

# Hood River County Multi-Jurisdictional Natural Hazard Mitigation Plan

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*Photos courtesy of Gary Halvorson, Oregon State Archives*

**Effective: July 8, 2025 through July 7, 2030**

Prepared for  
Hood River County  
601 State Street  
Hood River, OR 97031

Prepared by  
The University of Oregon  
Institute for Policy Research & Engagement  
School of Planning, Public Policy, and Management

This Multi-Jurisdictional Natural Hazard Mitigation Plan was prepared by:



With support from:



UNIVERSITY OF  
OREGON

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Policy and Management**

Planning grant funding provided by:



**FEMA**

Federal Emergency Management Agency (FEMA)  
Hazard Mitigation Grant Program  
Project Award Number: DR-4499-04-P-OR

Additional Support Provided by:



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# Acknowledgements

Hood River County developed this Multi-Jurisdictional Natural Hazard Mitigation Plan (NHMP) through a regional partnership funded by the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program (HMGP): DR-4499-04-P-OR. This updated NHMP is a collaboration between Hood River County and the cities of Cascade Locks and Hood River, as well as the Port of Cascade Locks, Port of Hood River, Hood River County Library District, Hood River County School District, and the West Side Rural Fire Protection District. Planning process, plan templates, and plan development support was provided by the Oregon Partnership for Disaster Resilience at the University of Oregon's Institute for Policy Research and Engagement.

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## About the Institute for Policy Research and Engagement



**School of Planning, Public  
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Institute for Policy  
Research and Engagement**

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

## About the Oregon Partnership for Disaster Resilience

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

## NHMP Template Disclaimer

This NHMP 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 Title 44 CFR Section 201.6; where language is applicable to communities throughout Oregon, OPDR encourages the use of standardized language. As part of this regional planning initiative, OPDR provided copies of the plan templates to communities for use in developing or updating their hazards mitigation plans. OPDR hereby authorizes the use of all content and language provided to Hood River County in the plan template.

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**FEMA**

July 14, 2025

Mr. Stephen Richardson  
State Hazard Mitigation Officer  
Oregon Department of Emergency Management  
3930 Fairview Industrial Dr SE  
Salem, Oregon 97302

Reference: Approval of the Hood River County Multi-Jurisdictional Hazard Mitigation Plan

In accordance with applicable<sup>1</sup> laws, regulations and policy, the Risk Analysis Branch of FEMA Region 10 Mitigation Division has approved the local mitigation plan for the following jurisdictions:

Hood River County	City of Cascade Locks	City of Hood River
Port of Cascade Locks	Port of Hood River	Hood River County Library District
Hood River County School District	West Side Rural Fire Protection District	

Mitigation plans may include additional content to meet Element H: Additional State Requirements or content the local government included beyond applicable FEMA mitigation planning requirements. FEMA approval does not include the review or approval of content that exceeds these applicable FEMA mitigation planning requirements.

The approval period for this plan is from July 8, 2025 through July 7, 2030.

The jurisdictions' plan approval ensures the eligibility for project grants under FEMA's Hazard Mitigation Assistance programs. All requests for funding are evaluated individually according to eligibility and other program requirements. Having an approved mitigation plan does not mean that mitigation grant funding will be awarded. Specific application and eligibility requirements can be found in each FEMA grant program's respective policies and annual Notice of Funding Opportunities, as applicable.

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<sup>1</sup> Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended; the National Flood Insurance Act of 1968, as amended; and National Dam Safety Program Act, as amended; 44 CFR Part 201, Mitigation Planning; and Local Mitigation Planning Policy Guide (FP-206-21-0002).

FEMA's approval is for a period of five years, effective the date FEMA received the adoption documentation. For this plan, documentation was received on July 8, 2025 and is considered approved as of then. Prior to July 7, 2030, each jurisdiction must review, revise, and submit their plan to FEMA for approval to maintain eligibility for grant funding. The enclosed plan review tool provides opportunities to incorporate into future updates.

Sincerely,

Wendy Shaw, P.E.  
Risk Analysis Branch Chief  
Mitigation Division

JF:JG

Attachment: Local Mitigation Plan Review Tool

**BEFORE THE BOARD OF COMMISSIONERS**

**OF**

**HOOD RIVER COUNTY, OREGON**

**IN THE MATTER OF ADOPTING ) RESOLUTION NO. 2606**  
**UPDATES TO THE HOOD RIVER COUNTY )**  
**MULTI-JURISDICTIONAL NATURAL )**  
**HAZARDS MITIGATION PLAN )**

**WHEREAS**, Hood River County recognizes the threat that natural hazards pose to people, property and infrastructure within our community; and

**WHEREAS**, undertaking hazard mitigation actions will reduce the potential for harm to people, property and infrastructure from future hazard occurrences; and

