increase the risk of a pandemic occurring.

Between December 15, 2014, and May 29, 2015, the USDA confirmed more than 200 findings of birds infected with highly-pathogenic avian influenza (HPAI) A (H5N2), (H5N8), and (H5N1) viruses. The majority of these infections have occurred in poultry, including backyard and commercial flocks. USDA surveillance indicates that more than 40 million birds have been affected (either infected or exposed) in 20 states. These are the first reported infections with these viruses in US wild or domestic birds.

While these recently-identified HPAI H5 viruses are not known to have caused disease in humans, their appearance in North American birds may increase the likelihood of human infection in the United States. Human infection with other avian influenza viruses, including a different HPAI (H5N1) virus found in Asia, Africa, and other parts of the world; HPAI (H5N6) virus; and (H7N9) virus, has been associated with severe, sometimes fatal, disease. Previous human infections with other avian viruses have most often occurred after unprotected direct physical contact with infected birds or surfaces contaminated by avian influenza viruses, being in close proximity to infected birds, or visiting a live poultry market. Human infection with avian influenza viruses has not occurred from eating properly cooked poultry or poultry products.

Based on current models of disease transmission, a new pandemic could affect 30% of the U.S. population and result in the deaths of 200,000 to two million U. S. residents.

A pandemic's impact will extend far beyond human health. It will undermine many of the day-to-day functions within our society and thus could significantly weaken our economy and national security. Worker absentee rates (due to illness, care giving, exposure avoidance, etc.) are projected to reach 40% at the height of a pandemic.

Epidemics are outbreaks of disease that spread rapidly through a community. The last 30 years history of epidemics in the county is informative. There were outbreaks of hepatitis in the 1970s related to sewage disposal and faulty septic systems in the county's clay soils. There were outbreaks of bacterial infection in the 1980s related to food preparation in restaurants, and illnesses associated with ecoli.

In 1992, between 3,000 and 4,000 people became ill with cryptosporidiosis, a waterborne parasite similar to giardia. Intensive research resulted in the local water source being identified. Over the last 10 years, there have been periodic outbreaks of illnesses, such as the Noro-virus family and salmonella in nursing homes and assisted living facilities. In 2003, there was an outbreak of pertussis, otherwise known as "whooping cough", among children.

One concern is the imminent arrival of West Nile Virus (WNV) in our region. WNV is a mosquito-borne virus that produces mild symptoms in most infected persons. In a very small number of cases, however, encephalitis (inflammation of the brain) may occur.

#3 Wildfire

Each year, about 350 wildfires are sparked in Jackson and Josephine Counties, and at least once every 10 years several extraordinarily large wildfires (10,000 acres and greater) damage or destroy timber resources, threaten populated areas and blanket the region in dense smoke.

Fire suppression, past forest management, land use decisions and other stressors have generated dense overcrowded forest stands prone to declining tree vigor, and placing the oldest and most structurally valuable trees at risk of high-intensity wildfire. Concurrent with declining forest health are other natural resource concerns such as altered water quality and quantity, poor air quality, degraded fish and wildlife habitat, and reduced biodiversity and ecosystem resilience. Much of the southwest Oregon landscape is now prone to crown fires during hot, dry summers (such as the summer of 2015) and climate change elevates the urgency to promote more fire-resilient forests.

The costs of managing large wildfires in southwest Oregon are climbing dramatically, and true costs extend far beyond what it takes to extinguish flames.

- The 1987 Silver Complex in 1987 burned 99,310 acres and cost \$19 million to suppress;
- The 2002 Biscuit Fire burned 499,945 acres at a cost of \$150 million;
- The 27,111 acre Timbered Rock Fire, also in 2002, burned on BLM and private forestlands and cost \$14 million dollars of Oregon Forest Land Protection Funds to suppress; and

- In 2013, four fires sparked by a dry lightning storm burned 47,000 acres in Josephine County. The suppression cost for the three fires on state protected lands was over \$50 million. In addition, there was one firefighter fatality; widespread economic loss for local businesses relying on income from summer tourism, loss of timber resources for private timber owners; and a significant health risk posed to citizens of both Josephine and Jackson Counties due to smoke from the fires.

All of these fires were lightning-caused and started on federal lands. Overgrown forest fuels, limited access, and low priority ranking for limited suppression forces were all factors in the fires becoming large. These large wildfires threaten more than 27,000 homes in wildland-urban interface areas, watersheds, airsheds, timber and recreational resources on public and private forestlands, tourism, and habitat important for the recovery of several threatened and endangered species.

#4 Winter Storm and #8 Windstorm (Severe Weather)

Occurring most commonly from October through April, winter storms (snow/ice) and windstorms can disrupt the region's utilities, telecommunications and roadway systems. Damage from windstorms is typically related to the toppling of trees and limbs and consequent downing of utility infrastructure. Significant storms are defined as those that have sustained winds of 40 mph with gusts of 55 mph for more than two hours.

Particularly threatening are wintertime winds from the Cascades that funnel through the Rogue Valley at 50 mph. The region's outstanding historic windstorm, the 1962 "Columbus Day" storm, had winds gusting to 104 miles per hour and was described by meteorologists as a cyclone.

Each year, snowfalls of 6 to 12 inches, falling in a 24-hour period, cause closures of Interstate 5 at the Siskiyou Summit disrupting the flow of interstate freight and traffic. The American Red Cross opens shelters for stranded travelers several times a year.

Hailstorms may also cause property damage in Jackson County. Hail stones larger than 1/4" have been recorded.

Public utilities in the county are supplied through privately owned, publicly regulated companies. Power is provided through a network of above and below ground pipelines and electrical lines. Power outages can result in the loss of light, heat and, in some cases, well water. PacifiCorp is the primary electrical distribution company in the region. Avista supplies natural gas. Qwest serves the telecommunications needs of much of the region. Rogue Valley Sewer Service (RVS) manages sewage.

Power failures are most often caused by severe weather that downs trees or their limbs onto power lines and poles. Traffic accidents involving utility poles are another common cause. Wildland fires can also threaten transmission lines.

#5 Floods/Dam Failure

Jackson County has a history of flash flooding along several drainages. The county experiences the most severe flooding conditions when the effects of snowmelt and direct, heavy rainfall combine during the winter and early spring months.

There are two prime examples of such conditions leading to landmark floods. The first is the flood of 1964, characterized as a "100 year" flood. This flood was so devastating that it led to the construction of both Applegate Dam and Lost Creek Dam by the Army Corps of Engineers. The second is the flood known as the New Year's Day flood, which occurred in late December 1996 and early January 1997. The initial damage assessment report indicated that the flood had caused \$16 million in damages to housing; \$12 million in damages to businesses; \$9 million in damages to agriculture; and \$13 million in damages to local government in costs and losses. Most of the housing damage occurred along Bear Creek. Nearly all the business damage occurred along Ashland Creek, a tributary of Bear Creek. Agricultural damage was predominantly experienced in the Little Butte Creek and Applegate River watersheds. Infrastructure damage was sustained throughout the county.

Jackson County has over 80 permitted dams and approximately 600 non-permitted holding ponds used for irrigation, livestock watering and firefighting purposes. There are eight Bureau of Reclamation dams, built during the 1930s, and two Army Corps of Engineers dams. In all, there are 15 dams in Jackson County whose failure or disoperation would create high levels of hazard to the nearest downstream communities, such as Ashland, Applegate, Shady Cove, Pinehurst, White City, Brownsboro, Gold Hill and Lake Creek.

Total and cataclysmic dam failure is rare. However, during an earthquake, the movement of waters over the top of a dam can create enough stress to cause dam failure. The failure of any one of the larger dams in the county could result in significant loss of life, damage to property and interruption of transportation systems.

#6 Hazardous Materials/Transportation Accidents

Hazardous materials are stored in industrial and manufacturing facilities throughout the county. There are about 50 manufacturing facilities that store or use reportable quantities of hazardous materials. Hazardous materials are transported through the county in freight trucks using Interstate 5, state highways and county roadways. The highest potential for hazardous materials accidents in the county is on county roads and state highways.

In addition to vehicular transportation, Central Oregon & Pacific Railroad (COPR) lines are host to hazardous materials being transported through downtown centers.

With a full complement of railroads, highways, and airport facilities, Jackson County's risks include a variety of transportation accidents. The County is served by Interstate 5 along with other state highways and county roads, the Central Oregon & Pacific Railroad (COPR), and the Rogue Valley International-Medford Airport. Risks include airline crashes, train derailments, freight truck and vehicular accidents. In addition to road closure related transportation disruptions, risks include hazardous materials spills, fires, explosions and mass casualties.

The most frequent transportation accidents involve motor vehicle accidents. Highway 62 is dotted with some of the most frequent accident locations, including the highway intersections with Vilas Rd., Delta Waters Rd. and Highway 140.

#7 Drought

Jackson County has extended hot and dry weather conditions during the summer and early fall months. Sequential years of below normal rainfall result in drought conditions. In 1939, 1977, 1992 - 1994, and 2001 Oregon suffered extreme drought conditions that adversely affected the availability of well water to homes. More recently, ground water supplies throughout Jackson County were depleted after five consecutive years of drought, from 2010 through 2015 (with emergency declarations in 2014/2015), ranging in severity from moderate to extreme. It will take several "normal" rain years to recover.

Population growth and related drilling of residential wells have increased the demand on the ground water supply. This growth exacerbates the impact of drought years as more wells have lower yields or go dry.

Currently, professionals speak of a 5- to 7-year drought cycle in our region; it was previously considered a 10-year cycle.

Drought also severely impacts the availability of water to agricultural irrigators, adversely affecting both environment and economy. Local tourist attractions like rafting guides are impacted by low waters in the rivers also creating a negative economic impact. Following the principle of "first in time, first in use", the Water master cuts back users with junior water rights when the stream system cannot satisfy all users. At times, this has resulted in no users with rights dating after 1906 receiving their appropriation. The migration of fish is also a significant issue in times of drought.

Arguably the most significant drought impact is the increased wildland fires, threatening the safety of the residents in wildland-urban interface areas and rural communities.

#9 Terrorism

As a result of national and international terrorism incidents, local governments must assess a broad range of vulnerabilities and prepare for new types of hazards, including chemical, biological, nuclear/radiological weapons and explosives.

#10 Landslides

Most landslides in Jackson County have occurred during flood events. They have been comprised of debris flows along stream channels or slides along hillsides whose soils have become saturated during heavy rains.

The impacts of landslides has increased as population growth in the county has encouraged development of residential areas and access roads on previously uninhabited hillsides. Logging roads are also implicated in landslide problems.

During the 1997 "New Year's Day" flood, more than 70 landslides occurred in the county. The majority (70%) of the slope failures that occurred in the county were adjacent to road cuts on steep slopes. Of these, 77% were on south-facing slopes where vegetation has a more difficult time of re-establishing itself.

#12 Volcano

Volcanoes erupt in different ways, pose multiple types of hazards and the initiation and duration of eruptions is relatively uncertain. Therefore, authorities and populations at risk must be knowledgeable about regional volcano hazards so that they can be both prepared and flexible in their response.

In the Pacific Northwest, the movement of tectonic plates against each other along the Cascadia Subduction Zone generates volcanic activity. Although volcanoes in the northern reaches of the Cascade Mountain Range have been active more recently than those in southern Oregon, historically active shield and composite volcanoes are present in close proximity to Jackson County. Oregon's beloved Crater Lake, to our immediate east, was formed by the spectacularly catastrophic eruption and subsequent collapse of Mount Mazama. Mount Shasta and Medicine Lake, both in neighboring Siskiyou County, are considered a high threat potential by the USGS. And Jackson County's own Mount McLoughlin, while considered dormant, is a lava cone formed on top of a composite volcano. Although volcanic eruptions in southern Oregon are exceptionally rare, the impact of an eruption on local communities is potentially devastating.

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Appendix D: Economic Analysis of Natural Hazard Mitigation Projects

This appendix was developed by the Oregon Partnership for Disaster Resilience at the University of Oregon's Community Service Center. It has been reviewed and accepted by the Federal Emergency Management Agency as a means of documenting how the prioritization of actions shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

The appendix outlines three approaches for conducting economic analyses of natural hazard mitigation projects. It describes the importance of implementing mitigation activities, different approaches to economic analysis of mitigation strategies, and methods to calculate costs and benefits associated with mitigation strategies. Information in this section is derived in part from: The Interagency Hazards Mitigation Team, *State Hazard Mitigation Plan*, (Oregon Military Department – Office of Emergency Management, 2000), and Federal Emergency Management Agency Publication 331, *Report on Costs and Benefits of Natural Hazard Mitigation*. This section is not intended to provide a comprehensive description of benefit/cost analysis, nor is it intended to evaluate local projects. It is intended to (1) raise benefit/cost analysis as an important issue, and (2) provide some background on how an economic analysis can be used to evaluate mitigation projects.

Why Evaluate Mitigation Strategies?

Mitigation activities reduce the cost of disasters by minimizing property damage, injuries, and the potential for loss of life, and by reducing emergency response costs, which would otherwise be incurred. Evaluating possible natural hazard mitigation activities provides decision-makers with an understanding of the potential benefits and costs of an activity, as well as a basis upon which to compare alternative projects.

Evaluating mitigation projects is a complex and difficult undertaking, which is influenced by many variables. First, natural disasters affect all segments of the communities they strike, including individuals, businesses, and public services such as fire, law enforcement, utilities, and schools. Second, while some of the direct and indirect costs of disaster damages are measurable, some of the costs are non-financial and difficult to quantify in dollars. Third, many of the impacts of such events produce “ripple-effects” throughout the community, greatly increasing the disaster's social and economic consequences.

While not easily accomplished, there is value from a public policy perspective, in assessing the positive and negative impacts from mitigation activities, and obtaining an instructive benefit/cost comparison. Otherwise, the decision to pursue or not pursue various mitigation options would not be based on an objective understanding of the net benefit or loss associated with these actions.

Mitigation Strategy Economic Analyses Approaches

The approaches used to identify the costs and benefits associated with natural hazard mitigation strategies, measures, or projects fall into three general categories: benefit/cost analysis, cost-effectiveness analysis and the STAPLE/E approach. The distinction between the three methods is outlined below:

Benefit/Cost Analysis

Benefit/cost analysis is a key mechanism used by the state Oregon Military Department – Office of Emergency Management (OEM), the Federal Emergency Management Agency, and other state and federal agencies in evaluating hazard mitigation projects, and is required by the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended.

Benefit/cost analysis is used in natural hazards mitigation to show if the benefits to life and property protected through mitigation efforts exceed the cost of the mitigation activity. Conducting benefit/cost analysis for a mitigation activity can assist communities in determining whether a project is worth undertaking now, in order to avoid disaster-related damages later. Benefit/cost analysis is based on calculating the frequency and severity of a hazard, avoiding future damages, and risk. In benefit/cost analysis, all costs and benefits are evaluated in terms of dollars, and a net benefit/cost ratio is computed to determine whether a project should be implemented. A project must have a benefit/cost ratio greater than 1 (i.e., the net benefits will exceed the net costs) to be eligible for FEMA funding.

Cost-Effectiveness Analysis

Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. This type of analysis, however, does not necessarily measure costs and benefits in terms of dollars. Determining the economic feasibility of mitigating natural hazards can also be organized according to the perspective of those with an economic interest in the outcome. Hence, economic analysis approaches are covered for both public and private sectors as follows.

Investing in Public Sector Mitigation Activities

Evaluating mitigation strategies in the public sector is complicated because it involves estimating all of the economic benefits and costs regardless of who realizes them, and potentially to a large number of people and economic entities. Some benefits cannot be evaluated monetarily, but still affect the public in profound ways. Economists have developed methods to evaluate the economic feasibility of public decisions which involve a diverse set of beneficiaries and non-market benefits.

Investing in Private Sector Mitigation Activities

Private sector mitigation projects may occur on the basis of one or two approaches: it may be mandated by a regulation or standard, or it may be economically justified on its own merits. A building or landowner, whether a private entity or a public agency, required to conform to a mandated standard may consider the following options:

1. Request cost sharing from public agencies;

2. Dispose of the building or land either by sale or demolition;
3. Change the designated use of the building or land and change the hazard mitigation compliance requirement; or
4. Evaluate the most feasible alternatives and initiate the most cost effective hazard mitigation alternative.

The sale of a building or land triggers another set of concerns. For example, real estate disclosure laws can be developed which require sellers of real property to disclose known defects and deficiencies in the property, including earthquake weaknesses and hazards to prospective purchases. Correcting deficiencies can be expensive and time consuming, but their existence can prevent the sale of the building. Conditions of a sale regarding the deficiencies and the price of the building can be negotiated between a buyer and seller.

STAPLE/E Approach

Considering detailed benefit/cost or cost-effectiveness analysis for every possible mitigation activity could be very time consuming and may not be practical. There are some alternate approaches for conducting a quick evaluation of the proposed mitigation activities which could be used to identify those mitigation activities that merit more detailed assessment. One of those methods is the STAPLE/E approach.

Using STAPLE/E criteria, mitigation activities can be evaluated quickly by steering committees in a synthetic fashion. This set of criteria requires the committee to assess the mitigation activities based on the Social, Technical, Administrative, Political, Legal, Economic and Environmental (STAPLE/E) constraints and opportunities of implementing the particular mitigation item in your community. The second chapter in FEMA's How-To Guide "Developing the Mitigation Plan – Identifying Mitigation Actions and Implementation Strategies" as well as the "State of Oregon's Local Natural Hazard Mitigation Plan: An Evaluation Process" outline some specific considerations in analyzing each aspect. The following are suggestions for how to examine each aspect of the STAPLE/E approach from the "State of Oregon's Local Natural Hazard Mitigation Plan: An Evaluation Process."

Social: Community development staff, local non-profit organizations, or a local planning board can help answer these questions.

- Is the proposed action socially acceptable to the community?
- Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- Will the action cause social disruption?

Technical: The city or county public works staff, and building department staff can help answer these questions.

- Will the proposed action work?
- Will it create more problems than it solves?
- Does it solve a problem or only a symptom?

- Is it the most useful action in light of other community goals?

Administrative: Elected officials or the city or county administrator, can help answer these questions.

- Can the community implement the action?
- Is there someone to coordinate and lead the effort?
- Is there sufficient funding, staff, and technical support available?
- Are there ongoing administrative requirements that need to be met?

Political: Consult the mayor, city council or city board of commissioners, city or county administrator, and local planning commissions to help answer these questions.

- Is the action politically acceptable?
- Is there public support both to implement and to maintain the project?

Legal: Include legal counsel, land use planners, risk managers, and city council or county planning commission members, among others, in this discussion.

- Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
- Are there legal side effects? Could the activity be construed as a taking?
- Is the proposed action allowed by the comprehensive plan, or must the comprehensive plan be amended to allow the proposed action?
- Will the community be liable for action or lack of action?
- Will the activity be challenged?

Economic: Community economic development staff, civil engineers, building department staff, and the assessor's office can help answer these questions.

- What are the costs and benefits of this action?
- Do the benefits exceed the costs?
- Are initial, maintenance, and administrative costs taken into account?
- Has funding been secured for the proposed action? If not, what are the potential funding sources (public, non-profit, and private?)
- How will this action affect the fiscal capability of the community?
- What burden will this action place on the tax base or local economy?
- What are the budget and revenue effects of this activity?
- Does the action contribute to other community goals, such as capital improvements or economic development?

- What benefits will the action provide? (This can include dollar amount of damages prevented, number of homes protected, credit under the CRS, potential for funding under the HMGP or the FMA program, etc.)

Environmental: Watershed councils, environmental groups, land use planners and natural resource managers can help answer these questions.

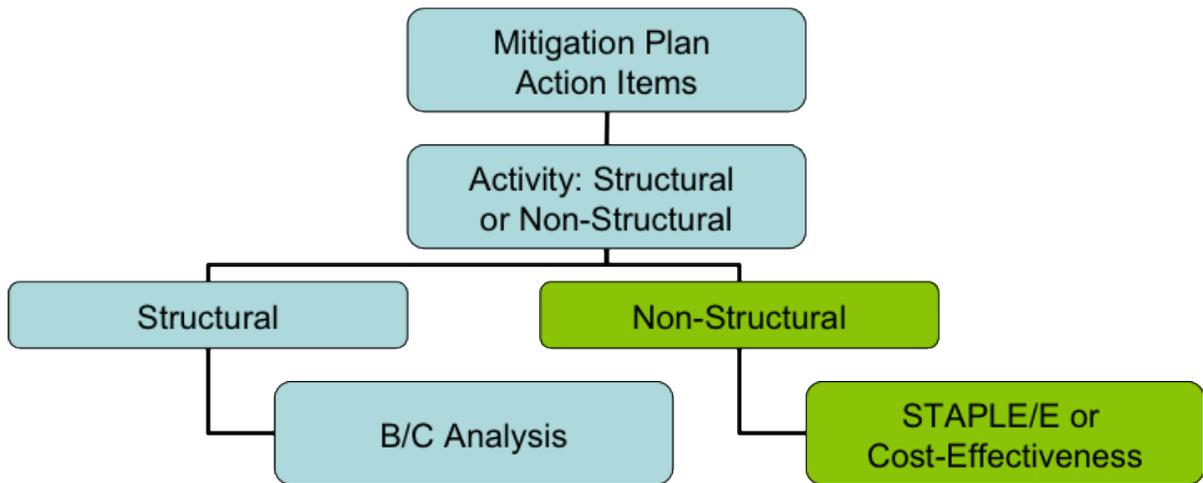
- How will the action impact the environment?
- Will the action need environmental regulatory approvals?
- Will it meet local and state regulatory requirements?
- Are endangered or threatened species likely to be affected?

The STAPLE/E approach is helpful for doing a quick analysis of mitigation projects. Most projects that seek federal funding and others often require more detailed benefit/cost analyses.

When to use the Various Approaches

It is important to realize that various funding sources require different types of economic analyses. The following figure is to serve as a guideline for when to use the various approaches.

Figure D-1 Economic Analysis Flowchart



Source: Oregon Partnership for Disaster Resilience. 2005.

Implementing the Approaches

Benefit/cost analysis, cost-effectiveness analysis, and the STAPLE/E are important tools in evaluating whether or not to implement a mitigation activity. A framework for evaluating mitigation activities is outlined below. This framework should be used in further analyzing the feasibility of prioritized mitigation activities.

1. Identify the Activities

Activities for reducing risk from natural hazards can include structural projects to enhance disaster resistance, education and outreach, and acquisition or demolition of exposed properties, among others. Different mitigation projects can assist in minimizing risk to natural hazards, but do so at varying economic costs.

2. Calculate the Costs and Benefits

Choosing economic criteria is essential to systematically calculating costs and benefits of mitigation projects and selecting the most appropriate activities. Potential economic criteria to evaluate alternatives include:

- **Determine the project cost.** This may include initial project development costs, and repair and operating costs of maintaining projects over time.
- **Estimate the benefits.** Projecting the benefits, or cash flow resulting from a project can be difficult. Expected future returns from the mitigation effort depend on the correct specification of the risk and the effectiveness of the project, which may not be well known. Expected future costs depend on the physical durability and potential economic obsolescence of the investment. This is difficult to project. These considerations will also provide guidance in selecting an appropriate salvage value. Future tax structures and rates must be projected. Financing alternatives must be researched, and they may include retained earnings, bond and stock issues, and commercial loans.
- **Consider costs and benefits to society and the environment.** These are not easily measured, but can be assessed through a variety of economic tools including existence value or contingent value theories. These theories provide quantitative data on the value people attribute to physical or social environments. Even without hard data, however, impacts of structural projects to the physical environment or to society should be considered when implementing mitigation projects.
- **Determine the correct discount rate.** Determination of the discount rate can just be the risk-free cost of capital, but it may include the decision maker's time preference and also a risk premium. Including inflation should also be considered.

3. Analyze and Rank the Activities

Once costs and benefits have been quantified, economic analysis tools can rank the possible mitigation activities. Two methods for determining the best activities given varying costs and benefits include net present value and internal rate of return.

- **Net present value.** Net present value is the value of the expected future returns of an investment minus the value of the expected future cost expressed in today's dollars. If the net present value is greater than the projected costs, the project may be determined feasible for implementation. Selecting the discount rate, and identifying the present and future costs and benefits of the project calculates the net present value of projects.
- **Internal rate of return.** Using the internal rate of return method to evaluate mitigation projects provides the interest rate equivalent to the dollar returns

expected from the project. Once the rate has been calculated, it can be compared to rates earned by investing in alternative projects. Projects may be feasible to implement when the internal rate of return is greater than the total costs of the project. Once the mitigation projects are ranked on the basis of economic criteria, decision-makers can consider other factors, such as risk, project effectiveness, and economic, environmental, and social returns in choosing the appropriate project for implementation.

Economic Returns of Natural Hazard Mitigation

The estimation of economic returns, which accrue to building or land owners as a result of natural hazard mitigation, is difficult. Owners evaluating the economic feasibility of mitigation should consider reductions in physical damages and financial losses. A partial list follows:

- Building damages avoided
- Content damages avoided
- Inventory damages avoided
- Rental income losses avoided
- Relocation and disruption expenses avoided
- Proprietor's income losses avoided

These parameters can be estimated using observed prices, costs, and engineering data. The difficult part is to correctly determine the effectiveness of the hazard mitigation project and the resulting reduction in damages and losses. Equally as difficult is assessing the probability that an event will occur. The damages and losses should only include those that will be borne by the owner. The salvage value of the investment can be important in determining economic feasibility. Salvage value becomes more important as the time horizon of the owner declines. This is important because most businesses depreciate assets over a period of time.

Additional Costs from Natural Hazards

Property owners should also assess changes in a broader set of factors that can change as a result of a large natural disaster. These are usually termed "indirect" effects, but they can have a very direct effect on the economic value of the owner's building or land. They can be positive or negative, and include changes in the following:

- Commodity and resource prices
- Availability of resource supplies
- Commodity and resource demand changes
- Building and land values
- Capital availability and interest rates
- Availability of labor
- Economic structure
- Infrastructure
- Regional exports and imports
- Local, state, and national regulations and policies
- Insurance availability and rates

Changes in the resources and industries listed above are more difficult to estimate and require models that are structured to estimate total economic impacts. Total economic impacts are the sum of direct and indirect economic impacts. Total economic impact models are usually not combined with economic feasibility models. Many models exist to estimate total economic impacts of changes in an economy. Decision makers should understand the total economic impacts of natural disasters in order to calculate the benefits of a mitigation activity. This suggests that understanding the local economy is an important first step in being able to understand the potential impacts of a disaster, and the benefits of mitigation activities.

Additional Considerations

Conducting an economic analysis for potential mitigation activities can assist decision-makers in choosing the most appropriate strategy for their community to reduce risk and prevent loss from natural hazards. Economic analysis can also save time and resources from being spent on inappropriate or unfeasible projects. Several resources and models are listed on the following page that can assist in conducting an economic analysis for natural hazard mitigation activities.

Benefit/cost analysis is complicated, and the numbers may divert attention from other important issues. It is important to consider the qualitative factors of a project associated with mitigation that cannot be evaluated economically. There are alternative approaches to implementing mitigation projects. With this in mind, opportunity rises to develop strategies that integrate natural hazard mitigation with projects related to watersheds, environmental planning, community economic development, and small business development, among others. Incorporating natural hazard mitigation with other community projects can increase the viability of project implementation.

Resources

CUREe Kajima Project, *Methodologies for Evaluating the Socio-Economic Consequences of Large Earthquakes*, Task 7.2 Economic Impact Analysis, Prepared by University of California, Berkeley Team, Robert A. Olson, VSP Associates, Team Leader; John M. Eidinger, G&E Engineering Systems; Kenneth A. Goettel, Goettel and Associates, Inc.; and Gerald L. Horner, Hazard Mitigation Economics Inc., 1997

Federal Emergency Management Agency, *Benefit/Cost Analysis of Hazard Mitigation Projects*, Riverine Flood, Version 1.05, Hazard Mitigation Economics, Inc., 1996

Federal Emergency Management Agency, *Report on the Costs and Benefits of Natural Hazard Mitigation*. Publication 331, 1996.

Goettel & Horner Inc., *Earthquake Risk Analysis Volume III: The Economic Feasibility of Seismic Rehabilitation of Buildings in the City of Portland*, Submitted to the Bureau of Buildings, City of Portland, August 30, 1995.

Goettel & Horner Inc., *Benefit/Cost Analysis of Hazard Mitigation Projects Volume V, Earthquakes*, Prepared for FEMA's Hazard Mitigation Branch, October 25, 1995.

Horner, Gerald, *Benefit/Cost Methodologies for Use in Evaluating the Cost Effectiveness of Proposed Hazard Mitigation Measures*, Robert Olsen Associates, Prepared for Oregon Military Department – Office of Emergency Management, July 1999.

Interagency Hazards Mitigation Team, *State Hazard Mitigation Plan*, (Oregon State Police – Office of Emergency Management, 2000.)

Risk Management Solutions, Inc., *Development of a Standardized Earthquake Loss Estimation Methodology*, National Institute of Building Sciences, Volume I and II, 1994.

VSP Associates, Inc., *A Benefit/Cost Model for the Seismic Rehabilitation of Buildings*, Volumes 1 & 2, Federal Emergency management Agency, FEMA Publication Numbers 227 and 228, 1991.

VSP Associates, Inc., *Benefit/Cost Analysis of Hazard Mitigation Projects: Section 404 Hazard Mitigation Program and Section 406 Public Assistance Program, Volume 3: Seismic Hazard Mitigation Projects*, 1993.

VSP Associates, Inc., *Seismic Rehabilitation of Federal Buildings: A Benefit/Cost Model*, Volume 1, Federal Emergency Management Agency, FEMA Publication Number 255, 1994.

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APPENDIX E: GRANT PROGRAMS AND RESOURCES

Introduction

There are numerous local, state and federal funding sources available to support natural hazard mitigation projects and planning. The Oregon Natural Hazard Mitigation Plan includes a comprehensive list of funding sources (refer to Oregon NHMP Chapter 2 Section F(1)). The following section includes an abbreviated list of the most common funding sources utilized by local jurisdictions in Oregon. Because grant programs often change, it is important to periodically review available funding sources for current guidelines and program descriptions.

Post-Disaster Federal Programs

Hazard Mitigation Grant Program

The Hazard Mitigation Grant Program (HMGP) provides grants to states and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. The HMGP is authorized under Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act.

<http://www.fema.gov/hazard-mitigation-grant-program>

Physical Disaster Loan Program

When physical disaster loans are made to homeowners and businesses following disaster declarations by the U.S. Small Business Administration (SBA), up to 20% of the loan amount can go towards specific measures taken to protect against recurring damage in similar future disasters. <http://www.sba.gov/category/navigation-structure/loans-grants/small-business-loans/disaster-loans>

Pre-Disaster Federal Programs

Pre-Disaster Mitigation Grant Program

The Pre-Disaster Mitigation (PDM) program provides funds to states, territories, Indian tribal governments, communities, and universities for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. Funding these plans and projects reduces overall risks to the population and structures, while also reducing reliance on funding from actual disaster declarations. PDM grants are to be awarded on a competitive basis and without reference to state allocations, quotas, or other formula-based allocation of funds. <http://www.fema.gov/pre-disaster-mitigation-grant-program>

Flood Mitigation Assistance Program

The overall goal of the Flood Mitigation Assistance (FMA) Program is to fund cost-effective measures that reduce or eliminate the long-term risk of flood damage to buildings,

manufactured homes, and other National Flood Insurance Program (NFIP) insurable structures. This specifically includes:

- Reducing the number of repetitively or substantially damaged structures and the associated flood insurance claims;
- Encouraging long-term, comprehensive hazard mitigation planning;
- Responding to the needs of communities participating in the NFIP to expand their mitigation activities beyond floodplain development activities; and
- Complementing other federal and state mitigation programs with similar, long-term mitigation goals.

<http://www.fema.gov/flood-mitigation-assistance-program>

Detailed program and application information for federal post-disaster and pre-disaster programs can be found in the FY13 Hazard Mitigation Assistance Unified Guidance, available at: <https://www.fema.gov/media-library/assets/documents/33634>. Note that guidance regularly changes. Verify that you have the most recent edition.

For Oregon Military Department, Office of Emergency Management (OEM) grant guidance on Federal Hazard Mitigation Assistance, visit:

http://www.oregon.gov/OMD/OEM/pages/all_grants.aspx - Hazard_Mitigation_Grants

Contact: Angie Lane, angie.lane@mil.state.or.us

State Programs

Seismic Rehabilitation Grant Program

The Seismic Rehabilitation Grant Program (SRGP) provides state funds to strengthen public schools and emergency services buildings so they will be less damaged during an earthquake. Reducing property damage, injuries, and casualties caused by earthquakes is the goal of the SRGP. <http://www.orinfrastructure.org/Infrastructure-Programs/Seismic-Rehab/>

Community Development Block Grant Program

The Community Development Block Grant Program promotes viable communities by providing: 1) decent housing; 2) quality living environments; and 3) economic opportunities, especially for low and moderate income persons. Eligible activities most relevant to natural hazards mitigation include: acquisition of property for public purposes; construction/reconstruction of public infrastructure; community planning activities. Under special circumstances, CDBG funds also can be used to meet urgent community development needs arising in the last 18 months which pose immediate threats to health and welfare.

http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs

Oregon Watershed Enhancement Board

While OWEB's primary responsibilities are implementing projects addressing coastal salmon restoration and improving water quality statewide, these projects can sometimes also benefit efforts to reduce flood and landslide hazards. In addition, OWEB conducts watershed workshops for landowners, watershed councils, educators, and others, and

conducts a biennial conference highlighting watershed efforts statewide. Funding for OWEB programs comes from the general fund, state lottery, timber tax revenues, license plate revenues, angling license fees, and other sources. OWEB awards approximately \$20 million in funding annually. More information at: <http://www.oregon.gov/OWEB/Pages/index.aspx>

Federal Mitigation Programs, Activities & Initiatives

Basic & Applied Research/Development

National Earthquake Hazard Reduction Program (NEHRP), National Science Foundation.

Through broad based participation, the NEHRP attempts to mitigate the effects of earthquakes. Member agencies in NEHRP are the US Geological Survey (USGS), the National Science Foundation (NSF), the Federal Emergency Management Agency (FEMA), and the National Institute for Standards and Technology (NIST). The agencies focus on research and development in areas such as the science of earthquakes, earthquake performance of buildings and other structures, societal impacts, and emergency response and recovery. <http://www.nehrp.gov/>

Decision, Risk, and Management Science Program, National Science Foundation.

Supports scientific research directed at increasing the understanding and effectiveness of decision making by individuals, groups, organizations, and society. Disciplinary and interdisciplinary research, doctoral dissertation research, and workshops are funded in the areas of judgment and decision making; decision analysis and decision aids; risk analysis, perception, and communication; societal and public policy decision making; management science and organizational design. The program also supports small grants for exploratory research of a time-critical or high-risk, potentially transformative nature. http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5423

Hazard ID and Mapping

National Flood Insurance Program: Flood Mapping; FEMA

Flood insurance rate maps and flood plain management maps for all NFIP communities. <http://www.fema.gov/national-flood-insurance-program-flood-hazard-mapping>

National Digital Orthophoto Program, DOI – USGS

Develops topographic quadrangles for use in mapping of flood and other hazards. <http://www.ndop.gov/>

Mapping Standards Support, DOI-USGS

Expertise in mapping and digital data standards to support the National Flood Insurance Program. <http://ncgmp.usgs.gov/standards.html>

Soil Survey, USDA-NRCS

Maintains soil surveys of counties or other areas to assist with farming, conservation, mitigation or related purposes. http://soils.usda.gov/survey/printed_surveys/

Project Support

Coastal Zone Management Program, NOAA.

Provides grants for planning and implementation of non-structural coastal flood and hurricane hazard mitigation projects and coastal wetlands restoration.

<http://coastalmanagement.noaa.gov/>

Community Development Block Grant Entitlement Communities Program, US Department of Housing and Urban Development

Provides grants to entitled cities and urban counties to develop viable communities (e.g., decent housing, a suitable living environment, expanded economic opportunities), principally for low- and moderate- income persons.

http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs/entitlement

National Fire Plan (DOI – USDA)

The NFP provides technical, financial, and resource guidance and support for wildland fire management across the United States. This plan addresses five key points: firefighting, rehabilitation, hazardous fuels reduction, community assistance, and accountability.

<http://www.forestsandrangelands.gov/>

Assistance to Firefighters Grant Program, FEMA

FEMA AFGM grants are awarded to fire departments to enhance their ability to protect the public and fire service personnel from fire and related hazards. Three types of grants are available: Assistance to Firefighters Grant (AFG), Fire Prevention and Safety (FP&S), and Staffing for Adequate Fire and Emergency Response (SAFER).

<http://www.fema.gov/welcome-assistance-firefighters-grant-program>

Emergency Watershed Protection Program, USDA-NRCS

Provides technical and financial assistance for relief from imminent hazards in small watersheds, and to reduce vulnerability of life and property in small watershed areas damaged by severe natural hazard events.

<http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/ewpp>

Rural Development Assistance – Utilities, USDA

Direct and guaranteed rural economic loans and business enterprise grants to address utility issues and development needs.

http://www.rurdev.usda.gov/Utilities_Programs_Grants.html

Rural Development Assistance – Housing, USDA.

The RDA program provides grants, loans, and technical assistance in addressing rehabilitation, health and safety needs in primarily low-income rural areas. Declaration of major disaster necessary. <http://www.rurdev.usda.gov/HAD-HCFPGGrants.html>

Public Assistance Grant Program, FEMA.

The objective of the Federal Emergency Management Agency's (FEMA) Public Assistance (PA) Grant Program is to provide assistance to State, Tribal and local governments, and certain types of Private Nonprofit organizations so that communities can quickly respond to and recover from major disasters or emergencies declared by the President.

<http://www.fema.gov/public-assistance-local-state-tribal-and-non-profit>

National Flood Insurance Program, FEMA

The NFIP makes available flood insurance to residents of communities that adopt and enforce minimum floodplain management requirements. <http://www.fema.gov/national-flood-insurance-program>

HOME Investments Partnerships Program, HUD

The HOME IPP provides grants to states, local government and consortia for permanent and transitional housing (including support for property acquisition and rehabilitation) for low-income persons. <http://www.hud.gov/offices/cpd/affordablehousing/programs/home/>

Disaster Recovery Initiative, HUD

The DRI provides grants to fund gaps in available recovery assistance after disasters (including mitigation).

http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs/dri

Emergency Management Performance Grants, FEMA

EMPG grants help state and local governments to sustain and enhance their all-hazards emergency management programs. <http://www.fema.gov/fy-2012-emergency-management-performance-grants-program>

Partners for Fish and Wildlife, DOI – FWS

The PFW program provides financial and technical assistance to private landowners interested in pursuing restoration projects affecting wetlands and riparian habitats.

<http://www.fws.gov/partners/>

North American Wetland Conservation Fund, DOI-FWS

NAWC fund provides cost-share grants to stimulate public/private partnerships for the protection, restoration, and management of wetland habitats.

<http://www.fws.gov/birdhabitat/Grants/index.shtm>

Federal Land Transfer / Federal Land to Parks Program, DOI-NPS

Identifies, assesses, and transfers available federal real property for acquisition for State and local parks and recreation, such as open space.

<http://www.nps.gov/ncrc/programs/flp/index.htm>

Wetlands Reserve program, USDA-NCRS

The WR program provides financial and technical assistance to protect and restore wetlands through easements and restoration agreements.

<http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/wetlands>

Secure Rural Schools and Community Self-Determination Act of 2000, US Forest Service.

Reauthorized for FY2012, it was originally enacted in 2000 to provide five years of transitional assistance to rural counties affected by the decline in revenue from timber harvests on federal lands. Funds have been used for improvements to public schools, roads, and stewardship projects. Money is also available for maintaining infrastructure, improving the health of watersheds and ecosystems, protecting communities, and strengthening local economies. <http://www.fs.usda.gov/pts/>

APPENDIX F: COMMUNITY SURVEY

Survey Purpose and Use

The purpose of this survey was to gauge the overall perception of natural disasters, determine a baseline level of loss reduction activity for residents in the community and assess citizen's support for different types of individual and community risk reduction activities.

Data from this survey directly informs the natural hazards mitigation planning process. Jackson County can use this survey data to enhance action item rationale and ideas for implementation. Other community organizations can also use survey results to inform their own outreach efforts. Data from the survey provides the County with a better understanding of desired outreach strategies (sources and formats) and a baseline understanding of community perceptions of natural hazards and resilience.

Background

Citizen involvement is a key component in the NHMP planning process. Citizens should have the opportunity to voice their ideas, interests and concerns about the impact of natural disasters on their communities.

According to Bierle¹, the benefits of citizen involvement include the following: (1) educate and inform public; (2) incorporate public values into decision making; (3) substantially improve the quality of decisions; (4) increase trust in institutions; (5) reduce conflict; and (6) ensure cost effectiveness.

The NHMP planning process provided opportunities for the public to engage through an on-line survey disseminated by Jackson County.

Methodology

In the spring of 2017, the Oregon Partnership for Disaster Resilience (OPDR) administered the survey via the on-line tool (Qualtrics). The survey was distributed via social media and the County's website. Survey respondents were received from a total of 35 respondents (25 responses were complete and 10 responses were incomplete). Of the complete responses, 21 (84%) lived in Jackson County, four (4) lived in an unspecified other location (two respondents indicated that they lived in Josephine County).

The survey consisted of seven questions. Jackson County designed the survey to determine public perceptions and opinions regarding natural hazards and mitigation priorities.

¹ Bierle, T. 1999. Using social goals to evaluate public participation in environmental decisions. *Policy Studies Review*. 16(3/4), 75-103.

The intent of this survey was not to be statistically valid but instead to gain the perspective and opinions of residents regarding natural hazards in the region. Our assessment is that the results reflect a range attitudes and opinions of residents throughout the county.

Survey Results

This section presents the compiled data and analysis for the 2017 Jackson County NHMP Community Survey. We provide a copy of the survey instrument as Attachment A.

Respondent Characteristics

Most respondents (84%) indicated that they live in Jackson County. Ten respondents (40%) lived in Medford, four lived in an “other” location (including at least two that lived in neighboring Josephine County) and three (3) live in an unincorporated part of the county. The cities of (Town of) Butte Falls, Gold Hill and Phoenix did not have a respondent to the survey.

Table F-1 Respondent Place of Residence (97 respondents)

Answer	Count	Percent
In the County (unincorporated city, e.g., White City, Prospect, etc.)	3	12%
Ashland	1	4%
Butte Falls	0	0%
Central Point	1	4%
Eagle Point	2	8%
Gold Hill	0	0%
Jacksonville	1	4%
Medford	10	40%
Phoenix	0	0%
Rogue River	1	4%
Shady Cove	1	4%
Talent	1	4%
Other location	4	16%
Total Responses	25	100%

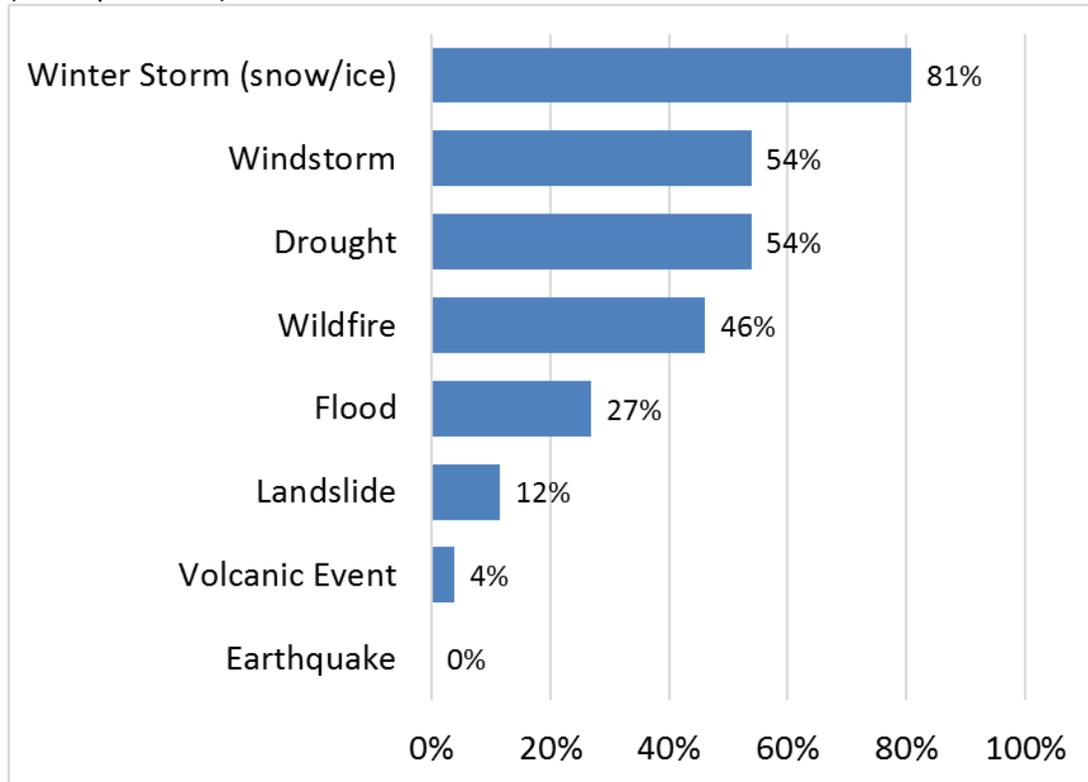
Source: 2017 NHMP Community Survey, analysis by OPDR

Natural Hazard Information

This section reports the experiences of survey respondents involving natural hazards and their exposure to preparedness information.

The survey asked respondents to indicate which natural hazards they, or a member of their household, has experienced in the past ten (10) years. Figure F-1 shows that 81% of respondents have experienced a winter storm (snow/ice) event in the previous 10 years, while substantial percentages of respondents have experienced windstorms (54%), droughts (54%) and wildfires (46%). Fewer respondents have experienced floods (27%), landslides (12%) or volcanic events (4%). No respondents experienced an earthquake event.

Figure F-1 Household Natural Hazard Experience previous 10 Years
(26 respondents)



Source: 2017 NHMP Community Survey, analysis by OPDR

The survey asked respondents to indicate their level of concern about natural hazards that impact Jackson County. Table F-2 shows that the hazards of highest concern for respondents include wildfire (93% Very Concerned and Somewhat Concerned), winter storms (snow/ ice, 86% Very Concerned or Somewhat Concerned) and earthquake (81% Very Concerned and Somewhat Concerned). Approximately three-quarters of all respondents were also Very Concerned or Somewhat Concerned about the windstorm (79%) and drought (68%) hazards. Respondents were least concerned about the volcanic event, landslide and flood hazards.

Table F-2 Hazards that Concern Respondent the Most

Hazard	Very Concerned	Somewhat Concerned	Not Very Concerned	Not Concerned	Total Responses
Drought	32%	36%	29%	4%	28
Earthquake	56%	26%	19%	0%	27
Flood	15%	26%	52%	7%	27
Landslide	11%	19%	48%	22%	27
Volcanic Event	4%	15%	41%	41%	27
Wildfire	46%	46%	4%	4%	28
Windstorm	39%	39%	11%	11%	28
Winter Storm (snow/ice)	46%	39%	11%	4%	28

Source: 2017 NHMP Community Survey, analysis by OPDR

Mitigation Efforts

The survey asked respondents to indicate what types of facilities are most important to them. Police stations (93% Extremely Important and Very Important), Hospitals (90% Extremely Important and Very Important), fire stations (90% Extremely Important and Very Important). More than 75% of the respondents also rated major bridges (80%), schools (83%) and housing (78%) as Extremely Important or Very Important.

Table F-3 Facilities Ranked by Level of Importance to Respondent

Facility Category	Extremely important	Very important	Moderately important	Slightly important	Not at all important	Total Responses
Elder-care facilities	25%	36%	25%	14%	0%	28
Schools (K-12)	41%	41%	10%	0%	7%	29
Hospitals	73%	17%	10%	0%	0%	30
Major bridges	60%	20%	13%	3%	3%	30
Fire Stations	67%	23%	7%	3%	0%	30
Police Stations	67%	27%	7%	0%	0%	30
Historic Buildings	10%	31%	24%	17%	17%	29
Large employers	10%	45%	24%	14%	7%	29
Small businesses	45%	24%	21%	3%	7%	29
Housing	59%	19%	15%	7%	0%	27
Other	55%	18%	0%	27%	0%	11

Source: 2017 NHMP Community Survey, analysis by OPDR

A total of 13 Other responses were provided by respondents. Below is a list of the facility categories that were list as Other:

- Airports
- coffee houses
- Communication Services
- Communications
- Community Center
- Coordinated response
- Cultural Significant Sites
- flags
- Interstate Highway System
- Library
- Pets/livestock
- Public preparedness
- teepees

Table F-4 shows respondent level of agreement to a variety of regulatory and non-regulatory mitigation activities/approaches. In general, respondents strongly agreed and agreed with the majority of listed mitigation activities/approaches. Slightly more than half (56% strongly agree or agree) of the respondents support regulatory approaches to reducing risk, while 80% (strongly agree or agree) support non-regulatory approaches to reducing risk. Slightly more respondents (84% strongly agree or agree) support a mix of regulatory and non-regulatory approaches to reduce risk. More than half (60%) of respondents strongly agree or agree with policies to prohibit development in areas subject to natural hazards, however, only 16% strongly agree or agree with the use of tax dollars to compensate land owners for not developing in areas subject to natural hazards. Conversely, just under three-quarters (72%) of respondents strongly agree or agree with the use of tax dollars to reduce risks and losses from natural disasters. One-half (50% strongly agree or agree) of respondents support protecting historical and cultural resources. Over 90% of respondents (92% strongly agree or agree) would be willing to make their home more disaster resilient.

The vast majority of respondents support safeguarding the local economy following a disaster event (92% strongly agree or agree). Respondents also support safeguarding local schools (92% strongly agree or agree) and maintaining a local inventory of at-risk buildings and infrastructure (92% strongly agree or agree).

Table F-4 Level of Support for Regulatory and Non-Regulatory Mitigation Activities

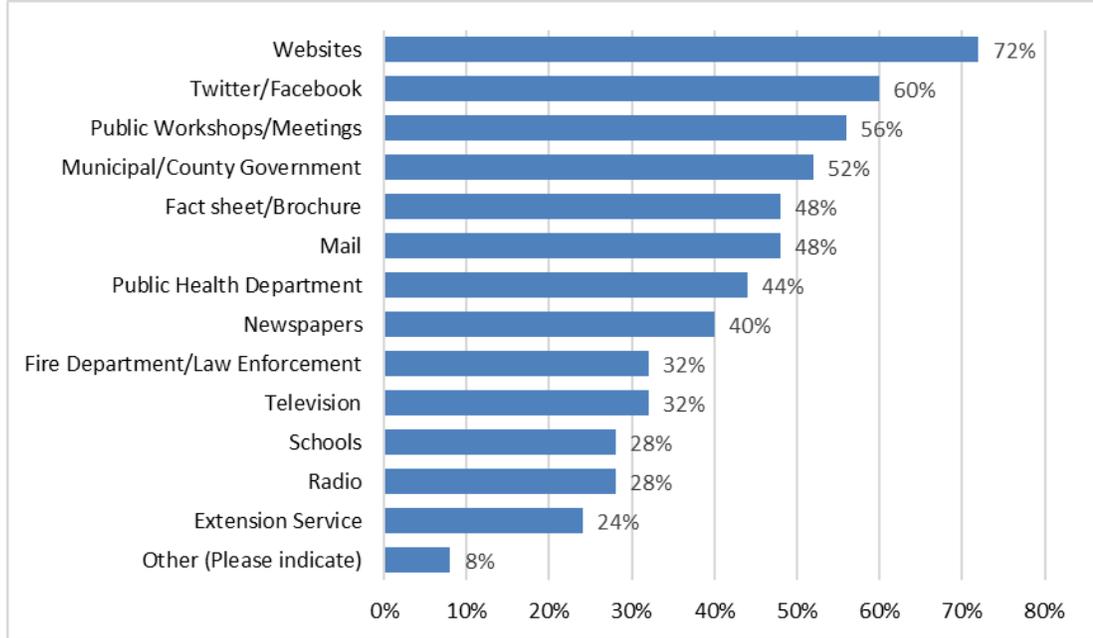
Mitigation Activity/Approach	Strongly agree	Agree	Neither agree nor disagree	Somewhat disagree	Disagree	Not sure	Total Responses
I support a regulatory approach to reducing risk	4%	52%	28%	12%	4%	0%	25
I support a non-regulatory approach to reducing risk	32%	48%	12%	8%	0%	0%	25
I support a mix of both regulatory and non-regulatory approaches to reducing risk	44%	40%	8%	4%	4%	0%	25
I support policies to prohibit development in areas subject to natural hazards	20%	40%	28%	8%	0%	4%	25
I support the use of tax dollars (federal and/or local) to compensate land owners for not developing in areas subject to natural hazards	0%	16%	24%	24%	28%	8%	25
I support the use of local tax dollars to reduce risks and losses from natural disasters	28%	44%	20%	4%	4%	0%	25
I support protecting historical and cultural structures	8%	42%	29%	17%	4%	0%	24
I would be willing to make my home more disaster-resistant	58%	33%	8%	0%	0%	0%	24
I support steps to safeguard the local economy following a disaster event	46%	46%	4%	4%	0%	0%	24
I support improving the disaster preparedness of local schools	63%	29%	8%	0%	0%	0%	24
I support a local inventory of at-risk buildings and infrastructure	42%	50%	4%	0%	4%	0%	24

Source: 2017 NHMP Community Survey, analysis by OPDR

Communication

The survey asked respondents to indicate which form of communication is most effective for them to receive information about reducing the impacts of natural disasters. Respondents could choose as many options as applied. As shown in Figure F-2, the majority of respondents (72%) indicated that websites were their preferred method of communication, followed by social media (Twitter/Facebook, 60%). Next, respondents preferred public workshops/meetings (56%), municipal/County government (52%), fact sheets/brochures (48%), mail (48%), public health departments (44%) and newspapers (40%). There were two respondents who listed “other” as their preferred communication method and indicated email and the Red Cross.

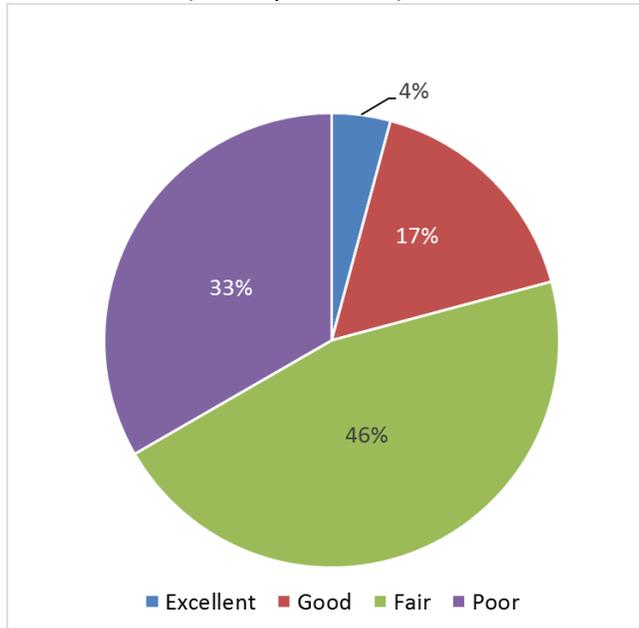
Figure F-2 Respondent Preferred Communication Method



Source: 2017 NHMP Community Survey, analysis by OPDR

The survey next asked the respondents to indicate how well the County is doing to educate people of the natural hazards they may face. Figure F-3 shows that about two-thirds of survey respondents believe their community is doing an excellent (4%), good (17%), or fair (46%) job educating the public about natural hazards. Another one-third of respondents indicated that they feel that the County is doing a poor job at educating people about the natural hazards that they may face.

Figure F-2 Respondent Perception of Community Natural Hazard Education Performance (24 respondents)



Source: 2017 NHMP Community Survey, analysis by OPDR

Respondents to this question were asked to explain their response as shown below:

- While there are news stories about an impending earthquake, very little is being done from municipal agencies to plan for mitigation before or after an event like a Cascadia Subduction.
- We are facing the Cascadia Subduction event at some point and I feel the message has not been spread effectively by local government or nonprofits. Due to the location of Jackson County, we will be fully cut off from supply lines and knowing that it is imperative that our local community is prepared to respond to the vast local needs we will have after the event. Seismic retrofitting is not an advertised service of local contractors, until very recently there has been little to no conversation about preparedness and there are only loose associations coming together to actually address community preparedness.
- Other natural hazards such as drought and wildfire are threats we face nearly every year yet there are few PSAs or major encouragement for planting drought tolerant plants, encouraging fire protection of rural property beyond that which is required by law, or teaching people how to help put out fires that start along the road or in fields.
- I feel there is vast room for improvement.
- Earthquake preparedness is lacking
- We have many outreach efforts but they only connect with a small minority of the community - I would guess less than 5%. For example, I have heard emergency managers proudly announce that they held an education seminar with 25 citizens. In a County of more than a quarter of a million people it will take a lot of years to reach everyone at that rate! In support of these managers, however, they certainly are working hard at outreach.
- We need reality based education.
- I haven't heard anything about what natural disasters that could occur in my area and what to do in such an event
- Folks know what to do it is just a matter of doing it
- never hear anything
- I think people are complacent. People have to take a serious active role in self preparedness and stop thinking that the government needs to take care of them. People don't know how to survive any kind of disaster because they expect the government to take care of them.
- It's a work in progress and it's hard to get the public interested.
- Many sources, including fire depts., LE, Public Health offices and County emergency preparedness depts. are reaching out to citizens.
- Preparedness fairs and info booths at local events are sharing info. that can make survival of a major disaster more likely.
- Local Red Cross and CERT groups, as well as other citizen groups are not only reaching out to alert people to the dangers we may face but are providing practical steps we can take to increase our safety.
- I don't hear, read, or see enough about the importance of planning, or reference to resources that can easily be accessed to help people plan - for businesses or households.

- The lack of staffing at both city hall and fire department make it nearly impossible to devote time and resources to educate people about how and what they can do to prepare THEMSELVES for natural hazard events (prevention work).

Conclusion

In general, the survey responses reinforced information collected by the plan update team (Steering Committee and consultant). As indicated in the survey there are a significant percentage of respondents who feel that the County could do more to outreach to the community about natural hazards. The steering committee reviewed the survey results and incorporated the findings into discussions about the mitigation plan update. Specifically, the survey helped to inform the priority actions and contributed to the overall assessment of risk in Jackson County.

ATTACHMENT A: SURVEY

Thank you for taking the time to complete this survey! The Oregon Partnership for Disaster Resilience at the University of Oregon is working with community leaders in Jackson County and the cities of Ashland, Butte Falls, Eagle Point, Phoenix, Rogue River, Shady Cove and Talent to update their Natural Hazard Mitigation Plan (NHMP).

Mitigation plans outline community risk to natural hazards and outline potential actions the County can take to reduce risks to people, property and the local economy BEFORE the next hazard event (e.g., wildfire, winter storm, flood, earthquake, etc.) strikes.

Developing hazard mitigation plans enables state, tribal and local governments to:

Increase education and awareness around threats, hazards and vulnerabilities; Build partnerships for risk reduction involving government, organizations, businesses and the public; Identify long-term, broadly-supported strategies for risk reduction; Align risk reduction with other state, tribal, or community objectives; Identify implementation approaches that focus resources on the greatest risks and vulnerabilities; and Communicate priorities to potential sources of funding.

To review the current Jackson County NHMP, please visit:

<https://jacksoncountyor.org/emergency/County-Plans/NHMP>

We estimate that this survey should take about 10-15 minutes to complete.

If you have questions regarding this survey, please contact Michael Howard, Assistant Program Director with the University of Oregon's Community Service Center (mrhoward@uoregon.edu).

Q1. In the past 10 years, have you or someone in your household experienced any of the following natural hazards in this community? (Please check all that apply.)

- Drought
- Earthquake
- Flood
- Landslide
- Volcanic Event
- Wildfire
- Windstorm
- Winter Storm (snow/ice)

Q2. Please indicate your level of concern about the following natural hazards.

	Very Concerned	Somewhat Concerned	Not Very Concerned	Not Concerned	Don't Know
Drought	<input type="radio"/>				
Earthquake	<input type="radio"/>				
Flood	<input type="radio"/>				
Landslide	<input type="radio"/>				
Volcanic Event	<input type="radio"/>				
Wildfire	<input type="radio"/>				
Windstorm	<input type="radio"/>				
Winter Storm (snow/ice)	<input type="radio"/>				

Q3. Next, we would like to know what specific types of community assets are most important to you. (make one selection for each asset)

	Extremely important	Very important	Moderately important	Slightly important	Not at all important
Elder-care facilities	<input type="radio"/>				
Schools (K-12)	<input type="radio"/>				
Hospitals	<input type="radio"/>				
Major bridges	<input type="radio"/>				
Fire Stations	<input type="radio"/>				
Police Stations	<input type="radio"/>				
Historic Buildings	<input type="radio"/>				
Large employers	<input type="radio"/>				
Small businesses	<input type="radio"/>				
Housing	<input type="radio"/>				
Other	<input type="radio"/>				
Other	<input type="radio"/>				
Other	<input type="radio"/>				

Q4. A number of activities can reduce your community’s risk from natural hazards. These activities can be both regulatory and non-regulatory. Please check the box that best represents your opinion of the following strategies to reduce the risk and loss associated with natural disasters.

	Strongly agree	Agree	Neither agree nor disagree	Somewhat disagree	Disagree	Not sure
I support a regulatory approach to reducing risk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I support a non-regulatory approach to reducing risk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I support a mix of both regulatory and non-regulatory approaches to reducing risk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I support policies to prohibit development in areas subject to natural hazards	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I support the use of tax dollars (federal and/or local) to compensate land owners for not developing in areas subject to natural hazards	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I support the use of local tax dollars to reduce risks and losses from natural disasters	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I support protecting historical and cultural structures	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would be willing to make my home more disaster-resistant	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I support steps to safeguard the local economy following a disaster event	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I support improving the disaster preparedness of local schools	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I support a local inventory of at-risk buildings and infrastructure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q5. What are the most effective ways for you to receive information on how to protect your household and property from damage due to natural hazards? (Please Check all that apply).

- Newspapers
- Television
- Radio
- Websites
- Twitter/Facebook
- Schools
- Mail
- Fact sheet/Brochure
- Extension Service
- Public Workshops/Meetings
- Fire Department/Law Enforcement
- Public Health Department
- Municipal/County Government
- Other (Please indicate) _____

Q6. How do you feel your community is doing to educate people of the natural hazards that they may face?

- Excellent
- Good
- Fair
- Poor
- None

Please explain your response to the question above:

Q7. Where do you live in Jackson County?

- In the County (unincorporated city, e.g., White City, Prospect, etc.)
- Ashland
- Butte Falls
- Central Point
- Eagle Point
- Gold Hill
- Jacksonville
- Medford
- Phoenix
- Rogue River
- Shady Cove
- Talent
- Other location _____

Thank you for completing this survey!

You will now be directed back to the Rogue Valley Emergency Management website with a link to the County's NHMP. We encourage you to review and comment on the plan.

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Appendix G:
City of Ashland Hazard Mitigation,
Green Infrastructure, and
Low Impact Development

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City of Ashland Hazard Mitigation, Green Infrastructure, and Low Impact Development



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October 2017

NHMP Recommendations Report

Submitted to:
The City of Ashland

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Ashland, OR 97520

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UNIVERSITY OF OREGON



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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 challenges 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.

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EXECUTIVE SUMMARY

This report serves as an appendix to the Ashland Natural Hazards Mitigation Plan (NHMP) Addendum to the 2017 Jackson County Multi-Jurisdictional NHMP. The report describes the pilot project process conducted by the University of Oregon's Community Service Center (CSC team). The CSC team received support from City of Ashland, regional, and state stakeholders. The Environmental Protection Agency (EPA) and the Federal Emergency Management Agency (FEMA) advised on the project and provided oversight.

EPA and FEMA formed a unique partnership and contracted with the University of Oregon's Community Service Center (CSC team) to complete this project. The goals of this project were to:

- Expand the range of tools used to mitigate flood and other natural hazard risks.
- Institutionalize GI/LID into natural hazard mitigation planning.
- Enable FEMA funds to be directed to GI/LID projects.
- Promote an understanding of the co-benefits of GI/LID to both hazard risk reduction and community health, safety, and livability.

Co-Benefit Administration and Process Recommendations

The purpose of this pilot project was to identify opportunities to incorporate green infrastructure (GI) and low impact development (LID) best management practices (BMPs) into NHMP Action Items.

From a process perspective, a simple first step is to ensure Parks and Recreation, Emergency Management, and Public Works staff know each other and understand their respective departmental objectives. A follow up step is to explicitly identify opportunities where multi-objective outcomes can be both achieved AND communicated to elected officials, residents, and other community stakeholders. Finally, Ashland can work to enhance collaboration with regional partners on multi-objective projects that have both environmental and risk reduction benefits.

While not formally vetted, the CSC team also recommends that during NHMP maintenance and update cycles, Ashland use nature-based solutions for floodplain and watershed management to improve the city's Community Rating System (CRS) rating. Ashland can use existing and ongoing natural hazard mitigation programs that achieve multiple water quality and risk reduction benefits to provide flood insurance premium discounts to NFIP insurance policyholders through CRS.

In addition to these process recommendations, the project resulted in two specific NHMP action items for Ashland, OR (presented below). These action items use GI and LID best management practices (BMPs) to mitigate risk from natural hazards and to provide water quality, habitat, and community benefits.

NHMP Action Item Project Recommendations

This report's two final recommended NHMP action items resulted from the GIS assessment, ecosystem services evaluation, ordinance review, and two Technical Advisory Team (TAT) workshops.

In May 2017, the TAT provided feedback on a set of proposed action items at a workshop event. The CSC team presented three proposed action items. The CSC team then used a modified version of FEMA's STAPLE/E project scoring criteria to rate, rank, and discuss the action items.

After reviewing the TAT feedback, the team modified two of the action items as final recommendations for consideration by the Ashland NHMP committee. The final recommendations are:

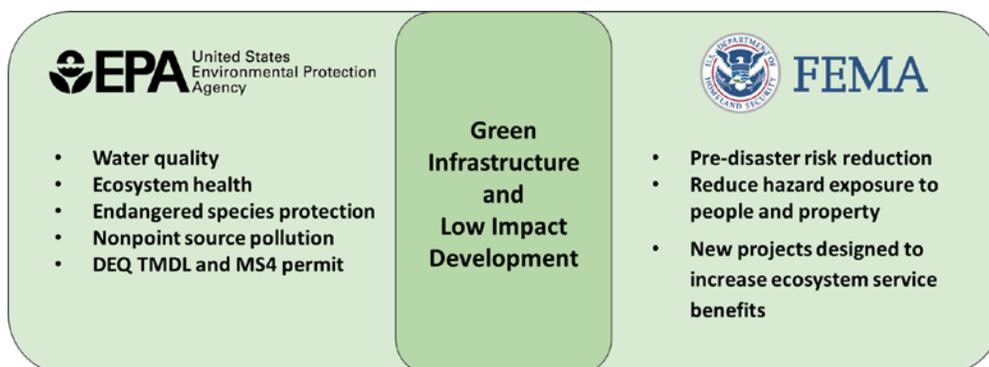
- **Develop Increased Floodwater Storage Project along Bear and Ashland Creek.** Restore wetlands and use techniques like floodplain benching along Bear and Ashland Creek to increase floodwater storage capacity and reduce flood risk.
- **Develop a City Led "Green Streets" Program.** Expand the use of GI/LID BMPs in development codes such as bioswales in city owned right-of-way to minimize local and downstream flooding.

INTRODUCTION

In 2016, the Environmental Protection Agency (EPA) Region 10 and Federal Emergency Management Agency (FEMA) Region 10 proposed a pilot project to integrate green infrastructure and low impact development strategies (GI/LID) into a natural hazard mitigation plan (NHMP). The stated goals of the project were to:

1. Expand the range of tools used to mitigate flood risk.
2. Institutionalize GI/LID into flood risk management planning.
3. Enable FEMA funds to be directed to GI/LID projects.
4. Promote the understanding of the co-benefits of GI/LID including improved water quality, hydrology, climate mitigation, air quality and quality of life.

This report (1) summarizes the GI/LID based action item development process, and (2) presents the final recommended NHMP action items. A set of technical appendixes provide supporting information. The Federal Emergency Management Agency with support from the Environmental Protection Agency funded this CSC team conducted project. The Ashland project was one of two national pilot projects that emerged from this unique partnership between the EPA and FEMA.



Background

The CSC team worked with the City of Ashland, regional stakeholders, and state agency partners to develop and workshop proposed natural hazard mitigation plan (NHMP) action items that utilize green infrastructure (GI) and low impact development (LID) best management practice (BMPs). The proposed action items are intended to reduce risk from natural hazards while providing important water quality, habitat, and community benefits.

What is GI and LID?

Green infrastructure (GI) and low impact development (LID) are cost-effective and resilient approaches to stormwater and associated natural hazard management.¹ GI and LID techniques can be used to manage weather and climate impacts in ways that also provide many environmental and community benefits. These strategies

¹ <https://www.epa.gov/nps/using-low-impact-development-and-green-infrastructure-get-benefits-fema-programs>

are traditionally applied to stormwater management for limiting flow, reducing pollution, and increasing the environmental health of receiving waterways.

LID and GI represent a wide range of tools and techniques that can be applied at the site, neighborhood, and regional/watershed scales. In general, the goal of GI and LID best management practices is to minimize impervious area, limit the disturbance of undeveloped lands, prevent runoff from landscapes and hardscape area, and protect land and ecosystems.²

Figure 1: Green Infrastructure – Low Impact Development Continuum



Source: U.S. Environmental Protection Agency

Low impact development (LID) refers to systems and practices that use or mimic natural processes that result in the infiltration, evapotranspiration, or use of stormwater to protect water quality and associated aquatic habitat.³ Low impact development is most commonly applied at the site or neighborhood scale. There are an extensive number of LID best management practices whose use depend on topological, environmental, and geological conditions. Common approaches include the use of rain gardens, bioswales, tree boxes, engineered soils, and stormwater planters.

Green Infrastructure (GI) uses natural and engineered practices to mimic, protect, or restore natural processes required to manage water and create healthier urban environments.⁴ Green infrastructure is most commonly applied at the neighborhood and regional/watershed scale. Green infrastructure best management approaches can include the protection and enhancement of landscapes such as watersheds, wetlands, and floodplains. Constructed wetlands, restored and reconnected floodplains, and stream buffers are all examples of green infrastructure best management practices.

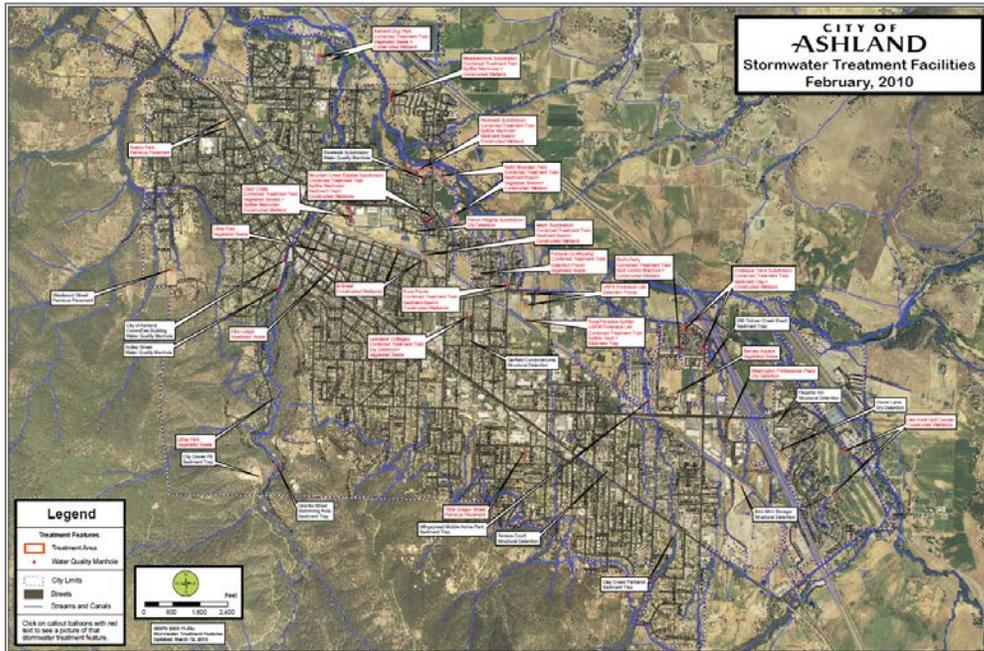
² Best Management Practice from Low Impact Development in Western Oregon: A Practical Guide for Watershed Health

³ Urban Runoff: Low Impact Development. EPA. <https://www.epa.gov/nps/urban-runoff-low-impact-development>

⁴ What is Green Infrastructure? EPA. <https://www.epa.gov/green-infrastructure/what-green-infrastructure>

The City of Ashland is already a leader in applying GI/LID strategies to stormwater collection, conveyance, storage, and treatment. Collectively, existing GI/LID based projects already help reduce flood impacts at the local level. Figure 2 shows an inventory of stormwater facilities in Ashland as of 2010. Click on the image to access this interactive map online.

Figure 2: City of Ashland Stormwater Treatment Facilities, 2010



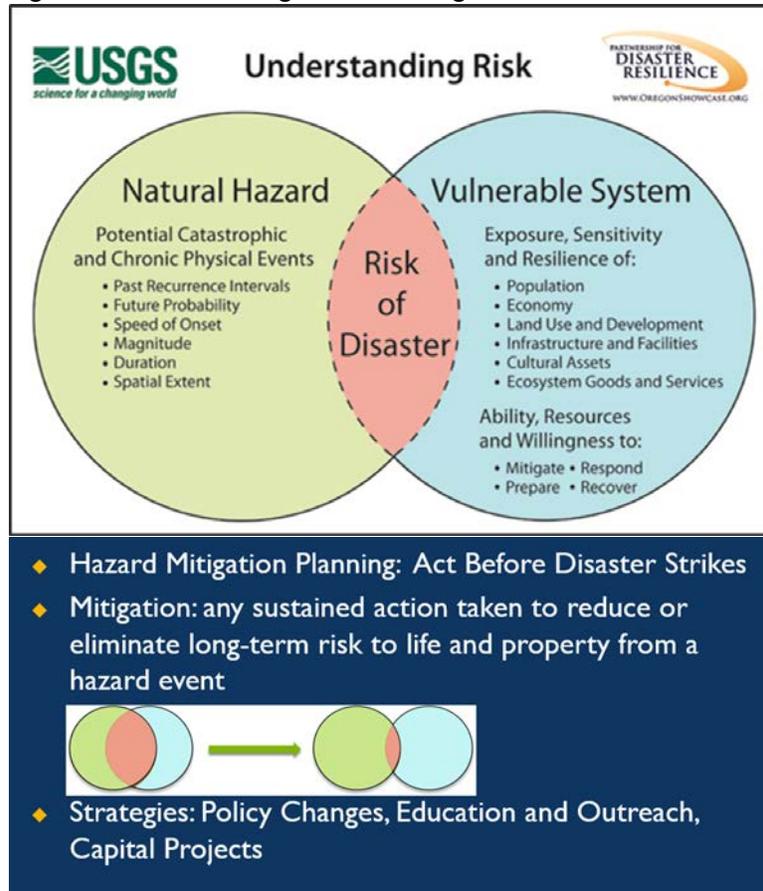
Source: City of Ashland; click on map to access interactive map online.

What is Hazard Mitigation?

The Federal Emergency Management Agency (FEMA) defines mitigation as “... the effort to reduce loss of life and property by lessening the impact of disasters ...”⁵ Hazard mitigation is a method of permanently reducing or alleviating the losses of life, property, and injuries resulting from natural hazards through long- and short-term strategies. Engaging in mitigation activities provides jurisdictions with many benefits, including reduced loss of life, property, essential services, critical facilities and economic hardship; reduced short-term and long-term recovery and reconstruction costs; increased cooperation and communication within the community through the planning process; and increased potential for state and federal funding for recovery and reconstruction projects.

⁵What is Mitigation? FEMA <https://www.fema.gov/what-mitigation>

Figure 3: Understanding Risk and Mitigation



Source: Oregon Partnership for Disaster Resilience

Natural Hazard Mitigation Plans (NHMPs)

The Disaster Mitigation Act of 2000 (DMA2K) established regulations pertaining to planning for natural hazards. Chapter 44 Code of Federal Regulations (CFR), section 201.6, requires that local governments have an approved mitigation plan in order to receive Hazard Mitigation Assistance Grants.⁶ Natural Hazard Mitigation Plans must contain the following:

- A process that includes opportunity for public comment
- A risk assessment that provides a factual basis for loss reduction strategies
- A description of community vulnerabilities
- A mitigation strategy that includes risk reduction goals and specific actions
- A plan maintenance and implementation process

Hazard mitigation plans are adopted locally and formally reviewed and approved by the Federal Emergency Management Agency. Plans must be updated at least every five years.

⁶ Code of Federal Regulations, Chapter 44. Section 201.6, subsection (a), 2015

The Overlap of GI and LID with Natural Hazard Mitigation

GI and LID stormwater management best practices seek to treat urban stormwater onsite to improve water quality, provide habitat, and manage runoff. While these benefits are perhaps the most widely recognized, there is increasing interest in a much wider range of co-benefits associated with GI and LID. These include natural hazard mitigation, lower lifetime infrastructure costs, improved community livability, reduced energy use, and improved air quality. GI and LID techniques can reduce urban heat island effects, improve plant health during droughts reducing fire risks, stabilize soils in landslide prone areas, mitigate localized flooding, and reduce downstream flooding occurrences and severity.

The following table illustrates some of the co-benefits of a GI or LID project. Full circles indicate strong positive overlaps, while half circles indicate partial overlaps. The CSC utilized the Best Management Practice from Low Impact Development in Western Oregon: A Practical Guide for Watershed Health to inform the scoring categories. The CSC team then conducted a high-level evaluation of potential risk reduction and ecosystem service benefits. As presented, the results provide a starting point for discussion.

Table 1: Co-Benefits of GI and LID

GI and LID Example Best Management Practices	Natural Hazard Mitigation			Co-Benefits		
	Flood	Wildfire	Landslide	Water Quality	Community Benefits	Habitat
Minimize Impervious Area: Share parking spaces Minimize pavement widths Minimize front yard setbacks Share driveway Minimize building footprint(s) Minimize roadway cross section(s)	●		●	●	●	◐
Limit Disturbance of Undeveloped Land: Sequence construction schedule Conserve fast(er) draining soils Cluster development Preserve/protect trees Minimize foundation(s) Minimize grading	◐		●	◐	●	◐
Prevent Runoff from Landscape and Hardscape Areas: Rain garden(s) Bioswale(s) Bio-retention (infiltration) basin (Dry) Detention basin Tree and landscape planting(s) Remove existing pavement Contained planters Vegetated roofs (green roofs) Porous Pavement	●	◐	●	●	●	◐
Protect Land and Ecosystems: Conserve open space Protect/preserve wetlands Construct wetlands Protect/preserve riparian areas Maintain/enhance urban forest (forest parks)	●	●	◐	●	●	●

Source: Best Management Practice from Low Impact Development in Western Oregon: A Practical Guide for Watershed Health with CSC additions. Co-Benefit scoring from CSC research and should be interpreted as opportunities for further investigation.

FEMA and GI/LID

In recent years, FEMA has acknowledged the risks and vulnerabilities associated with changing climate trends. Specifically citing “more intense storms, frequent heavy precipitation, heat waves, drought, extreme flooding, and higher sea levels,”⁷ FEMA is focusing efforts on providing information that can help communities manage climate related risks. “FEMA’s focus on risk management has expanded to anticipate climate changes and to plan and implement strategy for program development in support of climate resilient infrastructure. FEMA now integrates climate change adaptation into planning for future risk, programs, policies, and operations to strengthen the nation’s resilience.”⁸

Pre-disaster mitigation planning broadly focuses on reducing hazard exposure to people and property. GI and LID best management practices support FEMA goals through the use of strategies and approaches that protect, restore, and mimic natural systems. According to a recent FEMA report on innovation in hazard mitigation projects, “Implementation of LID/GI practices can help mitigate flood events by increasing the ability of the landscape to store water on site. Infiltration of these stored waters can also mitigate the effects of drought by replenishing water supply aquifers and enhancing usable water supply.”⁹ The report goes on to state, “GI can be used at a wide range of landscape scales in place of, or in addition to, more traditional stormwater control elements to support the principles of LID (USEPA 2014c). Both LID and GI utilize best management practices (BMPs) that can be combined in a BMP Treatment Train to enhance benefits and reduce costs.”

EPA and GI/LID

While FEMA is focused on emergency management from the human perspective, the EPA has historically focused on environmental concerns revolving around the health of species and natural ecosystems. However, EPA also views GI and LID approaches as way to garner benefits associated with FEMA programs.

“LID/GI provides many community benefits including cleaner water, wildlife habitat, enhanced aesthetics, and can be designed to supplement localized or watershed flood protection. LID/GI projects that reduce flood losses to properties insured under the National Flood Insurance Program (NFIP) may be eligible for grant funding through the Federal Emergency Management Agency (FEMA). In addition, LID/GI projects may allow a community to claim points toward flood insurance discounts.”¹⁰

Regarding this pilot project, the EPA has an interest in protecting endangered and threatened species and their habitat, in reducing nonpoint source pollution, and improving water quality. In improving water quality, the EPA is interested in meeting existing water quality standards such as the requirements of the Department of Environmental Quality (DEQ) Total Maximum Daily Load (TMDL) and municipal separate storm sewer systems (MS4) permits. The EPA has recognized the overlapping interest with FEMA in seeing the use of GI and LID best

⁷ <https://www.fema.gov/climate-change>

⁸ FEMA, *Innovative Drought and Flood Mitigation Projects*, Final Report, 2017.

⁹ *Ibid.*

¹⁰ <https://www.epa.gov/nps/using-low-impact-development-and-green-infrastructure-get-benefits-fema-programs>

management practices expanded and is interested in opportunities to utilize FEMA grant funding to achieve diverse co-benefits between the agencies.

BiOp and GI and LID

Additionally, a recently released biological opinion (BiOp) in accordance with the Endangered Species Act (ESA) compounds existing efforts to address flooding. Based on the opinion, NFIP communities, including Ashland, will need to increase habitat protections. Under the BiOp, development that degrades floodplain functions includes: clearing of native riparian vegetation; increases in impervious surface; displacement or reduction of flood storage via fill or structures; interruption of habitat forming process; increases of pollutant loading in receiving water bodies; and increases in stormwater. The BiOp includes Reasonable and Prudent Alternatives (RPA) for development. These RPA's state, in part, that development cannot degrade floodplain functions in NFIP communities that are in counties with ESA listed salmonids. Thus, the introduction of GI/LID concepts to Ashland's NHMP has the potential to address flooding issues in an effective and cost effect manner. Further, it has the potential to benefit endangered species. NMFS's draft Reasonable and Prudent Alternatives (RPA) specifically includes FEMA adopting the use of GI/LID.

Organization of this Report

The remainder of this report is organized as follows:

Section 2: Action Item Development Process summarizes the process used to inform, identify, refine, and review mitigation actions.

Section 3: Final Action Item Recommendations presents the final action item recommendations that will be included in the Ashland NHMP.

This report also includes several appendices:

Appendix A: Final NHMP Recommended Action Items

Appendix B: Modified STAPLEE Feedback Comments

Appendix C: GIS Assessment

Appendix D: Ordinance Review

Appendix E: Ecosystem Service Evaluation

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ACTION ITEM DEVELOPMENT PROCESS

The CSC team utilized multiple data collection, analysis, and review techniques to develop and refine the final GI/LID based hazard mitigation recommendations. In general terms, the CSC team:

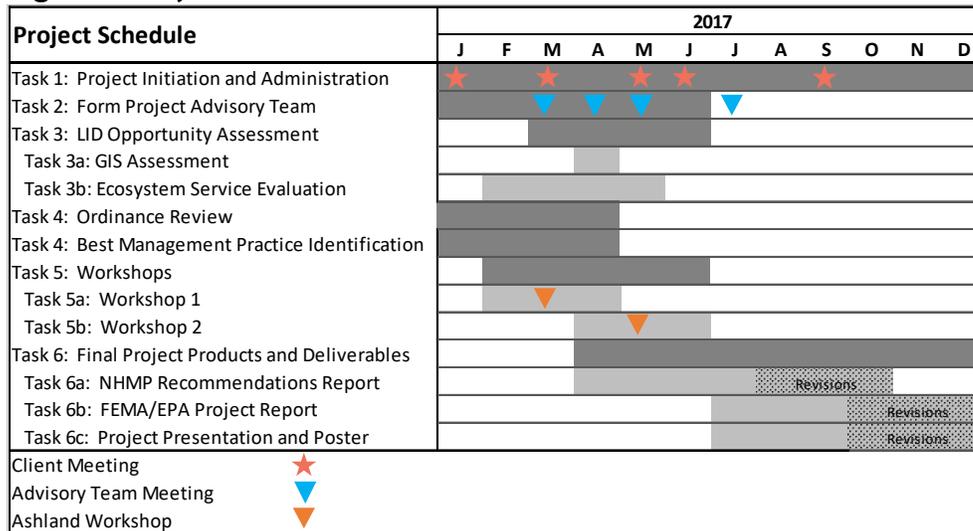
- Assessed flood and other natural hazard areas to determine where GI/LID techniques could be used to reduce hazard impacts.
- Identified existing ecosystem services in Ashland to identify where GI/LID based mitigation projects could be implemented.
- Reviewed local codes and ordinances in Ashland to identify where potential GI/LID based hazard mitigation policy changes could be implemented.
- Convened two workshops to develop and review GI/LID based hazard mitigation recommendations.
- Used feedback to refine and finalized GI/LID based hazard mitigation actions.
- Developed final recommendations for the City of Ashland and a final report for EPA and FEMA with lessons learned and recommendations on how local governments and states across the country can incorporate GI/LID into their NHMPs.

The CSC team also conducted two workshops with the Technical Advisory Team (TAT). These workshops informed the development of LID and GI based NHMP Action Item recommendations.

Primary Methods Summary

The CSC research team used several methods to collect data and information for this project. These activities occurred throughout the course of the project. Figure 4 shows the project schedule.

Figure 4 Project Process Timeline



Source: CSC Team

The following list summarizes the primary methods and processes used to complete the project. Detailed information on each is located in the appendices.

