



DESCHUTES COUNTY MULTI-JURISDICTIONAL NATURAL HAZARDS MITIGATION PLAN

Report for:

Deschutes County
Bend
La Pine
Redmond
Sisters

Prepared by:

Central Oregon Intergovernmental Council

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SPECIAL THANKS & ACKNOWLEDGEMENTS

Deschutes County developed this Multi-jurisdictional Natural Hazards Mitigation Plan (NHMP) through a regional partnership funded by the Federal Emergency Management Agency's Pre-Disaster Mitigation Competitive Grant Program. FEMA awarded the grant to support the update of the natural hazards mitigation plan. The county's planning process utilized a four-phased planning process, plan templates provided by Oregon Partnership for Disaster Resilience (OPDR) and plan development support provided by the Community and Economic Development Department of Central Oregon Intergovernmental Council (COIC). This project would not have been possible without technical and in-kind staff support provided by Deschutes County and the cities of Bend, La Pine, Redmond, and Sisters.

Partners include:

Deschutes County	FEMA Region X
City of Bend	City of La Pine
City of Redmond	City of Sisters
Oregon Military Department – Office of Emergency Management	
Central Oregon Intergovernmental Council	

Project Steering Committee:

Deschutes County

Representatives from the following organizations served as steering committee members for the Deschutes County natural hazards mitigation planning process.

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Aaron Wells	Police Lieutenant, City of Redmond Police Department
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Roger Johnson	Fire Chief, Sisters-Camp Sherman Fire District
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About Central Oregon Intergovernmental Council

"COIC supports the region as a trusted leader and partner, helping communities identify and address their unique and common needs through collaboration, shared service delivery, technical assistance, information sharing, and resource development."

In 1972, COIC was designated a Council of Governments organized under ORS 190. We provide services to the counties of Crook, Deschutes and Jefferson, the cities of Bend, Culver, La Pine, Madras, Metolius, Prineville, Redmond and Sisters, as well as the Confederated Tribes of Warm Springs. Our offices are located throughout Central Oregon. COIC employs more than 100 people and services in the following areas: employment and training, alternative high school education, business loans, transportation, and community and economic development. The majority of the COIC Board is comprised of elected officials appointed by each of these member governments. Other appointed members of the Board represent timber and wood products, business and industry, under and unemployed, agribusiness and agriculture, and tourism and recreation.

For more information on COIC, visit www.coic.org

Plan Template Disclaimer

This Natural Hazards 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 natural hazards mitigation plans. OPDR hereby authorizes the use of all content and language provided to Deschutes County in the plan template.

DESCHUTES COUNTY MULTI-JURISDICTIONAL NATURAL HAZARDS MITIGATION PLAN

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VOLUME I: BASIC PLAN

EXECUTIVE SUMMARY

Deschutes County developed this Multi-jurisdictional Natural Hazards Mitigation Plan (NHMP, MNHMP or Plan) in an effort to prepare for the long-term effects resulting from natural 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, 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, such as 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.

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?

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 Natural Hazard Mitigation Plan (NHMP) in order to receive federal funds for mitigation projects.

Local and federal approval of this Plan ensures that the county and listed jurisdictions will remain eligible for pre- and post-disaster mitigation project grants.

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. . . .

Who Participated in Developing the Plan?

The Deschutes 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 Plan development process. Surrounding counties were provided regular updates and opportunities for input.

The County Steering Committee included representatives from the following jurisdictions and agencies:

- Deschutes County
- City of Bend
- City of La Pine
- City of Redmond
- City of Sisters
- Oregon Department of Forestry
- OSU Extension
- Oregon Water Resources Department
- Sisters-Camp Sherman Fire
- Black Butte Ranch Fire
- Bend Fire & Rescue
- Sunriver Fire
- City of Redmond Police Department
- Crooked River Ranch
- National Weather Service – Pendleton
- Portland General Electric

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.

The Deschutes County Sheriff’s Office Emergency Management Program convened the planning process and will take the lead in implementing, maintaining and updating the plan. Deschutes County is dedicated to directly involving the public in the continual review and update of the natural hazards mitigation plan. 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 Plan throughout the implementation and maintenance period.

The county will ensure continued public involvement by posting the NHMP on the County website, as well as on Central Oregon Intergovernmental Council’s project webpage here: <https://www.coic.org/emergency-preparedness/natural-hazard-mitigation-plans/deschutes-county-nhmp/>

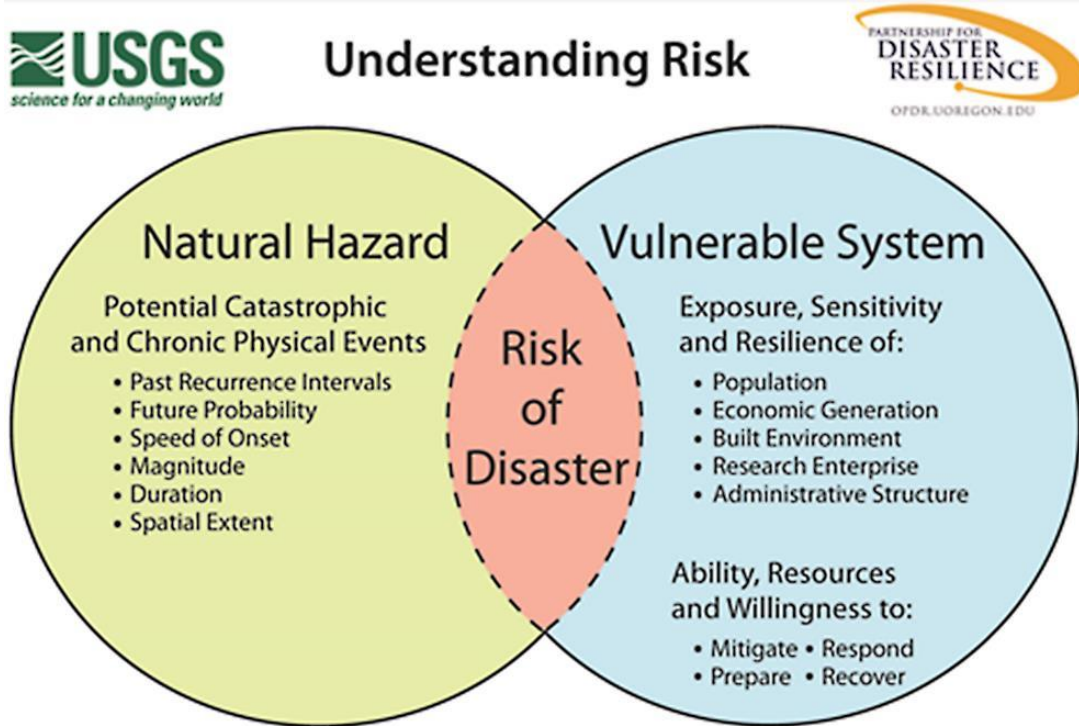
How Does this Mitigation Plan Reduce Risk?

The NHMP is intended to assist Deschutes County in reducing the risk from natural 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

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

consists of three phases: hazard identification, vulnerability assessment, and risk analysis, as illustrated in the following graphic.

Figure ES-I Understanding Risk



Source: Oregon Partnership for Disaster Resilience

By identifying and understanding the relationship between natural hazards, vulnerable systems, and existing capacity, Deschutes County is better equipped to identify and implement actions aimed at reducing the overall risk to natural hazards.

What is the County’s Overall Risk to Hazards?

Deschutes County reviewed and updated their risk assessment to evaluate the probability of each hazard as well as the vulnerability of the community to that hazard. In addition, the steering committees for the participating cities reviewed the recently updated Deschutes County risk assessment to compare risk and vulnerability particular to their jurisdiction (see addenda for more information). Table ES-1 below summarizes hazard probability and vulnerability as determined by the county steering committee (for more information see Section 2, Risk Assessment).

Table ES-I Risk Assessment Summary

Hazard	Maximum				Total Threat Score	Hazard Rank
	History	Vulnerability	Threat	Probability		
Winter Storm	20	50	90	70	230	# 1
Wildfire	20	50	80	70	220	# 2
Windstorm	20	40	80	70	210	#3
Drought	20	15	70	70	175	#4
Volcano	2	50	100	21	173	#5
Earthquake (Cascadia)	2	40	100	7	149	#6
Flood	8	10	40	56	114	#7
Earthquake (Crustal)	2	20	80	7	109	# 8
Landslide	20	5	20	42	87	# 9

Source: Deschutes County NHMP Steering Committee, 2021

What is the Plan’s Mission?

The mission of the Deschutes County NHMP is to:

Mission: *To promote sound public policy designed to protect people, critical facilities, infrastructure, private property, and the environment from natural hazards.*

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

This can be achieved by increasing public awareness, documenting the resources for risk reduction and loss-prevention, and identifying activities to guide the county towards building a safer, more disaster resistant community.

What are the Plan Goals?

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

- Goal 1: Protect life and reduce injuries resulting from natural hazards.
- Goal 2: Minimize property damage from natural hazards.
- Goal 3: Minimize damage to critical or essential infrastructure and services from natural hazards.
- Goal 4: Enhance the ability of Deschutes County’s economy to rebound quickly from the effects of natural hazard events.
- Goal 5: Minimize project impacts to the environment and utilize natural solutions to protect people and property from natural hazards.
- Goal 6: Enhance the county’s capability to implement a comprehensive county wide natural hazards mitigation strategy.
- Goal 7: Motivate the “whole community” to build resilience and mitigate against the effects of natural hazards through engagement, listening, learning, information- sharing, and funding opportunities.
- Goal 8: Eliminate development within mapped hazardous areas where the risks to people and property cannot be practicably mitigated.

- Goal 9: Minimize damage to historic and cultural resources from natural hazards.
- Goal 10: Enhance communication, collaboration, and coordination among agencies at all levels of government, sovereign tribal nations, and the private sector to mitigate natural hazards.
- Goal 11: Mitigate the inequitable impacts of natural hazards by prioritizing and directing resources and investments to build resilience in the most vulnerable populations and the communities least able to respond and recover.
- Goal 12: Develop, integrate, and align natural hazards mitigation and climate adaptation efforts based on the evolving understanding of the interrelationships between climate change and climate-related natural hazard events.
- Goal 13: Reduce repetitive and severe repetitive flood losses.
- Goal 14: Minimize or eliminate potential impacts from dams posing the greatest risk to people, property, and infrastructure.

How are the Action Items Organized?

The action items are organized within an action matrix included within Section 3, Mitigation Strategy (full descriptions are provided in Appendix A, *Action Item Forms*).

Data collection, research and the public participation processes resulted in the development of the action items. The Action Item Matrix portrays the overall Plan framework and identifies linkages between the plan goals and actions. The matrix documents the title of each action along with the coordinating organization, timeline, and priority action items. Action items particular to each of the participating cities are included at the end of the action item matrix in Section 3, Mitigation Strategy and in the addenda.

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

How will the plan be implemented?