**WHEREAS**, an adopted Natural Hazards Mitigation Plan (NHMP) is required as a condition of future funding for mitigation projects under multiple FEMA non-disaster and disaster mitigation grant programs; and

**WHEREAS**, Hood River County fully participated in the FEMA prescribed mitigation planning process to prepare this Natural Hazards Mitigation Plan; and

**WHEREAS**, the Oregon Department of Emergency Management and Federal Emergency Management Agency, Region X officials have reviewed the Hood River County Multi-Jurisdictional Natural Hazard Mitigation Plan and pre-approved it contingent upon this official adoption of the participating governments and entities; and

**WHEREAS**, the NHMP is in an on-going cycle of development and revision to improve its effectiveness; and

**WHEREAS**, Hood River County adopts the NHMP and directs the County’s Emergency Manager to develop, approve, and implement the mitigation strategies and any administrative changes to the NHMP.

**NOW, THEREFORE, BE IT RESOLVED by the Hood River County Board of Commissioners:**

1. The Hood River County Multi-Jurisdictional Natural Hazards Mitigation Plan is hereby adopted as an official plan.

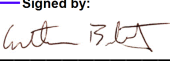
2. The Emergency Manager shall submit this Resolution to the Oregon Department of Emergency Management and Federal Emergency Management Agency, Region X officials to enable final approval of the Hood River County Multi-Jurisdictional Natural Hazards Mitigation Plan.

**ADOPTED THIS 19 DAY OF MAY, 2025.**

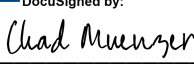
**HOOD RIVER COUNTY BOARD OF COMMISSIONERS**

Signed by:  
  
BFDFA1237C546E...  
Jennifer Euwer, Chair

Signed by:  
  
B4CB20C2CC3048C...  
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CITY OF HOOD RIVER
PORT OF HOOD RIVER
HOOD RIVER COUNTY LIBRARY DISTRICT
HOOD RIVER COUNTY SCHOOL DISTRICT
WEST SIDE RURAL FIRE PROTECTION DISTRICT

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# **Volume I: Basic Plan**

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# Plan Summary

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

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

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

## Why Develop this Mitigation Plan?

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

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

## What is Mitigation?

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

- U.S. Federal Emergency Management Agency

## Who Participated in Developing the NHMP?

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

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

Hood River County Emergency Management	Hood River County Library District
Hood River County Administration	Hood River Valley Parks and Recreation District
Hood River County Community Development Department	Columbia Area Transit
Hood River County Forestry Department	Crystal Springs Water District
Hood River County Public Health	Ice Fountain Water District
City of Cascade Locks	Mid-Columbia Economic Development District
City of Hood River	Oregon State University Extension Service
Port of Cascade Locks	Fire Adapted Communities Learning Network
Port of Hood River	Oregon Department of Transportation – Columbia River Gorge National Scenic Area
Cascade Locks Fire Department	Oregon Department of Forestry
Hood River Fire Department	Oregon State Fire Marshal’s Office
Parkdale Fire District	U.S. Forest Service – Mount Hood National Forest
West Side Fire District	
Wy’East Fire District	
Hood River County School District	Hood River Forest Collaborative

*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.*

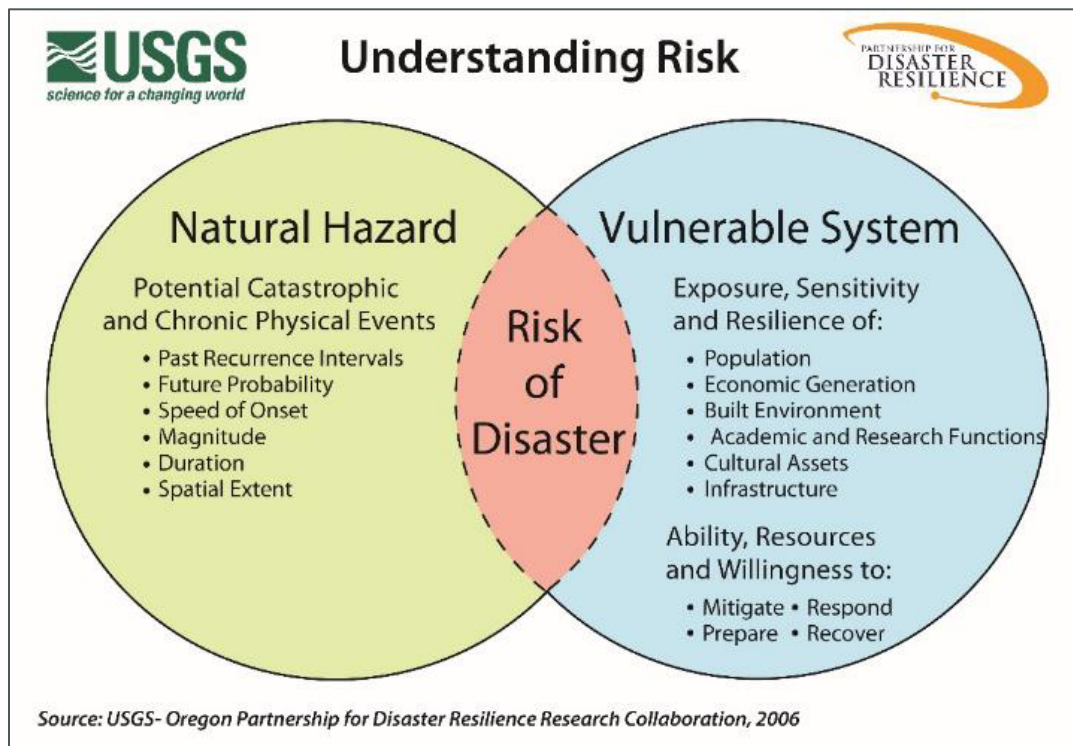
The Hood River County Emergency Manager convened the planning process and will take the lead in implementing, maintaining, and updating the County NHMP. Each of the participating jurisdictions have also named a local convener who is responsible for implementing, maintaining, and updating their addendum (see Volume III, Jurisdictional Addenda, for specific names and positions). Hood River County is dedicated to directly involving the public in the continual review and update of the NHMP. The County achieves this through systematic engagement of a wide variety of active groups, organizations, or committees, including but not limited to the Hood River County All-Lands Partnership, public and private infrastructure partners, watershed and neighborhood groups, and numerous others. The public is encouraged to provide feedback about the NHMP throughout the implementation and maintenance period.