- **GIS Assessment.** The CSC team partnered with the Department of Geology and Mineral Industries (DOGAMI) to conduct a GIS analysis on Hamilton Creek-Bear Creek, Ashland Creek, and Neil Creek Sub-Watersheds in Ashland’s Bear Creek Watershed (Middle Rogue Sub-Basin). The analysis includes flood risk and identification of green infrastructure areas for protection and restoration and future low-impact development projects. Specifically, DOGAMI developed Lidar-based floodplains and flood depth grids, impervious surface grids, hydrologic and geologic network, and constructed stormwater facilities (pipes, channels, treatment facilities, etc.).
- **Ecosystem Service Evaluation.** The CSC team conducted an ecosystem services evaluation for the city. For the flood hazard specifically, the team applied the state’s recently released comprehensive evaluation criteria and LID cost/benefit guidance outlined in the document: “Low Impact Development in Western Oregon: A Practical Guide for Watershed Health.”
- **Ordinance Review/Best Practices.** The CSC team identified best practices and case studies from around the country that address or support hazard mitigation goals through GI/LID approaches. In addition, the team reviewed state policies and programs that support identified best practices at the local level. Lastly, the team reviewed Ashland’s municipal code/ordinances to assess their effectiveness in addressing or supporting hazard mitigation goals through GI/LID approaches.
- **Workshops.** The CSC team facilitated a set of workshops designed to solicit broad stakeholder involvement from City of Ashland staff as well as state, local, and federal experts in GI/LID and natural hazard risk reduction.
 - **Workshop 1.** The first workshop introduced the idea of using GI/LID concepts in natural hazard mitigation planning, the potential for GI/LID to reduce flooding, and other GI/LID co-benefits.
 - **Workshop 2.** The second workshop provided an opportunity to review the modified GIS Analysis/Ecosystem Services Valuation and Ordinance Review and develop a set of specific recommendations on how GI/LID could be incorporated into Ashland’s NHMP.

Action Item Development

To develop GI/LID based action items, the CSC team first reviewed the requirements contained in 44 CFR 201.6. The team then reviewed the City of Ashland’s existing mitigation strategy documented in the 2012 NHMP. The following subsections describe how the team engaged local community stakeholders and the TAT to identify and refine GI/LID based risk reduction opportunities for the City of Ashland NHMP.

Workshop I: Information Gathering

On March 14, 2017, the CSC team delivered a presentation on EPA and FEMA's intersecting interests in (1) expanding the use of GI/LID, (2) determining what GI/LID techniques include, and (3) identifying how GI/LID tools can help mitigate Ashland's risk from natural hazards including flooding, wildfire, earthquake, and landslide.

The CSC team provided background on Jackson County's NHMP policy for natural hazard mitigation in Ashland. Using a process model called a world café,¹¹ the meeting participants discussed the following topics:

- local plans and regulations,
- structure and infrastructure projects,
- natural systems protections, and
- education and awareness program categories

The purpose of the world café exercise was to identify ways to institutionalize GI/LID strategies in NHMP action items. Participants also identified environmental co-benefits of GI/LID, funding opportunities, and administrative strategies for developing GI/LID objectives into NHMP action items. Each table discussion focused on one of three natural hazard categories: wildfire, flood, and earthquake/landslide. We present summary findings from each table below.

Wildfire

Workshop participants clearly articulated concerns that wildfire mitigation is a citywide, rather than site specific, issue. To address wildfire, Ashland must prepare community education outreach, and programmatic support that unites forest management, community development, and low impact development retrofits to properties with existing structures. Workshop participants identified multiple strategies to accomplish this, including:

- updating zoning ordinance to account for municipal-wide wildfire hazard risk,
- updating land use regulations through city ordinance and development code for natural hazard risk reduction, and
- applying a watershed- based approach to wildfire mitigation policy.

Notably, the watershed-based approach for disaster mitigation can unite wildfire risk reduction goals with goal objectives for other natural hazards, such as flood, landslide, and earthquake mitigation.

Flood

Ashland has strong land use regulations that define and protect its floodplain. Participants discussed the scoring and incentive schemes used at the local, state, and federal level to promote flood-based GI/LID projects. Specifically, participants

¹¹ A World Café or Knowledge Café is a structured conversational process for knowledge sharing in which groups of people discuss a topic at several tables, with individuals switching tables periodically and being introduced to the previous discussion at their new table by a "table host".

discussed opportunities through FEMA’s Community Rating System (CRS) and the National Marine Fisheries Biological Opinion’s Reasonable and Prudent Alternatives. Both of these programs encourage the use of GI/LID within the floodplain. However, workshop participants identified a need to better support the use of GI/LID outside of the floodplain. Specifically, projects that result in water quality and flooding benefits to the floodplain and river. Funding mechanisms (such as DEQ’s loan program) and support for large-scale water catchment (e.g. cisterns) were additional table discussion topics.

Earthquake and Landslide

Importantly, workshop participants expressed reservations about discussing landslide and earthquake hazards together.¹² While the probability of earthquake low, the landslides are a chronic hazard in Ashland. As a result, participants viewed the landslide hazard as being more closely aligned with wildfire and flood concerns. Therefore, while earthquake was touched on, landslide was discussed more thoroughly. Broadly, the discussion revolved around the following topics:

- the need for improved coordination among private and public land management to create a comprehensive land management strategy,
- the need to understand public health aspects of landslide and earthquake management to help frame the conversation in a way that garners more public support, and
- the need to develop financial incentive programs as a way of encouraging landowners to implement GI/LID tactics.

Following the first workshop, the CSC compiled and documented participant feedback. The team cross walked that information with its review of the Ashland Municipal Code review, GIS Assessment, and Ecosystem Services Evaluation. The CSC team also integrated feedback from additional meetings with the following advisory groups:

- The Oregon Interagency Hazard Mitigation Team
- The Bear Creek and Rogue Basin TMDL Group
- City of Ashland Planning and GIS Department

¹² NOTE: The CSC team combined the earthquake and landslide hazards due to workshop time constraints. The team recognized that these hazards are unique in terms of both risk and vulnerability. The team made the choice to combine them, rather than drop one from consideration. To the extent possible, the CSC team categorized feedback as either earthquake or landslide related.

Ashland Creek Ponds Riparian Restoration Project Case Example

During the information-gathering phase of this project, the CSC team learned about numerous green infrastructure and low-impact development projects throughout the city. One such project – the [Ashland Creek Ponds Riparian Restoration Project](#) – exemplified many of the co-benefits the team sought to promote. This case study illustrates the laudable benefits of the project. In addition, we discuss where the partners may have missed opportunities to link water quality/habitat goals to flood management/risk reduction goals.

According to the City of Ashland Parks and Recreation department, the Ashland Creek Ponds Riparian Restoration Project area is, “a unique blend of gallery forest, stream and wetland habitats. Located at the confluence of Ashland Creek and Bear Creek on City of Ashland Parks and Recreation Commission (APRC) property, it is home to a wide range of birds and other diverse wildlife. Through a collaborative effort by a dedicated team of caretakers, including the APRC, Lomakatsi Restoration Project, Bear Creek Watershed Council, Helman Elementary School and hundreds of students and community volunteers, the 12-acre site is transitioning towards a healthy streamside forest.”

The primary goal of the Ashland Creek Ponds Project stated by the City was to, “restore degraded habitat for Chinook and Coho salmon and steelhead trout through the reestablishment of native trees and vegetation.” In addition, the



Photo Credit: Northwest Biological Consulting.



Photo Credit: Northwest Biological Consulting.

City sought to reduce stream temperatures, stabilize banks to reduce erosion and sedimentation, provide beneficial nutrients for aquatic life, and create a future source of large wood for fish habitat. Additional stated project objectives included establishing a thriving wildlife corridor, maintaining the site for recreational use, and providing restoration based education for students in the Rogue Valley. Thus, from a water quality, habitat, and environmental restoration standpoint, the Ashland Creek Ponds is stunning in its achievement of multiple -water quality and habitat goals. Similarly, the collaboration, community engagement, youth education, and stewardship successes also deserve recognition.

Notably, stormwater detention, flood control, urban heat island, groundwater recharge, and drought management are not explicitly stated objectives of this project. However, each of these objectives are potential outcomes of the project. This project shows how more explicit connection between the City of Ashland's environmental and hazard risk reduction goals could be beneficial.

The purpose of this pilot project is to explore how such connections can be made more explicit in the future. A simple first step is to ensure Parks and Recreation, Emergency Management, and Public Works staff know each other and understand their respective departmental objectives. The next step is to explicitly identify opportunities where multi-objective outcomes can be both achieved AND communicated to elected officials, residents, and other community stakeholders.

Workshop 2: Action Item Evaluation and Refinement

On May 18, 2017, the CSC team facilitated a second workshop. The dual purpose of the second workshop was to:

- Present draft NHMP action item recommendations for review and consideration; and
- Evaluate the recommended action items using a modified version of FEMA’s STAPLEE criteria.

Prior to introducing the draft actions, the CSC team began by presenting findings from the GIS assessment, ecosystem service evaluation, and ordinance review. With that context, the team then presented a set of potential GI/LID based mitigation actions for consideration and discussion. After introducing each action, the CSC team first solicited feedback on potential project timelines as well as potential lead staff, departments or agencies individuals who could help move the recommended action items forward if Ashland chose to do so.

Draft Recommendations

As noted above, the CSC team presented three potential action items for consideration. The team developed the actions based on the ordinance review, GIS assessment, ecosystem service analysis, and findings from the first workshop. The potential actions summarized in the following table and described in more detail below.

Table 2: Draft NHMP Action Items

Recommendation	Description	Modified STAPLEE Score (0-8)
Develop Increased Floodwater Storage Project along Bear and Ashland Creek	Initiative to increase storage of floodwater at flood risk sites through GI/LID method.	3.6
Develop a City “Green Streets” Program	Retrofit LID best management practices within the city owned right of way.	3.3
Develop a LID Retrofit Incentive Program for Private Landowners	Incentivize private landowners to retrofit LID best management practices on their property.	3.1

Source: CSC Team

Recommendation 1: Develop Increased Floodwater Storage Projects along Bear and Ashland Creek

Action Item Goals: This action item would involve increasing floodwater storage by restoring and expanding wetlands and reconnecting the floodplain along the banks of Bear Creek and Ashland Creek. Environmental co-benefits of this action would include water quality benefits, including contributions to the Regional NPDES stormwater permit. Chapter 5 of the NPDES Phase 2 Stormwater Program Guide for the Rogue Valley includes stormwater management objectives. While the primary goal of this project is to minimize the occurrence and severity of flood events, there are also clear water quality benefits.

GI/LID Best Management Practices: This would also involve the use of GI BMPs including wetland restoration, bio-swales, and floodplain benching, restoration, restored connectivity, and revegetation. These approaches would divert and store stormwater runoff to protect urbanized floodplains, and minimize downstream flood effects. In addition, this work would result in similar water quality benefits to those outlined in the Ashland Creek Ponds project.

Location: Ashland currently has two types of wetland protection zones: locally significant wetlands and other possible wetlands. These areas are protected by buffer zones, in which human activity is regulated. These areas are scattered below Ashland's urban development, surrounding Ashland Creek and Bear Creek. Ashland can increase floodwater storage in these key areas.

Funding: FEMA Hazard Mitigation assistance grants, Oregon Watershed Enhancement Board, public stormwater and drainage CIP, Parks and Rec funds, the DEQ clean water state revolving fund, the Oregon Water Resources Development Program or the EPA Clean Water Act 319 program are all potential funding sources for projects of this type. Note: the EPA's Water Finance Clearinghouse provides a central portal for funding, finance, and case study information.

Recommendation 2: Develop a City Led "Green Streets" Program

Action Item Goals: This action item would create a city led "green streets" program to minimize and mitigate the effects of impervious surfaces within city right of ways. Specifically, this program could target streets in high impervious surface inter-city drainages and near floodplains. The intent is to reduce localized and downstream flooding. Increasing rainwater infiltration and decreasing stormwater runoff in areas with high impervious surface coverage can reduce the occurrence of localized flooding. In addition, these approaches decrease sedimentation that reduce stream flow capacity, mitigate downstream flood effects, and reduce drought and urban heat island effects.

GI/LID Best Management Practice: This program would involve installing pervious street paving and sidewalk treatments. Flow through planter boxes, planting strips, and tree boxes could be added within the city right of way. This would lead to water quality improvements, both on-site and downstream, infiltration and aquifer recharge, on-site stormwater treatment, and bioretention of sediment and pollutants. EPA recommends consideration of the National Green Infrastructure Certification Program. Specifically, the City could consider including a LID construction specification that requires a NGICP professional be on contractors staff.

Location: The 2007 Ashland Watershed Assessment's analysis of impervious surface coverage of inter-city drainages in combination with the DOGAMI Impervious Surface map can be used to identify streets with the largest hazard mitigation potential. This would include streets in inter-city drainages with significant impervious surface coverage and streets near the floodplain.

Funding: FEMA Hazard Mitigation assistance grants, public stormwater and drainage CIP, the Parks and Rec funds, the DEQ clean water state revolving fund are all proposed as funding sources. Note: the EPA's Water Finance Clearinghouse provides a central portal for funding, finance, and case study information.

Recommendation 3: Develop a LID Retrofit Incentive Program for Private Landowners

Action Item Goals: This action item would create targeted incentives for private landowners to remove impervious surface coverage and retrofit LID best management practices on their sites. The objective would be to incentivize private property owners to reduce runoff from their properties by increasing on-site infiltration. This would help to reduce localized flooding by minimizing offsite runoff. Downstream flood events would also be mitigated by reducing runoff that reaches Bear Creek, and limiting sediment in streams that reduces water conveyance and increases flood risk. Funding could be targeted to areas with histories of localized flooding and/or to sites with the largest impervious surface coverage where the largest hazard mitigation benefits could be achieved with the retrofitting of LID best management practices.

GI/LID Best Management Practices: This would involve porous pavement, pavement removal, planter boxes, and rain barrels, among other LID best management practices.

Location: Areas with historic localized flooding issues and/or private development with large amounts of impervious surface coverage would be strong targets for LID retrofit incentives.

Funding: Ashland's Lawn Replacement Program, which offers homeowners the chance to replace their lawn with permeable pavement surfaces, provides an example of similar program that has already been developed. Incentives tied to reductions in stormwater fees or that provide stormwater credits could incentive private landowners to undertake LID retrofit projects. Note: the EPA's Water Finance Clearinghouse provides a central portal for funding, finance, and case study information.

Action Item Evaluation Process

To evaluate each of the actions, the CSC team presented a modified version of FEMA's STAPLEE criteria. This set of criteria assesses possible mitigation activities based on the Social, Technical, Administrative, Political, Legal, Economic, and Environmental (STAPLEE) constraints and opportunities of implementing the mitigation items. Under STAPLEE, participants assign scores to each action across each of the STAPLEE categories. This approach is a recognized evaluation method for NHMP action items when detailed benefit/cost or cost effectiveness analysis may not be practical. Furthermore, it was already an existing component of Ashland's NHMP.

To maximize the discussion time available during the workshop, the CSC team asked participants to focus primarily on scoring the Technical, Administrative, Political, and Economic categories. For more information, refer to Appendix E. The CSC team used the results of Workshop 2 to prioritize, refine, and finalize recommended LID/GI based NHMP actions.

Based on the CSC's assessments, there was a high degree of confidence that the three proposed action items are likely to be socially acceptable in Ashland given that the city's existing support and use of GI/LID and natural hazard mitigation projects. Further, the actions are legally feasible as they have been successfully

implemented in Ashland already or have been utilized in other communities. Finally, the actions are environmentally beneficial as they use nature-based GI/LID that have clear positive environmental co-benefits.

Feedback from workshop participants was encouraged on the Technical, Administrative, Political, and Economic feasibility as the CSC team was less confident in their assessment of these criteria. Feedback was gathered both in comment form and through a general 0-2 rating system. A score of 0 represented highly infeasible while a 2 represented highly feasible. With four feasibility categories assessed, individual category scores ranging from 0-2 were aggregated and a total score out of 8 was calculated for each recommendation.

Action Item STAPLEE Scoring by Category

The CSC team utilized the following categories to evaluate potential recommendations:

- **Technical:** Is the project technically feasible? Is it a cohesive part of a larger floodplain restoration project? What expertise is needed?
- **Administrative:** How can Ashland city departments coordinate? How can leading departments coordinate with external partners? Will there be maintenance and who will be responsible?
- **Political:** Is there support or opposition for public land vs. private land? For upstream in the watershed or downstream?
- **Economic:** What are the funding sources? What is the feasibility of creating partnerships to help obtain more funding?

The following table presents the scoring from the technical, administrative, political, and economic criteria for each of the three recommended action items.

Table 3: Workshop 2 Modified STAPLEE Scoring Results

STAPLEE Criteria	Technical	Admin	Political	Economic	Totals
<u>Recommendation 1:</u> Develop Increased Floodwater Storage Projects along Bear and Ashland Creek	1.3	0.8	1.2	0.3	3.6
<u>Recommendation 2:</u> Develop a City Led “Green Streets” Program	1	0.8	1	0.5	3.3
<u>Recommendation 3:</u> Develop a LID Retrofit Incentive Program for Private Landowners	0.8	0.8	0.8	0.7	3.1
Average Score (0-2)	1.03	0.8	1	0.5	

Source: CSC Team

The following sections present detailed scoring information with notes.

Recommendation 1: Develop Increased Floodwater Storage Projects along Bear and Ashland Creek - Total Score - 3.6/8.0

- **Technical – Average Score 1.3/2.0:**
 - Difficult to identify undeveloped opportunity sites with Ashland city limits that would have substantial flood storage capacity.
 - Increased feasibility on city-owned land.
- **Administrative – Average Score 0.8/2.0:**
 - Political coordination would be difficult between the jurisdiction where sites exist and the jurisdiction with the largest hazard mitigation benefit from possible projects.
- **Political – Average Score 1.2/2.0:**
 - The group considered coordination for this activity between sites and downstream partners essential.
 - Benefits of decreasing hazard risk for downstream communities would not be as tangible or recognizable to Ashland residents.
- **Economic – Average Score 0.3/2.0:**
 - Funding would require partnership between jurisdictions, state agencies, local advocacy groups, and private foundations.
 - Funding for long term maintenance of projects can be challenging to secure.

Recommendation 2: Develop a City Led “Green Streets” Program Total Score - 3.3/8.0

- **Technical – Average Score 1.0/2.0:**
 - Installation of LID project may be affordable, but there are long term maintenance costs that need to be considered.
 - The group suggested that bioswales are easier to maintain and more appealing to the city than porous pavement.
 - There is also no set of preferred contractors to design and install LID projects.
 - The workshop members thought the Washington TAPE (Technology Assessment Protocol Evaluation) stormwater treatment systems standards and certification could be a tool to emulate or adopt.¹³
- **Administrative – Average Score 0.8/2.0:**
 - The group discussed how there would have to be a cost-benefit analysis performed for any such project, and that one of the significant costs would be maintenance. More staff and equipment would be necessary for public works to maintain LID projects on public roads.
 - While new streets could be developed with new green street standards, retrofitting existing streets would be more challenging.
- **Political – Average Score 1.0/2.0:**
 - Many organizations would likely be politically on board with such a project, including the conservation commission, planning

¹³ How Ecology Evaluates Emerging Stormwater Treatment Technologies. State of Washington Department of Ecology. Accessed June 4, 2017 at <http://www.ecy.wa.gov/programs/wq/stormwater/newtech/tape.html>

commission, and other organizations, including external organizations relating to climate change.

- A demonstration project calculating return on investment would be ideal to create political support and developer receptiveness to city-led projects.

- **Economic – Average Score 0.5/2.0:**

- The group considered Capital Improvements Plan (CIP) funds, but because the CIP planning process operate on 2-5 year cycles, adopting project through the CIP would happen over a long time frame.

Recommendation 3: Develop a LID Retrofit Incentive Program for Private Landowners Total Score - 3.1/8.0

- **Technical – Average Score 0.8/2.0:**

- The group expressed that porous pavement solutions alone seemed infeasible.

- **Administrative – Average Score 0.8/2.0:**

- A greater discussion of benefits and costs would be needed before undertaking an effort like this.

- **Political – Average Score 0.8/2.0:**

- Many improvements on private property would not be visible to most residents and could make political support for funding an incentive program more challenging.
- Targeting project on a lot by lot basis does not effectively address many impervious surface runoffs concerns. Uncoordinated improvements could make some parcels take on more runoff mitigation than others.
- Coordination within a neighborhood-scale would be needed to make this type of program feasible.

- **Economic – Average Score 0.7/2.0:**

- It would be difficult to communicate economic benefits realized by surrounding property owners or the city to the private land owner that would take on the cost of the actual LID project.

WORKSHOP FINDINGS SUMMARY

After reviewing the workshop two modified STAPLEE scoring and workshop feedback, the CSC team found Recommendation 1: Develop Increased Floodwater Storage Projects along Bear and Ashland Creek and Recommendation 2: Develop a City Led “Green Streets” Program to have enough support to be moved forward for adoption into the 2017 Ashland Natural Hazards Mitigation Plan (NHMP) Addendum to the Jackson County Multi-Jurisdictional NHMP. Recommendation 3: Develop a LID Retrofit Incentive Program for Private Landowners was not considered to have enough support to be recommended to the Ashland NHMP committee for adoption and was dropped.

Recommendation 1: Develop Increased Floodwater Storage Projects along Bear and Ashland Creek

The CSC team concluded that the floodwater storage action was a feasible and desired action item. However, there were concerns with balancing which jurisdiction would fund such projects, and which jurisdiction would benefit from the project. Expanded floodwater storage at the base of Ashland would be within their jurisdiction, but the flood mitigation benefits would be primarily to downstream communities. In terms of benefits that would be easier for residents to perceive and fund would be projects that mitigate localized flooding within the city. The Ashland Ponds Riparian Restoration Project was considered an example of a successful project with floodwater storage benefits that had already occurred.¹⁴

Recommendation 2: Develop a City Led “Green Streets” Program

The CSC team concluded that the “green streets” action was feasible. However, there were reservations about the suitability of Ashland to many LID best management practices given the slope of the city, the high-water table, and cost of LID project maintenance. Projects within the city streets were considered less feasible than projects within the greater city right of way alongside streets. Political support for such a program was expected to be high. Several examples already exist within the city.

Recommendation 3: Develop a LID Retrofit Incentive Program for Private Landowners

The private LID retrofit program received the lowest score. In addition, workshop participants expressed significant reservations about the feasibility and success of such a program. The ability to fund a program at a sufficient level that private landowners would participate was considered infeasible. There were concerns that the benefits of LID projects are often mainly to surrounding properties, not to the

¹⁴ Ashland Ponds Riparian Restoration Project. Accessed July 19, 2017 at <http://www.ashland.or.us/News.asp?NewsID=3234>

property with the LID projects. This provides limited economic incentive for individual land owners to undertake LID projects. Based on these factors, the CSC team concluded that this recommendation should not be included as one of the recommended NHMP actions.

Factors which contributed to excluding Recommendation 3: Develop a LID Retrofit Incentive Program for Private Landowners included:

- **Technical infeasibility:** Porous pavement was considered by local officials to be too difficult to implement because of maintenance costs, and while the recommendation also included vegetation improvements and pavement removal, this combined with the unequal effects created by non-coordinated implementation spelled difficulties for Public Works. More coordinated efforts would be needed to make this recommendation feasible.
- **Political infeasibility:** while there were programs throughout the community like the Lawn Replacement Program already in place, City staff and members at the workshop gave a convincing case that these were tougher to work and varying in their effects unless coordinated better.

APPENDIX A: FINAL NHMP RECOMMENDED ACTION ITEMS

Develop Increased Floodwater Storage Projects along Bear and Ashland Creek	
<p>Action:</p> <p>This would minimize the occurrence and severity of flood events by increasing floodwater storage by restoring wetlands and improving the floodplains ability to store flood water along Bear and Ashland Creek. Co-benefits would include improved habitat, water quality, and water conveyance.</p>	<p>GI/LID Best Management Practices</p> <p>Divert and store stormwater to mitigate localized flooding, protect urbanized floodplains, and mitigate downstream flood effects through wetland restoration, bio-swale installation, and floodplain benching, increased connectivity, and vegetation.</p>
<p>Lead Organization</p>	<p>Ashland Public Works and Ashland Parks and Recreation</p>
<p>Internal Partners:</p> <ul style="list-style-type: none"> • Ashland Public Works • Ashland Community Development Department • Bear Creek Watershed Council/ Rogue Valley Council of Governments 	<p>External Partners:</p> <ul style="list-style-type: none"> • Federal Emergency Management Agency • Environmental Protection Agency • National Marine Fisheries Service • Oregon Department of State Lands • Oregon Watershed Enhancement Board • Oregon Department of Environmental Quality • Oregon Water Resources Department
<p>Potential Funding Sources:</p> <ul style="list-style-type: none"> • FEMA Hazard Mitigation Assistance (HMA) Grant • Ashland Public Works Stormwater & Drainage Capital Improvement Plan • Ashland Parks and Recreation Department Funds • DEQ Clean Water State Revolving Fund • Oregon Water Resources Development Program 	

Develop a City Led “Green Streets” Program

Action:

Increase rainwater infiltration and decrease stormwater runoff in areas with high impervious surface coverage to reduce localized and downstream flooding through expansion of City-led implementation of “green streets” in high impervious surface inter-city drainages and near floodplains. Co-benefits would include improved water quality, both on-site and downstream, through on-site stormwater treatment and increased infiltration

GI/LID Best Management Practices:

Use pervious street paving and sidewalk treatments such as flow through planters, planting strips, tree boxes and bioretention features according to approved design standards to reduce the impact of development on the Ashland watershed.

Lead Organization

Ashland Public Works

Internal Partners:

- Ashland Community Development Department
- Ashland Parks and Recreation Commission

External Partners:

- Bear Creek/Rogue Valley Council of Governments
- Oregon Department of Environmental Quality
- Oregon Water Resources Department
- Environmental Protection Agency
- Federal Emergency Management Agency

Potential Funding Sources:

- FEMA Hazard Mitigation Assistance (HMA) Grant
- Ashland Public Works Stormwater & Drainage Capital Improvement Plan
- DEQ Clean Water State Revolving Fund
- Oregon Water Resources Development Program

FUNDING

FEMA Pre-Disaster Mitigation Grant Program (PDM)

Executive order 2013 “climate resilient investment;” created new channels for funding for climate resilient mitigation activities, this directly supports flood diversion and storage projects/ floodplain and stream restoration.

Bear Creek Watershed Council/ Rogue Valley Council of Governments; Ashland Parks and Recreation Commission: Ashland Community Development Department; Ashland Public Works

Provides 75% grant funding for GI/LID projects.

EPA Urban Waters Small Grant

EPA Urban Small Waters Grant project includes Green Streets Projects including bioswales and permeable pavement; used in Corvallis.

Ashland Community Development, Public Works

Use of small water quality grant to fund GI/LID projects.

Oregon DEQ Clean Water State Revolving Fund

DEQ will approve loans/bonds for public agencies planning, designing, constructing, or implementing water quality improvement projects including: non-point source water pollution control projects (wetland restoration projects would fall under this category).

Ashland Public Works, Ashland Parks and Recreation, Ashland Community Development Department

Offer below-market interest rate loans and bond purchases to public agencies that could be used for GI/LID projects.

Oregon Water Resources Development Program Feasibility Study Grants and Water Project Grants and Loans

Feasibility Study Grants can be used for analysis of stream storage projects and the associated environmental, fiscal, and public impacts. The Water Project Grants and Loans have been used to fund on the ground water conservation, storage, and flow restoration projects.

Oregon Water Resources Department, Ashland Public Works, Ashland Parks and Recreation

Provides grants of loans to offset cost of GI/LID projects.

Capital Improvements Plan

Public Works Stormwater & Drainage Master Plan identified and funded projects in targeted areas can help fund GI/LID projects

Ashland Public Works

Integrate GI/LID best management practices in projects with existing funding.

City of Ashland Parks and Recreation Department Funds

If GI/LID prioritized or paired with other projects, various funding resources through the parks budget/ through special tax collection going to parks with certain criteria

Ashland Parks and Recreation

Department budget (EX: 20% of prepared food and beverage tax goes to parks dept. for open space acquisition-- could be leveraged for hybrid wetland restoration/park projects).

System Development Charges

These charges can offset the costs of GI/LID projects or can be decreased or waived for developments that implement GI/LID best management practices.

Neighborhood associations, developers

Can serve either as an incentive for new development or as a funding mechanism.

Local Improvement Districts and Special Assessments

These allow groups of property owners to share in the cost of LID infrastructure improvements.

Neighborhood associations, Ashland Public Works

Fund LID retrofits.

Parcel-Based Building Credit Program

Heavily impacted stormwater fee users in Philadelphia are offered credits for installing permeable pavement and other GI/LID projects; partners with State Horticultural Society to engage in small depavement pilot projects buy-in.

Ashland Public Works, Ashland Garden Club, Oregon Horticultural Society
Credits for depavement and other LID projects.

Community Based Foundations

Local foundations can help to offset the cost of LID projects.

Fund LID retrofits.

Local Bond

Municipal bonds may be passed to fund city infrastructure projects that utilize GI/LID

Ashland Public Work, Ashland Community Development

Funding for city lead GI/LID projects

NHMP Project Funding Sources

Name	Funding Mechanism	Applicable GI/LID Projects
Federal Funding		
FEMA Pre-Disaster Mitigation Grant Program (PDM)	Provides 75% grant funding for GI/LID projects.	Floodwater Storage; LID Impervious Retrofit; Green Streets
EPA Urban Waters Small Grant	Use of small water quality grant to fund GI/LID projects.	LID Impervious Retrofit; Green Streets
State Funding		
Oregon DEQ Clean Water State Revolving Fund	Offer below-market interest rate loans and bond purchases to public agencies that could be used for GI/LID projects.	Floodwater Storage; Green Streets
Oregon Water Resources Development Program Feasibility Study Grants and Water Project Grants and Loans	Provides grants of loans to offset cost of GI/LID projects.	Floodwater Storage
Local Funding		
Capital Improvements Plan	Integrate GI/LID best management practices in projects with existing funding.	Green Streets
City of Ashland Parks and Recreation Department Funds	Department budget (EX: 20% of prepared food and beverage tax goes to parks dept. for open space acquisition-- could be leveraged for hybrid wetland restoration/park projects).	Floodwater Storage
System Development Charges	Can serve either as an incentive for new development or as a funding mechanism.	LID Impervious Retrofit; Green Streets
Local Improvement Districts and Special Assessments	Fund LID retrofits.	LID Impervious Retrofit; Green Streets
Parcel-Based Building Credit Program	Credits for depavement and other LID projects.	LID Impervious Retrofit; Green Streets
Community Based Foundations	Fund LID retrofits.	LID Impervious Retrofit; Green Streets
Local Bond	Funding for city lead GI/LID projects	Floodwater Storage; Green Streets

Source: Community Planning Workshop

APPENDIX B:

MODIFIED STAPLEE FEEDBACK COMMENTS

Recommendation I: Develop Increased Floodwater Storage Projects along Bear and Ashland Creek

Tech

Is it technically feasible? is it a cohesive part of a larger floodplain restoration project? What expertise is needed?

Comments

“New development has been creating almost all of the current LID/GI projects w/ a few exceptions; hire outside designers to design these types of things.”

“Challenges exist in identifying opportunity sites that are currently undeveloped. On private property, with no development potential, there is not always a trigger to compel action by private property owner. On City owned lands (parks) the feasibility is increased.”

“Parks can assist in identifying sites within the control of the city. Examine approval process with community development regarding physical environmental standards for alteration in existing flood zones. Coordination with private property owners, and requiring continued maintenance would be more difficult if not incentivized.”

Administrative

How can Ashland city departments coordinate? How can leading departments coordinate with external partners? Will there be maintenance and who would be responsible?

Comments

“Feasible IF city leaders agree storage is a desired activity.”

Political

Is there support or opposition for public land vs. private land? For upstream in the watershed or downstream?

Comments

“In town political support would be almost 100% positive; working w/downstream could be more of a "project.””

“Upstream work that would reduce the incidents of flooding would be politically palatable. Downstream projects would still be considered a posture, but would be less likely to receive public funding; the benefits of decreased risk are not [recognized] by Ashland residents....”

“Downstream coordination not motivated and not developed.”

“Lack of support from developers [when it comes time for] maintenance for GI on private property.”

Economic

What are the funding sources? What is the feasibility of creating partnerships to help obtain more funding?

Comments

“Stormwater fund does not have much in it to cover these types of projects; Need to fund through private development or outside funding.”

“Very limited financial capacity when political willingness to spend on long term projects is low.”

“GI funding in SRF; Federal state budget issues; what about public private partners (PPPs)”

Recommendation 2: Develop a City Led “Green Streets” Program

Technical

Is it technically feasible and does it provide the appropriate level of protection against stormwater problems? What types of technical expertise are needed? How long will it take to complete the project?

Comments

“Needs study for individual community choice to develop engineering master plan to bring the right methods into the established streets plan.”

“Staff has no specific adopted standards to provide to have the designs meet the stated goals of infiltration.”

Administrative

Do internal and external partners have the capability to implement green streets? Can Ashland provide the necessary maintenance to support green streets and porous pavement?

Comments

“New streets can readily be developed to green street standards. Retrofitting existing streets would change the needed maintenance by the City, which Ashland's current CIP does not anticipate as an ongoing (annual) cost.”

“Cost of ongoing maintenance (cleaning, replacement) would likely require more staff and equipment for public roads; park[] retrofit to add bioswales would require

private property coordination, as they would typically be responsible for ongoing maintenance of the system.”

Political

"Are residents favorable to pavers, swales, and other green streets projects? Have there been difficulties/ complaints?"

Comments

“Conservation commission, planning commission, Council and external orgs relating to climate change, would likely be supportive of green infrastructure, provided the return on investment could demonstrate performance that justifies the cost. Demonstration project would be ideal that shows the cost/benefit.”

“Lack of support from developers; issues of maintenance for GI on private property.”

Economic

Are green streets a cost-effective solution to storm water and flood management in Ashland?

Comments

“Replacement of existing streets, parking, and the cost of ongoing maintenance would need a new funding stream; Replacement of [...] bioswales were feasible. Increased staffing and equipment would be needed for maintenance”

“TIGER grants for green streets from US DOT; Green report for flooding”

Recommendation 3: Develop a LID Retrofit Incentive Program for Private Landowners

Technical

Is it technically feasible and does it provide the appropriate level of protection against stormwater problems? What types of technical expertise are needed? How long will it take to complete the project?

Comments

“Porous pavement as a public facility poses maintenance difficulties, once porous areas are filled in.”

“Some retrofit options would be useful but pervious as pavers are not as feasible to the degree new development incorporates pervious/porous pavement surfaces”

“Would be difficult to find areas without high water tables and or springs.”

Administrative

Do internal and external partners have the capability to implement LID Incentives?
Can Ashland and or private land owners provide the necessary maintenance to support LID retrofits?

Comments

“Need discussion of benefits/costs to even undertake an effort like this.”

Political

“What type of incentive would have the most private buy-in? Would residents or community organizations be involved?”

Comments

“Ashland's planning commission and council have typically been receptive to green streets and on-site stormwater management through the use of pervious pavement”

“Residents I believe are favorable but not many can afford to implement; if they are installed around the city, residents most likely won't notice they are there.”

“Would be hardest with private land owners that aren't directly impacted.”

“Lots of examples in Portland. Money is always in neighborhood improvement districts; downspout disconnections; greenstreets maintenance volunteers; greenstreets report/maintenance - staying green American rivers”

Economic

What type of incentives are economically viable? Where would incentives result in the highest return on investment?

Comments

“Larger community benefits are not often recognized by private sector.”

“If a property is impacted, there is more motivation to pay for changes.”

APPENDIX C: GIS ASSESSMENT

The CSC team partnered with the Oregon Department of Geology and Mineral Industries (DOGAMI) to conduct a Geographic Information Systems (GIS) analysis of flood risk and identification of green infrastructure areas for protection and restoration and future low-impact development projects. The analysis was conducted within the City of Ashland City limits including a 200-foot buffer.

The GIS analysis consisted of data acquisition, creation, and analysis tasks. The deliverables were packaged into two geodatabases, one containing secondary data compiled from the City of Ashland's GIS office, and another one containing primary data created or analyzed by DOGAMI. The datasets included:

- From the City of Ashland
 - Constructed channels, creeks, pipes, and culverts layers.
- From DOGAMI
 - 10-, 25, 50-, 100-, and 500-year flood event boundaries mapped using 2009 bare earth Light Detection and Ranging (LiDAR) remote sensing data.
 - 10-, 25, 50-, 100-, and 500-year LiDAR based flood event depth grids.
 - Impervious surfaces grid based on LiDAR and orthoimagery
 - Alluvial geologic deposits

Using this data, along with FEMA's Flood Insurance Rate Maps (FIRMs) and the City of Ashland's Modified Floodplain layer, the CSC team sought to identify sites where LID and GI tools could strengthen ecosystem services and achieve natural hazard risk reduction. Two primary GIS assessments were conducted. The first looked at floodwater storage sites and the seconds looked at impervious surface coverage.

Assessment I: Floodwater Storage Analysis

First, the CSC team looked for undeveloped area without impervious surfaces. Specifically, the team sought to identify surfaces inside or connected to the floodplain and had high wetland restoration potential. The DOGAMI impervious surface layer shows the success of Ashland's wetland and stream protection regulations that have limited impervious surface coverage near Bear and Ashland Creek. This has helped to preserve existing ecosystem services such as sediment retention and floodwater storage. Green infrastructure approaches such as wetland restoration and floodplain benching can increase the natural hazard mitigation benefits of these ecosystem services.

In other parts of the city, the impervious surface layer illustrates where development has affected stream corridors and their pre-development function. Figure 5 shows an area where Paradise Creek enters a piped system beneath an area with a high percentage of impervious surface. Areas such as these are candidates for restoration projects that use GI or LID tools to reintroduce stormwater storage, infiltration, and conveyance approaches. These in turn have the potential to help reduce localized or chronic flooding in these areas.

Figure 5: DOGAMI Impervious Surface Detail



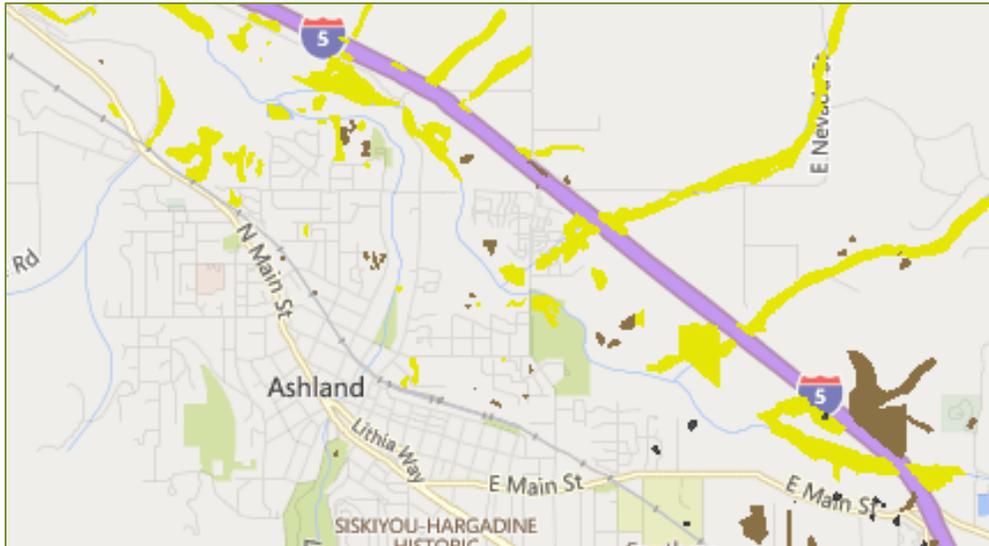
Source: DOGAMI

To help locate sites with strong ecosystem service enhancement potential, the CSC team used Oregon Explorer Wetland Restoration Planning Tool.¹⁵ This tool aggregates six factors including proximity (300ft) to a wetland with previous investment, current land management status, and the size of the wetland and surrounding wetlands into a single score. A cumulative wetland restoration/mitigation potential score (0-100) summarizes a site's potential to be successfully restored or used for mitigation. Numerous sites along Bear and Ashland Creek at along the North-East edge of the Ashland city limits have scores in the 70s and 80s reflecting a considerable restoration and hazard mitigation

¹⁵ Oregon Explorer. Oregon State University Libraries and Press and the Institute for Natural Resources. Accessed June 7, 2017 at http://oregonexplorer.info/content/oregon-wetland-restoration-planning-tool?topic=4138&ptopic=98&qt-subtopic_quicktab=3

opportunity. In the following figure, yellow areas indicate higher wetland restoration potential while brown areas have lower wetland restoration potential.

Figure 6: Oregon Explorer Wetland Restoration Planning Tool



Source: Oregon Explorer Wetland Restoration Planning Tool, accessed July 13, 2017 at <http://oe.oregonexplorer.info/wetlands/restoration/>

Overall, this analysis suggested that suitable sites exist for flood storage and floodplain restoration projects along Bear Creek and Ashland Creek in the low-lying portion of Ashland's city limits. It is important to note that the Ashland City limits are designated such that only portions of Bear Creek's potential wetland restoration sites are fully, or partially, within the cities jurisdiction. To achieve the largest natural hazard risk reduction from ecosystem service enhancements along Bear Creek, the City of Ashland, County, and State land managers must act collaboratively.

Notably, the flood risk-reduction benefits of this project would largely occur downstream. While Ashland is part of the Jackson County Multi-Jurisdictional NHMP, FEMA funding and cost-benefit analysis requirements tend to apply at a jurisdictional level. Multi-jurisdictional or special district level approaches could address this constraint. Discussions with municipalities outside the City of Ashland were outside the scope of this project. Importantly, the City of Turner and Marion County are exploring the feasibility of projects like this now.

Assessment 2: Impervious Surface Analysis

Second, the CSC team identified the 2007 Ashland Watershed Assessment's analysis of impervious surface coverage of inter-city drainages as a resource to identify portions of the city that have increased risk of localized flooding and that contribute to the severity and occurrence of water channel overtopping and

downstream flooding.¹⁶ The Ashland Watershed Assessment identified 25 drainages within the Ashland Watershed and notes that:

It is essential to design the storm drain system for this increased runoff to avoid excessive erosion and local flooding. As previously discussed in the peak flow discussion, the smaller streams in the City would be more vulnerable to short-duration, high-intensity rain events than the larger streams. However, since the associated drainages are relatively small, the higher flow volume should be manageable. The use of retention ponds can help reduce the risk associated with these events (Chapter IV page 9-10).

It is important to note that from a water quality perspective, a distinction needs to be made between “connected” impervious area (also referred to as “effective impervious area”) and “disconnected” impervious area. Effective impervious areas collect and convey stormwater directly to receiving streams, often resulting in negative impacts to water quality, quantity, temperature, etc. Furthermore, effective impervious areas can increase erosion, sedimentation, and flooding. Conversely, disconnected impervious areas often have little to no impact on watershed health, particularly where they discharge onto vegetated areas with porous soils.¹⁷ While this is the case from a water quality perspective, from a hazards mitigation perspective, even disconnected impervious areas can be a concern. For example, in sloped areas with significant landslide potential, disconnected impervious surfaces may imperil downslope developments. The Oregon Department of Geology and Mineral Industries recommends, “control[ing] stormwater so it flows away from steep slopes and into storm drains or natural drainages . . .”¹⁸ Generally speaking, any reductions in impervious surface can result in water quality and risk reduction co-benefits. In all cases, communities must carefully consider the tension and trade-offs that exist between density/urbanization, hazard risk reduction, environmental quality goals.

With respect to this assessment, the Ashland Watershed Assessment does not differentiate between effective and disconnected impervious surface coverage. The study does present an assessment of aggregate impervious surface at a sub-watershed (drainage) scale. Table 4 below presents the results of the Ashland Watershed Assessment. The highlighted drainages in the table have impervious surface coverage greater than 25 percent. Note that the original report highlighted these drainages for emphasis only, as we do here.

Also of note is that past floods, including the most recent flash flood event in July of 2015, have most heavily impacted development along Ashland Creek (Ashland Creek Drainage). As a percent of total cover, impervious surfaces in the Lower Ashland Creek, West Fork Ashland Creek, and East Fork Ashland Creek drainages are low. This is due to a combination of drainage size relative to developed area

¹⁶ Bear Creek Watershed Council (2007). “Ashland Watershed Assessment and Action Plan.” Accessed July 7, 2017 at <http://www.rogueriverwc.org/wp-content/uploads/2015/05/Ashland-Watershed-Assessment-part-1.pdf>

¹⁷ Condon, Patrick. *Seven Rules for Sustainable Communities: Design Strategies for the Post-Carbon World*. Island Press. 2010.

¹⁸ Oregon Geology Fact Sheet (2010), “Understanding Landslide Deposit Maps.” Oregon Department of Geology and Mineral Industries. <http://www.oregongeology.org/pubs/fs/landslide-inv-factsheet.pdf>

and, in the case of the West and East fork drainages, the fact that both drainages are located outside the Ashland City Limit with little existing development.

Table 4: Ashland Watershed Assessment Drainage Impervious Surfaces

	Drainage	Total Acres	Impervious Surfaces			Total %
			Street	Buildings	Other	
1	Wagner-Wrights S End	981.3	1.16%	1.18%	1.43%	3.78%
2	Wrights Ck	2067.8	0.72%	0.64%	0.42%	1.78%
3	Wrights-Ashland	495.3	10.65%	12.38%	8.48%	31.51%
4	Lower Ashland Ck	3776.8	1.73%	1.56%	1.13%	4.42%
7	Ash-Clear	39.9	3.50%	6.17%	1.90%	11.58%
8	Clear Ck	127.5	13.62%	16.68%	15.61%	45.92%
9	Clear-Mountain	22.6	0.84%	1.38%	0.65%	2.87%
10	Mountain	400.4	15.70%	15.81%	9.71%	41.23%
11	Beach	359.2	8.53%	10.22%	10.23%	28.98%
12	Beach-Roca	69.8	8.45%	12.41%	12.00%	32.86%
13	Roca	369.1	6.62%	8.16%	8.39%	23.17%
14	Paradise	587.8	5.86%	7.18%	7.52%	20.56%
15	Pardise-Cemetery	110.4	3.75%	5.02%	8.13%	16.89%
16	Cemetery	424.8	8.72%	11.64%	8.31%	28.67%
17	Cemetery-Clay	20.3	1.72%	1.47%	2.22%	5.41%
18	Clay	953.2	2.40%	3.49%	2.45%	8.35%
19	Clay-Hamilton	58.7	8.33%	6.21%	4.74%	19.28%
20	Hamilton	539.5	6.17%	6.86%	7.90%	20.93%
21	Hamilton-Neil	29.6	3.47%	1.61%	0.51%	5.58%
22	Lower Neil Ck	1482.5	4.42%	3.34%	3.07%	10.84%
23	Tolman Ck	1702.2	0.23%	0.23%	0.04%	0.50%
24	Clayton Ck	2146.4	0.00%	0.09%	20.84%	20.92%
25	Upper Neil Ck	8240.2	0.00%	0.10%	0.00%	0.10%

Source: Ashland Watershed Assessment Chapter IV, page 11 Table IV-6, 2007

Significantly, a 1994 study by Ludwa recommends that watersheds in the Pacific Northwest should limit impervious surface cover to not more than 10%.¹⁹ Prominent researchers in the watershed health space, such as Dr. Patrick Condon of UBC and Horner, et. al.,²⁰ also cite the 10 percent impervious surface goal as being critical to watershed health and particularly the health of fish stocks. Condon goes on to acknowledge that to achieve a 10 percent impervious surface goal, “would result in a maximum density of about one dwelling unit per two acres or less.”²¹ Given Oregon’s land use laws (which promote density within urban areas), as well as the existing development pattern in Ashland, achieving such impervious surface targets could prove difficult to achieve. However, placed in the larger context of the watershed, including unincorporated lands outside of designated

¹⁹ Ludwa, K. A. 1994. Urbanization Effects on Palustrine Wetlands: Empirical Water Quality Models and Development of a Macroinvertebrate Community-Based Biological Index. M.S.C.E. thesis, University of Washington, Department of Civil Engineering, Environmental Engineering and Science Program, Seattle, WA.

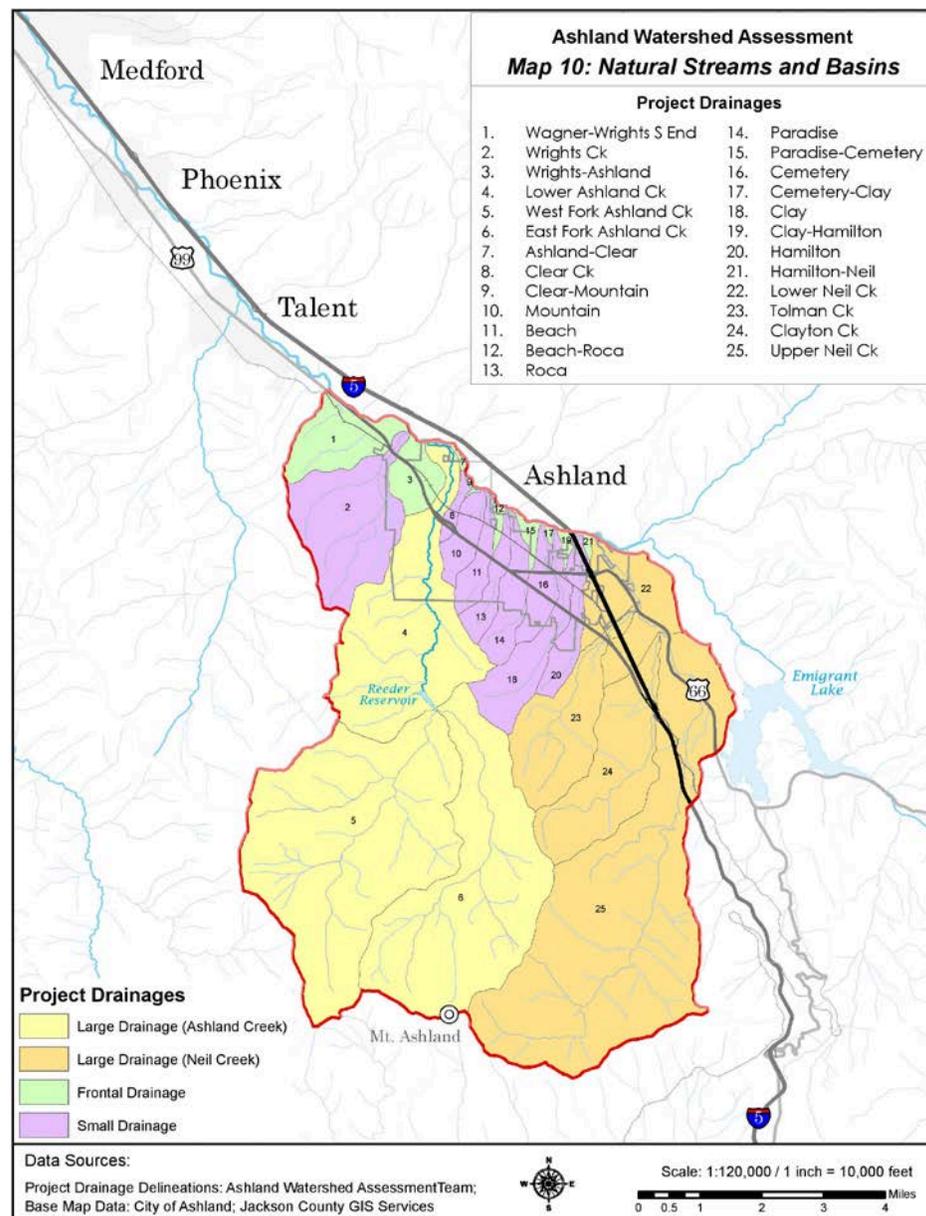
²⁰ Horner, Richard, et. al. “The Effects of Watershed Development on Water Quality and Soils.” *Wetlands and Urbanization: Implications for the Future*. Ed. Amanda Lewis. Lewis Publishers, 2001. 237-253.

²¹ Ibid.

Urban Growth Boundaries, aggregate densities of less than one dwelling unit per acre may already be in place.

To be clear, this study does not assess the feasibility of reaching a 10 percent impervious surface target in Ashland or within the greater watershed. Instead, the focus is on identifying GI/LID informed strategies to mitigate the flood and other hazard. Thus, the focus here is on reduction of impervious surface, particularly in areas with documented incidents of high (in this case over 25 percent) impervious cover. While this data is now 10 years old, it nonetheless identifies areas of Ashland where impervious surface reduction strategies may be appropriate. Substantial changes in impervious coverage is unlikely as Ashland population has been largely stable over the past decade. Infill and housing development may have increased impervious surface coverage in some portions of Ashland.

Figure 7: Ashland Watershed Assessment Map 10: Natural Streams and Basins



Source: Ashland Watershed Assessment, Map 10: Natural Streams and Basins, page 237, 2007

We utilized the DOGAMI impervious surface layer to compare the findings of the Ashland Watershed Assessment against current conditions. This analysis confirmed that there is substantial public and private impervious surface, especially within the previously called out drainages. The ability to reduce the impact of impervious surface coverage from buildings is limited to costly LID retrofit approaches such as gray and green roof treatments. However, there is also substantial impervious surface coverage from streets and parking lots. Both streets and parking lots are suitable for many types of LID retrofit projects that can increase stormwater infiltration, reduce runoff, and decrease sedimentation of streams and channels.

Ashland provided tax parcel data that showed that parking lot and street impervious surface coverage can be further divided into private and public property. Within the city right of way along street corridors, there are opportunities to incorporate LID best management practices when performing regular street maintenance or as part of concerted “green streets” program to minimize and mitigate the effects of impervious surfaces. Within private property, there may be opportunities to utilize an incentive based program to encourage property owners to retrofit LID best management practices.

APPENDIX D: ORDINANCE REVIEW

The CSC team reviewed the Ashland Municipal Code (AMC) to identify existing support and barriers to achieving natural hazard mitigation goals with GI/LID approaches. Ashland's Municipal Code (AMC) regulates development and land use at the site, neighborhood, and city-wide scale for public safety and welfare. Within the scope of natural hazard management, the AMC guides development and design standards to protect residents and developments from natural hazards, while preserving and protecting community, cultural, and environmental assets.

This ordinance review sought to first identify how natural hazard mitigation is addressed in the city's regulatory framework, and second to identify specific, existing tools for implementing green infrastructure and low impact development projects in the code.

The AMC includes both natural hazard and GI/LID design and development standards in the code's regulatory framework. These code sections often internally cross-reference natural hazard management and GI or LID design standards. For example, the Croman Mill District's Green Development Standard at AMC 8.3.2.060.C(1) regulates for conservation and preservation of water quality, natural hydrology and habitat, and biodiversity through stream and wetland protection. These development standards are to be applied in addition to natural hazard management standards under the AMC 18.3.11 Water Resources Overlay, in applicable areas.

Main Findings

In reviewing the code, it is evident that Ashland has completed substantial work to support the use of low impact development for new developments. This is especially evident in the ordinance sections that guide development standards for Ashland's special neighborhood districts. However, all code standards are only applied to new developments, and cannot be applied retroactively to existing developments. Since Ashland has already developed most of the land within the Urban Growth Boundary, the recommended NHMP action items are to be applied to retrofits, or to areas where development is already prohibited.

Community Rating System

Based on Ashland's significant integration of stormwater and flood management in its municipal code, it is likely that they could qualify for an improved rating under the Community Rating System (CRS) of the National Flood Insurance Program. The CRS rating directly correlates to property owners' flood insurance premium discounts under the NFIP. As of 2016, Ashland's CRS rating class was 7 out of 10, which correlates to a 15% discount for property owners who purchase flood insurance. The CRS premium discounts and class scores are depicted in Table 5, below.

Table 5: National Flood Insurance Community Rating System Premium Discount Rates.

Class	Discount	Class	Discount
1	45%	6	20%
2	40%	7	15%
3	35%	8	10%
4	30%	9	5%
5	25%	10	-

Source: FEMA, NFIP Flood Insurance Manual; Community Rating System Communities, Nov. 1, 2015.

According to the Federal Emergency Management Agency (FEMA), the CRS rewards a community-centered approach to reducing flood hazards that also protect natural and beneficial functions of a community’s floodplain lands.²² FEMA awards CRS credits on over 90 elements of comprehensive floodplain and watershed management actions implemented by communities. (FEMA, 2015). Based on the AMC sections highlighted above, it is likely that Ashland could receive additional CRS points as outlined in EPA’s *Get Flood Insurance Discounts with Low Impact Development, Open Space Protection Plans, and Stormwater Management Regulations* (2015) guide for open space preservation, natural channel protection, and stormwater management regulations.

To qualify, the CSC team recommend Ashland include a review of existing and ongoing natural hazard mitigation programs that incorporate nature-based solutions for floodplain and watershed management in the 2017 NHMP update to be used to improve the city’s CRS rating, and provide an improved flood insurance premium discount to NFIP insurance policyholders.

Natural Hazard Mitigation and the Ashland Municipal Code

Natural hazard mitigation is incorporated in the AMC primarily through building, zoning, and overlay zones. The following list highlights existing sections in the AMC that focus or include a natural hazard management element.

Buildings and Construction (AMC Title 15)

There are two sections in the AMC’s Building and Construction Section (Title 15) that address natural hazard management; Section 15.10 - Flood Damage Prevention Regulations, and Section 15.28 Fire Prevention Code.

Flood Damage Prevention Regulations (15.10)

Section 15.10 is comprised of three subsections that require: general standards for all areas classified for flood hazards; specific standards for flood hazard areas where elevation data has established the area to be a “Special Flood Hazard” area and; flood-ways. These sub-sections describe siting and permitting standards for

²² Federal Insurance and Mitigation Administration 2015 Fact Sheet; The Community Rating System works to Protect Natural Floodplains (2015). Accessed July 19, 2017 at <https://www.fema.gov/media-library/assets/documents/115715>

new developments. Regulated areas include: anchoring building foundations, construction materials and methods, subdivision proposals, critical facility standards, and restrictions on encroachment and fill in flood-ways.

Fire Prevention Code (15.28)

This section authorizes the Ashland Fire Chief to, at her/his discretion to restrict activities and land use during the fire season. The section does not issue regulations on buildings to mitigate wildfire risk exposure.

Physical and Environmental Constraints overlay (AMC 18.3.10)

The Physical and Environmental Constraints Overlay Chapter is a zoning tool used by the City to identify and regulate areas that are sensitive to, or have a high exposure to natural hazard risks based on “physiographic conditions.” AMC 18.3.10.010. The sub-sections under this Chapter are applied to new residential and non-residential developments, qualifying retrofits, and land uses/activities. The Chapter does not retroactively apply to dwellings or buildings built in hazardous areas prior to the section’s adoption into the AMC. This Chapter regulates land use, new development, and activities including: alteration of land; any activity located in the special flood hazard area; and tree removal in the flood plain corridor. AMC 18.3.10.020. The Chapter also establishes development and design standards for areas exposed to flood, landslide, and wildfire hazards. Finally, this Chapter includes regulations for density transfers, which allows density to be transferred out of areas found to be unbuildable to buildable areas. AMC 18.3.10.120.

Flood Plain Corridor Lands (18.3.10.080)

Building and development in flood plain corridors are subject to constraints in Section 18.3.10.080. The code does not prohibit development in flood plain corridors, but dictates where and to what extent development can occur. For example, the code states that “to the maximum extent feasible, structures shall be placed on other than Flood Plain Corridor Lands.” AMC 18.3.10.080.E.

Hillside Lands (18.3.10.090)

For Hillside lands, the code requires applicants to review risk of hazards on property, and take all reasonable steps to reduce the adverse impacts of development to environment. AMC 18.3.10.090. The Hillside land classification cover lands that are subject to damage from erosion and slope failure. Development standards include: structure placement; elevation of residential structures; local streets and utilities; and building design. Subdivisions in the hillside land constraint overlay must conduct a geotechnical study. The code includes provisions to control hillside erosion, such as re-vegetation requirements, surface and groundwater drainage, and tree conservation, protection, and removal standards. AMC 18.3.10.090.B

Wildfire Lands (18.3.10.100)

Development standards for Wildfire Lands fall into two categories: (1) requirements for subdivisions, and (2) requirements for construction of all structures. AMC 18. 18.3.10.100. Subdivision developments require a Fire

Prevention and Control Plan to be submitted with applications to subdivide or partition land. The plan largely requires an analysis and mapping of known fire hazards affecting the property. Additional development standards for construction of all structures includes fuel break and building material requirements as found in Section 18.3.10.100.B.

Severe Constraint Lands (18.3.10.110)

Land uses and developments are heavily restricted in this constraint zone. New development or qualifying retrofit development are required to comply with development restrictions in this sub-section. New developments and retrofits must complete an engineering geological study, and receive approval from the Public Works and Planning Director to establish that the constrained site is stable for the proposed use or development.

Water Resources Protection Zones (Overlays) (18.3.11)

This Section is comprised of a set of regulations to ensure federal environmental standards, and Oregon environmental and hazard management standards under the Statewide Planning Goals 6 (Air, Water, and Land Quality Resources) and 7 (Natural Disasters) are met in Ashland's identified water resource areas. The section largely enforces environmental protection standards for development, land use, and activities in the identified water resources overlay zone. The Section accomplishes this by establishing floodplain and riparian corridor buffer requirements around surface water resources, and limiting development in these areas. AMC 18.3.11.040.

The Water Resources Protection Zone does not explicitly regulate for natural hazards. Rather, flood hazards (only) are addressed in the "Purpose" sub-section, at AMC 18.3.11.010(C), (E), (F). This sub-section states that the purpose and intent of the Chapter includes "reduc[ing] flood damage and potential loss of life in areas subject to periodic flooding." AMC 18.3.11.010(F). Thus, Chapter regulations help mitigate risk from flood hazards with tools such as buffers, setbacks, and building standards.

GI/LID and the Ashland Municipal Code

Support for GI/LID best management practices are found in several Ashland's Municipal Code sections. Expanded on below, AMC Chapters that use nature-based solutions to mitigate natural hazards largely focused on the connection between flood risk and stormwater management. The following sections include LID or GI strategies for environmental quality management or hazard mitigation purposes, and are also subject to the natural hazard mitigation code sections, listed above.

Special Districts and Overlay Zones (18.3)

Croman Mill District (18.3.2)

The Croman Mill District plan and map was adopted in 2010 by Ashland City Council, but remained undeveloped at the time of this review. The intent and goal of the district is to provide a mixed employment, recreational, and residential environment. Additionally, the District provides for preservation of "significant

open spaces, while minimizing the impact on natural resources through site and building design.” AMC 18.3.2.010. The District established “Green Development Standards” for streets, parking lots, and new buildings. These development standards appear to incorporate LID strategies to mitigate the impact of development on natural systems. Below, are sections of this District’s development and design standards that incorporate, or could easily incorporate LID principles.

Green Development Standards in Croman Mill District

The district code includes landscaping design requirements that includes some LID landscaping techniques. For example, developments are required to “utilize a variety of low water use deciduous and evergreen trees, shrubs, and flowering plant species. . .” to improve water conservation. AMC 18.3.2.060.B.9(b). Additionally, the district’s open space policy for the Croman Mill Central Park calls for “[l]andscaped swales for capture and treat runoff.” AMC 18.3.2.060.B.16(h).

The Croman Mill district code also provides a list of Green Development Standards to manage “stormwater... and conserving natural areas.” AMC 18.3.2.060.C. These design standards are required to be met by developers, and can only be adjusted through a minor amendment (in accordance with AMC 18.3.2.030.B). This ensures that the Green Development Standards will be largely applied to new development and major renovations to structures in the district.

The Green Design Standards required include:

- AMC 18.3.2.060.C(1) - conservation and preservation of water quality, natural hydrology and habitat, and biodiversity through stream and wetland protection. This section sets additional standards to the 18.3.11 Water Resources Overlay zone.
- AMC 18.3.2.060.C(3) – requiring new streets to “be developed to capture and treat stormwater in a manner consistent with the Croman Mill District Stormwater Management Plan map, the Ashland Stormwater Master Plan and Green Streets Standards.”
- AMC 18.3.2.060.C(4) – explaining that “development shall minimize the adverse environmental and microclimate impacts of parking lots” by developing up to 25% of the project area to be used surface parking-lot; and requiring parking areas to conform to *Parking, Access and Circulation* (AMC 18.4.3) and *Landscaping, Lighting and Screening* (18.4.4) chapters of the AMC.
- AMC 18.3.2.060.C(5) – stating that development shall “reduce the public infrastructure costs and adverse environmental effects of stormwater runoff by managing runoff from building roofs, driveways, parking areas, sidewalks, and other hard surfaces through. . . Design grading and site plans to capture and slow runoff. Use porous solid surfaces [for infiltration]. Direct discharge of stormwater runoff into designated street. . . Retain rainfall on-site through infiltration, evapotranspiration to through capture and reuse techniques.” AMC 18.3.2.060.C(5)(a)-(d)
- AMC 18.3.2.060.C(7) – requiring construction activity to minimize erosion and sediment pollution by submitting an erosion and sediment control plan with final engineering for public improvements and building permits.

- AMC 18.3.2.060.C(8) – requiring development plans to include water-efficient landscape irrigation design that significantly reduces the use of potable water for irrigation.

Normal Neighborhood District (18.3.4)

Development in the district applies “principles of low impact development to minimize the extent and initial cost of new infrastructure and to promote the benefits of storm water management.” AMC 18.3.4.010. The district also provides for preservation of “open spaces, stream corridors, wetlands, and other significant natural features.” *Id.* The regulations appear to provide general statement of intent for the application of LID projects in district boundaries. This flexibility allows the city and private land owners to develop and adopt LID projects suitable for their neighborhood’s environmental needs and hazard risk level.

Low Impact Development Standards in Normal Neighborhood District

In Section 18.3.4.060.A.2 the district calls for storm water management standards in the district to use “street trees, green streets, and other green infrastructure to manage storm water, protect water quality and improve watershed health.” This standard provides opportunities for LID projects to occur in stormwater management practices in the district. Specifically, in Section 18.3.4.060.B.4, the district code requires the development projects in the district to manage for flood hazards from storm water run-off from roofs, driveways, sidewalks, and other hard surfaces. Section 18.3.4.060(B)(4)(d) lists development standards for storm water management in this district, and includes a range of low impact development techniques to localize capture, treatment, or reuse of stormwater.

Additionally, in Section 18.3.4.060.B.3, the district provides for conservation of natural areas that “preserve water quality, natural hydrology and habitat, and preserve biodiversity through protection of streams and wetlands.” This conservation requirement can encourage the use of green infrastructure to control for natural hazards in natural areas.

North Mountain Neighborhood (18.3.5)

Portions of North Mountain District are in the Bear Creek Flood Plain, and has experienced limited growth due to lack of service by public facilities. The City established this district to provide site development and design constraints, and to direct funding for constructing or improving public facilities servicing the area. Additionally, the code calls for property dedication for the North Mountain/Bear Creek Greenway, a protected park area that was zoned, based on the impacts of planned development in the district. Section 18.3.5.100.C includes street types and design standards that limit the impact of street development on the Bear Creek Floodplain.

Site Development and Design Standards (18.4)

Parking, Access, Circulation (18.4.3)

Ashland’s code includes design standards in this code section to minimize the environmental and micro-climate impacts of parking lots with 50 or more spaces. AMC 18.4.3.080(B)(5). Developers must seek design approval for larger lots, and

include a combination of low impact development strategies to mitigate environmental and micro-climate impacts, including: using light colored pavement for solar reflectance, use porous surfacing on at least 50% of the parking surface area, provide 50% shade from tree canopy trellis structures, etc. over parking area, or; design lot area to “capture [] and treat [] runoff with landscaped medians and swales” (AMC 18.4.3.080(B)(5)(b)). AMC 18.4.3.080(B)(5).

Landscaping, Lighting, and Screening (18.4.4)

This section includes regulations for residential, commercial, and manufacturing developments that are subject to a Site Design Review (18.5.2). Landscaping regulations guide property owners to use plants that are appropriate for the “local climate, exposure, and water availability.” AMC 18.4.4.030(C)(2). For example, landscape plans occurring on hillside lands must conform to the Physical Environmental Constraint Overlay’s requirements for hillside stabilizing vegetation. AMC 18.4.4.030(C)(4). Additionally, non-residential properties must apply LID Best Management Practices to use Water Conserving Landscaping (AMC 18.4.4.030(I)) for drought mitigation. AMC 18.4.4.030(C)(3).

Landscaping requirements also regulate for canopy coverage over streets and parking lots. AMC 18.4.4.030(F). These requirements are for both aesthetic and environmental quality purposes. AMC 18.4.4.010.

Public Facilities (18.4.6)

Street Design Standards (18.4.6.040)

This section integrates some water-based LID management practices into the new development or retrofit of streets and sidewalks in Ashland. Section 18.4.6.040(A)(2) describes the intent of these street design standards, and includes the assumption that all streets have parkrows and sidewalks on both sides, which will be landscaped. Additionally, specific considerations must be included into the street layout and design process under 18.4.6.040(B). For example, streets must be designed with specificity to their locations, and must include consideration of the natural features of the area, such as slope, mature trees, creeks, wetlands, etc. 18.4.6.040(B)(1)(e). The code is not explicit about the desired outcome of including this into the street design consideration, but it is important that the code requires any consideration as to the effects of impervious surface developments on adjacent sensitive environments.

This section also requires minimization of pavement areas for neighborhood street, to “reduce street and maintenance costs, storm water runoff, and negative environmental impacts.” 18.4.6.040(D)(12). Further, the section has a “peak run-off” requirements, that states, “use the local street system and its infrastructure to reduce peak storm water run-off into the city’s storm drain system and natural water ways.” 18.4.6.040(D)(13). This design principle does not explicitly call for LID tools, such as infiltration swales, but does provide the framework for city planners, architects, and public works officials to incorporate LID tools to mitigate flood risk by managing water conveyance from impervious areas.

This section also regulates to minimize impacts to hillside land natural areas by minimizing the use of cut and fill slopes. AMC 18.4.6.040(I). The approval of streets

in hillside lands must conform to the Physical and Environmental Constraints Overlay requirements (AMC 18.3.10). AMC 18.4.6.040(l)(1).

APPENDIX E: ECOSYSTEM SERVICE EVALUATION

According to the Environmental Protection Agency (EPA), ecosystem services produce many life-sustaining benefits we receive from nature — clean air and water, fertile soil for crop production, pollination, and flood control to name only a few.²³ An ecosystem is a dynamic network of plant, animal, and microorganism communities and the nonliving environment interacting as a functional unit, and ecosystem services are the benefits people obtain from ecosystems.²⁴ Urbanization and development often decreases the ability of these ecosystem services to mitigate risks from natural hazard. For instance, impervious surfaces can decrease stormwater infiltration, reducing groundwater recharge, and increase runoff exacerbating sedimentation and the rate and severity of both localized and downstream flooding. However, green infrastructure and low impact design approaches can protect, support and strengthen these services and their natural hazard mitigation benefits in Ashland and other communities.²⁵

Traditionally, many ecosystem services have been taken for granted and many were not appropriately understood or valued. However, this has changed significantly in recent years. In 2013, FEMA became the first federal agency to adopt a major policy change that recognizes ecosystem services in benefit-cost analysis (BCA).²⁶ Further, in 2015, FEMA expanded its consideration of ecosystem services in BCA from just flood acquisition projects to include flood, fire, and drought related projects that address climate change.²⁷ Table 6 presents updated ecosystem service values that can be used to complete FEMA’s benefit cost analysis.²⁸

²³ Ecosystem Services. The Environmental Protection Agency (EPA). Accessed July 13, 2017 at <https://www.epa.gov/eco-research/ecosystem-services>

²⁴ Ecosystem Services, The National Wildlife Federation. Accessed June 4, 2017, at <https://www.nwf.org/Wildlife/Wildlife-Conservation/Ecosystem-Services.aspx>.

²⁵ Millennium Ecosystem Assessment. Accessed June 4, 2017 at <http://www.millenniumassessment.org/en/index.html>

²⁶ FEMA Takes on Climate Change – By Funding Restoration. Earth Economics. Accessed July 13, 2017, at <http://www.eartheconomics.org/latest-news-blog/2016/8/29/fema-takes-on-climate-change-by-funding-restoration>

²⁷ Benefit-Cost Analysis Tools for Drought, Ecosystem Services, and Post-Wildfire Mitigation for Hazard Mitigation Assistance. Federal Emergency Management Agency (FEMA). Accessed July 13, 2017

²⁸ FEMA. FY 2017 Mitigation Grant Application Cycle - Lessons Learned and Best Practices for Application Development. August, 2017. <https://www.fema.gov/media-library/assets/documents/133770>

Table 6: Ecosystem Service Benefit Values

Updated Ecosystem Service Matrix (USD 2014 per acre per year)					
Ecosystem Service	Green Open Space	Riparian	Forest	Wetland	Marine & Estuary
Aesthetic Value	\$1,707	\$612		\$3,640	
Air Quality	\$215	\$226			
Biological Control		\$173			
Climate Regulation	\$61	\$81	\$153	\$136	\$63
Erosion Control	\$68	\$12,042			
Flood Hazard Reduction		\$4,215	\$321		
Food Provisioning		\$641			
Habitat		\$878			\$1,214
Nutrient Cycling				\$536	\$522
Pollination	\$305				
Recreation/Tourism	\$5,644	\$15,967			
Stormwater Retention	\$308				
Water Filtration		\$4,473		\$1,406	
Water Supply		\$237	\$80	\$292	
Total Annual Value	\$8,308	\$39,535	\$554	\$6,010	\$1,799

Source: FEMA Hazard Mitigation Assistance – NTR Webinar.

Increased understanding and utilization of ecosystem services are based in extensive scientific study and documented in peer reviewed scientific literature. Ecosystem services are often grouped into four primary categories:²⁹

- Provisioning services
 - Provide materials for humans to use.
- Regulating services
 - Preserve and maintain ecosystem benefits (e.g. water quality).
- Cultural services
 - Consist of recreational, aesthetic, and spiritual benefits; and
- Supporting services
 - Involve ecological processes which make other services possible (e.g. nutrient cycling, soil formation).

The CSC team first applied the lens of natural hazard mitigation to a broad set of ecosystem services across these four major categories. The goal was to identify ecosystem services with significant natural hazard risk reduction benefits. For example, nutrient cycling is a critical ecosystem service for ecological health, but it provides little direct natural hazard mitigation. On the other hand, floodwater storage is an important ecosystem service that also provides a clear natural hazard risk reduction benefit.

The CSC team identified the following ecosystem services with natural hazard risk reduction benefits. For each of these ecosystem services, the service and its risk reduction is described, the general location of the service in the Ashland watershed is identified, and LID and GI techniques that support the service are listed. The CSC team identified the following ecosystem services in Ashland by service category:

²⁹ Ecosystem Services. The Economics of Ecosystems and Biodiversity (TEEB). Accessed July 13, 2017. <http://www.teebweb.org/resources/ecosystem-services/>

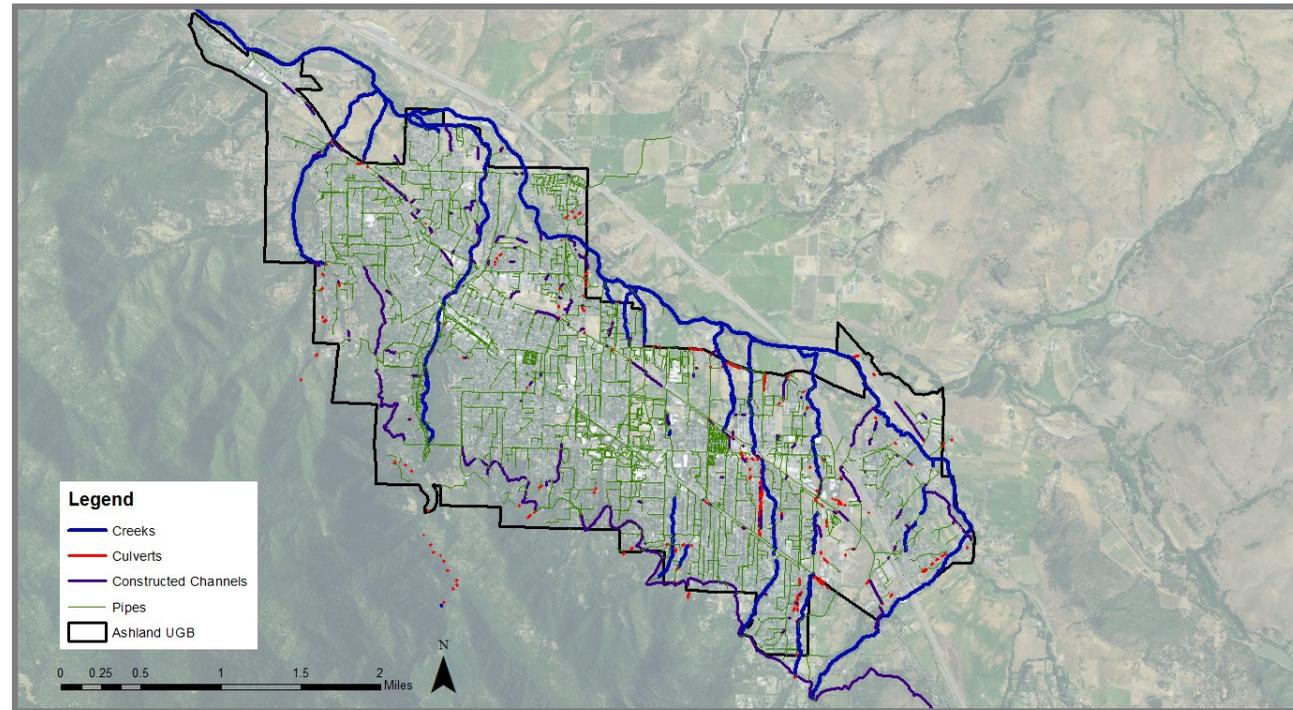
- Provisioning Services
 - Stormwater infiltration
 - Freshwater provisioning
- Regulating Services
 - Surface water conveyance
 - Sediment retention
 - Floodwater storage
 - Wildfire resilience
 - Steel slope stability
- Cultural Services
 - Cultural and livability services
- Supporting Services
 - None applicable

The results of this ecosystem service evaluation showed that the largest natural hazard mitigation benefits provided by ecosystem services are a reduction in the occurrence and severity of localized and downstream flooding. In general, a minimization of impervious surfaces and enhancement of landscapes with flood storage potential were found to have the greatest natural hazard risk reduction potential. The following ecosystem service summaries present the individual ecosystem service finding for Ashland.

SURFACE WATER CONVEYANCE

In nature, surface water moves along a network of waterways: brooks, creeks, streams, and rivers. Generally speaking, these systems consist of a channel, banks, a flood way, and a flood plain. Water from rain events, snow and ice melt, and natural springs is collected and conveyed naturally according to the laws of hydrodynamics. Without human intervention, these systems can work to efficiently move water across the landscape. In addition, natural water conveyance systems provide additional ecosystem service benefits such as improved water quality, sediment conveyance, floodwater storage, and habitat.

Increasing attention has been turned to placing all water conveyance decisions within a watershed context as localized flood control measures, such as concrete channelization in a neighborhood, can result in increased flood risk downstream.



TAKEAWAY

Ashland is a hillside community located in the upper portion of the Ashland Creek Watershed. Numerous first to third order streams convey water from above, and through, Ashland to Bear Creek at the base of the watershed. LID techniques may be used to mitigate localized flooding within the city, while GI approaches along Bear Creek would have greater flood reduction benefits to downstream communities.

NHMP Benefits

Surface water conveyance can help to mitigate the number and severity of localized and downstream flood events.

- Minimizing and slowing overland stormwater flow by supporting soil and vegetation infiltration and roughness reduces the speed and rate of stormwater delivered to waterways and stormwater infrastructure.
- Decreasing the amount of runoff that reaches streams can keep stream flow rates within the stream channels conveyance capacity and prevent downstream flood events.
- Waterways are more resilient alternatives to hardened infrastructure such as pipes and culverts that are more susceptible to failure during flood and earthquake events.

GI/LID Best Management

Reducing the watershed's susceptibility to flood events is goal of GI and LID best management practices for water conveyance.

- Urban stream daylighting, the practice of uncovering some or all of a previously covered waterway, can increase the watershed's resilience to flood events.
- Channel stabilization, channel enlargement, bank protection, and river diversion techniques are GI approaches to preserving and enhancing stream channel conveyance.
- There are many LID tools for reducing urban impacts on water conveyance to reduce a stream channel's risk of flooding such as water conveyance swales, rain gardens, soakage trenches, vegetated rooftops, rain barrels, permeable pavement, and removal of impervious surfaces.

NHMP Actions

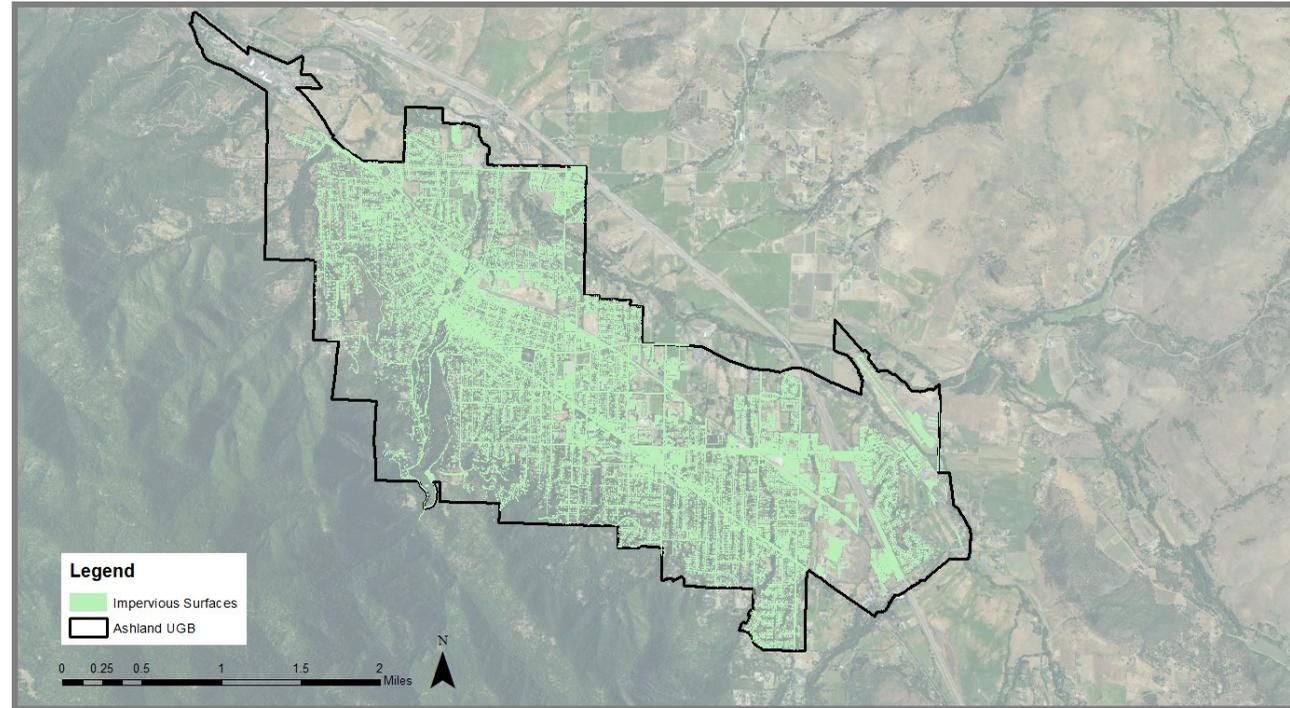
Possible NHMP action items to support the ecosystem service of surface water conveyance include:

- Increasing vegetation along stream channels to reduce sedimentation, mitigate bank erosion, and maintain channel width and conveyance capacity.
- Increase pervious surfaces and reduce impervious surfaces in areas of developed areas to reduce runoff and increase infiltration and absorption.
- Plan GI projects in concentrated conveyance areas to detain, or slow the flow of water into Bear Creek and Ashland Creek during periods of heavy precipitation and peak flow.

STORWATER INFILTRATION

In predevelopment conditions, a significant portion of precipitation is intercepted by vegetation and evaporated while the limited rainfall that does reach the ground can be absorbed by pervious soils. Without human caused soil compaction, impervious surface coverage, and reduction of vegetation, stormwater can infiltrate resulting in minimal surface runoff and increased groundwater recharge. Stormwater infiltration is important for sustaining a healthy water table that that sustains streamflow during summer and fall months and after periods of low precipitation. Infiltration further provides natural filtration that improves water quality.

While soil infiltration rates vary based on soil type and topography, in general human development decreases stormwater infiltration across a watershed due to an increase in impervious surfaces and compaction of porous soils.



TAKEAWAY

Ashland is a largely developed within its urban growth boundary (UGB) and there has been a significant reduction in infiltration resulting in an increased risk of flooding. GI and LID best management practices can be used to increase infiltration and reduce localized flooding within Ashland. A reduction in runoff that reaches Bear Creek will further help to mitigate the number and severity of downstream floods.

NHMP Benefits

Stormwater infiltration can help to mitigate the number and severity of localized and downstream flood events while also contributing to a sustained water supply during periods of drought.

- By infiltrating stormwater, overland flow is reduced and the speed and rate of stormwater delivered to waterways and stormwater infrastructure is minimized.
- A reduction in runoff above steep slopes can help to prevent the saturation of soils that is a primary factor in triggering landslides.
- Reducing overall runoff by increasing stormwater infiltration in a watershed can mitigate flash flooding during high volume rain events.

GI/LID Best Management

Reducing the watershed's susceptibility to flood events is goal of GI and LID best management practices for stormwater infiltration.

- Amended soils, urban trees, rain gardens, bioswales, stormwater planters, infiltration basins, and pervious pavers, pavement, and asphalt are all LID best management practices supporting stormwater infiltration.
- Wetland restoration, constructed wetlands, and dry and wet detention basins are all GI best management practices for supporting stormwater infiltration.
- To minimize the impact of development, new development can be required to maintain stormwater infiltration and not to increase the overland flow from the site.

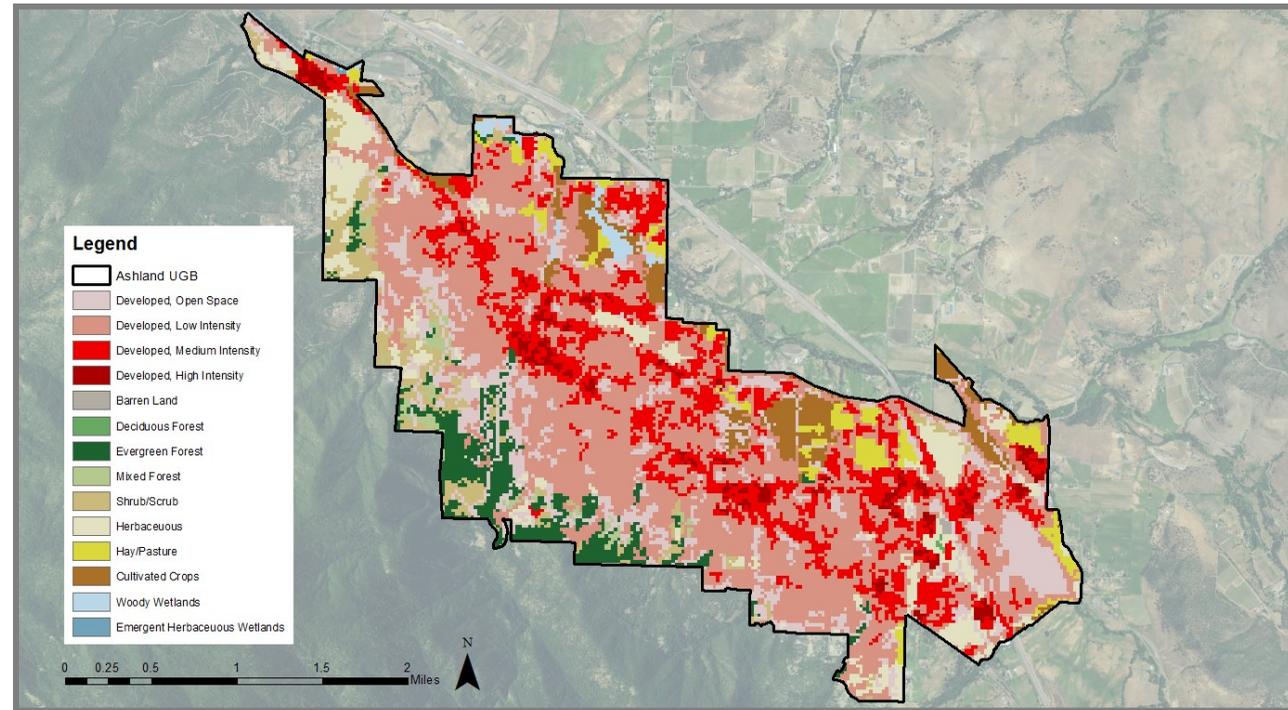
NHMP Actions

Possible NHMP action items to support the ecosystem service of stormwater infiltration include:

- The use of LID best management practices (BMPs) within the city right of way can reduce runoff from city streets and parking lots. Retrofitting LID BMPs can be accomplished during routine street maintenance or as part of a targeted "green streets" program.
- Incentives could be used to encourage private landowners to implement LID BMPs that increase stormwater infiltration.
- GI projects can be designed to increase infiltration and reduce stormwater runoff into Ashland and Bear Creek.