The plan maintenance section of this Plan details the formal process that will ensure that the Deschutes County NHMP remains an active and relevant document. The Plan will be implemented, maintained, and updated by a designated convener. The Deschutes County Emergency Services Manager is the designated convener (Plan Convener) and is responsible for overseeing the review and implementation processes. The Plan maintenance process includes a schedule for monitoring and evaluating the Plan semi-annually and producing a

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 . . .

plan revision every five years. This section also describes how the communities will integrate public participation throughout the plan maintenance process.

Plan Adoption

Once the Plan is locally reviewed and deemed complete the Plan Convener submits it to the State Hazard Mitigation Officer at the Oregon Military Department – Office of Emergency Management (OEM). OEM reviews the Plan 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 Rule 44 CFR Part 201.6. Once the Plan is pre-approved by FEMA, the county and cities formally adopt the Plan via resolution. The Deschutes County Plan Convener will be responsible for ensuring local adoption of the Deschutes County NHMP and providing the support necessary to ensure plan implementation. Once the resolution is executed at the local level and documentation is provided to FEMA, the Plan is formally acknowledged by FEMA and the County (and participating cities) and re-establishes eligibility for the Pre-Disaster Mitigation Grant Program, the Hazard Mitigation Grant Program funds, and the Flood Mitigation Assistance program funds.

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] . . .

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 Plan 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 Deschutes County and participating cities each met to review the Plan update process and their governing bodies adopted the NHMP as shown below:

Deschutes County adopted the plan on []

The City of Bend adopted the plan on []

The City of La Pine adopted the plan on []

The City of Redmond adopted the plan on []

The City of Sisters adopted the plan on []

FEMA Region X approved the Deschutes County NHMP on []. With approval of this Plan, 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 [].

SECTION I: INTRODUCTION

Section I: Introduction provides a general introduction to natural hazard mitigation planning in Deschutes 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 plan 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, such as 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 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.

Why Develop a Mitigation Plan?

Deschutes County developed this Natural Hazards Mitigation Plan (NHMP or Plan) 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 plan 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 Plan 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 plan during review, and the updated Natural Hazard Mitigation Plan shall include documentation of the public planning process used to develop the plan.³ The Natural Hazard Mitigation Plan update must also contain a risk assessment, mitigation strategy and a plan 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 plan review, and then federal approval.⁵ Additionally, OEM administers the Emergency Management Performance Grant (EMPG), which helps fund local emergency management programs and 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 plan aligns with the goals of the jurisdiction's Comprehensive Plan, and helps each jurisdiction meet the requirements of statewide land use planning Goal 7.

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

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 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 Plan Developed?

The Plan was developed by the Deschutes County Natural Hazard Mitigation Plan Steering Committee and the Steering Committees for the cities of Bend, La Pine, Redmond, and Sisters. The Deschutes County Steering Committee formally convened on four occasions to discuss and revise the plan. Each of the participating city Steering Committees met at least once formally. Steering Committee members contributed data and maps, and 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 plan. 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 Plan during review.⁶ Central Oregon Intergovernmental Council (COIC) provided a publicly accessible project webpage for the general public in order to make meeting materials, the draft plan and contact information available throughout the update process. Additionally, COIC and Deschutes County hosted a virtual public input meeting on June 7th, 2021.

COIC and Deschutes County also administered a public opinion survey to obtain additional input from the public regarding the county's risks, vulnerabilities, hazards history, and mitigation strategies. See Appendix F for more information.

Finally, COIC sent quarterly updates to Emergency Services staff in the following neighboring communities with opportunities to participate and comment throughout the review process:

- Confederated Tribes of Warm Springs
- Lane County
- Klamath County
- Lake County
- Crook County
- Jefferson County

For more details and documentation of the public processes described above, see Appendix B.

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

How is the Plan Organized?

Each volume of the Plan 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 plan structure enables stakeholders to use the section(s) of interest to them.

Volume I: Basic Plan

Executive Summary

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

Section 1: Introduction

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

Section 2: Risk Assessment

Section 2 provides the factual basis for the mitigation strategies contained in Section 3. (Additional information is included within Appendix C, which contains an overall description of Deschutes County and the cities of Bend, La Pine, Redmond, and Sisters). This section includes a brief description of community sensitivities and vulnerabilities and an overview of the hazards addressed in Volume II of this plan. The Risk Assessment allows readers to gain an understanding of the county's, and other jurisdictions', sensitivities – those community assets and characteristics that may be impacted by natural hazards, as well as the county's, and other jurisdictions', resilience – the ability to manage risk and adapt to hazard event impacts. Additionally, this section provides information on the jurisdictions' participation in the National Flood Insurance Program (NFIP).

Section 3: Mitigation Strategy

This section documents the Plan 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 Section 2 and the Hazard Annexes (Volume II).

Section 4: Plan Implementation and Maintenance

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

Volume II: Hazard Annexes

The hazard annexes describe the risk assessment process and summarize the best available local hazard data. A hazard summary is provided for each of the hazards addressed in the Plan. The summary includes hazard history, location, extent, vulnerability, impacts, and probability.

The hazard specific annexes included with this Plan are the following:

- Drought
- Earthquake
- Flood
- Landslide
- Volcanic Event
- Wildfire
- Windstorm, and
- Winter Storm

Volume III: Jurisdictional Addenda

Volume III of the plan is reserved for any city or special district addenda developed through this multi-jurisdictional planning process. Each of the cities with a FEMA approved addendum went through an update to coincide with the county's update. As such, the five-year update cycle will be the same for all of the cities and the county.

The Plan includes city addenda updates for the following jurisdictions:

- City of Bend
- City of La Pine
- City of Redmond
- City of Sisters

Volume IV: Mitigation Resources

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

Appendix A: Action Item Forms

This appendix contains the detailed action item forms for each of the mitigation strategies identified in Section 3 of this Plan.

Appendix B: Planning and Public Process

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

Appendix C: 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. Sensitivity factors can be defined as those community assets and characteristics that may be impacted by natural hazards, (e.g., special populations, economic factors, and historic and cultural resources). Community resilience factors can be defined as the community's ability to manage risk and adapt to hazard event impacts (e.g., governmental structure, agency missions and directives, and plans, policies, and programs).

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. The Oregon Partnership for Disaster Resilience developed this appendix. It has been reviewed and accepted by FEMA 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.

Appendix E: Grant Programs and Resources

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

Appendix F: Deschutes County Natural Hazards Community Survey (2021)

Appendix F includes the survey instrument and results from the preparedness survey implemented by COIC and Deschutes County. The survey aims to gauge household knowledge of mitigation tools and techniques to assist in reducing the risk and loss from natural hazards, as well as assessing household disaster preparedness.

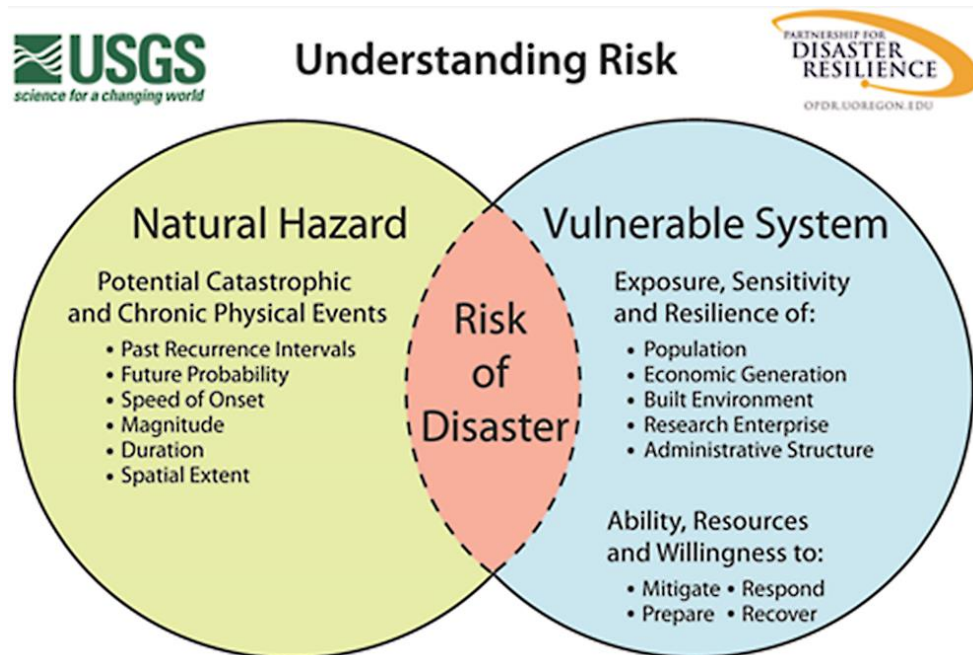
SECTION 2: RISK ASSESSMENT

This section of the NHMP 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 information presented below, along with hazard specific information presented in the Hazard Annexes and community characteristics presented in the Community Profile Appendix, will be used as the local level rationale for the risk reduction actions identified in Section 3 – Mitigation Strategy. The risk assessment process is graphically depicted in Figure 2-1 below. Ultimately, the goal of hazard mitigation is to reduce the area where hazards and vulnerable systems overlap.

Figure 2-1 Understanding Risk

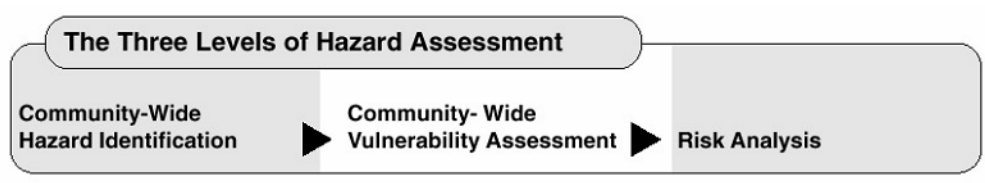


Source: Oregon Partnership for Disaster Resilience

What is a Risk Assessment?

A risk assessment consists of three phases: hazard identification, vulnerability assessment, and risk analysis, as illustrated in the following graphic.

Figure 2-2 Three Phases of a Risk Assessment



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

The first phase, **hazard identification**, involves the identification of the geographic extent of a hazard, its intensity, and its probability of occurrence. This level of assessment typically involves producing a map. The outputs from this phase can also be used for land use planning, management, and regulation; public awareness; defining areas for further study; and identifying properties or structures appropriate for acquisition or relocation.¹

The second phase, **vulnerability assessment**, combines the information from the hazard identification with an inventory of the existing (or planned) property and population exposed to a hazard, and attempts to predict how different types of property and population groups will be affected by the hazard. This step can also assist in justifying changes to building codes or development regulations, property acquisition programs, policies concerning critical and public facilities, taxation strategies for mitigating risk, and informational programs for members of the public who are at risk.²

The third phase, **risk analysis**, 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, and (2) the likelihood or probability of the harm occurring. An example of a product that can assist communities in completing the risk analysis phase is HAZUS, a risk assessment software program for analyzing potential losses from floods, hurricane winds and earthquakes. In Hazards U.S. – Multi-Hazard (HAZUS-MH) current scientific and engineering knowledge is coupled with the latest geographic information systems (GIS) technology to produce estimates of hazard-related damage before, or after a disaster occurs.