SEDIMENT RETENTION

In natural systems, sediment retention occurs via vegetated land and streambanks that control both the rate of sediment creation and slow surface water flow allowing sediment to settle out prior to entering stream channels. Development can disrupt these natural sediment retention systems by removing vegetative cover and increasing surface flow rates. This can lead to increased sediment deposition in stream channels that can accrue faster than it can be flushed down stream. Large amounts of sediment build up, or channel deposits, can cause stream channels to expand or branch away from the buildup, decreasing their water conveyance capacity and increasing channel flood risk. Similarly, increased sedimentation impacts the water quality of streams, lowering habit quality of stream segments. In addition, sediment that builds up behind dams can cause a dam breach during a flood event, aggregating the extent of flood damage.



TAKEAWAY

Ashland has a large number of surface water conveyance structures, both natural and built, that are susceptible to sedimentation that can increase flood risk. GI and LID best management practices can be used to decrease sediment creation and to prevent sediment from reaching the surface water conveyance structures. Maintaining sediment further protects stabilizing steep slope vegetation.

NHMP Benefits

Sediment retention can help to mitigate the number and severity of localized and downstream flood events.

- By minimizing the rate that sediment is created and deposited, the capacity of waterways to transport stormwater is maintained and the risk of flooding is not increased.
- Maintaining vegetative cover on steep slopes prevents the release of sediment in landslide events.
- Preventing the buildup of sediment behind dams maintains the dam capacity and mitigates flood effects and risks.
- Sediment accrual in hardened and piped water infrastructure decreases the stormwater infrastructure capacity and can contribute to localized flooding.

GI/LID Best Management

Reducing the watershed's susceptibility to flood events is goal of GI and LID best management practices for sediment retention.

- Soakage trenches, bioswales, vegetated filter strips, and tree protection and planting are all LID best management practices for increasing sediment retention by decreasing sediment creation and decreasing surface water flow rates allowing sediment to fall out prior to reaching surface water conveyance structures.
- Constructed wetlands, restored and connected floodplains, and vegetated stream buffers are all GI best management practices that can maximize sediment retention and protect water conveyance systems from sediment buildup.

NHMP Actions

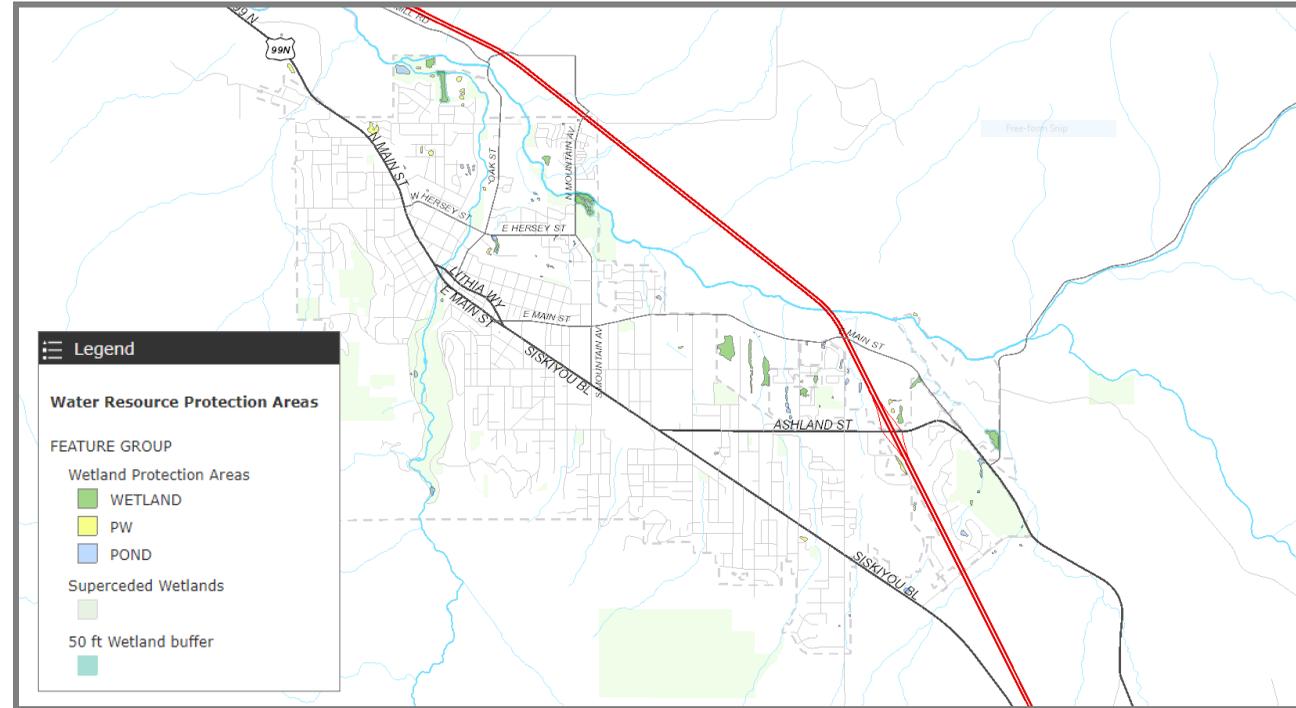
Possible NHMP action items to support the ecosystem service of sediment retention include:

- Continue support for the Ashland Forest All-Lands Restoration (AFAR) project that manages the upper Ashland Watershed for wildfire mitigation, steep slope stability, and sediment retention
- Increased development and maintenance of vegetative buffers along surface water conveyance channels can protect stream channels from sediment buildup.
- Bioretention facilities can be constructed alongside highly developed area to prevent sediment from reaching water conveyance systems.

FLOODWATER STORAGE

The capacity of the ecosystem to store water and the extent of riparian zones for retention of stormwater is a measure of floodwater storage. Floodwater storage occurs in all locations that retain stormwater, and the greatest floodwater ecosystem service is provided by wetlands, particularly floodplain wetlands. Wetlands and floodplains within and downstream of urban areas are an effective tools for capturing the increased volume and rate of surface water runoff and channeled water from upland impervious surfaces and buildings. Successful floodwater storage detains and retains floodwater slowly releasing it as the flood risk decreases.

Localized floodwater storage with dry and wet detention ponds can provide localized floodwater storage that can protect against localized flooding in developed areas.



TAKEAWAY

Ashland currently has two types of wetland protection zones: locally significant wetlands and other possible wetlands. These areas are currently protected by buffer zones. The largest wetland areas are located along Ashland Creek and Bear Creek. GI approaches such as wetland restoration and floodplain connections can expand Ashland's floodwater storage helping to protect downstream communities from flooding.

NHMP Benefits

Floodwater storage can help to mitigate the number and severity of localized and downstream flood events.

- Successful floodwater storage strategies protect urbanizing floodplains and mitigates localized flooding by absorbing rainfall and keeping water from burdening pipe networks or causing damage by pooling in streets or basements.
- Adequate floodwater storage allows for groundwater recharge and the overall regulation of water flows, reducing instances of flooding.
- Floodwater storage sites help to recharge groundwater and support year-round stream flow that protects against the effects of drought and contributes to healthy and more fire resistant vegetation.

GI/LID Best Management

Reducing the watershed's susceptibility to flood events is the goal of GI and LID best management practices for floodwater storage.

- Rain gardens, infiltration strips, bioswales, stormwater planters, and soakage trenches are all LID best management practices that can be applied at the site level to decrease stormwater runoff that reaches floodwater storages sites.
- Dry and wet detention ponds, constructed wetlands, floodplain benching, and restored and reconnected floodplains are all GI best management practices that can detain, retain, and slowly release floodwater.

NHMP Actions

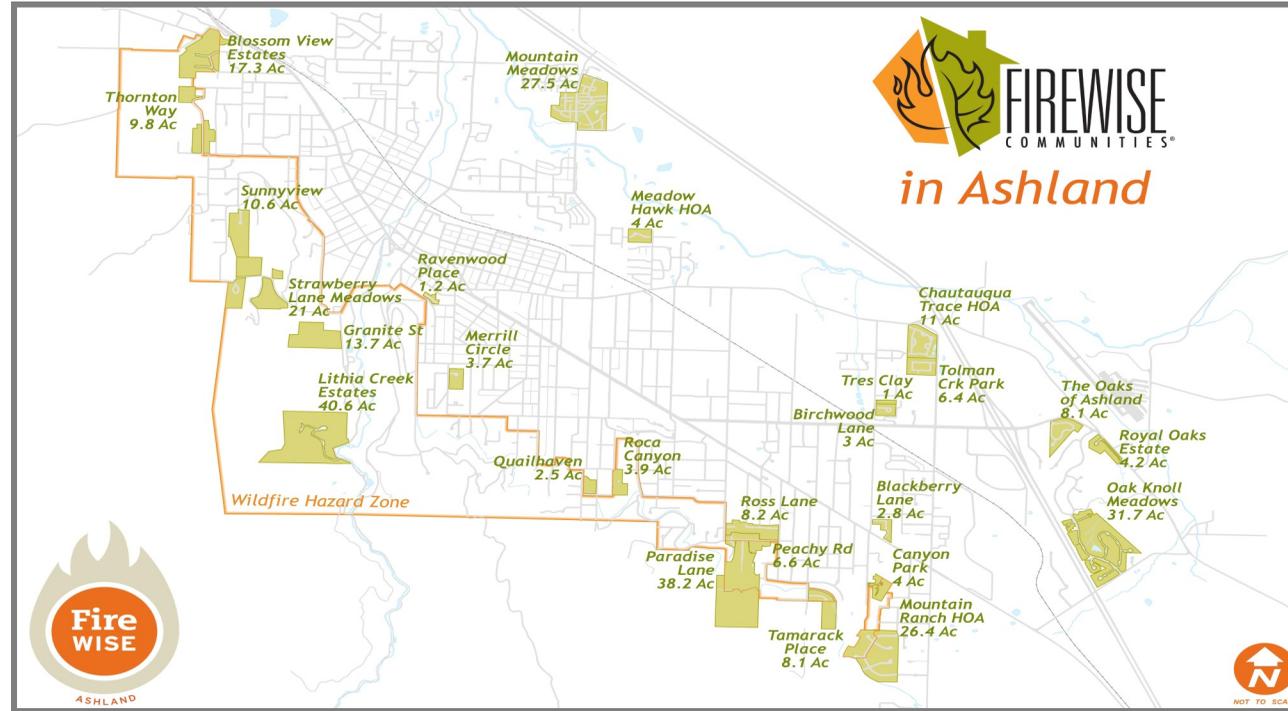
Possible NHMP action items to support the ecosystem service of floodwater storage include:

- Restored and constructed wetlands along Bear and Ashland Creek in the lower portions of the Ashland city limits can increase the floodwater storage capacity of the Ashland Watershed.
- Similarly, floodplain benching and restored and reconnected floodplains along Bear and Ashland Creek can also increase the floodwater storage capacity of the Ashland Watershed.

WILDFIRE RESILIENCE

Wildfire resilience is achieved through a healthy forest ecosystem, making a healthy forest a valuable ecosystem service. Fires are a normal occurrence in a healthy forest, leaving stronger, older, and healthier trees. Natural fire cycles support animal and plants that are adapted to, or even require, the effects of fire. The reduction of fire events due to fire suppression tactics has led to the accumulation of larger fuel loads from younger and less healthy trees, invasive and fire prone plants that can outcompete native wildfire resistant species, and vegetation that has been weakened or killed by invasive insects or drought.

Wildfire resilient communities help manage risk through the reduction of fire loads in the watershed, the selection of drought-tolerant and fire resistant vegetation, landscaping standards, and defensible space standards.



TAKEAWAY

Ashland has undertaken significant efforts to improve wildfire resilience of the watershed with the Ashland Forest All-Lands Restoration Project (AFAR) and with its 24 recognized Firewise Communities within the city limits. Continued expansion of Ashland's wildfire resilience can be accomplished with city wide utilization of Firewise standards, landscaping, and defensible space.

NHMP Benefits

Wildfire resilience can decrease the occurrence and severity of wildfire events and protects vegetation that stabilized steep slopes and decrease post fire sedimentation of water conveyance systems.

- The use of fire resistant vegetation and the creation of defensible space around structures can mitigate the damage to property from wildfire events.
- Managing the greater watershed to reduce the occurrence of large scale and severe wildfires by reducing the fuel load with strategic thinning and other active forest management techniques helps to prevent wildfires from encroaching on the Urban-Wildland Interface region of Ashland.

GI/LID Best Management

Decreasing watershed's susceptibility to fire is the goal of GI and LID best management practices for wildfire resilience.

- Wildfire resilience requires the participation of all, or the vast majority of land owners, to undertake creation of defensible space and planting of fire resistant landscaping as part of LID best management practices for increasing wildfire resilience.
- Active forest management techniques including thinning, fuel load reduction, and slope stabilization are GI best management practices for increasing wildfire resilience of the Ashland Watershed.

NHMP Actions

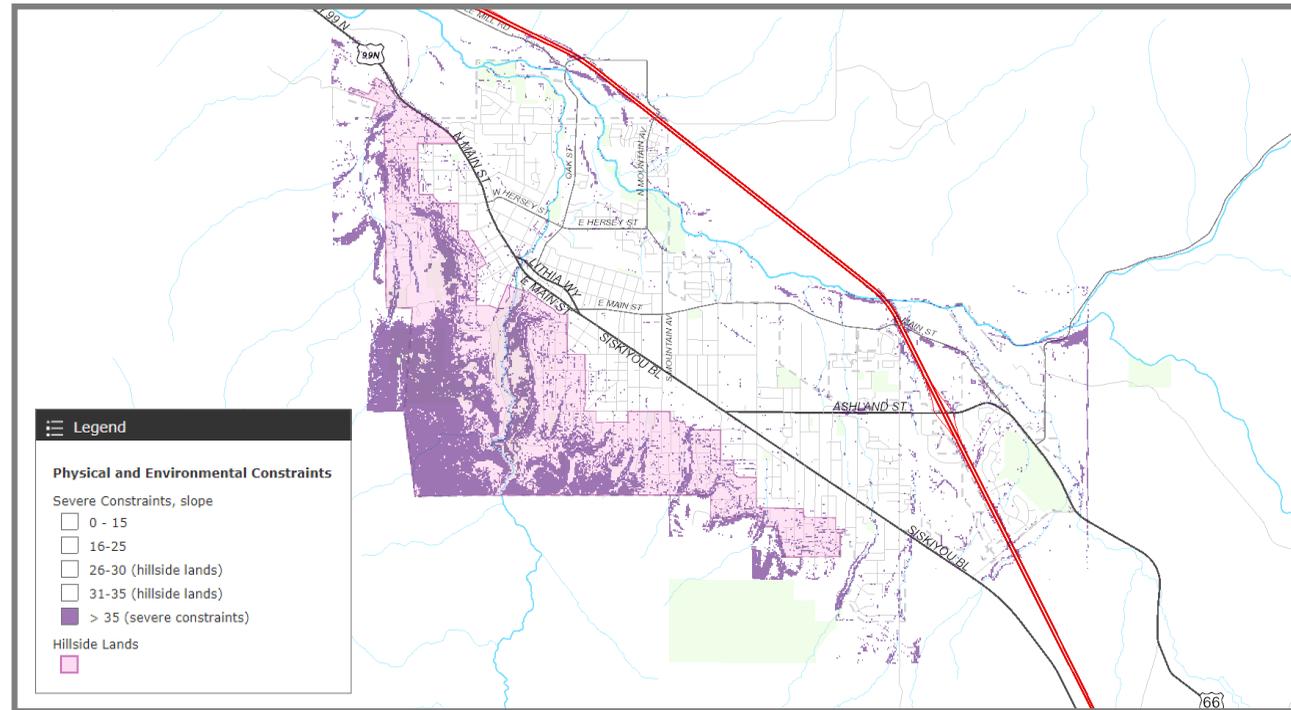
Possible NHMP action items to support the ecosystem service of wildfire resilience include:

- Continue support for the Ashland Forest All-Lands Restoration (AFAR) project that manages the upper Ashland Watershed for wildfire mitigation, steep slope stability, and sediment retention.
- Expand the Wildfire Hazard Zone (WHZ), Development Standards for Wildfire Lands, and Fuel Break Prohibited Plant List to cover all of Ashland to increase the overall communities resiliency to wildfire events.
- Continue to expand neighborhood participation and certification through the Firewise Communities program to support wildfire resilient neighborhoods.

STEEP SLOPE STABILITY

Steep slope stability is a valuable ecosystem service for controlling sedimentation and for decreasing the size and number of landslides. Landslides occur when heavy rains dislodge and eventually destabilize the soil on steep slopes. Landslides can be exacerbated, or even caused by, human development near steep slopes that decrease slope stability.

Development increases impervious surface cover and during rain events increases flow, especially if the drainage systems are insufficient or direct water toward the slopes. When the soil of steep slopes are saturated, soil can dislodge and cause a landslide. Therefore, steep slope stability depends greatly on decreased impacts of development near steep slopes, on the strength of the slope vegetation and soil, and on effective stormwater management



TAKEAWAY

Ashland is a hillside community with slopes exceeding 35% in the South-West portion of the city and within the greater Ashland Watershed that lies above the city. Supporting steep slope stability by minimizing runoff and stabilizing slopes with vegetation not only mitigates the risk of landslides, but also supports sediment retention and protects surface water systems from damage.

NHMP Benefits

Steep slope stability can support sediment retention and decrease the occurrence and size of landslide events.

- Steep slope stability decreases sedimentation of surface water conveyance systems that can lead to increased risk of flooding.
- Vegetation helps to prevent sedimentation by increasing the soils ability to resist movement and decreases soil saturation with evapotranspiration mitigating the risk of landslide events.

GI/LID Best Management

Decreasing watershed's susceptibility to landslides is the goal of GI and LID best management practices for steep slope stability

- The use of LID best management practices such as amended soils, urban trees, rain gardens, bioswales, stormwater planters, infiltration basins, and pervious pavers, pavement, and asphalt above steep slopes to increase infiltration and decrease runoff promotes steep slope stability.
- To stabilize steep slopes vegetation and trees can be planted and maintained at both the site and landscape scale to protect steep slopes from landslide events.

NHMP Actions

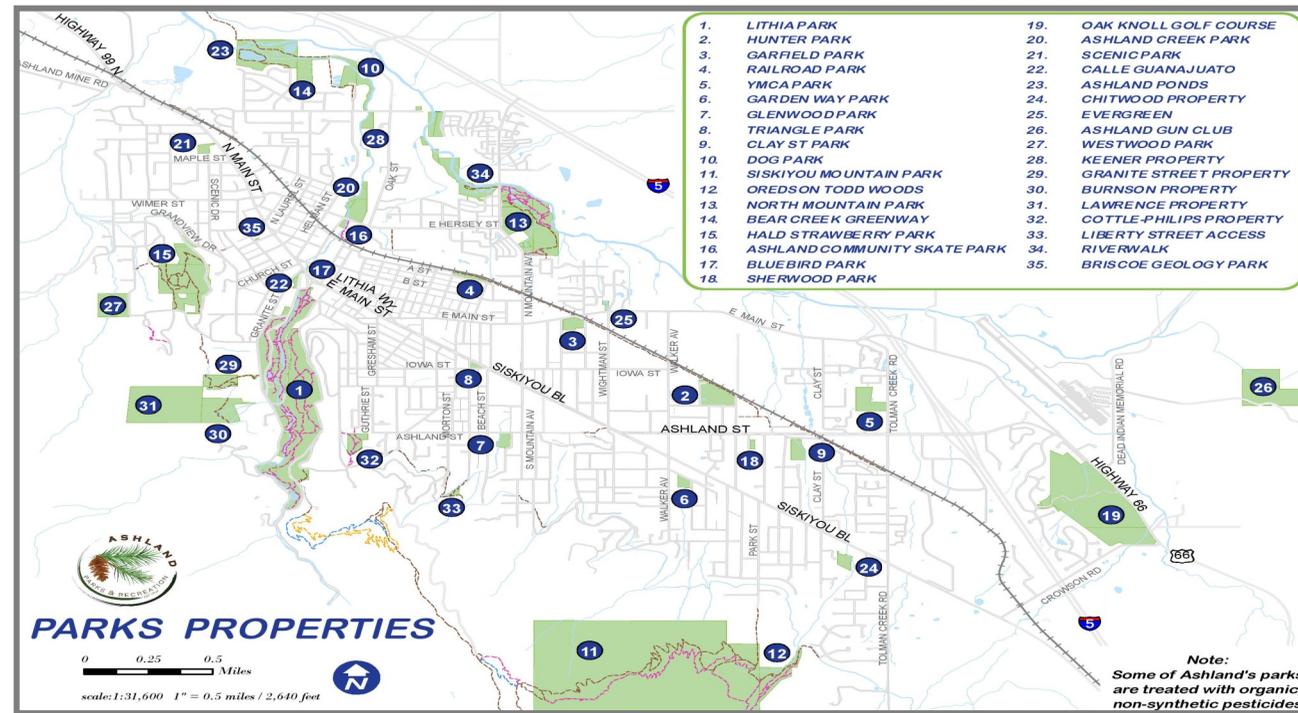
Possible NHMP action items to support the ecosystem service of steep slope stability include:

- Continue support for the Ashland Forest All-Lands Restoration (AFAR) project that manages the upper Ashland Watershed for wildfire mitigation, steep slope stability, and sediment retention.
- Utilize

CULTURAL & LIVABILITY SERVICES

Landscapes provide aesthetic and recreational features which promote livability among residents and visitors. These services can be protected and enhanced as stream and wetland buffers, parks, open space, trails, or nature preserves. There is often a strong overlap between landscapes of high cultural value, landscapes with high ecological value, and landscapes with existing or potential natural hazard risk reduction benefits.

Ashland's extensive park and trail system supports steep slope stability, wildfire resiliency, protects surface water conveyance systems, and provides for floodwater storage that all contribute to Ashland's natural hazard resiliency.



TAKEAWAY

Ashland is well known for its parks and trail system. These provide important cultural and livability services that enhance the quality of life for visitors and residents. Stream and wetland buffers, parks, open space, trails, and nature preserves are also important city controlled assets for GI and LID projects that support numerous ecosystem services with natural hazard mitigation benefits.

NHMP Benefits

Landscapes with cultural and livability services can support numerous ecosystem services that have natural hazard mitigation benefits.

- Surface water conveyance (e.g. stream and trail networks)
- Surface water storage (e.g. wetlands, ponds, park fields)
- Permanent open space buffers between mapped hazard and development areas
- Create multi-objective, multi-use, trail, pathway, and evacuation systems
- Improve the aesthetic of risk reduction structures and projects (i.e. green vs. gray infrastructure)

GI/LID Best Management

Enhancing the overall resiliency of the Ashland Watershed to natural hazards is the goal of GI and LID best management practices for cultural and livability services.

- Utilize park and open space as a mechanism to preserve floodplains
 - Establish flood plain preservation areas within park boundaries (e.g. Ashland's Vogel Park)
 - Reduce hardscape
 - Plant native trees and vegetation
- Protect, preserve, or restore wetland functions
- Cultural service maintenance techniques
 - Conserve fast draining soils
 - Protect trees
 - Reduce runoff

NHMP Actions

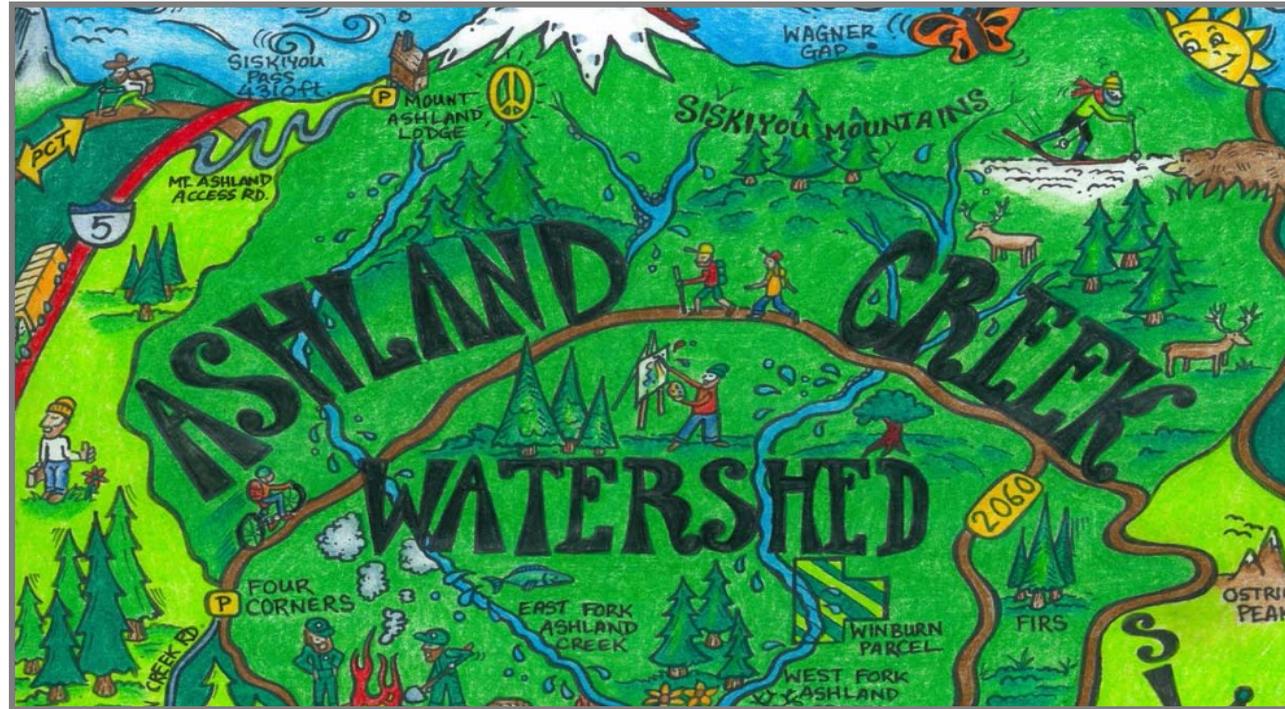
Possible NHMP action items to support the ecosystem service of cultural services include:

- Include GI- and LID-based natural hazard mitigation planning actions as a component of parks and recreation master planning as was done with the Lithia Parks Master Plan Request for Proposal (RFP).
- Consider hazard objectives in the planned restoration of the Vogel Creek property.
- Expand the Ashland Lawn Replacement program

FRESHWATER PROVISIONING

The 15,000 acre Ashland Creek Watershed begins on the slopes of Mt. Ashland and drains into Reeder Reservoir, the source of the City's municipal water supply. The main sources of fresh water are precipitation and the snowpack from the surrounding mountains. The naturally filtrated water emerges in local streams, most prominently in Ashland Creek that feeds the Reeder Reservoir. Ashland's Water Treatment plant is currently located below Reeder Reservoir.

The ability of the ecosystem to provide clean freshwater is a key benefit to the city and the region. According to the Freshwater Trust, freshwater encompasses agriculture, industry, fisheries, drinking water, recreation, and more. In Neil Creek alone, restoration efforts have resulted in a 16,000 percent increase in documented coho and Chinook salmon over a two-year period.



TAKEAWAY

Ashland's location means it is inextricably linked to water. A significant portion of the City's infrastructure is tied to water: drinking water, storm and floodwater control, wastewater, and habitat. Secondary benefits derived from the utilization of GI and LID approaches to risk reduction include habitat preservation, recreation, water quality, and tourism.

NHMP Benefits

Freshwater provisioning

- Many of the techniques used to protect water quality – vegetated streamside buffers, wetlands, detention basins, groundwater recharge, etc. – also provide important erosion control, flood reduction and drought mitigation services

GI/LID Best Management

Improving freshwater quality while decreasing hazard impacts is the goal of GI and LID best management practices for freshwater provisioning.

- Reduce runoff
- Employ infiltration solutions to reduce flow volumes while increasing water quality
-

NHMP Actions

Possible NHMP action items to support freshwater provisioning include:

- Maintain and enhance existing water department policies related to installing culverts, detention ponds, and filtration ponds throughout the city to direct runoff and filter water, as well as store water.
- Maintain and enhance the Water Advisory Committee's efforts to hold runoff during the wet season, construct new dams, and reuse water and irrigate with wastewater effluent could involve more GI/LID solutions.
- Relocate the water treatment plant.

Volume III: City Addenda

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CITY OF ASHLAND ADDENDUM

Purpose

This is an update of the Ashland addendum to the Jackson County Multi-Jurisdictional Natural Hazard Mitigation Plan (MNHMP, NHMP). This addendum supplements information contained in Volume I (Basic Plan) which serves as the NHMP foundation and Volume II (Appendices) which provide additional information. This addendum meets the following requirements:

- Multi-Jurisdictional **Plan Adoption** §201.6(c)(5),
- Multi-Jurisdictional **Participation** §201.6(a)(3),
- Multi-Jurisdictional **Mitigation Strategy** §201.6(c)(3)(iv) and
- Multi-Jurisdictional **Risk Assessment** §201.6(c)(2)(iii).

Updates to Ashland's addendum are further discussed throughout the NHMP and within Volume II, Appendix B, which provides an overview of alterations to the document that took place during the update process.

Mitigation Plan Mission

The NHMP mission states the purpose and defines the primary functions of the NHMP. It is intended to be adaptable to any future changes made to the NHMP and need not change unless the community's environment or priorities change.

The City concurs with the mission statement developed during the Jackson County planning process (Volume I, Section 4):

Protect life, property and the environment, reduce risk and prevent loss from natural hazard events through coordination and cooperation among public and private partners.

Mitigation Plan Goals

Mitigation plan goals are more specific statements of direction that Jackson County citizens and public and private partners can take while working to reduce the City's risk from natural hazards. These statements of direction form a bridge between the broad mission statement and particular action items. The goals listed here serve as checkpoints as agencies and organizations begin implementing mitigation action items.

The City concurs with the goals developed during the Jackson County planning process (Volume I, Section 4). All of the NHMP goals are important and are listed below in no particular order of priority. Establishing community priorities within action items neither negates nor eliminates any goals, but it establishes which action items to consider to implement first, should funding become available.

Below is a list of the NHMP goals:

GOAL 1: EMERGENCY SERVICES

Minimize life safety issues by promoting, strengthening and coordinating emergency response plans.

GOAL 2: EDUCATION AND OUTREACH

Further the public's awareness and understanding of natural hazards and potential risk, including economic vulnerability and mitigation efforts.

GOAL 3: PREVENTION

Reduce the threat of loss of life and property from natural hazards by incorporating information on known hazards and providing incentives to make hazard mitigation planning a priority in land use policies and decisions, including plan implementation.

GOAL 4: PROPERTY PROTECTION

Lessen impact from natural disasters on individual properties, businesses and public facilities by increasing awareness at the individual level and encouraging activities that can prevent damage and loss of life from natural hazards.

GOAL 5: PARTNERSHIP AND COORDINATION

Identify mitigation or risk reduction measures that address multiple areas (i.e., environment, transportation, telecommunications); Coordinate public/private sector participation in planning and implementing mitigation projects throughout the City; and seek funding and resource partnerships for future mitigation efforts.

GOAL 6: NATURAL RESOURCE PROTECTION

Preserve and rehabilitate natural systems to serve natural hazard mitigation functions (i.e., floodplains, wetlands, watershed and urban interface areas).

GOAL 7: STRUCTURAL PROTECTIONS

When applicable, utilize structural mitigation activities to minimize risks associated with natural hazards.

NHMP Process, Participation and Adoption

This section of the NHMP addendum addresses 44 CFR 201.6(c)(5), *Plan Adoption* and 44 CFR 201.6(a)(3), *Participation*. The first update of the Jackson County NHMP was approved by FEMA on February 4, 2013. To maintain compliance with the Disaster Mitigation Act of 2000 (DMA2K), the NHMP required an update by February 3, 2018. Ashland was included with an addendum in the 2012 Jackson County NHMP process.

The Oregon Partnership for Disaster Resilience (OPDR) at the University of Oregon's Community Service Center (CSC) collaborated with the Oregon Military Department's Office of Emergency Management (OEM), Jackson County and Ashland to update their NHMP. This project is funded through the Federal Emergency Management Agency's (FEMA) FY15 Pre-Disaster Mitigation Competitive Grant Program (PDMC-PL-10-PR-2015-003). Members of

the Ashland NHMP steering committee also participated in the County NHMP update process (Volume II, Appendix B).

By updating the NHMP, locally adopting it and having it re-approved by FEMA, Ashland will maintain eligibility for FEMA Hazard Mitigation, Pre-Disaster Mitigation and Flood Mitigation Assistance grant program funds.

The Jackson County NHMP and Ashland addendum, are the result of a collaborative effort between citizens, public agencies, non-profit organizations, the private sector and regional organizations. A project steering committee guided the process of developing the NHMP.

The Ashland Interim Fire Chief served as the designated convener of the NHMP update and will take the lead in implementing, maintaining and updating the addendum to the Jackson County NHMP in collaboration with the designated convener of the Jackson County NHMP (Emergency Manager).

Representatives from the City of Ashland steering committee met formally and informally, to discuss updates to their addendum (Volume II, Appendix B). The steering committee reviewed and revised the City's addendum, with focus on the NHMP's risk assessment and mitigation strategy (action items).

This addendum reflects decisions made at the designated meetings and during subsequent work and communication with Jackson County Emergency Management and the OPDR. The changes are highlighted with more detail throughout this document and within Volume II, Appendix B. Other documented changes include a revision of the City's risk assessment and hazard identification sections, NHMP mission and goals, action items and community profile.

The Ashland Steering Committee was comprised of the following representatives:

- Convener, David Shepherd, Interim Fire Chief
- Mike Morrison, Public Works
- Fred Creek, Southern Oregon University
- Aaron Ott, Asante
- Janice Tacconi, Oregon Shakespeare Festival
- Bill Molnar, Ashland Community Development
- Meiwen Richard, Ashland Chamber of Commerce
- Kate Jackson, Resident
- David Sommer, Ashland School District

Public participation was achieved with the establishment of the steering committee, which was comprised of City officials representing different departments and sectors and members of the public. The steering committee served as the local review body for the NHMP's development. Community members were provided an opportunity for comment via the NHMP review process and through a survey administered by the OPDR and publicized by the participating jurisdictions (Volume II, Appendix B).

The Jackson County NHMP was approved by FEMA on [Month] [Day], 2018 and the Ashland addendum was adopted via resolution on [Month] [Day], 2018. This NHMP is effective through [Month] [Day], 2023.

NHMP Implementation and Maintenance

The City Council will be responsible for adopting the Ashland addendum to the Jackson County NHMP. This addendum designates a steering committee and a convener to oversee the development and implementation of action items. Because the City addendum is part of the County's multi-jurisdictional NHMP, the City will look for opportunities to partner with the County. The City's steering committee will convene after re-adoption of the Ashland NHMP addendum on an annual schedule. The County is meeting on a semi-annual basis and will provide opportunities for the cities to report on NHMP implementation and maintenance during their meetings. The City's Fire Chief will serve as the convener and will be responsible for assembling the steering committee. The steering committee will be responsible for:

- Reviewing existing action items to determine suitability of funding;
- Reviewing existing and new risk assessment data to identify issues that may not have been identified at NHMP creation;
- Educating and training new steering committee members on the NHMP and mitigation actions in general;
- Assisting in the development of funding proposals for priority action items;
- Discussing methods for continued public involvement; and
- Documenting successes and lessons learned during the year.

The convener will also remain active in the County's implementation and maintenance process (Volume I, Section 5).

The City will utilize the same action item prioritization process as the County (Volume I, Section 5 and Volume II, Appendix D).

Implementation through Existing Programs

Many of the Natural Hazard Mitigation Plan's recommendations are consistent with the goals and objectives of the City's existing plans and policies. Where possible, Ashland will implement the NHMP's recommended actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses and policy makers. Many land-use, comprehensive and strategic plans get updated regularly, allowing them to adapt to changing conditions and needs. Implementing the NHMP's action items through such plans and policies increases their likelihood of being supported and implemented.

Ashland's acknowledged comprehensive plan is the City of Ashland Comprehensive Plan (1982, updated August, 2016). The Oregon Land Conservation and Development Commission first acknowledged the plan in 1983. The City implements the plan through the Community Development Code.

Ashland currently has the following plans that relate to natural hazard mitigation. For a complete list visit the City's [website](#):

- [Comprehensive Plan](#) (1982, amended 2016)
- [Municipal Codes](#)
 - [Chapter 2.26 Ashland Wildfire Mitigation Commission](#)
 - [Section 14.06 Water Curtailment](#)

- [Section 15.10 Flood Damage Prevention Regulations](#)
- [Community Development Plans](#)
- [Building Code, 2017 Oregon State Code](#) based on 2015 International Residential Code (IRC) and 2012 International Building Code
- [Capital Improvement Plan](#)
- [Emergency Operations Plan](#)
- [2034 Transportation System Plan](#) (2012, update underway)
- [Hosler Dam Emergency Action Plan](#) and [Early Warning System](#)
- [Community Wildfire Protection Plan](#) (2004)
- [Ashland Forest Plan](#) (2016)[Ashland Climate and Energy Action Plan](#) (2017)
- [Water Management Conservation Plan](#) (2013)
- City of Ashland Hazard Mitigation, Green Infrastructure and Low Impact Development (2017) (Volume II, Appendix G)

Other plans:

- Oregon Shakespeare Festival Long Range Plan (includes information on smoke from wildfires)
- Ashland Chamber of Commerce: Business Continuity Plan
- [Southern Oregon University: Natural Hazard Mitigation Plan \(2012\)](#)

Continued Public Participation

Keeping the public informed of the City's efforts to reduce its risk to future natural hazard events is important for successful NHMP implementation and maintenance. The City is committed to involving the public in the NHMP review and updated process (Volume I, Section 5).

NHMP Maintenance

The Jackson County Multi-Jurisdictional Natural Hazard Mitigation Plan and City addendum will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. During the County NHMP update process, the City will also review and update its addendum (Volume I, Section 5). The convener will be responsible for convening the steering committee to address the questions outlined below.

- Are there new partners that should be brought to the table?
- Are there new local, regional, state or federal policies influencing natural hazards that should be addressed?
- Has the community successfully implemented any mitigation activities since the NHMP was last updated?
- Have new issues or problems related to hazards been identified in the community?
- Are the actions still appropriate given current resources?
- Have there been any changes in development patterns that could influence the effects of hazards?
- Have there been any significant changes in the community's demographics that could influence the effects of hazards?
- Are there new studies or data available that would enhance the risk assessment?

- Has the community been affected by any disasters? Did the NHMP accurately address the impacts of this event?

These questions will help the steering committee determine what components of the mitigation plan need updating. The steering committee will be responsible for updating any deficiencies found in the NHMP.

Mitigation Strategy

This section of the NHMP addendum addresses 44 CFR 201.6(c)(3)(iv), *Mitigation Strategy*.

The City's mitigation strategy (action items) were first developed during the 2012 NHMP planning process. During this process, the steering committee assessed the City's risk, identified potential issues and developed a mitigation strategy (action items).

During the 2017 update process the City re-evaluated their mitigation strategy (action items). During this process action items were updated, noting what accomplishments had been made and whether the actions were still relevant; any new action items were identified at this time (see Volume II, Appendix B for more information on changes to action items).

Priority Actions

The City is listing a set of high priority actions in an effort to focus attention on an achievable set of high leverage activities over the next five-years (Table AA-1). The City's priority actions are listed below in the following table.

Action Item Pool

Table AA-2 presents a "pool" of mitigation actions. This expanded list of actions is available for local consideration as resources, capacity, technical expertise and/or political will become available.

Table AA-I Ashland Priority Action Items

Action Item ID	Mitigation Action Item	Timeline	Lead Organization	Partner Organization(s)	Potential Funding Source(s)
Priority Actions					
Earthquake (EQ)					
EQ #1	Emergency Operations Center Upgrades	Mid-Term (3-5 Years)	Ashland Fire and Rescue	Ashland Fire and Rescue	Local Funding Resources, SRGP, PDM, HMGP
EQ #2	Seismic Retrofit for Critical Infrastructure	Long Term (5+ Years)	Ashland Fire and Rescue	City of Ashland, Chamber of Commerce, Ashland School District, Southern Oregon University, Oregon Shakespeare Festival	Local Funding Resources, SRGP, PDM, HMGP
Landslide (LS)					
LS #1	Water Treatment Plant Relocation Assessment	Mid-Term (3-5 Years)	Ashland Public Works	Ashland Community Development	Local Funding Resources, PDM, HMGP
Wildfire (WF)					
WF #1 (new)	Ashland Defensible Space Initiative	Mid-Term (3-5 Years)	Ashland Fire and Rescue	Private Contractors	Local Funding Resources, ODF, PDM, HMGP
WF #2	Ashland Forest Resiliency Project	Ongoing	Ashland Fire and Rescue	The Nature Conservancy, USFS, Lomakatsi Restoration Project	Local Funding Resources, ODF

Source: City of Ashland NHMP Steering Committee, 2017.

Table AA-2 Ashland Action Item Pool

Action Item ID	Mitigation Action Item	Timeline	Lead Organization	Partner Organization(s)	Potential Funding Source(s)
Action Item Pool					
Multi-Hazard (MH)					
MH #1	Community Preparedness	Ongoing	Ashland Fire and Rescue	Ashland CERT, Jackson County EM	Local Funding Resources, DLCD
MH #2	Emergency Provisions for Responders and Schools	Mid-Term (3-5 Years)	Ashland Fire and Rescue	Ashland School District	Local Funding Resources, School District
MH #3	Enhanced Audio Alert System for Southern Oregon University	Mid-Term (3-5 Years)	Southern Oregon University	Jackson County Emergency Management	Local Funding Resources, Oregon University System, PDM, HMGP
Drought (DR)					
No specific action item developed for this hazard. See multi-hazard actions for applicable mitigation strategies.					
Earthquake (EQ)					
EQ #3	Seismic Natural Gas shut-off Valves for the City's Critical Infrastructure	Long Term (5+ Years)	Ashland Public Works	AVISTA	Local Funding Resources, AVISTA
EQ #4	Seismic Risk Assessment	Mid-Term (3-5 Years)	Ashland Fire and Rescue	City of Ashland, Chamber of Commerce, Ashland School District, Southern Oregon University, Oregon Shakespeare Festival	Local Funding Resources, PDM, HMGP
Emerging Infectious Disease (EID)					
No specific action item developed for this hazard. See multi-hazard actions for applicable mitigation strategies.					
Flood (FL)					
FL #1 (new)	Develop Increased Floodwater Storage Project along Bear and Ashland Creek. Restore wetlands and use techniques like floodplain benching along Bear and Ashland Creek to increase floodwater storage capacity and reduce flood risk.	Long Term (5+ Years)	Ashland Public Works	DLCD, DEQ	Local Funding Resources
FL #2 (new)	Develop a City Led "Green Streets" Program. Expand the use of GI/LID BMPs in development codes such as bioswales in city owned right-of-way to minimize local and downstream flooding.	Long Term (5+ Years)	Ashland Community Development	Ashland Public Works, RVSS	Local Funding Resources, PDM, HMGP, DEQ

Source: City of Ashland NHMP Steering Committee, 2017.

Table AA-2 Ashland Action Item Pool (continued)

Action Item ID	Mitigation Action Item	Timeline	Lead Organization	Partner Organization(s)	Potential Funding Source(s)
Action Item Pool					
Landslide (LS)					
	See priority actions and multi-hazard actions for applicable mitigation strategies.				
Severe Weather (SW, Windstorm and Winter Storm)					
	No specific action item developed for this hazard. See multi-hazard actions for applicable mitigation strategies.				
Volcano (VE)					
	No specific action item developed for this hazard. See multi-hazard actions for applicable mitigation strategies.				
Wildfire (WF)					
WF #3	Ashland Firewise Communities	Ongoing	Ashland Fire and Rescue	HOAs, Oregon Department of Forestry	Local Funding Resources, Firewise, ODF
WF #4 (new)	Wildfire Mitigation Ordinance	Short Term (0-2 Years)	Ashland Fire and Rescue	Ashland Community Development	Local Funding Resources, Firewise, ODF, DLCDC

Source: City of Ashland NHMP Steering Committee, 2017.

Green Infrastructure and Low Impact Development

The Community Service Center (CSC) team worked with the City of Ashland, regional stakeholders and state agency partners to develop and workshop proposed natural hazard mitigation plan (NHMP) action items that utilize green infrastructure (GI) and low impact development (LID) best management practice (BMPs). The proposed action items are intended to reduce risk from natural hazards while providing important water quality, habitat and community benefits.

What is GI and LID?

Green infrastructure (GI) and low impact development (LID) are cost-effective and resilient approaches to stormwater and associated natural hazard management.¹ GI and LID techniques can be used to manage weather and climate impacts in ways that also provide many environmental and community benefits. These strategies are traditionally applied to stormwater management for limiting flow, reducing pollution and increasing the environmental health of receiving waterways.

LID and GI represent a wide range of tools and techniques that can be applied at the site, neighborhood and regional/watershed scales. In general, the goal of GI and LID best management practices is to minimize impervious area, limit the disturbance of undeveloped lands, prevent runoff from landscapes and hardscape area and protect land and ecosystems.²

Figure AA-I Green Infrastructure – Low Impact Development Continuum



Source: U.S. Environmental Protection Agency

Low impact development (LID) refers to systems and practices that use or mimic natural processes that result in the infiltration, evapotranspiration or use of stormwater to protect water quality and associated aquatic habitat.³ Low impact development is most commonly applied at the site or neighborhood scale. There are an extensive number of LID best

¹ Using Low Impact Development and Green Infrastructure to Get Benefits from FEMA Programs. EPA. <https://www.epa.gov/nps/using-low-impact-development-and-green-infrastructure-get-benefits-fema-programs>

² Low Impact Development in Western Oregon: A Practical Guide for Watershed Health. OR DEQ. <http://www.oregon.gov/deq/wq/tmdls/Pages/TMDLs-LID.aspx>

³ Urban Runoff: Low Impact Development. EPA. <https://www.epa.gov/nps/urban-runoff-low-impact-development>

management practices whose use depend on topological, environmental and geological conditions. Common approaches include the use of rain gardens, bioswales, tree boxes, engineered soils and stormwater planters.

Green Infrastructure (GI) uses natural and engineered practices to mimic, protect or restore natural processes required to manage water and create healthier urban environments.⁴ Green infrastructure is most commonly applied at the neighborhood and regional/watershed scale. Green infrastructure best management approaches can include the protection and enhancement of landscapes such as watersheds, wetlands and floodplains. Constructed wetlands, restored and reconnected floodplains and stream buffers are all examples of green infrastructure best management practices.

The City of Ashland is already a leader in applying GI/LID strategies to stormwater collection, conveyance, storage and treatment. Collectively, existing GI/LID based projects already help reduce flood impacts at the local level.

The Overlap of GI and LID with Natural Hazard Mitigation

GI and LID stormwater management best practices seek to treat urban stormwater onsite to improve water quality, provide habitat and manage runoff. While these benefits are perhaps the most widely recognized, there is increasing interest in a much wider range of co-benefits associated with GI and LID. These include natural hazard mitigation, lower lifetime infrastructure costs, improved community livability, reduced energy use and improved air quality. GI and LID techniques can reduce urban heat island effects, improve plant health during droughts reducing fire risks, stabilize soils in landslide prone areas, mitigate localized flooding and reduce downstream flooding occurrences and severity. Table AA-3 illustrates some of the co-benefits of a GI or LID project. Full circles indicate strong positive overlaps, while half circles indicate partial overlaps

FEMA and GI/LID

In recent years, FEMA has acknowledged the risks and vulnerabilities associated with changing climate trends. Specifically citing “more intense storms, frequent heavy precipitation, heat waves, drought, extreme flooding and higher sea levels,”⁵ FEMA is focusing efforts on providing information that can help communities manage climate related risks. “FEMA’s focus on risk management has expanded to anticipate climate changes and to plan and implement strategy for program development in support of climate resilient infrastructure. FEMA now integrates climate change adaptation into planning for future risk, programs, policies and operations to strengthen the nation’s resilience.”⁶

Pre-disaster mitigation planning broadly focuses on reducing hazard exposure to people and property. GI and LID best management practices support FEMA goals through the use of strategies and approaches that protect, restore and mimic natural systems. According to a recent FEMA report on innovation in hazard mitigation projects, “Implementation of LID/GI practices can help mitigate flood events by increasing the ability of the landscape to store

⁴ What is Green Infrastructure? EPA. <https://www.epa.gov/green-infrastructure/what-green-infrastructure>

⁵ Climate Change. FEMA. <https://www.fema.gov/climate-change>

⁶ Innovative Drought and Flood Mitigation Projects, Final Report, 2017. FEMA. <https://www.fema.gov/media-library/assets/documents/129691>

water on site. Infiltration of these stored waters can also mitigate the effects of drought by replenishing water supply aquifers and enhancing usable water supply.”⁷ The report goes on to state, “GI can be used at a wide range of landscape scales in place of or in addition to, more traditional stormwater control elements to support the principles of LID (USEPA 2014c). Both LID and GI utilize best management practices (BMPs) that can be combined in a BMP Treatment Train to enhance benefits and reduce costs.”

Table AA-3 Co-Benefits of GI and LID

GI and LID Example Best Management Practices	Natural Hazard Mitigation			Co-Benefits		
	Flood	Wildfire	Landslide	Water Quality	Community Benefits	Habitat
Minimize Impervious Area: Share parking spaces Minimize pavement widths Minimize front yard setbacks Share driveway Minimize building footprint(s) Minimize roadway cross section(s)	●		●	●	●	◐
Limit Disturbance of Undeveloped Land: Sequence construction schedule Conserve fast(er) draining soils Cluster development Preserve/protect trees Minimize foundation(s) Minimize grading	◐		●	◐	●	◐
Prevent Runoff from Landscape and Hardscape Areas: Rain garden(s) Bioswale(s) Bio-retention (infiltration) basin (Dry) Detention basin Tree and landscape planting(s) Remove existing pavement Contained planters Vegetated roofs (green roofs) Porous Pavement	●	◐	●	●	●	◐
Protect Land and Ecosystems: Conserve open space Protect/preserve wetlands Construct wetlands Protect/preserve riparian areas Maintain/enhance urban forest (forest parks)	●	●	◐	●	●	●

Source: Best Management Practice from Low Impact Development in Western Oregon: A Practical Guide for Watershed Health with CSC additions. Co-Benefit scoring from CSC research and should be interpreted as opportunities for further investigation.

For more information on Green Infrastructure and Low Impact Development refer to Volume II, Appendix G.

⁷ Ibid.

Risk Assessment

This section of the NHMP addendum addresses 44 CFR 201.6(b)(2) - Risk Assessment. In addition, this chapter can serve as the factual basis for addressing Oregon Statewide Planning Goal 7 – Areas Subject to Natural Hazards. Assessing natural hazard risk has three phases:

- **Phase 1:** Identify hazards that can impact the jurisdiction. This includes an evaluation of potential hazard impacts – type, location, extent, etc.
- **Phase 2:** Identify important community assets and system vulnerabilities. Example vulnerabilities include people, businesses, homes, roads, historic places and drinking water sources.
- **Phase 3:** Evaluate the extent to which the identified hazards overlap with or have an impact on, the important assets identified by the community.

The local level rationale for the identified mitigation strategies (action items) is presented herein and within Volume I, Sections 2 and 3. The risk assessment process is graphically depicted in Figure AA-2. Ultimately, the goal of hazard mitigation is to reduce the area of risk, where hazards overlap vulnerable systems.

Figure AA-2 Understanding Risk



Hazard Analysis

The Ashland steering committee developed their hazard vulnerability assessment (HVA), using their previous HVA and the County’s HVA (Volume II, Appendix C) as a reference. Changes from the County’s HVA were made where appropriate to reflect distinctions in vulnerability and risk from natural hazards unique to Ashland, which are discussed throughout this addendum.

Table AA-4 shows the HVA matrix for Ashland listing each hazard in order of rank from high to low. 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.

Three chronic hazards (wildfire, landslide and emerging Infectious disease) and one catastrophic hazard (Cascadia Subduction Zone Earthquake) rank as the top hazard threats to the City (Top Tier). The drought, windstorm, flood and winter storm hazards comprise the next highest ranked hazards (Middle Tier), while the crustal earthquake and volcano hazards comprise the lowest ranked hazards (Bottom Tier).

Table AA-4 Hazard Analysis Matrix – Ashland

Hazard	Maximum				Total Threat Score	Hazard Rank	Hazard Tiers
	History	Vulnerability	Threat	Probability			
Wildfire	20	50	100	70	240	#1	Top Tier
Earthquake (Cascadia)	2	50	100	70	222	#1	
Landslide	10	50	100	56	216	#3	
Emerging Infectious Disease	12	50	100	49	211	#4	
Drought	20	50	60	63	193	#5	Middle Tier
Windstorm	20	30	70	70	190	#6	
Flood - Riverine	20	30	60	70	180	#7	
Winter Storm	20	30	60	70	180	#7	
Earthquake (Crustal)	2	25	70	21	118	#9	Bottom Tier
Volcano	2	5	50	7	64	#10	

Source: Ashland NHMP Steering Committee, 2017.

Table AA-5 categorizes the probability and vulnerability scores from the hazard analysis for the City and compares the results to the assessment completed by the Jackson County NHMP Steering Committee (Volume II, Appendix C). Variations between the City and County are noted in **bold** text.

Table AA-5 Probability and Vulnerability Comparison

Hazard	Ashland		Jackson County	
	Probability	Vulnerability	Probability	Vulnerability
Drought	High	High	High	Moderate
Earthquake (Cascadia)	High	High	High	High
Earthquake (Crustal)	Low	Moderate	Low	Moderate
Emerging Infectious Disease	Moderate	High	Moderate	High
Flood	High	Moderate	High	Moderate
Landslide	High	High	High	Low
Volcano	Low	Low	Low	Low
Wildfire	High	High	High	Moderate
Windstorm	High	Moderate	High	Moderate
Winter Storm	High	Moderate	High	Moderate

Source: Ashland NHMP Steering Committee, 2017.

Community Characteristics

Table AA-6 and the following section provides information on City specific demographics and assets. For additional information on the characteristics of Ashland, in terms of geography, environment, population, demographics, employment and economics, as well as housing and transportation see Volume I, Section 2. Many of these community characteristics can affect how natural hazards impact communities and how communities choose to plan for natural hazard mitigation. Considering the City specific assets during the planning process can assist in identifying appropriate measures for natural hazard mitigation. Between 2012 and 2016 the City grew by 295 people (1.5%) and median household income increased by about 2% (Volume I, Section 2). New development has complied with the standards of the [Oregon Building Code](#) and the city's development code including their floodplain ordinance.

Transportation/Infrastructure

In the City of Ashland, transportation has played a major role in shaping the community. From the railroad tracks to the development of Interstate 5, Highway 99 and Highway 66, Ashland's commercial areas developed along primary routes and residential development followed nearby.

Today, mobility plays an important role in Ashland and the daily experience of its residents and businesses as they move from point A to point B. In addition to Hwy 99, the City also has two other highways within its borders: Highway 66 and Interstate 5. The current railroad system is serviced through the Union Pacific Railroad system and the Central Oregon and Pacific Railroad (CORP) route. This complements the established Rogue Valley Transportation District (RVTD) and the series of four transit stops located within Ashland. In addition, the City operates several recreational trails within City limits that provide alternative routes for pedestrians and bicyclists in the northwest and southwest regions of the City (around the Ashland Creek and Bear Creek corridors)⁸.

By far, motor vehicles represent the dominant mode of travel through and within Ashland.

Economy

A diverse range of businesses have chosen to locate in Ashland. Traditionally, Ashland has built its economy on a resource base of timber, favorable climate, attractive landscape, cultural attractions, a well-educated labor force and education. In addition, Ashland's location on Interstate 5 and the Southern Pacific Railroad, its proximity to the Medford Airport and its own local airport give it market access that is more favorable than usual for a rural town. According to the economic profile of the City's Comprehensive Plan, Ashland finds their main economic drivers in the sectors of tourism, manufacturing and commercial retail⁹.

⁸ City of Ashland Park and Recreation Finder, <http://gis.ashland.or.us/AshlandParksandRec/>

⁹ City of Ashland Comprehensive Plan, Economy Element (2016)
http://www.ashland.or.us/Files/Ashland_Economy_Element.pdf

Table AA-6 Community Characteristics

Population Characteristics		
2012 Population	20,325	
2016 Population	20,620	
2035 Forecasted Population*	23,183	
Race and Ethnic Categories		
White		91%
Black/ African American		2%
American Indian and Alaska Native		1%
Asian		2%
Native Hawaiian and Other Pacific Islander		< 1%
Some Other Race		< 1%
Two or More Races		4%
Hispanic or Latino		4%
Limited or No English Spoken		1%
Vulnerable Age Groups		
Less than 15 Years	2,672	13%
65 Years and Over	4,173	20%
Disability Status		
Total Population	2,409	12%
Children	20	< 1%
Seniors	1,070	5%

Income Characteristics		
Households by Income Category		
Less than \$15,000	1,763	19%
\$15,000-\$29,999	1,601	17%
\$30,000-\$44,999	1,270	13%
\$45,000-\$59,999	1,044	11%
\$60,000-\$74,999	895	9%
\$75,000-\$99,999	1,018	11%
\$100,000-\$199,999	1,546	16%
\$200,000 or more	309	3%
Median Household Income	\$45,704	
Poverty Rates		
Total Population	3,767	19%
Children	749	23%
Seniors	239	6%
Housing Cost Burden		
Owners with Mortgage		44%
Renters		58%

Source: U.S. Census Bureau, 2011-2015 American Community Survey; Portland State University, Population Research Center.

Note: * = Population forecast within UGB

Housing Characteristics		
Housing Units		
Single-Family	2,595	75%
Multi-Family	571	17%
Mobile Homes	292	8%
Year Structure Built		
Pre-1970	448	13%
1970-1989	864	25%
1990 or later	2,146	62%
Housing Tenure and Vacancy		
Owner-occupied	2,042	64%
Renter-occupied	1,129	36%
Vacant	287	8%

Ashland is in Jackson County in southwestern Oregon. The City has grown steadily since its incorporation in 1874 and has an area today of 6.5 square miles. It is in the southern region of the county, located about 18 miles northwest of the California border and southeast of the City of Medford. The City is within the Rogue watershed.

Ashland experiences a relatively mild climate with four distinct seasons that comes from its position on the west coast of North America and within the mountains of the region. The town is just off of Interstate 5 and about 15 miles north of the California border and at the southern end of the Rogue Valley at approximately 2000 feet above sea level. Mt Ashland, part of the Siskiyou Mountain Range, rises to 7500 feet above Ashland to the south and the Cascades Range rises to the north and east. As a result of its location Ashland has a climate somewhat intermediate to central California and northern Oregon. Ashland averages only 20 inches of rain per year due to being inland from the coast and in the rain shadow of the nearby mountains. While the surrounding mountains receive plentiful snow, Ashland itself sees less than 10 inches annually.

The City of Ashland includes a diversity of land uses but is zoned primarily residential.

For more information see Volume I, Section 2.

Community Assets

This section outlines the resources, facilities and infrastructure that, if damaged, could significantly impact the public safety, economic conditions and environmental integrity of Ashland.

Critical Facilities

Facilities that are critical to government response and recovery activities (i.e. life, safety, property and environmental protection). These facilities include: 911 Centers, Emergency Operations Centers, Police and Fire Stations, Public Works facilities, sewer and water facilities, hospitals, bridges, roads, shelters and more. Facilities that, if damaged, could cause serious secondary impacts may also be considered “critical.” A hazardous material facility is one example of this type of critical facility.

Fire Stations:

- Ashland Fire & Rescue Stations 1 and 2

Law Enforcement:

- Ashland Police Department

Public Works:

- Public Works and Street Division Building
- Parks and Recreation Building

Private:

- Ashland Shopping Center
- Ashland Propane
- Food Bank

Hospitals/Immediate Medical Care Facilities:

- Asante Ashland Community Hospital
- Southern Oregon University – Health Center

City Buildings:

- Ashland Senior Center (Gathering Point)
- Ashland Planning Division
- Ashland Library (County)
- Municipal Court

Essential Facilities

Facilities that are essential to the continued delivery of key government services and/or that may significantly impact the public’s ability to recover from the emergency. These facilities may include: City buildings such as the Public Services Building, the City Hall and other public facilities such as schools.

Hospitals/Immediate Medical Care Facilities:

- Rogue Community Health - Ashland
- Asante Physician Partners
- Valley Immediate Care
- La Clinica Mobile Unit (Based in Phoenix)

Public Schools:

- Ashland High School
- Ashland Middle School
- Bellview School
- Helman Elementary School
- John Muir School
- Walker Elementary School
- Willow Wind Community Learning Center (CLC)

Private Schools:

- Children’s World Bilingual Montessori Pre-School and Kindergarten
- Lithia Springs School
- Pilot Rock Christian School
- The Siskiyou School

Potential Shelter Sites:

- All Ashland Schools (Red Cross designates Middle and High Schools)
- Ashland Bible Church
- Ashland Christian Fellowship
- Ashland GracePoint
- Bellview Christian Church
- Christian Church of Ashland
- Church of Christ
- Family Life Bible Church
- First Baptist Church of Ashland
- First Methodist Church
- First Presbyterian Church
- Grace Lutheran Church

- Newman Center
- Trinity Episcopal Church
- Ashland Gracepoint Church of the Nazarene
- Ashland Foursquare Church
- Ashland SDA Church
- Our Lady of the Mountain Parish
- Calvary Baptist Church
- Clay Street Community Church
- First Congressional United Church of Christ
- Green Springs Christian Fellowship
- Nevada Street Church of Christ
- Alliance Bible Chapel
- Faith Tabernacle Church
- National Guard Armory
- YMCA

Infrastructure:

Infrastructure that provides services for the City includes:

Transportation Networks:

- Highway 99
- Highway 66
- Eagle Mill Rd
- Ashland St
- S Mountain Ave
- Interstate 5
- E Main St
- Tolman Creek Rd
- Walker Ave
- Oak St
- Hersey St
- Maple St
- [Wildfire/Flood Evacuation Routes](#)

Special Service Districts:

- Southern Oregon Education Service District

Water Facilities:

- 6 Pump Stations
- 57 Pressure Reducing Stations
- Water Treatment Plant
- 4 Water Reservoirs (above ground with 6.7 million gallons when full)
- 1,236 Fire Hydrants
- Reeder Reservoir
- Hosler Dam
- Waste Water Plant

Private Utilities:

- Avista Natural Gas
- 3 Electric Substations
- Communication Towers
- Recology Ashland

Hazard Characteristics

Drought

The steering committee determined that the City's probability for drought is **high** (which is the same as the County's rating) and that their vulnerability to drought is **high** (which is higher than the County's rating). *The probability rating increased and the vulnerability rating did not change since the previous version of this NHMP addendum.*

Volume I, Section 3 describes the characteristics of drought hazards, history, as well as the location, extent and probability of a potential event. Due to the climate of Jackson County, past and present weather conditions have shown an increasing potential for drought.

Ashland draws its main water supply from Reeder Reservoir. Additionally, the Talent Ashland Phoenix (TAP) Intertie and the Talent Irrigation District (TID) are backup resources available for residential use during times of drought. For more information on the future of Ashland's water supply visit their website:

<http://www.ashland.or.us/Files/2016%20water%20supply.pdf>

Please review Volume I, Section 3 for additional information on this hazard.

Earthquake (Cascadia)

The steering committee determined that the City's probability for a Cascadia Subduction Zone (CSZ) earthquake is **high** (which is the same as the County's rating) and that their vulnerability to a CSZ earthquake is **high** (which is the same as the County's rating). *Previously, the earthquake hazard profile was a single risk assessment, which is now divided into two separate earthquake hazards: Cascadia Subduction Zone (CSZ) earthquake and Crustal earthquake.*

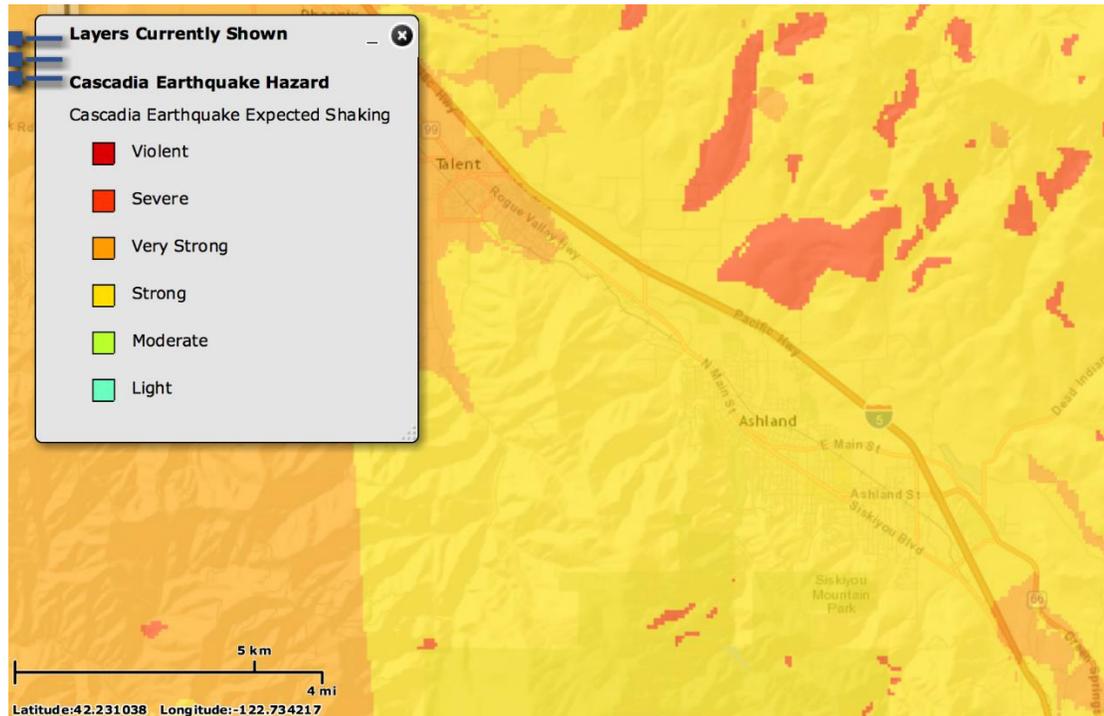
Volume I, Section 3 describes the characteristics of earthquake hazards, history, as well as the location, extent and probability of a potential event. Generally, an event that affects the County is likely to affect Ashland as well. The causes and characteristics of an earthquake event are appropriately described within the Volume I, Section 3 as well as the location and extent of potential hazards. Previous occurrences are well documented within Volume I, Section 3 and the community impacts described by the County would generally be the same for Ashland as well.

The local faults, the county's proximity to the Cascadia Subduction Zone, potential slope instability and the prevalence of certain soils subject to liquefaction and amplification combine to give the County a high-risk profile. Due to the expected pattern of damage resulting from a CSZ event, the Oregon Resilience Plan divides the State into four distinct zones and places Jackson County predominately within the "Valley Zone" (Valley Zone, from the summit of the Coast Range to the summit of the Cascades). Within the Southwest Oregon region, damage and shaking is expected to be strong and widespread - an event will be disruptive to daily life and commerce and the main priority is expected to be restoring services to business and residents.¹⁰ Figure AA-3 displays relative shaking hazards from a

¹⁰ Ibid.

Cascadia Subduction Zone earthquake event. As shown in the figure below, the majority of the City is expected to experience strong shaking (yellow) in a CSZ event.

Figure AA-3 Cascadia Subduction Zone



Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](#)

Note: To view detail click the link above to access Oregon HazVu.

As noted in the community profile, approximately 68% of residential buildings were built prior to 1990, which increases the City's vulnerability to the earthquake hazard. Information on specific public buildings' (schools and public safety) estimated seismic resistance, determined by DOGAMI in 2007, is shown in Table AA-7; each "X" represents one building within that ranking category. Of the facilities evaluated by DOGAMI using their Rapid Visual Survey (RVS), one (1) has a very high (100% chance) collapse potential and six (6) have a high (greater than 10% chance) collapse potential.

In addition to building damages, utility (electric power, water, wastewater, natural gas) and transportation systems (bridges, pipelines) are also likely to experience significant damage. There is a low probability that a major earthquake will result in failure of upstream dams.

Utility systems will be significantly damaged, including damaged buildings and damage to utility infrastructure, including water treatment plants and equipment at high voltage substations (especially 230 kV or higher which are more vulnerable than lower voltage substations). Buried pipe systems will suffer extensive damage with approximately one break per mile in soft soil areas. There would be a much lower rate of pipe breaks in other areas. Restoration of utility services will require substantial mutual aid from utilities outside of the affected area.

Table AA-7 Rapid Visual Survey Scores

Facility	Site ID*	Level of Collapse Potential			
		Low (< 1%)	Moderate (>1%)	High (>10%)	Very High (100%)
Schools					
Ashland High School (Ashland SD 5) (201 S Mountain Ave)	Jack_sch07	X, X, X		X, X, X, X	X
Ashland Middle School (Ashland SD 5) (100 Walker Ave)	Jack_sch06	X			
Bellview Elementary School (Ashland SD 5) (1070 Tolman Creek Rd)	Jack_sch03			X	
Helman Elementary School (Ashland SD 5) (705 Helman St)	Jack_sch04	2007 RVS report did not include structural appendix for this facility.			
Walker Elementary School (Ashland SD 5) (364 Walker Ave)	Jack_sch05			X	
Public Safety					
Ashland Fire & Rescue (City of Ashland) (455 Siskiyou Blvd)	Jack_fir11	X			
Ashland Police Department (City of Ashland) (1155 E Main St)	Jack_pol08	X			
Facility	Site ID*	Level of Collapse Potential			
Hospital					
Ashland Community Hospital (NFP - Ashland) (280 Maple St)	Jack_hos01	X			
Southern Oregon University					
<i>Various (see SOU emergency plan)</i>					

Source: [DOGAMI 2007. Open File Report 0-07-02. Statewide Seismic Needs Assessment Using Rapid Visual Assessment](#). "*" – Site ID is referenced on the [RVS Jackson County Map](#)

Mitigation Successes

The City of Ashland Public Works Department maintains a seismic vulnerability report of public facilities. In addition, Southern Oregon University (SOU) has information on the seismic vulnerability of their infrastructure. SOU has retrofitted several structures on their campus, see their Natural Hazard Mitigation Plan for more information.

Earthquake (Crustal)

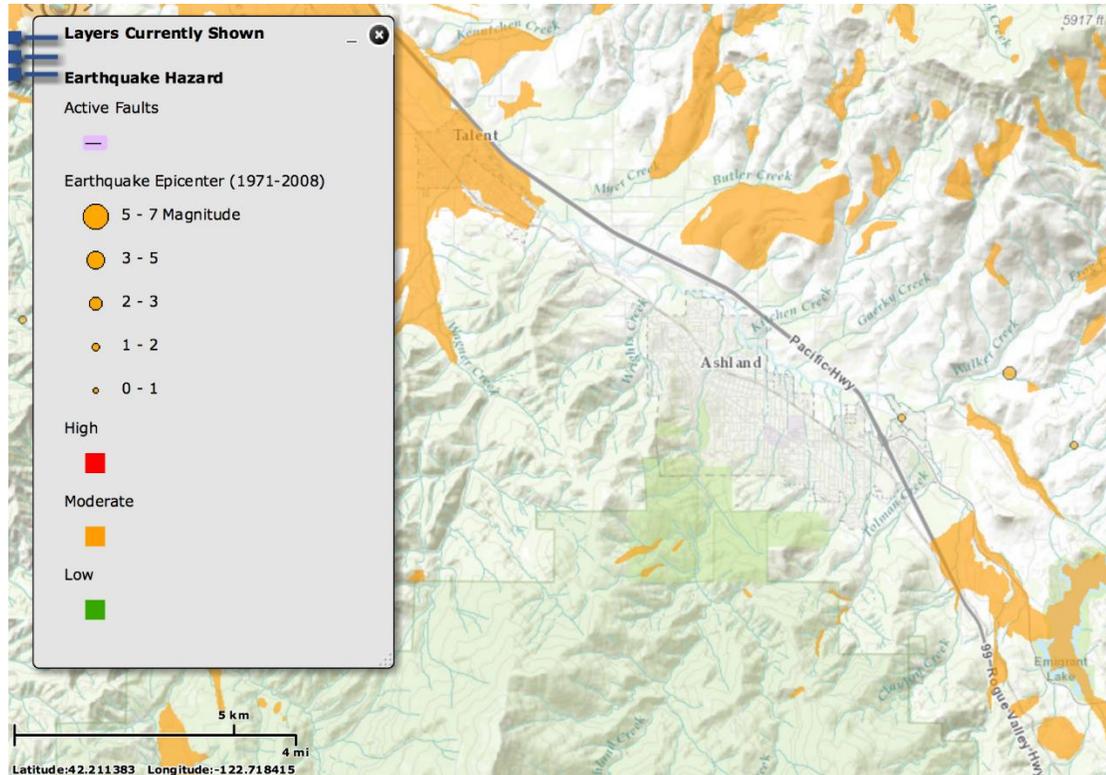
The steering committee determined that the City’s probability for a crustal earthquake is **low** (which is the same as the County’s rating) and that their vulnerability to crustal earthquake is **moderate** (which is the same as the County’s rating). *Previously, the earthquake hazard profile was a single risk assessment, which is now divided into two separate earthquake hazards: Crustal earthquake and Cascadia Subduction Zone (CSZ) earthquake.*

Volume I, Section 3 describes the characteristics of earthquake hazards, history, as well as the location, extent and probability of a potential event. Generally, an event that affects the County is likely to affect Ashland as well. The causes and characteristics of an earthquake event are appropriately described within Volume I, Section 3 as well as the location and extent of potential hazards. Previous occurrences are well-documented within Volume I,

Section 3 and the community impacts described by the County would generally be the same for Ashland as well.

Earthquake-induced damages are difficult to predict and depend on the size, type and location of the earthquake, as well as site-specific building and soil characteristics. Presently, it is not possible to accurately forecast the location or size of earthquakes, but it is possible to predict the behavior of soil at any site. In many major earthquakes, damages have primarily been caused by the behavior of the soil. Figure AA-4 displays relative liquefaction hazards. As shown in the figure below, the area of greatest concern (liquefaction hazard orange areas) is to the north and northwest of the City.

Figure AA-4 Active Faults and Soft Soils



Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](#)

Note: To view detail click the link above to access Oregon HazVu.

Please review Volume I, Section 3 for additional information on this hazard.

Emerging Infectious Disease

The steering committee determined that the City's probability for emerging infectious disease is **moderate** (which is the same as the County's rating) and that their vulnerability is **high** (which is the same as the County's rating). *The City did not assess the emerging infectious disease hazard in the previous version of their NHMP.*

Emerging infectious diseases are those that have recently appeared in a population or those whose incidence or geographic range is rapidly increasing or threatens to increase. Emerging infections may be caused by biological pathogens (e.g., virus, parasite, fungus or bacterium) and may be: previously unknown or undetected biological pathogens, biological pathogens

that have spread to new geographic areas or populations, previously known biological pathogens whose role in specific diseases was previously undetected and biological pathogens whose incidence of disease was previously declining but whose incidence of disease has reappeared (re-emerging infectious disease).¹¹

Volume I, Section 3 describes the characteristics of emerging infectious disease, history, as well as the location, extent and probability of a potential event within the region. Generally, an event that affects the County is likely to affect the City as well.

Low immunization rates within Jackson County, specifically Ashland and the large foreign contingency that visits Ashland due to tourism and Southern Oregon University contribute to the City's vulnerability.

Please review Volume I, Section 3 for additional information on this hazard.

Flood

The steering committee determined that the City's probability for flood is **high** (which is the same as the County's rating) and that their vulnerability to flood is **moderate** (which higher than the County's rating). *These ratings did not change since the previous version of this NHMP addendum.*

Volume I, Section 3 describes the characteristics of flood hazards, history, as well as the location, extent and probability of a potential event. Portions of Ashland have areas of flood plains (special flood hazard areas, SFHA). These include areas along the Bear Creek, Clay Creek and Ashland Creek (Figure AA-5). Furthermore, other portions of Ashland, outside of the mapped floodplains, are also subject to flooding from local storm water drainage.

Ashland Creek is the chief source of flooding in Ashland. The creek, which has its origins in the Rogue River National Forest south of the City, is very steep and has a drainage area of approximately 27.5 square miles. The creek flows into Reeder Reservoir south of the City; from the reservoir, the creek flows northward and empties into Bear Creek. Clay Creek rises in the hills to the southeast of Ashland, flows northward at the eastern edge of the City and enters Bear Creek to the north.¹² Floods in the past, including the 1974 and 1997 floods on Ashland Creek, have caused failures with the Ashland water-supply system. Reeder Reservoir is created by Hosler Dam and is one of the City's chief concerns for flooding. The City maintains a [Hosler Dam Emergency Action Plan](#) and has an [Early Warning System](#) including cameras. A [failure study \(inundation\) map](#) is also maintained on the [City's website](#) and shows the commercial and residential properties are at risk during a failure event.

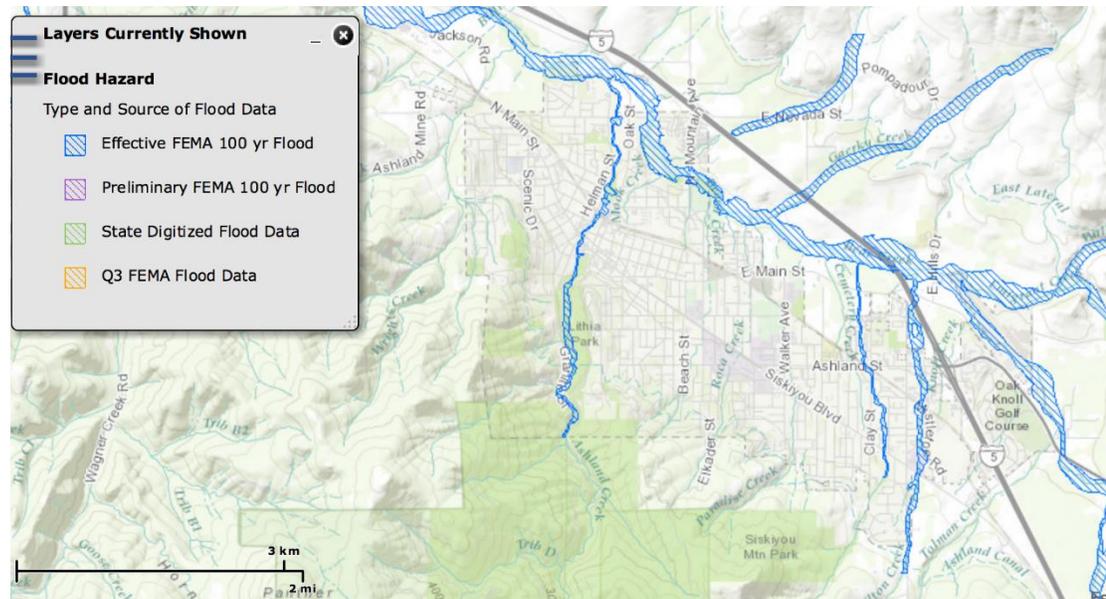
The City is at risk from two types of flooding: riverine and urban. Riverine flooding occurs when streams overflow their banks and inundate low-lying areas. This is a natural process that adds sediment and nutrients to fertile floodplain areas. It usually results from prolonged periods of precipitation over a wide geographic area. Most areas are generally flooded by low velocity sheets of water. Urban flooding occurs as land is converted to

¹¹ Baylor College of Medicine, *Emerging Infectious Disease*, URL: <https://www.bcm.edu/departments/molecular-virology-and-microbiology/emerging-infections-and-biodefense/emerging-infectious-diseases>, accessed September 17, 2017.

¹² FEMA, Flood Insurance Study: Jackson County, Oregon and incorporated Areas, May 2011.

impervious surfaces and hydrologic systems are changed. Precipitation is collected and transmitted to streams at a much faster rate, causing floodwaters that rise rapidly and peak with violent force. During urban flooding, storm drains can back up and cause localized flooding of streets and basements. These flooding events and subsequent damages are commonly caused by the behavior of Ashland Creek and Bear Creek and their tributaries. Additional risks of flood are posed from Clay Creek, Hamilton Creek, Gaerky Creek and Kitchen Creek. These urban creeks flow through many subsurface pipe systems which can be plugged by debris during flood events.

Figure AA-5 Special Flood Hazard Area



Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](#)

Note: To view detail click the link above to access Oregon HazVu.

Floods can have a devastating impact on almost every aspect of the community, including private property damage, public infrastructure damage and economic loss from business interruption. It is important for the City to be aware of flooding impacts and assess its level of risk. The City has been proactive in mitigating flood hazards by purchasing floodplain property.

The economic losses due to business closures often total more than the initial property losses that result from flood events. Business owners and their employees are significantly impacted by flood events. Direct damages from flooding are the most common impacts, but indirect damages, such as diminished clientele, can be just as debilitating to a business. Following the January 1997 flood, businesses in Ashland suffered direct damage from high water and reduced water service resulting from damage to the public water system.

The FEMA Flood Insurance Study (January 19, 2018) has a brief history of flooding in Jackson County and Ashland (Volume I, Section 3). Following the 1997 floods, the City of Ashland was without a functional drinking water system for several weeks while repair and sanitization work was performed. Businesses that depended on the Ashland water supply were unable to operate and their employees were without work.

The City's central business district is located adjacent to Ashland Creek, which was a chief source of flood problems in the past. Both the 1974 and 1997 flood events caused significant damage to the City and water reservoir.¹³ Currently, there is no financial impact data available of this infrastructure. It should be noted that major improvements in the culvert at Ashland Creek and Winburn Way will substantially decrease the likelihood of future flooding in the downtown business district.

Highway 99 and Interstate 5 are major transportation routes in the Rogue Valley. If major flooding affected all of the bridges in Ashland, traffic flow in an out of the City would be significantly affected, but would not cut all off all avenues. The amount of property in the flood plain is not a large area but damage could be significant as it would affect residential, commercial and public property. Floodwaters can affect building foundations, seep into basements or cause damage to the interior, exterior and contents of buildings, dependent upon the velocity and depth of the water and by the presence of floating debris. The City sewer system can overflow during flood events and cause further property damage.

For mitigation planning purposes, it is important to recognize that flood risk for a community is not limited only to areas of mapped floodplains. Other portions of Ashland outside of the mapped floodplains may also be at relatively high risk from over bank flooding from streams too small to be mapped by FEMA or from local storm water drainage.

National Flood Insurance Program (NFIP)

FEMA updated the Flood Insurance Study (FIS) and Flood Insurance Rate Maps (FIRMs) in 2018 (effective January 19, 2018). Table AA-8 shows that as of June 2016, Ashland has 114 National Flood Insurance Program (NFIP) policies in force. Of those, 32 are for properties that were constructed before the initial FIRM. The last Community Assistance Visit (CAV) for Ashland was on September 24, 1997. Ashland's Class Rating within the Community Rating System (CRS) is a 7. The table shows that the majority of flood insurance policies are for residential structures, primarily single-family homes. There has been a total of 16 paid claims for \$369,591. The City complies with the NFIP through enforcement of their flood damage prevention ordinance and their floodplain management program.

The Community Repetitive Loss record for Ashland identifies zero (0) Repetitive Loss Properties¹⁴ and zero (0) Severe Repetitive Loss Properties¹⁵. For details on the repetitive loss properties see Volume I, Section 3.

¹³ Ibid.

¹⁴ A Repetitive Loss (RL) property is any insurable building for which two or more claims of more than \$1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978. A RL property may or may not be currently insured by the NFIP.

¹⁵ A Severe Repetitive Loss (SRL) property is a single family property (consisting of 1 to 4 residences) that is covered under flood insurance by the NFIP and has incurred flood-related damage for which 4 or more separate claims payments have been paid under flood insurance coverage, with the amount of each claim payment exceeding \$5,000 and with cumulative amount of such claims payments exceeding \$20,000; or for which at least 2 separate claims payments have been made with the cumulative amount of such claims exceeding the reported value of the property.

Table AA-8 Flood Insurance Detail

Jurisdiction	Effective FIRM and FIS	Initial FIRM Date	Total Policies	Pre-FIRM Policies	Policies by Building Type				Minus Rated A Zone
					Single Family	2 to 4 Family	Other Residential	Non-Residential	
Jackson County	-	-	1,828	809	1,568	44	91	125	126
Ashland	1/19/2018	6/1/1981	114	32	78	1	22	13	3

Jurisdiction	Insurance in Force	Total Paid Claims	Pre-FIRM Claims Paid	Substantial Damage Claims	Total Paid Amount	Repetitive Loss Structures	Severe Repetitive Loss Properties	CRS Class Rating	Last Community Assistance Visit
Jackson County	\$ 442,723,400	197	132	10	\$ 2,337,660	8	0	-	-
Ashland	\$ 34,959,700	16	12	0	\$ 369,591	0	0	7	9/24/1997

Source: Information compiled by Department of Land Conservation and Development, July 2016.

Please review Volume I, Section 3 for additional information on this hazard.

Landslide

The steering committee determined that the City’s probability for landslide is **high** (which is the same as the County’s rating) and that their vulnerability to landslide is **high** (which is higher than the County’s rating). *These ratings did not change since the previous version of this NHMP addendum.*

Volume I, Section 3 describes the characteristics of landslide hazards, history, as well as the location, extent and probability of a potential event within the region. The potential for landslide in Ashland is high and the City’s water treatment plant is vulnerable to landslide. The last major landslide event occurred in 1997 associated with the flooding rain events of that year.

Landslide susceptibility exposure for Ashland is shown in Figure AA-6. Most of Ashland demonstrates a moderate to high susceptibility to landslide exposure, with corridors of moderate susceptibility concentrated around the outer edges of Highway 99 and Interstate-5. Approximately 18% of Ashland has very high or high and approximately 43% moderate, landslide susceptibility exposure.¹⁶

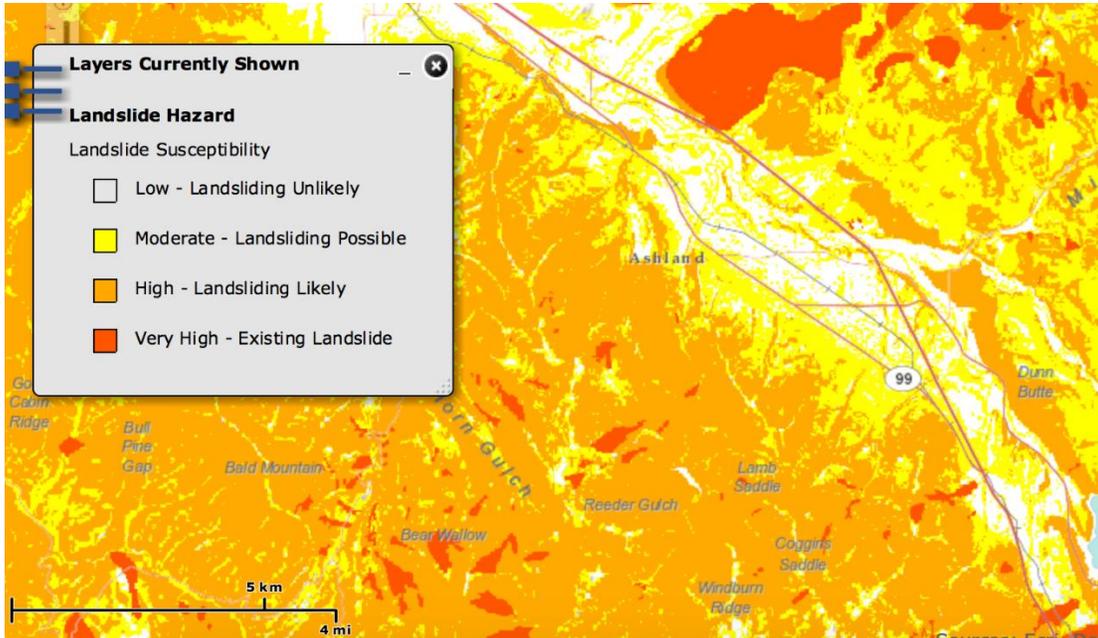
Note that even if a jurisdiction has a high percentage of area in a high or very high landslide exposure susceptibility zone, this does not mean there is a high risk, because risk is the intersection of hazard and assets.

Potential landslide-related impacts are adequately described within Volume I, Section 3 and include infrastructural damages, economic impacts (due to isolation and/or arterial road closures), property damages and obstruction to evacuation routes. Rain-induced landslides and debris flows can potentially occur during any winter in Jackson County and thoroughfares beyond City limits are susceptible to obstruction as well.

The most common type of landslides in Jackson County are slides caused by erosion. Slides move in contact with the underlying surface, are generally slow moving and can be deep. Rainfall-initiated landslides tend to be smaller; while earthquake induced landslides may be quite large. All soil types can be affected by natural landslide triggering conditions.

¹⁶ DOGAMI Open-File Report, O-16-02, Landslide Susceptibility Overview Map of Oregon (2016)

Figure AA-6 Landslide Susceptibility Exposure



Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](#)

Note: To view detail click the link above to access Oregon HazVu.

Please review Volume I, Section 3 for additional information on this hazard.

Severe Weather

Severe weather can account for a variety of intense and potentially damaging weather events. These events include windstorms and winter storms. The following section describes the unique probability and vulnerability of each identified weather hazard. Other more abrupt or irregular events such as hail are also described in this section.

Windstorm

The steering committee determined that the City's probability for windstorm is **high** (which is the same as the County's rating) and that their vulnerability to windstorm is **moderate** (which is the same as the County's rating). *The City did not assess the windstorm hazard in the previous version of their NHMP as a unique hazard (it was assessed as a component of the severe winter storm and windstorm hazard). The previous rating was applied to both windstorm and winter storm and the ratings were modified slightly to account for the differences in vulnerability and risk to the hazard.*

Volume I, Section 3 describes the characteristics of windstorm hazards, history, as well as the location, extent and probability of a potential event within the region. Because windstorms typically occur during winter months, they are sometimes accompanied by ice, freezing rain, flooding and very rarely, snow. Other severe weather events that may accompany windstorms, including thunderstorms, hail, lightning strikes and tornadoes are generally negligible for Ashland.

Volume I, Section 3 describes the impacts caused by windstorms, including power outages, downed trees, heavy precipitation, building damages and storm-related debris. Additionally, transportation and economic disruptions result as well.

Damage from high winds generally has resulted in downed utility lines and trees usually limited to several localized areas. Electrical power can be out anywhere from a few hours to several days. Outdoor signs have also suffered damage. If the high winds are accompanied by rain (which they often are), blowing leaves and debris clog drainage-ways, which in turn causes localized urban flooding.

Please review Volume I, Section 3 for additional information on this hazard.

Winter Storm (Snow/Ice)

The steering committee determined that the City's probability for winter storm is **high** (which is the same as the County's rating) and that their vulnerability to winter storm is **moderate** (which is the same as the County's rating). *The City did not assess the winter storm hazard in the previous version of their NHMP as a unique hazard (it was assessed as a component of the severe winter storm and windstorm hazard). The previous rating was applied to both windstorm and winter storm and the ratings were modified slightly to account for the differences in vulnerability and risk to the hazard.*

Volume I, Section 3 describes the characteristics of winter storm hazards, history, as well as the location, extent and probability of a potential event within the region. Severe winter storms can consist of rain, freezing rain, ice, snow, cold temperatures and wind. They originate from troughs of low pressure offshore that ride along the jet stream during fall, winter and early spring months. Severe winter storms affecting the City typically originate in the Gulf of Alaska or in the central Pacific Ocean. These storms are most common from November through March.

Major winter storms can and have occurred in the Ashland area, and while they typically do not cause significant damage, they are frequent and have the potential to impact economic activity. Road and rail closures due to winter weather are an uncommon occurrence, but can interrupt commuter and commercial traffic.

Please review Volume I, Section 3 for additional information on this hazard.

Volcano

The steering committee determined that the City's probability for a volcanic event is **low** (which is the same as the County's rating) and that their vulnerability to a volcanic event is **low** (which is the same as the County's rating). *These ratings did not change since the previous version of this NHMP addendum.*

Volume I, Section 3 describes the characteristics of volcanic hazards, history, as well as the location, extent and probability of a potential event within the region. Generally, an event that affects the County is likely to affect Ashland as well. Ashland is very unlikely to experience anything more than volcanic ash during a volcanic event. Ashland's water supply has a high concentration of Sulphur which could increase during a volcanic event.

Please review Volume I, Section 3 for additional information on this hazard.

Wildfire

The steering committee determined that the City's probability for wildfire is **high** (which is the same as the County's rating) and that their vulnerability to wildfire is **high** (which is higher than the County's rating). *These ratings did not change since the previous version of this NHMP addendum.*

Volume I, Section 3 describes the characteristics of wildland fire hazards, history, as well as the location, extent and probability of a potential event within the region. The location and extent of a wildland fire vary depending on fuel, topography and weather conditions. Weather and urbanization conditions are primarily at cause for the hazard level. Notable Wildland fires have occurred in Ashland and it remains a concern due to an increased amount of development along the Wildland-Urban Interface. In addition, the City's watershed is particularly vulnerable and a wildfire in that area would impact its water supply and potentially lead to landslides and increased flooding concerns.

Please review Page 17 of the [2016 Ashland Forest Plan](#) for more fire related details.

The potential community impacts and vulnerabilities described in Volume I, Section 3 are generally accurate for the City as well. Ashland developed a [Community Wildfire Protection Plan](#) in 2004. The [Rogue Valley Integrated Community Wildfire Protection Plan](#) (RVIFP, updated 2017), assesses wildfire risk, maps wildland urban interface areas and includes actions to mitigate wildfire risk. The City is included in the RVIFP and will update the City's wildfire risk assessment if the fire plan presents better data during future updates (an action item is included within Volume I, Section 4 to participate in updates to the integrated fire plan and to continue to maintain and update their RVIFP). Ashland is within an area of high wildfire prone urban landscape. The City hereby incorporates the RVIFP into this addendum by reference to provide greater detail to sensitivity and exposure to the wildfire hazard.

Property can be damaged or destroyed with one fire as structures, vegetation and other flammables easily merge to become unpredictable and hard to manage. Other factors that affect ability to effectively respond to a wildfire include access to the location and to water, response time from the fire station, availability of personnel and equipment and weather (e.g., heat, low humidity, high winds and drought).

The City is involved in an ongoing, six-year project known as the Ashland Forest Resiliency (AFR) Stewardship Project. [AFR](#) is a collaboration between the City, The Nature Conservancy, the U.S. Forest Service and Lomakatsi Restoration Project that is working to enhance and protect over 58,000 acres of landscape from Emigrant Lake to Wagner Creek irrespective of ownership.

Ashland also participates in [Firewise](#) and has a [Wildfire Hazard Zone Overlay](#) that dates back to 1992 and is proposed to include the entire City. The City is also considering adopting a [wildfire ordinance](#) that would address:

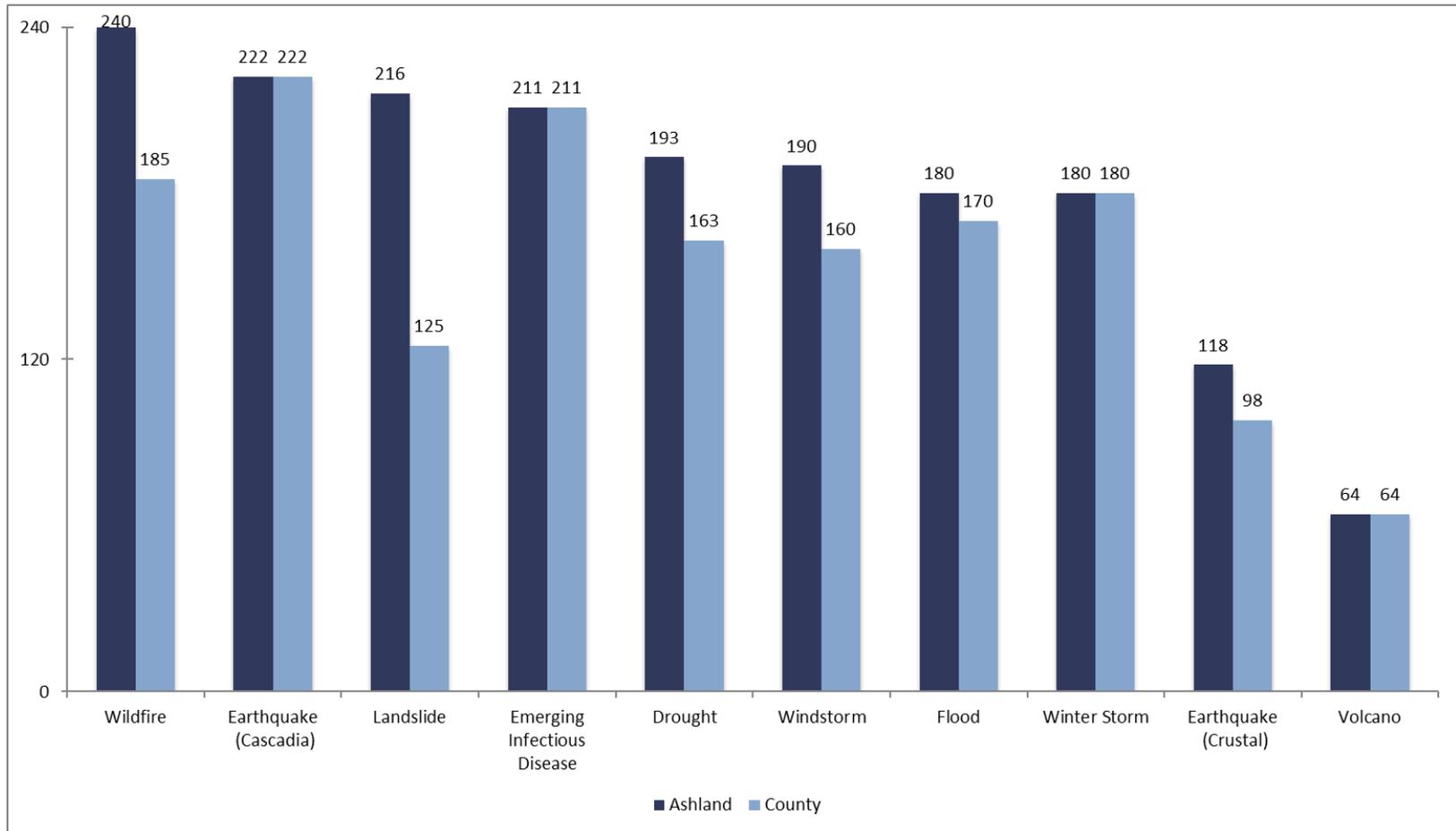
- Fire prone vegetation within 3 ft of a structure
- 10 ft spacing from tree branches to a chimney
- Spacing requirements for existing fire prone trees and shrubs
- Additional fuel break size for lots with more than 20% slope

Please review Volume I, Section 3 for additional information on this hazard.

Summary

Figure AA-7 presents a summary of the hazard analysis for Ashland and compares the results to the assessment completed by Jackson County. The top hazards for the City are wildfire, Cascadia Subduction Zone earthquake, landslide and emerging infectious disease.

Figure AA-7 Overall Hazard Analysis Comparison – Ashland/Jackson County



Source: City of Ashland NHMP Steering Committee and Jackson County NHMP Steering Committee, 2017.

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TOWN OF BUTTE FALLS ADDENDUM

Purpose

Butte Falls' addendum to the Jackson County Multi-Jurisdictional Natural Hazard Mitigation Plan (MNHMP, NHMP) was completed in 2017. This addendum supplements information contained in Volume I (Basic Plan) of this NHMP which serves as the NHMP foundation and Volume II (Appendices) which provide additional information. This addendum meets the following requirements:

- Multi-Jurisdictional **Plan Adoption** §201.6(c)(5),
- Multi-Jurisdictional **Participation** §201.6(a)(3),
- Multi-Jurisdictional **Mitigation Strategy** §201.6(c)(3)(iv) and
- Multi-Jurisdictional **Risk Assessment** §201.6(c)(2)(iii).

Mitigation Plan Mission

The NHMP mission states the purpose and defines the primary functions of the NHMP. It is intended to be adaptable to any future changes made to the NHMP and need not change unless the community's environment or priorities change.

The Town concurs with the mission statement developed during the Jackson County planning process (Volume I, Section 4):

Protect life, property and the environment, reduce risk and prevent loss from natural hazard events through coordination and cooperation among public and private partners.

Mitigation Plan Goals

Mitigation plan goals are more specific statements of direction that Jackson County citizens and public and private partners can take while working to reduce the Town's risk from natural hazards. These statements of direction form a bridge between the broad mission statement and particular action items. The goals listed here serve as checkpoints as agencies and organizations begin implementing mitigation action items.

The Town concurs with the goals developed during the Jackson County planning process (Volume I, Section 4). All of the NHMP goals are important and are listed below in no particular order of priority. Establishing community priorities within action items neither negates nor eliminates any goals, but it establishes which action items to consider to implement first, should funding become available.

Below is a list of the NHMP goals:

GOAL 1: EMERGENCY SERVICES

Minimize life safety issues by promoting, strengthening and coordinating emergency response plans.

GOAL 2: EDUCATION AND OUTREACH

Further the public's awareness and understanding of natural hazards and potential risk, including economic vulnerability and mitigation efforts.

GOAL 3: PREVENTION

Reduce the threat of loss of life and property from natural hazards by incorporating information on known hazards and providing incentives to make hazard mitigation planning a priority in land use policies and decisions, including plan implementation.

GOAL 4: PROPERTY PROTECTION

Lessen impact from natural disasters on individual properties, businesses and public facilities by increasing awareness at the individual level and encouraging activities that can prevent damage and loss of life from natural hazards.

GOAL 5: PARTNERSHIP AND COORDINATION

Identify mitigation or risk reduction measures that address multiple areas (i.e., environment, transportation, telecommunications); Coordinate public/private sector participation in planning and implementing mitigation projects throughout the Town; and seek funding and resource partnerships for future mitigation efforts.

GOAL 6: NATURAL RESOURCE PROTECTION

Preserve and rehabilitate natural systems to serve natural hazard mitigation functions (i.e., floodplains, wetlands, watershed and urban interface areas).

GOAL 7: STRUCTURAL PROTECTIONS

When applicable, utilize structural mitigation activities to minimize risks associated with natural hazards.

NHMP Process, Participation and Adoption

This section of the NHMP addendum addresses 44 CFR 201.6(c)(5), *Plan Adoption* and 44 CFR 201.6(a)(3), *Participation*. The first update of the Jackson County NHMP was approved by FEMA on February 4, 2013. To maintain compliance with the Disaster Mitigation Act of 2000 (DMA2K), the NHMP required an update by February 3, 2018. The Butte Falls addendum was added with the 2017 update of the Jackson County MNHMP.

The Oregon Partnership for Disaster Resilience (OPDR) at the University of Oregon's Community Service Center (CSC) partnered with the Oregon Military Department's Office of Emergency Management (OEM), Jackson County and Butte Falls to update their NHMP. This project is funded through the Federal Emergency Management Agency's (FEMA) FY15 Pre-Disaster Mitigation Competitive Grant Program (PDMC-PL-10-PR-2015-003). Members of

the Butte Falls NHMP steering committee also participated in the County NHMP update process (Volume II, Appendix B).

By creating a NHMP, locally adopting it and having it approved by FEMA, Butte Falls will gain eligibility for FEMA Hazard Mitigation, Pre-Disaster Mitigation and Flood Mitigation Assistance grant program funds.

The Jackson County NHMP and Butte Falls addendum, are the result of a collaborative effort between citizens, public agencies, non-profit organizations, the private sector and regional organizations. A project steering committee guided the process of developing the NHMP.

The Mayor served as the designated convener of the NHMP update and will take the lead in implementing, maintaining and updating the addendum to the Jackson County NHMP in collaboration with the designated convener of the Jackson County NHMP (Emergency Manager).

Representatives from the Town of Butte Falls steering committee met formally and informally, to discuss updates to their addendum (Volume II, Appendix B). The steering committee reviewed and revised the Town's addendum, with particular focus on the NHMP's risk assessment and mitigation strategy (action items).

The addendum reflects decision made at the designated meetings and during subsequent work and communication with Jackson County Emergency Management and the OPDR.

The Butte Falls Steering Committee was comprised of the following representatives:

- Convener, Linda Spencer, Town of Butte Falls Mayor
- Chris Bray, Town of Butte Falls Public Works
- Trish Callahan, Town Council (Business Owner)
- Jeff Gorman, Butte Falls Fire
- Lori Paxton, Town of Butte Falls Recorder
- Fred Phillips, Volunteer

Public participation was achieved with the establishment of the steering committee, which was comprised of Town officials representing different departments and sectors and members of the public. The steering committee was closely involved throughout the development of the NHMP and served as the local oversight body for the NHMP's development. Community members were provided an opportunity for comment via the NHMP review process and through a survey administered by the OPDR and publicized by the participating jurisdictions (Volume II, Appendix F).

The Jackson County NHMP was approved by FEMA on [Month] [Day], 2018 and the Butte Falls addendum was adopted via resolution on [Month] [Day], 2018. This NHMP is effective through [Month] [Day], 2023.

NHMP Implementation and Maintenance

The Town Council will be responsible for adopting the Butte Falls addendum to the Jackson County NHMP. This addendum designates a Steering Committee and a convener to oversee the development and implementation of action items. Because the Town addendum is part of the County's multi-jurisdictional NHMP, the Town will look for opportunities to partner with the County. The Town's steering committee will convene after re-adoption of the Butte

Falls NHMP addendum on an annual schedule. The County is meeting on a semi-annual basis and will provide opportunities for the cities to report on NHMP implementation and maintenance during their meetings. The Town's Mayor will serve as the convener and will be responsible for assembling the steering committee. The steering committee will be responsible for:

- Reviewing existing action items to determine suitability of funding;
- Reviewing existing and new risk assessment data to identify issues that may not have been identified at NHMP creation;
- Educating and training new steering committee members on the NHMP and mitigation actions in general;
- Assisting in the development of funding proposals for priority action items;
- Discussing methods for continued public involvement; and
- Documenting successes and lessons learned during the year.

The convener will also remain active in the County's implementation and maintenance process (Volume I, Section 5).

The Town will utilize the same action item prioritization process as the County (Volume I, Section 5 and Volume II, Appendix D).

Implementation through Existing Programs

Many of the Natural Hazard Mitigation Plan's recommendations are consistent with the goals and objectives of the Town's existing plans and policies. Where possible, Butte Falls will implement the NHMP's recommended actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses and policy makers. Many land-use, comprehensive and strategic plans get updated regularly, allowing them to adapt to changing conditions and needs. Implementing the NHMP's action items through such plans and policies increases their likelihood of being supported and implemented.

Butte Falls' acknowledged comprehensive plan is the Town of Butte Falls Comprehensive Plan (1982). The Oregon Land Conservation and Development Commission first acknowledged the plan in 1983. The Town implements the plan through the Community Development Code.

Butte Falls currently has the following plans that relate to natural hazard mitigation. For a complete list visit the Town's [website](#).

- Comprehensive Plan (1982)
- Community Development Code (2007)
- [Building Code, 2017 Oregon State Code](#) based on 2015 International Residential Code (IRC) and 2012 International Building Code
- Emergency Operations Plan (2012)
- Water System Master Plan (2012)

Continued Public Participation

Keeping the public informed of the Town's efforts to reduce its risk to future natural hazard events is important for successful NHMP implementation and maintenance. The Town is committed to involving the public in the plan review and updated process (Volume I, Section 5).

NHMP Maintenance

The Jackson County Multi-Jurisdictional Natural Hazard Mitigation Plan and Town addendum will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. During the County NHMP update process, the Town will also review and update its addendum (Volume I, Section 5). The convener will be responsible for convening the steering committee to address the questions outlined below.

- Are there new partners that should be brought to the table?
- Are there new local, regional, state or federal policies influencing natural hazards that should be addressed?
- Has the community successfully implemented any mitigation activities since the NHMP was last updated?
- Have new issues or problems related to hazards been identified in the community?
- Are the actions still appropriate given current resources?
- Have there been any changes in development patterns that could influence the effects of hazards?
- Have there been any significant changes in the community's demographics that could influence the effects of hazards?
- Are there new studies or data available that would enhance the risk assessment?
- Has the community been affected by any disasters? Did the NHMP accurately address the impacts of this event?

These questions will help the steering committee determine what components of the mitigation plan need updating. The steering committee will be responsible for updating any deficiencies found in the NHMP.

Mitigation Strategy

This section of the NHMP addendum addresses 44 CFR 201.6(c)(3)(iv), *Mitigation Strategy*.

The Town's mitigation strategy (action items) were developed during the 2017 NHMP planning process. The steering committee assessed the Town's risk, identified potential issues and developed a mitigation strategy (action items). The Town developed actions specific to their community after first reviewing a list of recommended actions developed by the County or recommended by OPDR. Some actions were developed out of the Upper Rogue Watershed Natural Hazard Risk Report ([DOGAMI, Open-File Report O-18-XX](#)).

Priority Actions

The Town is listing a set of high priority actions in an effort to focus attention on an achievable set of high leverage activities over the next five-years (Table BA-1). The Town's priority actions are listed below in the following table.

Action Item Pool

Table BA-2 presents a "pool" of mitigation actions. This expanded list of actions is available for local consideration as resources, capacity, technical expertise and/or political will become available.

Table BA-I Butte Falls Priority Action Items

Action Item ID	Mitigation Action Item	Timeline	Lead Organization	Partner Organization(s)	Potential Funding Source(s)
Priority Actions					
Multi-Hazard (MH)					
MH #1	Explore funding sources and grant opportunities for community-wide natural hazard mitigation and resiliency activities	Ongoing	City Administration	County Emergency Management, RVCOG, NRCS, ODG	General Fund (Staff Time)
MH #2	Obtain generators to provide power to maintain water and sewer systems.	Mid-Term (3-5 Years)	City Administration	RVCOG, DLCD, FEMA	Building Improvement Grants, HMGP, PDM
Drought (DR)					
DR #1	Obtain and connect a pump for emergency water connection to Medford Water Commission system.	Mid-Term (3-5 Years)	City Administration	Medford Water Commission	General Fund, HMA
Earthquake (EQ)					
EQ #1	Implement structural and non-structural retrofits to critical and essential facilities.	Short-Term (0-2 Years)	City Administration	Building officials, Planning, Public Works	General Fund, SRGP, PDM
Wildfire (WF)					
WF #1	Remove fuels from vacant lots/ alleys.	Ongoing	City Administration	Property Owners	General Fund, ODF
WF #2	Mutual aid agreement with Rogue Valley Fire Chiefs Association	Short-Term (0-2 Years)	City Administration	Rogue Valley Fire Chiefs Association	General Fund (Staff Time)

Source: Town of Butte Falls NHMP Steering Committee, 2017.

Table BA-2 Butte Falls Action Item Pool

Action Item ID	Mitigation Action Item	Timeline	Lead Organization	Partner Organization(s)	Potential Funding Source(s)
Action Item Pool					
Multi-Hazard (MH)					
MH #3	Sustain a public awareness and education campaign about natural hazards.	Ongoing	City Administration	County Emergency Management, FEMA, OEM, NWS, ODOT, CERT, RVCOG Utilities	General Fund, FEMA, DLCDC
MH #4	Obtain a generator to provide back-up power to maintain school's food supply.	Long-Term (5+ Years)	City Administration	OEM, FEMA, RVCOG	Building Improvement Grants, HMGP, PDM
MH #5	Use hazard information as a basis for city ordinances and regulations that govern site-specific land use decisions.	Long-Term (5+ Years)	City Administration	City/County GIS, FEMA, DLCDC	General Fund
MH #6	Integrate the Mitigation Plan findings into planning and regulatory documents and programs including the Comprehensive Plan (particularlry Goal 7).	Mid-Term (3-5 Years)	City Administration	RVCOG, DLCDC, FEMA	General Fund, DLCDC Technical Assistance Grant
MH #7	Perform a phased analysis study on landslide/earthquake risk for water tank.	Long-Term (5+ Years)	City Administration	DOGAMI	General Fund, PDM, FMA, HMGP, PA
MH #8	Identify current capabilities and research option to secure an early warning system (EWS) for flood/landslide risk.	Mid-Term (3-5 Years)	City Administration	County Emergency Management, OMD-OEM, DLCDC, USACE, Silver Jackets	General Fund, PDM, FMA, HMGP, PA
Drought (DR)					
	See priority actions and multi-hazard actions for applicable mitigation strategies.				

Source: Town of Butte Falls NHMP Steering Committee, 2017.

Table BA-2 Butte Falls Action Item Pool (continued)

Action Item ID	Mitigation Action Item	Timeline	Lead Organization	Partner Organization(s)	Potential Funding Source(s)
Action Item Pool					
Earthquake (EQ)					
EQ #2	Promote building safety through nonstructural improvements and public education.	Ongoing	City Administration	Building officials, American Red Cross, DOGAMI, OEM	General Fund
Emerging Infectious Disease (EID)					
	No specific action item developed for this hazard. See multi-hazard actions for applicable mitigation strategies.				
Flood (FL)					
FL #1	Promote Green Infrastructure/Low Impact Development as stormwater mitigation strategy.	Short-Term (0-2 Years)	City Administration	Rogue Valley Sewer Services	General Fund, RVSS
Landslide (LS)					
	No specific action item developed for this hazard. See multi-hazard actions for applicable mitigation strategies.				
Severe Weather (SW, Windstorm and Winter Storm)					
SW #1	Promote the benefits of tree-trimming and tree replacement programs and help to coordinate local efforts by public and private agencies.	Ongoing	City Administration	Public Works, Utility companies, ODOT, USFS, BLM, ODF, Fire	General Fund, HMA, Utilities
Volcano (VE)					
	No specific action item developed for this hazard. See multi-hazard actions for applicable mitigation strategies.				
Wildfire (WF)					
WF #3	Coordinate fire mitigation action items through the Rogue Valley Integrated Fire Plan.	Ongoing	City Administration	Fire Plan Committee and Participating Agencies	General Fund, ODF

Source: Town of Butte Falls NHMP Steering Committee, 2017.

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Risk Assessment

This section of the NHMP addendum addresses 44 CFR 201.6(b)(2) - Risk Assessment. In addition, this chapter can serve as the factual basis for addressing Oregon Statewide Planning Goal 7 – Areas Subject to Natural Hazards. Assessing natural hazard risk has three phases:

- **Phase 1:** Identify hazards that can impact the jurisdiction. This includes an evaluation of potential hazard impacts – type, location, extent, etc.
- **Phase 2:** Identify important community assets and system vulnerabilities. Example vulnerabilities include people, businesses, homes, roads, historic places and drinking water sources.
- **Phase 3:** Evaluate the extent to which the identified hazards overlap with or have an impact on, the important assets identified by the community.

The local level rationale for the identified mitigation strategies (action items) is presented herein and within Volume I, Sections 2 and 3. The risk assessment process is graphically depicted in Figure BA-1. Ultimately, the goal of hazard mitigation is to reduce the area of risk, where hazards overlap vulnerable systems.

Figure BA-1 Understanding Risk



Hazard Analysis

The Butte Falls steering committee developed their hazard vulnerability assessment (HVA), using the County’s HVA (Volume II, Appendix C) as a reference. Changes from the County’s HVA were made where appropriate to reflect distinctions in vulnerability and risk from natural hazards unique to Butte Falls, which are discussed throughout this addendum.

Table BA-3 shows the HVA matrix for Butte Falls listing each hazard listed in order of rank from high to low. 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.

Three chronic hazards (wildfire, emerging infectious disease and winter storm) and a catastrophic hazard (Cascadia Subduction Zone earthquake) rank as the top hazard threats to the Town (Top Tier). Windstorm and drought comprise the next highest ranked hazards (Middle Tier), while the flood, landslide, crustal earthquake and volcano hazards comprise the lowest ranked hazards (Bottom Tier).

Table BA-3 Hazard Analysis Matrix – Butte Falls

Hazard	Maximum				Total Threat Score	Hazard Rank	Hazard Tiers
	History	Vulnerability	Threat	Probability			
Wildfire	20	50	100	70	240	#1	Top Tier
Earthquake (Cascadia)	2	50	100	70	222	#2	
Emerging Infectious Disease	12	50	100	49	211	#3	
Winter Storm	20	40	80	70	210	#4	
Windstorm	20	20	50	70	160	#5	Middle Tier
Drought	20	15	50	63	148	#6	
Flood	10	10	50	21	91	#7	Bottom Tier
Landslide	6	15	30	21	72	#8	
Earthquake (Crustal)	2	15	30	21	68	#9	
Volcano	2	5	50	7	64	#10	

Source: Butte Falls NHMP Steering Committee, 2017.

Table BA-4 categorizes the probability and vulnerability scores from the hazard analysis for the Town and compares the results to the assessment completed by the Jackson County NHMP Steering Committee (Volume II, Appendix C). Variations between the Town and County are noted in **bold** text.

Table BA-4 Probability and Vulnerability Comparison

Hazard	Butte Falls		Jackson County	
	Probability	Vulnerability	Probability	Vulnerability
Drought	High	Moderate	High	Moderate
Earthquake (Cascadia)	High	High	High	High
Earthquake (Crustal)	Low	Low	Low	Moderate
Emerging Infectious Disease	Moderate	High	Moderate	High
Flood	Low	Low	High	Moderate
Landslide	Low	Low	High	Low
Volcano	Low	Low	Low	Low
Wildfire	High	High	High	Moderate
Windstorm	High	Moderate	High	Moderate
Winter Storm	High	High	High	Moderate

Source: Butte Falls NHMP Steering Committee, 2017.

Community Characteristics

Table BA-5 and the following section provides information on Town specific demographics and assets. For additional information on the characteristics of Butte Falls, in terms of geography, environment, population, demographics, employment and economics, as well as housing and transportation see Volume I, Section 2. Many of these community characteristics can affect how natural hazards impact communities and how communities choose to plan for natural hazard mitigation. Considering the Town specific assets during the planning process can assist in identifying appropriate measures for natural hazard mitigation. Between 2012 and 2016 the City grew by 5 people (1.2%) and median household income decreased by about 28% (Volume I, Section 2). New development has complied with the standards of the [Oregon Building Code](#) and the city's development code including their floodplain ordinance.

Transportation/Infrastructure

In the Town of Butte Falls, transportation has played a major role in shaping the community. Butte Falls' commercial areas developed along primary routes and residential development followed nearby.

Today, mobility plays an important role in Butte Falls and the daily experience of its residents and businesses as they move from point A to point B. The Town is primarily serviced through the Butte Falls Highway. In addition, the Butte Falls Discover Loop Tour is a recreational trail system that attracts visitors and provides alternative travel corridors for bikes and pedestrians.

By far, motor vehicles represent the dominant mode of travel through and within Butte Falls.

Economy

Traditionally, Butte Falls has built its economy on logging. According to economic Town data, Butte Falls finds their main economic drivers in the sectors of agriculture, forestry, fishing and hunting, tourism and education.¹

¹ City Data.com, Butte Falls, <http://www.city-data.com/city/Butte-Falls-Oregon.html> and as verified by City staff.

Table BA-5 Community Characteristics

Population Characteristics		
2012 Population	425	
2016 Population	430	
2035 Forecasted Population*	437	
Race and Ethnic Categories		
White	94%	
Black/ African American	0%	
American Indian and Alaska Native	0%	
Asian	0%	
Native Hawaiian and Other Pacific Islander	0%	
Some Other Race	< 1%	
Two or More Races	5%	
Hispanic or Latino	< 1%	
Limited or No English Spoken	< 1%	
Vulnerable Age Groups		
Less than 15 Years	64	15%
65 Years and Over	66	15%
Disability Status		
Total Population	101	24%
Children	4	1%
Seniors	18	4%

Income Characteristics		
Households by Income Category		
Less than \$15,000	41	27%
\$15,000-\$29,999	36	24%
\$30,000-\$44,999	23	15%
\$45,000-\$59,999	19	13%
\$60,000-\$74,999	13	9%
\$75,000-\$99,999	9	6%
\$100,000-\$199,999	5	3%
\$200,000 or more	5	3%
Median Household Income	\$29,375	
Poverty Rates		
Total Population	146	34%
Children	48	53%
Seniors	9	15%
Housing Cost Burden		
Owners with Mortgage		34%
Renters		54%

Source: U.S. Census Bureau, 2011-2015 American Community Survey; Portland State University, Population Research Center.

Note: * = Population forecast within UGB

Housing Characteristics		
Housing Units		
Single-Family	110	55%
Multi-Family	26	13%
Mobile Homes	64	32%
Year Structure Built		
Pre-1970	103	52%
1970-1989	28	14%
1990 or later	69	35%
Housing Tenure and Vacancy		
Owner-occupied	90	60%
Renter-occupied	61	40%
Vacant	37	19%

Butte Falls is located in Jackson County in southwestern Oregon. The Town has both grown and declined in population since its incorporation in 1911 and has an area today of .40 square miles. It is located in the northeast region of the County, located about 30 miles northeast of the Town of Medford and about 5 miles from the Rogue River-Siskiyou National Forest. The Town and most of Jackson County are within the Rogue and Umpqua watersheds.

Butte Falls experiences a relatively mild climate with four distinct seasons that comes from its position on the west coast of North America and within the Cascade Range mountains. The town is in a fairly mountainous area of the Rogue Valley, approximately 2,500 feet above sea level. Mt McLoughlin, part of the Siskiyou Mountain Range, rises to 9,500 feet to the southeast. Butte Falls averages more precipitation per month than the state of Oregon especially during November and December. The Town of Butte Falls includes a diversity of land uses but is zoned primarily residential.

For more information see Volume I, Section 2.

Community Assets

This section outlines the resources, facilities and infrastructure that, if damaged, could significantly impact the public safety, economic conditions and environmental integrity of Butte Falls.

Critical Facilities

Facilities that are critical to government response and recovery activities (i.e. life, safety, property and environmental protection). These facilities include: 911 Centers, Emergency Operations Centers, Police and Fire Stations, Public Works facilities, sewer and water facilities, hospitals, bridges, roads, shelters and more. Facilities that, if damaged, could cause serious secondary impacts may also be considered "critical." A hazardous material facility is one example of this type of critical facility.

Fire Stations:

- Butte Falls Fire Department
- Fire office
- Fire garage

Law Enforcement:

- Butte Falls Police Department

Public Works:

- Public Works Building
(located at Waste Water Treatment Plant)

Government:

- USFS Butte Falls Ranger District Office (staff up during summer months)

Town Buildings:

- Butte Falls Town Hall
- Butte Falls Community Hall
- Butte Falls Community School Partnership at the Landing

Private:

- Butte Falls General Store
- Butte Falls Service Station
- Cafes in Town (2)

Essential Facilities

Facilities that are essential to the continued delivery of key government services and/or that may significantly impact the public's ability to recover from the emergency. These facilities may include: Town buildings such as the Public Services Building, the Town Hall and other public facilities such as schools.

Hospitals/Immediate Medical Care Facilities:

- Community Health Center

Public Schools:

- Butte Falls Elementary School
- Butte Falls Charter School

County Buildings:

- Butte Falls Library

Potential Shelter Sites:

- All Butte Falls Schools (Red Cross designated)
- Butte Falls Assembly of God
- Forest Service Complex
- Butte Falls Community Bible

Infrastructure:

Infrastructure that provides services for the Town include:

Transportation Networks:

- John Dyck Bypass
- Broad St
- Butte Falls Rd (Co. Rd 821)
- Butte Falls/Prospect Rd
- Fish Lake Rd
- Falls Rd

Water Facilities:

- Complete potable water system
- Complete sewage treatment system
- Bulk water plan
- Water bottling plant

Special Service Districts:

- Southern Oregon Education Service District
- 911 Service District

Private Utilities:

- Pacific Power
- Century Link
- DishNet, Direct TV, Satellite
- Hunter (schools)

Hazard Characteristics

Drought

The steering committee determined that the Town's probability for drought is **high** (which is the same as the County's rating) and that their vulnerability to drought is **low** (which is lower than the County's rating).

Volume I, Section 3 describes the characteristics of drought hazards, history, as well as the location, extent and probability of a potential event. Due to the climate of Jackson County, past and present weather conditions have shown an increasing potential for drought.

The City receives its main water supply from Ginger Springs. The Town has an adequate supply have high quality water and draws 3.6 million gallons per week (mgw). In addition, the Town maintains an emergency connection to Medford Water Commission (however, they do not currently have a pump). For more information on the future of Butte Fall's water supply visit their [website](#).

Please review Volume I, Section 3 for additional information on this hazard.

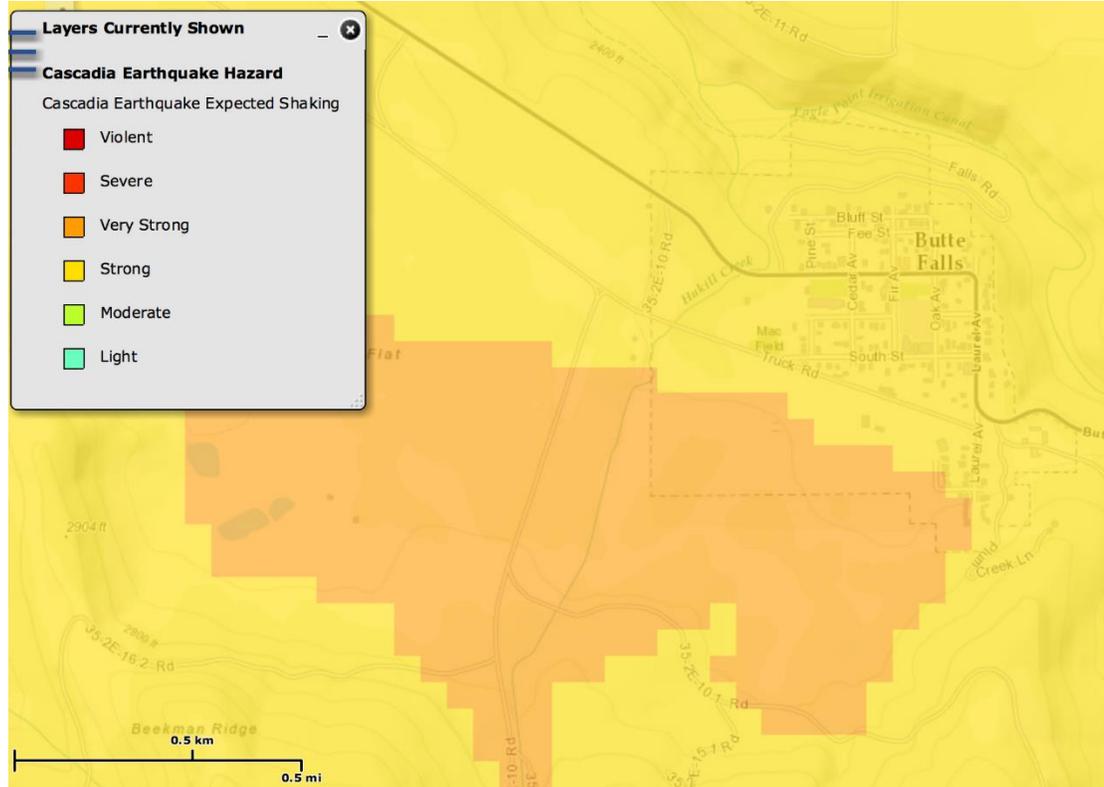
Earthquake (Cascadia)

The steering committee determined that the Town's probability for a Cascadia Subduction Zone (CSZ) earthquake is **high** (which is the same as the County's rating) and that their vulnerability to a CSZ earthquake is **high** (which is the same as the County's rating).

Volume I, Section 3 describes the characteristics of earthquake hazards, history, as well as the location, extent and probability of a potential event. Generally, an event that affects the County is likely to affect Butte Falls as well. The causes and characteristics of an earthquake event are appropriately described within Volume I, Section 3, as well as the location and extent of potential hazards. Previous occurrences are well documented within Volume I, Section 3 and the community impacts described by the County would generally be the same for Butte Falls as well.

The local faults, the County's proximity to the Cascadia Subduction Zone, potential slope instability and the prevalence of certain soils subject to liquefaction and amplification combine to give the County a high-risk profile. Due to the expected pattern of damage resulting from a CSZ event, the Oregon Resilience Plan divides the State into four distinct zones and places Jackson County predominately within the "Valley Zone" (Valley Zone, from the summit of the Coast Range to the summit of the Cascades). Within the Southwest Oregon region, damage and shaking is expected to be strong and widespread - an event will be disruptive to daily life and commerce and the main priority is expected to be restoring services to business and residents. Figure BA-2 displays relative shaking hazards from a Cascadia Subduction Zone earthquake event. As shown in the figure below, the area of greatest concern within the Town of Butte Falls (darker areas).

Figure BA-2 Cascadia Subduction Zone



Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](#)

Note: To view detail click the link above to access Oregon HazVu.

As noted in the community profile, approximately 66% of residential buildings were built prior to 1990, which increases the Town’s vulnerability to the earthquake hazard. Information on specific public buildings’ (schools and public safety) estimated seismic resistance, determined by DOGAMI in 2007, is shown in Table BA-6; each “X” represents one building within that ranking category. Of the facilities evaluated by DOGAMI using a Rapid Visual Survey (RVS), one (1) has a very high (100% chance) collapse potential.

In addition to building damages, utility (electric power, water, wastewater, natural gas) and transportation systems (bridges, pipelines) are also likely to experience significant damage.

Utility systems will be significantly damaged, including damaged buildings and damage to utility infrastructure, including water and wastewater treatment plants and equipment at high voltage substations (especially 230 kV or higher which are more vulnerable than lower voltage substations). Buried pipe systems will suffer extensive damage with approximately one break per mile in soft soil areas. There would be a much lower rate of pipe breaks in other areas. Restoration of utility services will require substantial mutual aid from utilities outside of the affected area.

Table BA-6 Rapid Visual Survey Scores

Facility	Site ID*	Level of Collapse Potential			
		Low (< 1%)	Moderate (>1%)	High (>10%)	Very High (100%)
Public Safety					
City Hall (prev. Butte Falls Police Department) (431 Broad St)	Jack_pol06	X			
Butte Falls Volunteer Fire Department (431 Broad St)	Jack_fir12				X

Source: [DOGAMI 2007. Open File Report 0-07-02. Statewide Seismic Needs Assessment Using Rapid Visual Assessment.](#) “*” – Site ID is referenced on the [RVS Jackson County Map](#)

Mitigation Successes

Seismic retrofit grant awards per the [Seismic Rehabilitation Grant Program](#)² have been funded to retrofit The Butte Falls High School (Charter School; Phase One of 2015-2017 grant award, \$1,492,300) and Butte Falls Volunteer Fire Department (Phase Two of 2015-2017 grant award, \$337,540).

Natural Hazard Risk Report: Upper Rogue Watershed

The Oregon Department of Geology and Mineral Industries (DOGAMI) conducted a natural hazard risk assessment (Risk Report) for portions of Jackson County (Upper Rogue Watershed) including Butte Falls. The study is funded through the FEMA Risk MAP program and was completed in 2018. The Risk Report provides a quantitative risk assessment that informs communities of their risks related to certain natural hazards. The Town hereby incorporates the Risk Report into this addendum by reference to provide greater detail to hazard sensitivity and exposure ([DOGAMI, Open-File Report O-18-XX](#)).

The **Risk Report** identifies that during a CSZ earthquake, approximately 5 buildings will be damaged (0 critical facilities) for a total loss of \$216,000 (a loss ratio of 1.6%). In addition, no residents are expected to be displaced.

Earthquake (Crustal)

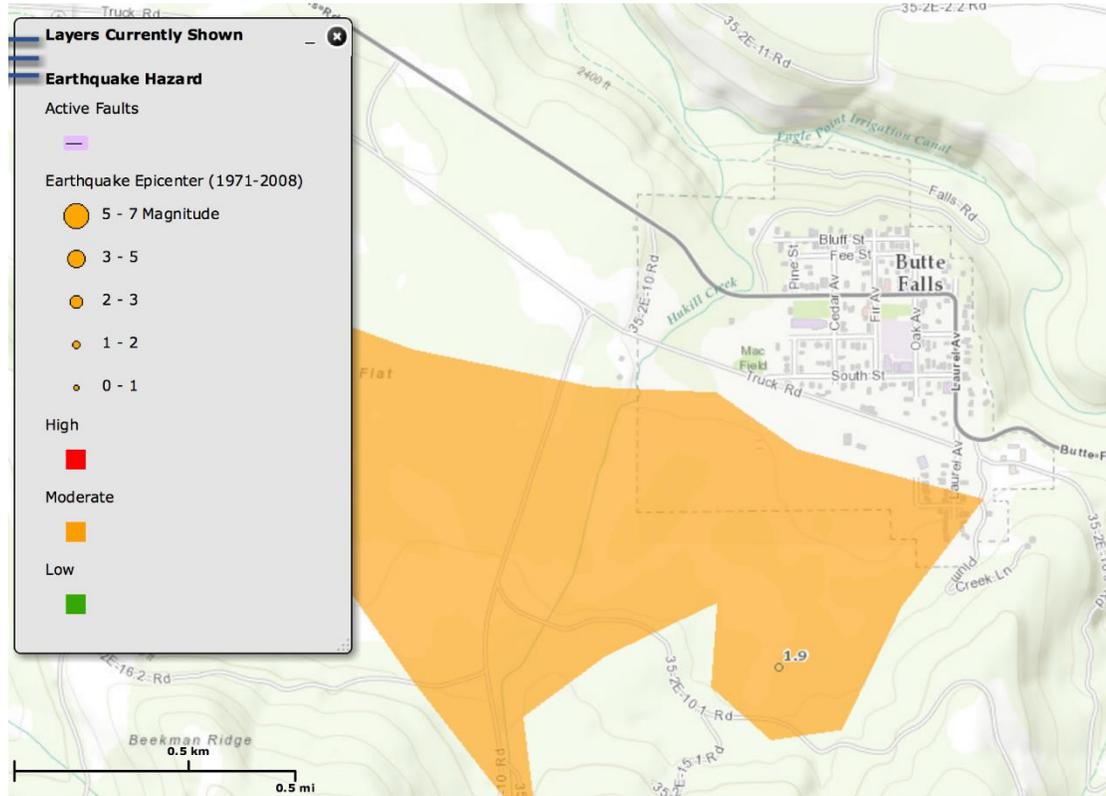
The steering committee determined that the Town’s probability for a crustal earthquake is **low** (which is the same as the County’s rating) and that their vulnerability to crustal earthquake is **low** (which is lower than the County’s rating).

Volume I, Section 3 describes the characteristics of earthquake hazards, history, as well as the location, extent and probability of a potential event. Generally, an event that affects the County is likely to affect Butte Falls as well. The causes and characteristics of an earthquake event are appropriately described within Volume I, Section 3, as well as the location and extent of potential hazards. Previous occurrences are well-documented within Volume I, Section 3 and the community impacts described by the County would generally be the same for Butte Falls as well.

² The Seismic Rehabilitation Grant Program (SRGP) is a state of Oregon competitive grant program that provides funding for the seismic rehabilitation of critical public buildings, particularly public schools and emergency services facilities.

Earthquake-induced damages are difficult to predict and depend on the size, type and location of the earthquake, as well as site-specific building and soil characteristics. Presently, it is not possible to accurately forecast the location or size of earthquakes, but it is possible to predict the behavior of soil at any particular site. In many major earthquakes, damages have primarily been caused by the behavior of the soil. Figure BA-3 displays relative liquefaction hazards. As shown in the figure below, the area of greatest concern near the Town of Butte Falls (liquefaction hazard orange areas) is to the southwest of the Town.

Figure BA-3 Active Faults and Soft Soils



Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](#)
 Note: To view detail click the link above to access Oregon HazVu.

Please review Volume I, Section 3 for additional information on this hazard.

Emerging Infectious Disease

The steering committee determined that the Town’s probability for emerging infectious disease is **moderate** (which is the same as the County’s rating) and that their vulnerability is **high** (which is the same as the County’s rating).

Emerging infectious diseases are those that have recently appeared in a population or those whose incidence or geographic range is rapidly increasing or threatens to increase. Emerging infections may be caused by biological pathogens (e.g., virus, parasite, fungus or bacterium) and may be: previously unknown or undetected biological pathogens, biological pathogens that have spread to new geographic areas or populations, previously known biological pathogens whose role in specific diseases was previously undetected and biological

pathogens whose incidence of disease was previously declining but whose incidence of disease has reappeared (re-emerging infectious disease).³

Volume I, Section 3 describes the characteristics of emerging infectious disease, history, as well as the location, extent and probability of a potential event within the region. Generally, an event that affects the County is likely to affect the Town as well.

Please review Volume I, Section 3 for additional information on this hazard.

Flood

The steering committee determined that the Town's probability for flood is **low** (which is lower than the County's rating) and that their vulnerability to flood is **low** (which is the same as the County's rating).

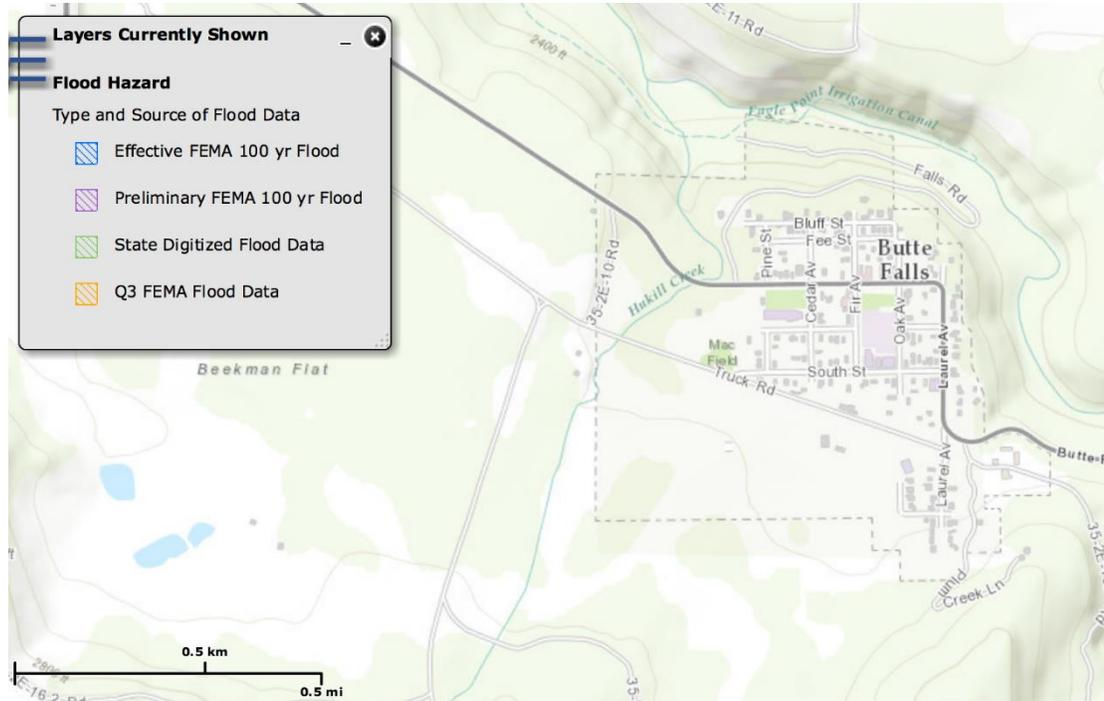
Volume I, Section 3 describes the characteristics of flood hazards, history, as well as the location, extent and probability of a potential event. There is no portion of Butte Falls that has areas of flood plains (Figure BA-4). Despite the lack of mapped flood hazard, other portions of Butte Falls, outside of the mapped floodplains, are also subject to flooding from local storm water drainage; however, areas that flood do not impact development or infrastructure.

Big Butte Creek is the chief source of flooding in Butte Falls, Hukill Creek also travels through the Town's western edge. There is a low potential for flood from this water source, but the canal will likely show signs of stress or potential urban flooding in the event of heavy rains or winter storms. Big Butte Creek is a primary drinking water source for residents of the Rogue Valley. The Eagle Point Irrigation Canal begins just downstream from Butte Falls and diverts 100 cubic feet per second (cfs) of water for irrigation within the Little Butte Creek Watershed.

The Town is at minor risk from two types of flooding: riverine and urban. Riverine flooding occurs when streams overflow their banks and inundate low-lying areas. This is a natural process that adds sediment and nutrients to fertile floodplain areas. It usually results from prolonged periods of precipitation over a wide geographic area. Most areas are generally flooded by low velocity sheets of water. Urban flooding occurs as land is converted to impervious surfaces and hydrologic systems are changed. Precipitation is collected and transmitted to streams at a much faster rate, causing floodwaters that rise rapidly and peak with violent force. During urban flooding, storm drains can back up and cause localized flooding of streets and basements.

³ Baylor College of Medicine, Emerging Infectious Disease, URL: <https://www.bcm.edu/departments/molecular-virology-and-microbiology/emerging-infections-and-biodefense/emerging-infectious-diseases>, accessed September 17, 2017.

Figure BA-4 Special Flood Hazard Area



Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](#)

Note: To view detail click the link above to access Oregon HazVu.

Floods can have a devastating impact on almost every aspect of the community, including private property damage, public infrastructure damage and economic loss from business interruption. It is important for the Town to be aware of flooding impacts and assess its level of risk. The Town has been proactive in mitigating flood hazards by purchasing floodplain property.

The economic losses due to business closures often total more than the initial property losses that result from flood events. Business owners and their employees are significantly impacted by flood events. Direct damages from flooding are the most common impacts, but indirect damages, such as diminished clientele, can be just as debilitating to a business.

The FEMA Flood Insurance Study (January 19, 2018) has a brief history of flooding in Jackson County and Butte Falls (Volume I, Section 3). Currently, no critical or essential facilities are located in the floodplain.

The amount of property in potential flood areas is not a large area but damage could be significant as it would affect residential, commercial and public property. Floodwaters can affect building foundations, seep into basements or cause damage to the interior, exterior and contents of buildings, dependent upon the velocity and depth of the water and by the presence of floating debris. The Town sewer system can overflow during flood events and cause further property damage.

Natural Hazard Risk Report: Upper Rogue Watershed

The Risk Report ([DOGAMI, Open-File Report O-18-XX](#)) does not include potential loss due to flood since there are no mapped floodplains within the Town.

For mitigation planning purposes, it is important to recognize that flood risk for a community is not limited only to areas of mapped floodplains. Other portions of Butte Falls outside of the mapped floodplains may also be at relatively high risk from over bank flooding from streams too small to be mapped by FEMA or from local storm water drainage.

National Flood Insurance Program (NFIP)

The effective Flood Insurance Rate Map (FIRM) for Butte Falls was created in 1976 (effective June 30, 1976); note Butte Falls was not included in the Jackson County Flood Insurance Study of 2011, revised January 19, 2018. Table BA-7 shows that Butte Falls has one (1) National Flood Insurance Program (NFIP) policy in force. Of those, zero (0) are for properties that were constructed before the initial FIRM. The last Community Assistance Visit (CAV) for Butte Falls was on August 31, 2011. The table shows that the flood insurance policy is for a single-family residential structure. There has been a total of zero (0) paid claims. The City complies with the NFIP through enforcement of their flood damage prevention ordinance and their floodplain management program.

The Community Repetitive Loss record for Butte Falls identifies zero (0) Repetitive Loss Properties⁴ and zero (0) Severe Repetitive Loss Properties⁵. For details on the repetitive loss properties Volume I, Section 3.

Table BA-7 Flood Insurance Detail

Jurisdiction	Effective FIRM and FIS	Initial FIRM Date	Total Policies	Pre-FIRM Policies	Policies by Building Type				Minus Rated A Zone
					Single Family	2 to 4 Family	Other Residential	Non-Residential	
Jackson County	-	-	1,828	809	1,568	44	91	125	126
Butte Falls	6/30/1976	6/30/1976	1	0	1	0	0	0	0

Jurisdiction	Insurance in Force	Total Paid Claims	Pre-FIRM Claims Paid	Substantial Damage Claims	Total Paid Amount	Repetitive Loss Structures	Severe Repetitive Loss Properties	CRS Class Rating	Last Community Assistance Visit
Jackson County	\$ 442,723,400	197	132	10	\$ 2,337,660	8	0	-	-
Butte Falls	\$ 42,000	0	0	0	\$ -	0	0	-	8/31/2011

Source: Information compiled by Department of Land Conservation and Development, July 2016.

Please review Volume I, Section 3 for additional information on this hazard.

⁴ A Repetitive Loss (RL) property is any insurable building for which two or more claims of more than \$1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978. A RL property may or may not be currently insured by the NFIP.

⁵ A Severe Repetitive Loss (SRL) property is a single family property (consisting of 1 to 4 residences) that is covered under flood insurance by the NFIP and has incurred flood-related damage for which 4 or more separate claims payments have been paid under flood insurance coverage, with the amount of each claim payment exceeding \$5,000 and with cumulative amount of such claims payments exceeding \$20,000; or for which at least 2 separate claims payments have been made with the cumulative amount of such claims exceeding the reported value of the property.

Landslide

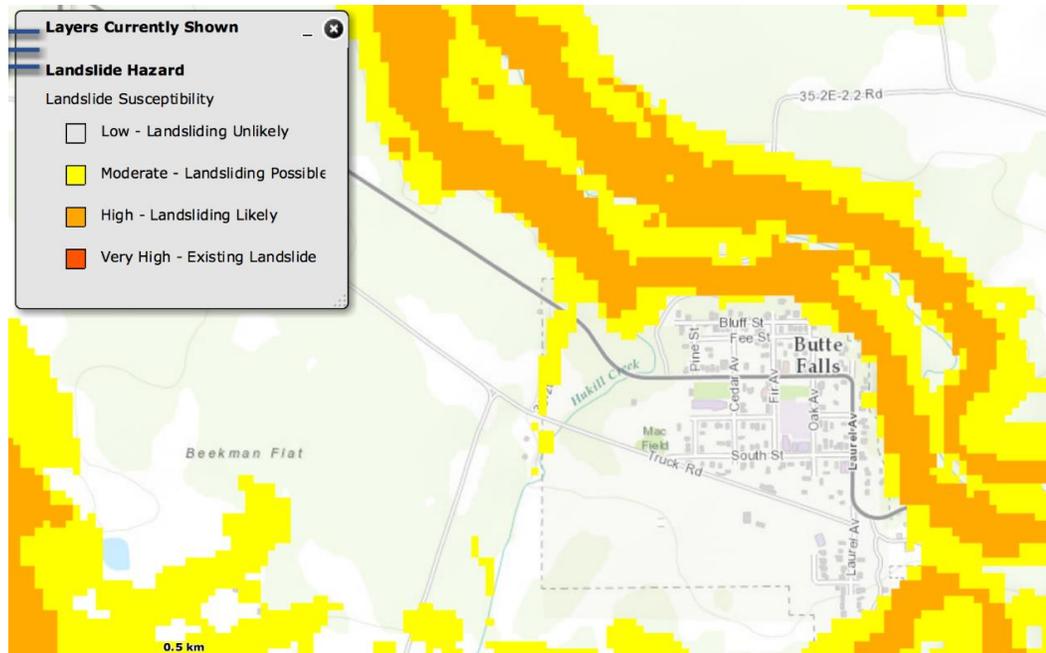
The steering committee determined that the Town's probability for landslide is **low** (which is lower than the County's rating) and that their vulnerability to landslide is **low** (which is the same as the County's rating).

Volume I, Section 3 describes the characteristics of landslide hazards, history, as well as the location, extent and probability of a potential event within the region.

Landslide susceptibility exposure for Butte Falls is shown in Figure BA-5. Most of Butte Falls demonstrates a low susceptibility to landslide exposure, with corridors of moderate and high susceptibility concentrated around the edges of the Town. Approximately 7% of Butte Falls has high and approximately 10% moderate, landslide susceptibility exposure⁶. The chief concern for landslide is along Butte Falls Road west of town between mile post 11 and 12 (landslides in past has sunken the road and guard rails). An additional concern is in the southeast corner of town where a water is located on steep slopes; however, the slopes in this area have not experienced landslides.

Note that even if a jurisdiction has a high percentage of area in a high or very high landslide exposure susceptibility zone, this does not mean there is a high risk, because risk is the intersection of hazard and assets.

Figure BA-5 Landslide Susceptibility Exposure



Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](#)

Note: To view detail click the link above to access Oregon HazVu.

Natural Hazard Risk Report: Upper Rogue Watershed

The **Risk Report** ([DOGAMI, Open-File Report O-18-XX](#)) does not include potential loss due to landslide.

⁶ DOGAMI Open-File Report, O-16-02, Landslide Susceptibility Overview Map of Oregon (2016)

Severe Weather

Severe weather can account for a variety of intense and potentially damaging weather events. These events include windstorms and winter storms. The following section describes the unique probability and vulnerability of each identified weather hazard. Other more abrupt or irregular events such as hail are also described in this section.

Windstorm

The steering committee determined that the Town's probability for windstorm is **high** (which is the same as the County's rating) and that their vulnerability to windstorm is **moderate** (which is the same as the County's rating).

Volume I, Section 3 describes the characteristics of windstorm hazards, history, as well as the location, extent and probability of a potential event within the region. Because windstorms typically occur during winter months, they are sometimes accompanied by ice, freezing rain, flooding and snow. Other severe weather events that may accompany windstorms, including thunderstorms, hail and lightning strikes are standard for Butte Falls.

Volume I, Section 3 describes the impacts caused by windstorms, including power outages, downed trees, heavy precipitation, building damages and storm-related debris. Additionally, transportation and economic disruptions result as well. Butte Falls regularly experiences high winds and had 75 mph winds in 2008 that left the Town without power for two to three days. Pacific Power has mitigated the risk of power loss by trimming trees near their above ground infrastructure along Butte Falls Highway as it approaches the Town from the west.

Damage from high winds generally has resulted in downed utility lines and trees. Electrical power can be out anywhere from a few hours to several days. Outdoor signs have also suffered damage. If the high winds are accompanied by rain (which they often are), blowing leaves and debris clog drainage-ways, which in turn causes localized urban flooding.

Please review Volume I, Section 3 for additional information on this hazard.

Winter Storm (Snow/Ice)

The steering committee determined that the Town's probability for winter storm is **high** (which is the same as the County's rating) and that their vulnerability to winter storm is **high** (which is higher than the County's rating).

Volume I, Section 3 describes the characteristics of winter storm hazards, history, as well as the location, extent and probability of a potential event within the region. Severe winter storms can consist of rain, freezing rain, ice, snow, cold temperatures and wind. They originate from troughs of low pressure offshore that ride along the jet stream during fall, winter and early spring months. Severe winter storms affecting the Town typically originate in the Gulf of Alaska or in the central Pacific Ocean. These storms are most common from November through March.

Major winter storms can and have occurred in the Butte Falls area and while they typically do not cause significant damage, they are frequent and have the potential to impact economic activity. Road closures due to winter weather are an uncommon occurrence, but can interrupt commuter and commercial traffic.

Please review Volume I, Section 3 for additional information on this hazard.

Volcano

The steering committee determined that the Town's probability for a volcanic event is **low** (which is the same as the County's rating) and that their vulnerability to a volcanic event is **low** (which is the same as the County's rating).

Volume I, Section 3 describes the characteristics of volcanic hazards, history, as well as the location, extent and probability of a potential event within the region. Generally, an event that affects the County is likely to affect Butte Falls as well. Butte Falls is very unlikely to experience anything more than volcanic ash during a volcanic event.

Please review Volume I, Section 3 for additional information on this hazard.

Wildfire

The steering committee determined that the Town's probability for wildfire is **high** (which is the same as the County's rating) and that their vulnerability to wildfire is **high** (which is higher than the County's rating).

Volume I, Section 3 describes the characteristics of wildfire hazards, history, as well as the location, extent and probability of a potential event within the region. The location and extent of a wildfire vary depending on fuel, topography and weather conditions. Weather and urbanization conditions are primarily at cause for the hazard level. Wildfires near Butte Falls in recent times have included the Double Day wildfire in 2008 which approached the Town from the south.

The potential community impacts and vulnerabilities described in Volume I, Section 3 are generally accurate for the Town as well. The [Rogue Valley Integrated Community Wildfire Protection Plan](#) (RVIFP, updated 2017), assesses wildfire risk, maps wildland urban interface areas and includes actions to mitigate wildfire risk. The Town is included in the RVIFP and will update the Town's wildfire risk assessment if the RVIFP presents better data during future updates (an action item is included within Volume I, Section 4 to participate in updates to the integrated fire plan and to continue to maintain and update their RVIFP). The forest service and Town are actively reducing fuels in and around town but anticipate an increase in wildfire risk with maturation of the forest near town. The Town hereby incorporates the RVIFP into this addendum by reference to provide greater detail to sensitivity and exposure to the wildfire hazard.

Property can be damaged or destroyed with one fire as structures, vegetation and other flammables easily merge to become unpredictable and hard to manage. Other factors that affect ability to effectively respond to a wildfire include access to the location and to water, response time from the fire station, availability of personnel and equipment and weather (e.g., heat, low humidity, high winds and drought).

Natural Hazard Risk Report: Upper Rogue Watershed

The **Risk Report** ([DOGAMI, Open-File Report O-18-XX](#)) identifies that there are 145 buildings (3 critical facilities; Butte Falls Town Hall, Butte Falls Elementary School and the Public Works Facility) exposed to High wildfire risk for a total potential loss of \$6.35 million (a loss ratio of 46%). In addition, about 230 residents may be displaced (54% of the population).

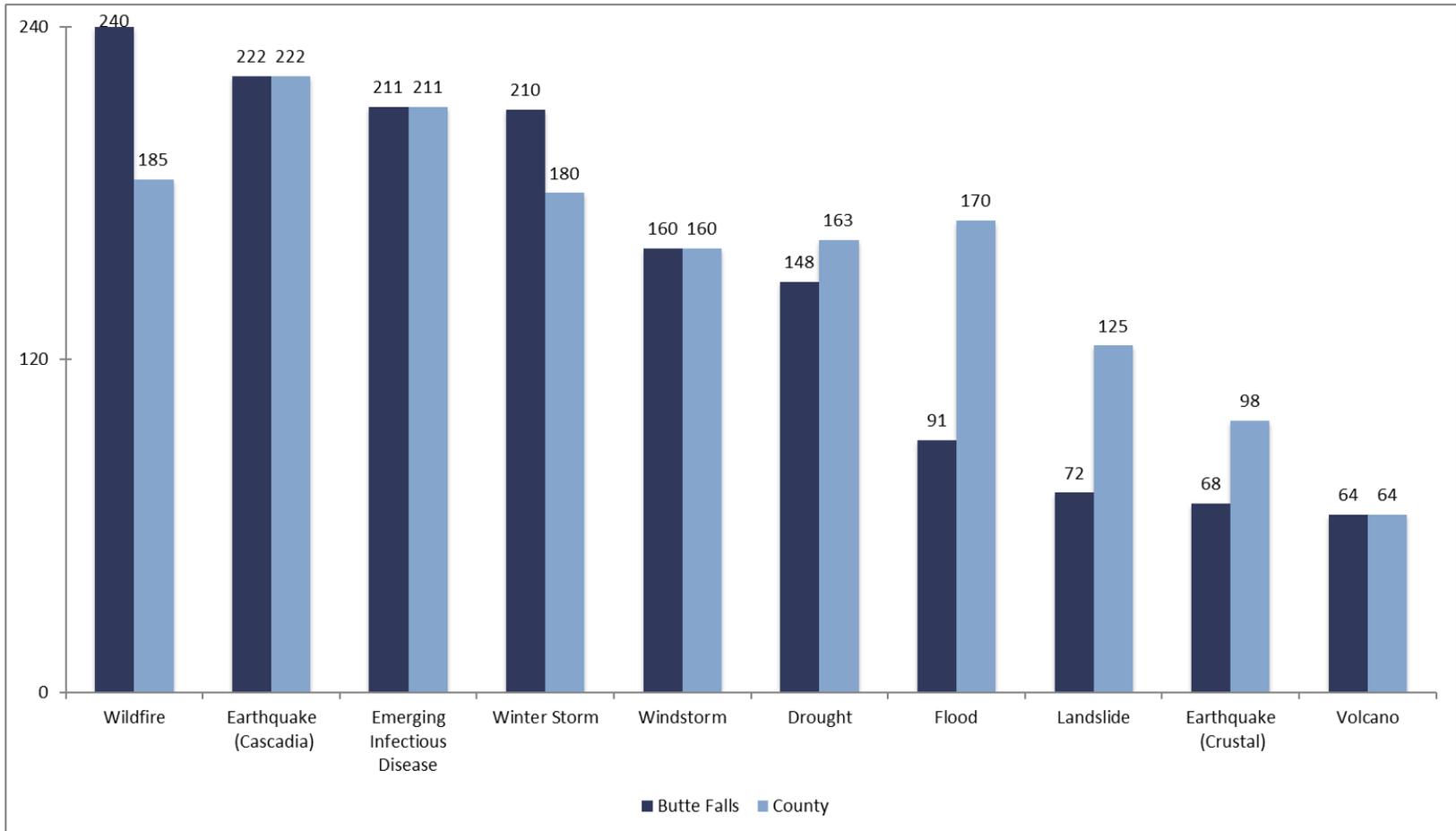
Please review Volume I, Section 3 for additional information on this hazard.

Summary

Figure BA-6 below presents a summary of the hazard analysis for Butte Falls and compares the results to the assessment completed by Jackson County. The Town rates wildfire as its top hazard, followed by Cascadia Subduction Zone earthquake, emerging infectious disease and winter storms.

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Figure BA-6 Overall Hazard Analysis Comparison – Butte Falls/Jackson County



Source: Town of Butte Falls NHMP Steering Committee and Jackson County NHMP Steering Committee, 2017.

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CITY OF EAGLE POINT ADDENDUM

Purpose

This is an update of the Eagle Point addendum to the Jackson County Multi-Jurisdictional Natural Hazard Mitigation Plan (MNHMP, NHMP). This addendum supplements information contained in Volume I (Basic Plan) which serves as the NHMP foundation and Volume II (Appendices) which provide additional information. This addendum meets the following requirements:

- Multi-Jurisdictional **Plan Adoption** §201.6(c)(5),
- Multi-Jurisdictional **Participation** §201.6(a)(3),
- Multi-Jurisdictional **Mitigation Strategy** §201.6(c)(3)(iv) and
- Multi-Jurisdictional **Risk Assessment** §201.6(c)(2)(iii).

Updates to Eagle Point's addendum are further discussed throughout the NHMP and within Volume II, Appendix B, which provides an overview of alterations to the document that took place during the update process.

Mitigation Plan Mission

The NHMP mission states the purpose and defines the primary functions of the NHMP. It is intended to be adaptable to any future changes made to the NHMP and need not change unless the community's environment or priorities change.

The City concurs with the mission statement developed during the Jackson County planning process (Volume I, Section 4):

Protect life, property and the environment, reduce risk and prevent loss from natural hazard events through coordination and cooperation among public and private partners.

Mitigation Plan Goals

Mitigation plan goals are more specific statements of direction that Jackson County citizens and public and private partners can take while working to reduce the City's risk from natural hazards. These statements of direction form a bridge between the broad mission statement and particular action items. The goals listed here serve as checkpoints as agencies and organizations begin implementing mitigation action items.

The City concurs with the goals developed during the Jackson County planning process (Volume I, Section 4). All of the NHMP goals are important and are listed below in no particular order of priority. Establishing community priorities within action items neither negates nor eliminates any goals, but it establishes which action items to consider to implement first, should funding become available.

Below is a list of the NHMP goals:

GOAL 1: EMERGENCY SERVICES

Minimize life safety issues by promoting, strengthening and coordinating emergency response plans.

GOAL 2: EDUCATION AND OUTREACH

Further the public's awareness and understanding of natural hazards and potential risk, including economic vulnerability and mitigation efforts.

GOAL 3: PREVENTION

Reduce the threat of loss of life and property from natural hazards by incorporating information on known hazards and providing incentives to make hazard mitigation planning a priority in land use policies and decisions, including plan implementation.

GOAL 4: PROPERTY PROTECTION

Lessen impact from natural disasters on individual properties, businesses and public facilities by increasing awareness at the individual level and encouraging activities that can prevent damage and loss of life from natural hazards.

GOAL 5: PARTNERSHIP AND COORDINATION

Identify mitigation or risk reduction measures that address multiple areas (i.e., environment, transportation, telecommunications); Coordinate public/private sector participation in planning and implementing mitigation projects throughout the City; and seek funding and resource partnerships for future mitigation efforts.

GOAL 6: NATURAL RESOURCE PROTECTION

Preserve and rehabilitate natural systems to serve natural hazard mitigation functions (i.e., floodplains, wetlands, watershed and urban interface areas).

GOAL 7: STRUCTURAL PROTECTIONS

When applicable, utilize structural mitigation activities to minimize risks associated with natural hazards.

NHMP Process, Participation and Adoption

This section of the NHMP addendum addresses 44 CFR 201.6(c)(5), *Plan Adoption* and 44 CFR 201.6(a)(3), *Participation*. The first update of the Jackson County NHMP was approved by FEMA on February 4, 2013. To maintain compliance with the Disaster Mitigation Act of 2000 (DMA2K), the NHMP required an update by February 3, 2018. Eagle Point was included with an addendum in the 2012 Jackson County NHMP process.

The Oregon Partnership for Disaster Resilience (OPDR) at the University of Oregon's Community Service Center (CSC) partnered with the Oregon Military Department's Office of Emergency Management (OEM), Jackson County and Eagle Point to update their NHMP. This project is funded through the Federal Emergency Management Agency's (FEMA) FY15 Pre-Disaster Mitigation Competitive Grant Program (PDMC-PL-10-PR-2015-003). Members of

the Eagle Point NHMP steering committee also participated in the County NHMP update process (Volume II, Appendix B).

By updating the NHMP, locally adopting it and having it re-approved by FEMA, Eagle Point will maintain eligibility for FEMA Hazard Mitigation, Pre-Disaster Mitigation and Flood Mitigation Assistance grant program funds.

The Jackson County NHMP and Eagle Point addendum, are the result of a collaborative effort between citizens, public agencies, non-profit organizations, the private sector and regional organizations. A project steering committee guided the process of developing the NHMP.

The Eagle Point Police Chief served as the designated convener of the NHMP update and the City Administrator will take the lead in implementing, maintaining and updating the addendum to the Jackson County NHMP in collaboration with the designated convener of the Jackson County NHMP (Emergency Manager).

Representatives from the City of Eagle Point steering committee met formally and informally, to discuss updates to their addendum (Volume II, Appendix B). The steering committee reviewed and revised the City's addendum, with particular focus on the NHMP's risk assessment and mitigation strategy (action items).

This addendum reflects decisions made at the designated meetings and during subsequent work and communication with Jackson County Emergency Management and the OPDR. The changes are highlighted with more detail throughout this document and within Volume II, Appendix B. Other documented changes include a revision of the City's risk assessment and hazard identification sections, NHMP mission and goals, action items and community profile.

The Eagle Point Steering Committee was comprised of the following representatives:

- Convener, Vern Thompson, Police Chief
- Robert Miller, Public Works Director
- Mike Upston, Planning Director

Public participation was achieved with the establishment of the steering committee, which was comprised of City officials representing different departments and sectors and members of the public. The steering committee was closely involved throughout the development of the NHMP and served as the local oversight body for the NHMP's development. Community members were provided an opportunity for comment via the NHMP review process and through a survey administered by the OPDR and publicized by the participating jurisdictions (see Appendix B for more information).

The Jackson County NHMP was approved by FEMA on [Month] [Day], 2018 and the Eagle Point addendum was adopted via resolution on [Month] [Day], 2018. This NHMP is effective through [Month] [Day], 2023.

NHMP Implementation and Maintenance

The City Council will be responsible for adopting the Eagle Point addendum to the Jackson County NHMP. This addendum designates a steering committee and a convener to oversee the development and implementation of action items. Because the City addendum is part of

the County's multi-jurisdictional NHMP, the City will look for opportunities to partner with the County. The City's steering committee will convene after re-adoption of the Eagle Point NHMP addendum on an annual schedule. The County is meeting on a semi-annual basis and will provide opportunities for the cities to report on NHMP implementation and maintenance during their meetings. The Eagle Point City Administrator will serve as the convener and will be responsible for assembling the steering committee. The steering committee will be responsible for:

- Reviewing existing action items to determine suitability of funding;
- Reviewing existing and new risk assessment data to identify issues that may not have been identified at NHMP creation;
- Educating and training new steering committee members on the NHMP and mitigation actions in general;
- Assisting in the development of funding proposals for priority action items;
- Discussing methods for continued public involvement; and
- Documenting successes and lessons learned during the year.

The convener will also remain active in the County's implementation and maintenance process (Volume I, Section 5).

The City will utilize the same action item prioritization process as the County (Volume I, Section 5 and Volume II, Appendix D).

Implementation through Existing Programs

Many of the Natural Hazard Mitigation Plan's recommendations are consistent with the goals and objectives of the City's existing plans and policies. Where possible, Eagle Point will implement the NHMP's recommended actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses and policy makers. Many land-use, comprehensive and strategic plans get updated regularly, allowing them to adapt to changing conditions and needs. Implementing the NHMP's action items through such plans and policies increases their likelihood of being supported and implemented.

Eagle Point's acknowledged comprehensive plan is the City of Eagle Point Comprehensive Plan (2013). The City implements the plan through the Community Development Code.

Eagle Point currently has the following plans that relate to natural hazard mitigation. For a complete list visit the City's [website](#):

- [Comprehensive Plan](#) (Amended 2013)
- [Municipal Code](#)
- [Building Code, 2017 Oregon State Code](#) based on 2015 International Residential Code (IRC) and 2012 International Building Code
- Flood Mitigation Action Plan
- [Emergency Operations Plan \(2012\)](#)
- [Transportation System Plan](#) (2010, update expected in 2017)
- [Regional Problem Solving \(RPS\) Plan](#) (2012)

Continued Public Participation

Keeping the public informed of the City's efforts to reduce its risk to future natural hazard events is important for successful NHMP implementation and maintenance. The City is committed to involving the public in the NHMP review and updated process (Volume I, Section 5).

NHMP Maintenance

The Jackson County Multi-Jurisdictional Natural Hazard Mitigation Plan and City addendum will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. During the County plan update process, the City will also review and update its addendum (see Volume I, Section 5, *Plan Implementation and Maintenance*, for more information). The convener will be responsible for convening the steering committee to address the questions outlined below.

- Are there new partners that should be brought to the table?
- Are there new local, regional, state or federal policies influencing natural hazards that should be addressed?
- Has the community successfully implemented any mitigation activities since the NHMP was last updated?
- Have new issues or problems related to hazards been identified in the community?
- Are the actions still appropriate given current resources?
- Have there been any changes in development patterns that could influence the effects of hazards?
- Have there been any significant changes in the community's demographics that could influence the effects of hazards?
- Are there new studies or data available that would enhance the risk assessment?
- Has the community been affected by any disasters? Did the NHMP accurately address the impacts of this event?

These questions will help the steering committee determine what components of the mitigation plan need updating. The steering committee will be responsible for updating any deficiencies found in the NHMP.

Mitigation Strategy

This section of the NHMP addendum addresses 44 CFR 201.6(c)(3)(iv), *Mitigation Strategy*.

The City's mitigation strategy (action items) were first developed during the 2012 NHMP planning process. During this process, the steering committee assessed the City's risk, identified potential issues and developed a mitigation strategy (action items).

During the 2017 update process the City re-evaluated their mitigation strategy (action items). During this process action items were updated, noting what accomplishments had been made and whether the actions were still relevant; any new action items were identified at this time (see Volume II, Appendix B for more information on changes to action items). Some actions were developed out of the Upper Rogue Watershed Natural Hazard Risk Report ([DOGAMI, Open-File Report O-18-XX](#)) while additional action items were developed from a FEMA *Areas of Mitigation Interest and Development of Mitigation Strategies for Shady Cove and Eagle Point, OR* project (Wright, Stacy, 2016).

Priority Actions

The City is listing a set of high priority actions to focus attention on an achievable set of high leverage activities over the next five-years (Table EA-1). The City's priority actions are listed below in the following table.

Action Item Pool

Table EA-2 presents a "pool" of mitigation actions. This expanded list of actions is available for local consideration as resources, capacity, technical expertise and/or political will become available.

Most of these actions carry forward from prior versions of this NHMP (Jackson County and/or Eagle Point NHMPs).

Table EA-I Eagle Point Priority Action Items

Action Item ID	Mitigation Action Item	Timeline	Lead Organization	Partner Organization(s)	Potential Funding Source(s)
Priority Actions					
Drought (DR)					
DR #1	Develop a drought preparedness and response plan to include a city ordinance restricting water during periods of low water availability.	Short Term (0-2 Years)	Public Works	Planning, Administration, Legal Counsel, Water Districts, Irrigation and Watershed Councils, Medford Water Commission	Local Funding Resources, OWRD
Flood (FL)					
FL #1	Promote and enhance the use of natural flood prone open space or wetlands as flood storage areas. Add potential open space preservation areas within the north segment of the City where floodways are identified as wide and potential contributors to flooding and flood effects.	Ongoing	Planning, Public Works	Building, Code Enforcement, Jackson County, ODOT, DEQ	Local Funding Resources, DLCDC, OEM, FEMA, OPRD (Local Government Grant Program)
FL #2	Protect City facilities in flood prone areas.	Long Term (5+ Years)	Public Works	Planning, County GIS, Jackson County, DLCDC	Local Funding Resources, DLCDC, OEM, FEMA (HMGP, PDM)
FL #3 (New)	Increase street drainage system capacity on new road improvements in flood prone areas.	Ongoing	Public Works	Oregon DOT	Local Funding Resources, DLCDC, OEM, FEMA (HMGP, PDM)
FL #4 (New)	Improve water retention capacity through new headwall design to reduce water flow in flood prone areas.	Ongoing	Public Works	DLCDC, DLCDC	Local Funding Resources, DLCDC, OEM, FEMA (HMGP, PDM)

Source: City of Eagle Point NHMP Steering Committee, 2017.

Table EA-2 Eagle Point Action Item Pool

Action Item ID	Mitigation Action Item	Timeline	Lead Organization	Partner Organization(s)	Potential Funding Source(s)
Action Item Pool					
Multi-Hazard (MH)					
MH #1	Maintain public information programs to inform the public about the mitigation of all natural hazards	Ongoing	City Administrator	Public Works, Planning, JCFD#3, Jackson County DEM, Red Cross, Humane Society, Shelters, School District	Local Funding Resources, DLCD, FEMA
MH #2	Integrate the goals and action items from the Natural Hazards Mitigation Plan into existing regulatory documents and programs where appropriate (Comprehensive Plan)	Mid-Term (3-5 Years)	Planning	Public Works, Building Codes Division	Local Funding Resources, DLCD Technical Assistance Grant
MH #3 (New)	Incorporate flood risk and hazard mitigation concepts into the local Comprehensive Plan when updated in the future.	Mid-Term (3-5 Years)	Planning	Public Works, Building Codes Division	Local Funding Resources, DLCD Technical Assistance Grant
MH #4	Enhance hazard resistant construction methods (wind, winter storm, landslide, etc.) where possible to reduce damage to utilities and critical facilities. In part, this may be accomplished by encouraging electric utility providers to convert existing overhead lines to underground lines.	Ongoing	City Planning, Public Works	Utility companies	Local Funding Resources
Drought (DR)					
	See priority actions and multi-hazard actions for applicable mitigation strategies.				
Earthquake (EQ)					
EQ #1	Promote non-structural mitigation for buildings to prevent damage from earthquakes	Short Term (0-2 Years)	City Administrator	Code Enforcement, Public Works, Planning, Building, Jackson County DEM	Local Funding Resources
EQ #2	Promote earthquake insurance	Ongoing	City Administrator	City Hall, insurance companies, FEMA, mortgage companies	Local Funding Resources, DLCD, OEM, FEMA

Source: City of Eagle Point NHMP Steering Committee, 2017.

Table EA-2 Eagle Point Action Item Pool (continued)

Action Item ID	Mitigation Action Item	Timeline	Lead Organization	Partner Organization(s)	Potential Funding Source(s)
Action Item Pool					
EQ #3	Promote and coordinate earthquake hazard risk mapping for Jackson County and cities	Short Term (0-2 Years)	Planning	Public Works, Building, Administration, DOGAMI, Jackson County	FEMA Risk MAP, DOGAMI, DLCD, OEM, HMGP, PDM
EQ #4	Promote structural mitigation to prevent structural damage to city buildings in effort to provide business continuity	Ongoing	Building	Planning, Public Works, Administration, DOGAMI, Jackson County	Local Funding Resources, SRGP
Emerging Infectious Disease (EID)					
No specific action item developed for this hazard. See multi-hazard actions for applicable mitigation strategies.					
Flood (FL)					
FL #5	Inform the public about the National Flood Insurance Program and ensure compliance through enforcement of local floodplain management ordinances.	Ongoing	Planning	Public Works, Code Enforcement, Building, Jackson County; FEMA; NFIP; CRS/ISO; DLCD	Local Funding Resources, DLCD, FEMA, ASFPM
FL #6	Consider participation in the NFIP's Community Rating System (CRS)	Short Term (0-2 Years)	Planning	Public Works, Code Enforcement, County GIS, Jackson County; FEMA; NFIP; CRS/ISO; DLCD	Local Funding Resources, DLCD Technical Assistance Grant
FL #7	Preserve water quantity and quality by using storm water best management practices (Low Impact Development/ Green Infrastructure).	Ongoing	Public Works	Planning, Jackson County; DEQ; Rogue Valley Sewer Services	Local Funding Resources, DLCD, FEMA, ASFPM, DEQ
FL #8 (New)	Determine if the pinch point at the Antelope Creek Bridge is enough of a concern to warrant the investigation of potential solutions to relieve the pinch point.	Short Term (0-2 Years)	Public Works	Planning, DLCD	Local Funding Resources
FL #9 (New)	Identify current capabilities and research option to secure an early warning system (EWS) for dam failure or flood.	Mid-Term (3-5 Years)	Public Works	County Emergency Management, OMD-OEM, DLCD, USACE, Silver Jackets	Local Funding Resources, PDM, FMA, HMGP, PA

Source: City of Eagle Point NHMP Steering Committee, 2017.