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.

¹ Burby, *Cooperating with Nature* (Washington, DC: Joseph Henry Press, 1998), 126.

² Ibid, 133.

Hazard Analysis Methodology

This NHMP utilizes a hazard analysis methodology that 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%.

This method provides the jurisdiction with a sense of hazard priorities, or relative risk. It doesn't 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 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 as demonstrated below.

History

Weight factor for category = 2

History is the record of previous occurrences. Events to include in assessing history of a hazard in your jurisdiction are events for which the following types of activities were required:

- The Emergency Operations Center (EOC) or alternate EOC was activated;
- Three or more Emergency Operations Planning (EOP) functions were implemented, e.g., alert & warning, evacuation, shelter, etc.;
- An extraordinary multi-jurisdictional response was required; and/or
- A "Local Emergency" was declared.

LOW = 0 to 1 event in the past 100 years, scores between 1 and 3 points

MODERATE = 2 to 3 event in the past 100 years, scores between 4 and 7 points

HIGH = 4+ events in the past 100 years, scores between 8 and 10 points

Probability

Weight factor for category = 7

Probability is the likelihood of future occurrence within a specified period of time.

LOW = one incident likely within 75 to 100 years, scores between 1 and 3 points

MODERATE = one incident likely within 35 to 75 years, scores between 4 and 7 points

HIGH = one incident likely within 10 to 35 years, scores between 8 and 10 points

Vulnerability

Weight factor for category = 5

Vulnerability is the percentage of population and property likely to be affected under an “average” occurrence of the hazard.

LOW = < 1% affected, scores between 1 and 3 points

MODERATE = 1 - 10% affected, scores between 4 and 7 points

HIGH = > 10% affected, scores between 8 and 10 points

Maximum Threat

Weight factor for category = 10

Maximum threat is the highest percentage of population and property that could be impacted under a worst-case scenario.

LOW = < 5% affected, scores between 1 and 3 points

MODERATE = 5 - 25% affected, scores between 4 and 7 points

HIGH = > 25% affected, scores between 8 and 10 points

Hazard Identification

Deschutes County identifies eight natural hazards that could have an impact on the county (as shown in Table 2-1). For specific information pertaining to individual hazards, including location information, reference the Hazard Annexes (Volume II). Table 2-1 shows the hazards identified in the county in comparison to the hazards identified in the State of Oregon NHMP for Central Oregon (Region 6), which includes Deschutes County.

Table 2-1 Deschutes County Hazard Identification

Deschutes County	State of Oregon NHMP Region 6 Central Oregon
Drought	Drought
Earthquake	Earthquake
N/A	Extreme Heat
Flood	Flood
Landslide	Landslide
Volcano	Volcano
Wildfire	Wildfire
Windstorm	Windstorm
Winter Storm	Winter Storm

Source: Deschutes County NHMP Steering Committee (2021) and State of Oregon NHMP, Region 6: Central Oregon (2020)

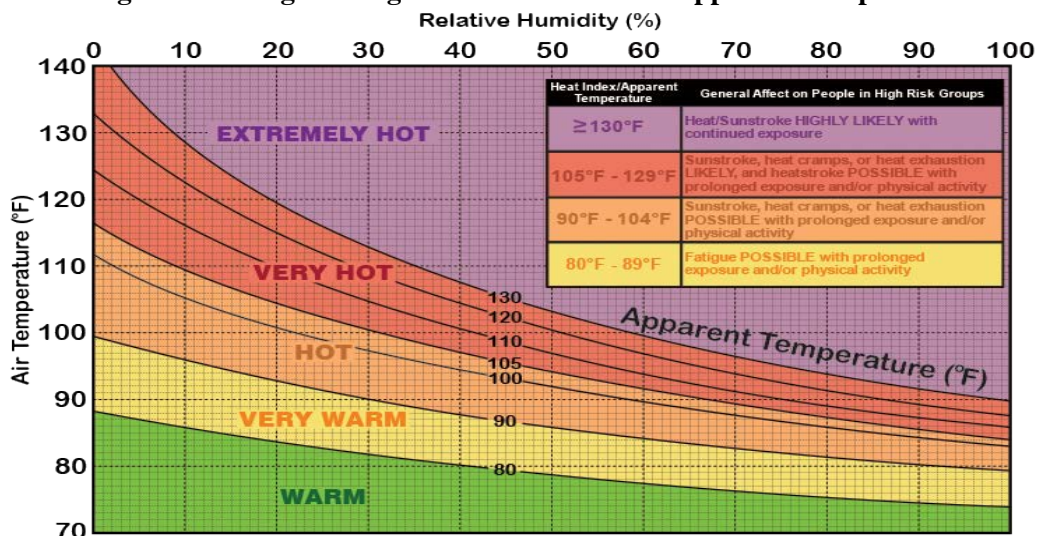
The extreme heat hazard is the only hazard identified in the state profile that is not perceived as a threat by the Deschutes NHMP steering committee. While Central Oregon is no stranger to hot days in the warm season (May – September), with temperatures frequently climbing to or exceeding 95 to 100 degrees (Fig. 2-2), these temperatures normally do not represent a major threat to the public. One consideration is the apparent temperature, or how the temperature actually feels when combined with humidity. Given the high desert climate of the region, humidity is often quite low (15% or less), leading the apparent temperature to be lower than the actual temperature. In such cases, the temperature actually feels cooler than it is due to the very low humidity. This lessens the danger of heat in these regions in the absence of higher humidity. In addition to low humidity leading to lower apparent temperatures, they also lend to rapidly cooling conditions during the overnight hours. It is not uncommon for some of the hottest days in Central Oregon to be coupled with cool nights where lows fall into the 50s and even 40s. This shortens the potential duration of heat events and related human exposure, making extreme heat a rather low risk in this region. This is not to say it cannot happen, but it is a rare occurrence. Figure 2-3 below illustrates danger levels associated with varying heat indices. The humidity is frequently too low to warrant extreme heat in Deschutes County.

Figure 2-2 Average Extreme Heat Days Per Year

Location	Average 95+ degree days per year	Average 100+ degree days per year
Bend	3.3	0.7 (once every 1.5 years)
Redmond Airport	12.7	2.8
Sisters	8.4	1.3
Sunriver	5	0.7 (once every 1.5 years)

Source: XMACIS 2000-2020

Figure 2-3 Danger Categories Associated with Apparent Temperature



Source: Marcus Austin, NOAA (2021)

Drought

A drought is a period of drier than normal conditions that results in water-related problems. 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.

For more information on the Drought Hazard (including history and extent) see the Drought Annex in Volume II.

Earthquake

Oregon and the Pacific Northwest in general are susceptible to earthquakes from four sources: 1) the off-shore Cascadia Fault Zone; 2) deep intra-plate events within the subducting Juan de Fuca Plate; 3) shallow crustal events within the North American Plate; and 4) earthquakes associated with volcanic activity.

The areas most susceptible to ground amplification and liquefaction have young, soft alluvial sediments, found along river and stream channels. The extent of the damage to structures and injury and death to people will depend upon the type of earthquake, proximity to the epicenter and the magnitude and duration of the event.

For more information on the Earthquake Hazard (including history and extent) see the Earthquake Annex in Volume II.

Flood

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.³ Flooding can be aggravated when rain is accompanied by snowmelt and frozen ground; the spring cycle of melting snow is the most common source of flood in the region. The principal types of flood that occur in Deschutes County include: spring/snowmelt flooding, warm winter rain-on-snow flooding, ice jams, flash floods, and dam failure.

For more information on the Flood Hazard (including history and extent) see the Flood Annex in Volume II.

Landslide

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

³ Taylor, George H. and Chris Hannan. *The Oregon Weather Book*. Corvallis, OR: Oregon State University Press. 1999

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. Avalanches also occur in the mountainous west portion of the county; avalanches are similar to landslides except they involve snow and ice with some movement of rock or other debris.

For more information on the Landslide Hazard (including history and extent) see the Landslide Annex in Volume II.

Volcano

The Pacific Northwest lies within the “ring of fire,” an area of frequent volcanic activity surrounding the Pacific Basin. Volcanic events occur regularly along the ring of fire, in part because of the movement of the Earth’s tectonic plates. Volcanic events have the potential to coincide with numerous other hazards including ash fall, earthquakes, lava flows, pyroclastic flows, lahars, and debris flows, and landslides.

For more information on the Volcano Hazard (including history and extent) see the Volcano Annex in Volume II.

Wildfire

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 that provide structural protection.

For more information on the Wildfire Hazard (including history and extent) see the Wildfire Annex in Volume II.

Windstorm

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 Deschutes 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.

For more information on the Windstorm Hazard (including history and extent) see the Windstorm Annex in Volume II.

Winter Storm

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 Deschutes County typically originate in the Gulf of Alaska or in the central Pacific Ocean. These storms are most common from November through March.

For more information on the Winter Storm Hazard (including history and extent) see the Winter Storm Annex in Volume II.

Federal Disaster and Emergency Declarations

Looking at the past events that have occurred 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 April 2021, FEMA has approved a total of 133 disaster declarations in Oregon.⁴ 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 2-2 summarizes the major disasters declared in Oregon that have affected Deschutes County, since 1955. The table shows that there have been three major disaster declarations for the county; all were weather-related.

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. There have been two emergency declarations that have affected Deschutes County.

Fire Management Assistance Grants (FMAG) may be provided after a State submits a request for assistance to the FEMA Regional Director at the time a "threat of major disaster" exists. There have been eleven fire management assistance declarations for the county (for a list of wildfires that have affected the county, between 1990 through 2021, see the Wildfire Hazard Annex in Volume II).

⁴FEMA, *Declared Disasters by Year or State*, http://www.fema.gov/news/disaster_totals_annual.fema. Accessed April 5, 2021.