Table EA-2 Eagle Point Action Item Pool (continued)

Action Item ID	Mitigation Action Item	Timeline	Lead Organization	Partner Organization(s)	Potential Funding Source(s)
Action Item Pool					
Landslide (LS)					
	No specific action item developed for this hazard. See multi-hazard actions for applicable mitigation strategies.				
Severe Weather (SW, Windstorm and Winter Storm)					
SW #1	Promote the benefits of tree-trimming and tree replacement programs and help to coordinate local efforts by public and private agencies.	Short Term (0-2 Years)	Public Works	Planning, Utility companies, local Arborists, landscaping services and tree services	Local Funding Resources, HMA, Utilities
Volcano (VE)					
	No specific action item developed for this hazard. See multi-hazard actions for applicable mitigation strategies.				
Wildfire (WF)					
WF #1	Partner with Jackson County on Implementation of Rogue Valley Integrated Community Wildfire Protection Plan and outreach projects	Ongoing	Planning	Public Works, Administration, Jackson County, JCFD#3, Bureau of Land Management - Medford District, Oregon Department of Forestry, Office of State Fire Marshall	Fire and Rescue Districts, State Office of Emergency Management, Oregon Department of Forestry
WF #2	Reduce wildfire fuels/Investigate "Firewise Community" Program	Ongoing	Planning	Administration, Public Works, Jackson County, JCFD#3, Office of State Fire Marshall, Oregon Department of Forestry	Local Funding Resources

Source: City of Eagle Point NHMP Steering Committee, 2017.

Risk Assessment

This section of the NHMP addendum addresses 44 CFR 201.6(b)(2) - Risk Assessment. In addition, this chapter can serve as the factual basis for addressing Oregon Statewide Planning Goal 7 – Areas Subject to Natural Hazards. Assessing natural hazard risk has three phases:

- **Phase 1:** Identify hazards that can impact the jurisdiction. This includes an evaluation of potential hazard impacts – type, location, extent, etc.
- **Phase 2:** Identify important community assets and system vulnerabilities. Example vulnerabilities include people, businesses, homes, roads, historic places and drinking water sources.
- **Phase 3:** Evaluate the extent to which the identified hazards overlap with or have an impact on, the important assets identified by the community.

The local level rationale for the identified mitigation strategies (action items) is presented herein and within Volume I, Sections 2 and 3. The risk assessment process is graphically depicted in Figure EA-1 below. Ultimately, the goal of hazard mitigation is to reduce the area of risk, where hazards overlap vulnerable systems.

Figure EA-1 Understanding Risk



Hazard Analysis

The Eagle Point steering committee developed their hazard vulnerability assessment (HVA), using their previous HVA and the County’s HVA (Volume II, Appendix C) as a reference. Changes from the County’s HVA were made where appropriate to reflect distinctions in vulnerability and risk from natural hazards unique to Eagle Point, which are discussed throughout this addendum.

Table EA-3 shows the HVA matrix for Eagle Point listing each hazard in order of rank from high to low. 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.

Two chronic hazards (emerging infectious disease and winter storm) and one catastrophic hazard (Cascadia Subduction Zone earthquake) rank as the top hazard threats to the City (Top Tier). Windstorm, flood, drought and wildfire comprise the next highest ranked hazards (Middle Tier), while the crustal earthquake, volcano and landslide hazards comprise the lowest ranked hazards (Bottom Tier).

Table EA-3 Hazard Analysis Matrix – Eagle Point

Hazard	Maximum				Total Threat Score	Hazard Rank	Hazard Tiers
	History	Vulnerability	Threat	Probability			
Earthquake (Cascadia)	2	50	100	70	222	#1	Top Tier
Emerging Infectious Disease	12	50	100	49	211	#2	
Winter Storm	20	50	60	70	200	#3	
Windstorm	20	20	60	70	170	#4	Middle Tier
Flood	20	20	50	70	160	#5	
Drought	10	20	50	63	143	#6	
Wildfire	20	20	50	35	125	#7	
Earthquake (Crustal)	2	25	50	21	98	#8	Bottom Tier
Volcano	2	5	50	7	64	#9	
Landslide	2	5	10	21	38	#10	

Source: Eagle Point NHMP Steering Committee, 2017.

Table EA-4 categorizes the probability and vulnerability scores from the hazard analysis for the City and compares the results to the assessment completed by the Jackson County NHMP Steering Committee (Volume II, Appendix C). Variations between the City and County are noted in **bold** text.

Table EA-4 Probability and Vulnerability Comparison

Hazard	Eagle Point		Jackson County	
	Probability	Vulnerability	Probability	Vulnerability
Drought	High	Moderate	High	Moderate
Earthquake (Cascadia)	High	High	High	High
Earthquake (Crustal)	Low	Moderate	Low	Moderate
Emerging Infectious Disease	Moderate	High	Moderate	High
Flood	High	Moderate	High	Moderate
Landslide	Low	Low	High	Low
Volcano	Low	Low	Low	Low
Wildfire	Moderate	Moderate	High	Moderate
Windstorm	High	Moderate	High	Moderate
Winter Storm	High	High	High	Moderate

Source: Eagle Point NHMP Steering Committee, 2017.

Community Characteristics

Table EA-5 and the following section provides information on City specific demographics and assets. For additional information on the characteristics of Eagle Point, in terms of geography, environment, population, demographics, employment and economics, as well as housing and transportation see Volume I, Section 2. Many of these community characteristics can affect how natural hazards impact communities and how communities choose to plan for natural hazard mitigation. Considering the City specific assets during the planning process can assist in identifying appropriate measures for natural hazard mitigation. Between 2012 and 2016 the City grew by 215 people (2.5%) and median household income decreased by about 3% (Volume I, Section 2). New development has complied with the standards of the [Oregon Building Code](#) and the city's development code including their floodplain ordinance.

Transportation/Infrastructure

In the City of Eagle Point, transportation has played a major role in shaping the community. Eagle Point's commercial areas developed along primary routes and residential development followed nearby.

Today, mobility plays an important role in Eagle Point and the daily experience of its residents and businesses as they move from point A to point B. The central travel corridor is along Highway 62. Rogue Valley Transportation District (RVTD) provides public transit.

By far, motor vehicles represent the dominant mode of travel through and within Eagle Point.

Economy

A diverse range of businesses have chosen to locate in Eagle Point. In addition, Eagle Point's proximity to the Medford Airport give it market access that is more favorable than usual for a rural town. According to the economic profile of the City's Comprehensive Plan, Eagle Point finds their main economic drivers in the sectors of tourism, manufacturing and commercial retail.

Table EA-5 Community Characteristics

Population Characteristics		
2012 Population	8,550	
2016 Population	8,765	
2035 Forecasted Population*	14,839	
Race and Ethnic Categories		
White	91%	
Black/ African American	0%	
American Indian and Alaska Native	1%	
Asian	1%	
Native Hawaiian and Other Pacific Islander	< 1%	
Some Other Race	< 1%	
Two or More Races	7%	
Hispanic or Latino	5%	
Limited or No English Spoken	0%	
Vulnerable Age Groups		
Less than 15 Years	1,919	22%
65 Years and Over	1,244	14%
Disability Status		
Total Population	1,635	19%
Children	102	1%
Seniors	641	7%

Income Characteristics		
Households by Income Category		
Less than \$15,000	264	8%
\$15,000-\$29,999	625	20%
\$30,000-\$44,999	414	13%
\$45,000-\$59,999	385	12%
\$60,000-\$74,999	497	16%
\$75,000-\$99,999	343	11%
\$100,000-\$199,999	600	19%
\$200,000 or more	43	1%
Median Household Income	\$55,474	
Poverty Rates		
Total Population	1,891	22%
Children	949	42%
Seniors	75	6%
Housing Cost Burden		
Owners with Mortgage		26%
Renters		59%

Source: U.S. Census Bureau, 2011-2015 American Community Survey; Portland State University, Population Research Center.
 Note: * = Population forecast within UGB

Housing Characteristics		
Housing Units		
Single-Family	7,369	71%
Multi-Family	2,687	26%
Mobile Homes	316	3%
Year Structure Built		
Pre-1970	4,073	39%
1970-1989	2,966	29%
1990 or later	3,333	32%
Housing Tenure and Vacancy		
Owner-occupied	5,131	54%
Renter-occupied	4,315	46%
Vacant	609	6%

Eagle Point is in Jackson County in southwestern Oregon. The City has grown steadily since its incorporation in 1911 and has an area today of 2.57 square miles. It is in the north central region of the county, located about 15 miles northeast of the City of Medford and immediately northeast of the unincorporated community of White City. The City and most of Jackson County are within the Rogue and Umpqua watersheds.

Eagle Point experiences a relatively mild climate with four distinct seasons that comes from its position on the west coast of North America and within the mountains of the region. The town is just off Highway 62 and about 40 miles north of the California border and at the southern end of the Rogue Valley at approximately 1,305 feet above sea level. Because of its location, Eagle Point has a climate somewhat intermediate to central California and northern Oregon. Eagle Point averages about 35 inches of rain per year due to being inland from the coast and in the rain shadow of the nearby mountains. The City of Eagle Point includes a diversity of land uses but is zoned primarily residential.

For more information see Volume I, Section 2.

Community Assets

This section outlines the resources, facilities and infrastructure that, if damaged, could significantly impact the public safety, economic conditions and environmental integrity of Eagle Point.

Critical Facilities

Facilities that are critical to government response and recovery activities (i.e. life, safety, property and environmental protection). These facilities include: 911 Centers, Emergency Operations Centers, Police and Fire Stations, Public Works facilities, sewer and water facilities, hospitals, bridges, roads, shelters and more. Facilities that, if damaged, could cause serious secondary impacts may also be considered “critical.” A hazardous material facility is one example of this type of critical facility.

Fire Stations:

- Jackson County Fire District #3

Law Enforcement/City Buildings:

- Eagle Point/City Hall Police Department (EOC)

Private:

- Ray’s
- Walmart
- Ace Hardware

Essential Facilities

Facilities that are essential to the continued delivery of key government services and/or that may significantly impact the public’s ability to recover from the emergency. These facilities may include: City buildings such as the Public Services Building, the City Hall and other public facilities such as schools.

Hospitals/Immediate Medical Care Facilities:

- Providence Medical Group – Eagle Point
- Providence Eagle Point Physical Therapy
- Eagle Point Eye Care
- Eagle Point Medical Center
- Optimal Behavioral Health
- Jackson County Physical Therapy
- Complete Care Chiropractic/Physical Therapy

City/ County Buildings:

- Eagle Point Library
- Eagle Point Museum

Public Schools:

- Eagle Point High School
- Eagle Point Middle School
- Eagle Rock Elementary School
- Hillside Elementary School
- Lake Creek Learning Center
- Upper Rogue Center for Educational Opportunities
- Willow Wind Community Learning Center (CLC)
- Crater Lake Charter Academy

Private Schools:

- St. John Lutheran Church and School

Potential Shelter Sites:

- Saint John Lutheran Church
- Church on the Hill
- Eagle Point Assembly of God
- Eagle Point Community Bible Church
- Butte Creek Baptist Church
- Campus Life
- LDS Church

Infrastructure:

Infrastructure that provides services for the City include:

Transportation Networks:

- Highway 62
- Royal Ave
- Shasta Ave
- Crystal Drive
- Dianne Way
- Hannon Road
- Robert Trent Jones Blvd.
- Alta Vista Road
- Stephens Road
- Main St.

Water Facilities:

- 4 tanks
- 1 Pump Stations
- 1 Test well near Highway 62
- RVS Transfer Station

Special Service Districts:

- Southern Oregon Education Service District
- Talent Irrigation District
- Fire District #5
- Phoenix/ Talent School District
- Medford Water Commission

Private Utilities:

- Pacific Power
- Avista
- Charter/Dish/Direct TV
- Rogue Valley Sewer (stormwater)
- Ashland Sanitary

Hazard Characteristics

Drought

The steering committee determined that the City's probability for drought is **high** (which is the same as the County's rating) and that their vulnerability to drought is **moderate** (which is the same as the County's rating). *The probability rating increased and the vulnerability decreased since the previous version of this NHMP addendum.*

Volume I, Section 3 describes the characteristics of drought hazards, history, as well as the location, extent and probability of a potential event. Due to the climate of Jackson County, past and present weather conditions have shown an increasing potential for drought.

The City receives its main water supply from Big Butte Springs through the Medford Water Commission, supplemented by the Rogue River in the summer months. For more information on the future of Eagle Point's water supply visit their [website](#).

Please review Volume I, Section 3 for additional information on this hazard.

Earthquake (Cascadia)

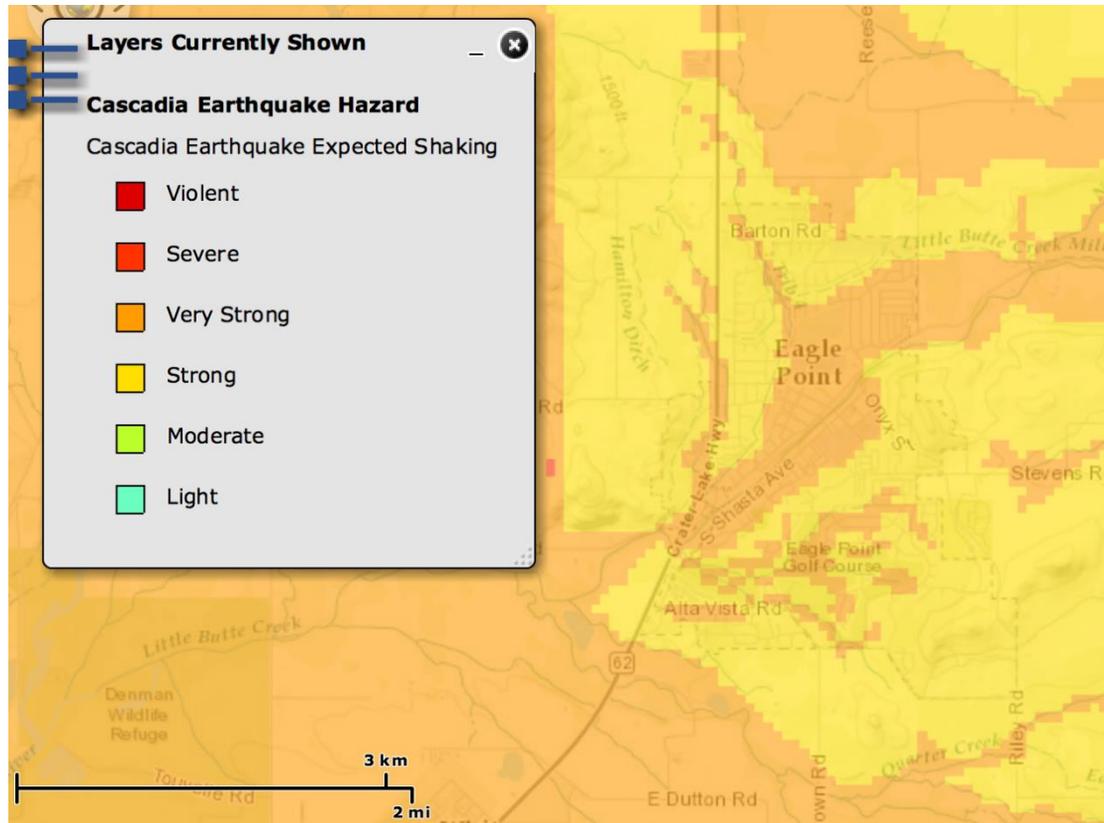
The steering committee determined that the City's probability for a Cascadia Subduction Zone (CSZ) earthquake is **high** (which is the same as the County's rating) and that their vulnerability to a CSZ earthquake is **high** (which is the same as the County's rating). *Previously, the earthquake hazard profile was a single risk assessment, which is now divided into two separate earthquake hazards: crustal earthquake and Cascadia Subduction Zone (CSZ) earthquake.*

Volume I, Section 3 describes the characteristics of earthquake hazards, history, as well as the location, extent and probability of a potential event. Generally, an event that affects the County is likely to affect Eagle Point as well. The causes and characteristics of an earthquake event are appropriately described within Volume I, Section 3 as well as the location and extent of potential hazards. Previous occurrences are well documented within Volume I, Section 3 and the community impacts described by the County would generally be the same for Eagle Point as well.

The local faults, the county's proximity to the Cascadia Subduction Zone, potential slope instability and the prevalence of certain soils subject to liquefaction and amplification combine to give the county a high-risk profile. Due to the expected pattern of damage resulting from a CSZ event, the Oregon Resilience Plan divides the State into four distinct zones and places Jackson County predominately within the "Valley Zone" (Valley Zone, from the summit of the Coast Range to the summit of the Cascades). Within the Southwest Oregon region, damage and shaking is expected to be strong and widespread - an event will be disruptive to daily life and commerce and the main priority is expected to be restoring services to business and residents.¹ Figure EA-2 displays relative shaking hazards from a Cascadia Subduction Zone earthquake event. As shown in the figure below, the area of greatest concern within the City of Eagle Point (darker areas) is along the Little Butte Creek corridor.

¹ Ibid.

Figure EA-2 Cascadia Subduction Zone



Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](#)

Note: To view detail click the link above to access Oregon HazVu.

As noted in the community profile, approximately 38% of residential buildings were built prior to 1990, which increases the City's vulnerability to the earthquake hazard. Information on specific public buildings' (schools and public safety) estimated seismic resistance, determined by DOGAMI in 2007, is shown in Table EA-6; each "X" represents one building within that ranking category. Of the facilities evaluated by DOGAMI using a Rapid Visual Survey (RVS), zero (0) have a very high (100% chance) collapse potential and four (4) have a high (greater than 10% chance) collapse potential.

In addition to building damages, utility (electric power, water, wastewater, natural gas) and transportation systems (bridges, pipelines) are also likely to experience significant damage.

Utility systems will be significantly damaged, including damaged buildings and damage to utility infrastructure, including water and wastewater treatment plants and equipment at high voltage substations (especially 230 kV or higher which are more vulnerable than lower voltage substations). Buried pipe systems will suffer extensive damage with approximately one break per mile in soft soil areas. There would be a much lower rate of pipe breaks in other areas. Restoration of utility services will require substantial mutual aid from utilities outside of the affected area.

Table EA-6 Rapid Visual Survey Scores

Facility	Site ID*	Level of Collapse Potential			
		Low (< 1%)	Moderate (>1%)	High (>10%)	Very High (100%)
Schools					
Eagle Point High School (Eagle Point SD 9) (203 N Platt Ave)	Jack_sch19	X		X, X, X	
Eagle Point Middle School (Eagle Point SD 9) (477 Reese Creek Road)	Jack_sch18	X			
Eagle Rock Elementary School (Eagle Point SD 9) (1280 Barton Rd)	Jack_sch39	X			
Little Butte School (Eagle Point SD 9) (12 N Shasta Ave) - NO LONGER IN USE	Jack_sch44	X	X	X	

Source: [DOGAMI 2007. Open File Report 0-07-02. Statewide Seismic Needs Assessment Using Rapid Visual Assessment.](#) "*" – Site ID is referenced on the [RVS Jackson County Map](#)

Mitigation Successes

Seismic retrofit grant awards per the [Seismic Rehabilitation Grant Program](#)² have been funded to retrofit Jackson County Fire District 3 - Eagle Point Station (Phase Two of 2015-2017 grant award, \$46,760).

Natural Hazard Risk Report: Upper Rogue Watershed

The Oregon Department of Geology and Mineral Industries (DOGAMI) conducted a natural hazard risk assessment (Risk Report) for portions of Jackson County (Upper Rogue Watershed) including Eagle Point. The study was funded through the FEMA Risk MAP program and was completed in 2017. The Risk Report provides a quantitative risk assessment that informs communities of their risks related to certain natural hazards. The City hereby incorporates the Risk Report into this addendum by reference to provide greater detail to hazard sensitivity and exposure ([DOGAMI, Open-File Report O-18-XX](#)).

The **Risk Report** identifies that during a CSZ earthquake, approximately 284 buildings will be damaged (3 critical facilities; Little Butte School, Eagle Point High School and Eagle Point Medical Center) for a total loss of \$12.1 million (a loss ratio of 2.6%). In addition, about 164 residents may be displaced (2% of the population).

Earthquake (Crustal)

The steering committee determined that the City’s probability for a crustal earthquake is **low** (which is the same as the County’s rating) and that their vulnerability to crustal earthquake is **moderate** (which is the same as the County’s rating). *Previously, the earthquake hazard profile was a single risk assessment, which is now divided into two separate earthquake hazards: crustal earthquake and Cascadia Subduction Zone (CSZ) earthquake.*

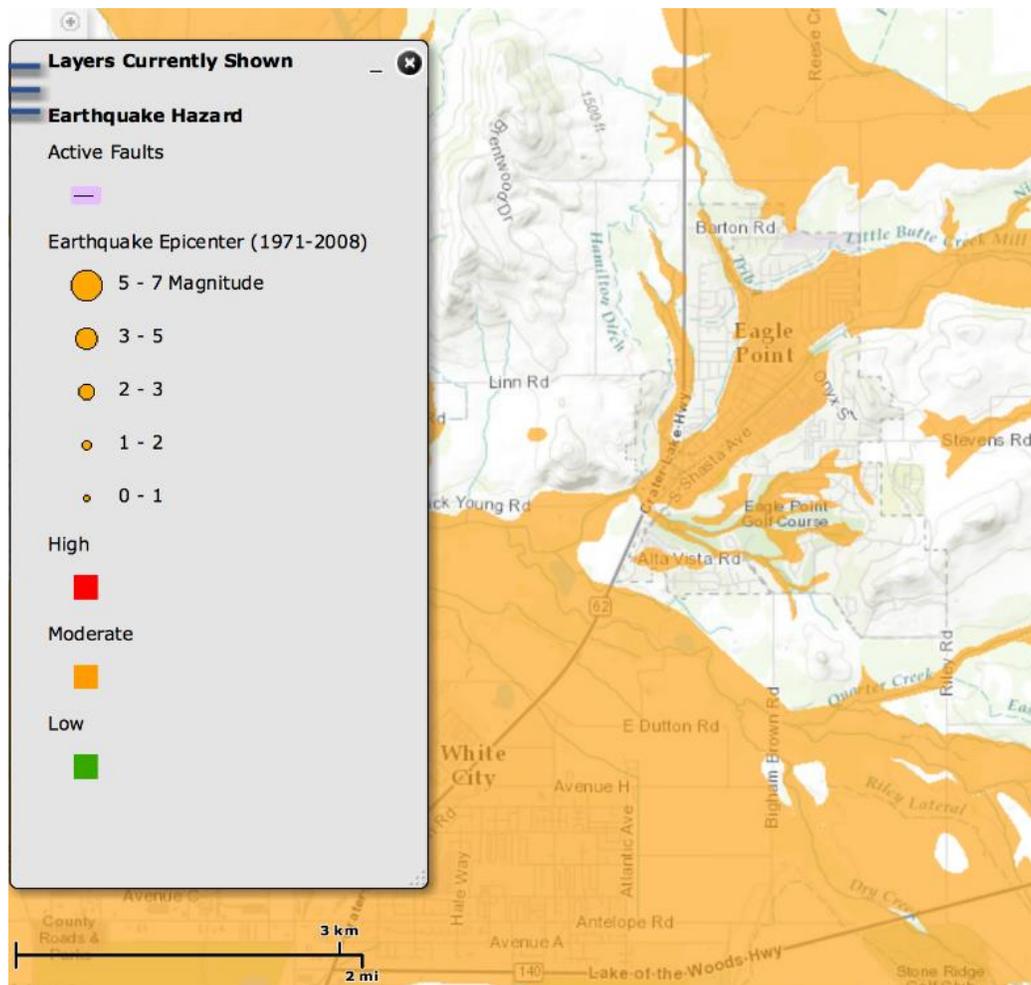
Volume I, Section 3 describes the characteristics of earthquake hazards, history, as well as the location, extent and probability of a potential event. Generally, an event that affects the

² The Seismic Rehabilitation Grant Program (SRGP) is a state of Oregon competitive grant program that provides funding for the seismic rehabilitation of critical public buildings, particularly public schools and emergency services facilities.

County is likely to affect Eagle Point as well. The causes and characteristics of an earthquake event are appropriately described within Volume I, Section 3 as well as the location and extent of potential hazards. Previous occurrences are well documented within Volume I, Section 3 and the community impacts described by the County would generally be the same for Eagle Point as well.

Earthquake-induced damages are difficult to predict and depend on the size, type and location of the earthquake, as well as site-specific building and soil characteristics. Presently, it is not possible to accurately forecast the location or size of earthquakes, but it is possible to predict the behavior of soil at any particular site. In many major earthquakes, damages have primarily been caused by the behavior of the soil. Figure EA-3 displays relative liquefaction hazards, the majority of the City is within an area of moderate soft soils (liquefaction hazard orange areas).

Figure EA-3 Active Faults and Soft Soils



Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](#)
 Note: To view detail click the link above to access Oregon HazVu.

Please review Volume I, Section 3 for additional information on this hazard.

Emerging Infectious Disease

The steering committee determined that the City's probability for emerging infectious disease is **moderate** (which is the same as the County's rating) and that their vulnerability is **high** (which is the same as the County's rating). *The City did not assess the emerging infectious disease hazard in the previous version of their NHMP.*

Emerging infectious diseases are those that have recently appeared in a population or those whose incidence or geographic range is rapidly increasing or threatens to increase. Emerging infections may be caused by biological pathogens (e.g., virus, parasite, fungus or bacterium) and may be: previously unknown or undetected biological pathogens, biological pathogens that have spread to new geographic areas or populations, previously known biological pathogens whose role in specific diseases was previously undetected and biological pathogens whose incidence of disease was previously declining but whose incidence of disease has reappeared (re-emerging infectious disease).³

Volume I, Section 3 describes the characteristics of emerging infectious disease, history, as well as the location, extent and probability of a potential event within the region. Generally, an event that affects the County is likely to affect the City as well.

Please review Volume I, Section 3 for additional information on this hazard.

Flood

The steering committee determined that the City's probability for flood is **high** (which is the same as the County's rating) and that their vulnerability to flood is **moderate** (which is higher than the County's rating). *These ratings did not change since the previous version of this NHMP addendum.*

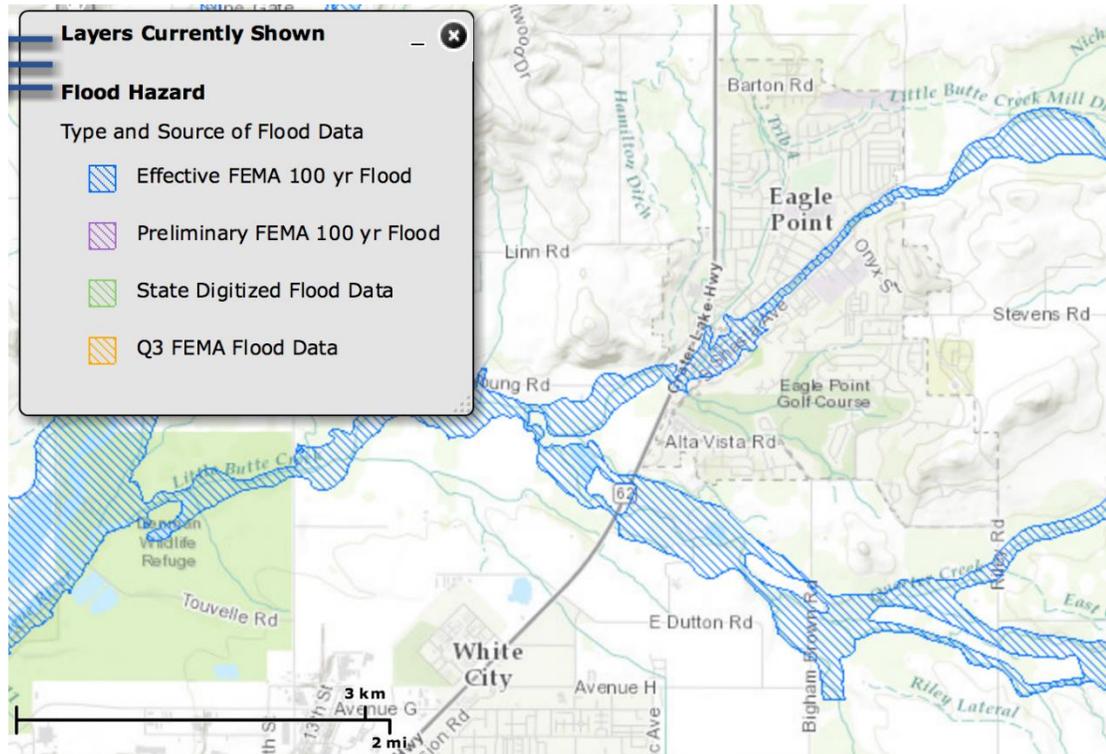
Volume I, Section 3 describes the characteristics of flood hazards, history, as well as the location, extent and probability of a potential event. Portions of Eagle Point have areas of flood plains (special flood hazard areas, SFHA). These areas are mostly concentrated along the Little Butte Creek corridor and Buchanan Ditch, with additional flood potential seen along Antelope Creek to the south of the City (Figure EA-4). Furthermore, other portions of Eagle Point, outside of the mapped floodplains, are also subject to flooding from local storm water drainage.

The City is at risk from two types of flooding: riverine and urban. Riverine flooding occurs when streams overflow their banks and inundate low-lying areas. This is a natural process that adds sediment and nutrients to fertile floodplain areas. It usually results from prolonged periods of precipitation over a wide geographic area. Most areas are generally flooded by low velocity sheets of water. Urban flooding occurs as land is converted to impervious surfaces and hydrologic systems are changed. Precipitation is collected and transmitted to streams at a much faster rate, causing floodwaters that rise rapidly and peak with violent force. During urban flooding, storm drains can back up and cause localized flooding of streets and basements. These flooding events and subsequent damages are

³ Baylor College of Medicine, *Emerging Infectious Disease*, URL: <https://www.bcm.edu/departments/molecular-virology-and-microbiology/emerging-infections-and-biodefense/emerging-infectious-diseases>, accessed September 17, 2017.

commonly caused by the behavior of Little Butte Creek, Antelope Creek and their tributaries.

Figure EA-4 Special Flood Hazard Area



Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](#)

Note: To view detail click the link above to access Oregon HazVu.

Floods can have a devastating impact on almost every aspect of the community, including private property damage, public infrastructure damage and economic loss from business interruption. It is important for the City to be aware of flooding impacts and assess its level of risk. The City has been proactive in mitigating flood hazards by purchasing floodplain property. Little Butte Creek is the chief source of flooding in Eagle Point. The creek, a tributary of the Rogue River, is relatively flat as it proceeds through the City and has a drainage area of approximately 354 square miles throughout the entire county.

The economic losses due to business closures often total more than the initial property losses that result from flood events. Business owners and their employees are significantly impacted by flood events. Direct damages from flooding are the most common impacts, but indirect damages, such as diminished clientele, can be just as debilitating to a business.

The FEMA Flood Insurance Study (January 19, 2018) has a brief history of flooding in Jackson County and Eagle Point (Volume I, Section 3). Currently, no critical or essential facilities are located in the floodplain. Any new development and substantial improvements to existing development, within the Special Flood Hazard Area (SFHA) is required to have two-feet of freeboard.⁴ The ordinance also limits the development of critical facilities within the AE

⁴ Eagle Point Municipal Code, Flood Hazard Prevention, Chapter 15.20, <http://www.codepublishing.com/OR/EaglePoint/>

zone and imposes a three-foot freeboard or be built to the height of the 500-year flood, whichever is higher.⁵

If major flooding affected all of the bridges in Eagle Point, traffic flow in an out of the City would be significantly affected, but would not cut all off all avenues. The risk report identifies the Main Street Pedestrian Bridge (Antelope Creek Bridge) as a pinch point, *“The bridge sits on large concrete piers near the edge of the streambed on both sides, which could potentially trap debris during flood events and cause water to channel unnaturally and back up upstream.”* The amount of property in the flood plain is not a large area but damage could be significant as it would affect residential, commercial and public property. Floodwaters can affect building foundations, seep into basements or cause damage to the interior, exterior and contents of buildings, dependent upon the velocity and depth of the water and by the presence of floating debris. The City sewer system can overflow during flood events and cause further property damage.

Natural Hazard Risk Report: Upper Rogue Watershed

The **Risk Report** ([DOGAMI, Open-File Report O-18-XX](#)) identifies that during a “1% Annual Chance” Flood event (100-Year Flood) approximately 11 buildings will be damaged (0 essential facilities) for a total loss of \$34,000 (a loss ratio of less than 1%). In addition, about 67 residents may be displaced (less than 1% of the population).

For mitigation planning purposes, it is important to recognize that flood risk for a community is not limited only to areas of mapped floodplains. Other portions of Eagle Point outside of the mapped floodplains may also be at relatively high risk from over bank flooding from streams too small to be mapped by FEMA or from local storm water drainage. In addition, the City is at low risk to flooding from dam inundation from Fish Lake Dam.

National Flood Insurance Program (NFIP)

FEMA updated the Flood Insurance Study (FIS) and Flood Insurance Rate Maps (FIRMs) in 2018 (effective January 19, 2018). Table EA-7 shows that as of June 2016, Eagle Point has 84 National Flood Insurance Program (NFIP) policies in force. Of those, 42 are for properties that were constructed before the initial FIRM. The last Community Assistance Visit (CAV) for Eagle Point was on April 5, 1995. Eagle Point does not currently participate in the Community Rating System (CRS). The table shows that the majority of flood insurance policies are for residential structures, primarily single-family homes. There has been a total of 28 paid claims for \$264,770. The City complies with the NFIP through enforcement of their flood damage prevention ordinance and their floodplain management program.

The Community Repetitive Loss record for Eagle Point identifies two (2) Repetitive Loss Properties⁶ (both single-family residential) and zero (0) Severe Repetitive Loss Properties⁷. For details on the repetitive loss properties see Volume I, Section 3.

⁵ Ibid.

⁶ A Repetitive Loss (RL) property is any insurable building for which two or more claims of more than \$1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978. A RL property may or may not be currently insured by the NFIP.

⁷ A Severe Repetitive Loss (SRL) property is a single family property (consisting of 1 to 4 residences) that is covered under flood insurance by the NFIP and has incurred flood-related damage for which 4 or more separate claims payments have been paid under flood insurance coverage, with the amount of each claim payment exceeding \$5,000 and with cumulative amount of such claims payments exceeding \$20,000; or for which at least

Table EA-7 Flood Insurance Detail

Jurisdiction	Effective FIRM and FIS	Initial FIRM Date	Total Policies	Pre-FIRM Policies	Policies by Building Type				Minus Rated A Zone
					Single Family	2 to 4 Family	Other Residential	Non-Residential	
Jackson County	-	-	1,828	809	1,568	44	91	125	126
Eagle Point	1/19/2018	9/30/1980	84	42	74	10	0	0	6

Jurisdiction	Insurance in Force	Total Paid Claims	Pre-FIRM Claims Paid	Substantial Damage Claims	Total Paid Amount	Repetitive Loss Structures	Severe Repetitive Loss Properties	CRS Class Rating	Last Community Assistance Visit
Jackson County	\$ 442,723,400	197	132	10	\$ 2,337,660	8	0	-	-
Eagle Point	\$ 20,526,500	28	17	0	\$ 264,770	2	0	-	4/5/1995

Source: Information compiled by Department of Land Conservation and Development, July 2016.

Note: The effective FIRM and FIS was updated (January 19, 2018) after the content of this table was generated.

Please review Volume I, Section 3 for additional information on this hazard.

Landslide

The steering committee determined that the City’s probability for landslide is **low** (which is lower than the County’s rating) and that their vulnerability to landslide is **low** (which is the same as the County’s rating). *The probability rating has decreased since the previous version of this NHMP addendum.*

Volume I, Section 3 describes the characteristics of landslide hazards, history, as well as the location, extent and probability of a potential event within the region. The potential for landslide in Eagle Point is almost negligible with the possible exception of very small areas immediately adjacent to stream channels and along distinct slope increases within the City. The structures and infrastructure within these susceptible areas of the City are particularly vulnerable to damages from landslides.

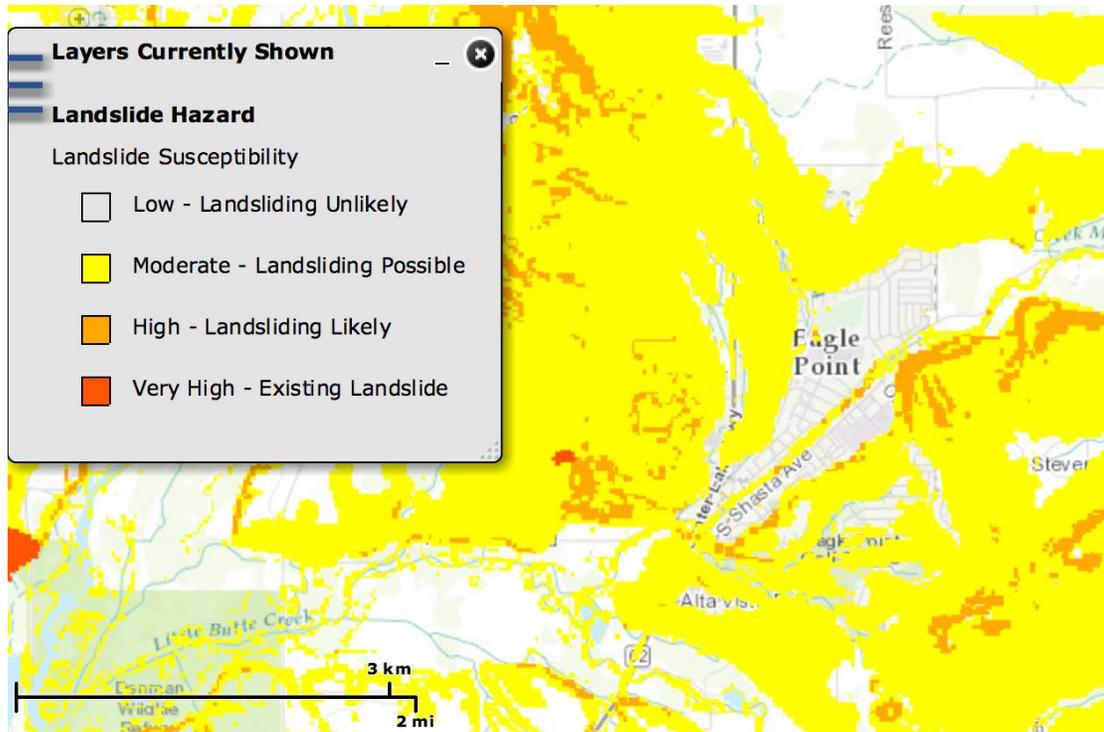
Landslide susceptibility exposure for Eagle Point is shown in Figure EA-5. Most of Eagle Point demonstrates a low susceptibility to landslide exposure, with corridors of moderate susceptibility concentrated around the outer edges of the Little Butte Creek corridor and in the immediate north and south portions of the City along the municipal boundary. Approximately 5% of Eagle Point has high and approximately 62% moderate, landslide susceptibility exposure.⁸

Note that even if a jurisdiction has a high percentage of area in a high or very high landslide exposure susceptibility zone, this does not mean there is a high risk, because risk is the intersection of hazard and assets.

2 separate claims payments have been made with the cumulative amount of such claims exceeding the reported value of the property.

⁸ DOGAMI Open-File Report, O-16-02, Landslide Susceptibility Overview Map of Oregon (2016)

Figure EA-5 Landslide Susceptibility Exposure



Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](#)

Note: To view detail click the link above to access Oregon HazVu.

Natural Hazard Risk Report: Upper Rogue Watershed

The **Risk Report** ([DOGAMI, Open-File Report O-18-XX](#)) identifies that there are 26 buildings (1 critical facility; Eagle Point High School) exposed to High or Very High landslide susceptibility for a total potential loss of \$2.65 million (a loss ratio of less than 1%). In addition, about 43 residents may be displaced (less than 1% of the population).

Potential landslide-related impacts are adequately described within Volume I, Section 3 and include infrastructural damages, economic impacts (due to isolation and/or arterial road closures), property damages and obstruction to evacuation routes. Rain-induced landslides and debris flows can potentially occur during any winter in Jackson County and thoroughfares beyond City limits are susceptible to obstruction as well.

The most common type of landslides in Jackson County are slides caused by erosion. Slides move in contact with the underlying surface, are generally slow moving and can be deep. Rainfall-initiated landslides tend to be smaller; while earthquake induced landslides may be quite large. All soil types can be affected by natural landslide triggering conditions.

Please review Volume I, Section 3 for additional information on this hazard.

Severe Weather

Severe weather can account for a variety of intense and potentially damaging weather events. These events include windstorms and winter storms. The following section describes the unique probability and vulnerability of each identified weather hazard. Other more abrupt or irregular events such as hail are also described in this section.

Windstorm

The steering committee determined that the City's probability for windstorm is **high** (which is the same as the County's rating) and that their vulnerability to windstorm is **moderate** (which is the same as the County's rating). *The City did not assess the windstorm hazard in the previous version of their NHMP as a unique hazard (it was assessed as a component of the severe winter storm and windstorm hazard). The previous rating was applied to both windstorm and winter storm and the ratings were modified slightly to account for the differences in vulnerability and risk to the hazard.*

Volume I, Section 3 describes the characteristics of windstorm hazards, history, as well as the location, extent and probability of a potential event within the region. Because windstorms typically occur during winter months, they are sometimes accompanied by ice, freezing rain, flooding and very rarely, snow. Other severe weather events that may accompany windstorms, including thunderstorms, hail, lightning strikes and tornadoes are generally negligible for Eagle Point.

Volume I, Section 3 describes the impacts caused by windstorms, including power outages, downed trees, heavy precipitation, building damages and storm-related debris. Additionally, transportation and economic disruptions result as well.

Damage from high winds generally has resulted in downed utility lines and trees. Electrical power can be out anywhere from a few hours to several days. Outdoor signs have also suffered damage. If the high winds are accompanied by rain (which they often are), blowing leaves and debris clog drainage-ways, which in turn causes localized urban flooding.

Please review Volume I, Section 3 for additional information on this hazard.

Winter Storm (Snow/Ice)

The steering committee determined that the City's probability for winter storm is **high** (which is the same as the County's rating) and that their vulnerability to winter storm is **high** (which is higher than the County's rating). *The City did not assess the winter storm hazard in the previous version of their NHMP as a unique hazard (it was assessed as a component of the severe winter storm and windstorm hazard). The previous rating was applied to both windstorm and winter storm and the ratings were modified slightly to account for the differences in vulnerability and risk to the hazard.*

Volume I, Section 3 describes the characteristics of winter storm hazards, history, as well as the location, extent and probability of a potential event within the region. Severe winter storms can consist of rain, freezing rain, ice, snow, cold temperatures and wind. They originate from troughs of low pressure offshore that ride along the jet stream during fall, winter and early spring months. Severe winter storms affecting the City typically originate in the Gulf of Alaska or in the central Pacific Ocean. These storms are most common from November through March.

Major winter storms can and have occurred in the Eagle Point area and while they typically do not cause significant damage, they are frequent and have the potential to impact economic activity. Road and rail closures due to winter weather are an uncommon occurrence, but can interrupt commuter and commercial traffic. The City maintains roads with a snow-plow and sanding capability.

Please review Volume I, Section 3 for additional information on this hazard.

Volcano

The steering committee determined that the City's probability for a volcanic event is **low** (which is the same as the County's rating) and that their vulnerability to a volcanic event is **low** (which is the same as the County's rating). *These ratings did not change since the previous version of this NHMP addendum.*

Volume I, Section 3 describes the characteristics of volcanic hazards, history, as well as the location, extent and probability of a potential event within the region. Generally, an event that affects the County is likely to affect Eagle Point as well. Eagle Point is very unlikely to experience anything more than volcanic ash during a volcanic event.

Please review Volume I, Section 3 for additional information on this hazard.

Wildfire

The steering committee determined that the City's probability for wildfire is **moderate** (which is lower than the County's rating) and that their vulnerability to wildfire is **moderate** (which is the same as the County's rating). *These ratings did not change since the previous version of this NHMP addendum.*

Volume I, Section 3 describes the characteristics of wildland fire hazards, history, as well as the location, extent and probability of a potential event within the region. There have been no large wildland events in or near Eagle Point. The location and extent of a wildland fire vary depending on fuel, topography and weather conditions. Weather and urbanization conditions are primarily at cause for the hazard level. Wildland fires in Eagle Point are rare.

The potential community impacts and vulnerabilities described in Volume I, Section 3 are generally accurate for the City as well. The [Rogue Valley Integrated Community Wildfire Protection Plan](#) (RVIFP, updated 2017), assesses wildfire risk, maps wildland urban interface areas and includes actions to mitigate wildfire risk. The City is included in the RVIFP and will update the City's wildfire risk assessment if the fire plan presents better data during future updates (an action item is included within Volume I, Section 4 to participate in updates to the integrated fire plan and to continue to maintain and update their RVIFP). Eagle Point is within an area of low wildfire prone urban landscape. The City hereby incorporates the RVIFP into this addendum by reference to provide greater detail to sensitivity and exposure to the wildfire hazard.

Property can be damaged or destroyed with one fire as structures, vegetation and other flammables easily merge to become unpredictable and hard to manage. Other factors that affect ability to effectively respond to a wildfire include access to the location and to water, response time from the fire station, availability of personnel and equipment and weather (e.g., heat, low humidity, high winds and drought).

Natural Hazard Risk Report: Upper Rogue Watershed

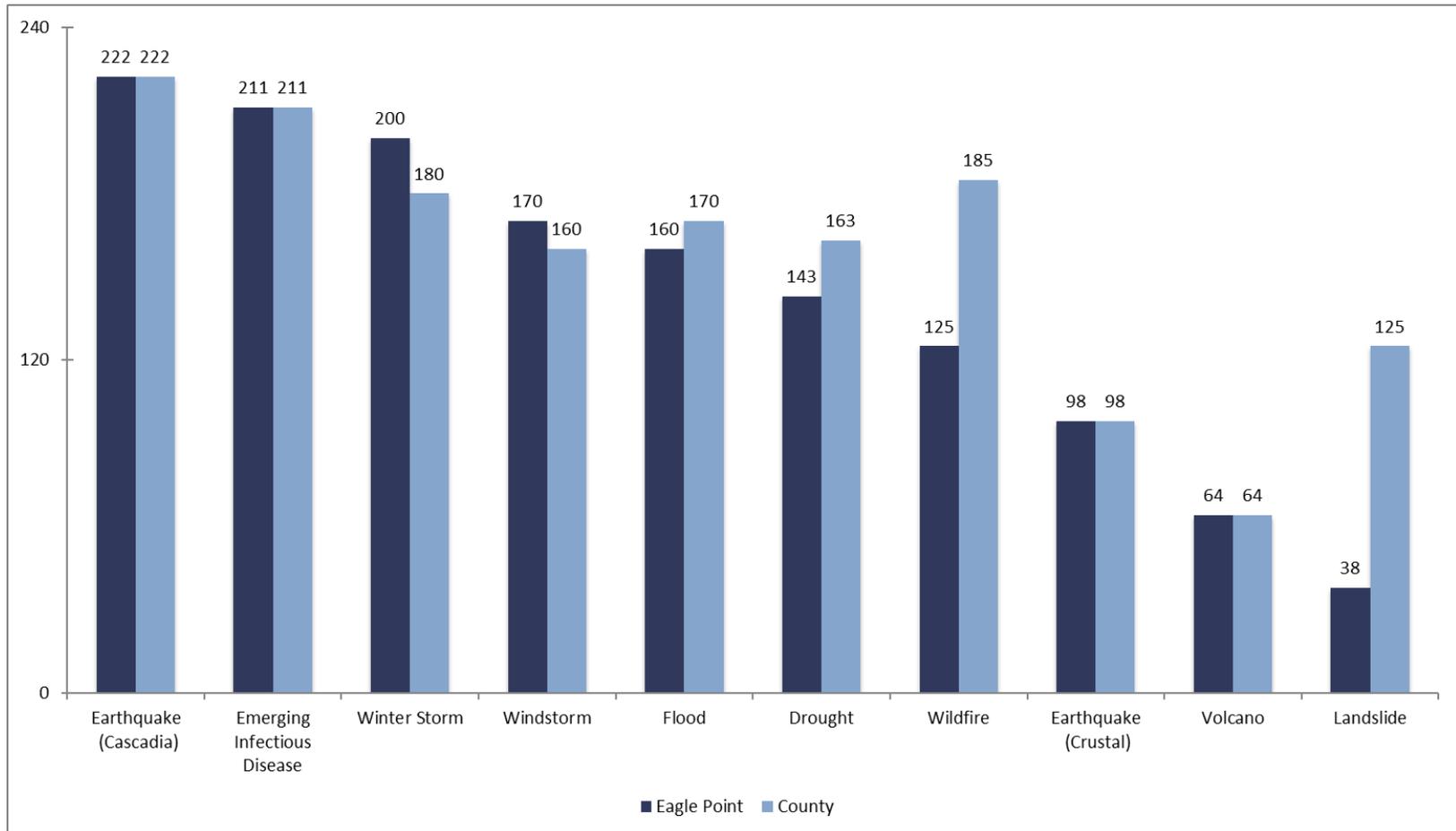
The **Risk Report** ([DOGAMI, Open-File Report O-18-XX](#)) identifies that there are 603 buildings (2 critical facilities; Eagle Point Middle School and Eagle Point High School) exposed to high wildfire risk for a total potential loss of \$101 million (a loss ratio of 21%). In addition, about 1,362 residents may be displaced (16% of the population).

Please review Volume I, Section 3 for additional information on this hazard.

Summary

Figure EA-6 presents a summary of the hazard analysis for Eagle Point and compares the results to the assessment completed by Jackson County. The top hazards for the City are Cascadia Subduction Zone earthquake, emerging infectious disease and winter storms.

Figure EA-6 Overall Hazard Analysis Comparison – Eagle Point/Jackson County



Source: City of Eagle Point NHMP Steering Committee and Jackson County NHMP Steering Committee, 2017.

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CITY OF JACKSONVILLE ADDENDUM

Purpose

Jacksonville's addendum to the Jackson County Multi-Jurisdictional Natural Hazard Mitigation Plan (MNHMP, NHMP) was completed in 2017. This addendum supplements information contained in Volume I (Basic Plan) which serves as the NHMP foundation and Volume II (Appendices) which provide additional information. This addendum meets the following requirements:

- Multi-Jurisdictional **Plan Adoption** §201.6(c)(5),
- Multi-Jurisdictional **Participation** §201.6(a)(3),
- Multi-Jurisdictional **Mitigation Strategy** §201.6(c)(3)(iv) and
- Multi-Jurisdictional **Risk Assessment** §201.6(c)(2)(iii).

Mitigation Plan Mission

The NHMP mission states the purpose and defines the primary functions of the NHMP. It is intended to be adaptable to any future changes made to the NHMP and need not change unless the community's environment or priorities change.

The City concurs with the mission statement developed during the Jackson County planning process Volume I, Section 4:

Protect life, property and the environment, reduce risk and prevent loss from natural hazard events through coordination and cooperation among public and private partners.

Mitigation Plan Goals

Mitigation plan goals are more specific statements of direction that Jackson County citizens and public and private partners can take while working to reduce the City's risk from natural hazards. These statements of direction form a bridge between the broad mission statement and particular action items. The goals listed here serve as checkpoints as agencies and organizations begin implementing mitigation action items.

The City concurs with the goals developed during the Jackson County planning process (Volume I, Section 4). All of the NHMP goals are important and are listed below in no particular order of priority. Establishing community priorities within action items neither negates nor eliminates any goals, but it establishes which action items to consider to implement first, should funding become available.

Below is a list of the NHMP goals:

GOAL 1: EMERGENCY SERVICES

Minimize life safety issues by promoting, strengthening and coordinating emergency response plans.

GOAL 2: EDUCATION AND OUTREACH

Further the public's awareness and understanding of natural hazards and potential risk, including economic vulnerability and mitigation efforts.

GOAL 3: PREVENTION

Reduce the threat of loss of life and property from natural hazards by incorporating information on known hazards and providing incentives to make hazard mitigation planning a priority in land use policies and decisions, including plan implementation.

GOAL 4: PROPERTY PROTECTION

Lessen impact from natural disasters on individual properties, businesses and public facilities by increasing awareness at the individual level and encouraging activities that can prevent damage and loss of life from natural hazards.

GOAL 5: PARTNERSHIP AND COORDINATION

Identify mitigation or risk reduction measures that address multiple areas (i.e., environment, transportation, telecommunications); Coordinate public/private sector participation in planning and implementing mitigation projects throughout the City; and seek funding and resource partnerships for future mitigation efforts.

GOAL 6: NATURAL RESOURCE PROTECTION

Preserve and rehabilitate natural systems to serve natural hazard mitigation functions (i.e., floodplains, wetlands, watershed and urban interface areas).

GOAL 7: STRUCTURAL PROTECTIONS

When applicable, utilize structural mitigation activities to minimize risks associated with natural hazards.

NHMP Process, Participation and Adoption

This section of the NHMP addendum addresses 44 CFR 201.6(c)(5), *Plan Adoption* and 44 CFR 201.6(a)(3), *Participation*. The first update of the Jackson County NHMP was approved by FEMA on February 4, 2013. To maintain compliance with the Disaster Mitigation Act of 2000 (DMA2K), the NHMP required an update by February 3, 2018. The Jacksonville addendum was added with the 2017 update of the Jackson County MNHMP.

The Oregon Partnership for Disaster Resilience (OPDR) at the University of Oregon's Community Service Center (CSC) partnered with the Oregon Military Department's Office of Emergency Management (OEM), Jackson County and Jacksonville to update their NHMP. This project is funded through the Federal Emergency Management Agency's (FEMA) FY15 Pre-Disaster Mitigation Competitive Grant Program (PDMC-PL-10-PR-2015-003). Members of the Jacksonville NHMP steering committee also participated in the County NHMP update process (Volume II, Appendix B).

By creating a NHMP, locally adopting it and having it approved by FEMA, Jacksonville will gain eligibility for FEMA Hazard Mitigation, Pre-Disaster Mitigation and Flood Mitigation Assistance grant program funds.

The Jackson County NHMP and Jacksonville addendum, are the result of a collaborative effort between citizens, public agencies, non-profit organizations, the private sector and regional organizations. A project steering committee guided the process of developing the NHMP.

The Jacksonville Fire Chief served as the designated convener of the NHMP update and will take the lead in implementing, maintaining and updating the addendum to the Jackson County NHMP in collaboration with the designated convener of the Jackson County NHMP (Emergency Manager).

Representatives from the City of Jacksonville steering committee met formally and informally, to discuss updates to their addendum (Volume II, Appendix B). The steering committee reviewed and revised the City's addendum, with particular focus on the NHMP's risk assessment and mitigation strategy (action items).

This addendum reflects decisions made at the designated meetings and during subsequent work and communication with Jackson County Emergency Management and the OPDR.

The Jacksonville Steering Committee was comprised of the following representatives:

- Convener, Devin Hull, Jacksonville Fire Chief
- Stacey Bray, City of Jacksonville Administration
- Dick Converse, City of Jacksonville Planning
- Ian Foster, City of Jacksonville Planning

Public participation was achieved with the establishment of the steering committee, which was comprised of City officials representing different departments and sectors and members of the public. The steering committee was closely involved throughout the development of the NHMP and served as the local oversight body for the NHMP's development. Community members were provided an opportunity for comment via the NHMP review process and through a survey administered by the OPDR and publicized by the participating jurisdictions (Volume II, Appendix B).

The Jackson County NHMP was approved by FEMA on [Month] [Day], 2018 and the Jacksonville addendum was adopted via resolution on [Month] [Day], 2018. This NHMP is effective through [Month] [Day], 2023.

NHMP Implementation and Maintenance

The City Council will be responsible for adopting the Jacksonville addendum to the Jackson County NHMP. This addendum designates a steering committee and a convener to oversee the development and implementation of action items. Because the City addendum is part of the County's multi-jurisdictional NHMP, the City will look for opportunities to partner with the County. The City's steering committee will convene after re-adoption of the Jacksonville NHMP addendum on an annual schedule. The County is meeting on a semi-annual basis and will provide opportunities for the cities to report on NHMP implementation and maintenance during their meetings. The City's Fire Chief will serve as the convener and will be responsible for assembling the steering committee. The steering committee will be responsible for:

- Reviewing existing action items to determine suitability of funding;

- Reviewing existing and new risk assessment data to identify issues that may not have been identified at NHMP creation;
- Educating and training new steering committee members on the NHMP and mitigation actions in general;
- Assisting in the development of funding proposals for priority action items;
- Discussing methods for continued public involvement; and
- Documenting successes and lessons learned during the year.

The convener will also remain active in the County's implementation and maintenance process (Volume I, Section 5).

The City will utilize the same action item prioritization process as the County (Volume I, Section 5 and Volume II, Appendix D).

Implementation through Existing Programs

Many of the Natural Hazard Mitigation Plan's recommendations are consistent with the goals and objectives of the City's existing plans and policies. Where possible, Jacksonville will implement the NHMP's recommended actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses and policy makers. Many land-use, comprehensive and strategic plans get updated regularly, allowing them to adapt to changing conditions and needs. Implementing the NHMP's action items through such plans and policies increases their likelihood of being supported and implemented.

Jacksonville's acknowledged comprehensive plan is the City of Jacksonville Comprehensive Plan. The Oregon Land Conservation and Development Commission first acknowledged the plan in 1983. The City implements the plan through the Community Development Code.

Jacksonville currently has the following plans that relate to natural hazard mitigation. For a complete list visit the City's [website](#):

- [Comprehensive Plan](#)
- Transportation System Plan (2009)
- [Community Development Code](#)
- [Building Code, 2017 Oregon State Code](#) based on 2015 International Residential Code (IRC) and 2012 International Building Code
- [Urban Renewal Plan](#) (2014)
- [Emergency Operations Plan](#) (2012)
- Water System Master Plan (2016)

Continued Public Participation

Keeping the public informed of the City's efforts to reduce its risk to future natural hazard events is important for successful NHMP implementation and maintenance. The City is committed to involving the public in the NHMP review and updated process (Volume I, Section 5).

NHMP Maintenance

The Jackson County Multi-Jurisdictional Natural Hazard Mitigation Plan and City addendum will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. During the County NHMP update process, the City will also review and update its addendum (Volume I, Section 5). The convener will be responsible for convening the steering committee to address the questions outlined below.

- Are there new partners that should be brought to the table?
- Are there new local, regional, state or federal policies influencing natural hazards that should be addressed?
- Has the community successfully implemented any mitigation activities since the NHMP was last updated?
- Have new issues or problems related to hazards been identified in the community?
- Are the actions still appropriate given current resources?
- Have there been any changes in development patterns that could influence the effects of hazards?
- Have there been any significant changes in the community's demographics that could influence the effects of hazards?
- Are there new studies or data available that would enhance the risk assessment?
- Has the community been affected by any disasters? Did the NHMP accurately address the impacts of this event?

These questions will help the steering committee determine what components of the mitigation plan need updating. The steering committee will be responsible for updating any deficiencies found in the NHMP.

Mitigation Strategy

This section of the NHMP addendum addresses 44 CFR 201.6(c)(3(iv), *Mitigation Strategy*.

The City's mitigation strategy (action items) were developed during the 2017 NHMP planning process. The steering committee assessed the City's risk, identified potential issues and developed a mitigation strategy (action items). The City developed actions specific to their community after first reviewing a list of recommended actions developed by the County or recommended by OPDR.

Priority Actions

The City is listing a set of high priority actions in an effort to focus attention on an achievable set of high leverage activities over the next five-years (Table JA-1).

Action Item Pool

Table JA-2 presents a "pool" of mitigation actions. This expanded list of actions is available for local consideration as resources, capacity, technical expertise and/or political will become available.

Table JA-I Jacksonville Priority Action Items

Action Item ID	Mitigation Action Item	Timeline	Lead Organization	Partner Organization(s)	Potential Funding Source(s)
Priority Actions					
Multi-Hazard (MH)					
MH #1	Integrate the Mitigation Plan findings into planning and regulatory documents and programs including the Comprehensive Plan (particularly Goal 7) and development code. Particular attention will be paid to the wildfire hazard.	Mid-Term	City Planning	RVCOG, DLCD, FEMA	General Fund, DLCD Technical Assistance Grant
Landslide (LS)					
LS #1	Investigate the development and implementation of a city landslide ordinance.	Long-Term	City Planning	DLCD, DOGAMI	General Fund, DLCD Technical Assistance Grant
Wildfire (WF)					
WF #1	Coordinate fire mitigation action items through the recommendations of the Rogue Valley Integrated Community Wildfire Protection Plan.	Ongoing	City Emergency Management Agencies	Public Works, Administration, Jackson County, Fire Districts, Bureau of Land Management - Medford District, Oregon Department of Forestry, Office of State Fire Marshall	Local Funding Resources, Fire Districts, ODF

Source: City of Jacksonville NHMP Steering Committee, 2017.

Table JA-2 Jacksonville Action Item Pool

Action Item ID	Mitigation Action Item	Timeline	Lead Organization	Partner Organization(s)	Potential Funding Source(s)
Action Item Pool					
Multi-Hazard (MH)					
MH #2	Sustain a public awareness and education campaign about natural hazards.	Ongoing	City Administration/ Emergency Management Agencies	County Emergency Management, FEMA, OEM, NWS, ODOT, CERT, RVCOG Utilities	General Fund, FEMA, DLCDC
MH #3	Enhance hazard resistant construction methods (wind, winter storm, landslide, etc.) where possible to reduce damage to utilities and critical facilities. In part, this may be accomplished by encouraging electric utility providers to convert existing overhead lines to underground lines.	Ongoing	City Planning, Public Works	Utility Companies	New construction is required to underground Utilities
Drought (DR)					
	No specific action item developed for this hazard. See multi-hazard actions for applicable mitigation strategies.				
Earthquake (EQ)					
EQ #1	Implement structural and non-structural retrofits to critical and essential facilities.	Long-Term	City Planning	Building officials, Administration, Public Works	General Fund, SRGP, PDM
Emerging Infectious Disease (EID)					
	No specific action item developed for this hazard. See multi-hazard actions for applicable mitigation strategies.				
Flood (FL)					
FL #1	Encourage private property owners to restore natural systems within the floodplain, and to manage riparian areas and wetlands for flood abatement.	Long-Term	City Planning	RVCOG, FEMA, Watershed Councils, neighboring cities	General Fund
FL #2	Use federal grant funds to acquire or elevate, or otherwise mitigate, individual repetitive loss or severe repetitive loss properties, within 100-year floodplain as opportunities arise.	Long-Term	City Planning	FEMA, DLCDC	FMA

Source: City of Jacksonville NHMP Steering Committee, 2017

Table JA-2 Jacksonville Action Item Pool (continued)

Action Item ID	Mitigation Action Item	Timeline	Lead Organization	Partner Organization(s)	Potential Funding Source(s)
Action Item Pool					
Landslide (LS)					
	See priority actions and multi-hazard actions for applicable mitigation strategies.				
Severe Weather (SW, Windstorm and Winter Storm)					
SW #1	Promote the benefits of tree-trimming and tree replacement programs and help to coordinate local efforts by public and private agencies.	Ongoing	City Vegetation Management	Utility companies, ODOT, Public Works, USFS, BLM, ODF, Fire	General Fund
Volcano (VE)					
	No specific action item developed for this hazard. See multi-hazard actions for applicable mitigation strategies.				
Wildfire (WF)					
	See priority actions and multi-hazard actions for applicable mitigation strategies.				

Source: City of Jacksonville NHMP Steering Committee, 2017

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Risk Assessment

This section of the NHMP addendum addresses 44 CFR 201.6(b)(2) - Risk Assessment. In addition, this chapter can serve as the factual basis for addressing Oregon Statewide Planning Goal 7 – Areas Subject to Natural Hazards. Assessing natural hazard risk has three phases:

- **Phase 1:** Identify hazards that can impact the jurisdiction. This includes an evaluation of potential hazard impacts – type, location, extent, etc.
- **Phase 2:** Identify important community assets and system vulnerabilities. Example vulnerabilities include people, businesses, homes, roads, historic places and drinking water sources.
- **Phase 3:** Evaluate the extent to which the identified hazards overlap with or have an impact on, the important assets identified by the community.

The local level rationale for the identified mitigation strategies (action items) is presented herein and within Volume I, Sections 2 and 3. The risk assessment process is graphically depicted in Figure JA-1 below. Ultimately, the goal of hazard mitigation is to reduce the area of risk, where hazards overlap vulnerable systems.

Figure JA-1 Understanding Risk



Hazard Analysis

The Jacksonville steering committee developed their hazard vulnerability assessment (HVA), using the County's HVA (Volume II, Appendix C) as a reference. Changes from the County's HVA were made where appropriate to reflect distinctions in vulnerability and risk from natural hazards unique to Jacksonville, which are discussed throughout this addendum.

Table JA-3 shows the HVA matrix for Jacksonville listing each hazard in order of rank from high to low. 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.

One catastrophic hazard (Cascadia Subduction Zone earthquake) and four chronic hazards (emerging infectious disease, wildfire, windstorm and winter storm) rank as the top hazard threats to the City (Top Tier). The landslide and drought comprise the next highest ranked hazards (Middle Tier), while the flood, earthquake (crustal) and volcano hazards comprise the lowest ranked hazards (Bottom Tier).

Table JA-3 Hazard Analysis Matrix – Jacksonville

Hazard	Maximum				Total Threat Score	Hazard Rank	Hazard Tiers
	History	Vulnerability	Threat	Probability			
Earthquake (Cascadia)	2	50	100	70	222	#1	Top Tier
Emerging Infectious Disease	12	50	100	49	211	#2	
Wildfire	20	40	80	70	210	#3	
Windstorm	20	40	80	70	210	#4	
Winter Storm	20	40	70	70	200	#5	
Landslide	14	25	60	56	155	#6	Middle Tier
Drought	20	15	50	63	148	#7	
Flood	16	10	40	49	115	#8	Bottom Tier
Earthquake (Crustal)	2	25	50	21	98	#9	
Volcano	2	5	50	7	64	#10	

Source: Jacksonville NHMP Steering Committee, 2017.

Table JA-4 categorizes the probability and vulnerability scores from the hazard analysis for the City and compares the results to the assessment completed by the Jackson County NHMP Steering Committee (Volume II, Appendix C). Variations between the City and County are noted in **bold** text.

Table JA-4 Probability and Vulnerability Comparison

Hazard	Jacksonville		Jackson County	
	Probability	Vulnerability	Probability	Vulnerability
Drought	High	Low	High	Moderate
Earthquake (Cascadia)	High	High	High	High
Earthquake (Crustal)	Low	Moderate	Low	Moderate
Emerging Infectious Disease	Moderate	High	Moderate	High
Flood	Moderate	Low	High	Moderate
Landslide	High	Moderate	High	Low
Volcanic Eruption	Low	Low	Low	Low
Wildfire	High	High	High	Moderate
Windstorm	High	High	High	Moderate
Winter Storm	High	High	High	Moderate

Source: Jacksonville NHMP Steering Committee, 2017.

Community Characteristics

Table JA-5 and the following section provides information on City specific demographics and assets. For additional information on the characteristics of Jacksonville, in terms of geography, environment, population, demographics, employment and economics, as well as housing and transportation see Volume I, Section 2. Many of these community characteristics can affect how natural hazards impact communities and how communities choose to plan for natural hazard mitigation. Considering the City specific assets during the planning process can assist in identifying appropriate measures for natural hazard mitigation. Between 2012 and 2016 the City grew by 105 people (3.7%) and median household income increased by about 11% (Volume I, Section 2). New development has complied with the standards of the [Oregon Building Code](#) and the city's development code including their floodplain ordinance.

Transportation/Infrastructure

In the City of Jacksonville, transportation has played a major role in shaping the community. Jacksonville's commercial areas developed along primary routes and residential development followed nearby.

Today, mobility plays an important role in Jacksonville and the daily experience of its residents and businesses as they move from point A to point B. The existing transportation system is complemented by the established Rogue Valley Transportation District (RVTD) and the transit stop located within Jacksonville. In addition, the City has formed the Jacksonville Woodlands Association to operate several recreational trails within a series of protected parcels surrounding 70% of the town's historic district¹.

By far, motor vehicles represent the dominant mode of travel through and within Jacksonville.

Economy

A diverse range of businesses have chosen to locate in Jacksonville. Traditionally, Jacksonville has built its economy as a gold rush town with favorable climate, attractive landscape and cultural attractions. In addition, Jacksonville's proximity to the Medford give it market access that is more favorable than usual for a rural town. According to the economic profile of the City's Comprehensive Plan, Jacksonville finds their main economic drivers in the sectors of Construction; Health Care and Social Assistance; and Agriculture, Forestry, Fishing and Hunting².

¹ Jacksonville Woodlands Association, <http://www.jvwoodlands.org/>

²<http://www.jacksonvilleor.us/wp-content/uploads/2011/01/Chapter-Six-Economic-Element.pdf>

Table JA-5 Community Characteristics

Population Characteristics		
2012 Population	2,815	
2016 Population	2,920	
2035 Forecasted Population*	4,316	
Race and Ethnic Categories		
White		95%
Black/ African American		1%
American Indian and Alaska Native		0%
Asian		4%
Native Hawaiian and Other Pacific Islander		0%
Some Other Race		0%
Two or More Races		0%
Hispanic or Latino		1%
Limited or No English Spoken		0%
Vulnerable Age Groups		
Less than 15 Years	210	7%
65 Years and Over	1,276	44%
Disability Status		
Total Population	705	25%
Children	57	2%
Seniors	549	19%

Income Characteristics		
Households by Income Category		
Less than \$15,000	184	12%
\$15,000-\$29,999	256	17%
\$30,000-\$44,999	274	18%
\$45,000-\$59,999	253	16%
\$60,000-\$74,999	132	9%
\$75,000-\$99,999	145	9%
\$100,000-\$199,999	228	15%
\$200,000 or more	67	4%
Median Household Income	\$46,901	
Poverty Rates		
Total Population	121	4%
Children	0	0%
Seniors	48	4%
Housing Cost Burden		
Owners with Mortgage		63%
Renters		59%

Source: U.S. Census Bureau, 2011-2015 American Community Survey; Portland State University, Population Research Center.

Note: * = Population forecast within UGB

Housing Characteristics		
Housing Units		
Single-Family	1,018	63%
Multi-Family	359	22%
Mobile Homes	231	14%
Year Structure Built		
Pre-1970	526	33%
1970-1989	488	30%
1990 or later	594	37%
Housing Tenure and Vacancy		
Owner-occupied	1,077	70%
Renter-occupied	462	30%
Vacant	69	4%

Jacksonville is in Jackson County in southwestern Oregon. The City has grown steadily since its incorporation in 1860 and has an area today of 1.82 square miles. It is in the central region of the county, located about 5 miles west of Medford or and about 25 miles east of Grants Pass or. The City and most of Jackson County are within the Rogue and Umpqua watersheds.

Jacksonville experiences a relatively mild climate with four distinct seasons that comes from its position on the west coast of North America and within the mountains of the region. The town is at the northeastern edge of the Siskiyou Mountains at approximately 1,500 feet above sea level. Because of its location Jacksonville has a climate somewhat intermediate to central California and northern Oregon. Jacksonville averages only 20 inches of rain per year due to being inland from the coast and in the rain shadow of the nearby mountains.

The City of Jacksonville includes a diversity of land uses but is zoned primarily residential. A notable vulnerability shown in Table JA-5 is the high percentage (44%) of residents age 65 or older.

For more information see Volume I, Section 2.

Community Assets

This section outlines the resources, facilities and infrastructure that, if damaged, could significantly impact the public safety, economic conditions and environmental integrity of Jacksonville.

Critical Facilities

Facilities that are critical to government response and recovery activities (i.e. life, safety, property and environmental protection). These facilities include: 911 Centers, Emergency Operations Centers, Police and Fire Stations, Public Works facilities, sewer and water facilities, hospitals, bridges, roads, shelters and more. Facilities that, if damaged, could cause serious secondary impacts may also be considered “critical.” A hazardous material facility is one example of this type of critical facility.

Fire Stations:

- Fire Department

Law Enforcement:

- Police Department

Private:

- Ray’s Food Place

City Buildings:

- Community Center
- City Hall (new; 206 N. 5th St)
– administration, planning, parks
- City Hall (old; 205 W. Main St)
– City Offices
- Public Works

Essential Facilities

Facilities that are essential to the continued delivery of key government services and/or that may significantly impact the public’s ability to recover from the emergency. These facilities may include: City buildings such as the Public Services Building, the City Hall and other public facilities such as schools.

Hospitals/Immediate Medical Care Facilities:

- Active Medical
- Jacksonville Physical Therapy
- Jacksonville Vision Clinic
- Jacksonville Veterinary Hospital

Public Schools:

- Jacksonville Elementary School

City/County/Other:

- Jacksonville Library (County)

Potential Shelter Sites:

- Elementary School
- Calvary Church Assembly of God (First Aid Shelter)
- First Presbyterian Church (Shelter)

Infrastructure:

Infrastructure that provides services for the City includes:

Transportation Networks:

- Highway 238
- California St
- Oregon St
- Cady Rd
- N 5th St
- S 3rd St
- Stage Rd

Water Facilities:

- Water Reservoirs (4); 3.45 million gallons total

Special Service Districts:

- Southern Oregon Education Service District
- Medford Water Commission
- Medford Irrigation District
- Rogue Valley Sewer

Private Utilities:

- Pacific Power
- Avista Natural Gas
- Telecommunications

Hazard Characteristics

Drought

The steering committee determined that the City's probability for drought is **high** (which is the same as the County's rating) and that their vulnerability to drought is **low** (which is lower than the County's rating).

Volume I, Section 3 describes the characteristics of drought hazards, history, as well as the location, extent and probability of a potential event. Due to the climate of Jackson County, past and present weather conditions have shown an increasing potential for drought.

The City receives its main water supply from Big Butte Springs through the Medford Water Commission, supplemented by the Rogue River in the summer months. For more information on the future of Jacksonville's water supply visit their [website](#).

Please review Volume I, Section 3 for additional information on this hazard.

Earthquake (Cascadia)

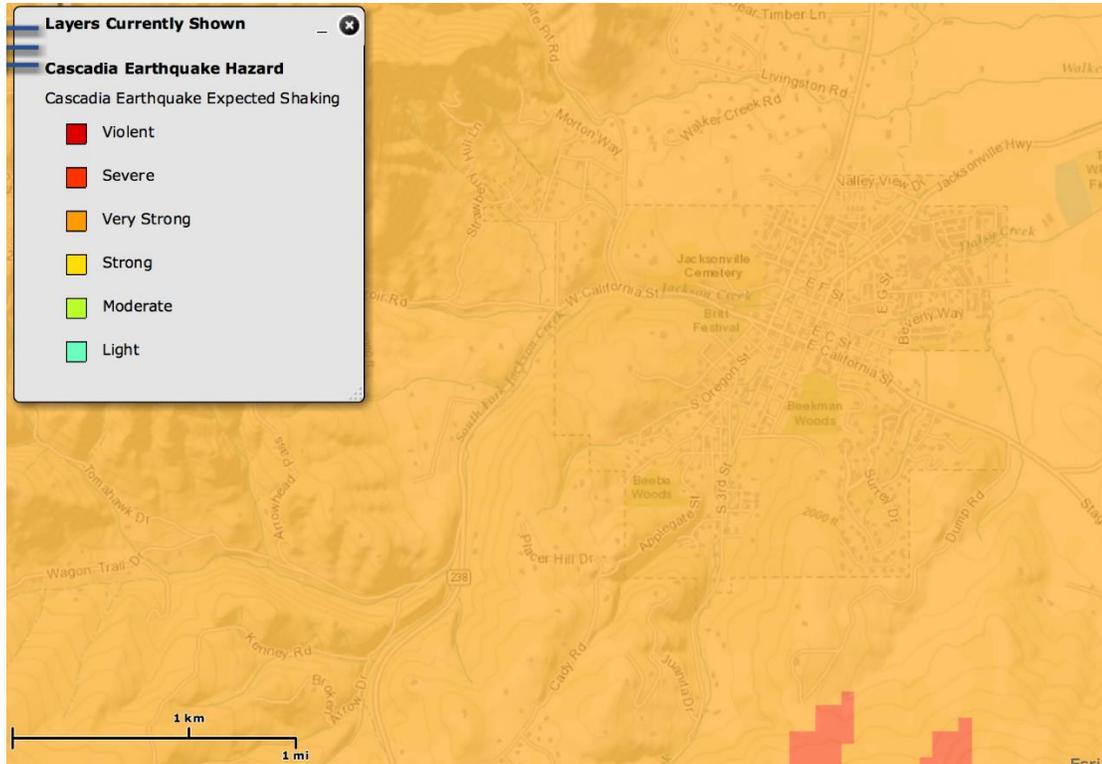
The steering committee determined that the City's probability for a Cascadia Subduction Zone (CSZ) earthquake is **high** (which is the same as the County's rating) and that their vulnerability to a CSZ earthquake is **high** (which is the same as the County's rating).

Volume I, Section 3 describes the characteristics of earthquake hazards, history, as well as the location, extent and probability of a potential event. Generally, an event that affects the County is likely to affect Jacksonville as well. The causes and characteristics of an earthquake event are appropriately described within Volume I, Section 3, as well as the location and extent of potential hazards. Previous occurrences are well documented within Volume I, Section 3 and the community impacts described by the County would generally be the same for Jacksonville as well.

The local faults, the county's proximity to the Cascadia Subduction Zone, potential slope instability and the prevalence of certain soils subject to liquefaction and amplification combine to give the county a high-risk profile. Due to the expected pattern of damage resulting from a CSZ event, the Oregon Resilience Plan divides the State into four distinct zones and places Jackson County predominately within the "Valley Zone" (Valley Zone, from the summit of the Coast Range to the summit of the Cascades). Within the Southwest Oregon region, damage and shaking is expected to be strong and widespread - an event will be disruptive to daily life and commerce and the main priority is expected to be restoring services to business and residents.³ Figure JA-2 displays relative shaking hazards from a Cascadia Subduction Zone earthquake event. As shown in the figure below, the area of greatest concern within the City of Jacksonville (darker areas) is along the mountainous areas to the northeast of the City.

³ Ibid.

Figure JA-2 Cascadia Subduction Zone



Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](#)

Note: To view detail click the link above to access Oregon HazVu.

As noted in the community profile, approximately 63% of residential buildings were built prior to 1990, which increases the City's vulnerability to the earthquake hazard. Information on specific public buildings' (schools and public safety) estimated seismic resistance, determined by DOGAMI in 2007, is shown in Table JA-6; each "X" represents one building within that ranking category. Of the facilities evaluated by DOGAMI using a Rapid Visual Survey (RVS), no buildings have a very high (100% chance) collapse potential, however, three (3) buildings have a high (greater than 10% chance) collapse potential.

In addition to building damages, utility (electric power, water, wastewater, natural gas) and transportation systems (bridges, pipelines) are also likely to experience significant damage. There is a low probability that a major earthquake will result in failure of upstream dams.

Utility systems will be significantly damaged, including damaged buildings and damage to utility infrastructure, including water and wastewater treatment plants and equipment at high voltage substations (especially 230 kV or higher which are more vulnerable than lower voltage substations). Buried pipe systems will suffer extensive damage with approximately one break per mile in soft soil areas. There would be a much lower rate of pipe breaks in other areas. Restoration of utility services will require substantial mutual aid from utilities outside of the affected area.

Table JA-6 Rapid Visual Survey Scores

Facility	Site ID*	Level of Collapse Potential			
		Low (< 1%)	Moderate (>1%)	High (>10%)	Very High (100%)
Schools					
Jacksonville Elementary School (Medford SD 549C) (655 Hueners Ln)	Jack_sch27	X		X,X,X	
Public Safety					
Jacksonville Fire Department (City of Jacksonville) (180 N 3rd St)	Jack_fir16	X			

Source: [DOGAMI 2007. Open File Report 0-07-02. Statewide Seismic Needs Assessment Using Rapid Visual Assessment.](#) "*" – Site ID is referenced on the [RVS Jackson County Map](#)

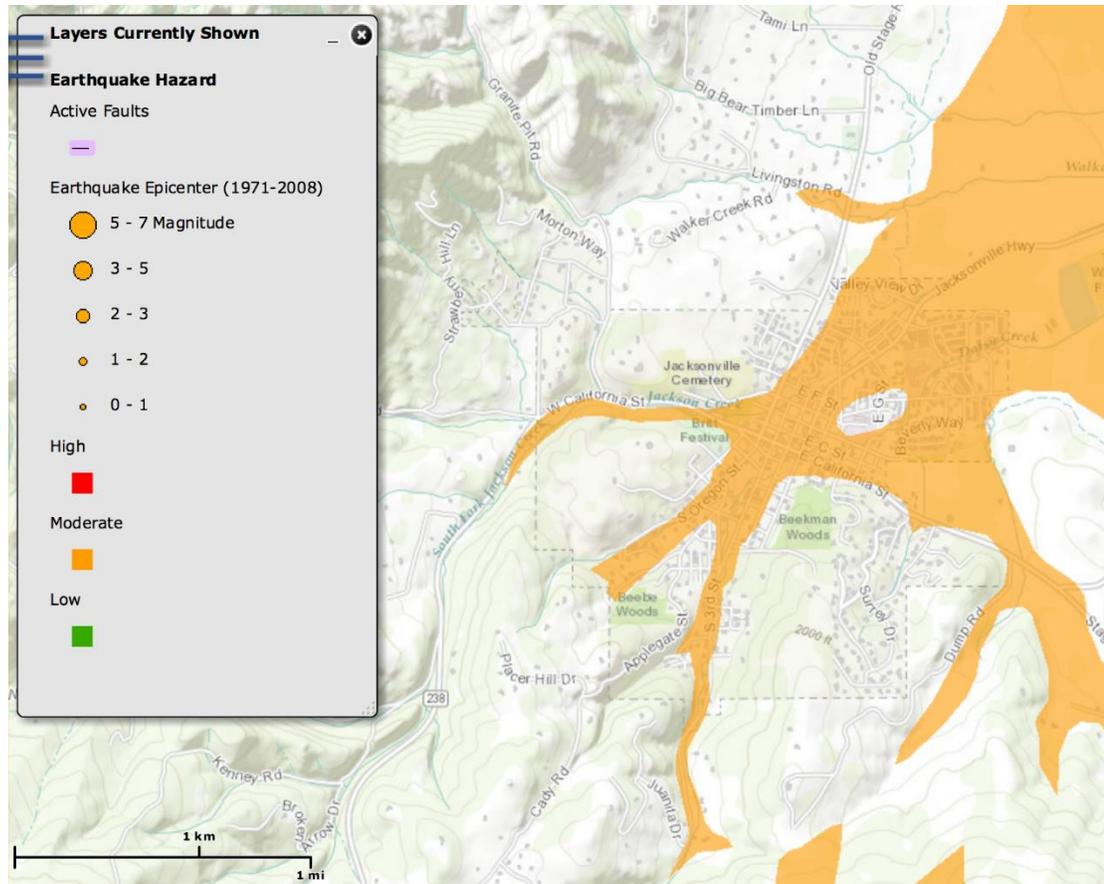
Earthquake (Crustal)

The steering committee determined that the City’s probability for a crustal earthquake is **low** (which is the same as the County’s rating) and that their vulnerability to crustal earthquake is **moderate** (which is the same as the County’s rating).

Volume I, Section 3 describes the characteristics of earthquake hazards, history, as well as the location, extent and probability of a potential event. Generally, an event that affects the county is likely to affect Jacksonville as well. The causes and characteristics of an earthquake event are appropriately described within Volume I, Section 3, as well as the location and extent of potential hazards. Previous occurrences are well-documented within Volume I, Section 3 and the community impacts described by the County would generally be the same for Jacksonville as well.

Earthquake-induced damages are difficult to predict and depend on the size, type and location of the earthquake, as well as site-specific building and soil characteristics. Presently, it is not possible to accurately forecast the location or size of earthquakes, but it is possible to predict the behavior of soil at any particular site. In many major earthquakes, damages have primarily been caused by the behavior of the soil. Figure JA-3 displays relative liquefaction hazards, a portion of the City is within an area of moderate soft soils (liquefaction hazard orange areas).

Figure JA-3 Active Faults and Soft Soils



Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](#)

Note: To view detail click the link above to access Oregon HazVu.

Please review Volume I, Section 3 for additional information on this hazard.

Emerging Infectious Disease

The steering committee determined that the City's probability for emerging infectious disease is **moderate** (which is the same as the County's rating) and that their vulnerability is **high** (which is the same as the County's rating).

Emerging infectious diseases are those that have recently appeared in a population or those whose incidence or geographic range is rapidly increasing or threatens to increase. Emerging infections may be caused by biological pathogens (e.g., virus, parasite, fungus or bacterium) and may be: previously unknown or undetected biological pathogens, biological pathogens that have spread to new geographic areas or populations, previously known biological pathogens whose role in specific diseases was previously undetected and biological pathogens whose incidence of disease was previously declining but whose incidence of disease has reappeared (re-emerging infectious disease).⁴

⁴ Baylor College of Medicine, *Emerging Infectious Disease*, URL: <https://www.bcm.edu/departments/molecular-virology-and-microbiology/emerging-infections-and-biodefense/emerging-infectious-diseases>, accessed September 17, 2017.

Volume I, Section 3 describes the characteristics of emerging infectious disease, history, as well as the location, extent and probability of a potential event within the region. Generally, an event that affects the County is likely to affect the City as well.