Table 2-2 FEMA Major Disaster, Emergency, and Fire Management Declarations for Deschutes 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-1510	2/19/2004	12/26/2003	1/14/2004	Severe Winter Storm	None	A, B, C, D, E, F, G
DR-4328	8/8/2017	1/7/2017	1/10/2017	Oregon Severe Winter Storms	None	B, E
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
FMA-2034	7/25/1979	7/25/1979	-	Bridge Creek Fire	None	-
FMA-2035	7/26/1979	7/26/1979	-	Sisters Fire	None	-
FMA-2046	8/27/1984	8/27/1984	-	La Pine/Wampus Butte Fire	None	-
FMA-2075	8/5/1990	8/4/1990	-	Aubrey Hall Fire	None	-
FMA-2189	8/24/1996	8/24/1996	-	Skelton/Evans West Fire	None	B
FMA-2455	7/29/2002	7/28/2002	8/1/2002	Cache Mountain Fire	None	B
FMA-2493	8/20/2003	8/20/2003	10/22/2003	Booth Fire	None	B, H
FMA-2659	7/27/2006	7/27/2006	8/14/2006	Black Crater Fire	None	B, H
FMA-2727	9/3/2007	9/2/2007	9/11/2007	GW Fire	None	B, H
FMA-5056	6/8/2014	6/7/2014	6/14/2014	Two Bulls	None	-
FMA-5196	8/17/2017	8/16/2017	9/6/2017	Milii Fire	None	-

Source: FEMA, Oregon Disaster History. Major Disaster Declarations

Vulnerability Assessment

Community vulnerabilities are an important component of the NHMP risk assessment. For more in-depth information regarding specific community vulnerabilities, reference Volume II, Hazard Annexes and Appendix C: Community Profile.

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.⁵ 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. For planning purposes, it is essential that Deschutes County and the cities of Bend, La Pine, Redmond, and Sisters

⁵ Hazards Workshop Session Summary #16, *Disasters, Diversity, and Equity*, University of Colorado, Boulder (2000).

consider both immediate and long-term socio-demographic implications of hazard resilience.

Population Vulnerabilities

- As of 2019, 19.6% of Deschutes County’s population is over the age of 64,⁶ a number that is projected to rise to 23.3% by 2035.⁷ Deschutes County’s elderly population is expected to grow to a slightly greater proportion of the population than Oregon as a whole which in 2020 had currently 18.7% of its population over the age of 64, with a projection of 22.5% by 2035.⁸
- The 2020 Deschutes County age dependency ratio is 57.1,⁹ which is higher than that of the State of Oregon (55.4); the age dependency figure for the county is expected to increase to 62.4 by the year 2035 (largely due to the growth in population over age 64), compared to 59.3 for the State of Oregon. As of 2019, La Pine has the highest age dependency ratio in the county (64.8).
- The cities of La Pine (19.2%) and Sisters (14.0%) have a high percentage of their populations over age 64 living alone.
- Even though the vast majority of the county population is reported as proficient in English, nearly 40% of Spanish speakers--the second most popular language spoken at home in the county--speak English “less than very well.” These populations would stand to benefit from mitigation outreach, with special attention to cultural, visual and technologically sensitive materials.
- Although the county has a median household income (\$67,043) almost exactly in line with the state (\$67,058); La Pine (\$37,991) has much lower median household income.
- The poverty rate of La Pine (16.8%) is almost double the county percentage (9.7%); Redmond’s poverty rate is 12.1%.
- La Pine has more than 20% of its population spending more than 35% of household income on housing (mortgage and 43% spending more than 35% of household income on rent.¹⁰
- Approximately 42% of La Pine’s population 65-74 years of age and 49% of those over 75 years of age have a disability.

⁶ Portland State University Population Research Center, Population Estimate Reports. 2020 Broad Age Groups by County. Accessed January 2021.

⁷ Portland State University Population Research Center, Population Forecasts. Deschutes County Final Forecast Tables. Accessed January 2021.

⁸ Portland State University Population Research Center, Population Forecasts. Oregon Final Forecast Table by Age. Accessed January 2021.

⁹ Dependency Ratio: the ratio of population typically not in the work force (less than 15, greater than 64); ratios have been calculated using Portland State University population data (current and forecasted).

¹⁰ U.S. Census Bureau, 2008-2012 American Community Survey, Tables B25070 & B25091.

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. A strong and diverse economic base increases the ability of individuals, families and the community to absorb disaster impacts for a quick recovery. It is imperative that Deschutes County and the cities of Bend, La Pine, Redmond, and Sisters recognize that economic diversification is a long-term issue; more immediate strategies to reduce vulnerability should focus on risk management for the dominant industries.

Economic Vulnerabilities

- According to the Oregon Employment Department, Deschutes County unemployment has decreased since 2014 when it was at 7.7% to 3.9% in 2019. It is important to note that the COVID-19 pandemic that began in 2020 likely had a drastic effect on employment rates, but annual data was not yet available at the time of writing. In the event of a large-scale disaster, unemployment has the potential to rise when businesses and companies are unable to overcome the ramifications of the hazard event.
- The largest sectors of employment in Deschutes County are Trade, Transportation, and Utilities (18.7%), Education and Health Services (16.5%), Leisure and Hospitality (15.7%), and Professional and Business Services (12.1%).¹¹
- The largest revenue sectors in Deschutes County are Retail Trade, Health Care and Social Assistance, and Wholesale Trade.¹² In the event of a natural disaster, large industries such as retail and wholesale trade may be significantly affected by a disaster as these basic industries tend to rely on a stable disposable income, which may decline following a disaster.
- In Central Oregon (Crook, Deschutes, and Jefferson Counties) the Construction (20%), Private Educational and Health Services (20%), and Information (19%) industries are expected to have the most growth from 2019 to 2029.¹³

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

¹¹ Oregon Employment Department, Current Employment Estimates (CES) 2019 <http://www.qualityinfo.org>. Accessed January 2021.

¹² U.S. Census Bureau, Economic Census 2017, Table EC1700BASIC.

¹³ Oregon Employment Department, East Cascades Industry Employment Projections 2019-2029. <http://www.qualityinfo.org>. Accessed January 2021.

support and provide space to live, work and recreate.¹⁴ 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

- Dynamic weather and relatively flat (east of the Cascades), arid land across Deschutes County are indicators of hazard vulnerability when combined with the changing climate and severe weather-related events. Both wet and dry cycles are likely to last longer and be more extreme, leading to periods of deeper drought and more frequent flooding. Less precipitation in the summers and subsequently lower soil moisture with hotter temperatures will likely increase the amount of vegetation consumed by wildfire.
- Extended drought periods affect snowpack and agricultural irrigation.
- The combination of a growing population and development intensification can lead to the increasing risk of hazards, threatening loss of life, property and long-term economic disruption if land management is inadequate.

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 of 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 could force communities to rely on local and immediately available resources.

Development

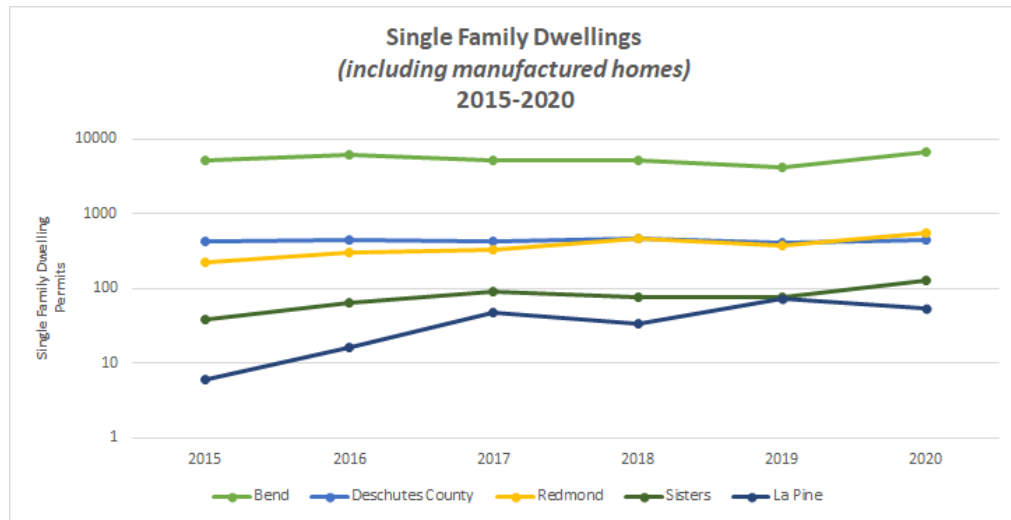
- Single-family development trends are generally stable or increasing across the jurisdictions in the past 5 years (figure 2-4 below).
- Notably, the Cities La Pine, Sisters, and Redmond have seen over a 9, 3, and 2-fold increase, respectively, in single-family building permits from 2015-2020 (figure 2-4 below).
- The Deschutes County Community Development Department (CDD) has coordinated efforts to establish planned communities with wildfire mitigation as a primary objective. In 2016, County staff facilitated the establishment of the Miller Tree Farm cluster development along the City of Bend's western Urban Growth Boundary. The Tree Farm development incorporates standards from the National Fire Protection Association (NFPA) and Firewise Communities for defensible space, fuel treatments, and construction material guidelines for all new development which occurs onsite. These standards are codified as conditions of approval for the

¹⁴ Mayunga, J. "Understanding and Applying the Concept of Community Disaster Resilience: A capital-based approach. Summer Academy for Social Vulnerability and Resilience Building," (2007).

Tree Farm master plan, and ultimately serve as a benchmark for all residential developments which occur in the Wildland Urban Interface moving forward.

- In 2019 CDD led the adoption of a new zoning district in Deschutes County. The Westside Transect Zone (WTZ) serves as a transitional buffer between the City of Bend's western edge and heavily forested parcels further west. The WTZ is a unique zone in the County and serves as a major piece of compromise legislation between various interests in the region including developers, private property owners, environmental stewardship organizations, and wildfire protection officials. The WTZ incorporates National Fire Protection Association (NFPA) and Firewise Communities standards for all new development. All land divisions which occur in the WTZ are required to submit Wildfire Mitigation Plans prepared by a professional forester, which outline the specific wildfire risks within the subdivision area, and must include direct strategies for mitigating those risks. Mitigation strategies can include a defensible space program for individual properties, roofing and other fire-resistant building material standards, and road access requirements for citizens and firefighting personnel. Measures outlined in individual Wildfire Mitigation Plans are ultimately included as conditions of approval and upheld by designated Homeowners Associations. These plans and designated mitigation actions must be evaluated on a regular basis or at the request of CDD. This ensures that any changes to wildfire risk are adequately captured and factored into new and existing development plans.
- In April 2020, the Deschutes County Wildfire Mitigation Advisory Committee presented a report to the Deschutes County Board of Commissioners with recommendations for adoption of new fire-resistant building standards, possible County-wide defensible space programs for residential development, and updates to the adopted Deschutes County Wildfire Hazard Zone. The fire-resistant building standards are based on the Oregon Building Codes Division's (BCD) updated Wildfire Hazard Mitigation standards, also known as ORSC - R327. Ultimately, CDD staff found that a majority of citizen respondents were supportive of additional building or defensible space requirements to reduce wildfire risk in Deschutes County. The results of the public outreach effort were presented to the Deschutes County Board of Commissioners in February 2021 along with a timeline for future steps to further evaluate these issues.