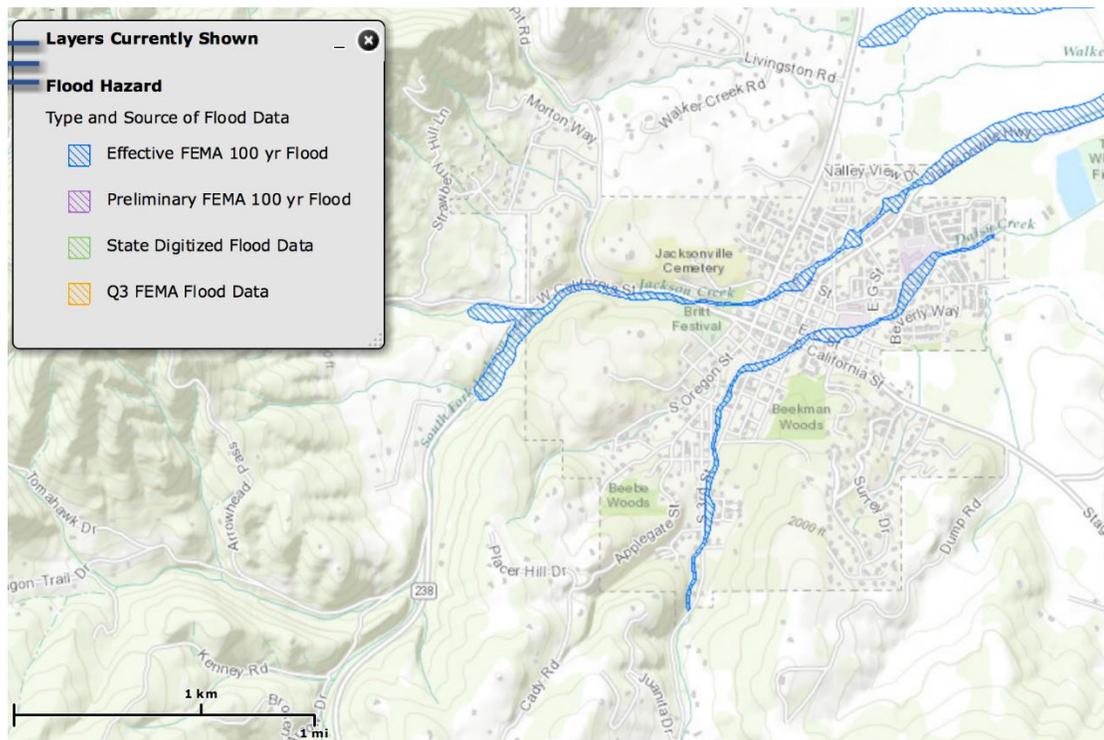
Please review Volume I, Section 3 for additional information on this hazard.

Flood

The steering committee determined that the City's probability for flood is **moderate** (which is lower than the County's rating) and that their vulnerability to flood is **low** (which is the same as the County's rating).

Volume I, Section 3 describes the characteristics of flood hazards, history, as well as the location, extent and probability of a potential event. Portions of Jacksonville have areas of flood plains (special flood hazard areas, SFHA). These include areas along the South Fork Jackson Creek and Daisy Creek (Figure JA-4). Furthermore, other portions of Jacksonville, outside of the mapped floodplains, are also subject to flooding from local storm water drainage.

Figure JA-4 Special Flood Hazard Area



Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](#)

Note: To view detail click the link above to access Oregon HazVu.

Jackson Creek is the chief source of flooding in Jacksonville. The creek, which has its origins in the Bear Creek tributary of the Rogue River, is relatively even in terrain and is projected to flood only within a very narrow corridor.

The City is at risk from two types of flooding: riverine and urban. Riverine flooding occurs when streams overflow their banks and inundate low-lying areas. This is a natural process that adds sediment and nutrients to fertile floodplain areas. It usually results from

prolonged periods of precipitation over a wide geographic area. Low velocity sheets of water generally flood most areas that are prone to flooding. Urban flooding occurs as land is converted to impervious surfaces and hydrologic systems are changed. Precipitation is collected and transmitted to streams at a much faster rate, causing floodwaters that rise rapidly and peak with violent force. During urban flooding, storm drains can back up and cause localized flooding of streets and basements.

Floods can have a devastating impact on almost every aspect of the community, including private property damage, public infrastructure damage and economic loss from business interruption. It is important for the City to be aware of flooding impacts and assess its level of risk. The City has been proactive in mitigating flood hazards by purchasing floodplain property.

The economic losses due to business closures often total more than the initial property losses that result from flood events. Flood events significantly impact business owners and their employees. Direct damages from flooding are the most common impacts, but indirect damages, such as diminished clientele, can be just as debilitating to a business. No critical or essential facilities are in the floodplain. Currently, there is no financial impact data available of this infrastructure.

Highway 238 is the main connector between Jacksonville and the services and amenities found in Medford and other urban centers. If major flooding affected all of the main transportation routes in Jacksonville, traffic flow in and out of the City would be significantly affected, but would not cut all off all avenues. The amount of property in the flood plain is not a large area but damage could be significant as it would affect residential, commercial and public property. Floodwaters can affect building foundations, seep into basements or cause damage to the interior, exterior and contents of buildings, dependent upon the velocity and depth of the water and by the presence of floating debris. The City sewer system can overflow during flood events and cause further property damage.

For mitigation planning purposes, it is important to recognize that flood risk for a community is not limited only to areas of mapped floodplains. Other portions of Jacksonville outside of the mapped floodplains may also be at relatively high risk from over bank flooding from streams too small to be mapped by FEMA or from local storm water drainage.

National Flood Insurance Program (NFIP)

FEMA updated the Flood Insurance Study (FIS) and Flood Insurance Rate Maps (FIRMs) in 2018 (effective January 19, 2018). Table JA-7, below shows that as of June 2016, Jacksonville has 49 National Flood Insurance Program (NFIP) policies in force. Of those, 17 are for properties that were constructed before the initial FIRM. The last Community Assistance Visit (CAV) for Jacksonville was on August 15, 1994. The table shows that the majority of flood insurance policies are for residential structures, primarily single-family homes. There has been a total of three (3) paid claims for \$6,498. The City complies with the NFIP through enforcement of their flood damage prevention ordinance and their floodplain management program.

The Community Repetitive Loss record for Jacksonville identifies one (1) Repetitive Loss Properties⁵ (a single-family residence) and zero (0) Severe Repetitive Loss Properties⁶. For details on the repetitive loss properties see Volume I, Section 3.

Table JA-7 Flood Insurance Detail

Jurisdiction	Effective FIRM and FIS	Initial FIRM Date	Total Policies	Pre-FIRM Policies	Policies by Building Type				Minus Rated A Zone
					Single Family	2 to 4 Family	Other Residential	Non-Residential	
Jackson County	-	-	1,828	809	1,568	44	91	125	126
Jacksonville	1/19/2018	12/4/1979	49	17	32	0	14	3	8

Jurisdiction	Insurance in Force	Total Paid Claims	Pre-FIRM Claims Paid	Substantial Damage Claims	Total Paid Amount	Repetitive Loss Structures	Severe Repetitive Loss Properties	CRS Class Rating	Last Community Assistance Visit
Jackson County	\$ 442,723,400	197	132	10	\$ 2,337,660	8	0	-	-
Jacksonville	\$ 10,990,700	3	3	0	\$ 6,498	1	0	-	8/15/1994

Source: Information compiled by Department of Land Conservation and Development, July 2016.

Please review Volume I, Section 3 for additional information on this hazard.

Landslide

The steering committee determined that the City’s probability for landslide is **high** (which is the same as the County’s rating) and that their vulnerability to landslide is **moderate** (which is higher than the County’s rating).

Volume I, Section 3 describes the characteristics of landslide hazards, history, as well as the location, extent and probability of a potential event within the region. The potential for landslide in Jacksonville is almost negligible except for very small areas immediately adjacent to stream channels. However, such areas have little or no development or infrastructure.

Landslide susceptibility exposure for Jacksonville is shown in Figure JA-5. Jacksonville demonstrates a mix of low, moderate and high susceptibility to landslide exposure, with corridors of high and moderate susceptibility concentrated around the outer western and southwestern edges of the City. Approximately 18% of Jacksonville has high and approximately 32% moderate, landslide susceptibility exposure.⁷

Note that even if a jurisdiction has a high percentage of area in a high or very high landslide exposure susceptibility zone, this does not mean there is a high risk, because risk is the intersection of hazard and assets.

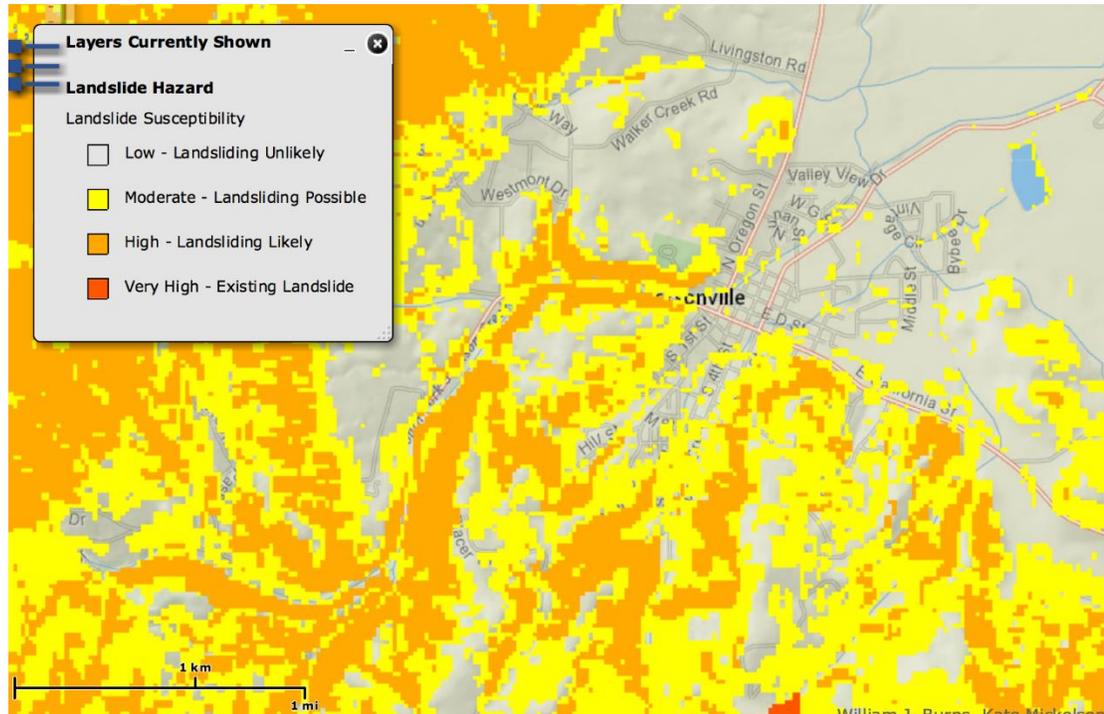
⁵ A Repetitive Loss (RL) property is any insurable building for which two or more claims of more than \$1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978. A RL property may or may not be currently insured by the NFIP.

⁶ A Severe Repetitive Loss (SRL) property is a single family property (consisting of 1 to 4 residences) that is covered under flood insurance by the NFIP and has incurred flood-related damage for which 4 or more separate claims payments have been paid under flood insurance coverage, with the amount of each claim payment exceeding \$5,000 and with cumulative amount of such claims payments exceeding \$20,000; or for which at least 2 separate claims payments have been made with the cumulative amount of such claims exceeding the reported value of the property.

⁷ DOGAMI Open-File Report, O-16-02, Landslide Susceptibility Overview Map of Oregon (2016)

There is little history of landslide activity in Jacksonville, however, development pressure is encroaching upon areas that are more susceptible to landslide activity particularly during heavy rain events.

Figure JA-5 Landslide Susceptibility Exposure



Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](#)

Note: To view detail click the link above to access Oregon HazVu.

Potential landslide-related impacts are adequately described within Volume I, Section 3 and include infrastructural damages, economic impacts (due to isolation and/or arterial road closures), property damages and obstruction to evacuation routes. Rain-induced landslides and debris flows can potentially occur during any winter in Jackson County and thoroughfares beyond City limits are susceptible to obstruction as well.

The most common type of landslides in Jackson County are slides caused by erosion. Slides move in contact with the underlying surface, are generally slow moving and can be deep. Rainfall-initiated landslides tend to be smaller; while earthquake induced landslides may be quite large. All soil types can be affected by natural landslide triggering conditions.

Please review Volume I, Section 3 for additional information on this hazard.

Severe Weather

Severe weather in can account for a variety of intense and potentially damaging weather events. These events include windstorms and winter storms. The following section describes the unique probability and vulnerability of each identified weather hazard. Other more abrupt or irregular events such as hail are also described in this section.

Windstorm

The steering committee determined that the City's probability for windstorm is **high** (which is the same as the County's rating) and that their vulnerability to windstorm is **high** (which is higher than the County's rating).

Volume I, Section 3 describes the characteristics of windstorm hazards, history, as well as the location, extent and probability of a potential event within the region. Because windstorms typically occur during winter months, they are sometimes accompanied by ice, freezing rain, flooding and very rarely, snow. Other severe weather events that may accompany windstorms, including thunderstorms, hail, lightning strikes and tornadoes are generally negligible for Jacksonville.

Volume I, Section 3 describes the impacts caused by windstorms, including power outages, downed trees, heavy precipitation, building damages and storm-related debris. Additionally, transportation and economic disruptions result as well. Microbursts also occur in Jacksonville creating strong winds, particularly from the northeast.

Damage from high winds generally has resulted in downed utility lines and trees. Electrical power can be out anywhere from a few hours to several days. Outdoor signs have also suffered damage. If the high winds are accompanied by rain (which they often are), blowing leaves and debris clog drainage-ways, which in turn causes localized urban flooding.

Please review Volume I, Section 3 for additional information on this hazard.

Winter Storm (Snow/Ice)

The steering committee determined that the City's probability for winter storm is **high** (which is the same as the County's rating) and that their vulnerability to winter storm is **high** (which is higher than the County's rating).

Volume I, Section 3 describes the characteristics of winter storm hazards, history, as well as the location, extent and probability of a potential event within the region. Severe winter storms can consist of rain, freezing rain, ice, snow, cold temperatures and wind. They originate from troughs of low pressure offshore that ride along the jet stream during fall, winter and early spring months. Severe winter storms affecting the City typically originate in the Gulf of Alaska or in the central Pacific Ocean. These storms are most common from November through March.

Major winter storms can and have occurred in the Jacksonville area and while they typically do not cause significant damage, they are frequent and have the potential to impact economic activity. Road closures due to winter weather are a common occurrence (particularly along 3rd, 4th and 5th streets) and can interrupt commuter and commercial traffic. Jacksonville maintains roads with a John Deere tractor with a plow hookup and sanding equipment.

Please review Volume I, Section 3 for additional information on this hazard.

Volcano

The steering committee determined that the City's probability for a volcanic event is **low** (which is the same as the County's rating) and that their vulnerability to a volcanic event is **low** (which is the same as the County's rating).

Volume I, Section 3 describes the characteristics of volcanic hazards, history, as well as the location, extent and probability of a potential event within the region. Generally, an event that affects the County is likely to affect Jacksonville as well. Jacksonville is very unlikely to experience anything more than volcanic ash during a volcanic event.

Please review Volume I, Section 3 for additional information on this hazard.

Wildfire

The steering committee determined that the City's probability for wildfire is **high** (which is the same as the County's rating) and that their vulnerability to wildfire is **high** (which is higher than the County's rating).

Volume I, Section 3 describes the characteristics of wildfire hazards, history, as well as the location, extent and probability of a potential event within the region. The location and extent of a potential wildfire vary depending on fuel, topography and weather conditions. Weather and urbanization conditions are primarily at cause for the hazard level. Wildfires near Jacksonville are common.

The potential community impacts and vulnerabilities described in Volume I, Section 3 are generally accurate for the City as well. The [Rogue Valley Integrated Community Wildfire Protection Plan](#) (RVIFP, updated 2017), assesses wildfire risk, maps wildland urban interface areas and includes actions to mitigate wildfire risk. The City is included in the RVIFP and will update the City's wildfire risk assessment if the fire plan presents better data during future updates (an action item is included within Volume I, Section 4 to participate in updates to the integrated fire plan and to continue to maintain and update their RVIFP). Jacksonville is within an area of high wildfire prone urban landscape. The City hereby incorporates the RVIFP into this addendum by reference to provide greater detail to sensitivity and exposure to the wildfire hazard. The City participates in Firewise and has a defensible space (fuel break) ordinance per the Jacksonville Code.

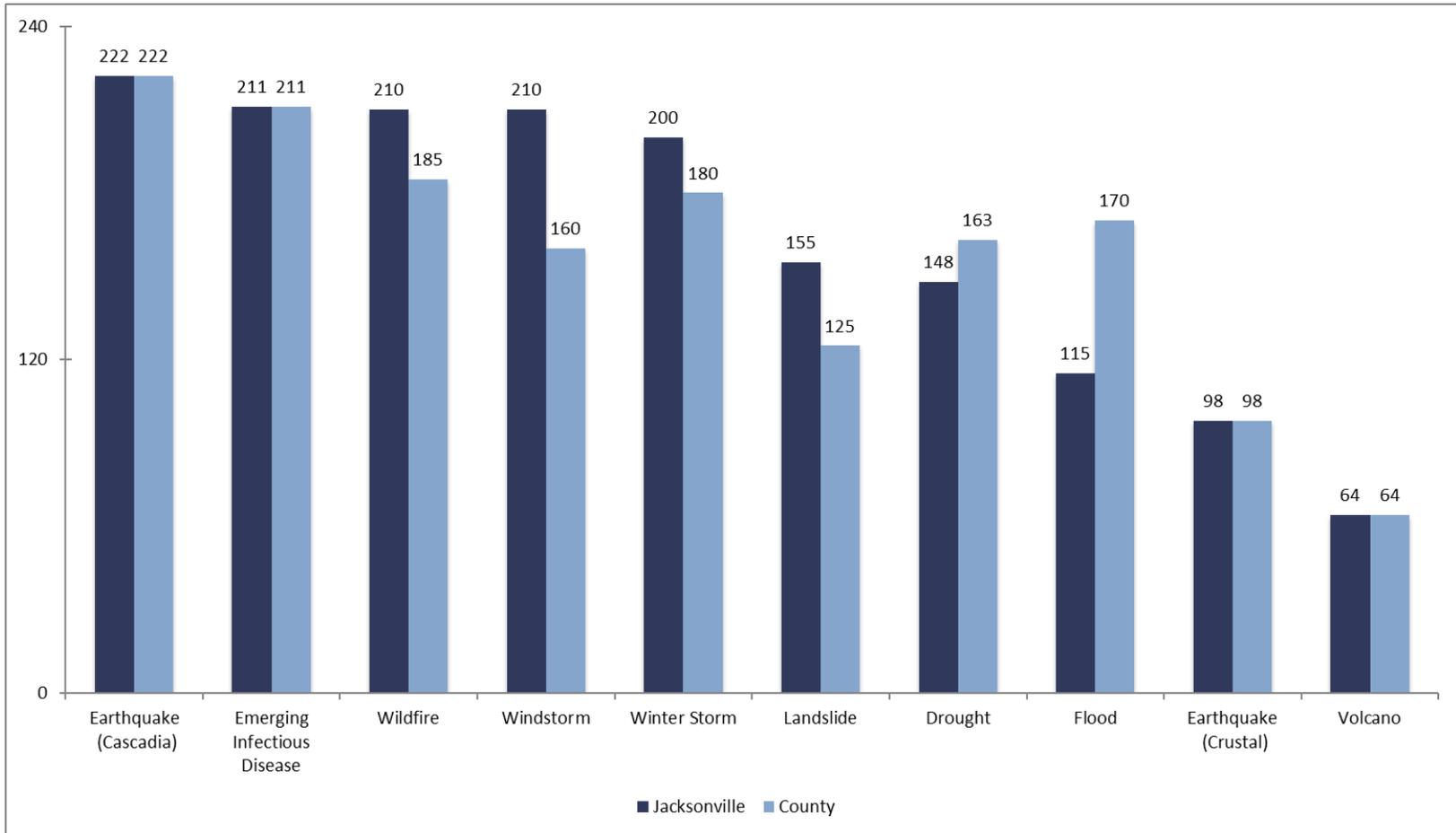
Property can be damaged or destroyed with one fire as structures, vegetation and other flammables easily merge to become unpredictable and hard to manage. Other factors that affect ability to effectively respond to a wildfire include access to the location and to water, response time from the fire station, availability of personnel and equipment and weather (e.g., heat, low humidity, high winds and drought).

Please review Volume I, Section 3 for additional information on this hazard.

Summary

Figure JA-6 presents a summary of the hazard analysis for Jacksonville and compares the results to the assessment completed by Jackson County. The top hazards for the City are Cascadia Subduction Zone earthquake, emerging infectious disease, wildfire, windstorm and winter storm.

Figure JA-6 Overall Hazard Analysis Comparison – Jacksonville/Jackson County



Source: City of Jacksonville NHMP Steering Committee and Jackson County NHMP Steering Committee, 2017.

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Purpose

Phoenix's addendum to the Jackson County Multi-Jurisdictional Natural Hazard Mitigation Plan (MNHMP, NHMP) was completed in 2017. This addendum supplements information contained in Volume I (Basic Plan) which serves as the NHMP foundation and Volume II (Appendices) which provide additional information. This addendum meets the following requirements:

- Multi-Jurisdictional **Plan Adoption** §201.6(c)(5),
- Multi-Jurisdictional **Participation** §201.6(a)(3),
- Multi-Jurisdictional **Mitigation Strategy** §201.6(c)(3)(iv) and
- Multi-Jurisdictional **Risk Assessment** §201.6(c)(2)(iii).

Mitigation Plan Mission

The NHMP mission states the purpose and defines the primary functions of the NHMP. It is intended to be adaptable to any future changes made to the NHMP and need not change unless the community's environment or priorities change.

The City concurs with the mission statement developed during the Jackson County planning process (Volume I, Section 4):

Protect life, property and the environment, reduce risk and prevent loss from natural hazard events through coordination and cooperation among public and private partners.

Mitigation Plan Goals

Mitigation plan goals are more specific statements of direction that Jackson County citizens and public and private partners can take while working to reduce the City's risk from natural hazards. These statements of direction form a bridge between the broad mission statement and particular action items. The goals listed here serve as checkpoints as agencies and organizations begin implementing mitigation action items.

The City concurs with the goals developed during the Jackson County planning process (Volume I, Section 4). All of the NHMP goals are important and are listed below in no particular order of priority. Establishing community priorities within action items neither negates nor eliminates any goals, but it establishes which action items to consider to implement first, should funding become available.

Below is a list of the NHMP goals:

GOAL 1: EMERGENCY SERVICES

Minimize life safety issues by promoting, strengthening and coordinating emergency response plans.

GOAL 2: EDUCATION AND OUTREACH

Further the public's awareness and understanding of natural hazards and potential risk, including economic vulnerability and mitigation efforts.

GOAL 3: PREVENTION

Reduce the threat of loss of life and property from natural hazards by incorporating information on known hazards and providing incentives to make hazard mitigation planning a priority in land use policies and decisions, including plan implementation.

GOAL 4: PROPERTY PROTECTION

Lessen impact from natural disasters on individual properties, businesses and public facilities by increasing awareness at the individual level and encouraging activities that can prevent damage and loss of life from natural hazards.

GOAL 5: PARTNERSHIP AND COORDINATION

Identify mitigation or risk reduction measures that address multiple areas (i.e., environment, transportation, telecommunications); Coordinate public/private sector participation in planning and implementing mitigation projects throughout the City; and seek funding and resource partnerships for future mitigation efforts.

GOAL 6: NATURAL RESOURCE PROTECTION

Preserve and rehabilitate natural systems to serve natural hazard mitigation functions (i.e., floodplains, wetlands, watershed and urban interface areas).

GOAL 7: STRUCTURAL PROTECTIONS

When applicable, utilize structural mitigation activities to minimize risks associated with natural hazards.

NHMP Process, Participation and Adoption

This section of the NHMP addendum addresses 44 CFR 201.6(c)(5), *Plan Adoption* and 44 CFR 201.6(a)(3), *Participation*. The first update of the Jackson County NHMP was approved by FEMA on February 4, 2013. To maintain compliance with the Disaster Mitigation Act of 2000 (DMA2K), the NHMP required an update by February 3, 2018. The Phoenix addendum was added with the 2017 update of the Jackson County MNHMP.

The Oregon Partnership for Disaster Resilience (OPDR) at the University of Oregon's Community Service Center (CSC) partnered with the Oregon Military Department's Office of Emergency Management (OEM), Jackson County and Phoenix to update their NHMP. This project is funded through the Federal Emergency Management Agency's (FEMA) FY15 Pre-Disaster Mitigation Competitive Grant Program (PDMC-PL-10-PR-2015-003). Members of

the Phoenix NHMP steering committee also participated in the County NHMP update process (Volume II, Appendix B).

By creating a NHMP, locally adopting it and having it approved by FEMA, Phoenix will gain eligibility for FEMA Hazard Mitigation, Pre-Disaster Mitigation and Flood Mitigation Assistance grant program funds.

The Jackson County NHMP and Phoenix addendum, are the result of a collaborative effort between citizens, public agencies, non-profit organizations, the private sector and regional organizations. A project steering committee guided the process of developing the NHMP.

The Phoenix Public Works Director served as the designated convener of the NHMP update and the Planning Director will take the lead in implementing, maintaining and updating the addendum to the Jackson County NHMP in collaboration with the designated convener of the Jackson County NHMP (Emergency Manager).

Representatives from the City of Phoenix steering committee met formally and informally, to discuss updates to their addendum (Volume II, Appendix B). The steering committee reviewed and revised the City's addendum, with particular focus on the NHMP's risk assessment and mitigation strategy (action items).

This addendum reflects decisions made at the designated meetings and during subsequent work and communication with Jackson County Emergency Management and the OPDR.

The Phoenix Steering Committee was comprised of the following representatives:

- Convener, Ray DiPasquale, Public Works Director
- Evan MacKenzie, Planning Director
- Dave Kanner, (interim) City Manager
- Derek Bowker, Police Chief
- Chris Luz, Mayor
- Micki Summerhays, Planning Commissioner

Public participation was achieved with the establishment of the steering committee, which was comprised of City officials representing different departments and sectors and members of the public. The steering committee was closely involved throughout the development of the NHMP and served as the local oversight body for the NHMP's development. Community members were provided an opportunity for comment via the NHMP review process and through a survey administered by the OPDR and publicized by the participating jurisdictions (Volume II, Appendix B). The NHMP was submitted to the Planning Commission for review and then to the City Council for adoption by resolution.

The Jackson County NHMP was approved by FEMA on [Month] [Day], 2018 and the Phoenix addendum was adopted via resolution on [Month] [Day], 2018. This NHMP is effective through [Month] [Day], 2023.

NHMP Implementation and Maintenance

The City Council will be responsible for adopting the Phoenix addendum to the Jackson County NHMP. This addendum designates a steering committee and a convener to oversee the development and implementation of action items. Because the City addendum is part of the County's multi-jurisdictional NHMP, the City will look for opportunities to partner with the County. The City's steering committee will convene after re-adoption of the Phoenix NHMP addendum on an annual schedule. The County is meeting on a semi-annual basis and will provide opportunities for the cities to report on NHMP implementation and maintenance during their meetings. The City's Planning Director will serve as the convener and will be responsible for assembling the steering committee. The steering committee will be responsible for:

- Reviewing existing action items to determine suitability of funding;
- Reviewing existing and new risk assessment data to identify issues that may not have been identified at NHMP creation;
- Educating and training new steering committee members on the NHMP and mitigation actions in general;
- Assisting in the development of funding proposals for priority action items;
- Discussing methods for continued public involvement; and
- Documenting successes and lessons learned during the year.

The convener will also remain active in the County's implementation and maintenance process (Volume I, Section 5).

The City will utilize the same action item prioritization process as the County (Volume I, Section 5 and Volume II, Appendix D).

Implementation through Existing Programs

Many of the Natural Hazard Mitigation Plan's recommendations are consistent with the goals and objectives of the City's existing plans and policies. Where possible, Phoenix will implement the NHMP's recommended actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses and policy makers. Many land-use, comprehensive and strategic plans get updated regularly, allowing them to adapt to changing conditions and needs. Implementing the NHMP's action items through such plans and policies increases their likelihood of being supported and implemented.

Phoenix's acknowledged comprehensive plan is the City of Phoenix Comprehensive Plan (2016, effective August, 2016). The Oregon Land Conservation and Development Commission first acknowledged the plan in 1984. The City implements the plan through the Community Development Code.

Phoenix currently has the following plans that relate to natural hazard mitigation. For a complete list visit the City's [website](#).

- [Comprehensive Plan](#) (1984, amendment process underway, expected in 2017)
- [Land Development Code](#)
- [Building Code, 2017 Oregon State Code](#) based on 2015 International Residential Code (IRC) and 2012 International Building Code

- [Emergency Operations Plan](#) (2013)
- [Transportation System Plan](#) (2016)
- Water System Master Plan (2007)

Continued Public Participation

Keeping the public informed of the City's efforts to reduce its risk to future natural hazard events is important for successful NHMP implementation and maintenance. The City is committed to involving the public in the NHMP review and updated process (Volume I, Section 5).

NHMP Maintenance

The Jackson County Multi-Jurisdictional Natural Hazard Mitigation Plan and City addendum will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. During the County NHMP update process, the City will also review and update its addendum (Volume I, Section 5). The convener will be responsible for convening the steering committee to address the questions outlined below.

- Are there new partners that should be brought to the table?
- Are there new local, regional, state or federal policies influencing natural hazards that should be addressed?
- Has the community successfully implemented any mitigation activities since the NHMP was last updated?
- Have new issues or problems related to hazards been identified in the community?
- Are the actions still appropriate given current resources?
- Have there been any changes in development patterns that could influence the effects of hazards?
- Have there been any significant changes in the community's demographics that could influence the effects of hazards?
- Are there new studies or data available that would enhance the risk assessment?
- Has the community been affected by any disasters? Did the NHMP accurately address the impacts of this event?

These questions will help the steering committee determine what components of the mitigation plan need updating. The steering committee will be responsible for updating any deficiencies found in the NHMP.

Mitigation Strategy

This section of the NHMP addendum addresses 44 CFR 201.6(c)(3(iv), *Mitigation Strategy*.

The City's mitigation strategy (action items) were developed during the 2017 NHMP planning process. The steering committee assessed the City's risk, identified potential issues and developed a mitigation strategy (action items). The City developed actions specific to their community after first reviewing a list of recommended actions developed by the County or recommended by OPDR.

Priority Actions

The City is listing a set of high priority actions in an effort to focus attention on an achievable set of high leverage activities over the next five-years (Table PA-1). The City's priority actions are listed below in the following table.

Action Item Pool

Table PA-2 presents a "pool" of mitigation actions. This expanded list of actions is available for local consideration as resources, capacity, technical expertise and/or political will become available.

Table PA-I Phoenix Priority Action Items

Action Item ID	Mitigation Action Item	Timeline	Lead Organization	Partner Organization(s)	Potential Funding Source(s)
Priority Actions					
Multi-Hazard (MH)					
MH #1	Integrate the Mitigation Plan findings into planning and regulatory documents and programs including the Comprehensive Plan (particularly Goal 7).	Mid-Term	City Planning	RVCOG, DLCD, FEMA	General Fund, DLCD Technical Assistance Grant
Earthquake (EQ)					
EQ #1	Implement structural and non-structural retrofits to critical and essential facilities.	Long-Term	City Administration	Building officials, Planning, Public Works	General Fund, SRGP, PDM
Flood (FL)					
FL #1	Ensure continued compliance in the National Flood Insurance Program (NFIP) through enforcement of local floodplain management ordinances and take steps to participate in the Community Rating System (CRS).	Short-Term	City Planning	City Administration, Public Works	General Fund
Wildfire (WF)					
WF #1	Coordinate fire mitigation action items through the Jackson County Integrated Fire Plan	Ongoing	City Emergency Management Agencies	Jackson County Emergency Management, JCFD #5	Fire Districts, ODF

Source: City of Phoenix NHMP Steering Committee, 2017.

Table PA-2 Phoenix Action Item Pool

Action Item ID	Mitigation Action Item	Timeline	Lead Organization	Partner Organization(s)	Potential Funding Source(s)
Action Item Pool					
Multi-Hazard (MH)					
MH #1	Sustain a public awareness and education campaign about natural hazards.	Ongoing	City Emergency Management Agencies	County Emergency Management, FEMA, OEM, NWS, ODOT, CERT, RVCOG Utilities	General Fund, FEMA, DLCD
MH #2	Use hazard information as a basis for county ordinances and regulations that govern site-specific land use decisions.	Long-Term	City Planning	County GIS, FEMA, DLCD	General Fund
MH #3	Enhance hazard resistant construction methods (wind, winter storm, landslide, etc.) where possible to reduce damage to utilities and critical facilities. In part, this may be accomplished by encouraging electric utility providers to convert existing overhead lines to underground lines.	Ongoing	City Planning, Public Works	Utility Companies	HMA
Drought (DR)					
No specific action item developed for this hazard. See multi-hazard actions for applicable mitigation strategies.					
Earthquake (EQ)					
EQ #2	Promote building safety through nonstructural improvements and public education.	Ongoing	City Emergency Management Agencies	Building officials, American Red Cross, DOGAMI, OEM	General Fund, HMA
Emerging Infectious Disease (EID)					
No specific action item developed for this hazard. See multi-hazard actions for applicable mitigation strategies.					
Flood (FL)					
FL #2	Encourage private property owners to restore natural systems within the floodplain, and to manage riparian areas and wetlands for flood abatement.	Long-Term	City Planning	RVCOG, FEMA, Watershed Councils, neighboring cities	General Fund, FMA, HMA

Source: City of Phoenix NHMP Steering Committee, 2017.

Table PA-2 Phoenix Action Item Pool (continued)

Action Item ID	Mitigation Action Item	Timeline	Lead Organization	Partner Organization(s)	Potential Funding Source(s)
Action Item Pool					
Landslide (LS)					
LS #1	Increase public education related to landslide hazards by distributing landslide informational brochures.	Ongoing	City Planning	RVCOG	General Fund, DOGAMI, DLCD
LS #2	Investigate the development and implementation of a city landslide ordinance.	Long-Term	City Planning	RVCOG	General Fund, DLCD Technical Assistance Grant
Severe Weather (SW, Windstorm and Winter Storm)					
SW #1	Map areas where extreme weather, such as road icing and wind damage occurs.	Short-Term	City Public Works	County Road Department, ODOT Region 8	General Fund
SW #2	Promote the benefits of tree-trimming and tree replacement programs and help to coordinate local efforts by public and private agencies.	Ongoing	City Vegetation Management	Utility companies, ODOT, Public Works, USFS, BLM, ODF, Fire	General Fund
Volcano (VE)					
	No specific action item developed for this hazard. See multi-hazard actions for applicable mitigation strategies.				
Wildfire (WF)					
	See priority actions and multi-hazard actions for applicable mitigation strategies.				

Source: City of Phoenix NHMP Steering Committee, 2017.

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Risk Assessment

This section of the NHMP addendum addresses 44 CFR 201.6(b)(2) - Risk Assessment. In addition, this chapter can serve as the factual basis for addressing Oregon Statewide Planning Goal 7 – Areas Subject to Natural Hazards. Assessing natural hazard risk has three phases:

- **Phase 1:** Identify hazards that can impact the jurisdiction. This includes an evaluation of potential hazard impacts – type, location, extent, etc.
- **Phase 2:** Identify important community assets and system vulnerabilities. Example vulnerabilities include people, businesses, homes, roads, historic places and drinking water sources.
- **Phase 3:** Evaluate the extent to which the identified hazards overlap with or have an impact on, the important assets identified by the community.

The local level rationale for the identified mitigation strategies (action items) is presented herein and within Volume I, Sections 2 and 3. The risk assessment process is graphically depicted in Figure PA-1. Ultimately, the goal of hazard mitigation is to reduce the area of risk, where hazards overlap vulnerable systems.

Figure PA-1 Understanding Risk



Hazard Analysis

The Phoenix steering committee developed their hazard vulnerability assessment (HVA), using the County’s HVA (Volume II, Appendix C) as a reference. Changes from the County’s HVA were made where appropriate to reflect distinctions in vulnerability and risk from natural hazards unique to Phoenix, which are discussed throughout this addendum.

Table PA-3 shows the HVA matrix for Phoenix listing each hazard in order of rank from high to low. 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.

One catastrophic hazard (Cascadia Subduction Zone earthquake) and two chronic hazards (emerging infectious disease and winter storm) rank as the top hazard threats to the City (Top Tier). The windstorm, drought, flood and wildfire hazards comprise the next highest ranked hazards (Middle Tier), while the landslide, crustal earthquake and volcano hazards comprise the lowest ranked hazards (Bottom Tier).

Table PA-3 Hazard Analysis Matrix – Phoenix

Hazard	Maximum				Total Threat Score	Hazard Rank	Hazard Tiers
	History	Vulnerability	Threat	Probability			
Earthquake (Cascadia)	2	50	100	70	222	#1	Top Tier
Emerging Infectious Disease	12	50	100	49	211	#2	
Winter Storm	20	40	80	70	210	#3	
Windstorm	20	20	50	70	160	#4	Middle Tier
Drought	20	25	50	63	158	#5	
Flood	16	20	50	63	149	#6	
Wildfire	16	15	50	49	130	#7	
Landslide	2	15	30	56	103	#8	Bottom Tier
Earthquake (Crustal)	2	25	50	21	98	#9	
Volcano	2	5	50	7	64	#10	

Source: Phoenix NHMP Steering Committee, 2017.

Table PA-4 categorizes the probability and vulnerability scores from the hazard analysis for the City and compares the results to the assessment completed by the Jackson County NHMP Steering Committee (Volume II, Appendix C). Variations between the City and County are noted in **bold** text.

Table PA-4 Probability and Vulnerability Comparison

Hazard	Phoenix		Jackson County	
	Probability	Vulnerability	Probability	Vulnerability
Drought	High	Moderate	High	Moderate
Earthquake (Cascadia)	High	High	High	High
Earthquake (Crustal)	Low	Moderate	Low	Moderate
Emerging Infectious Disease	Moderate	High	Moderate	High
Flood	High	Moderate	High	Moderate
Landslide	High	Low	High	Low
Volcano	Low	Low	Low	Low
Wildfire	Moderate	Low	High	Moderate
Windstorm	High	Moderate	High	Moderate
Winter Storm	High	High	High	Moderate

Source: Phoenix NHMP Steering Committee, 2017.

Community Characteristics

Table PA-5 and the following section provides information on City specific demographics and assets. For additional information on the characteristics of Phoenix, in terms of geography, environment, population, demographics, employment and economics, as well as housing and transportation see Volume I, Section 2. Many of these community characteristics can affect how natural hazards impact communities and how communities choose to plan for natural hazard mitigation. Considering the City specific assets during the planning process can assist in identifying appropriate measures for natural hazard mitigation. Between 2012 and 2016 the City grew by 15 people (0.3%) and median household income decreased by about 1% (Volume I, Section 2). New development has complied with the standards of the [Oregon Building Code](#) and the city's development code including their floodplain ordinance.

Transportation/Infrastructure

In the City of Phoenix, transportation has played a major role in shaping the community. Phoenix's commercial areas developed along primary routes and residential development followed nearby.

Today, mobility plays an important role in Phoenix and the daily experience of its residents and businesses as they move from point A to point B. The current railroad system is serviced through the Union Pacific Railroad system and the Central Oregon and Pacific Railroad (CORP) route. This complements the established Rogue Valley Transportation District (RVTD) and the transit stop located within Phoenix. In addition, the City is located along the Bear Creek Greenway multi-use trail that provides alternative routes for pedestrians and bicyclists. By far, motor vehicles represent the dominant mode of travel through and within Phoenix.

Economy

A diverse range of businesses have chosen to locate in Phoenix. Traditionally, Phoenix has built its economy on a resource base of timber, favorable climate, attractive landscape, cultural attractions, a well-educated labor force and education. In addition, Phoenix's location on Interstate 5 and the Southern Pacific Railroad and its proximity to the Medford Airport give it market access that is more favorable than usual for a rural town. According to the economic profile of the City's Comprehensive Plan, Phoenix finds their main economic drivers in the sectors of manufacturing, retail trade and public administration.¹

¹ City of Phoenix, Comprehensive Land Use Plan, Economic Element (1996, amended 1998)
http://www.phoenixoregon.gov/sites/default/files/fileattachments/building/planning/page/351/comp_plan_economic_element.pdf

Table PA-5 Community Characteristics

Population Characteristics		
2012 Population	4,570	
2016 Population	4,585	
2035 Forecasted Population*	6,883	
Race and Ethnic Categories		
White		93%
Black/ African American		< 1%
American Indian and Alaska Native		< 1%
Asian		0%
Native Hawaiian and Other Pacific Islander		0%
Some Other Race		< 1%
Two or More Races		6%
Hispanic or Latino		12%
Limited or No English Spoken		4%
Vulnerable Age Groups		
Less than 15 Years	564	12%
65 Years and Over	1,270	28%
Disability Status		
Total Population	940	21%
Children	66	1%
Seniors	411	9%

Income Characteristics		
Households by Income Category		
Less than \$15,000	633	29%
\$15,000-\$29,999	385	18%
\$30,000-\$44,999	370	17%
\$45,000-\$59,999	204	9%
\$60,000-\$74,999	184	8%
\$75,000-\$99,999	150	7%
\$100,000-\$199,999	246	11%
\$200,000 or more	4	0%
Median Household Income	\$32,035	
Poverty Rates		
Total Population	1,160	25%
Children	256	31%
Seniors	75	6%
Housing Cost Burden		
Owners with Mortgage		42%
Renters		63%

Source: U.S. Census Bureau, 2011-2015 American Community Survey; Portland State University, Population Research Center.

Note: * = Population forecast within UGB

Housing Characteristics		
Housing Units		
Single-Family	1,236	54%
Multi-Family	582	25%
Mobile Homes	481	21%
Year Structure Built		
Pre-1970	288	13%
1970-1989	1,114	49%
1990 or later	897	39%
Housing Tenure and Vacancy		
Owner-occupied	1,375	63%
Renter-occupied	801	37%
Vacant	123	5%

Phoenix is in Jackson County in southwestern Oregon. The City has grown since its incorporation in 1910 and has an area today of 1.25 square miles. It is located in the south-central region of the county, located about 25 miles northwest of the California border and about 5 miles southeast of the City of Medford. The City and most of Jackson County are within the Rogue and Umpqua watersheds.

Phoenix experiences a relatively mild climate with four distinct seasons that comes from its position on the west coast of North America and within the mountains of the region. The town is just off of Interstate 5 at the southern end of the Rogue Valley at approximately 1,500 feet above sea level. As a result of its location Phoenix has a climate somewhat intermediate to central California and northern Oregon. Phoenix averages only 20 inches of rain per year due to being inland from the coast and in the rain shadow of the nearby mountains. While the surrounding mountains receive plentiful snow, Phoenix itself sees around 4 inches annually.

The City of Phoenix includes a diversity of land uses but is zoned primarily residential.

For more information see Volume I, Section 2.

Community Assets

This section outlines the resources, facilities and infrastructure that, if damaged, could significantly impact the public safety, economic conditions and environmental integrity of Phoenix.

Critical Facilities

Facilities that are critical to government response and recovery activities (i.e. life, safety, property and environmental protection). These facilities include: 911 Centers, Emergency Operations Centers, Police and Fire Stations, Public Works facilities, sewer and water facilities, hospitals, bridges, roads, shelters and more. Facilities that, if damaged, could cause serious secondary impacts may also be considered “critical.” A hazardous material facility is one example of this type of critical facility.

Fire Stations:

- Jackson County Fire District #5 – Station 3

Law Enforcement:

- Phoenix Police Department

Essential City Facilities:

- Public Works Office (EOC)
- Municipal Court
- City Shops

Private:

- The Home Depot
- Ray’s Food Place
- Rite Aid (Pharmacy)

Essential Facilities

Facilities that are essential to the continued delivery of key government services and/or that may significantly impact the public’s ability to recover from the emergency. These facilities may include: City buildings such as the Public Services Building, the City Hall and other public facilities such as schools.

Hospitals/Immediate Medical Care Facilities:

- Providence Phoenix Family Practice

Public Schools:

- Phoenix High School
- Phoenix Elementary School
- Armadillo Technical Institute

City/County Buildings:

- Phoenix Library

Potential Shelter Sites:

- All Phoenix Schools
- Central Neighborhood Church
- South Valley Church
- First Baptist Church
- His Valley Church
- Phoenix Chapel
- Covenant Life Ministries
- First Presbyterian Church
- New Song Community Church
- Coptic Christian

Infrastructure:

Infrastructure that provides services for the City include:

Transportation Networks:

- Highway 99/ Bear Creek Dr
- Interstate 5
- Fern Valley Rd
- N Phoenix Rd
- Colver Rd
- Grove Rd
- 1st St
- 4th St

Special Service Districts:

- Southern Oregon Education Service District
- Medford Water Commission
- Medford Irrigation District
- Talent Irrigation District
- Rogue Valley Sewer

Private Utilities:

- Pacific Power
- Avista

Hazard Characteristics

Drought

The steering committee determined that the City's probability for drought is **high** (which is the same as the County's rating) and that their vulnerability to drought is **moderate** (which is the same as the County's rating).

Volume I, Section 3 describes the characteristics of drought hazards, history, as well as the location, extent and probability of a potential event. Due to the climate of Jackson County, past and present weather conditions have shown an increasing potential for drought.

The City receives its main water supply from Big Butte Springs through the Medford Water Commission, supplemented by the Rogue River in the summer months. For more information on the future of Phoenix's water supply visit their [website](#).

Please review Volume I, Section 3 for additional information on this hazard.

Earthquake (Cascadia)

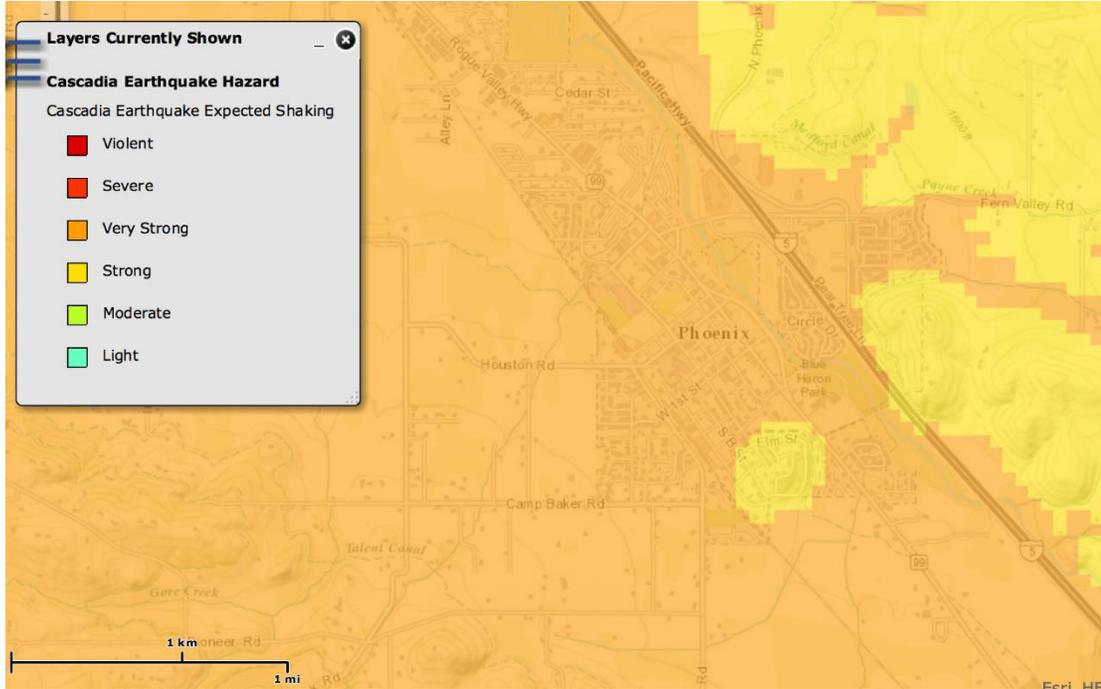
The steering committee determined that the City's probability for a Cascadia Subduction Zone (CSZ) earthquake is **high** (which is the same as the County's rating) and that their vulnerability to a CSZ earthquake is **high** (which is the same as the County's rating).

Volume I, Section 3 describes the characteristics of earthquake hazards, history, as well as the location, extent and probability of a potential event. Generally, an event that affects the County is likely to affect Phoenix as well. The causes and characteristics of an earthquake event are appropriately described within Volume I, Section 3, as well as the location and extent of potential hazards. Previous occurrences are well documented within Volume I, Section 3 and the community impacts described by the County would generally be the same for Phoenix as well.

The local faults, the county's proximity to the Cascadia Subduction Zone, potential slope instability and the prevalence of certain soils subject to liquefaction and amplification combine to give the County a high-risk profile. Due to the expected pattern of damage resulting from a CSZ event, the Oregon Resilience Plan divides the State into four distinct zones and places Jackson County predominately within the "Valley Zone" (Valley Zone, from the summit of the Coast Range to the summit of the Cascades). Within the Southwest Oregon region, damage and shaking is expected to be strong and widespread - an event will be disruptive to daily life and commerce and the main priority is expected to be restoring services to business and residents.² Figure PA-2 displays relative shaking hazards from a Cascadia Subduction Zone earthquake event. As shown in the figure below, the majority of the City is expected to experience very strong shaking in a CSZ event.

² Ibid.

Figure PA-2 Cascadia Subduction Zone



Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](#)

Note: To view detail click the link above to access Oregon HazVu.

As noted in the community profile, approximately 61% of residential buildings were built prior to 1990, which increases the City’s vulnerability to the earthquake hazard. Information on specific public buildings’ (schools and public safety) estimated seismic resistance, determined by DOGAMI in 2007, is shown in Table PA-6; each “X” represents one building within that ranking category. Of the facilities evaluated by DOGAMI using RVS, two (2) have a very high (100% chance) collapse potential and three (3) have a high (greater than 10% chance) collapse potential.

Table PA-6 Rapid Visual Survey Scores

Facility	Site ID*	Level of Collapse Potential			
		Low (< 1%)	Moderate (>1%)	High (>10%)	Very High (100%)
Schools					
Phoenix Elementary School (Phoenix-Talent SD 4) (215 N Rose St)	Jack_sch46	X,X,X,X		X	X
Phoenix High School (Phoenix-Talent SD 4) (745 N Rose St)	Jack_sch02	X		X,X	X
Public Safety					
Jackson County Fire District #5 (116 W 2nd St)	Jack_fir03	X			

Source: [DOGAMI 2007. Open File Report 0-07-02. Statewide Seismic Needs Assessment Using Rapid Visual Assessment.](#) “*” – Site ID is referenced on the [RVS Jackson County Map](#)

In addition to building damages, utility (electric power, water, wastewater, natural gas) and transportation systems (bridges, pipelines) are also likely to experience significant damage. The City has a concrete water reservoir, a water tower and 6.5 miles of pipe that connects to the Medford Water Commission that is vulnerable to earthquake.

Utility systems will be significantly damaged, including damaged buildings and damage to utility infrastructure, including water treatment plants and equipment at high voltage substations (especially 230 kV or higher which are more vulnerable than lower voltage substations). Buried pipe systems will suffer extensive damage with approximately one break per mile in soft soil areas. There would be a much lower rate of pipe breaks in other areas. Restoration of utility services will require substantial mutual aid from utilities outside of the affected area.

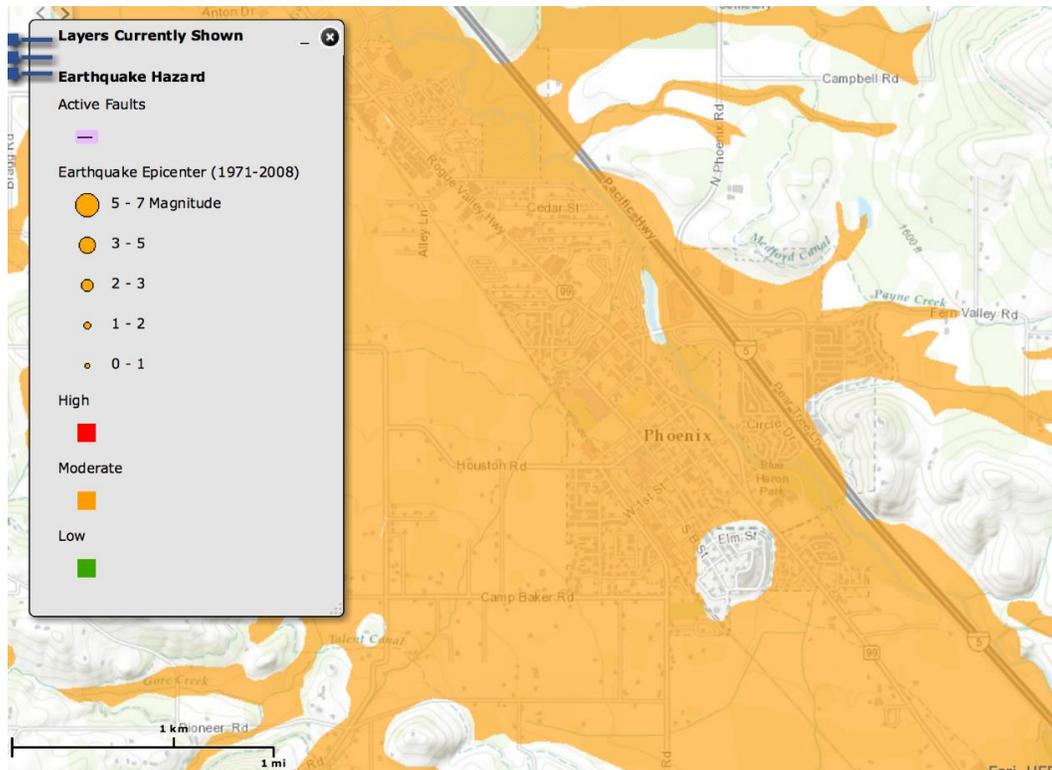
Earthquake (Crustal)

The steering committee determined that the City's probability for a crustal earthquake is **low** (which is the same as the County's rating) and that their vulnerability to crustal earthquake is **moderate** (which is the same as the County's rating).

Volume I, Section 3 describes the characteristics of earthquake hazards, history, as well as the location, extent and probability of a potential event. Generally, an event that affects the County is likely to affect Phoenix as well. The causes and characteristics of an earthquake event are appropriately described within Volume I, Section 3, as well as the location and extent of potential hazards. Previous occurrences are well-documented within Volume I, Section 3 and the community impacts described by the County would generally be the same for Phoenix as well.

Figure PA-3 displays relative liquefaction hazards, the majority of the City is within an area of moderate soft soils (liquefaction hazard; orange areas).

Figure PA-3 Active Faults and Soft Soils



Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](#)

Note: To view detail click the link above to access Oregon HazVu.

Earthquake-induced damages are difficult to predict and depend on the size, type and location of the earthquake, as well as site-specific building and soil characteristics. Presently, it is not possible to accurately forecast the location or size of earthquakes, but it is possible to predict the behavior of soil at any particular site. In many major earthquakes, damages have primarily been caused by the behavior of the soil.

Please review Volume I, Section 3 for additional information on this hazard.

Emerging Infectious Disease

The steering committee determined that the City's probability for emerging infectious disease is **moderate** (which is the same as the County's rating) and that their vulnerability is **high** (which is the same as the County's rating).

Emerging infectious diseases are those that have recently appeared in a population or those whose incidence or geographic range is rapidly increasing or threatens to increase. Emerging infections may be caused by biological pathogens (e.g., virus, parasite, fungus or bacterium) and may be: previously unknown or undetected biological pathogens, biological pathogens that have spread to new geographic areas or populations, previously known biological pathogens whose role in specific diseases was previously undetected and biological pathogens whose incidence of disease was previously declining but whose incidence of disease has reappeared (re-emerging infectious disease).³

Volume I, Section 3 describes the characteristics of emerging infectious disease, history, as well as the location, extent and probability of a potential event within the region. Generally, an event that affects the County is likely to affect the City as well.

Please review Volume I, Section 3 for additional information on this hazard.

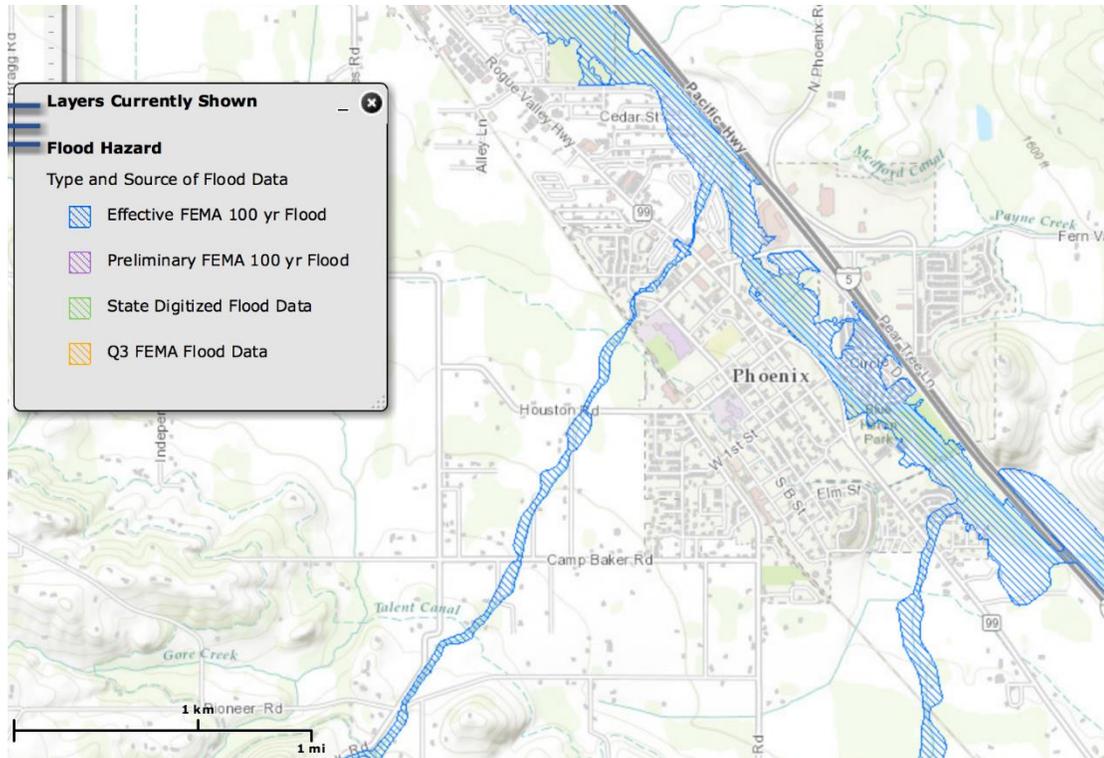
Flood

The steering committee determined that the City's probability for flood is **high** (which is the same as the County's rating) and that their vulnerability to flood is **moderate** (which is the same as the County's rating).

Volume I, Section 3 describes the characteristics of flood hazards, history, as well as the location, extent and probability of a potential event. Portions of Phoenix have areas of flood plains (special flood hazard areas, SFHA). These include areas along the Bear Creek, Coleman Creek and Anderson Creek (Figure PA-4). Furthermore, other portions of Phoenix, outside of the mapped floodplains, are also subject to flooding from local storm water drainage. *Note: Rogue Valley Sewer Services provides sewer and stormwater services to the City and provides information on [low-impact development](#).*

³ Baylor College of Medicine, *Emerging Infectious Disease*, URL: <https://www.bcm.edu/departments/molecular-virology-and-microbiology/emerging-infections-and-biodefense/emerging-infectious-diseases>, accessed September 17, 2017.

Figure PA-4 Special Flood Hazard Area



Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](#)

Note: To view detail click the link above to access Oregon HazVu.

The City is at risk from two types of flooding: riverine and urban. Riverine flooding occurs when streams overflow their banks and inundate low-lying areas. This is a natural process that adds sediment and nutrients to fertile floodplain areas. It usually results from prolonged periods of precipitation over a wide geographic area. Most areas are generally flooded by low velocity sheets of water. Urban flooding occurs as land is converted to impervious surfaces and hydrologic systems are changed. Precipitation is collected and transmitted to streams at a much faster rate, causing floodwaters that rise rapidly and peak with violent force. During urban flooding, storm drains can back up and cause localized flooding of streets and basements. These flooding events and subsequent damages are commonly caused by the behavior of Bear Creek and Coleman Creek and their tributaries.

Floods can have a devastating impact on almost every aspect of the community, including private property damage, public infrastructure damage and economic loss from business interruption. It is important for the City to be aware of flooding impacts and assess its level of risk. The City has been proactive in mitigating flood hazards by purchasing floodplain property.

The economic losses due to business closures often total more than the initial property losses that result from flood events. Business owners and their employees are significantly impacted by flood events. Direct damages from flooding are the most common impacts, but indirect damages, such as diminished clientele, can be just as debilitating to a business.

The FEMA Flood Insurance Study (January 19, 2018) has a brief history of flooding in Jackson County and Phoenix (Volume I, Section 3). Currently, no critical or essential facilities are

located in the floodplain. The City has two mobile home parks that were impacted by flooding in 1964 and 1997. Mitigation efforts that took place have decreased flooding in those areas adjacent to Bear Creek.

Highway 99 and Interstate 5 are major transportation routes in the Rogue Valley. If major flooding affected all of the bridges in Phoenix, traffic flow in and out of the City would be significantly affected, but would not cut all off all avenues. The amount of property in the flood plain is not a large area but damage could be significant as it would affect residential, commercial and public property. Floodwaters can affect building foundations, seep into basements or cause damage to the interior, exterior and contents of buildings, dependent upon the velocity and depth of the water and by the presence of floating debris. The City sewer system can overflow during flood events and cause further property damage.

For mitigation planning purposes, it is important to recognize that flood risk for a community is not limited only to areas of mapped floodplains. Other portions of Phoenix outside of the mapped floodplains may also be at relatively high risk from over bank flooding from streams too small to be mapped by FEMA or from local storm water drainage. In addition, the City is at low risk to flooding from dam inundation of Hosler Dam and Emigrant Lake.

National Flood Insurance Program (NFIP)

FEMA updated the Flood Insurance Study (FIS) and Flood Insurance Rate Maps (FIRMs) in 2018 (effective January 19, 2018). Table PA-7 shows that as of June 2016, Phoenix has 21 National Flood Insurance Program (NFIP) policies in force. Of those, 13 are for properties that were constructed before the initial FIRM. The last Community Assistance Visit (CAV) for Phoenix was on March 3, 2002. Phoenix does not participate in the Community Rating System (CRS). The table shows that the majority of flood insurance policies are for residential structures, primarily single-family homes. There has been a total of two paid claims for \$36,200. The City complies with the NFIP through enforcement of their flood damage prevention ordinance and their floodplain management program.

The Community Repetitive Loss record for Phoenix identifies zero (0) Repetitive Loss Properties⁴ and zero (0) Severe Repetitive Loss Properties.⁵ For details on the repetitive loss properties see Volume I, Section 3.

⁴ A Repetitive Loss (RL) property is any insurable building for which two or more claims of more than \$1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978. A RL property may or may not be currently insured by the NFIP.

⁵ A Severe Repetitive Loss (SRL) property is a single family property (consisting of 1 to 4 residences) that is covered under flood insurance by the NFIP and has incurred flood-related damage for which 4 or more separate claims payments have been paid under flood insurance coverage, with the amount of each claim payment exceeding \$5,000 and with cumulative amount of such claims payments exceeding \$20,000; or for which at least 2 separate claims payments have been made with the cumulative amount of such claims exceeding the reported value of the property.

Table PA-7 Flood Insurance Detail

Jurisdiction	Effective FIRM and FIS	Initial FIRM Date	Total Policies	Pre-FIRM Policies	Policies by Building Type				Minus Rated A Zone
					Single Family	2 to 4 Family	Other Residential	Non-Residential	
Jackson County	-	-	1,828	809	1,568	44	91	125	126
Phoenix	1/19/2018	5/3/1982	21	13	18	1	0	2	1

Jurisdiction	Insurance in Force	Total Paid Claims	Pre-FIRM Claims Paid	Substantial Damage Claims	Total Paid Amount	Repetitive Loss Structures	Severe Repetitive Loss Properties	CRS Class Rating	Last Community Assistance Visit
Jackson County	\$ 442,723,400	197	132	10	\$ 2,337,660	8	0	-	-
Phoenix	\$ 2,850,800	2	2	1	\$ 36,200	0	0		3/3/2002

Source: Information compiled by Department of Land Conservation and Development, July 2016.

Please review Volume I, Section 3 for additional information on this hazard.

Landslide

The steering committee determined that the City’s probability for landslide is **high** (which is the same as the County’s rating) and that their vulnerability to landslide is **low** (which is the same as the County’s rating).

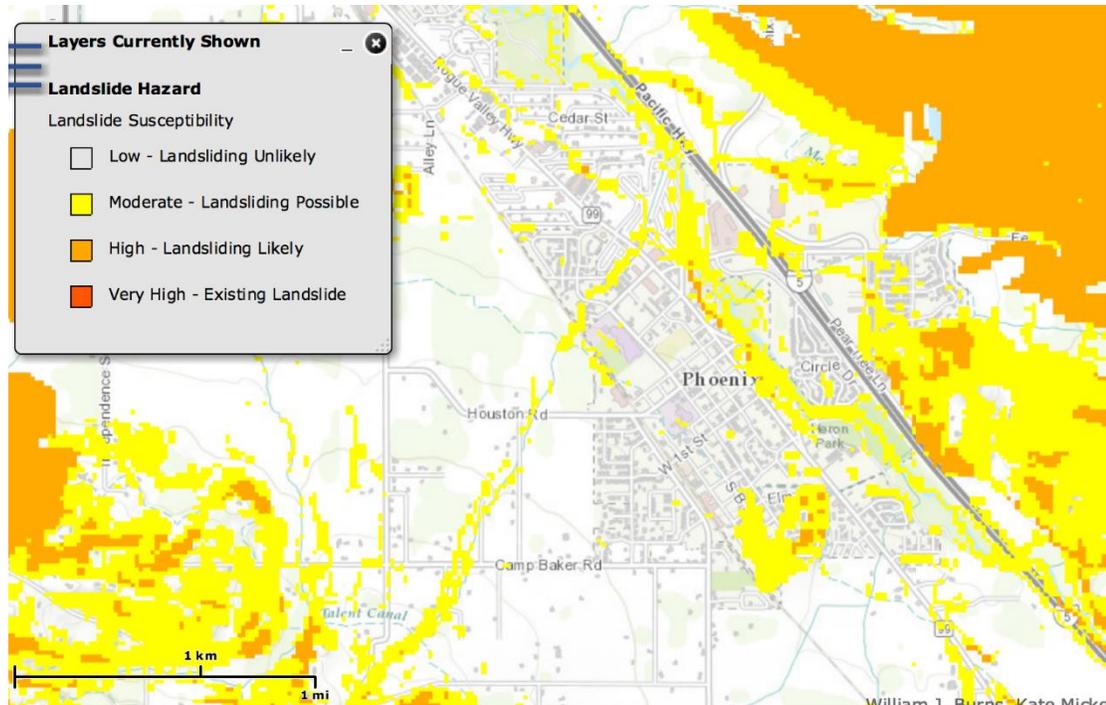
Volume I, Section 3 describes the characteristics of landslide hazards, history, as well as the location, extent and probability of a potential event within the region. The potential for landslide in Phoenix is almost negligible with the possible exception of very small areas immediately adjacent to stream channels. However, such areas have little or no development or infrastructure.

Landslide susceptibility exposure for Phoenix is shown in Figure PA-5. Most of Phoenix demonstrates a low susceptibility to landslide exposure, with corridors of moderate susceptibility concentrated around Bear Creek and Coleman Creek. Approximately 3% of Phoenix has high and approximately 21% moderate, landslide susceptibility exposure.⁶

Note that even if a jurisdiction has a high percentage of area in a high or very high landslide exposure susceptibility zone, this does not mean there is a high risk, because risk is the intersection of hazard and assets.

⁶ DOGAMI Open-File Report, O-16-02, Landslide Susceptibility Overview Map of Oregon (2016)

Figure PA-5 Landslide Susceptibility Exposure



Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](#)

Note: To view detail click the link above to access Oregon HazVu.

Potential landslide-related impacts are adequately described within Volume I, Section 3 and include infrastructural damages, economic impacts (due to isolation and/or arterial road closures), property damages and obstruction to evacuation routes. Rain-induced landslides and debris flows can potentially occur during any winter in Jackson County and thoroughfares beyond City limits are susceptible to obstruction as well.

The most common type of landslides in Jackson County are slides caused by erosion. Slides move in contact with the underlying surface, are generally slow moving and can be deep. Rainfall-initiated landslides tend to be smaller; while earthquake induced landslides may be quite large. All soil types can be affected by natural landslide triggering conditions.

Please review Volume I, Section 3 for additional information on this hazard.

Severe Weather

Severe weather in can account for a variety of intense and potentially damaging weather events. These events include windstorms and winter storms. The following section describes the unique probability and vulnerability of each identified weather hazard. Other more abrupt or irregular events such as hail are also described in this section.

Windstorm

The steering committee determined that the City's probability for windstorm is **high** (which is the same as the County's rating) and that their vulnerability to windstorm is **moderate** (which is the same as the County's rating).

Volume I, Section 3 describes the characteristics of windstorm hazards, history, as well as the location, extent and probability of a potential event within the region. Because windstorms typically occur during winter months, they are sometimes accompanied by ice, freezing rain, flooding and very rarely, snow. Other severe weather events that may accompany windstorms, including thunderstorms, hail, lightning strikes and tornadoes are generally negligible for Phoenix.

Volume I, Section 3 describes the impacts caused by windstorms, including power outages, downed trees, heavy precipitation, building damages and storm-related debris. Additionally, transportation and economic disruptions result as well.

Damage from high winds generally has resulted in downed utility lines and trees. Electrical power can be out anywhere from a few hours to several days. Outdoor signs have also suffered damage. If the high winds are accompanied by rain (which they often are), blowing leaves and debris clog drainage-ways, which in turn causes localized urban flooding.

Please review Volume I, Section 3 for additional information on this hazard.

Winter Storm (Snow/Ice)

The steering committee determined that the City's probability for winter storm is **high** (which is the same as the County's rating) and that their vulnerability to winter storm is **high** (which is higher than the County's rating).

Volume I, Section 3 describes the characteristics of winter storm hazards, history, as well as the location, extent and probability of a potential event within the region. Severe winter storms can consist of rain, freezing rain, ice, snow, cold temperatures and wind. They originate from troughs of low pressure offshore that ride along the jet stream during fall, winter and early spring months. Severe winter storms affecting the City typically originate in the Gulf of Alaska or in the central Pacific Ocean. These storms are most common from November through March.

Major winter storms can and have occurred in the Phoenix area, and while they typically do not cause significant damage, they are frequent and have the potential to impact economic activity. The last major storm was in December, 2013 which impacted schools for two to three days. Road and rail closures due to winter weather are an uncommon occurrence, but can interrupt commuter and commercial traffic. The City maintains roads with a plow and two sanding trucks.

Please review Volume I, Section 3 for additional information on this hazard.

Volcano

The steering committee determined that the City's probability for a volcanic event is **low** (which is the same as the County's rating) and that their vulnerability to a volcanic event is **low** (which is the same as the County's rating). The City assessed the volcanic eruption

hazard in the County's portion of this NHMP and accepted the County's ratings since volcanos are considered a regional hazard and will affect the City similarly to the County.

Volume I, Section 3 describes the characteristics of volcanic hazards, history, as well as the location, extent and probability of a potential event within the region. Generally, an event that affects the County is likely to affect Phoenix as well. Phoenix is very unlikely to experience anything more than volcanic ash during a volcanic event.

Please review Volume I, Section 3 for additional information on this hazard.

Wildfire

The steering committee determined that the City's probability for wildfire is **moderate** (which is lower than the County's rating) and that their vulnerability to wildfire is **low** (which is lower than the County's rating).

Volume I, Section 3 describes the characteristics of wildland fire hazards, history, as well as the location, extent and probability of a potential event within the region. The location and extent of a wildland fire vary depending on fuel, topography and weather conditions. Weather and urbanization conditions are primarily at cause for the hazard level. Wildland fires in Phoenix are somewhat rare. However, air inversions are relatively common during the summer and may bring wildfire smoke from miles away into the City.

The potential community impacts and vulnerabilities described in Volume I, Section 3 are generally accurate for the City as well. The [Rogue Valley Integrated Community Wildfire Protection Plan](#) (RVIFP, updated 2017), assesses wildfire risk, maps wildland urban interface areas and includes actions to mitigate wildfire risk. The City is included in the RVIFP and will update the City's wildfire risk assessment if the fire plan presents better data during future updates (an action item is included within Volume I, Section 4 to participate in updates to the integrated fire plan and to continue to maintain and update their RVIFP). Phoenix is within an area of low wildfire prone urban landscape. The City hereby incorporates the RVIFP into this addendum by reference to provide greater detail to sensitivity and exposure to the wildfire hazard.

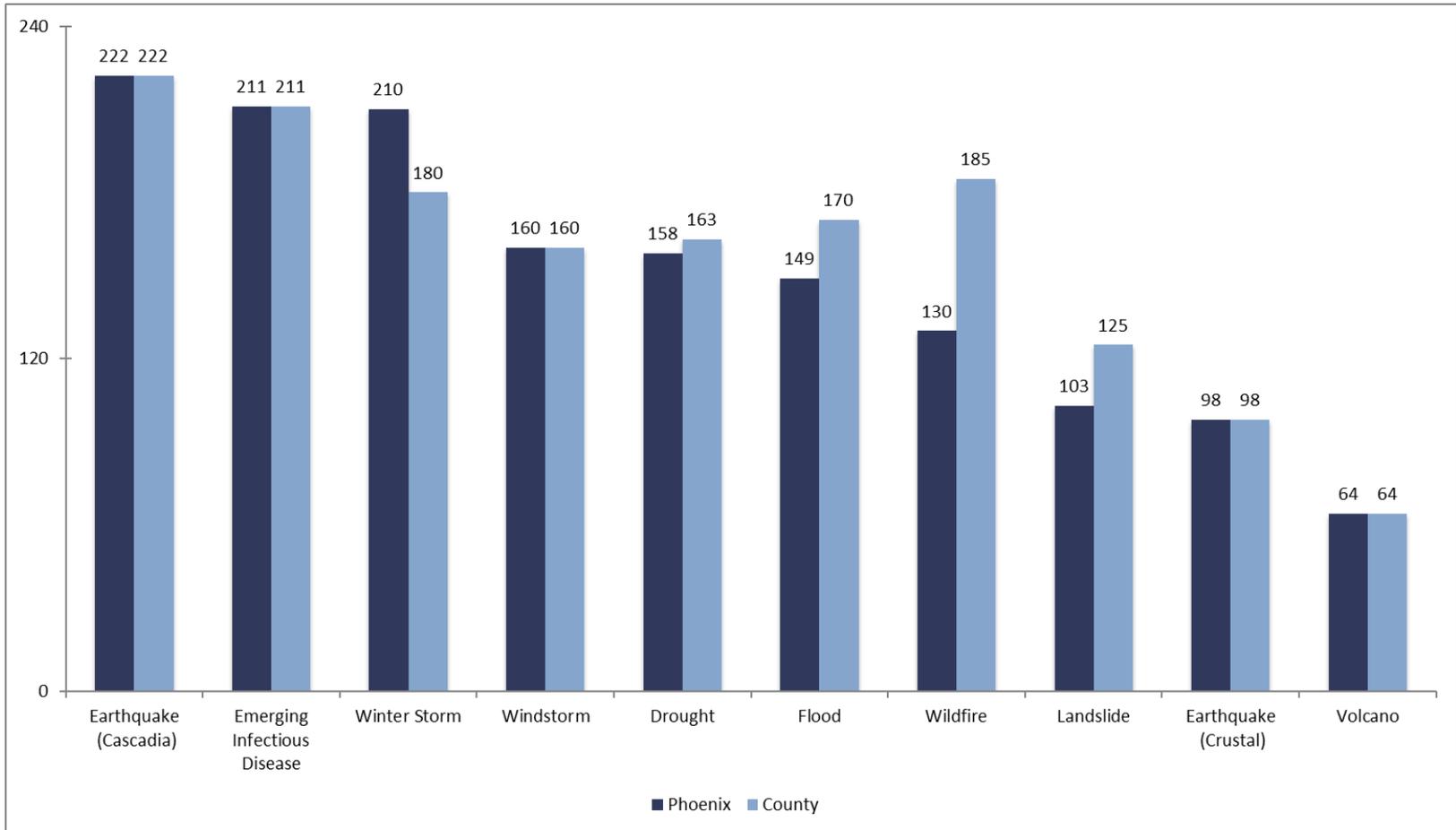
Property can be damaged or destroyed with one fire as structures, vegetation and other flammables easily merge to become unpredictable and hard to manage. Other factors that affect ability to effectively respond to a wildfire include access to the location and to water, response time from the fire station, availability of personnel and equipment and weather (e.g., heat, low humidity, high winds and drought).

Please review Volume I, Section 3 for additional information on this hazard.

Summary

Figure PA-6 presents a summary of the hazard analysis for Phoenix and compares the results to the assessment completed by Jackson County. The top three hazards for the City are the Cascadia Subduction Zone earthquake, emerging infectious disease and winter storm.

Figure PA-6 Overall Hazard Analysis Comparison – Phoenix/Jackson County



Source: City of Phoenix NHMP Steering Committee and Jackson County NHMP Steering Committee, 2017.

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CITY OF ROGUE RIVER ADDENDUM

Purpose

This is an update of the Rogue River addendum to the Jackson County Multi-Jurisdictional Natural Hazard Mitigation Plan (MNHMP, NHMP). This addendum supplements information contained in Volume I (Basic Plan) which serves as the NHMP foundation and Volume II (Appendices) which provide additional information. This addendum meets the following requirements:

- Multi-Jurisdictional **Plan Adoption** §201.6(c)(5),
- Multi-Jurisdictional **Participation** §201.6(a)(3),
- Multi-Jurisdictional **Mitigation Strategy** §201.6(c)(3)(iv) and
- Multi-Jurisdictional **Risk Assessment** §201.6(c)(2)(iii).

Updates to Rogue River's addendum are further discussed throughout the NHMP and within Volume II, Appendix B, which provides an overview of alterations to the document that took place during the update process.

Mitigation Plan Mission

The plan mission states the purpose and defines the primary functions of the NHMP. It is intended to be adaptable to any future changes made to the NHMP and need not change unless the community's environment or priorities change.

The City concurs with the mission statement developed during the Jackson County planning process (Volume I, Section 4):

Protect life, property and the environment, reduce risk and prevent loss from natural hazard events through coordination and cooperation among public and private partners.

Mitigation Plan Goals

Mitigation plan goals are more specific statements of direction that Jackson County citizens and public and private partners can take while working to reduce the City's risk from natural hazards. These statements of direction form a bridge between the broad mission statement and particular action items. The goals listed here serve as checkpoints as agencies and organizations begin implementing mitigation action items.

The City concurs with the goals developed during the Jackson County planning process (Volume I, Section 4). All of the NHMP goals are important and are listed below in no particular order of priority. Establishing community priorities within action items neither negates nor eliminates any goals, but it establishes which action items to consider to implement first, should funding become available.

Below is a list of the NHMP goals:

GOAL 1: EMERGENCY SERVICES

Minimize life safety issues by promoting, strengthening and coordinating emergency response plans.

GOAL 2: EDUCATION AND OUTREACH

Further the public's awareness and understanding of natural hazards and potential risk, including economic vulnerability and mitigation efforts.

GOAL 3: PREVENTION

Reduce the threat of loss of life and property from natural hazards by incorporating information on known hazards and providing incentives to make hazard mitigation planning a priority in land use policies and decisions, including plan implementation.

GOAL 4: PROPERTY PROTECTION

Lessen impact from natural disasters on individual properties, businesses and public facilities by increasing awareness at the individual level and encouraging activities that can prevent damage and loss of life from natural hazards.

GOAL 5: PARTNERSHIP AND COORDINATION

Identify mitigation or risk reduction measures that address multiple areas (i.e., environment, transportation, telecommunications); Coordinate public/private sector participation in planning and implementing mitigation projects throughout the City; and seek funding and resource partnerships for future mitigation efforts.

GOAL 6: NATURAL RESOURCE PROTECTION

Preserve and rehabilitate natural systems to serve natural hazard mitigation functions (i.e., floodplains, wetlands, watershed and urban interface areas).

GOAL 7: STRUCTURAL PROTECTIONS

When applicable, utilize structural mitigation activities to minimize risks associated with natural hazards.

NHMP Process, Participation and Adoption

This section of the NHMP addendum addresses 44 CFR 201.6(c)(5), *Plan Adoption* and 44 CFR 201.6(a)(3), *Participation*. The first update of the Jackson County NHMP was approved by FEMA on February 4, 2013. To maintain compliance with the Disaster Mitigation Act of 2000 (DMA2K), the NHMP required an update by February 3, 2018. Rogue River was included with an addendum in the 2012 Jackson County NHMP process.

The Oregon Partnership for Disaster Resilience (OPDR) at the University of Oregon's Community Service Center (CSC) partnered with the Oregon Military Department's Office of Emergency Management (OEM), Jackson County and Rogue River to update their NHMP. This project is funded through the Federal Emergency Management Agency's (FEMA) FY15 Pre-Disaster Mitigation Competitive Grant Program (PDMC-PL-10-PR-2015-003). Members

of the Rogue River NHMP steering committee also participated in the County NHMP update process (Volume II, Appendix B).

By updating the NHMP, locally adopting it and having it re-approved by FEMA, Rogue River will maintain eligibility for FEMA Hazard Mitigation, Pre-Disaster Mitigation and Flood Mitigation Assistance grant program funds.

The Jackson County NHMP and Rogue River addendum, are the result of a collaborative effort between citizens, public agencies, non-profit organizations, the private sector and regional organizations. A project steering committee guided the process of developing the NHMP.

The Rogue River City Manager served as the designated convener of the NHMP update and the Public Works Director will take the lead in implementing, maintaining and updating the addendum to the Jackson County NHMP in collaboration with the designated convener of the Jackson County NHMP (Emergency Manager).

Representatives from the City of Rogue River steering committee met formally and informally, to discuss updates to their addendum (Volume II, Appendix B). The steering committee reviewed and revised the City's addendum, with particular focus on the NHMP's risk assessment and mitigation strategy (action items).

This addendum reflects decisions made at the designated meetings and during subsequent work and communication with Jackson County Emergency Management and the OPDR. The changes are highlighted with more detail throughout this document and within Volume II, Appendix B. Other documented changes include a revision of the City's risk assessment and hazard identification sections, NHMP mission and goals, action items and community profile.

The Rogue River Steering Committee was comprised of the following representatives:

- Convener, Mark Reagles, City Administrator
- Mike Bollweg, Public Works Director
- Bonnie Honea, Finance Director
- James Price, Rogue River Fire District
- Dean Stirm, Planning Commissioner
- Pam VarnArsdale, Mayor

Public participation was achieved with the establishment of the steering committee, which was comprised of City officials representing different departments and sectors and members of the public. The steering committee was closely involved throughout the development of the NHMP and served as the local oversight body for the NHMP's development. Community members were provided an opportunity for comment via the NHMP review process and through a survey administered by the OPDR and publicized by the participating jurisdictions (Volume II, Appendix B).

The Jackson County NHMP was approved by FEMA on [Month] [Day], 2018 and the Rogue River addendum was adopted via resolution on [Month] [Day], 2018. This NHMP is effective through [Month] [Day], 2023.

NHMP Implementation and Maintenance

The City Council will be responsible for adopting the Rogue River addendum to the Jackson County NHMP. This addendum designates a steering committee and a convener to oversee the development and implementation of action items. Because the City addendum is part of the County's multi-jurisdictional NHMP, the City will look for opportunities to partner with the County. The City's steering committee will convene after re-adoption of the Rogue River NHMP addendum on an annual schedule. The County is meeting on a semi-annual basis and will provide opportunities for the cities to report on NHMP implementation and maintenance during their meetings. The City's Public Works Director will serve as the convener and will be responsible for assembling the steering committee. The steering committee will be responsible for:

- Reviewing existing action items to determine suitability of funding;
- Reviewing existing and new risk assessment data to identify issues that may not have been identified at NHMP creation;
- Educating and training new steering committee members on the NHMP and mitigation actions in general;
- Assisting in the development of funding proposals for priority action items;
- Discussing methods for continued public involvement; and
- Documenting successes and lessons learned during the year.

The convener will also remain active in the County's implementation and maintenance process (Volume I, Section 5).

The City will utilize the same action item prioritization process as the County (Volume I, Section 5 and Volume II, Appendix D).

Implementation through Existing Programs

Many of the Natural Hazard Mitigation Plan's recommendations are consistent with the goals and objectives of the City's existing plans and policies. Where possible, Rogue River will implement the NHMP's recommended actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses and policy makers. Many land-use, comprehensive and strategic plans get updated regularly, allowing them to adapt to changing conditions and needs. Implementing the NHMP's action items through such plans and policies increases their likelihood of being supported and implemented.

Rogue River's acknowledged comprehensive plan is the City of Rogue River Comprehensive Plan administered by the Rogue River Planning Commission. The City implements the plan through the Community Development Code.

Rogue River currently has the following plans that relate to natural hazard mitigation. For a complete list visit the City's [website](#):

- [Comprehensive Plan](#) (1990, amended 2005, available through request)
- [Municipal Code](#) (in update, flood ordinance may be updated)
- [Capital Improvement Plan](#) (available through Public Works)
- [Building Code, 2017 Oregon State Code](#) based on 2015 International Residential Code (IRC) and 2012 International Building Code

- Emergency Operations Plan
- Water CIP
- Wastewater CIP
- Street CIP
- Storm Drain CIP

Continued Public Participation

Keeping the public informed of the City's efforts to reduce its risk to future natural hazard events is important for successful NHMP implementation and maintenance. The City is committed to involving the public in the NHMP review and updated process (Volume I, Section 5).

NHMP Maintenance

The Jackson County Multi-Jurisdictional Natural Hazard Mitigation Plan and City addendum will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. During the County plan update process, the City will also review and update its addendum (Volume I, Section 5). The convener will be responsible for convening the steering committee to address the questions outlined below.

- Are there new partners that should be brought to the table?
- Are there new local, regional, state or federal policies influencing natural hazards that should be addressed?
- Has the community successfully implemented any mitigation activities since the NHMP was last updated?
- Have new issues or problems related to hazards been identified in the community?
- Are the actions still appropriate given current resources?
- Have there been any changes in development patterns that could influence the effects of hazards?
- Have there been any significant changes in the community's demographics that could influence the effects of hazards?
- Are there new studies or data available that would enhance the risk assessment?
- Has the community been affected by any disasters? Did the NHMP accurately address the impacts of this event?

These questions will help the steering committee determine what components of the mitigation NHMP need updating. The steering committee will be responsible for updating any deficiencies found in the NHMP.

Mitigation Strategy

This section of the NHMP addendum addresses 44 CFR 201.6(c)(3)(iv), *Mitigation Strategy*.

The City's mitigation strategy (action items) were first developed during the 2012 NHMP planning process. During this process, the steering committee assessed the City's risk, identified potential issues and developed a mitigation strategy (action items).

During the 2017 update process the City re-evaluated their mitigation strategy (action items). During this process action items were updated, noting what accomplishments had been made and whether the actions were still relevant; any new action items were identified at this time (see Volume II, Appendix B for more information on changes to action items).

Priority Actions

The City is listing a set of high priority actions in an effort to focus attention on an achievable set of high leverage activities over the next five-years (Table RA-1). The City's priority actions are listed below in the following table.

Action Item Pool

Table RA-2 presents a "pool" of mitigation actions. This expanded list of actions is available for local consideration as resources, capacity, technical expertise and/or political will become available.

The majority of these actions carry forward from prior versions of this NHMP (Jackson County and/ or Rogue River NHMPs).