Figure 2-4 Deschutes County Single Family Dwellings (Permits)



Source: Deschutes County Community Development Department, 2021

Housing Vulnerabilities

- It is crucial to maintain the quality of built capacity (transportation networks, critical facilities, utility transmission, etc.) throughout the area, as poor infrastructure can negatively affect Deschutes County’s ability to cope, respond, and recover from a natural disaster.
- Mobile homes and other non-permanent residential structures account for 7% of the housing in Deschutes County. In La Pine, mobile homes account for more than 12% of all homes; in Sisters, that figure is 4.6%; Redmond, 4.7%; Bend, 5.6%.¹⁵ These structures are particularly vulnerable to certain natural hazards, such as windstorms and heavy flooding events.
- Based on U.S. Census data, almost 60% of the residential housing throughout Deschutes County was built after the current seismic building standards of 1990.¹⁶
- Approximately one-third of residential structures were constructed prior to the local implementation of the flood elevation requirements of the 1970s (county Flood Insurance Rate Maps –FIRMs- were not completed until the mid-1980s).¹⁷
- The county has one-third of its housing units occupied by renters, versus two-thirds owner-occupied.¹⁸ The cities of La Pine and Sisters have around 50% of their housing occupied by renters (La Pine 45%). Studies have shown that renters are less likely than homeowners to prepare for hazardous events.

¹⁵ U.S. Census Bureau, 2019 American Community Survey 1- and 5- Year Estimates Data Profiles, Table DP04.

¹⁶ Ibid.

¹⁷ Ibid.

¹⁸ Ibid.

- The cities of La Pine (8.3%) and Sisters (21.2%) have the highest percentages of vacant units. County-wide, more than three-fourths of all vacant housing units can be attributed to seasonal or recreational housing; this is likely due to the large number of destination resorts and resort communities in Deschutes County, including Black Butte Ranch, Eagle Crest and Sunriver.¹⁹

Critical Facilities and Infrastructure Vulnerabilities

- Some roads and bridges in the county are highly vulnerable to hazards, specifically earthquakes. Because bridges vary in size, materials, siting, and design, any given hazard will affect them differently. The county and cities should pay considerable attention to roads and bridges that may become obstructed that serve as primary interstate travel routes (Highways 97, 20/126), as this will likely have significant impacts on access in and out of the county and region. Oregon Department of Transportation has jurisdiction over highways, but the cities and county may control maintenance in and around the communities.
- Several solar power facilities have been approved and constructed in Deschutes County. There is one power plant within Deschutes County; a Pacific Power station at Mirror Pond Dam in Bend operated by Pacific Power.
- There are five dams categorized as high hazard; North Canal Diversion, Crescent Lake, Crane Prairie Dam, Wickiup Dam, and the Sunriver Effluent Lagoon. In addition, the moraine lake dam on Whychus Creek (Carver Lake) above Sisters is identified as a potential flood concern, particularly with respect to impacts to the City of Sisters Wastewater Treatment Facility (see Flood Hazard Annex in Volume II and Sisters Addendum in Volume III for more information).

National Flood Insurance Program (NFIP)

The Deschutes County Flood Insurance Rate Maps (FIRMs) were modernized in September 2007. The table below shows that as of January 2021, Deschutes County (including the incorporated cities) has 218 National Flood Insurance Program (NFIP) policies in force and eleven paid claims. The last Community Assistance Visit (CAV) for Deschutes County was on July 22, 1994 (the most recent CAV was in Sisters on April 26, 2004). The county, and cities, are not members of the Community Rating System (CRS). The table displays the number of policies by building type and shows that the majority of residential structures that have flood insurance policies are single-family homes and that there are 11 non-residential structures with flood insurance policies. According to data from 2021, the proportion of single-family homes (excluding condominiums) within the mapped special flood hazard area (SFHA, floodplain) that have flood insurance (the market penetration rate) for Deschutes County is 12.7%.

The Community Repetitive Loss record for Deschutes County, Bend, La Pine, Redmond, and Sisters identifies zero repetitive loss buildings, zero severe repetitive loss buildings, and zero total repetitive loss claims.

¹⁹ Ibid, Table B25004.

Table 2-3 Flood Insurance Detail

Jurisdiction	Current FIRM Date	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	
Deschutes	-	-	218	90	208	3	1	1	14
County*	9/28/2007	9/29/1986	126	66	126	0	0	0	11
Bend	9/28/2007	9/4/1987	60	21	50	3	1	1	1
La Pine	9/28/2007	9/28/2007	1	1	1	0	0	0	0
Redmond	9/28/2007	9/28/2007	0	0	0	0	0	0	0
Sisters	9/28/2007	9/29/1986	31	2	31	0	0	0	2

Jurisdiction	Insurance in Force	Total Paid Claims	Pre-FIRM Claims Paid	Substantial Damage Claims	Repetitive Loss Buildings	Severe Repetitive Loss Buildings	Total Paid Amount	CRS Class Rating	Last CAV
County*	\$36,129,300	3	1	0	1	0	\$15,115	NP	7/22/1994
Bend	\$21,792,700	5	4	0	0	0	\$50,392	NP	7/20/1994
La Pine	\$280,000	0	0	0	0	0	\$0	NP	NA
Redmond	\$0	0	0	0	0	0	\$0	NP	NA
Sisters	\$9,689,200	0	0	0	0	0	\$0	NP	4/26/2004

* Portion of entire county under county jurisdiction
 NP - Not Participating NA - Information not Available/ Not Applicable

Source: Information compiled by FEMA, January 2021

Vulnerability Summary

Vulnerability is a measure of the exposure of the built environment 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 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. Deschutes County and the cities of Bend, La Pine, Redmond, and Sisters evaluated the best available vulnerability data to develop the vulnerability scores presented below. For the purposes of this Plan, the county and cities utilized the Oregon Military Department – Office of Emergency Management (OEM) Hazard Analysis methodology vulnerability definitions to determine hazard probability.

The table below presents the vulnerability scores for each of the natural hazards present in Deschutes County and for participating cities. As shown in the table with **bold text**, several hazards are rated with high vulnerabilities.

Table 2-4 Community Vulnerability Assessment Summary

Hazard	Deschutes County	Bend	La Pine	Redmond	Sisters
Drought	Low	Low	Moderate	Low	Low
Earthquake (Cascadia)	High	High	High	High	High
Earthquake (Crustal)	Moderate	Moderate	Moderate	Moderate	Moderate
Flood	Low	Moderate	High	Low	High
Landslide	Low	Low	Low	Low	Low
Volcano	High	High	High	High	High
Wildfire	High	High	High	High	High
Windstorm	High	Moderate	High	Moderate	High
Winter Storm	High	High	High	High	High

Source: Deschutes County, Bend, La Pine, Redmond, and Sisters NHMP Steering Committees, 2021

Risk Analysis

The risk analysis 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 section), and (2) the likelihood or probability of the harm occurring. The table below presents the probability scores for each of the natural hazards present in Deschutes County and for the participating cities. As shown in the table with **bold text**, several hazards are rated with high probabilities.

Table 2-5 Natural Hazard Probability Assessment Summary

Hazard	Deschutes County	Bend	La Pine	Redmond	Sisters
Drought	High	High	Moderate	High	High
Earthquake (Cascadia)	Low	Low	Low	Low	Low
Earthquake (Crustal)	Low	Low	Low	Low	Low
Flood	High	High	Low	Low	High
Landslide	Low	Low	Low	Low	Low
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

Source: Deschutes County, Bend, La Pine, Redmond, and Sisters NHMP Steering Committees, 2021.

The table below presents the entire updated hazard analysis matrix for Deschutes 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 particular hazard event occurring, the vulnerability to the community, and the maximum threat or worst-case scenario, winter storm, wildfire, and windstorm events rank as the top hazard threats to the county. Droughts, volcanic events, and Cascadia Earthquake rank in the middle. Flood, crustal earthquakes, and landslides comprise the lowest ranked hazards in the county.

Table 2-6 Hazard Analysis Matrix – Deschutes County

Hazard	Maximum				Total Threat Score	Hazard Rank
	History	Vulnerability	Threat	Probability		
Winter Storm	20	50	90	70	230	# 1
Wildfire	20	50	80	70	220	# 2
Windstorm	20	40	80	70	210	#3
Drought	20	15	70	70	175	#4
Volcano	2	50	100	21	173	#5
Earthquake (Cascadia)	2	40	100	7	149	#6
Flood	8	10	40	56	114	#7
Earthquake (Crustal)	2	20	80	7	109	# 8
Landslide	20	5	20	42	87	# 9

Source: Deschutes County NHMP Steering Committee, 2021

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.

Multi-Jurisdictional 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 four participating cities in Deschutes County: Bend, La Pine, Redmond, and Sisters each held local Steering Committee meetings and completed a jurisdiction specific hazard analysis. The multi-jurisdictional risk assessment information is located within the Risk Assessment section of each city’s addendum, which is located in Volume III of this NHMP.

SECTION 3: MITIGATION STRATEGY

Section 3 outlines Deschutes 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 plan. Additional planning process documentation is in Appendix B.

Mitigation Plan Mission

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

The mission of the Deschutes County NHMP is:

To promote sound public policy designed to protect people, critical facilities, infrastructure, private property, and the environment from natural hazards.

This can be achieved by increasing public awareness, documenting the resources for risk reduction and loss-prevention, and identifying activities to guide the county towards building a safer, more disaster resistant community.

The 2021 NHMP Steering Committee reviewed the 2015 plan mission statement and agreed it accurately describes the overall purpose and intent of this Plan. This is almost the exact wording that was present in the 2015 plan, with the minor change from “protect citizens” to “protect people.” The Steering Committee recognizes that Central Oregon receives many visitors as a tourism destination. The change captures all persons located in, visiting, or planning to visit Deschutes County. The Steering Committee believes the concise nature of the mission statement allows for a comprehensive approach to mitigation planning.

Mitigation Plan Goals

Mitigation plan goals are more specific statements of direction that Deschutes 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 particular action items. The goals listed here serve as checkpoints for agencies and organizations to begin implementing mitigation action items.

The 2021 Deschutes County NHMP Steering Committee reviewed the 2015 plan goals in comparison to the 2020 State Natural Hazard Mitigation Plan goals and determined they would modify their goals to align with the latest State Natural Hazard Mitigation Plan goals.

All the Plan 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 plan goals:

- Goal 1: Protect life and reduce injuries resulting from natural hazards.
- Goal 2: Minimize property damage from natural hazards.
- Goal 3: Minimize damage to critical or essential infrastructure and services from natural hazards.
- Goal 4: Enhance the ability of Deschutes County's economy to rebound quickly from the effects of natural hazard events.
- Goal 5: Minimize project impacts to the environment and utilize natural solutions to protect people and property from natural hazards.
- Goal 6: Enhance the county's capability to implement a comprehensive county wide natural hazards mitigation strategy.
- Goal 7: Motivate the "whole community" to build resilience and mitigate against the effects of natural hazards through engagement, listening, learning, information-sharing, and funding opportunities.
- Goal 8: Eliminate development within mapped hazardous areas where the risks to people and property cannot be practicably mitigated.
- Goal 9: Minimize damage to historic and cultural resources from natural hazards.
- Goal 10: Enhance communication, collaboration, and coordination among agencies at all levels of government, sovereign tribal nations, and the private sector to mitigate natural hazards.
- Goal 11: Mitigate the inequitable impacts of natural hazards by prioritizing and directing resources and investments to build resilience in the most vulnerable populations and the communities least able to respond and recover.
- Goal 12: Develop, integrate, and align natural hazards mitigation and climate adaptation efforts based on the evolving understanding of the interrelationships between climate change and climate-related natural hazard events.
- Goal 13: Reduce repetitive and severe repetitive flood losses.
- Goal 14: Minimize or eliminate potential impacts from dams posing the greatest risk to people, property, and infrastructure.

(Note: although numbered the goals are not prioritized.)

During the Steering Committee meetings for the participating jurisdictions (Bend, La Pine, Redmond, and Sisters) the Deschutes County NHMP mission statement and goal statements were reviewed and agreed upon by each community.

Existing Mitigation Activities

Existing mitigation activities include current mitigation programs and activities that are being implemented by the county in an effort to reduce the community's overall risk to natural hazards. Documenting these efforts can assist the jurisdiction to better understand risk and can assist in documenting successes. For a comprehensive list of existing mitigation activities for each specific hazard, reference Volume II, Hazard Annexes.

Government Structure

Beyond Emergency Management, most departments within the county and city governance structures have some degree of responsibility in building overall community resilience. Each plays a role in ensuring that jurisdiction functions and normal operations resume after an incident, and the needs of the population are met. For further explanation regarding how these departments influence hazard resilience, reference Appendix C, Community Profile and within the city addenda of Volume III.

Existing Plans and Policies

Communities often have existing plans and policies that guide and influence land use, land development, and population growth. Linking existing plans and policies to the NHMP helps identify what resources already exist that can be used to implement the action items identified in the Plan. Plans and policies already in existence have support from local residents, businesses and policy makers.¹ A list documenting plans and policies already in place in the county and participating cities can be found in Appendix C, Community Profile and within the city addenda of Volume III.

Community Organizations and Programs

In planning for natural hazard mitigation, it is important to know what social systems already exist within the community because of their existing connections to the public. The county and cities 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. Appendix C, Community Profile, provides a comprehensive list of community organizations and programs, and offers a more thorough explanation of how existing community organizations and programs can be utilized for hazard mitigation.

Mitigation Plan Action Items

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. They address both multi-hazard (MH) and hazard-specific issues. Action items can be developed through a number of sources such as local reports and plans, community stakeholder engagement processes, surveys, and committee work sessions. description of how the Plan’s mitigation actions were developed is provided below.

¹ Raymond J. Burby, “Cooperating with Nature: Confronting Natural Hazards with Land-Use Planning for Sustainable Communities,” (1998).

Action Item Worksheets

Each action item has a corresponding action item worksheet describing the activity, identifying the rationale for the project, identifying potential ideas for implementation, and assigning coordinating and partner organizations. The action item worksheets can assist the community in pre-packaging potential projects for grant funding. The worksheet components are described below. These action item worksheets are located in Appendix A, Action Item Forms.

Proposed Action Title

Each action item includes a brief description of the proposed action.

Alignment with Plan Goals

The Plan goals addressed by each action item are identified as a means for monitoring and evaluating how well the mitigation plan is achieving its goals, following implementation.

Affected Jurisdiction/s

Many of the action items within this Plan apply to all of the participating cities and the county; however, some action items are specific. The list of affected jurisdictions is provided on the right side of the matrix. Each city identified as an “affected jurisdiction” will contribute to accomplishing the specified action at a local level. The action item form in Appendix A provides more detailed information.

Alignment with Existing Plans/Policies

Identify any existing community plans and policies where the action item can be incorporated. Incorporating the mitigation action into existing plans and policies, such as comprehensive plans, will increase the likelihood that it will be implemented.

The Deschutes County NHMP includes a range of action items that, when implemented, will reduce loss from hazard events in the County. Within the Plan, FEMA requires the identification of existing programs that might be used to implement these action items. Deschutes County and the participating cities currently address statewide planning goals and legislative requirements through their comprehensive land use plans, capital improvements plans, mandated standards, and building codes. To the extent possible, the jurisdictions will work to incorporate the recommended mitigation action items into existing programs and procedures. (Note: Deschutes County is currently participating in a review of their development code to determine options for improvement regarding the flood and wildfire hazards.)

Many of the recommendations contained in the Deschutes County NHMP are consistent with the goals and objectives of the existing plans and policies. Where possible, Deschutes County and the participating cities will implement the recommendations and actions contained in the NHMP 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, and can adapt easily to changing conditions and needs.² Implementing the action items contained in the NHMP through such plans and policies increases their likelihood of being supported and implemented.

Rationale or Key Issues Addressed

Action items should be fact-based and tied directly to issues or needs identified throughout the planning process. Action items can be developed at any time during the planning process and can come from a number of sources, including participants in the planning process, noted deficiencies in local capability, or issues identified through the risk assessment. The rationale for proposed action items is based on the information documented in Section II and the Hazard Annexes.

Ideas for Implementation

The ideas for implementation offer a transition from theory to practice and serve as a starting point for this Plan. This component of the action item is dynamic, since some ideas may prove to not be feasible, and new ideas may be added during the plan maintenance process. Ideas for implementation include such things as collaboration with relevant organizations, grant programs, tax incentives, human resources, education and outreach, research, and physical manipulation of buildings and infrastructure.

Coordinating (Lead) Organization

The coordinating organization is the public agency with the regulatory responsibility to address natural hazards, or that is willing and able to organize resources, find appropriate funding, or oversee activity implementation, monitoring and evaluation.

Internal and External Partners

The internal and external partner organizations listed in the Action Item Worksheets are potential partners recommended by the project Steering Committee but not necessarily contacted during the development of the Plan. The coordinating organization should contact the identified partner organizations to see if they are capable of and interested in participation. This initial contact is also to gain a commitment of time and/or resources toward completion of the action items.

Internal partner organizations are departments within the county or other participating jurisdiction that may be able to assist in the implementation of action items by providing relevant resources to the coordinating organization.

External partner organizations can assist the coordinating organization in implementing the action items in various functions and may include local, regional, state, or federal agencies, as well as local and regional public and private sector organizations.

² Ibid

Potential Funding Sources

Where possible, identify potential funding sources for the action item. Example funding sources can include: the federal Pre-Disaster Mitigation and Flood Mitigation Assistance Programs; state funding sources such as the Oregon Seismic Rehabilitation Grant Program; or local funding sources such as capital improvement or general funds. An action item may also have multiple funding sources.

Estimated Cost

A rough estimate of the cost for implementing each action item is included. Costs are shown in general categories showing low, medium, or high cost. The estimated cost for each category is outlined below:

Low – Less than \$50,000

Medium - \$50,000 - \$100,000

High – More than \$100,000

Timeline

Action items include both short and long-term activities. Each action item includes an estimate of the timeline for implementation. *Short-term action items* (ST) are activities that may be implemented with existing resources and authorities in one to two years. *Medium-term action items* (MT) may require some resource development and coordination and may take 2-5 years. *Long-term action items* (LT) may require new or additional resources and/or authorities, and may take from one to five years to implement. *Ongoing* action items signify that work has begun and will either exist over an indefinite timeline, or an extended timeline.

Status

As action items are implemented or new ones are created during the Plan maintenance process, it is important to indicate the status of the action item—whether it is new, ongoing, deferred, or complete. Documenting the status of the action will make reviewing and updating the mitigation Plan easier during the Plan’s five-year update, and can be used as a benchmark for progress. *Deferred* action items have yet to see any significant work begin on the particular action.

Priority

High priority action items are designated in order to clarify the importance of these mitigation actions for the affected jurisdictions.

Action Item Development Process

Development of action items was a multi-step, iterative process that involved brainstorming, discussion, review, and revisions. The majority of the action items were first created during the 2005 and 2010 NHMP planning processes. During those 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. In 2015, 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. In 2021, the Steering Committee reviewed the 2015 action items to provide a status update. New action items were developed by Steering Committee members and approved by the full group throughout the update process.

Action Item Matrix

The action item matrix portrays the overall action plan framework and identifies linkages between the Plan goals, partnerships (coordination and partner organizations), and actions. The matrix documents a description of the action, if the Steering Committee identified the action as high priority, the coordinating organization, partner organizations, timeline, and the Plan goals addressed. Refer to Appendix A, Action Item Forms for detailed information about each action item.

Table 3-1 Deschutes County Action Items

2021 Action Item	Priority	Proposed Action Title	Lead Agency	Partner Organization(s)	Timeline	Status	Jurisdictions					
							Deschutes County	Bend	La Pine	Redmond	Sisters	
Multihazard #1		Integrate training and education initiatives from the Deschutes County Natural Hazards Mitigation Plan into existing regulatory documents and programs where appropriate.	Deschutes County Natural Hazards Mitigation Committee	<u>Internal:</u> Emergency Services, Community Development, County Forester, Road Department, Public Works, Cities; <u>External:</u> ODF, American Red Cross, OSU Cascades	Ongoing	Ongoing	X	X	X	X	X	
MH #2		Pursue coordination of mitigation initiative development, planning, and resource allocation (funding).	Deschutes County Natural Hazards Mitigation Committee	<u>Internal:</u> Emergency Services, Community Development, County Forester, Road Department, Public Works; <u>External:</u> ODF, American Red Cross, OSU Cascades, USFS	Ongoing	Ongoing	X	X	X	X	X	
MH #3		Strengthen understanding of the probability of natural hazards by continuing to support research specific to the region.	Deschutes County Natural Hazards Mitigation Committee	<u>Internal:</u> - <u>External:</u> OSU Cascades, DOGAMI, USGS, ACOE, FEMA, DLCD, OEM, University of Oregon	Ongoing	Ongoing	X	X	X	X	X	
MH #4	X	Assess power grid and determine methods to improve resiliency and encourage community preparedness for power loss.	Deschutes County Emergency Services	<u>Internal:</u> Public Works: Planning/Roads, Deschutes County Health Services <u>External:</u> Utility Providers, U.S. DOE, OEM, OHA	Long Term	Ongoing	X	X	X	X	X	
MH #5	X	Develop continuity of operations plans to ensure continued operation in the event of a natural hazard emergency.	Deschutes County Emergency Services	<u>Internal:</u> Public Works, Planning, Roads; <u>External:</u> OEM	Long Term	Ongoing	X	X	X	X	X	
MH #6		Develop code language to mitigate the harmful impact of hazard trees located on private and/ or vacant property.	Deschutes County Emergency Services	<u>Internal:</u> County Forester, Community Development, Public Works <u>External:</u> Electric Utilities, ODF	Long Term	New	X	X	X	X	X	
MH #7		Continue and enhance windstorm resistant construction methods where possible to reduce damage to utilities and critical facilities from windstorms. In part, this may be accomplished by encouraging electric utility providers to convert existing overhead lines to underground lines.	Deschutes County Emergency Services	<u>Internal:</u> Community Development, City Community Development/ Planning, and Public Works <u>External:</u> Electric Utilities	Long Term	Ongoing	X	X	X	X	X	