Table RA-I Rogue River Priority Action Items

Action Item ID	Mitigation Action Item	Timeline	Lead Organization	Partner Organization(s)	Potential Funding Source(s)
Priority Actions					
Multi-Hazard (MH)					
MH #1 (New)	Wire schools to use city's portable generators	Short Term (0-2 Years)	School District	City Administration, City Building	Local Funding Resources, School District
MH #2 (New)	Incorporate hazard-resilient development design and siting of infrastructure into development code and ordinances.	Mid-Term (3-5 Years)	City Planning	City Administration, City Building	Local Funding Resources, DLCDC Technical Assistance Grant
Drought (DR)					
DR #1 (New)	Ensure that the water quantity held in established water storage facilities is at an amount adequate for drought preparedness.	Mid-Term (3-5 Years)	City Public Works	City Administration, Jackson County Soil and Water Conservation District, OWRD	Local Funding Resources
Earthquake (EQ)					
EQ #1	Implement structural and non-structural retrofits to critical and essential facilities. Including water reservoir (500,000) built in 1974 and bridges.	Ongoing	City Administration	City Public Works, City Building, Rogue River Fire District, Main Building	Local Funding Resources, FEMA (HMA), SRGP
Flood (FL)					
FL #1 (New)	Mitigate streambank erosion near Wards Creek that is impacting adjacent property.	Long Term (5+ Years)	City Public Works	City Planning, City GIS, Jackson County, DLCDC	Local Funding Resources
FL #2	Ensure continued compliance in the National Flood Insurance Program (NFIP) through enforcement of local floodplain management ordinances.	Ongoing	City Planning	City Public Works, Jackson County, FEMA, NFIP; CRS/ISO; DLCDC	Local Funding Resources
Wildfire (WF)					
WF #1	Partner with Jackson County on Implementation of the Rogue Valley Integrated Community Wildfire Protection Plan and outreach projects	Ongoing	City Planning	City Administration, City Public Works, ODF, Jackson County, Rogue River Fire District, Bureau of Land Management - Medford District, Oregon Department of Forestry, Office of State Fire Marshal	Local Funding Resources, Fire and Rescue Districts, OEM, ODF

Source: City of Rogue River NHMP Steering Committee, 2017.

Table RA-I Rogue River Action Item Pool

Action Item ID	Mitigation Action Item	Timeline	Lead Organization	Partner Organization(s)	Potential Funding Source(s)
Action Item Pool					
Multi-Hazard (MH)					
MH #3	Maintain public education programs to inform the public about methods of mitigating the impacts of natural hazards	Ongoing	City Administration	City Public Works, Rogue River Fire District, Jackson County Fire; Jackson County; Community Organizations	Local Funding Resources
MH #4	Integrate the goals and action items from the Natural Hazards Mitigation Plan into existing regulatory documents and programs, where appropriate.	Ongoing	City Planning	City Administration, City Public Works, Building Codes Division	Local Funding Resources, DLCDC Technical Assistance Grant
MH #5 (New)	Integrate conservation and watershed protection into existing wildfire and other mitigation approaches.	Short Term (0-2 Years)	City Administration	City Planning, City Public Works, Fire District	Local Funding Resources
Drought (DR)					
	See priority actions and multi-hazard actions for applicable mitigation strategies.				
Earthquake (EQ)					
EQ #2	Promote earthquake insurance	Short Term (0-2 Years)	Administration	City Building, Rogue River Fire District, Insurance companies, FEMA, Mortgage companies	Local Funding Resources
EQ #3	Promote and coordinate Earthquake Hazard Risk Map for Jackson County and cities	Long Term (5+ Years)	City Planning	City Administration, City Public Works, DOGAMI, Jackson County	FEMA Risk MAP, DOGAMI, DLCDC, OEM, HMGP, PDM
Emerging Infectious Disease					
	No specific action item developed for this hazard. See multi-hazard actions for applicable mitigation strategies.				

Source: City of Rogue River NHMP Steering Committee, 2017.

Table RA-2 Rogue River Action Item Pool (continued)

Action Item ID	Mitigation Action Item	Timeline	Lead Organization	Partner Organization(s)	Potential Funding Source(s)
Action Item Pool					
Flood (FL)					
FL #3	Continue participation in the NFIP's Community Rating System (CRS)	Ongoing	City Planning	City, Public Works, Jackson County, FEMA, NFIP; CRS/ ISO; DLCD	Local Funding Resources
FL #4	Promote and protect the use of naturally flood prone open space or wetlands as flood storage areas	Ongoing	City Public Works	City Planning, Jackson County, DEQ	Local Funding Resources, DLCD, OEM, FEMA, OPRD (Local Government Grant Program)
FL #5	Preserve water quantity and quality by using storm water best management practices (Low Impact Development/ Green Infrastructure).	Long Term (5+ Years)	City Public Works	City Planning, Jackson County; DEQ; Rogue Valley Sewer Services	Local Funding Resources, DLCD, FEMA, ASFPM, DEQ
FL #6	Protect city facilities in flood prone areas	Ongoing	City Public Works	City Planning, City GIS, Jackson County, DLCD	Local Funding Resources, FMA, PDM, HMGP
FL #7 (New)	Implement flood control measures by improving storm drainage and educating the public.	Ongoing	City Public Works	City GIS Coordinator, City Planning, Jackson County, FEMA, NFIP; CRS/ ISO	Local Funding Resources, DLCD, FEMA, ASFPM, DEQ
FL #8 (New)	Update the city's stormwater master plan	Short Term (0-2 Years)	City Public Works	City Planning, City GIS, Jackson County, DLCD	Local Funding Resources, DLCD Technical Assistance Grant, DEQ
Landslide (LS)					
No specific action item developed for this hazard. See multi-hazard actions for applicable mitigation strategies.					
Severe Weather (SW, Windstorm and Winter Storm)					
SW #1	Encourage new developments to include underground power lines.	Ongoing	City Public Works	City Planning, Utility Companies, Developers	Local Funding Resources, Utilities, Developers
SW #2	Education and outreach Disaster Resilient Economy	Ongoing	City Administration	City Planning, City Public Works, Utility companies, Churches, schools, Fire, American Red Cross, FEMA	Local Funding Resources

Source: City of Rogue River NHMP Steering Committee, 2017.

Table RA-2 Rogue River Action Item Pool (continued)

Action Item ID	Mitigation Action Item	Timeline	Lead Organization	Partner Organization(s)	Potential Funding Source(s)
Action Item Pool					
Volcano (VE)					
	No specific action item developed for this hazard. See multi-hazard actions for applicable mitigation strategies.				
Wildfire (WF)					
WF #2	Promote wildfire mitigation through public education, fuels reductions and the improvement of transportation corridors.	Ongoing	City Administration	City Public Works, City Planning, Rogue River Police Department, Jackson County, Rogue River Fire Department	Local Funding Resources, ODF, FEMA
WF #3	Continue to promote wildfire education and awareness and the Firewise program	Ongoing	City Planning	City Administration, City Public Works, Jackson County; Rogue River Fire District; Oregon Department of Forestry, Office of State Fire Marshal	Local Funding Resources, Firewise, NFPA

Source: City of Rogue River NHMP Steering Committee, 2017.

Risk Assessment

This section of the NHMP addendum addresses 44 CFR 201.6(b)(2) - Risk Assessment. In addition, this chapter can serve as the factual basis for addressing Oregon Statewide Planning Goal 7 – Areas Subject to Natural Hazards. Assessing natural hazard risk has three phases:

- **Phase 1:** Identify hazards that can impact the jurisdiction. This includes an evaluation of potential hazard impacts – type, location, extent, etc.
- **Phase 2:** Identify important community assets and system vulnerabilities. Example vulnerabilities include people, businesses, homes, roads, historic places and drinking water sources.
- **Phase 3:** Evaluate the extent to which the identified hazards overlap with or have an impact on, the important assets identified by the community.

The local level rationale for the identified mitigation strategies (action items) is presented herein and within Volume I, Sections 2 and 3. The risk assessment process is graphically depicted in Figure RA-1 below. Ultimately, the goal of hazard mitigation is to reduce the area of risk, where hazards overlap vulnerable systems.

Figure RA-1 Understanding Risk



Hazard Analysis

The Rogue River steering committee developed their hazard vulnerability assessment (HVA), using their previous HVA and the County’s HVA (Volume II, Appendix C) as a reference. Changes from the County’s HVA were made where appropriate to reflect distinctions in vulnerability and risk from natural hazards unique to Rogue River, which are discussed throughout this addendum.

Table RA-4 shows the HVA matrix for Rogue River listing each hazard in order of rank from high to low. 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.

One catastrophic hazard (Cascadia Subduction Zone earthquake) and three chronic hazards (wildfire, emerging infectious disease and flood) rank as the top hazard threats to the City (Top Tier). Drought, winter storm and windstorm comprise the next highest ranked hazards (Middle Tier), while crustal earthquake, volcano and landslide comprise the lowest ranked hazards (Bottom Tier).

Table RA-3 Hazard Analysis Matrix – Rogue River

Hazard	Maximum				Total Threat Score	Hazard Rank	Hazard Tiers
	History	Vulnerability	Threat	Probability			
Wildfire	20	45	90	70	225	#1	Top Tier
Earthquake (Cascadia)	2	50	100	70	222	#2	
Emerging Infectious Disease	12	50	100	49	211	#3	
Flood	20	35	80	70	205	#4	
Drought	20	40	70	63	193	#5	Middle Tier
Winter Storm	20	30	60	70	180	#6	
Windstorm	20	20	50	70	160	#7	
Earthquake (Crustal)	2	25	50	21	98	#8	Bottom Tier
Volcano	2	5	50	7	64	#9	
Landslide	2	5	20	14	41	#10	

Source: Rogue River NHMP Steering Committee, 2017.

Table RA-4 categorizes the probability and vulnerability scores from the hazard analysis for the City and compares the results to the assessment completed by the Jackson County NHMP Steering Committee (Volume II, Appendix C). Variations between the City and County are noted in **bold** text.

Table RA-4 Probability and Vulnerability Comparison

Hazard	Rogue River		Jackson County	
	Probability	Vulnerability	Probability	Vulnerability
Drought	High	High	High	Moderate
Earthquake (Cascadia)	High	High	High	High
Earthquake (Crustal)	Low	Moderate	Low	Moderate
Emerging Infectious Disease	Moderate	High	Moderate	High
Flood	High	Moderate	High	Moderate
Landslide	Low	Low	High	Low
Volcano	Low	Low	Low	Low
Wildfire	High	High	High	Moderate
Windstorm	High	Moderate	High	Moderate
Winter Storm	High	Moderate	High	Moderate

Source: Rogue River NHMP Steering Committee, 2017.

Community Characteristics

Table RA-5 and the following section provides information on City specific demographics and assets. For additional information on the characteristics of Rogue River, in terms of geography, environment, population, demographics, employment and economics, as well as housing and transportation see Volume I, Section 2. Many of these community characteristics can affect how natural hazards impact communities and how communities choose to plan for natural hazard mitigation. Considering the City specific assets during the planning process can assist in identifying appropriate measures for natural hazard mitigation. Between 2012 and 2016 the City grew by 55 people (0.6%) and median household income decreased by about 20% (Volume I, Section 2). New development has complied with the standards of the [Oregon Building Code](#) and the city's development code including their floodplain ordinance.

Transportation/Infrastructure

In the City of Rogue River, transportation has played a major role in shaping the community. Rogue River's commercial areas developed along primary routes and residential development followed nearby.

Today, mobility or lack thereof due to heavy traffic, plays an important role in Rogue River and the daily experience of its residents and businesses as they move from point A to point B. The current railroad system is serviced through the Union Pacific Railroad system and the Central Oregon and Pacific Railroad (CORP) route. The Rogue Valley Transportation District (RVTD) provides commuter transit service Monday through Friday via their Rogue Valley Commuter Line.

By far, motor vehicles represent the dominant mode of travel through and within Rogue River.

Economy

A diverse range of businesses have chosen to locate in Rogue River. Rogue River's location on Interstate 5 and its proximity to the Medford Airport give it market access that is more favorable than usual for a rural town. According to economic City data, Rogue River finds their main economic drivers in the sectors of manufacturing, retail trade and construction.¹

¹<http://www.City-data.com/City/Rogue-River-Oregon.html>

Table RA-5 Community Characteristics

Population Characteristics		
2012 Population	2,145	
2016 Population	2,200	
2035 Forecasted Population*	3,705	
Race and Ethnic Categories		
White	93%	
Black/ African American	2%	
American Indian and Alaska Native	2%	
Asian	< 1%	
Native Hawaiian and Other Pacific Islander	0%	
Some Other Race	1%	
Two or More Races	2%	
Hispanic or Latino	13%	
Limited or No English Spoken	0%	
Vulnerable Age Groups		
Less than 15 Years	385	18%
65 Years and Over	596	27%
Disability Status		
Total Population	525	24%
Children	10	1%
Seniors	227	10%

Income Characteristics		
Households by Income Category		
Less than \$15,000	264	23%
\$15,000-\$29,999	315	27%
\$30,000-\$44,999	193	16%
\$45,000-\$59,999	166	14%
\$60,000-\$74,999	72	6%
\$75,000-\$99,999	45	4%
\$100,000-\$199,999	60	5%
\$200,000 or more	5	< 1%
Median Household Income	\$26,753	
Poverty Rates		
Total Population	616	28%
Children	191	38%
Seniors	100	15%
Housing Cost Burden		
Owners with Mortgage		56%
Renters		52%

Source: U.S. Census Bureau, 2011-2015 American Community Survey; Portland State University, Population Research Center.

Note: * = Population forecast within UGB

Housing Characteristics		
Housing Units		
Single-Family	671	50%
Multi-Family	481	36%
Mobile Homes	184	14%
Year Structure Built		
Pre-1970	222	17%
1970-1989	760	57%
1990 or later	354	27%
Housing Tenure and Vacancy		
Owner-occupied	536	46%
Renter-occupied	635	54%
Vacant	111	8%

Rogue River is in Jackson County in southwestern Oregon. The City has grown steadily since its incorporation in 1912 and has an area today of 0.97 square miles. It is located in the northern region of the county, located about 3.5 miles east of the Josephine County border and about 20 miles northwest of the City of Medford. The City and most of Jackson County are within the Rogue and Umpqua watersheds.

Rogue River experiences a relatively mild climate with four distinct seasons that comes from its position on the west coast of North America and within the mountains of the region. The town is just off of Interstate 5 and about 50 miles north of the California border and in the heart of the Rogue Valley at approximately 1,000 feet above sea level. Rogue River has a climate somewhat intermediate to central California and northern Oregon. Rogue River averages around five inches of precipitation per month in the winter and one or less inches in the summer months.

The City of Rogue River includes a diversity of land uses but is zoned primarily residential.

For more information see Volume I, Section 2.

Community Assets

This section outlines the resources, facilities and infrastructure that, if damaged, could significantly impact the public safety, economic conditions and environmental integrity of Rogue River.

Critical Facilities

Facilities that are critical to government response and recovery activities (i.e. life, safety, property and environmental protection). These facilities include: 911 Centers, Emergency Operations Centers, Police and Fire Stations, Public Works facilities, sewer and water facilities, hospitals, bridges, roads, shelters and more. Facilities that, if damaged, could cause serious secondary impacts may also be considered “critical.” A hazardous material facility is one example of this type of critical facility.

Fire Stations:

- Rogue River Fire District #1 (EOC)

Law Enforcement:

- Police Department

City Buildings:

- Community Center
- City Hall

Private:

- Ray’s Food Place
- Dollar General
- Main Building Supply (Ace)
- Murphy Plywood
- Rogue River Pharmacy
- Lil’ Pantry
- Circle K

Essential Facilities

Facilities that are essential to the continued delivery of key government services and/or that may significantly impact the public’s ability to recover from the emergency. These facilities may include: City buildings such as the Public Services Building, the City Hall and other public facilities such as schools.

Hospitals/Immediate Medical Care Facilities:

- Rogue River Family Practice Clinic
- Rogue River Veterinary Hospital
- Animal Clinic of Rogue River

Public Schools:

- Rogue River Elementary (east)
- Rogue River Elementary (west)
- Rogue River High
- Rivers Edge Academy Charter School

City/ County/Other Buildings:

- Rogue River Library
- Rogue River Chamber of Commerce and Visitor Center

Potential Shelter Sites:

- Church of Christ of Rogue River
- All Rogue River Schools
- Hope Presbyterian Church
- Rogue Valley Community Church
- Rogue River 2 Foursquare Church (Hope Alive)
- Jehovah's Witness
- New Beginnings
- Faith Lutheran
- Russian Orthodox

Infrastructure:

Infrastructure that provides services for the City includes:

Transportation Networks:

- Highway 99/Rogue River Hwy
- Foothill Blvd
- E Main St
- Interstate 5
- Wards Creek Rd
- W Evans Creek Rd
- Pine St/E Evans
- N River Rd

Water Facilities:

- 2 well-fed reservoirs
- Water Treatment Plant (1994)
- Waste Water Treatment Plant (1997)

Special Service Districts:

- Southern Oregon Education Service District
- Rogue River School District #35
- Rogue River Fire District #1
- Grants Pass Irrigation District
- Gold Hill Irrigation District

Private Utilities:

- Southern Oregon – Pacific Power
- Avista – Natural Gas
- Charter – Cable
- Hunter – Fiber
- AT&T – Fiber
- Century Link - Phone

Hazard Characteristics

Drought

The steering committee determined that the City's probability for drought is **high** (which is the same as the County's rating) and that their vulnerability to drought is **high** (which is higher than the County's rating). *These ratings increased since the previous version of this NHMP addendum.*

Volume I, Section 3 describes the characteristics of drought hazards, history, as well as the location, extent and probability of a potential event. Due to the climate of Jackson County, past and present weather conditions have shown an increasing potential for drought.

The City receives its main water supply directly from the Rogue River and established local wells. For more information on the future of Rogue River's water supply visit their [website](#).

Please review Volume I, Section 3 for additional information on this hazard.

Earthquake (Cascadia)

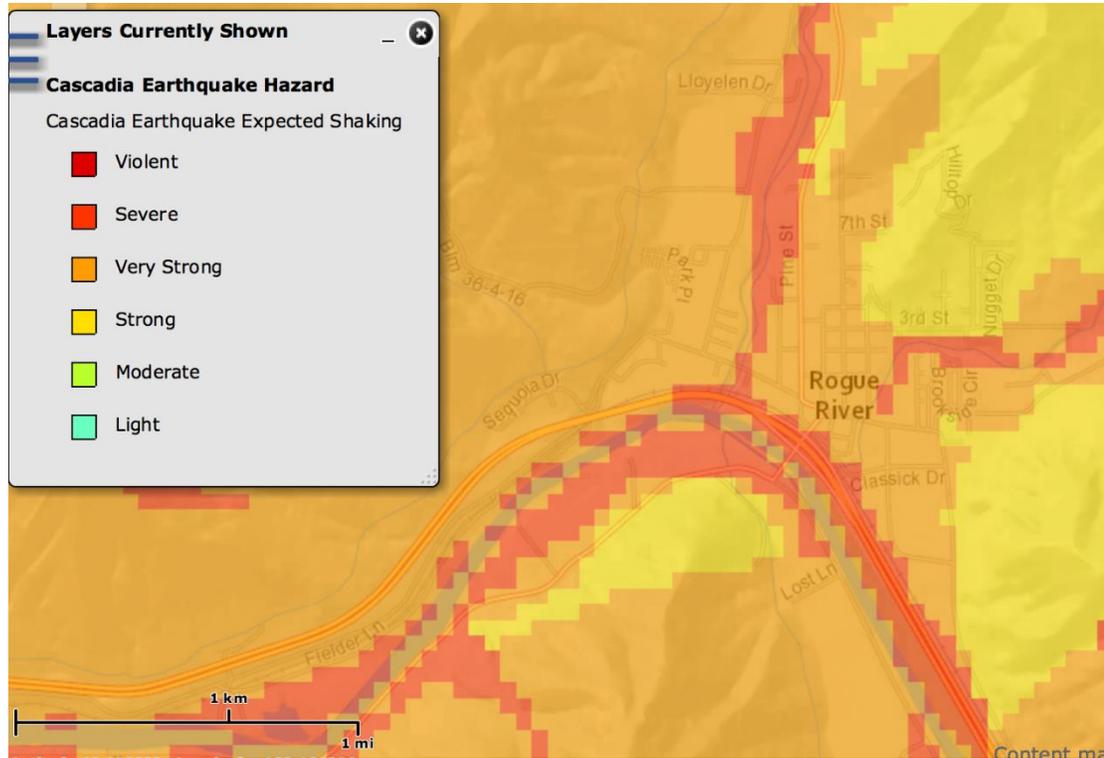
The steering committee determined that the City's probability for a Cascadia Subduction Zone (CSZ) earthquake is **high** (which is the same as the County's rating) and that their vulnerability to a CSZ earthquake is **high** (which is the same as the County's rating). *Previously, the earthquake hazard profile was a single risk assessment, which is now divided into two separate earthquake hazards: Cascadia Subduction Zone (CSZ) earthquake and crustal earthquake.*

Volume I, Section 3 describes the characteristics of earthquake hazards, history, as well as the location, extent and probability of a potential event. Generally, an event that affects the County is likely to affect Rogue River as well. The causes and characteristics of an earthquake event are appropriately described within Volume I, Section 3, as well as the location and extent of potential hazards. Previous occurrences are well documented within Volume I, Section 3 and the community impacts described by the County would generally be the same for Rogue River as well.

The local faults, the county's proximity to the Cascadia Subduction Zone, potential slope instability and the prevalence of certain soils subject to liquefaction and amplification combine to give the County a high-risk profile. Due to the expected pattern of damage resulting from a CSZ event, the Oregon Resilience Plan divides the State into four distinct zones and places Jackson County predominately within the "Valley Zone" (Valley Zone, from the summit of the Coast Range to the summit of the Cascades). Within the Southwest Oregon region, damage and shaking is expected to be strong and widespread - an event will be disruptive to daily life and commerce and the main priority is expected to be restoring services to business and residents.² Figure RA-2 displays relative shaking hazards from a Cascadia Subduction Zone earthquake event. As shown in the figure below, the area of greatest concern within the City of Rogue River (darker areas) is along the river and mountainous areas.

² Ibid.

Figure RA-2 Cascadia Subduction Zone



Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](#)

Note: To view detail click the link above to access Oregon HazVu.

As noted in the community profile, approximately 74% of residential buildings were built prior to 1990, which increases the City's vulnerability to the earthquake hazard. Information on specific public buildings' (schools and public safety) estimated seismic resistance, determined by DOGAMI in 2007, is shown in Table RA-8; each "X" represents one building within that ranking category. Of the facilities evaluated by DOGAMI using a Rapid Visual Survey (RVS), three (3) have a high (greater than 10% chance) collapse potential and zero (0) have a very high (100% chance) collapse potential.

In addition to building damages, utility (electric power, water, wastewater, natural gas) and transportation systems (bridges, pipelines) are also likely to experience significant damage. There is a low probability that a major earthquake will result in failure of upstream dams.

Utility systems will be significantly damaged, including damaged buildings and damage to utility infrastructure, including water and wastewater treatment plants and equipment at high voltage substations (especially 230 kV or higher which are more vulnerable than lower voltage substations). Buried pipe systems will suffer extensive damage with approximately one break per mile in soft soil areas. There would be a much lower rate of pipe breaks in other areas. Restoration of utility services will require substantial mutual aid from utilities outside of the affected area.³

³ Regional All Hazard Mitigation Master Plan for Jackson, Lane and Linn Counties: Phase II (2001)

Table RA-6 Rapid Visual Survey Scores

Facility	Site ID*	Level of Collapse Potential			
		Low (< 1%)	Moderate (>1%)	High (>10%)	Very High (100%)
Schools					
Evans Valley School (Rogue River SD 35) (8205 E Evans Creek Rd) - CLOSED	Jack_sch50	X		X	
Rogue River Elementary School (Rogue River SD 35) (300 Pine St) - East Campus	Jack_sch20	Mitigated per 2010-11 SRGP grant			
Rogue River High School (Rogue River SD 35) (1898 E Evans Creek Rd)	Jack_sch22		X,X		
Rogue River Elementary School (Rogue River SD 35) (301 Pine St) - West Campus	Jack_sch21	Mitigated per 2015-17 SRGP grant			
Public Safety					
Rogue River Police (133 Broadway)	Jack_pol02	X			

Source: [DOGAMI 2007. Open File Report 0-07-02. Statewide Seismic Needs Assessment Using Rapid Visual Assessment.](#)

"*" – Site ID is referenced on the [RVS Jackson County Map](#)

Mitigation Successes

Seismic retrofit grant awards per the [Seismic Rehabilitation Grant Program](#)⁴ have been funded to retrofit Rogue River West Elementary (Phase One of 2015-2017 grant award, \$1,497,500) and Rogue River East Elementary (2010-2011 grant award, \$1,500,000).

Earthquake (Crustal)

The steering committee determined that the City’s probability for a crustal earthquake is **low** (which is the same as the County’s rating) and that their vulnerability to crustal earthquake is **moderate** (which is the same as the County’s rating). *Previously, the earthquake hazard profile was a single risk assessment, which is now divided into two separate earthquake hazards: crustal earthquake and Cascadia Subduction Zone (CSZ) earthquake.*

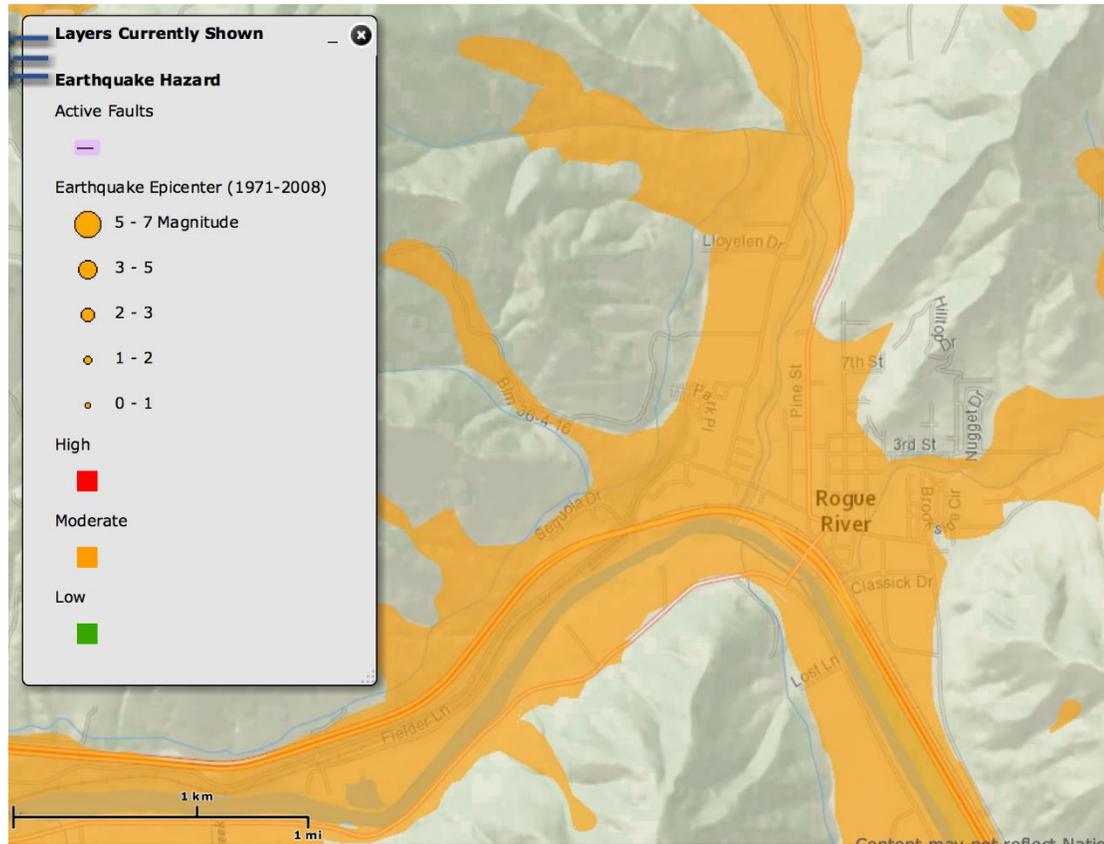
Volume I, Section 3 describes the characteristics of earthquake hazards, history, as well as the location, extent and probability of a potential event. Generally, an event that affects the County is likely to affect Rogue River as well. The causes and characteristics of an earthquake event are appropriately described within Volume I, Section 3, as well as the location and extent of potential hazards. Previous occurrences are well-documented within Volume I, Section 3 and the community impacts described by the County would generally be the same for Rogue River as well.

Earthquake-induced damages are difficult to predict and depend on the size, type and location of the earthquake, as well as site-specific building and soil characteristics. Presently, it is not possible to accurately forecast the location or size of earthquakes, but it is possible to predict the behavior of soil at any particular site. In many major earthquakes, damages

⁴ The Seismic Rehabilitation Grant Program (SRGP) is a state of Oregon competitive grant program that provides funding for the seismic rehabilitation of critical public buildings, particularly public schools and emergency services facilities.

have primarily been caused by the behavior of the soil. Figure RA-3 displays relative liquefaction hazards. Figure RA-3 displays relative liquefaction hazards, the majority of the City is within an area of moderate soft soils (liquefaction hazard; orange areas).

Figure RA-3 Active Faults and Soft Soils



Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](#)

Note: To view detail click the link above to access Oregon HazVu.

Please review Volume I, Section 3 for additional information on this hazard.

Emerging Infectious Disease

The steering committee determined that the City's probability for emerging infectious disease is **moderate** (which is the same as the County's rating) and that their vulnerability is **high** (which is the same as the County's rating). *The City did not assess the emerging infectious disease hazard in the previous version of their NHMP.*

Emerging infectious diseases are those that have recently appeared in a population or those whose incidence or geographic range is rapidly increasing or threatens to increase. Emerging infections may be caused by biological pathogens (e.g., virus, parasite, fungus or bacterium) and may be: previously unknown or undetected biological pathogens, biological pathogens that have spread to new geographic areas or populations, previously known biological pathogens whose role in specific diseases was previously undetected and biological

pathogens whose incidence of disease was previously declining but whose incidence of disease has reappeared (re-emerging infectious disease).⁵

Volume I, Section 3 describes the characteristics of emerging infectious disease, history, as well as the location, extent and probability of a potential event within the region. Generally, an event that affects the County is likely to affect the City as well.

Please review Volume I, Section 3 for additional information on this hazard.

Flood

The steering committee determined that the City's probability for flood is **high** (which is the same as the County's rating) and that their vulnerability to flood is **moderate** (which is higher than the County's rating). *These ratings did not change since the previous version of this NHMP addendum.*

Volume I, Section 3 describes the characteristics of flood hazards, history, as well as the location, extent and probability of a potential event. Portions of Rogue River have areas of flood plains (special flood hazard areas, SFHA), closely concentrated around the Rogue River corridor, contouring I-5. Areas along Evans Creek and Ward Creek (Figure RA-4). Furthermore, other portions of Rogue River, outside of the mapped floodplains, are also subject to flooding from local storm water drainage.

The Rogue River is the chief source of flooding in the City of Rogue River. The river, which has its origins in the Rogue River National Forest south of the City and flows from East to West. Evans Creek runs north-south out of the northern portion of Rogue River, with the smaller Ward Creek flowing through the northeastern portion of the City. During the 1964 and 1997 floods the City experienced flood inundation and damage in areas near the river including an RV park, Fleming Park and downtown. The City also experienced flooding in the 2006 flood, but without significant damages. The areas of Rogue River that are particularly flood prone include "the areas just south of and west of the Depot Street Bridge over the Rogue River, along the Rogue River and an area just west of Evans Creek, near its mouth" (Figure RA-4).⁶

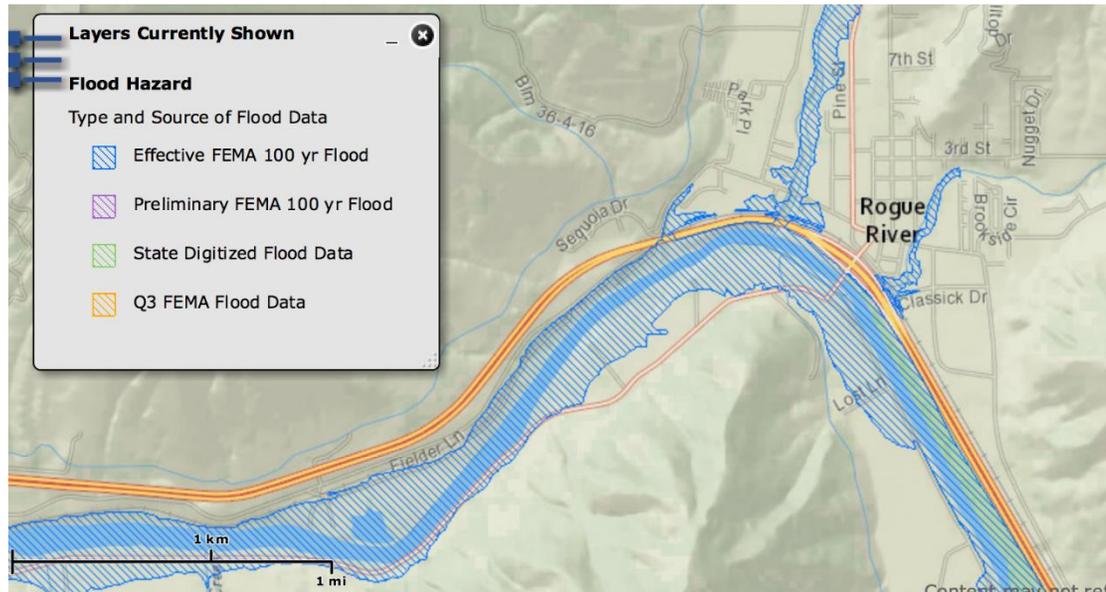
The City is at risk from two types of flooding: riverine and urban. Riverine flooding occurs when streams overflow their banks and inundate low-lying areas. This is a natural process that adds sediment and nutrients to fertile floodplain areas. It usually results from prolonged periods of precipitation over a wide geographic area. Most areas are generally flooded by low velocity sheets of water. Urban flooding occurs as land is converted to impervious surfaces and hydrologic systems are changed. Precipitation is collected and transmitted to streams at a much faster rate, causing floodwaters that rise rapidly and peak with violent force. During urban flooding, storm drains can back up and cause localized flooding of streets and basements. These flooding events and subsequent damages are commonly caused by the behavior of Rogue River. Additional risks of flood are posed from

⁵ Baylor College of Medicine, *Emerging Infectious Disease*, URL: <https://www.bcm.edu/departments/molecular-virology-and-microbiology/emerging-infections-and-biodefense/emerging-infectious-diseases>, accessed September 17, 2017.

⁶ Jackson County Flood Insurance Study (May 3, 2011)

Ward Creek and the Evans Creek, however, most of this flooding is due to backwater from the Rogue River.⁷

Figure RA-4 Special Flood Hazard Area



Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](#)

Note: To view detail click the link above to access Oregon HazVu.

Floods can have a devastating impact on almost every aspect of the community, including private property damage, public infrastructure damage and economic loss from business interruption. It is important for the City to be aware of flooding impacts and assess its level of risk.

The economic losses due to business closures often total more than the initial property losses that result from flood events. Business owners and their employees are significantly impacted by flood events. Direct damages from flooding are the most common impacts, but indirect damages, such as diminished clientele, can be just as debilitating to a business. Following the January 1997, flood businesses in Rogue River suffered direct damage from high water.

The FEMA Flood Insurance Study (January 19, 2018) has a brief history of flooding in Jackson County and Rogue River (Volume I, Section 3). The City's water plant and four sewer pump stations are within the 100-year flood plain, the City's waste water plant and intake structures are just outside. Currently, there is no financial impact data available for this infrastructure.

Highway 99 (Rogue River Highway) and Interstate 5 are major transportation routes in the Rogue Valley. If major flooding affected all of the bridges in Rogue River, traffic flow in an out of the City would be significantly affected, but would not cut off all avenues. The amount of property in the flood plain is not a large area but damage could be significant as it would affect residential, commercial and public property. Floodwaters can affect building foundations, seep into basements or cause damage to the interior, exterior and contents of

⁷ Ibid.

buildings, dependent upon the velocity and depth of the water and by the presence of floating debris. The City sewer system can overflow during flood events and cause further property damage.

For mitigation planning purposes, it is important to recognize that flood risk for a community is not limited only to areas of mapped floodplains. Other portions of Rogue River outside of the mapped floodplains may also be at relatively high risk from over bank flooding from streams too small to be mapped by FEMA or from local storm water drainage.

National Flood Insurance Program (NFIP)

FEMA updated the Flood Insurance Study (FIS) and Flood Insurance Rate Maps (FIRMs) in 2018 (effective January 19, 2018). The table below shows that as of June 2016, Rogue River has 60 National Flood Insurance Program (NFIP) policies in force. Of those, 14 are for properties that were constructed before the initial FIRM. The last Community Assistance Visit (CAV) for Rogue River was on JULY 11, 2011. Rogue River’s Class Rating within the Community Rating System (CRS) is an 8. The table shows that the majority of flood insurance policies are for residential structures, primarily single-family homes. There has been a total of six (6) paid claims for \$103,241. The City complies with the NFIP through enforcement of their flood damage prevention ordinance and their floodplain management program.

The Community Repetitive Loss record for Rogue River identifies zero (0) Repetitive Loss Properties⁸ and zero (0) Severe Repetitive Loss Properties⁹. For details on the repetitive loss properties see Volume I, Section 3.

Table RA-7 Flood Insurance Detail

Jurisdiction	Effective FIRM and FIS	Initial FIRM Date	Total Policies	Pre-FIRM Policies	Policies by Building Type				Minus Rated A Zone
					Single Family	2 to 4 Family	Other Residential	Non-Residential	
Jackson County	-	-	1,828	809	1,568	44	91	125	126
Rogue River	1/19/2018	1/2/1980	60	14	26	0	29	5	1

Jurisdiction	Insurance in Force	Total Paid Claims	Pre-FIRM Claims Paid	Substantial Damage Claims	Total Paid Amount	Repetitive Loss Structures	Severe Repetitive Loss Properties	CRS Class Rating	Last Community Assistance Visit
Jackson County	\$ 442,723,400	197	132	10	\$ 2,337,660	8	0	-	-
Rogue River	\$ 10,984,900	6	3	1	\$ 103,241	0	0	8	7/11/2011

Source: Information compiled by Department of Land Conservation and Development, July 2016.

Please review Volume I, Section 3 for additional information on this hazard.

⁸ A Repetitive Loss (RL) property is any insurable building for which two or more claims of more than \$1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978. A RL property may or may not be currently insured by the NFIP.

⁹ A Severe Repetitive Loss (SRL) property is a single family property (consisting of 1 to 4 residences) that is covered under flood insurance by the NFIP and has incurred flood-related damage for which 4 or more separate claims payments have been paid under flood insurance coverage, with the amount of each claim payment exceeding \$5,000 and with cumulative amount of such claims payments exceeding \$20,000; or for which at least 2 separate claims payments have been made with the cumulative amount of such claims exceeding the reported value of the property.

Landslide

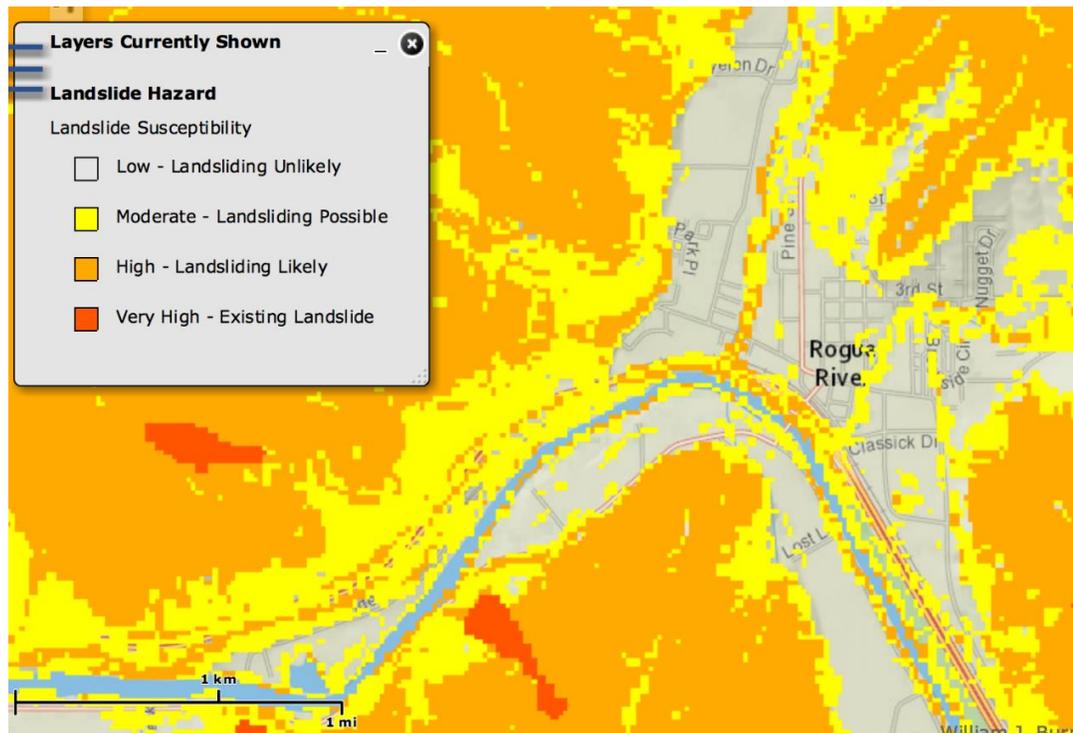
The steering committee determined that the City's probability for landslide is **low** (which is lower than the County's rating) and that their vulnerability to landslide is **low** (which is the same as the County's rating). *These ratings did not change since the previous version of this NHMP addendum.*

Volume I, Section 3 describes the characteristics of landslide hazards, history, as well as the location, extent and probability of a potential event within the region. The potential for landslide in Rogue River is low to moderate. However, critical transportation routes into the City may be susceptible to landslides.

Landslide susceptibility exposure for Rogue River is shown in Figure RA-4. Most of Rogue River demonstrates a low susceptibility to landslide exposure, with corridors of moderate susceptibility concentrated around the outer edges of Highway 99 and Interstate 5 and some areas of high susceptibility along the northern corridor of the Rogue River. Approximately 12% of Rogue River has high and approximately 27% moderate, landslide susceptibility exposure¹⁰.

Note that even if a jurisdiction has a high percentage of area in a high or very high landslide exposure susceptibility zone, this does not mean there is a high risk, because risk is the intersection of hazard and assets.

Figure RA-5 Landslide Susceptibility Exposure



Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](#)

Note: To view detail click the link above to access Oregon HazVu.

¹⁰ DOGAMI Open-File Report, O-16-02, Landslide Susceptibility Overview Map of Oregon (2016)

Potential landslide-related impacts are adequately described within Volume I, Section 3 and include infrastructural damages, economic impacts (due to isolation and/or arterial road closures), property damages and obstruction to evacuation routes. Rain-induced landslides and debris flows can potentially occur during any winter in Jackson County and thoroughfares beyond City limits are susceptible to obstruction as well.

The most common type of landslides in Jackson County are slides caused by erosion. Slides move in contact with the underlying surface, are generally slow moving and can be deep. Rainfall-initiated landslides tend to be smaller; while earthquake induced landslides may be quite large. All soil types can be affected by natural landslide triggering conditions.

Please review Volume I, Section 3 for additional information on this hazard.

Severe Weather

Severe weather can account for a variety of intense and potentially damaging weather events. These events include windstorms and winter storms. The following section describes the unique probability and vulnerability of each identified weather hazard. Other more abrupt or irregular events such as hail are also described in this section.

Windstorm

The steering committee determined that the City's probability for windstorm is **high** (which is the same as the County's rating) and that their vulnerability to windstorm is **moderate** (which is the same as the County's rating). *The City did not assess the windstorm hazard in the previous version of their NHMP as a unique hazard (it was assessed as a component of the severe winter storm and windstorm hazard). The previous severe storm rating was applied to both windstorm and winter storm and the ratings were modified slightly to account for the differences in vulnerability and risk to the hazard.*

Volume I, Section 3 describes the characteristics of windstorm hazards, history, as well as the location, extent and probability of a potential event within the region. Because windstorms typically occur during winter months, they are sometimes accompanied by ice, freezing rain, flooding and very rarely, snow. Other severe weather events that may accompany windstorms, including thunderstorms, hail, lightning strikes and tornadoes are generally negligible for Rogue River.

Volume I, Section 3 describes the impacts caused by windstorms, including power outages, downed trees, heavy precipitation, building damages and storm-related debris. Additionally, transportation and economic disruptions result as well.

Damage from high winds generally has resulted in downed utility lines and trees. Electrical power can be out anywhere from a few hours to several days. Outdoor signs have also suffered damage. If the high winds are accompanied by rain (which they often are), blowing leaves and debris clog drainage-ways, which in turn causes localized urban flooding.

Please review Volume I, Section 3 for additional information on this hazard.

Winter Storm (Snow/Ice)

The steering committee determined that the City's probability for winter storm is **high** (which is the same as the County's rating) and that their vulnerability to winter storm is **moderate** (which is the same as the County's rating). *The City did not assess the winter*

storm hazard in the previous version of their NHMP as a unique hazard (it was assessed as a component of the severe winter storm and windstorm hazard). The previous rating was applied to both windstorm and winter storm and the ratings were modified slightly to account for the differences in vulnerability and risk to the hazard.

Volume I, Section 3 describes the characteristics of winter storm hazards, history, as well as the location, extent and probability of a potential event within the region. Severe winter storms can consist of rain, freezing rain, ice, snow, cold temperatures and wind. They originate from troughs of low pressure offshore that ride along the jet stream during fall, winter and early spring months. Severe winter storms affecting the City typically originate in the Gulf of Alaska or in the central Pacific Ocean. These storms are most common from November through March.

Major winter storms can and have occurred in the Rogue River area and while they typically do not cause significant damage, they are frequent and have the potential to impact economic activity. Road and rail closures due to winter weather are an uncommon occurrence, but can interrupt commuter and commercial traffic. The City maintains roads with sanding equipment and County snow plows.

Please review Volume I, Section 3 for additional information on this hazard.

Volcano

The steering committee determined that the City's probability for a volcanic event is **low** (which is the same as the County's rating) and that their vulnerability to a volcanic event is **low** (which is the same as the County's rating). *These ratings did not change since the previous version of this NHMP addendum.*

Volume I, Section 3 describes the characteristics of volcanic hazards, history, as well as the location, extent and probability of a potential event within the region. Generally, an event that affects the County is likely to affect Rogue River as well. Rogue River is very unlikely to experience anything more than volcanic ash during a volcanic event.

Please review Volume I, Section 3 for additional information on this hazard.

Wildfire

The steering committee determined that the City's probability for wildfire is **high** (which is the same as the County's rating) and that their vulnerability to wildfire is **high** (which is higher than the County's rating). *The vulnerability rating increased since the previous version of this NHMP addendum.*

Volume I, Section 3 describes the characteristics of wildland fire hazards, history, as well as the location, extent and probability of a potential event within the region. There has been one large wildland event in Rogue River, the 2011 Tin Pan Peak Fire, a 300-acre fire that destroyed businesses as it approached Rogue River from the southeast. The location and extent of a wildland fire vary depending on fuel, topography and weather conditions. Weather and urbanization conditions are primarily at cause for the hazard level. Wildland fires in Rogue River City-limits are rare, however, recent wildfires have threatened subdivisions and mobile home parks on the edge of the City. Additional wildfires occurred circa 1990 (Mill Fire) and August 1992 (East Evans Creek Fire; FM-2083).

The potential community impacts and vulnerabilities described in Volume I, Section 3 are generally accurate for the City as well. The [Rogue Valley Integrated Community Wildfire Protection Plan](#) (RVIFP, updated 2017), assesses wildfire risk, maps wildland urban interface areas and includes actions to mitigate wildfire risk. The City is included in the RVIFP and will update the City's wildfire risk assessment if the fire plan presents better data during future updates (an action item is included within Volume I, Section 4 to participate in updates to the integrated fire plan and to continue to maintain and update their RVIFP). Rogue River is within an area of high wildfire prone urban landscape. Current wildfire mitigation activities include defensible space and fuels reduction projects. The City hereby incorporates the RVIFP into this addendum by reference to provide greater detail to sensitivity and exposure to the wildfire hazard.

Property can be damaged or destroyed with one fire as structures, vegetation and other flammables easily merge to become unpredictable and hard to manage. Other factors that affect ability to effectively respond to a wildfire include access to the location and to water, response time from the fire station, availability of personnel and equipment and weather (e.g., heat, low humidity, high winds and drought).

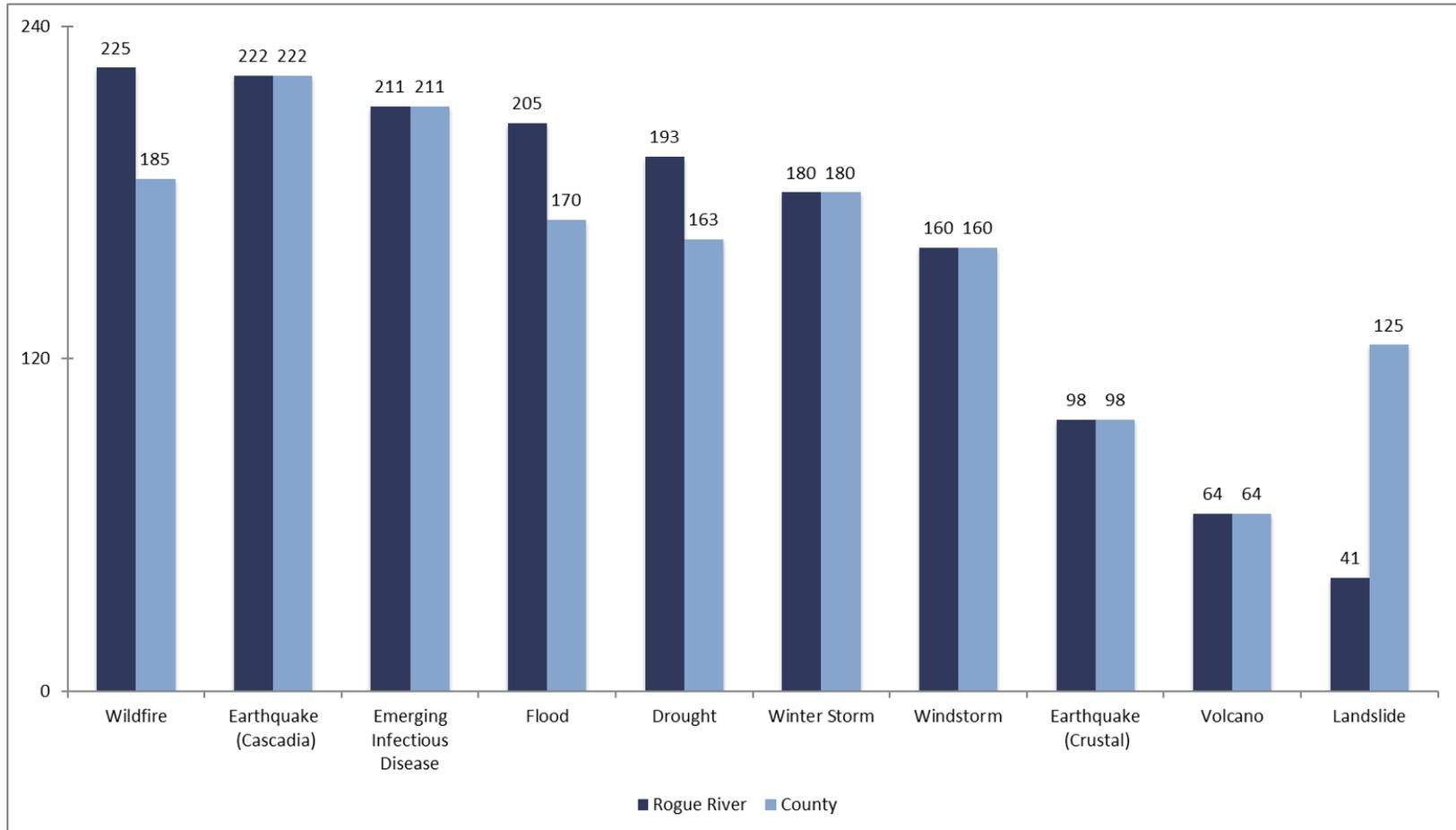
Please review Volume I, Section 3 for additional information on this hazard.

Summary

Figure RA-6 presents a summary of the hazard analysis for Rogue River and compares the results to the assessment completed by Jackson County. The top hazards for the City are wildfire, Cascadia Subduction Zone earthquake, emerging infectious disease and flood.

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Figure RA-6 Overall Hazard Analysis Comparison – Rogue River/Jackson County



Source: City of Rogue River NHMP Steering Committee and Jackson County NHMP Steering Committee, 2017.

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CITY OF SHADY COVE ADDENDUM

Purpose

This is an update of the Shady Cove addendum to the Jackson County Multi-Jurisdictional Natural Hazard Mitigation Plan (MNHMP, NHMP). This addendum supplements information contained in Volume I (Basic Plan) which serves as the NHMP foundation and Volume II (Appendices) which provide additional information. This addendum meets the following requirements:

- Multi-Jurisdictional **Plan Adoption** §201.6(c)(5),
- Multi-Jurisdictional **Participation** §201.6(a)(3),
- Multi-Jurisdictional **Mitigation Strategy** §201.6(c)(3)(iv) and
- Multi-Jurisdictional **Risk Assessment** §201.6(c)(2)(iii).

Updates to Shady Cove's addendum are further discussed throughout the NHMP and within Volume II, Appendix B, which provides an overview of alterations to the document that took place during the update process.

Mitigation Plan Mission

The NHMP mission states the purpose and defines the primary functions of the NHMP. It is intended to be adaptable to any future changes made to the NHMP and need not change unless the community's environment or priorities change.

The City concurs with the mission statement developed during the Jackson County planning process (Volume I, Section 4).

Protect life, property and the environment, reduce risk and prevent loss from natural hazard events through coordination and cooperation among public and private partners.

Mitigation Plan Goals

Mitigation plan goals are more specific statements of direction that Jackson County citizens and public and private partners can take while working to reduce the City's risk from natural hazards. These statements of direction form a bridge between the broad mission statement and particular action items. The goals listed here serve as checkpoints as agencies and organizations begin implementing mitigation action items.

The City concurs with the goals developed during the Jackson County planning process (Volume I, Section 4). All of the NHMP goals are important and are listed below in no particular order of priority. Establishing community priorities within action items neither negates nor eliminates any goals, but it establishes which action items to consider to implement first, should funding become available.

Below is a list of the NHMP goals:

GOAL 1: EMERGENCY SERVICES

Minimize life safety issues by promoting, strengthening and coordinating emergency response plans.

GOAL 2: EDUCATION AND OUTREACH

Further the public's awareness and understanding of natural hazards and potential risk, including economic vulnerability and mitigation efforts.

GOAL 3: PREVENTION

Reduce the threat of loss of life and property from natural hazards by incorporating information on known hazards and providing incentives to make hazard mitigation planning a priority in land use policies and decisions, including plan implementation.

GOAL 4: PROPERTY PROTECTION

Lessen impact from natural disasters on individual properties, businesses and public facilities by increasing awareness at the individual level and encouraging activities that can prevent damage and loss of life from natural hazards.

GOAL 5: PARTNERSHIP AND COORDINATION

Identify mitigation or risk reduction measures that address multiple areas (i.e., environment, transportation, telecommunications); Coordinate public/private sector participation in planning and implementing mitigation projects throughout the City; and seek funding and resource partnerships for future mitigation efforts.

GOAL 6: NATURAL RESOURCE PROTECTION

Preserve and rehabilitate natural systems to serve natural hazard mitigation functions (i.e., floodplains, wetlands, watershed and urban interface areas).

GOAL 7: STRUCTURAL PROTECTIONS

When applicable, utilize structural mitigation activities to minimize risks associated with natural hazards.

NHMP Process, Participation and Adoption

This section of the NHMP addendum addresses 44 CFR 201.6(c)(5), *Plan Adoption* and 44 CFR 201.6(a)(3), *Participation*. The first update of the Jackson County NHMP was approved by FEMA on February 4, 2013. To maintain compliance with the Disaster Mitigation Act of 2000 (DMA2K), the NHMP required an update by February 3, 2018. Shady Cove was included with an addendum in the 2012 Jackson County NHMP process.

The Oregon Partnership for Disaster Resilience (OPDR) at the University of Oregon's Community Service Center (CSC) partnered with the Oregon Military Department's Office of Emergency Management (OEM), Jackson County and Shady Cove to update their NHMP. This project is funded through the Federal Emergency Management Agency's (FEMA) FY15 Pre-Disaster Mitigation Competitive Grant Program (PDMC-PL-10-PR-2015-003). Members

of the Shady Cove NHMP update steering committee also participated in the County NHMP update process (Volume II, Appendix B).

By updating the NHMP, locally adopting it and having it re-approved by FEMA, Shady Cove will maintain eligibility for FEMA Hazard Mitigation, Pre-Disaster Mitigation and Flood Mitigation Assistance grant program funds.

The Jackson County NHMP and Shady Cove addendum, are the result of a collaborative effort between citizens, public agencies, non-profit organizations, the private sector and regional organizations. A project steering committee guided the process of developing the NHMP.

The Shady Cove City Administrator served as the designated convener of the NHMP update and will take the lead in implementing, maintaining and updating the addendum to the Jackson County NHMP in collaboration with the designated convener of the Jackson County NHMP (Emergency Manager).

Representatives from the City of Shady Cove steering committee met formally and informally, to discuss updates to their addendum (Volume II, Appendix B). The steering committee reviewed and revised the City's addendum, with particular focus on the NHMP's risk assessment and mitigation strategy (action items).

This addendum reflects decisions made at the designated meetings and during subsequent work and communication with Jackson County Emergency Management and the OPDR. The changes are highlighted with more detail throughout this document and within Volume II, Appendix B. Other documented changes include a revision of the City's risk assessment and hazard identification sections, NHMP mission and goals, action items and community profile.

The Shady Cove Steering Committee was comprised of the following representatives:

- Convener, Aaron Prunty, Administrator
- Dick Converse, Planning
- Dawn Edwards, Planning Commission
- Ed Mayer, Volunteer
- Paula Trudeau, Planning Commission
- Tom Sanderson, Mayor

Public participation was achieved with the establishment of the steering committee, which was comprised of City officials representing different departments and sectors and members of the public. The steering committee was closely involved throughout the development of the NHMP and served as the local oversight body for the NHMP's development. Community members were provided an opportunity for comment via the NHMP review process and through a survey administered by the OPDR and publicized by the participating jurisdictions (Volume II, Appendix B).

The Jackson County NHMP was approved by FEMA on [Month] [Day], 2018 and the Shady Cove addendum was adopted via resolution on [Month] [Day], 2018. This NHMP is effective through [Month] [Day], 2023.

NHMP Implementation and Maintenance

The City Council will be responsible for adopting the Shady Cove addendum to the Jackson County NHMP. This addendum designates a steering committee and a convener to oversee the development and implementation of action items. Because the City addendum is part of the County's multi-jurisdictional NHMP, the City will look for opportunities to partner with the County. The City's steering committee will convene after re-adoption of the Shady Cove NHMP addendum on an annual schedule. The County is meeting on a semi-annual basis and will provide opportunities for the cities to report on NHMP implementation and maintenance during their meetings. The city's Administrator will serve as the convener and will be responsible for assembling the steering committee. The steering committee will be responsible for:

- Reviewing existing action items to determine suitability of funding;
- Reviewing existing and new risk assessment data to identify issues that may not have been identified at NHMP creation;
- Educating and training new steering committee members on the NHMP and mitigation actions in general;
- Assisting in the development of funding proposals for priority action items;
- Discussing methods for continued public involvement; and
- Documenting successes and lessons learned during the year.

The convener will also remain active in the County's implementation and maintenance process (Volume I, Section 5).

The City will utilize the same action item prioritization process as the County (Volume I, Section 5 and Volume II, Appendix D).

Implementation through Existing Programs

Many of the Natural Hazard Mitigation Plan's recommendations are consistent with the goals and objectives of the City's existing plans and policies. Where possible, Shady Cove will implement the NHMP's recommended actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses and policy makers. Many land-use, comprehensive and strategic plans get updated regularly, allowing them to adapt to changing conditions and needs. Implementing the NHMP's action items through such plans and policies increases their likelihood of being supported and implemented.

Shady Cove has recently undergone an update to the City of Shady Cove Comprehensive Plan (2016). The City implements the plan through the Community Development Code. Shady Cove currently has the following plans that relate to natural hazard mitigation. For a complete list visit the City's [website](#):

- [Comprehensive Plan](#) (2016)
- [Municipal Code](#) (Flood Ordinance updated in 2017, [Riparian Ordinance](#), 2016)
- [Emergency Operations Plan](#) (2012)
- Stormwater Master Plan
- [Building Code, 2017 Oregon State Code](#) based on 2015 International Residential Code (IRC) and 2012 International Building Code

Continued Public Participation

Keeping the public informed of the City's efforts to reduce its risk to future natural hazard events is important for successful NHMP implementation and maintenance. The City is committed to involving the public in the NHMP review and updated process (Volume I, Section 5).

NHMP Maintenance

The Jackson County Multi-Jurisdictional Natural Hazard Mitigation Plan and City addendum will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. During the County NHMP update process, the City will also review and update its addendum (Volume I, Section 5). The convener will be responsible for convening the steering committee to address the questions outlined below.

- Are there new partners that should be brought to the table?
- Are there new local, regional, state or federal policies influencing natural hazards that should be addressed?
- Has the community successfully implemented any mitigation activities since the NHMP was last updated?
- Have new issues or problems related to hazards been identified in the community?
- Are the actions still appropriate given current resources?
- Have there been any changes in development patterns that could influence the effects of hazards?
- Have there been any significant changes in the community's demographics that could influence the effects of hazards?
- Are there new studies or data available that would enhance the risk assessment?
- Has the community been affected by any disasters? Did the NHMP accurately address the impacts of this event?

These questions will help the steering committee determine what components of the mitigation plan need updating. The steering committee will be responsible for updating any deficiencies found in the NHMP.

Mitigation Strategy

This section of the NHMP addendum addresses 44 CFR 201.6(c)(3)(iv), *Mitigation Strategy*.

The City's mitigation strategy (action items) were first developed during the 2012 NHMP planning process. During this process, the steering committee assessed the City's risk, identified potential issues and developed a mitigation strategy (action items).

During the 2017 update process the City re-evaluated their mitigation strategy (action items). During this process action items were updated, noting what accomplishments had been made and whether the actions were still relevant; any new action items were identified at this time (see Volume II, Appendix B for more information on changes to action items). Some actions were developed from the Upper Rogue Watershed Natural Hazard Risk Report ([DOGAMI, Open-File Report O-18-XX](#)) while additional action items were developed from a FEMA *Areas of Mitigation Interest and Development of Mitigation Strategies for Shady Cove and Eagle Point, OR* project (Wright, Stacy, 2016).

Priority Actions

The City is listing a set of high priority actions to focus attention on an achievable set of high leverage activities over the next five-years (Table SA-1). The City's priority actions are listed below in the following table.

Action Item Pool

Table SA-2 presents a "pool" of mitigation actions. This expanded list of actions is available for local consideration as resources, capacity, technical expertise and/or political will become available.

Most of these actions carry forward from prior versions of this NHMP (Jackson County and/or Shady Cove NHMPs).

Table SA-I Shady Cove Priority Action Items

Action Item ID	Mitigation Action Item	Timeline	Lead Organization	Partner Organization(s)	Potential Funding Source(s)
Priority Actions					
Flood (FL)					
FL #1	Ensure continued compliance in the National Flood Insurance Program (NFIP) through enforcement of local floodplain management ordinances.	Ongoing	City Floodplain Management	City Planning, FEMA, DLCD	Local Funding Resources, DLCD Technical Assistance Grant
Severe Weather (SW, Windstorm and Winter Storm)					
SW #1	Encourage critical facilities to secure emergency power.	Ongoing	City Emergency Management	City Hazard Mitigation Committee, Granting organizations, Upper Rogue Community Center	Local Funding Resources, FEMA (HMA)
Wildfire (WF)					
WF #1	Promote public awareness campaigns for individual property owners living in the Wildland / Urban Interface (WUI).	Ongoing	City Emergency Management	City Hazard Mitigation Committee, Fire Dist. #4, Firewise Project Coordinator, media, OEM, FEMA, DLCD, State Fire Marshal, ODF, BLM, USFS, insurance and real estate industries, Jackson County Sheriff Department.	Local Funding Resources, ODF, Firewise
WF #2 (New)	Partner with Jackson County on Implementation of Rogue Valley Integrated Community Wildfire Protection Plan and outreach projects	Ongoing	Planning	Public Works, Administration, Jackson County, Fire Dist. #4, BLM - Medford District, ODF, Office of State Fire Marshall	Fire and Rescue Districts, OEM, ODF

Source: City of Shady Cove NHMP Steering Committee, 2017.

Table SA-2 Shady Cove Action Item Pool

Action Item ID	Mitigation Action Item	Timeline	Lead Organization	Partner Organization(s)	Potential Funding Source(s)
Action Item Pool					
Multi-Hazard (MH)					
MH #1 (New)	Integrate the Mitigation Plan findings into planning and regulatory documents and programs including the Comprehensive Plan (particularly Goal 7).	Mid-Term (3-5 Years)	City Planning	RVCOG, DLCD, FEMA	Local Funding Resources, DLCD Technical Assistance Grant
MH #2 (New)	Enhance hazard resistant construction methods (wind, winter storm, landslide, etc.) where possible to reduce damage to utilities and critical facilities. In part, this may be accomplished by encouraging electric utility providers to convert existing overhead lines to underground lines.	Ongoing	City Planning, Public Works	Utility Companies	Local Funding Resources
Drought (DR)					
	No specific action item developed for this hazard. See multi-hazard actions for applicable mitigation strategies.				
Earthquake (EQ)					
EQ #1 (New)	Implement structural and non-structural retrofits to critical and essential facilities.	Long-Term (5+ Years)	City Administration	Building officials, Planning, Public Works	Local Funding Resources, FEMA (HMA), SRGP
Emerging Infectious Disease (EID)					
	No specific action item developed for this hazard. See multi-hazard actions for applicable mitigation strategies.				
Flood (FL)					
FL #2	Conduct workshops for target audiences on National Flood Insurance Programs, mitigation activities, and potential assistance from FEMAs Flood Mitigation Assistance and Hazard Mitigation Grant Programs. Include outreach regarding strapping to mobile home owners.	Short Term (0-2 Years)	Floodplain Management	City Planning, City Emergency Management, Upper Rogue Watershed Council , DLCD, OEM, FEMA	Local Funding Resources, FEMA (HMA), SRGP

Source: City of Shady Cove NHMP Steering Committee, 2017.

Table SA-2 Shady Cove Action Item Pool (continued)

Action Item ID	Mitigation Action Item	Timeline	Lead Organization	Partner Organization(s)	Potential Funding Source(s)
Action Item Pool					
FL #3	Encourage private property owners to restore natural systems within the floodplain, and to manage riparian areas and wetlands for flood abatement.	Ongoing	City Planning	Planning Commission, Floodplain Management, FEMA, County Emergency Management, Upper Rogue Watershed, DEQ, ODFW, DLCD, RVCOG, Rogue Fly Fishers, County Parks	Local Funding Resources, DLCD, OEM, FEMA, OPRD (Local Government Grant Program)
FL #4	Preserve water quality by using stormwater best management practices (BMP).	Long-Term (5+ Years)	City Planning	City Planning, City Public Works, City Floodplain Management, Rogue Valley Sewer Services, Upper Rogue Watershed Council, RVCOG	Local Funding Resources, DLCD, FEMA, ASFP, DEQ
FL #5 (New)	Identify current capabilities and research option to secure an early warning system (EWS) for dam failure or flood.	Mid-Term (3-5 Years)	City Emergency Management	County Emergency Management, OMD-OEM, DLCD, USACE, Silver Jackets	Local Funding Resources, PDM, FMA, HMGP, PA
FL #6 (New)	Create a dam failure evacuation plan for the City. Coordinate with Jackson County Emergency Management and the US Army Corps of Engineers to ensure that current inundation data is used during risk analysis and encourage collaboration and information sharing.	Short Term (0-2 Years)	City Emergency Management	County Emergency Management, USACE, Silver Jackets	Local Funding Resources, PDM, FMA, HMGP, PA, Silver Jackets
Landslide (LS)					
No specific action item developed for this hazard. See multi-hazard actions for applicable mitigation strategies.					

Source: City of Shady Cove NHMP Steering Committee, 2017.

Table SA-2 Shady Cove Action Item Pool (continued)

Action Item ID	Mitigation Action Item	Timeline	Lead Organization	Partner Organization(s)	Potential Funding Source(s)
Action Item Pool					
Severe Weather (SW, Windstorm and Winter Storm)					
SW #2	Develop and implement programs to keep trees from threatening lives, property, and public infrastructure during severe weather events.	Short Term (0-2 Years)	City Emergency Management	City Public Works, Utility providers, local Arborists and tree services	Local Funding Resources, HMA, Utilities
Volcano (VE)					
No specific action item developed for this hazard. See multi-hazard actions for applicable mitigation strategies.					
Wildfire (WF)					
WF #3	Reduce wildfire fuels / Promote and Enhance "Firewise Community" Program	Ongoing	City Emergency Management	City Hazard Mitigation Committee, Jackson County Fire Dist. #4, Firewise Project Coordinator, State Fire Marshal, ODF, BLM, US Forest Service	Local Funding Resources, ODF, Firewise
WF #4	Distribute public outreach materials informing residents about wildfire hazards and mitigation actions they can take to protect their property.	Short Term (0-2 Years)	City Emergency Management	City Hazard Mitigation Committee, Fire Dist. #4, Firewise, ODF, BLM, Forest Service	Local Funding Resources, ODF, Firewise
WF #5 (New)	Increase communication and coordination with the local Fire District to better prepare for hazard events. Consider establishing regular meetings or coordination intervals and share concerns and experiences in order to provide better response to local needs.	Short Term (0-2 Years)	City Administration	Fire Dist. #4	Local Funding Resources

Source: City of Shady Cove NHMP Steering Committee, 2017.

Risk Assessment

This section of the NHMP addendum addresses 44 CFR 201.6(b)(2) - Risk Assessment. In addition, this chapter can serve as the factual basis for addressing Oregon Statewide Planning Goal 7 – Areas Subject to Natural Hazards. Assessing natural hazard risk has three phases:

- **Phase 1:** Identify hazards that can impact the jurisdiction. This includes an evaluation of potential hazard impacts – type, location, extent, etc.
- **Phase 2:** Identify important community assets and system vulnerabilities. Example vulnerabilities include people, businesses, homes, roads, historic places and drinking water sources.
- **Phase 3:** Evaluate the extent to which the identified hazards overlap with or have an impact on, the important assets identified by the community.

The local level rationale for the identified mitigation strategies (action items) is presented herein and within Volume I, Sections 2 and 3. The risk assessment process is graphically depicted in Figure SA-1 below. Ultimately, the goal of hazard mitigation is to reduce the area of risk, where hazards overlap vulnerable systems.

Figure SA-1 Understanding Risk



Hazard Analysis

The Shady Cove steering committee developed their hazard vulnerability assessment (HVA), using their previous HVA and the County’s HVA (Volume II, Appendix C) as a reference. Changes from the County’s HVA were made where appropriate to reflect distinctions in vulnerability and risk from natural hazards unique to Shady Cove, which are discussed throughout this addendum.

Table SA-3 shows the HVA matrix for Shady Cove listing each hazard in order of rank from high to low. 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.

Two chronic hazards (wildfire and winter storm) and one catastrophic hazard (Cascadia Subduction Zone earthquake) rank as the top hazard threats to the City (Top Tier). Emerging infectious disease, flood and windstorm comprise the next highest ranked hazards (Middle Tier), while the landslide, drought, crustal earthquake and volcano hazards comprise the lowest ranked hazards (Bottom Tier).

Table SA-3 Hazard Analysis Matrix – Shady Cove

Hazard	Maximum				Total Threat Score	Hazard Rank	Hazard Tiers
	History	Vulnerability	Threat	Probability			
Wildfire	20	50	100	70	240	#1	Top Tier
Earthquake (Cascadia)	2	50	100	70	222	#2	
Winter Storm	20	50	80	70	220	#3	
Emerging Infectious Disease	12	50	100	49	211	#4	Middle Tier
Flood	20	40	80	70	210	#5	
Windstorm	20	40	70	70	200	#6	
Landslide	2	40	60	56	158	#7	Bottom Tier
Drought	10	40	30	63	143	#8	
Earthquake (Crustal)	2	25	50	21	98	#9	
Volcano	2	5	50	7	64	#10	

Source: Shady Cove NHMP Steering Committee, 2017.

Table SA-4 categorizes the probability and vulnerability scores from the hazard analysis for the City and compares the results to the assessment completed by the Jackson County NHMP Steering Committee (Volume II, Appendix C). Variations between the City and County are noted in **bold** text.

Table SA-4 Probability and Vulnerability Comparison

Hazard	Shady Cove		Jackson County	
	Probability	Vulnerability	Probability	Vulnerability
Drought	High	High	High	Moderate
Earthquake (Cascadia)	High	High	High	High
Earthquake (Crustal)	Low	Moderate	Low	Moderate
Emerging Infectious Disease	Moderate	High	Moderate	High
Flood	High	High	High	Moderate
Landslide	High	High	High	Low
Volcano	Low	Low	Low	Low
Wildfire	High	High	High	Moderate
Windstorm	High	High	High	Moderate
Winter Storm	High	High	High	Moderate

Source: Shady Cove NHMP Steering Committee, 2017.

Community Characteristics

Table SA-5 and the following section provides information on City specific demographics and assets. For additional information on the characteristics of Shady Cove, in terms of geography, environment, population, demographics, employment and economics, as well as housing and transportation see Volume I, Section 2. Many of these community characteristics can affect how natural hazards impact communities and how communities choose to plan for natural hazard mitigation. Considering the City specific assets during the planning process can assist in identifying appropriate measures for natural hazard mitigation. Between 2012 and 2016 the City grew by 120 people (4.1%) and median household income decreased by about 16% (Volume I, Section 2). New development has complied with the standards of the [Oregon Building Code](#) and the city's development code including their floodplain ordinance.

Transportation/Infrastructure

In the City of Shady Cove, transportation has played a major role in shaping the community. Shady Cove's commercial areas developed along primary routes and residential development followed nearby. By far, motor vehicles represent the dominant mode of travel through and within Shady Cove.

Today, mobility plays an important role in Shady Cove and the daily experience of its residents and businesses as they move from point A to point B. In addition, the City operates several recreational trails within City limits that provide alternative routes for pedestrians and bicyclists to connect between the City infrastructure and City parks such as Aunt Caroline's Park and Upper Rogue Regional County Park.¹ Shady Cove also supports the Shady Cove Airpark which serves as a small private airport for the community and surrounding cities.

Economy

A diverse range of businesses have chosen to locate in Shady Cove. Shady Cove's location on Highway 62 and its proximity to the Medford Airport give it market access that is more favorable than usual for a rural town. According to economic City data, Shady Cove finds their main economic drivers in the sectors of retail trade, agriculture, forestry, fishing and hunting and other services (except public administration).²

¹ http://www.shadycove.net/Comp_Plan_SecE_Recreation%20-%20for%20merge.pdf

² <http://www.City-data.com/City/shady-cove-Oregon.html>

Table SA-5 Community Characteristics

Population Characteristics		
2012 Population	2,920	
2016 Population	3,040	
2035 Forecasted Population*	4,343	
Race and Ethnic Categories		
White	97%	
Black/ African American	0%	
American Indian and Alaska Native	2%	
Asian	0%	
Native Hawaiian and Other Pacific Islander	1%	
Some Other Race	0%	
Two or More Races	0%	
Hispanic or Latino	9%	
Limited or No English Spoken	1%	
Vulnerable Age Groups		
Less than 15 Years	499	16%
65 Years and Over	824	27%
Disability Status		
Total Population	692	23%
Children	6	0%
Seniors	364	12%

Income Characteristics		
Households by Income Category		
Less than \$15,000	264	19%
\$15,000-\$29,999	276	20%
\$30,000-\$44,999	366	27%
\$45,000-\$59,999	105	8%
\$60,000-\$74,999	84	6%
\$75,000-\$99,999	132	10%
\$100,000-\$199,999	54	4%
\$200,000 or more	0	0%
Median Household Income	\$31,058	
Poverty Rates		
Total Population	692	23%
Children	92	19%
Seniors	93	12%
Housing Cost Burden		
Owners with Mortgage		66%
Renters		79%

Source: U.S. Census Bureau, 2011-2015 American Community Survey; Portland State University, Population Research Center.
 Note: * = Population forecast within UGB

For more information see Volume I, Section 2.

Housing Characteristics		
Housing Units		
Single-Family	751	50%
Multi-Family	145	10%
Mobile Homes	608	40%
Year Structure Built		
Pre-1970	250	17%
1970-1989	346	23%
1990 or later	908	60%
Housing Tenure and Vacancy		
Owner-occupied	1,013	74%
Renter-occupied	364	26%
Vacant	90	6%

Shady Cove is in Jackson County in southwestern Oregon. The City has grown steadily since its incorporation in 1972 and has an area today of 2 square miles. It is in the north central region of the county, located about 21 miles north of the City of Medford and about 13 miles south of the nearest border with Douglas County. The City and most of Jackson County are within the Rogue and Umpqua watersheds.

Shady Cove experiences a relatively mild climate with four distinct seasons that comes from its position on the west coast of North America and within the mountains of the region. The town is just off Highway 6 and about two miles south of the community of Trail and situated at the southern end of the Rogue Valley at approximately 1,400 feet above sea level. Crater Lake, a national recreational destination, is located about a 45-minute drive away. Because of its location Shady Cove has a climate somewhat intermediate to central California and northern Oregon. Shady Cove averages about 33 inches of rain per year due to being inland from the coast and in the rain shadow of the nearby mountains. While the surrounding mountains receive plentiful snow, Shady Cove itself sees less than four inches annually.

The City of Shady Cove includes a diversity of land uses but is zoned primarily residential.

Community Assets

This section outlines the resources, facilities and infrastructure that, if damaged, could significantly impact the public safety, economic conditions and environmental integrity of Shady Cove.

Critical Facilities

Facilities that are critical to government response and recovery activities (i.e. life, safety, property and environmental protection). These facilities include: 911 Centers, Emergency Operations Centers, Police and Fire Stations, Public Works facilities, sewer and water facilities, hospitals, bridges, roads, shelters and more. Facilities that, if damaged, could cause serious secondary impacts may also be considered “critical.” A hazardous material facility is one example of this type of critical facility.

Fire Stations:

- Jackson County Fire District #4

Law Enforcement:

- Jackson County Sheriff substation

City Buildings:

- Upper Rogue Community Center (Shelter)
- City Hall (EOC)

Private:

- Shady Cove Market
- Shady Cove Hardware
- Dollar Store
- Shady Cove Pharmacy

Essential Facilities

Facilities that are essential to the continued delivery of key government services and/or that may significantly impact the public’s ability to recover from the emergency. These facilities may include: City buildings such as the Public Services Building, the City Hall and other public facilities such as schools.

Hospitals/Immediate Medical Care Facilities:

- Shady Cove Clinic

Public Schools:

- Shady Cove Elementary/
Middle School

City/County/Other Buildings:

- Shady Cove Library (County)

Potential Shelter Sites:

- All schools
- Assembly of God
- Our Lady of Fatima Parish
- Shady Cove Church of Christ
- St. Martin’s Episcopal Church
- Dependence Church
- Trail Christian (in County)
- Jehovah’s Witness Hall

Infrastructure:

Infrastructure that provides services for the City include:

Transportation Networks:

- Highway 62
- Rogue River Dr
- Old Ferry Rd
- Indian Creek Rd
- Shady Cove Airfield
(Rogue Air Dr)

Water Facilities:

- 5 Wastewater Lift Stations
- about 1,000 private wells
- Waste Water Facility

Private Utilities:

- Pacific Power
- Communication Towers
- Avista
- Community Water Companies (about 15% of population served by private water)

Hazard Characteristics

Drought

The steering committee determined that the City's probability for drought is **high** (which is the same as the County's rating) and that their vulnerability to drought is **high** (which is higher than the County's rating). *These ratings did not change since the previous version of this NHMP addendum.*

Volume I, Section 3 describes the characteristics of drought hazards, history, as well as the location, extent and probability of a potential event. Due to the climate of Jackson County, past and present weather conditions have shown an increasing potential for drought.

Shady Cove draws its main water supply from the Rogue River and a series of private wells (there are about 1,000 private wells and about 15% of the population receive water from private water companies). For more information on the future of Shady Cove's water supply visit their [website](#).

Please review Volume I, Section 3 for additional information on this hazard.

Earthquake (Cascadia)

The steering committee determined that the City's probability for a Cascadia Subduction Zone (CSZ) earthquake is **high** (which is the same as the County's rating) and that their vulnerability to a CSZ earthquake is **high** (which is the same as the County's rating). *Previously, the earthquake hazard profile was a single risk assessment, which is now divided into two separate earthquake hazards: crustal earthquake and Cascadia Subduction Zone (CSZ) earthquake.*

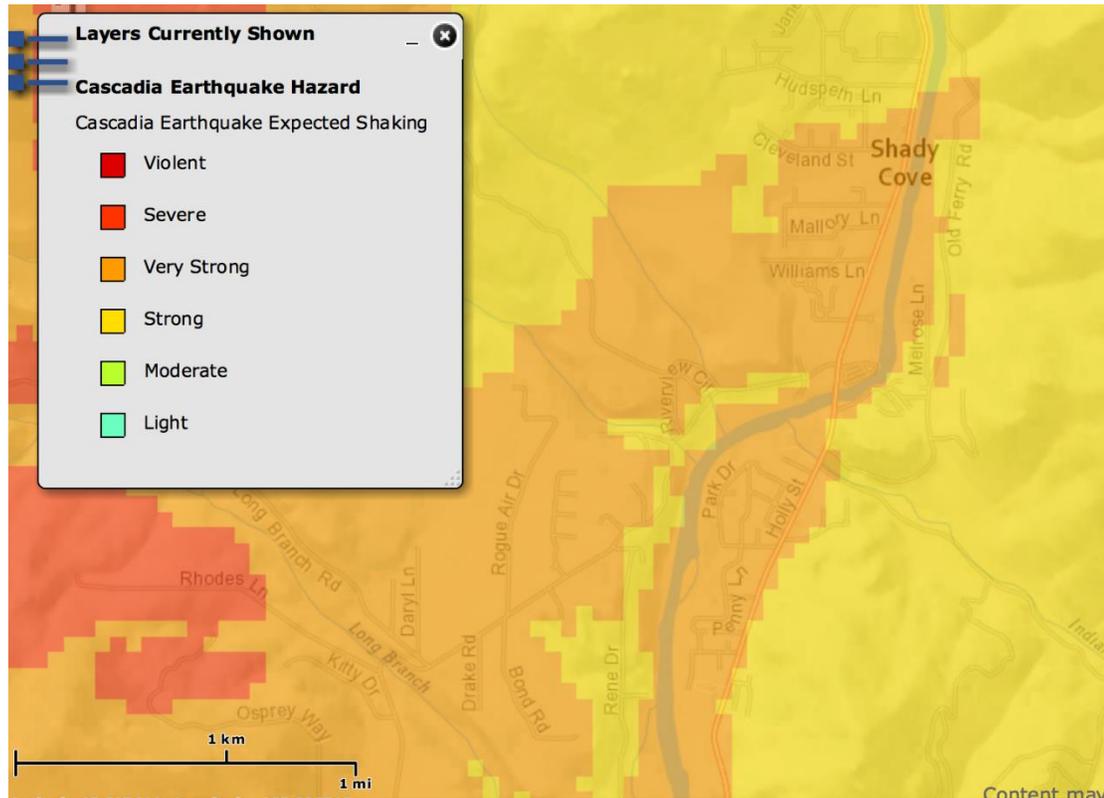
Volume I, Section 3 describes the characteristics of earthquake hazards, history, as well as the location, extent and probability of a potential event. Generally, an event that affects the County is likely to affect Shady Cove as well. The causes and characteristics of an earthquake event are appropriately described within Volume I, Section 3, as well as the location and extent of potential hazards. Previous occurrences are well-documented within Volume I, Section 3 and the community impacts described by the County would generally be the same for Shady Cove as well.

The local faults, the county's proximity to the Cascadia Subduction Zone, potential slope instability and the prevalence of certain soils subject to liquefaction and amplification combine to give the County a high-risk profile. Due to the expected pattern of damage resulting from a CSZ event, the Oregon Resilience Plan divides the State into four distinct zones and places Jackson County predominately within the "Valley Zone" (Valley Zone, from the summit of the Coast Range to the summit of the Cascades). Within the Southwest Oregon region, damage and shaking is expected to be strong and widespread - an event will be disruptive to daily life and commerce and the main priority is expected to be restoring services to business and residents.³ Figure SA-2 displays relative shaking hazards from a Cascadia Subduction Zone earthquake event. As shown in the figure below, the area of greatest concern within the City of Shady Cove (darker areas) is along the Rogue River

³ Ibid.

corridor, spreading to the northwest side of the river and up the northern slopes bordering the City.

Figure SA-2 Cascadia Subduction Zone



Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](#)

Note: To view detail click the link above to access Oregon HazVu.

As noted in the community profile, approximately 40% of residential buildings were built prior to 1990, which increases the City’s vulnerability to the earthquake hazard. Information on specific public buildings’ (schools and public safety) estimated seismic resistance, determined by DOGAMI in 2007, is shown in Table SA-6; each “X” represents one building within that ranking category. Of the facilities evaluated by DOGAMI using a Rapid Visual Survey (RVS), two (2) have a high (greater than 10% chance) collapse potential and one (1) has a low (less than 1% chance) collapse potential.

In addition to building damages, utility (electric power, water, wastewater, natural gas) and transportation systems (bridges, pipelines) are also likely to experience significant damage. There is a low probability that a major earthquake will result in failure of upstream dams.

Utility systems will be significantly damaged, including damaged buildings and damage to utility infrastructure, including water and wastewater treatment plants and equipment at high voltage substations (especially 230 kV or higher which are more vulnerable than lower voltage substations). Buried pipe systems will suffer extensive damage with approximately one break per mile in soft soil areas. There would be a much lower rate of pipe breaks in

other areas. Restoration of utility services will require substantial mutual aid from utilities outside of the affected area.⁴

Table SA-6 Rapid Visual Survey Scores

Facility	Site ID*	Level of Collapse Potential			
		Low (< 1%)	Moderate (>1%)	High (>10%)	Very High (100%)
Schools					
Shady Cove School (Eagle Point SD 9) (37 Schoolhouse Ln)	Jack_sch45	X		X	
Public Safety					
Jackson County Fire District #4 (21200 Crater Lake Hwy)	Jack_fir01			X	

Source: [DOGAMI 2007. Open File Report 0-07-02. Statewide Seismic Needs Assessment Using Rapid Visual Assessment.](#) “*” – Site ID is referenced on the [RVS Jackson County Map](#)

Natural Hazard Risk Report: Upper Rogue Watershed

The Oregon Department of Geology and Mineral Industries (DOGAMI) conducted a natural hazard risk assessment (Risk Report) for portions of Jackson County (Upper Rogue Watershed) including Shady Cove. The study was funded through the FEMA Risk MAP program and was completed in 2017. The Risk Report provides a quantitative risk assessment that informs communities of their risks related to certain natural hazards. The City hereby incorporates the Risk Report into this addendum by reference to provide greater detail to hazard sensitivity and exposure ([DOGAMI, Open-File Report O-18-XX](#)).