Source Deschutes County NHMP Steering Committee, updated 2021

Table 3-1 Deschutes County Action Items (Continued)

2021 Action Item	Priority	Proposed Action Title	Lead Agency	Partner Organization(s)	Timeline	Status	Jurisdictions				
							Deschutes County	Bend	La Pine	Redmond	Sisters
MH #8	X	Identify, inventory and prioritize hardening of critical communications infrastructure.	Deschutes County Emergency Services	<u>Internal:</u> Deschutes County 911, Deschutes County Forester/Project Wildfire, Deschutes County Information Technology/GIS <u>External:</u> ODOT, ODF, USFS, BLM, private landowners, private infrastructure owners	Medium Term	NEW	X	X	X	X	X
MH #9		Support the development and coordination of the Regional Emergency Services Training and Coordination Center (RESTCC)	Central Oregon Intergovernmental Council	<u>Internal:</u> DCSO, Board of County Commissioners, Cities, Special Service Districts <u>External:</u> OEM, OSFM, ODF, OSP, DPSST, Governor’s Office Regional Solutions, Central Oregon Fire Management Services (COFMS), Crook County, Jefferson County, Central Oregon Fire Chief’s Association (COFCA), Central Oregon Law Enforcement Services (COLES)	Long Term	NEW	X	X	X	X	X
Drought	No action items are identified specific to this hazard. However, several multi-hazard action items address this hazard.										
Earthquake #1		Support development of in-depth studies to determine county and region’s vulnerability to earthquake.	Deschutes County Emergency Services	<u>Internal:</u> Community Development <u>External:</u> FEMA, DOGAMI, OEM, USGS, OSU Cascades	Long Term	Deferred	X	X	X	X	X
EQ #2		Seismically retrofit vulnerable facilities and infrastructure to increase their resiliency to seismic hazards. Consider both structural and non-structural retrofit options.	Deschutes County Natural Hazards Mitigation Committee	<u>Internal:</u> Public Works, Community Development, Building, Fire, Police, Sheriff <u>External:</u> Deschutes County School Districts, OEM, DOGAMI, FEMA, ODE, IFA, SHPO	Long Term	Ongoing	X	X	X	X	X

Source: Deschutes County NHMP Steering Committee, updated 2021

Table 3-1 Deschutes County Action Items (Continued)

2021 Action Item	Priority	Proposed Action Title	Lead Agency	Partner Organization(s)	Timeline	Status	Jurisdictions				
							Deschutes County	Bend	La Pine	Redmond	Sisters
EQ #3		Develop outreach strategy and increase public awareness of ShakeAlert Early Warning System in Deschutes County.	Deschutes County Emergency Services	<u>Internal:</u> Deschutes County Health Services, Deschutes County Board of County Commissioners (Communications), Deschutes County 911, incorporated cities & fire districts <u>External:</u> OEM, DOGAMI, USGS	Short Term	NEW	X	X	X	X	X
Flood #1		Continue to coordinate mitigation activities with appropriate agencies and home and business owners/groups that include an inventory of actions to or within the floodplain.	Deschutes County Community Development	<u>Internal:</u> Emergency Services, Public Works, Building Division <u>External:</u> Oregon Water Resources, DLCD, USGS, Bureau of Reclamation, DSL, USACE, ODFW, USFS	Ongoing	Ongoing	X	X	X		X
FL #2		Maintain an inventory of all permitted in-water facilities in Deschutes County.	Deschutes County Community Development	<u>Internal:</u> Emergency Services <u>External:</u> Oregon Water Resources, USGS, Bureau of Reclamation	Long Term	Deferred	X	X			
FL #3		Comply with National Flood Insurance Program to maintain participation in program.	Deschutes County Community Development	<u>Internal:</u> - <u>External:</u> DLCD, FEMA	Ongoing	Ongoing	X	X	X		X
FL #4		Update the Flood Insurance Rate Maps for Deschutes County and revisit land use codes to determine if floodplain standards are still adequate.	Deschutes County Community Development	<u>Internal:</u> - <u>External:</u> FEMA, DOGAMI, DLCD	Long Term	Ongoing	X	X	X		X
FL #5		As funding becomes available, upgrade individual properties adjacent to or within the floodplain as appropriate.	Deschutes County Community Development	<u>Internal:</u> - <u>External:</u> FEMA, DOGAMI, DLCD	Long Term	Ongoing	X	X	X		X
FL #6		Analyze and implement mitigation measures related to ice jamming that occurs during winter storm events.	Deschutes County Emergency Services/ Planning	<u>Internal:</u> Public Works, Bend Parks and Recreation District <u>External:</u> Oregon Water Resources, Pacific Power, Landowners, DLCD, DOGAMI	Long Term	Deferred	X	X			
FL #7		Re-evaluate debris flow and flood hazards along Whychus Creek from moraine-dammed Carver Lake. Depending on outcome of USAGE and USGS study, consider suitable mitigative measures in City of Sisters and Deschutes County.	Deschutes County Emergency Services	<u>Internal:</u> Community Development, Public Works; Sisters Community Development and Public Works <u>External:</u> USGS, USACE, FEMA, DOGAMI, OEM, DLCD, OSU Cascades	Long Term	Ongoing	X				X

Source: Deschutes County NHMP Steering Committee, updated 2021

Table 3-1 Deschutes County Action Items (Continued)

Source: Deschutes County NHMP Steering Committee, updated 2021

2021 Action Item	Priority	Proposed Action Title	Lead Agency	Partner Organization(s)	Timeline	Status	Jurisdictions				
							Deschutes County	Bend	La Pine	Redmond	Sisters
Landslide	No action items are identified specific to this hazard. However, several multi-hazard action items address this hazard.										
Volcano #1		Continue to support on-going study of probability of volcanic eruption and potential impact.	Deschutes County Emergency Services	<u>Internal:</u> Health Department, Community Development, Public Works <u>External:</u> USGS-CVO, DOGAMI, FEMA, OEM, USGS, OSU Cascades	Long Term	Deferred	X				
Wildfire #1	X	Expand public information/education initiatives in support of active hazardous fuels treatment.	Deschutes County Forester/ Project Wildfire	<u>Internal:</u> Emergency Services, County Forester <u>External:</u> Firewise Communities, USFS, BLM, ODF, DEQ	Ongoing	Ongoing	X	X	X	X	X
WF #2	X	Review and upgrade existing building and land use codes to address landscape, fuel amounts and structure detail that reduces the incidence or spread of wildland fire in urban/rural interface areas.	Deschutes County Community Development and County Forester	<u>Internal:</u> Community Development, County Forester, Emergency Services, Project Wildfire <u>External:</u> ODF	Ongoing	Ongoing	X	X	X	X	X
WF #3	X	Continue to prioritize and support fuels reduction projects on private lands utilizing FireFree and other programs; and identify and prioritize fuels reduction projects on public lands in the Wildland Urban Interface (WUI).	Project Wildfire	<u>Internal:</u> Community Development, County Forester, Emergency Services, Project Wildfire <u>External:</u> Firewise Communities, ODF	Ongoing	Ongoing	X	X	X	X	X
WF #4	X	Assess critical infrastructure resilience to wildfire	Deschutes County	<u>Internal:</u> Cities of Sisters, Bend, La Pine <u>External:</u> State OEM/State DLCDC	Medium Term	NEW	X	X	X		X
Winter Storm #1		Continue to coordinate mitigation activities to reduce risk to the public from severe winter storms.	Deschutes County Emergency Services	<u>Internal:</u> City and County Public Works, Public Health <u>External:</u> National Weather Service, Utility companies, Vulnerable Populations Work Group, American Red Cross, other Community Organizations Active in Disasters,	Ongoing	Ongoing	X	X	X	X	X

Table 3-1 Deschutes County Action Items (Continued)

2021 Action Item	Priority	Proposed Action Title	Lead Agency	Partner Organization(s)	Timeline	Status	Jurisdictions				
							Deschutes County	Bend	La Pine	Redmond	Sisters
WS #2		Continue public awareness of severe winter storm mitigation activities.	Deschutes County Emergency Services	<u>Internal:</u> City and County Public Works, Public Health <u>External:</u> National Weather Service, Vulnerable Populations Work Group, American Red Cross	Ongoing	Ongoing	X	X	X	X	X
WS #3		Continue to enhance coordination maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms.	Deschutes County Emergency Services	<u>Internal:</u> City and County Public Works, Public Health <u>External:</u> National Weather Service, Utilities, Vulnerable Populations Work Group, American Red Cross	Ongoing	Ongoing	X	X	X	X	X

Source: Deschutes County NHMP Steering Committee, updated 2021

SECTION 4:

PLAN IMPLEMENTATION AND MAINTENANCE

The Plan Implementation and Maintenance section details the formal process that will ensure that the MNHMP remains an active and relevant document. The Plan implementation and maintenance process includes a schedule for monitoring and evaluating the Plan 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 Plan maintenance and implementation process.

Implementing the Plan

The success of the Deschutes 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. The Plan will be formally adopted, a coordinating body will be assigned, a convener shall be designated, the identified activities will be prioritized and evaluated, and finally, the Plan will be implemented through existing plans, programs, and policies.

Plan Adoption

The Deschutes County NHMP was developed and will be implemented through a collaborative process. After the Plan is locally reviewed and deemed complete, the Deschutes County Emergency Services Manager submits it to the State Hazard Mitigation Officer (SHMO) at the Oregon Military Department – Office of Emergency Management (OEM). OEM submits the plan 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 plan via resolution. At that point the County will gain eligibility for the Building Resilient Infrastructure and Communities Grant Program funds, the Hazard Mitigation Grant Program funds, and Flood Mitigation Assistance program funds. Following adoption by the county, the participating jurisdictions should convene local decision makers and adopt the Deschutes County Multijurisdictional NHMP.

Convener

The Deschutes County Emergency Services Manager will take responsibility for plan implementation and will facilitate the Hazard Mitigation Coordinating Body meetings and will assign tasks such as updating and presenting the Plan to the rest of the members of the Coordinating Body. Plan implementation and evaluation will be a shared responsibility among all of the assigned Hazard Coordinating Body Members. The Convener's responsibilities include:

- Coordinate Steering Committee meeting dates, times, locations, agendas, and member notification;
- Documenting the discussions and outcomes of committee meetings;
- Serving as a communication conduit between the Steering Committee and the public/stakeholders;

- Identifying emergency management-related funding sources for natural hazard mitigation projects; and
- Utilizing the Risk Assessment as a tool for prioritizing proposed natural hazard risk reduction projects.