The **Risk Report** identifies that during a CSZ earthquake, approximately 392 buildings will be damaged (4 critical facilities; Jackson County Fire District No. 4, Shady Cove City Hall, Shady Cove Medical Center and Shady Cove School) for a total loss of \$9.1 million (a loss ratio of 5.9%). In addition, about 111 residents may be displaced (4% of the population).

Earthquake (Crustal)

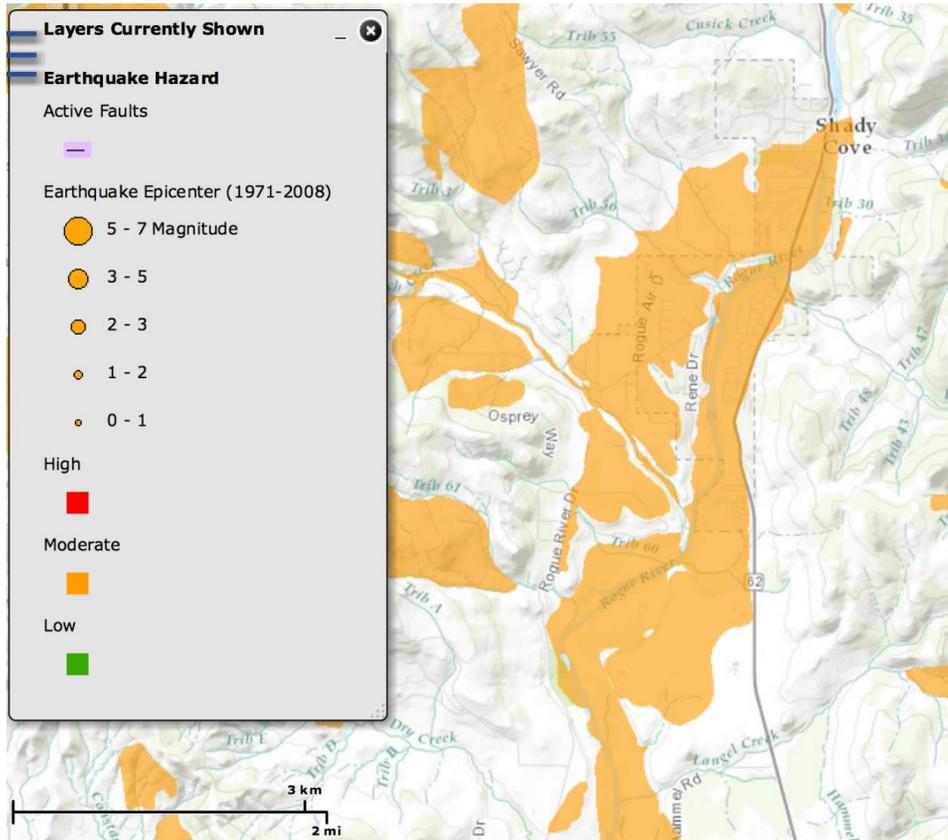
The steering committee determined that the City’s probability for a crustal earthquake is **low** (which is the same as the County’s rating) and that their vulnerability to crustal earthquake is **moderate** (which is the same as the County’s rating). *Previously, the earthquake hazard profile was a single risk assessment, which is now divided into two separate earthquake hazards: crustal earthquake and Cascadia Subduction Zone (CSZ) earthquake.*

Volume I, Section 3 describes the characteristics of earthquake hazards, history, as well as the location, extent and probability of a potential event. Generally, an event that affects the County is likely to affect Shady Cove as well. The causes and characteristics of an earthquake event are appropriately described within Volume I, Section 3, as well as the location and extent of potential hazards. Previous occurrences are well-documented within Volume I, Section 3 and the community impacts described by the County would generally be the same for Shady Cove as well.

⁴ Regional All Hazard Mitigation Master Plan for Jackson, Lane and Linn Counties: Phase II (2001)

Earthquake-induced damages are difficult to predict and depend on the size, type and location of the earthquake, as well as site-specific building and soil characteristics. Presently, it is not possible to accurately forecast the location or size of earthquakes, but it is possible to predict the behavior of soil at any site. In many major earthquakes, damages have primarily been caused by the behavior of the soil. Figure SA-3 displays relative liquefaction hazards, most of the City is within an area of moderate soft soils (liquefaction hazard; orange areas).

Figure SA-3 Active Faults and Soft Soils



Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](https://www.oregon.gov/DOGAMI/Statewide-Geohazards-Viewer)

Note: To view detail click the link above to access Oregon HazVu.

Please review Volume I, Section 3 for additional information on this hazard.

Emerging Infectious Disease

The steering committee determined that the City's probability for Emerging Infectious Disease is **moderate** (which is the same as the County's rating) and that their vulnerability is **high** (which is the same as the County's rating). *The City did not assess the Emerging Infectious Disease hazard in the previous version of their NHMP.*

Emerging infectious diseases are those that have recently appeared in a population or those whose incidence or geographic range is rapidly increasing or threatens to increase. Emerging infections may be caused by biological pathogens (e.g., virus, parasite, fungus or bacterium) and may be: previously unknown or undetected biological pathogens, biological pathogens that have spread to new geographic areas or populations, previously known biological pathogens whose role in specific diseases was previously undetected and biological pathogens whose incidence of disease was previously declining but whose incidence of disease has reappeared (re-emerging infectious disease).⁵

Volume I, Section 3 describes the characteristics of emerging infectious disease, history, as well as the location, extent and probability of a potential event within the region. Generally, an event that affects the County is likely to affect the City as well.

Please review Volume I, Section 3 for additional information on this hazard.

Flood

The steering committee determined that the City's probability for flood is **high** (which is the same as the County's rating) and that their vulnerability to flood is **high** (which higher than the County's rating). *The probability ratings stayed the same and the vulnerability rating increased, since the previous version of this NHMP addendum.*

Volume I, Section 3 describes the characteristics of flood hazards, history, as well as the location, extent and probability of a potential event. Portions of Shady Cove have areas of flood plains (special flood hazard areas, SFHA). These include areas along the Rogue River and Indian Creek (Figure SA-4). Furthermore, other portions of Shady Cove, outside of the mapped floodplains, are also subject to flooding from local storm water drainage.

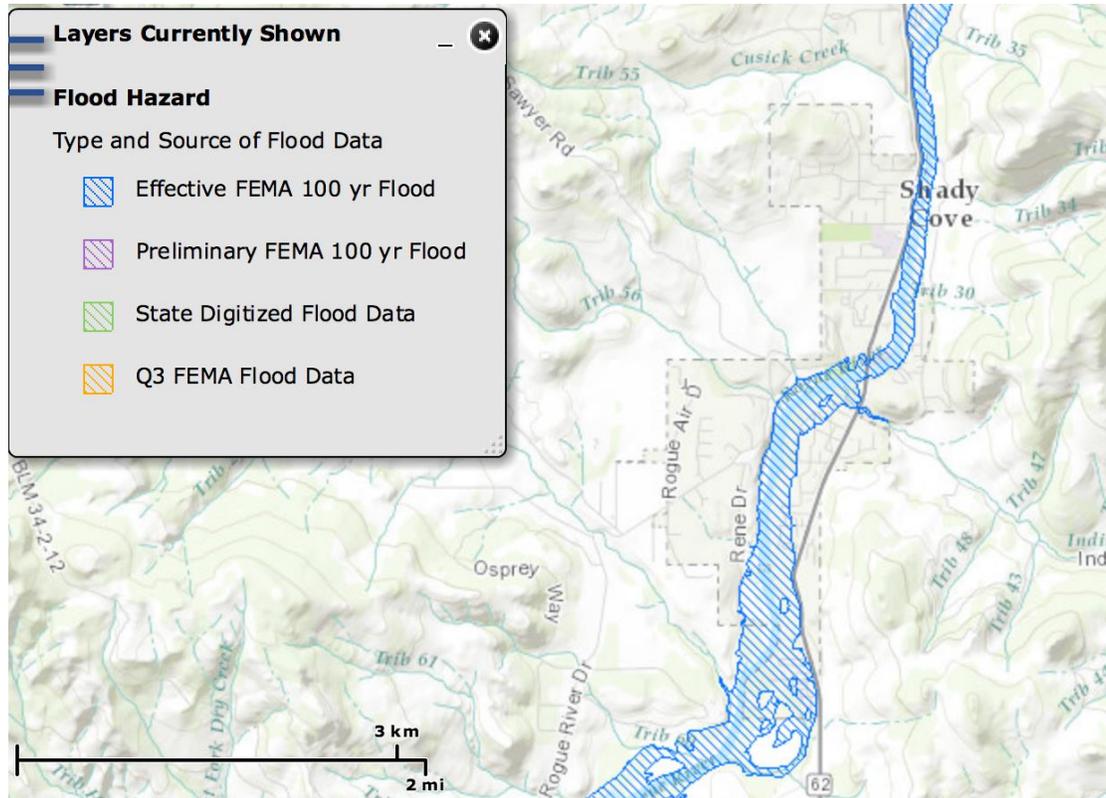
The City is at risk from two types of flooding: riverine and urban. Riverine flooding occurs when streams overflow their banks and inundate low-lying areas. This is a natural process that adds sediment and nutrients to fertile floodplain areas. It usually results from prolonged periods of precipitation over a wide geographic area. Low velocity sheets of water generally flood most areas that are prone to flooding. Urban flooding occurs as land is converted to impervious surfaces and hydrologic systems are changed. Precipitation is collected and transmitted to streams at a much faster rate, causing floodwaters that rise rapidly and peak with violent force. During urban flooding, storm drains can back up and cause localized flooding of streets and basements.

The Rogue River is the chief source of flooding events in Shady Cove. Shady Cove is also at risk from flooding from failure of the Lost Creek Dam (also known as the William L. Jess

⁵ Baylor College of Medicine, *Emerging Infectious Disease*, URL: <https://www.bcm.edu/departments/molecular-virology-and-microbiology/emerging-infections-and-biodefense/emerging-infectious-diseases>, accessed September 17, 2017.

Dam). The dam is owned and operated since 1977 by the US Army Corps of Engineers (USACE) and is classified as a high hazard potential dam (Volume I, Section 2). A worst-case scenario failure has the potential to have flows nearly 100 feet above normal river level within one hour of failure.⁶ These flooding events and subsequent damages are commonly caused by the Indian Creek and Long Branch Creek.

Figure SA-4 Special Flood Hazard Area



Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](#)

Note: To view detail click the link above to access Oregon HazVu.

Floods can have a devastating impact on almost every aspect of the community, including private property damage, public infrastructure damage and economic loss from business interruption. It is important for the City to be aware of flooding impacts and assess its level of risk. The City has been proactive in mitigating flood hazards by purchasing floodplain property.

The economic losses due to business closures often total more than the initial property losses that result from flood events. Flood events significantly impact business owners and their employees. Direct damages from flooding are the most common impacts, but indirect damages, such as diminished clientele, can be just as debilitating to a business. During the December 1964 flood event the State Highway 62 bridge was lost during the flood causing a

⁶ Wright, Stacy, Identification of Areas of Mitigation Interest (AoMI) and Development of Mitigation Strategies for Shady Cove and Eagle Point, OR. 2016.

hardship to the local lumber industry by interrupting transportation between lumber mills and the Rogue Valley (Medford)⁷.

The FEMA Flood Insurance Study (January 19, 2018) has a brief history of flooding in Jackson County and Shady Cove (Volume I, Section 3). No critical or essential facilities are in the floodplain. There is a central bridge located inside the floodplain (Highway 62 bridge, lost during the 1964 flood; however, the Lost Creek Dam was built after the 1964 flood, and now mitigates risk to this bridge).

Highway 62 is a major transportation route between Medford, Ashland and smaller cities to the north of Jackson County. If major flooding affected all the bridges in Shady Cove, traffic flow in and out of the City would be significantly affected, but would not cut off all routes. The amount of property in the flood plain is not a large area (a portion of approximately 273 tax lots) but damage could be significant as it would affect residential, commercial and public property. Floodwaters can affect building foundations, seep into basements or cause damage to the interior, exterior and contents of buildings, dependent upon the velocity and depth of the water and by the presence of floating debris. The City sewer system can overflow during flood events and cause further property damage.

Natural Hazard Risk Report: Upper Rogue Watershed

The **Risk Report** ([DOGAMI, Open-File Report O-18-XX](#)) identifies that during a “1% Annual Chance” Flood event (100-Year Flood) approximately 42 buildings will be damaged (0 critical facilities) for a total loss of \$240,000 (a loss ratio of less than 1%). In addition, about 245 residents may be displaced (about 8% of the population).

For mitigation planning purposes, it is important to recognize that flood risk for a community is not limited only to areas of mapped floodplains. Other portions of Shady Cove outside of the mapped floodplains may also be at relatively high risk from over bank flooding from streams too small to be mapped by FEMA or from local storm water drainage.

National Flood Insurance Program (NFIP)

FEMA updated the Flood Insurance Study (FIS) and Flood Insurance Rate Maps (FIRMs) in 2018 (effective January 19, 2018). Table SA-7 shows that as of June 2016, Shady Cove has 115 National Flood Insurance Program (NFIP) policies in force. Of those, 22 are for properties that were constructed before the initial FIRM. The last Community Assistance Visit (CAV) for Shady Cove was on May 18, 2001. Shady Cove does not participate in the Community Rating System (CRS). The table shows that the majority of flood insurance policies are for residential structures, primarily single-family homes. There has been a total of five (5) paid claims for \$41,847. The City complies with the NFIP through enforcement of their flood damage prevention ordinance and their floodplain management program.

⁷ Ibid.

The Community Repetitive Loss record for Shady Cove identifies one (1) Repetitive Loss Property⁸ (a single-family residence) and zero (0) Severe Repetitive Loss Properties⁹. For details on the repetitive loss properties see Volume I, Section 3.

Table SA-7 Flood Insurance Detail

Jurisdiction	Effective FIRM and FIS	Initial FIRM Date	Total Policies	Pre-FIRM Policies	Policies by Building Type				Minus Rated A Zone
					Single Family	2 to 4 Family	Other Residential	Non-Residential	
Jackson County	-	-	1,828	809	1,568	44	91	125	126
Shady Cove	1/19/2018	9/30/1980	115	22	104	0	0	11	16

Jurisdiction	Insurance in Force	Total Paid Claims	Pre-FIRM Claims Paid	Substantial Damage Claims	Total Paid Amount	Repetitive Loss Structures	Severe Repetitive Loss Properties	CRS Class Rating	Last Community Assistance Visit
Jackson County	\$ 442,723,400	197	132	10	\$ 2,337,660	8	0	-	-
Shady Cove	\$ 28,628,300	5	2	0	\$ 41,847	1	0		5/18/2001

Source: Information compiled by Department of Land Conservation and Development, July 2016.

Please review Volume I, Section 3 for additional information on this hazard.

Landslide

The steering committee determined that the City’s probability for landslide is **high** (which is the same as the County’s rating) and that their vulnerability to landslide is **high** (which is higher than the County’s rating). *These ratings have both increased since the previous version of this NHMP addendum.*

Volume I, Section 3 describes the characteristics of landslide hazards, history, as well as the location, extent and probability of a potential event within the region. The potential for landslide in Shady Cove is almost negligible with the possible exception of very small areas immediately adjacent to stream channels. However, such areas have little or no development or infrastructure. The City is concerned about roads that are subsiding along Highway 62 south of the City.

Landslide susceptibility exposure for Shady Cove is shown in Figure SA-5. Most of Shady Cove demonstrates a low to moderate susceptibility to landslide exposure, with corridors of high susceptibility. Approximately 13% of Shady Cove has high and approximately 34% moderate, landslide susceptibility exposure.¹⁰

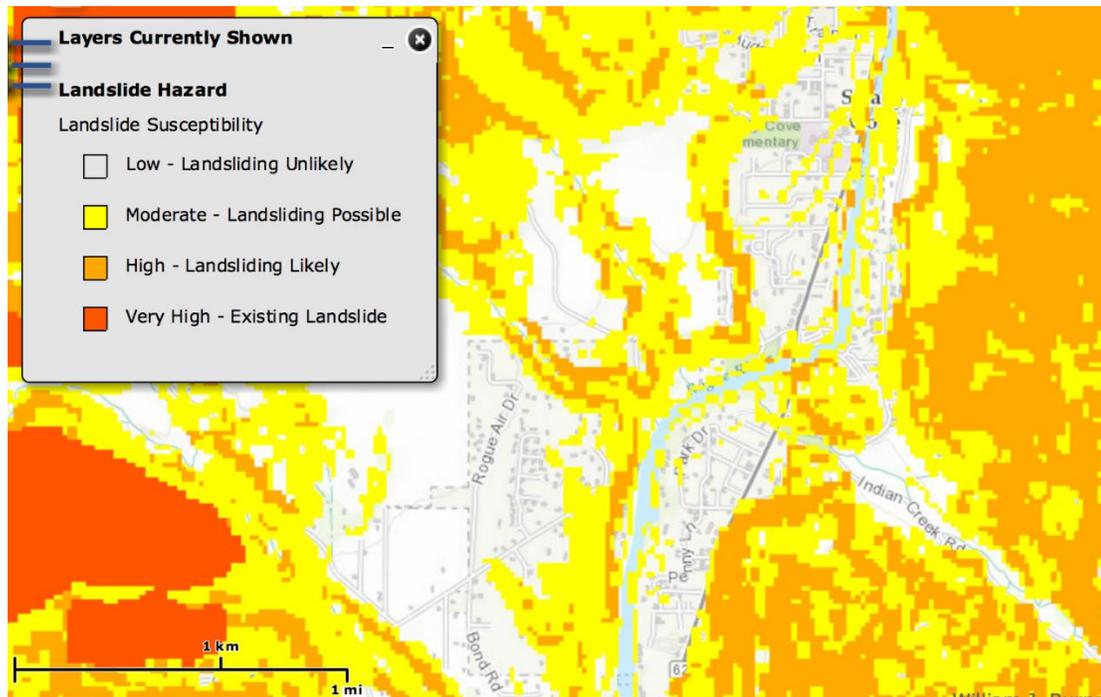
⁸ A Repetitive Loss (RL) property is any insurable building for which two or more claims of more than \$1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978. A RL property may or may not be currently insured by the NFIP.

⁹ A Severe Repetitive Loss (SRL) property is a single family property (consisting of 1 to 4 residences) that is covered under flood insurance by the NFIP and has incurred flood-related damage for which 4 or more separate claims payments have been paid under flood insurance coverage, with the amount of each claim payment exceeding \$5,000 and with cumulative amount of such claims payments exceeding \$20,000; or for which at least 2 separate claims payments have been made with the cumulative amount of such claims exceeding the reported value of the property.

¹⁰ DOGAMI Open-File Report, O-16-02, Landslide Susceptibility Overview Map of Oregon (2016)

Note that even if a jurisdiction has a high percentage of area in a high or very high landslide exposure susceptibility zone, this does not mean there is a high risk, because risk is the intersection of hazard and assets.

Figure SA-5 Landslide Susceptibility Exposure



Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](#)

Note: To view detail click the link above to access Oregon HazVu.

Natural Hazard Risk Report: Upper Rogue Watershed

The **Risk Report** ([DOGAMI, Open-File Report O-18-XX](#)) identifies that there are 124 buildings (0 critical facilities) exposed to High or Very High landslide susceptibility for a total potential loss of \$15.5 million (a loss ratio of just over 10%). In addition, about 242 residents may be displaced (about 8% of the population).

Potential landslide-related impacts are adequately described within Volume I, Section 3 and include infrastructural damages, economic impacts (due to isolation and/or arterial road closures), property damages and obstruction to evacuation routes. Rain-induced landslides and debris flows can potentially occur during any winter in Jackson County and thoroughfares beyond City limits are susceptible to obstruction as well.

The most common type of landslides in Jackson County are slides caused by erosion. Slides move in contact with the underlying surface, are generally slow moving and can be deep. Rainfall-initiated landslides tend to be smaller; while earthquake induced landslides may be quite large. All soil types can be affected by natural landslide triggering conditions.

Please review Volume I, Section 3 for additional information on this hazard.

Severe Weather

Severe weather in can account for a variety of intense and potentially damaging weather events. These events include windstorms and winter storms. The following section describes the unique probability and vulnerability of each identified weather hazard. Other more abrupt or irregular events such as hail are also described in this section.

Windstorm

The steering committee determined that the City's probability for windstorm is **high** (which is the same as the County's rating) and that their vulnerability to windstorm is **high** (which is higher than the County's rating). *The City did not assess the windstorm hazard in the previous version of their NHMP as a unique hazard (it was assessed as a component of the severe winter storm and windstorm hazard). The previous rating was applied to both windstorm and winter storm and the ratings were modified slightly to account for the differences in vulnerability and risk to the hazard.*

Volume I, Section 3 describes the characteristics of windstorm hazards, history, as well as the location, extent and probability of a potential event within the region. Because windstorms typically occur during winter months, they are sometimes accompanied by ice, freezing rain, flooding and very rarely, snow. Other severe weather events that may accompany windstorms, including thunderstorms, hail, lightning strikes and tornadoes are generally negligible for Shady Cove.

Volume I, Section 3 describes the impacts caused by windstorms, including power outages, downed trees, heavy precipitation, building damages and storm-related debris. Additionally, transportation and economic disruptions result as well.

Damage from high winds generally has resulted in downed utility lines and trees. Electrical power can be out anywhere from a few hours to several days. Outdoor signs have also suffered damage. If the high winds are accompanied by rain (which they often are), blowing leaves and debris clog drainage-ways, which in turn causes localized urban flooding.

Please review Volume I, Section 3 for additional information on this hazard.

Winter Storm (Snow/Ice)

The steering committee determined that the City's probability for winter storm is **high** (which is the same as the County's rating) and that their vulnerability to winter storm is **high** (which is higher than the County's rating). *The City did not assess the winter storm hazard in the previous version of their NHMP as a unique hazard (it was assessed as a component of the severe winter storm and windstorm hazard). The previous rating was applied to both windstorm and winter storm and the ratings were modified slightly to account for the differences in vulnerability and risk to the hazard.*

Volume I, Section 3 describes the characteristics of winter storm hazards, history, as well as the location, extent and probability of a potential event within the region. Severe winter storms can consist of rain, freezing rain, ice, snow, cold temperatures and wind. They originate from troughs of low pressure offshore that ride along the jet stream during fall, winter and early spring months. Severe winter storms affecting the City typically originate in the Gulf of Alaska or in the central Pacific Ocean. These storms are most common from November through March.

Major winter storms can and have occurred in the Shady Cove area, and while they typically do not cause significant damage, they are frequent and have the potential to impact economic activity. Road closures due to winter weather are an uncommon occurrence, but can interrupt commuter and commercial traffic.

Please review Volume I, Section 3 for additional information on this hazard.

Volcano

The steering committee determined that the City's probability for a volcanic event is **low** (which is the same as the County's rating) and that their vulnerability to a volcanic event is **low** (which is the same as the County's rating). *These ratings did not change since the previous version of this NHMP addendum.*

Volume I, Section 3 describes the characteristics of volcanic hazards, history, as well as the location, extent and probability of a potential event within the region. Generally, an event that affects the County is likely to affect Shady Cove as well. Shady Cove is very unlikely to experience anything more than volcanic ash during a volcanic event.

Please review Volume I, Section 3 for additional information on this hazard.

Wildfire

The steering committee determined that the City's probability for wildfire is **high** (which is the same as the County's rating) and that their vulnerability to wildfire is **high** (which is higher than the County's rating). *These ratings did not change since the previous version of this NHMP addendum.*

Volume I, Section 3 describes the characteristics of wildfire hazards, history, as well as the location, extent and probability of a potential event within the region. The location and extent of a wildfire vary depending on fuel, topography and weather conditions. Weather and urbanization conditions are primarily at cause for the hazard level. Wildfires in Shady Cove are relatively common. Recent wildfires that approached the City include Cleveland Ridge (2016) and a fire in 2015 that approached Rogue River Drive.

The potential community impacts and vulnerabilities described in Volume I, Section 3 are generally accurate for the City as well. The [Rogue Valley Integrated Community Wildfire Protection Plan](#) (RVIFP, updated 2017), assesses wildfire risk, maps wildland urban interface areas and includes actions to mitigate wildfire risk. The City is included in the RVIFP and will update the City's wildfire risk assessment if the fire plan presents better data during future updates (an action item is included within Volume I, Section 4 to participate in updates to the integrated fire plan and to continue to maintain and update their RVIFP). Shady Cove is within an area of considerable wildfire prone urban landscape. The City hereby incorporates the RVIFP into this addendum by reference to provide greater detail to sensitivity and exposure to the wildfire hazard.

Property can be damaged or destroyed with one fire as structures, vegetation and other flammables easily merge to become unpredictable and hard to manage. Other factors that affect ability to effectively respond to a wildfire include access to the location and to water, response time from the fire station, availability of personnel and equipment and weather (e.g., heat, low humidity, high winds and drought).

Natural Hazard Risk Report: Upper Rogue Watershed

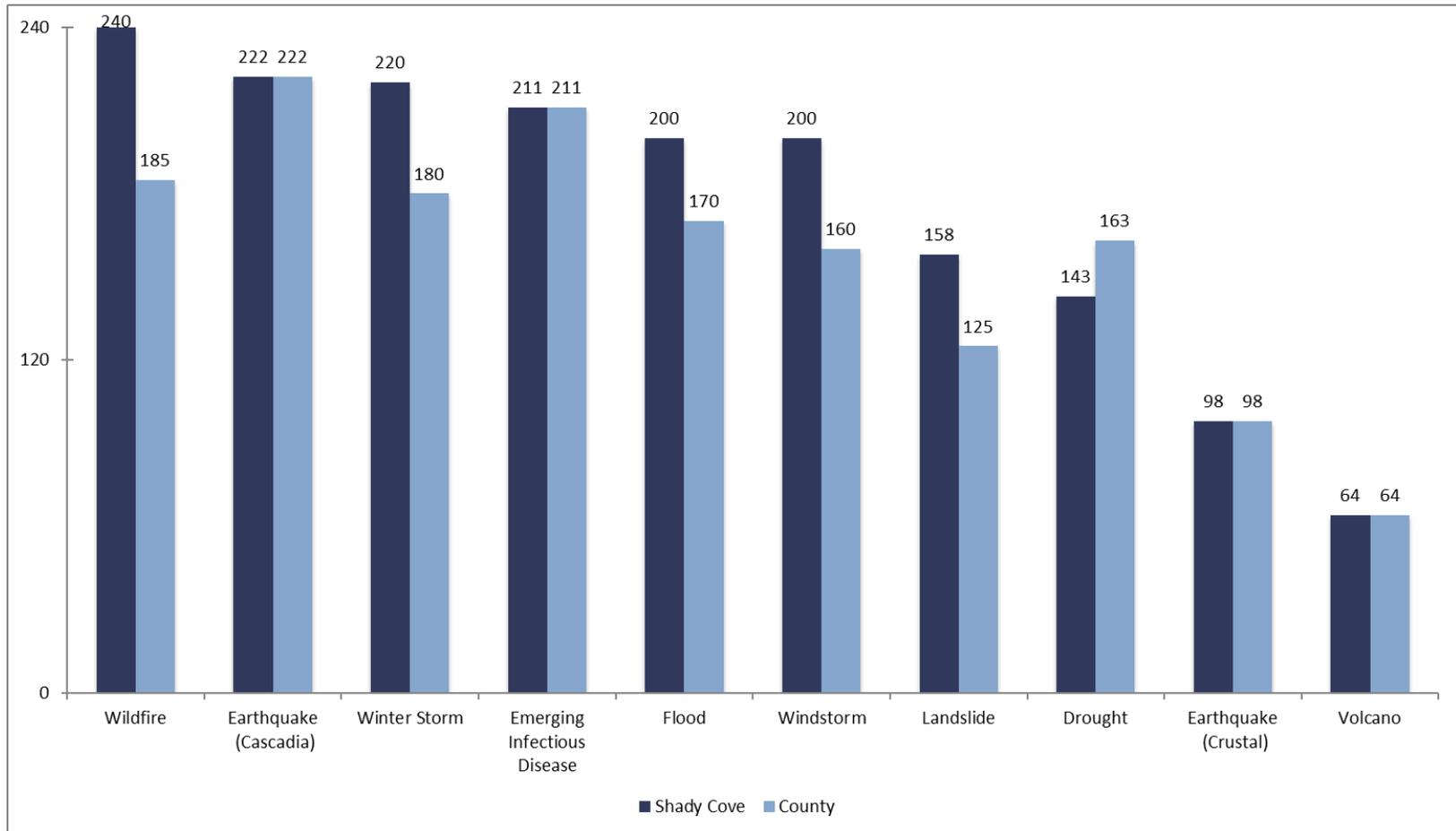
The **Risk Report** ([DOGAMI, Open-File Report O-18-XX](#)) identifies that there are 391 buildings (2 critical facilities; Jackson County Fire District No. 4 and Shady Cove School) exposed to high wildfire risk for a total potential loss of \$30.7 million (a loss ratio of 20%). In addition, about 700 residents may be displaced (24% of the population).

Please review Volume I, Section 3 for additional information on this hazard.

Summary

Figure SA-6 presents a summary of the hazard analysis for Shady Cove and compares the results to the assessment completed by Jackson County. The top hazards for the City are wildfire, Cascadia Subduction Zone earthquake, winter storm, emerging infectious disease and flood.

Figure SA-6 Overall Hazard Analysis Comparison – Shady Cove/Jackson County



Source: City of Shady Cove NHMP Steering Committee and Jackson County NHMP Steering Committee, 2017.

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Purpose

Talent's addendum to the Jackson County Multi-Jurisdictional Natural Hazard Mitigation Plan (MNHMP, NHMP) was completed in 2017. This addendum supplements information contained in Volume I (Basic Plan) which serves as the NHMP foundation and Volume II (Appendices) which provide additional information. This addendum meets the following requirements:

- Multi-Jurisdictional **Plan Adoption** §201.6(c)(5),
- Multi-Jurisdictional **Participation** §201.6(a)(3),
- Multi-Jurisdictional **Mitigation Strategy** §201.6(c)(3)(iv) and
- Multi-Jurisdictional **Risk Assessment** §201.6(c)(2)(iii).

Mitigation Plan Mission

The NHMP mission states the purpose and defines the primary functions of the NHMP. It is intended to be adaptable to any future changes made to the NHMP and need not change unless the community's environment or priorities change.

The City concurs with the mission statement developed during the Jackson County planning process (Volume I, Section 4):

Protect life, property and the environment, reduce risk and prevent loss from natural hazard events through coordination and cooperation among public and private partners.

Mitigation Plan Goals

Mitigation plan goals are more specific statements of direction that Jackson County citizens and public and private partners can take while working to reduce the City's risk from natural hazards. These statements of direction form a bridge between the broad mission statement and particular action items. The goals listed here serve as checkpoints as agencies and organizations begin implementing mitigation action items.

The City concurs with the goals developed during the Jackson County planning process (Volume I, Section 4). All of the NHMP goals are important and are listed below in no particular order of priority. Establishing community priorities within action items neither negates nor eliminates any goals, but it establishes which action items to consider to implement first, should funding become available.

Below is a list of the NHMP goals:

GOAL 1: EMERGENCY SERVICES

Minimize life safety issues by promoting, strengthening and coordinating emergency response plans.

GOAL 2: EDUCATION AND OUTREACH

Further the public's awareness and understanding of natural hazards and potential risk, including economic vulnerability and mitigation efforts.

GOAL 3: PREVENTION

Reduce the threat of loss of life and property from natural hazards by incorporating information on known hazards and providing incentives to make hazard mitigation planning a priority in land use policies and decisions, including plan implementation.

GOAL 4: PROPERTY PROTECTION

Lessen impact from natural disasters on individual properties, businesses and public facilities by increasing awareness at the individual level and encouraging activities that can prevent damage and loss of life from natural hazards.

GOAL 5: PARTNERSHIP AND COORDINATION

Identify mitigation or risk reduction measures that address multiple areas (i.e., environment, transportation, telecommunications); Coordinate public/private sector participation in planning and implementing mitigation projects throughout the City; and seek funding and resource partnerships for future mitigation efforts.

GOAL 6: NATURAL RESOURCE PROTECTION

Preserve and rehabilitate natural systems to serve natural hazard mitigation functions (i.e., floodplains, wetlands, watershed and urban interface areas).

GOAL 7: STRUCTURAL PROTECTIONS

When applicable, utilize structural mitigation activities to minimize risks associated with natural hazards.

NHMP Process, Participation and Adoption

This section of the NHMP addendum addresses 44 CFR 201.6(c)(5), *Plan Adoption* and 44 CFR 201.6(a)(3), *Participation*. The first update of the Jackson County NHMP was approved by FEMA on February 4, 2013. To maintain compliance with the Disaster Mitigation Act of 2000 (DMA2K), the NHMP required an update by February 3, 2018. The Talent addendum was added with the 2017 update of the Jackson County MNHMP. *Note: Following the 1997 flood events, Talent created a natural hazard mitigation plan that was not approved by FEMA, but was created to deal with damage that occurred due to riverbank erosion (undercutting).*

The Oregon Partnership for Disaster Resilience (OPDR) at the University of Oregon's Community Service Center (CSC) partnered with the Oregon Military Department's Office of

Emergency Management (OEM), Jackson County and Talent to update their NHMP. This project is funded through the Federal Emergency Management Agency's (FEMA) FY15 Pre-Disaster Mitigation Competitive Grant Program (PDMC-PL-10-PR-2015-003). Members of the Talent NHMP steering committee also participated in the County NHMP update process (Volume II, Appendix B).

By creating a NHMP, locally adopting it and having it approved by FEMA, Talent will gain eligibility for FEMA Hazard Mitigation, Pre-Disaster Mitigation and Flood Mitigation Assistance grant program funds.

The Jackson County NHMP and Talent addendum, are the result of a collaborative effort between citizens, public agencies, non-profit organizations, the private sector and regional organizations. A project steering committee guided the process of developing the NHMP.

The Talent Police Chief/Emergency Manager served as the designated convener of the NHMP update and will take the lead in implementing, maintaining and updating the addendum to the Jackson County NHMP in collaboration with the designated convener of the Jackson County NHMP (Emergency Manager).

Representatives from the City of Talent steering committee met formally and informally, to discuss updates to their addendum (Volume II, Appendix B). The steering committee reviewed and revised the City's addendum, with particular focus on the NHMP's risk assessment and mitigation strategy (action items).

This addendum reflects decisions made at the designated meetings and during subsequent work and communication with Jackson County Emergency Management and the OPDR.

The Talent Steering Committee was comprised of the following representatives:

- Convener, Curtis Whipple, Police Chief/Emergency Manager
- Zac Moody, Planner
- Jennifer Snook, Police Department
- Brett Marshall
- Vince Lockett
- Charles Hanley
- Joi Riley
- Kittie Harrison
- Chance Metcalf

Public participation was achieved with the establishment of the steering committee, which was comprised of City officials representing different departments and sectors and members of the public. The steering committee was closely involved throughout the development of the NHMP and served as the local oversight body for the NHMP's development. Community members were provided an opportunity for comment via the NHMP review process and through a survey administered by the OPDR and publicized by the participating jurisdictions (Volume II, Appendix B).

The Jackson County NHMP was approved by FEMA on [Month] [Day], 2018 and the Talent addendum was adopted via resolution on [Month] [Day], 2018. This NHMP is effective through [Month] [Day], 2023.

NHMP Implementation and Maintenance

The City Council will be responsible for adopting the Talent addendum to the Jackson County NHMP. This addendum designates a steering committee and a convener to oversee the development and implementation of action items. Because the City addendum is part of the County's multi-jurisdictional NHMP, the City will look for opportunities to partner with the County. The City's steering committee will convene after re-adoption of the Talent NHMP addendum on an annual schedule. The County is meeting on a semi-annual basis and will provide opportunities for the cities to report on NHMP implementation and maintenance during their meetings. The Police Chief/Emergency Manager will serve as the convener and will be responsible for assembling the steering committee. The steering committee will be responsible for:

- Reviewing existing action items to determine suitability of funding;
- Reviewing existing and new risk assessment data to identify issues that may not have been identified at NHMP creation;
- Educating and training new steering committee members on the NHMP and mitigation actions in general;
- Assisting in the development of funding proposals for priority action items;
- Discussing methods for continued public involvement; and
- Documenting successes and lessons learned during the year.

The convener will also remain active in the County's implementation and maintenance process (Volume I, Section 5).

The City will utilize the same action item prioritization process as the County (Volume I, Section 5 and Volume II, Appendix D).

Implementation through Existing Programs

Many of the Natural Hazard Mitigation Plan's recommendations are consistent with the goals and objectives of the City's existing plans and policies. Where possible, Talent will implement the NHMP's recommended actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses and policy makers. Many land-use, comprehensive and strategic plans get updated regularly, allowing them to adapt to changing conditions and needs. Implementing the NHMP's action items through such plans and policies increases their likelihood of being supported and implemented.

Talent's acknowledged comprehensive plan is the City of Talent Comprehensive Plan. The City implements the plan through the Community Development Code. The last update of the flood ordinance was in 2011.

Talent currently has the following plans that relate to natural hazard mitigation. For a complete list visit the City's [website](#).

- [Comprehensive Plan](#) (currently being amended)
- [Community Development Code](#)
- [Capital Improvements Plan \(2008-2013\)](#)
- [Emergency Operations Plan \(2012\)](#)

- [Transportation System Plan](#) (2015)
- [Stormwater Master Plan](#) (1999)
- Water System Master Plan (2004)
- [Regional Problem Solving \(RPS\) Plan](#) (2012)
- [Building Code, 2017 Oregon State Code](#) based on 2015 International Residential Code (IRC) and 2012 International Building Code

Continued Public Participation

Keeping the public informed of the City's efforts to reduce its risk to future natural hazards events is important for successful NHMP implementation and maintenance. The City is committed to involving the public in the NHMP review and updated process (Volume I, Section 5).

NHMP Maintenance

The Jackson County Multi-Jurisdictional Natural Hazard Mitigation Plan and City addendum will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. During the County NHMP update process, the City will also review and update its addendum (Volume I, Section 5). The convener will be responsible for convening the steering committee to address the questions outlined below.

- Are there new partners that should be brought to the table?
- Are there new local, regional, state or federal policies influencing natural hazards that should be addressed?
- Has the community successfully implemented any mitigation activities since the NHMP was last updated?
- Have new issues or problems related to hazards been identified in the community?
- Are the actions still appropriate given current resources?
- Have there been any changes in development patterns that could influence the effects of hazards?
- Have there been any significant changes in the community's demographics that could influence the effects of hazards?
- Are there new studies or data available that would enhance the risk assessment?
- Has the community been affected by any disasters? Did the NHMP accurately address the impacts of this event?

These questions will help the steering committee determine what components of the mitigation plan need updating. The steering committee will be responsible for updating any deficiencies found in the NHMP.

Mitigation Strategy

This section of the NHMP addendum addresses 44 CFR 201.6(c)(3(iv), *Mitigation Strategy*.

The City's mitigation strategy (action items) were developed during the 2017 NHMP planning process. The steering committee assessed the City's risk, identified potential issues and developed a mitigation strategy (action items). The City developed actions specific to their community after first reviewing a list of recommended actions developed by the County or recommended by OPDR.

Priority Actions

The City is listing a set of high priority actions in an effort to focus attention on an achievable set of high leverage activities over the next five-years (Table TA-1). The City's priority actions are listed below in the following table.

Action Item Pool

Table TA-2 presents a "pool" of mitigation actions. This expanded list of actions is available for local consideration as resources, capacity, technical expertise and/or political will become available.

Table TA-I Talent Priority Action Items

Action Item ID	Mitigation Action Item	Timeline	Lead Organization	Partner Organization(s)	Potential Funding Source(s)
Priority Actions					
Multi-Hazard (MH)					
MH #1	Pursue funding to replace existing water tank.	Short-Term (0-2 Years)	Public Works	Planning, City Administration	General Fund, FEMA (PDM, HMGP)
MH #2	Pursue funding for enhancement of city resources including emergency water supply system, critical infrastructure retrofitting, and emergency generators both traditional and solar.	Long Term (5+ Years)	Public Works	Planning, City Administration	General Fund, FEMA (PDM, HMGP), SRGP
MH #3	Identify and pursue funding and personnel to enhance communication efforts including radio equipment, HAM radio operation/ equipment, and community warning system.	Long Term (5+ Years)	Emergency Manager	Planning, Public Works, City Administration	General Fund
MH #4	Develop and enhance current education programs aimed at mitigating natural hazards. Programs should focus on evacuations, disaster awareness, simulated training with partner agencies, and identifying vulnerable populations.	Short-Term (0-2 Years)	Emergency Manager	Planning, Public Works, Fire District 5, Red Cross, County Emergency Management, RVCOG	General Fund
MH #5	Develop emergency fuel supply plan including supplying, management, rationing and identifying essential needs.	Short-Term (0-2 Years)	Emergency Manager	Planning, Public Works	General Fund
Flood (FL)					
FL #1	Review the City of Talent Flood Plan to ensure corrective and preventative measures for reducing flooding and flood damage are current.	Mid-Term (3-5 Years)	City Planning	Public Works	General Fund, DLCD Technical Assistance Grant

Source: City of Talent NHMP Steering Committee, 2017.

Table TA-2 Talent Action Item Pool

Action Item ID	Mitigation Action Item	Timeline	Lead Organization	Partner Organization(s)	Potential Funding Source(s)
Action Item Pool					
Multi-Hazard (MH)					
MH #6	Integrate the Mitigation Plan findings into planning and regulatory documents and programs including the Comprehensive Plan (particularly Goal 7).	Mid-Term (3-5 Years)	City Planning	RVCOG, DLCD, FEMA	General Fund, DLCD Technical Assistance Grant
MH #7	Use hazard information as a basis for ordinances and regulations that govern site-specific land use decisions.	Long-Term (5+ Years)	City Planning	County GIS, FEMA, DLCD	General Fund
Drought (DR)					
	No specific action item developed for this hazard. See multi-hazard actions for applicable mitigation strategies.				
Earthquake (EQ)					
EQ #1	Promote building safety through nonstructural improvements and public education.	Ongoing	City Emergency Management Agencies	Building officials, American Red Cross, DOGAMI, OEM	General Fund, SRGP
EQ #2	Implement structural and non-structural retrofits to critical and essential facilities.	Long-Term (5+ Years)	City Administration	Building officials, Planning, Public Works	General Fund, SRGP, PDM
Emerging Infectious Disease (EID)					
	No specific action item developed for this hazard. See multi-hazard actions for applicable mitigation strategies.				
Flood (FL)					
FL #2	Encourage private property owners to restore natural systems within the floodplain, and to manage riparian areas and wetlands for flood abatement.	Long-Term	City Planning	RVCOG, FEMA, Watershed Councils, neighboring cities	General Fund

Source: City of Talent NHMP Steering Committee, 2017.

Table TA-2 Talent Action Item Pool (continued)

Action Item ID	Mitigation Action Item	Timeline	Lead Organization	Partner Organization(s)	Potential Funding Source(s)
Action Item Pool					
Landslide (LS)					
LS #1	Investigate the development and implementation of a city landslide ordinance.	Long-Term	City Planning	DLCD	General Fund, DLCD Technical Assistance Grant
Severe Weather (SW, Windstorm and Winter Storm)					
SW #1	Map areas where extreme weather, such as road icing and wind damage occurs.	Short-Term	City Public Works	County Roads	General Fund
SW #2	Promote the benefits of tree-trimming and tree replacement programs and help to coordinate local efforts by public and private agencies.	Ongoing	City Vegetation Management	Utility companies, ODOT, Public Works, USFS, BLM, ODF, Fire	General Fund
Volcano (VE)					
	No specific action item developed for this hazard. See multi-hazard actions for applicable mitigation strategies.				
Wildfire (WF)					
WF #1	Coordinate fire mitigation action items through the Rogue Valley Integrated Community Wildfire Protection Plan	Ongoing	Emergency Manager	Jackson County Emergency Management	Fire Districts, ODF

Source: City of Talent NHMP Steering Committee, 2017.

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Risk Assessment

This section of the NHMP addendum addresses 44 CFR 201.6(b)(2) - Risk Assessment. In addition, this chapter can serve as the factual basis for addressing Oregon Statewide Planning Goal 7 – Areas Subject to Natural Hazards. Assessing natural hazard risk has three phases:

- **Phase 1:** Identify hazards that can impact the jurisdiction. This includes an evaluation of potential hazard impacts – type, location, extent, etc.
- **Phase 2:** Identify important community assets and system vulnerabilities. Example vulnerabilities include people, businesses, homes, roads, historic places and drinking water sources.
- **Phase 3:** Evaluate the extent to which the identified hazards overlap with or have an impact on, the important assets identified by the community.

The local level rationale for the identified mitigation strategies (action items) is presented herein and within Volume I, Sections 2 and 3. The risk assessment process is graphically depicted in Figure TA-1 below. Ultimately, the goal of hazard mitigation is to reduce the area of risk, where hazards overlap vulnerable systems.

Figure TA-1 Understanding Risk



Hazard Analysis

The Talent steering committee developed their hazard vulnerability assessment (HVA), using the County’s HVA (Volume II, Appendix C) as a reference. Changes from the County’s HVA were made where appropriate to reflect distinctions in vulnerability and risk from natural hazards unique to Talent, which are discussed throughout this addendum.

Table TA-3 shows the HVA matrix for Talent listing each hazard in order of rank from high to low. 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.

One catastrophic hazard (Cascadia Subduction Zone earthquake) and two chronic hazards (emerging infectious disease and winter storm) rank as the top hazard threats to the City (Top Tier). The wildfire, flood, windstorm, drought and landslide hazards comprise the next highest ranked hazards (Middle Tier), while the crustal earthquake and volcano hazards comprise the lowest ranked hazards (Bottom Tier).

Table TA-3 Hazard Analysis Matrix – Talent

Hazard	Maximum				Total Threat Score	Hazard Rank	Hazard Tiers
	History	Vulnerability	Threat	Probability			
Earthquake (Cascadia)	2	50	100	70	222	#1	Top Tier
Emerging Infectious Disease	12	50	100	49	211	#2	
Winter Storm	20	30	60	70	180	#3	
Wildfire	16	15	60	70	161	#4	Middle Tier
Flood	20	20	50	70	160	#5	
Windstorm	20	20	50	70	160	#5	
Drought	20	25	50	63	158	#7	
Landslide	14	20	40	70	144	#8	
Earthquake (Crustal)	2	25	50	21	98	#9	Bottom Tier
Volcano	2	5	50	7	64	#10	

Source: Talent NHMP Steering Committee, 2017.

Table TA-4 categorizes the probability and vulnerability scores from the hazard analysis for the City and compares the results to the assessment completed by the Jackson County NHMP Steering Committee (Volume II, Appendix C). Variations between the City and County are noted in **bold** text.

Table TA-4 Probability and Vulnerability Comparison

Hazard	Talent		Jackson County	
	Probability	Vulnerability	Probability	Vulnerability
Drought	High	Moderate	High	Moderate
Earthquake (Cascadia)	High	High	High	High
Earthquake (Crustal)	Low	Moderate	Low	Moderate
Emerging Infectious Disease	Moderate	High	Moderate	High
Flood	High	Moderate	High	Moderate
Landslide	High	Moderate	High	Low
Volcano	Low	Low	Low	Low
Wildfire	High	Low	High	Moderate
Windstorm	High	Moderate	High	Moderate
Winter Storm	High	Moderate	High	Moderate

Source: Talent NHMP Steering Committee, 2017.

Community Characteristics

Table TA-5 and the following section provides information on City specific demographics and assets. For additional information on the characteristics of Talent, in terms of geography, environment, population, demographics, employment and economics, as well as housing and transportation see Volume I, Section 2. Many of these community characteristics can affect how natural hazards impact communities and how communities choose to plan for natural hazard mitigation. Considering the City specific assets during the planning process can assist in identifying appropriate measures for natural hazard mitigation. Between 2012 and 2016 the City grew by 190 people (3.1%) and median household income increased by about 7% (Volume I, Section 2). New development has complied with the standards of the [Oregon Building Code](#) and the city's development code including their floodplain ordinance.

Transportation/Infrastructure

In the City of Talent, transportation has played a major role in shaping the community. Talent's commercial areas developed along primary routes and residential development followed nearby.

Today, mobility plays an important role in Talent and the daily experience of its residents and businesses as they move from point A to point B. The current railroad system is serviced through the Union Pacific Railroad system and the Central Oregon and Pacific Railroad (CORP) route. This complements the established Rogue Valley Transportation District (RVTD) and the transit stop located within Talent. In addition, the City is located along the Bear Creek Greenway multi-use trail that provides alternative routes for pedestrians and bicyclists.¹

By far, motor vehicles represent the dominant mode of travel through and within Talent.

Economy

A diverse range of businesses have chosen to locate in Talent. Traditionally, Talent has built its economy on a favorable climate and attractive landscape. Talent's location near Interstate 5, Highway 99, and the Southern Pacific Railroad shaped the development of the City. The majority of commercial development occurs along Highway 99 and along the corridor to Interstate 5. According to the economic profile of the City's Comprehensive Plan, Talent finds their main economic drivers in the sectors of government services, professional offices, minor retail and personal services.² Some light industry exists currently, but manufacturing is limited.

¹ Website: Jackson County Greenway, <http://jacksoncountyor.org/parks/Greenway/Bear-Creek-Greenway-Map>

² City of Talent Comprehensive Plan (2016)

Table TA-5 Community Characteristics

Population Characteristics		
2012 Population	6,115	
2016 Population	6,305	
2035 Forecasted Population*	9,020	
Race and Ethnic Categories		
White		90%
Black/ African American		1%
American Indian and Alaska Native		1%
Asian		1%
Native Hawaiian and Other Pacific Islander		0%
Some Other Race		<1%
Two or More Races		6%
Hispanic or Latino		9%
Limited or No English Spoken		6%
Vulnerable Age Groups		
Less than 15 Years	1,227	20%
65 Years and Over	1,098	18%
Disability Status		
Total Population	1,143	18%
Children	20	0%
Seniors	639	10%

Income Characteristics		
Households by Income Category		
Less than \$15,000	567	21%
\$15,000-\$29,999	604	22%
\$30,000-\$44,999	470	17%
\$45,000-\$59,999	360	13%
\$60,000-\$74,999	194	7%
\$75,000-\$99,999	205	8%
\$100,000-\$199,999	273	10%
\$200,000 or more	32	1%
Median Household Income (2015)		\$36,528
Poverty Rates		
Total Population	1,283	21%
Children	425	31%
Seniors	103	9%
Housing Cost Burden		
Owners with Mortgage		53%
Renters		47%

Source: U.S. Census Bureau, 2011-2015 American Community Survey; Portland State University, Population Research Center.

Note: * = Population forecast within UGB

Housing Characteristics		
Housing Units		
Single-Family	1,833	65%
Multi-Family	535	19%
Mobile Homes	475	17%
Year Structure Built		
Pre-1970	561	20%
1970-1989	769	27%
1990 or later	1,513	53%
Housing Tenure and Vacancy		
Owner-occupied	1,546	57%
Renter-occupied	1,159	43%
Vacant	95	3%

Talent is in Jackson County in southwestern Oregon. The City has grown since its incorporation in 1910 (population 250) and has an area today of 1.3 square miles. It is located in the south-central region of the county, located about 25 miles northwest of the California border and about 5 miles southeast of the City of Medford. The City and most of Jackson County are within the Rogue and Umpqua watersheds.

Talent experiences a relatively mild climate with four distinct seasons that comes from its position on the west coast of North America and within the mountains of the region. The city is just off of Interstate 5 at the southern end of the Rogue Valley at approximately 1,635 feet above sea level. As a result of its location Talent has a climate somewhat intermediate to central California and northern Oregon. Talent averages only 18 inches of rain per year due to being inland from the coast and in the rain shadow of the nearby mountains. While the surrounding mountains receive plentiful snow, Talent itself sees around 6 inches annually.

The City of Talent includes a diversity of land uses but is zoned primarily residential.

For more information see Volume I, 2.

Community Assets

This section outlines the resources, facilities and infrastructure that, if damaged, could significantly impact the public safety, economic conditions and environmental integrity of Talent.

Critical Facilities

Facilities that are critical to government response and recovery activities (i.e. life, safety, property and environmental protection). These facilities include: 911 Centers, Emergency Operations Centers, Police and Fire Stations, Public Works facilities, sewer and water facilities, hospitals, bridges, roads, shelters and more. Facilities that, if damaged, could cause serious secondary impacts may also be considered “critical.” A hazardous material facility is one example of this type of critical facility.

Fire Stations:

- Fire District #5 (Outside City)

Law Enforcement:

- Talent Police Department

City Buildings:

- Community Center
- City Hall
- Public Works
(Water delivery center)
- Talent Town Hall

Essential Facilities

Facilities that are essential to the continued delivery of key government services and/or that may significantly impact the public’s ability to recover from the emergency. These facilities may include: City buildings such as the Public Services Building, the City Hall and other public facilities such as schools.

Hospitals/Immediate Medical Care Facilities:

- Asante Physician Partners

Public Schools:

- Talent Elementary
- Talent Middle

Potential Shelter Sites:

- All Talent Schools
- Town Hall
- Brammo

Infrastructure:

Infrastructure that provides services for the City includes:

Transportation Networks:

- Highway 99
- Interstate 5
- Talent Avenue
- Main Street

Special Service Districts:

- Southern Oregon Education Service District
- Talent Irrigation District
- Fire District #5
- Phoenix/ Talent School District
- Medford Water Commission
- Ashland Water

Private Utilities:

- Pacific Power
- Avista
- Charter/Dish/Direct TV
- Rogue Valley Sewer (stormwater)
- Recology Ashland
- Century Link

Hazard Characteristics

Drought

The steering committee determined that the City's probability for drought is **high** (which is the same as the County's rating) and that their vulnerability to drought is **moderate** (which is the same as the County's rating).

Volume I, Section 3 describes the characteristics of drought hazards, history, as well as the location, extent and probability of a potential event. Due to the climate of Jackson County, past and present weather conditions have shown an increasing potential for drought.

The City receives its main water supply from Big Butte Springs through the Medford Water Commission, supplemented by the Rogue River in the summer months. The City operates two water treatment plants and has a water distribution system that reaches approximately 1,400 households and 100 businesses.³ For more information on the future of Talent's water supply visit their [website](#).

Please review Volume I, Section 3 for additional information on this hazard.

Earthquake (Cascadia)

The steering committee determined that the City's probability for a Cascadia Subduction Zone (CSZ) earthquake is **high** (which is the same as the County's rating) and that their vulnerability to a CSZ earthquake is **high** (which is the same as the County's rating).

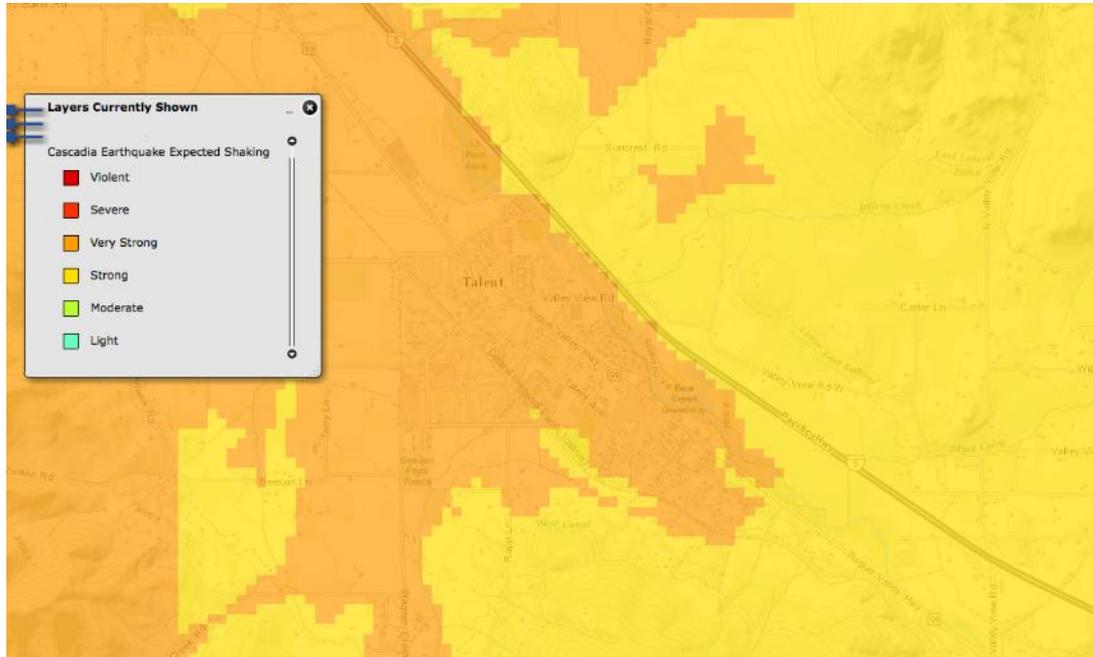
Volume I, Section 3 describes the characteristics of earthquake hazards, history, as well as the location, extent and probability of a potential event. Generally, an event that affects the County is likely to affect Talent as well. The causes and characteristics of an earthquake event are appropriately described within Volume I, Section 3, as well as the location and extent of potential hazards. Previous occurrences are well documented within Volume I, Section 3 and the community impacts described by the County would generally be the same for Talent as well.

The local faults, the county's proximity to the Cascadia Subduction Zone, potential slope instability and the prevalence of certain soils subject to liquefaction and amplification combine to give the County a high-risk profile. Due to the expected pattern of damage resulting from a CSZ event, the Oregon Resilience Plan divides the State into four distinct zones and places Jackson County predominately within the "Valley Zone" (Valley Zone, from the summit of the Coast Range to the summit of the Cascades). Within the Southwest Oregon region, damage and shaking is expected to be strong and widespread - an event will be disruptive to daily life and commerce and the main priority is expected to be restoring services to business and residents.⁴ Figure TA-2 displays relative shaking hazards from a Cascadia Subduction Zone earthquake event. As shown in the figure below, the majority of the City is expected to experience very strong shaking in a CSZ event.

³ City of Talent Comprehensive Plan (2016)

⁴ Ibid.

Figure TA-2 Cascadia Subduction Zone



Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](#)

Note: To view detail click the link above to access Oregon HazVu.

As noted in the community profile, approximately 47% of residential buildings were built prior to 1990, which increases the City’s vulnerability to the earthquake hazard. Information on specific public buildings’ (schools and public safety) estimated seismic resistance, determined by DOGAMI in 2007, is shown in Table TA-6; each “X” represents one building within that ranking category. Of the facilities evaluated by DOGAMI using their Rapid Visual Survey (RVS), none have a very high (100% chance) collapse potential, however, three (3) have a high (greater than 10% chance) collapse potential.

Table TA-6 Rapid Visual Survey Scores

Facility	Site ID*	Level of Collapse Potential			
		Low (< 1%)	Moderate (>1%)	High (>10%)	Very High (100%)
Schools					
Talent Elementary School (Phoenix-Talent SD 4) (307 W Wagner St)	Jack_sch47	X,X,X	X,X	X	
Talent Middle School (Phoenix-Talent SD 4) (102 Christian Ave)	Jack_sch01	X		X,X	
Public Safety					
Talent Police Department (604 Talent Ave)	Jack_pol05	X			
Jackson County Fire District #5 (Not in City) (716 S Pacific Hwy)	Jack_fir15	X			

Source: [DOGAMI 2007. Open File Report 0-07-02. Statewide Seismic Needs Assessment Using Rapid Visual Assessment.](#) “*” – Site ID is referenced on the [RVS Jackson County Map](#)

In addition to building damages, utility (electric power, water, wastewater, natural gas) and transportation systems (bridges, pipelines) are also likely to experience significant damage.

Utility systems will be significantly damaged, including damaged buildings and damage to utility infrastructure, including water treatment plants and equipment at high voltage substations (especially 230 kV or higher which are more vulnerable than lower voltage substations). Buried pipe systems will suffer extensive damage with approximately one break per mile in soft soil areas. There would be a much lower rate of pipe breaks in other areas. Restoration of utility services will require substantial mutual aid from utilities outside of the affected area.

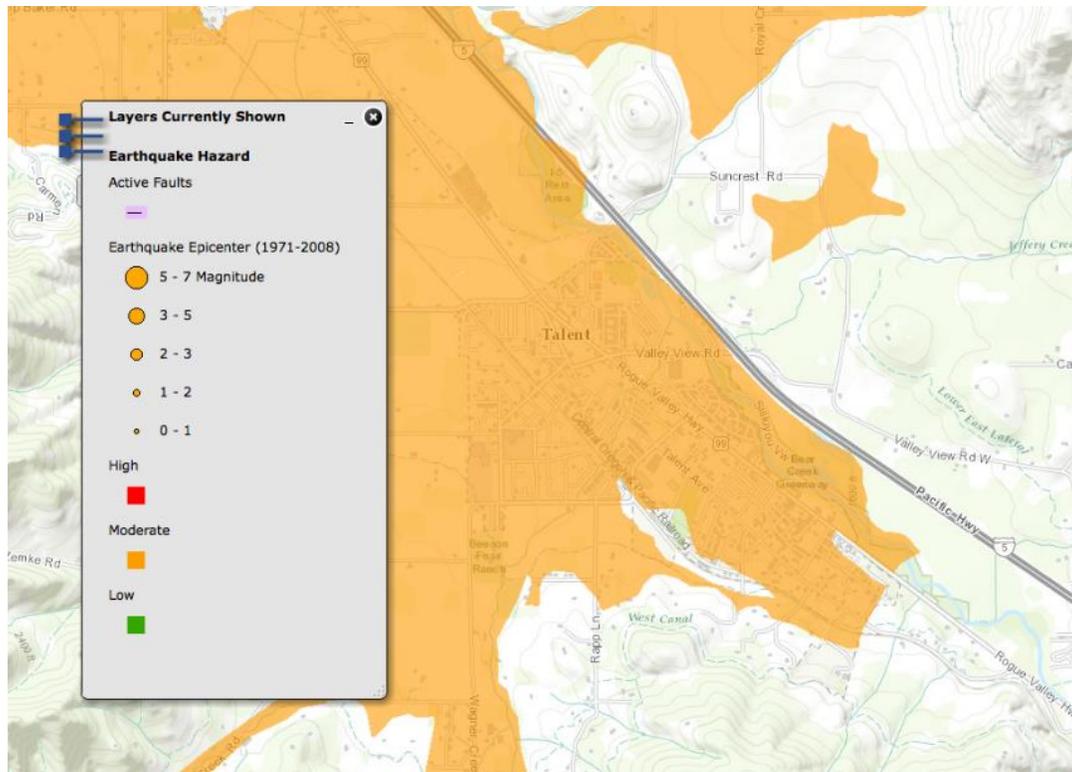
Earthquake (Crustal)

The steering committee determined that the City's probability for a crustal earthquake is **low** (which is the same as the County's rating) and that their vulnerability to crustal earthquake is **moderate** (which is the same as the County's rating).

Volume I, Section 3 describes the characteristics of earthquake hazards, history, as well as the location, extent and probability of a potential event. Generally, an event that affects the County is likely to affect Talent as well. The causes and characteristics of an earthquake event are appropriately described within Volume I, Section 3, as well as the location and extent of potential hazards. Previous occurrences are well-documented within Volume I, Section 3 and the community impacts described by the County would generally be the same for Talent as well.

Figure TA-3 displays relative liquefaction hazards, the majority of the City is within an area of moderate soft soils (liquefaction hazard; orange areas).

Figure TA-3 Active Faults and Soft Soils



Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](#)

Note: To view detail click the link above to access Oregon HazVu.

Earthquake-induced damages are difficult to predict and depend on the size, type and location of the earthquake, as well as site-specific building and soil characteristics. Presently, it is not possible to accurately forecast the location or size of earthquakes, but it is possible to predict the behavior of soil at any particular site. In many major earthquakes, damages have primarily been caused by the behavior of the soil.

Please review Volume I, Section 3 for additional information on this hazard.

Emerging Infectious Disease

The steering committee determined that the City's probability for emerging infectious disease is **moderate** (which is the same as the County's rating) and that their vulnerability is **high** (which is the same as the County's rating).

Emerging infectious diseases are those that have recently appeared in a population or those whose incidence or geographic range is rapidly increasing or threatens to increase. Emerging infections may be caused by biological pathogens (e.g., virus, parasite, fungus or bacterium) and may be: previously unknown or undetected biological pathogens, biological pathogens that have spread to new geographic areas or populations, previously known biological pathogens whose role in specific diseases was previously undetected and biological pathogens whose incidence of disease was previously declining but whose incidence of disease has reappeared (re-emerging infectious disease).⁵

Volume I, Section 3 describes the characteristics of emerging infectious disease, history, as well as the location, extent and probability of a potential event within the region. Generally, an event that affects the County is likely to affect the City as well.

Please review Volume I, Section 3 for additional information on this hazard.

Flood

The steering committee determined that the City's probability for flood is **high** (which is the same as the County's rating) and that their vulnerability to flood is **moderate** (which is higher than the County's rating).

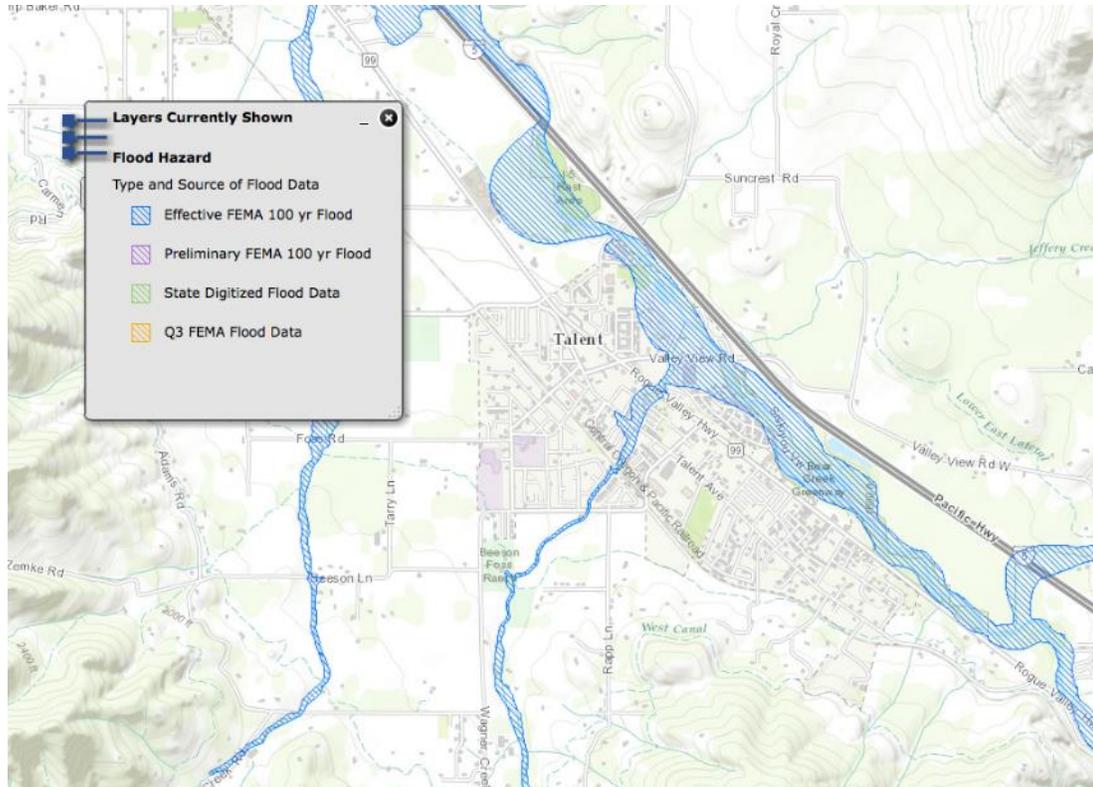
Volume I, Section 3 describes the characteristics of flood hazards, history, as well as the location, extent and probability of a potential event. Portions of Talent have areas of flood plains (special flood hazard areas, SFHA). These include areas along the Bear Creek and Wagner Creek (Figure TA-3). The worst flooding occurred along Bear Creek in 1928 and along Wagner Creek in 1964. Furthermore, other portions of Talent, outside of the mapped floodplains, are also subject to flooding from local storm water drainage. *Note: Rogue Valley Sewer Services provides sewer and stormwater services to the City and provides information on [low-impact development](#).*

The City is at risk from two types of flooding: riverine and urban. Riverine flooding occurs when streams overflow their banks and inundate low-lying areas. This is a natural process that adds sediment and nutrients to fertile floodplain areas. It usually results from

⁵ Baylor College of Medicine, *Emerging Infectious Disease*, URL: <https://www.bcm.edu/departments/molecular-virology-and-microbiology/emerging-infections-and-biodefense/emerging-infectious-diseases>, accessed September 17, 2017.

prolonged periods of precipitation over a wide geographic area. Most areas are generally flooded by low velocity sheets of water. Urban flooding occurs as land is converted to impervious surfaces and hydrologic systems are changed. Precipitation is collected and transmitted to streams at a much faster rate, causing floodwaters that rise rapidly and peak with violent force. During urban flooding, storm drains can back up and cause localized flooding of streets and basements. These flooding events and subsequent damages are commonly caused by the behavior of Bear Creek and Wagner Creek and their tributaries. In 1997, flooding threatened mobile home parks adjacent to Bear Creek but did not cause much damage (the same area flooded in 1964 with more extensive damage).

Figure TA-4 Special Flood Hazard Area



Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](#)

Note: To view detail click the link above to access Oregon HazVu.

Floods can have a devastating impact on almost every aspect of the community, including private property damage, public infrastructure damage and economic loss from business interruption. It is important for the City to be aware of flooding impacts and assess its level of risk.

The economic losses due to business closures often total more than the initial property losses that result from flood events. Business owners and their employees are significantly impacted by flood events. Direct damages from flooding are the most common impacts, but indirect damages, such as diminished clientele, can be just as debilitating to a business.

The FEMA Flood Insurance Study (January 19, 2018) has a brief history of flooding in Jackson County and Talent (see Volume I, Section 3 for more information). No critical or essential facilities are located within the floodplain, with the exception of the water treatment plants.

The fire station, an assisted care facility and the public works waste water pumping station are within the dam hazard impact area.⁶

Highway 99 and Interstate 5 are major transportation routes in the Rogue Valley. If major flooding affected all of the bridges in Talent, traffic flow in an out of the City would be significantly affected, but would not cut all off all avenues (Talent Avenue bridge). The amount of property in the flood plain is not a large area but damage could be significant as it would affect residential, commercial and public property. Floodwaters can affect building foundations, seep into basements or cause damage to the interior, exterior and contents of buildings, dependent upon the velocity and depth of the water and by the presence of floating debris. The City sewer system can overflow during flood events and cause further property damage.

For mitigation planning purposes, it is important to recognize that flood risk for a community is not limited only to areas of mapped floodplains. Other portions of Talent outside of the mapped floodplains may also be at relatively high risk from over bank flooding from streams too small to be mapped by FEMA or from local storm water drainage. In addition, the City is at risk to flooding from dam inundation of Hosler Dam and Emigrant Lake.

The City has an adopted Flood Hazard Mitigation Plan (Resolution #99-524-R) that “directs the City to manage land use decision making, storm sewers, open space and other City services in ways that minimize the risk of future flood events.”⁷ The City has a Flood Damage Prevention Ordinance and the Talent Zoning Code establishes, among other standards, a 35-foot setback from the 100-year floodplain, a 50-foot setback from inventoried riparian areas and wetlands and prohibits the siting of critical facilities within the flood hazard areas.⁸

National Flood Insurance Program (NFIP)

FEMA updated the Flood Insurance Study (FIS) and Flood Insurance Rate Maps (FIRMs) in 2018 (effective January 19, 2018). The table below shows that as of June 2016, Talent has 96 National Flood Insurance Program (NFIP) policies in force. Of those, nine (9) are for properties that were constructed before the initial FIRM. The last Community Assistance Visit (CAV) for Talent was on September 28, 2011. Talent’s Class Rating within the Community Rating System (CRS) is an 8. The table shows that the majority of flood insurance policies are for residential structures, primarily single-family homes. There has been a total of one (1) paid claim for \$14,525. The City complies with the NFIP through enforcement of their flood damage prevention ordinance and their floodplain management program.

The Community Repetitive Loss record for Talent identifies zero (0) Repetitive Loss Properties⁹ and zero (0) Severe Repetitive Loss Properties¹⁰. For details on the repetitive loss properties see Volume I, Section 3.

⁶ City of Talent Comprehensive Plan (2016)

⁷ Ibid.

⁸ Ibid.

⁹ A Repetitive Loss (RL) property is any insurable building for which two or more claims of more than \$1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978. A RL property may or may not be currently insured by the NFIP.

¹⁰ A Severe Repetitive Loss (SRL) property is a single family property (consisting of 1 to 4 residences) that is covered under flood insurance by the NFIP and has incurred flood-related damage for which 4 or more separate

Table TA-7 Flood Insurance Detail

Jurisdiction	Effective FIRM and FIS	Initial FIRM Date	Total Policies	Pre-FIRM Policies	Policies by Building Type				Minus Rated A Zone
					Single Family	2 to 4 Family	Other Residential	Non-Residential	
Jackson County	-	-	1,828	809	1,568	44	91	125	126
Talent	1/19/2018	2/1/1980	96	9	90	3	0	3	12

Jurisdiction	Insurance in Force	Total Paid Claims	Pre-FIRM Claims Paid	Substantial Damage Claims	Total Paid Amount	Repetitive Loss Structures	Severe Repetitive Loss Properties	CRS Class Rating	Last Community Assistance Visit
Jackson County	\$ 442,723,400	197	132	10	\$ 2,337,660	8	0	-	-
Talent	\$ 23,325,900	1	1	0	\$ 14,525	0	0	8	2015

Source: Information compiled by Department of Land Conservation and Development, July 2016.

Please review Volume I, Section 3 for additional information on this hazard.

Landslide

The steering committee determined that the City’s probability for landslide is **high** (which is the same as the County’s rating) and that their vulnerability to landslide is **moderate** (which is higher than the County’s rating).

Volume I, Section 3 describes the characteristics of landslide hazards, history, as well as the location, extent and probability of a potential event within the region. The potential for landslide in Talent is low with the higher landslide risk in the south and southwest and small areas immediately adjacent to stream channels. Future growth in Talent may expose development to higher landslide risk in the steeper sloped areas.

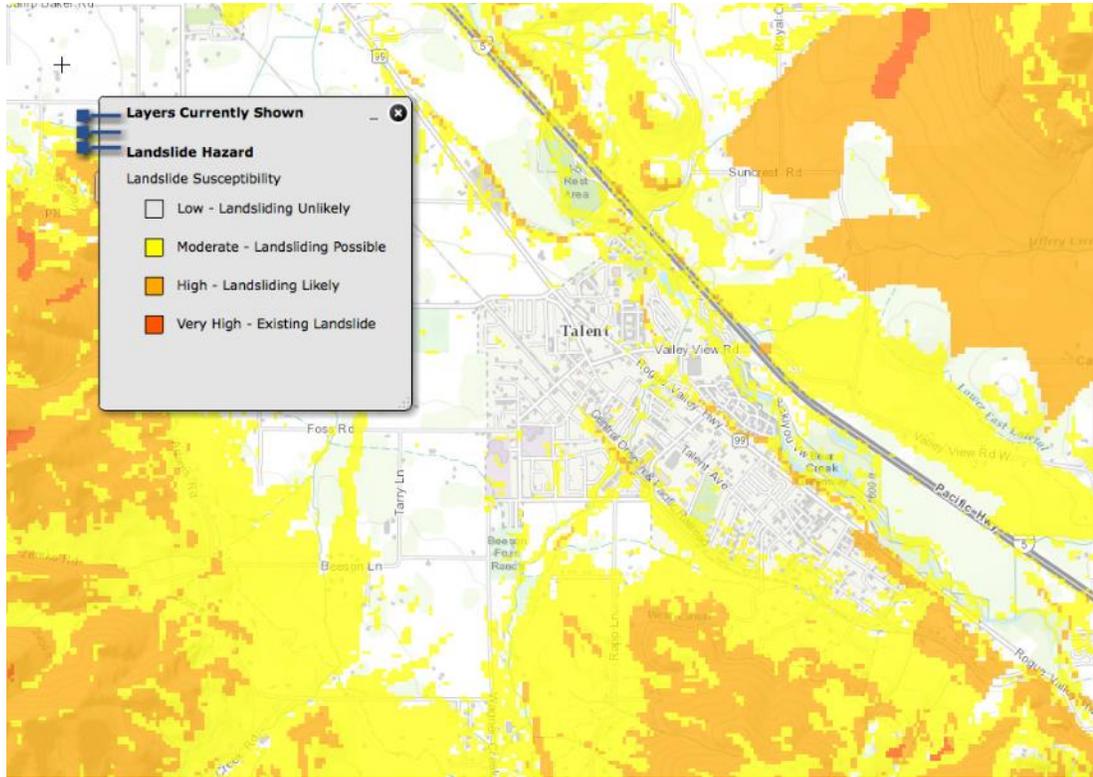
Landslide susceptibility exposure for Talent is shown in Figure TA-5. Most of Talent demonstrates a low susceptibility to landslide exposure, with corridors of moderate susceptibility concentrated around the hills south of the City. Approximately 4% of Talent has high and approximately 21% moderate, landslide susceptibility exposure.¹¹

Note that even if a jurisdiction has a high percentage of area in a high or very high landslide exposure susceptibility zone, this does not mean there is a high risk, because risk is the intersection of hazard and assets.

claims payments have been paid under flood insurance coverage, with the amount of each claim payment exceeding \$5,000 and with cumulative amount of such claims payments exceeding \$20,000; or for which at least 2 separate claims payments have been made with the cumulative amount of such claims exceeding the reported value of the property.

¹¹ DOGAMI Open-File Report, O-16-02, Landslide Susceptibility Overview Map of Oregon (2016)

Figure TA-5 Landslide Susceptibility Exposure



Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](#)

Note: To view detail click the link above to access Oregon HazVu.

Potential landslide-related impacts are adequately described within Volume I, Section 3 and include infrastructural damages, economic impacts (due to isolation and/or arterial road closures), property damages and obstruction to evacuation routes. Rain-induced landslides and debris flows can potentially occur during any winter in Jackson County and thoroughfares beyond City limits are susceptible to obstruction as well.

Landslide do not occur often in Talent, however, the most common type of landslide in Jackson County are slides caused by erosion. Slides move in contact with the underlying surface, are generally slow moving and can be deep. Rainfall-initiated landslides tend to be smaller; while earthquake induced landslides may be quite large. All soil types can be affected by natural landslide triggering conditions.

Please review Volume I, Section 3 for additional information on this hazard.

Severe Weather

Severe weather in can account for a variety of intense and potentially damaging weather events. These events include windstorms and winter storms. The following section describes the unique probability and vulnerability of each identified weather hazard. Other more abrupt or irregular events such as hail are also described in this section.

Windstorm

The steering committee determined that the City's probability for windstorm is **high** (which is the same as the County's rating) and that their vulnerability to windstorm is **moderate** (which is the same as the County's rating).

Volume I, Section 3 describes the characteristics of windstorm hazards, history, as well as the location, extent and probability of a potential event within the region. Because windstorms typically occur during winter months, they are sometimes accompanied by ice, freezing rain, flooding and very rarely, snow. Other severe weather events that may accompany windstorms, including thunderstorms, hail, lightning strikes and tornadoes are generally negligible for Talent.

Volume I, Section 3 describes the impacts caused by windstorms, including power outages, downed trees, heavy precipitation, building damages and storm-related debris. Additionally, transportation and economic disruptions result as well.

Damage from high winds generally has resulted in downed utility lines and trees. Electrical power can be out anywhere from a few hours to several days. Outdoor signs have also suffered damage. If the high winds are accompanied by rain (which they often are), blowing leaves and debris clog drainage-ways, which in turn causes localized urban flooding.

Please review Volume I, Section 3 for additional information on this hazard.

Winter Storm (Snow/Ice)

The steering committee determined that the City's probability for winter storm is **high** (which is the same as the County's rating) and that their vulnerability to winter storm is **moderate** (which is the same as the County's rating).

Volume I, Section 3 describes the characteristics of winter storm hazards, history, as well as the location, extent and probability of a potential event within the region. Severe winter storms can consist of rain, freezing rain, ice, snow, cold temperatures and wind. They originate from troughs of low pressure offshore that ride along the jet stream during fall, winter and early spring months. Severe winter storms affecting the City typically originate in the Gulf of Alaska or in the central Pacific Ocean. These storms are most common from November through March.

Major winter storms can and have occurred in the Talent area and while they typically do not cause significant damage, they are frequent and have the potential to impact economic activity. Road and rail closures due to winter weather are an uncommon occurrence, but can interrupt commuter and commercial traffic.

Please review Volume I, Section 3 for additional information on this hazard..

Volcano

The steering committee determined that the City's probability for a volcanic event is **low** (which is the same as the County's rating) and that their vulnerability to a volcanic event is **low** (which is the same as the County's rating).

Volume I, Section 3 describes the characteristics of volcanic hazards, history, as well as the location, extent and probability of a potential event within the region. Generally, an event that affects the County is likely to affect Talent as well. Talent is very unlikely to experience anything more than volcanic ash during a volcanic event.

Please review Volume I, Section 3 for additional information on this hazard.

Wildfire

The steering committee determined that the City's probability for wildfire is **high** (which is the same as the County's rating) and that their vulnerability to wildfire is **low** (which is lower than the County's rating).

Volume I, Section 3 describes the characteristics of wildfire hazards, history, as well as the location, extent and probability of a potential event within the region. The location and extent of a wildfire vary depending on fuel, topography and weather conditions. Weather and urbanization conditions are primarily at cause for the hazard level. Wildfires in Talent are somewhat rare.

The potential community impacts and vulnerabilities described in Volume I, Section 3 are generally accurate for the City as well. The [Rogue Valley Integrated Community Wildfire Protection Plan](#) (RVIFP, updated 2017), assesses wildfire risk, maps wildland urban interface areas and includes actions to mitigate wildfire risk. The City is included in the RVIFP and will update the City's wildfire risk assessment if the fire plan presents better data during future updates (an action item is included within Volume I, Section 4 to participate in updates to the integrated fire plan and to continue to maintain and update their RVIFP). Talent is within an area of low wildfire prone urban landscape. The City hereby incorporates the RVIFP into this addendum by reference to provide greater detail to sensitivity and exposure to the wildfire hazard.

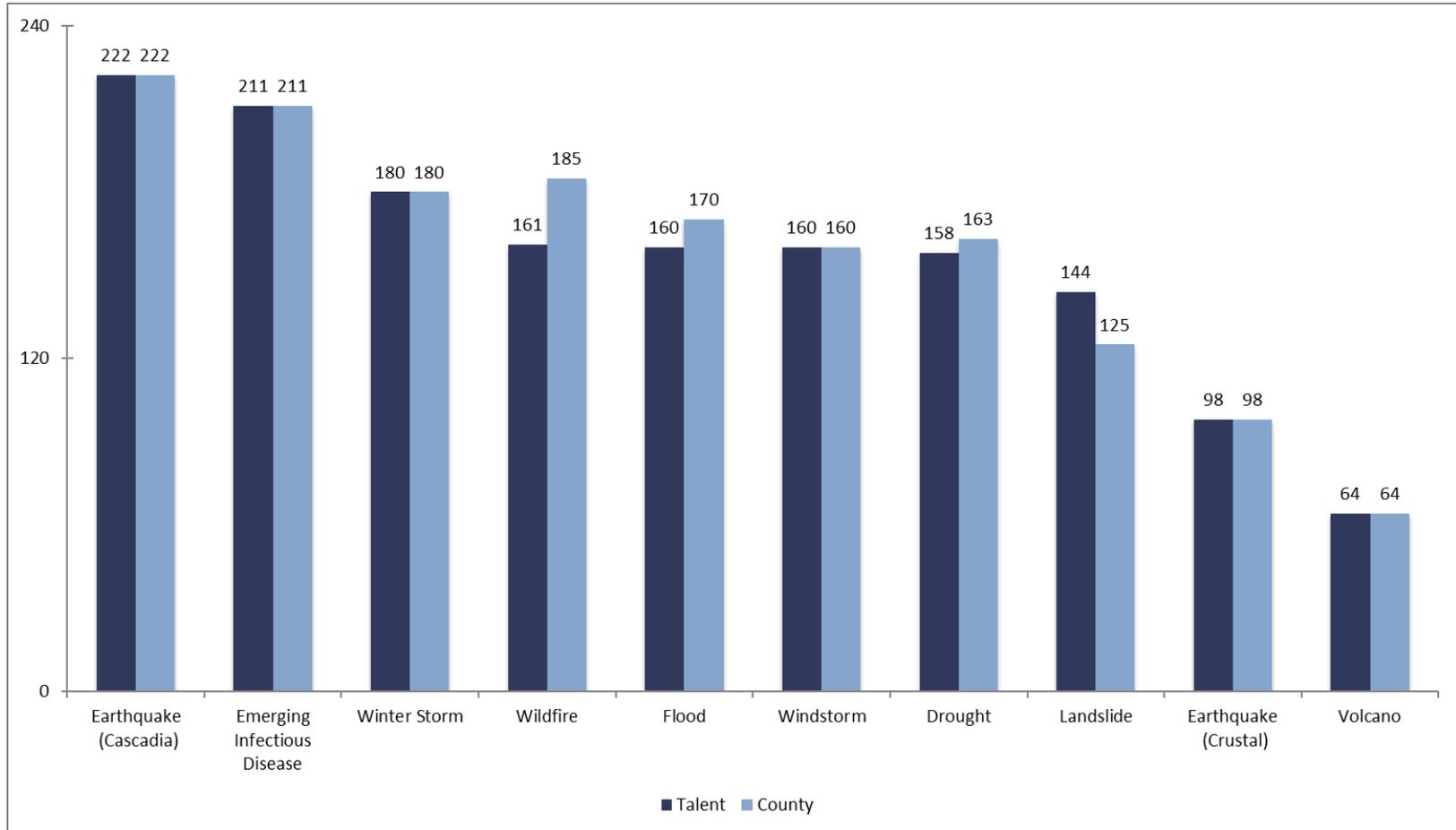
Property can be damaged or destroyed with one fire as structures, vegetation and other flammables easily merge to become unpredictable and hard to manage. Other factors that affect ability to effectively respond to a wildfire include access to the location and to water, response time from the fire station, availability of personnel and equipment and weather (e.g., heat, low humidity, high winds and drought).

Please review Volume I, Section 3 for additional information on this hazard.

Summary

Figure TA-6 presents a summary of the hazard analysis for Talent and compares the results to the assessment completed by Jackson County. The hazards for the City are the Cascadia Subduction Zone earthquake, emerging infectious disease and winter storm.

Figure TA-6 Overall Hazard Analysis Comparison – Talent/Jackson County



Source: City of Talent NHMP Steering Committee and Jackson County NHMP Steering Committee, 2017.

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