Coordinating Body

The Deschutes County Convener will form a Natural Hazard Coordinating Body for updating and implementing the NHMP. The Coordinating Body responsibilities include:

- Attending future Plan maintenance and Plan update meetings (or designating a representative to serve in your place);
- Serving 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;
- Prioritizing and recommending funding for natural hazard risk reduction projects;
- Evaluating and updating the NHMP in accordance with the prescribed maintenance schedule;
- Developing and coordinating ad hoc and/or standing subcommittees as needed; and
- Coordinating public involvement activities.

Members

The following jurisdictions, agencies, and/ or organizations were represented and served on the Steering Committee during the development of the Deschutes County NHMP (for a list of individuals see the Acknowledgements section of this NHMP):

- Deschutes County
- City of Bend
- City of La Pine
- City of Redmond
- City of Sisters
- Oregon Department of Forestry
- OSU Extension
- Oregon Water Resources Department
- Sisters-Camp Sherman Fire
- Black Butte Ranch Fire
- Bend Fire & Rescue
- Sunriver Fire
- City of Redmond Police Department
- Crooked River Ranch
- National Weather Service – Pendleton

To make the coordination and review of the Deschutes County NHMP as broad and useful as possible, the Coordinating Body will engage additional stakeholders and other relevant hazard mitigation organizations and agencies to implement the identified action items. Specific organizations have been identified as either internal or external partners on the individual action item forms found in Appendix A.

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 Plan, FEMA requires the identification of existing programs that might be used to implement these action items. Deschutes County, and the participating cities, currently addresses statewide planning goals and legislative requirements through their comprehensive land use plans, capital improvement plans, mandated standards and building codes. To the extent possible, Deschutes 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 cities and county's existing plans and policies. Where possible, Deschutes 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 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. 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 & Building Codes

For additional examples of plans, programs or agencies that may be used to implement mitigation activities refer to the list of plans in Appendix C, *Community Profile*.

Plan Maintenance

Plan maintenance is a critical component of the NHMP. Proper maintenance of the Plan ensures that this Plan will maximize the county and participating city's efforts to reduce the risks posed by natural hazards. This section was developed by Oregon Partnership for Disaster Resilience (OPDR) and was later adapted by Central Oregon Intergovernmental Council for purposes of the 2021 update. The maintenance plan includes a process to ensure that a regular review and update of the Plan occurs. The coordinating body and local staff are responsible for implementing this process, in addition to maintaining and updating the Plan through a series of meetings outlined in the maintenance schedule below.

Meetings

The Coordinating Body will meet on a **semi-annual basis** (twice per year) to complete the following tasks. The first meeting will take place in the spring, prior to the wildfire/ irrigation season. The meeting will include the County Coordinating Body, as well as the Steering Committee for the City of Bend and the City of La Pine. The second meeting of the year will take

place in early fall, following the wildfire/ irrigation season. The meeting will include the County Coordinating Body, as well as the Steering Committee for the City of Redmond and the City of Sisters.

- Review existing action items to determine appropriateness for funding;
- Educate and train new members on the Plan and mitigation in general;
- Identify issues that may not have been identified when the Plan was developed;
- Prioritize potential mitigation projects using the methodology described below;
- Review existing and new risk assessment data;
- Discuss methods for continued public involvement; and
- Document successes and lessons learned during the year.

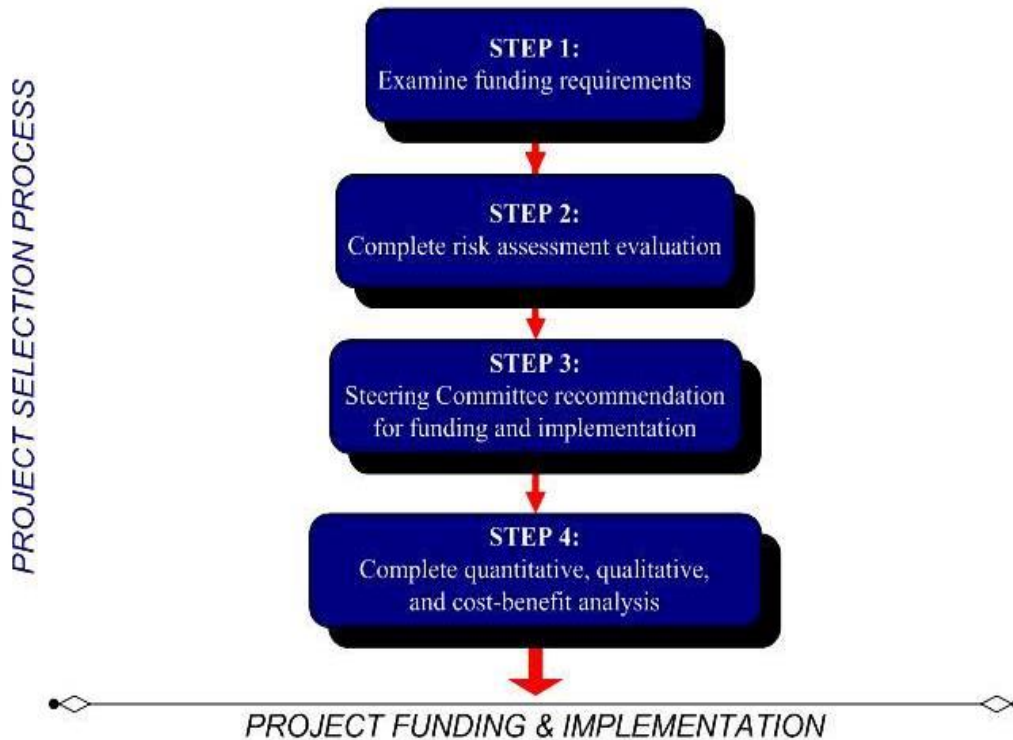
These meetings are an opportunity for the cities to report back to the county on progress that has been made towards their components of the NHMP.

The convener will be responsible for documenting the outcome of the semi-annual meetings in Appendix B. The process the Coordinating Body will use to prioritize mitigation projects is detailed in the section below. The Plan's format allows the county and participating jurisdictions 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 4-1 illustrates the project development and prioritization process.

Figure 4-1 Action Item and Project Review Process



Source: Oregon Partnership for Disaster Resilience, 2008

Step I: Examine funding requirements

The first step in prioritizing the Plan’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 Appendix E, *Grant Programs and Resources* for a more comprehensive list of potential grant programs.

Because grant programs open and close on differing schedules, the Coordinating Body will examine upcoming funding streams’ requirements to determine which mitigation activities would be eligible. The Coordinating Body 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 Coordinating Body’s semi-annual Plan maintenance meetings.

Step 2: Complete risk assessment evaluation

The second step in prioritizing the Plan'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 Coordinating Body will determine whether or not the Plan'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 Coordinating Body 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.

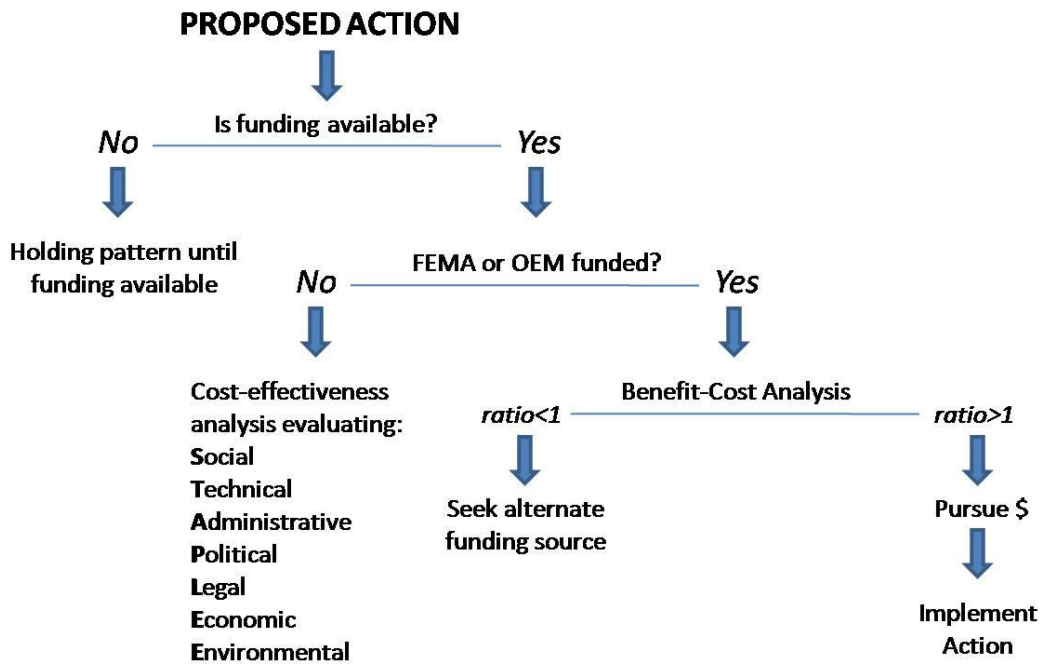
Step 3: Coordinating Body Recommendation

Based on the steps above, the Coordinating Body will recommend which mitigation activities should be moved forward. If the Coordinating Body decides to move forward with an action, the coordinating organization designated on the action item form will be responsible for taking further action and, if applicable, documenting success upon project completion. The Coordinating Body 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) benefit/cost analysis, and (2) cost-effectiveness analysis. Conducting benefit/cost 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 4.2 shows decision criteria for selecting the appropriate method of analysis.

Figure 4-2 Benefit Cost Decision Criteria



Source: Oregon Partnership for Disaster Resilience, 2010

If the activity requires federal funding for a structural project, the Coordinating Body will use a FEMA-approved cost-benefit analysis tool to evaluate the appropriateness of the activity. A project must have a benefit/cost 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 Coordinating Body 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 Deschutes County NHMP. Although members of the Coordinating Body represent the public to some extent, the public will also have the opportunity to continue to provide feedback about the Plan.

To ensure that these opportunities will continue, the County and participating jurisdictions will:

- Post copies of their plans 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, utility bills, and social media outlets to inform the public where to view and provide feedback.

In addition to the involvement activities listed above, Deschutes County will ensure continued public involvement by posting the Deschutes County NHMP on the County's website (<http://www.deschutes.org/>). The Plan will also be posted on Central Oregon Intergovernmental Council's website (<https://www.coic.org/emergency-preparedness/natural-hazard-mitigation-plans/deschutes-county-nhmp/>).

Five-Year Review of Plan

This plan will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. **The Deschutes County NHMP is due to be updated by [INSERT DATE].** The Convener will be responsible for organizing the coordinating body to address plan update needs. The Coordinating Body will be responsible for updating any deficiencies found in the Plan, and for ultimately meeting the Disaster Mitigation Act of 2000's Plan update requirements.

The following 'toolkit' can assist the Convener in determining which Plan update activities can be discussed during regularly-scheduled Plan maintenance meetings, and which activities require additional meeting time and/or the formation of sub-committees.

Table 4-1 Natural Hazards 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
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, 2021