## How does Mitigation Planning Reduce Risk?

The NHMP is intended to assist Hood River County reduce the risk from hazards by identifying resources, information, and strategies for risk reduction. It is also intended to guide and coordinate mitigation activities throughout the County. A risk assessment consists of three phases: hazard identification, vulnerability assessment and risk analysis, as illustrated in Figure PS-1.

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

**Figure PS-1 Understanding Risk**



Source: Oregon Partnership for Disaster Resilience.

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

# What is Hood River County’s Overall Risk to Hazards?

Hood River County reviewed and updated the risk assessment to evaluate the probability of each hazard as well as the vulnerability of the community to that hazard. Table PS-1 presents the updated hazard analysis matrix for Hood River County. The hazards are listed in rank order from high to low, with scores influenced by past historical events, the probability or likelihood of a hazard event occurring, the vulnerability to the community, and the maximum threat. Wildfire and Winter Storm are the two **high hazard threats** to the county. Drought, Extreme Heat, Earthquake (crustal), Air Quality/Smoke, Landslide/Debris Flow, and a Cascadia Subduction Zone (CSZ) Event are all **moderate hazard threats** to the county. Windstorm, Flood, and a Volcanic Event are the **low hazard threats** to the county.

**Table PS-1 Hazard Analysis Matrix**

Hazard	History (x2)	Probability (x7)	Vulnerability (x5)	Maximum Threat (x10)	Total Threat Score	Rank	Hazard Tier
Wildfire	9	9	9	10	226	1	High
Winter Storm	10	10	5	10	215	2	High
Drought	5	8	7	8	181	3	Moderate
Extreme Heat	4	8	5	8	169	4	Moderate
Crustal Earthquake	2	5	6	9	161	5	Moderate
Air Quality/Smoke	5	6	5	8	157	6	Moderate
Landslide/Debris Flow	6	7	3	8	156	7	Moderate
CSZ Event	2	6	6	8	156	8	Moderate
Windstorm	4	4	4	8	136	9	Low
Flood	4	6	3	7	135	10	Low
Volcanic Event	2	2	5	6	103	11	Low

Source: Hood River County Steering Committee (2025); Analysis by OPDR.

# Community Vulnerability

Community vulnerabilities are an important component of the NHMP risk assessment. For more in-depth information regarding specific community vulnerabilities, see Volume II, Appendix D. Changes to population, economy, built environment, critical facilities, and infrastructure have not significantly influenced vulnerability. New development has complied with the standards of the Oregon Building Code and the County's development code including their floodplain ordinance. Data sources for the following community vulnerability information can be found in Volume II, Appendix D unless otherwise noted below. The primary data source is the U.S. Census Bureau's American Community Survey 2018-2022.

## 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.<sup>1</sup> 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.

### Population Vulnerabilities

- Nearly 3,000 County residents (13%) are not proficient in English. Language barriers will often make it difficult to reach populations of residents who do not speak English. Resiliency efforts need to focus on targeting these populations as they will be most vulnerable and may have trouble knowing what to do in the event of a disaster.
- The countywide population has dropped 3% between 2016 and 2022; this decrease is concentrated in the rural areas of the County, as both the cities of Cascade Locks and Hood River have increased in population (12% and 8% respectively).
- The region is visited by nearly 2.5 million tourists annually,<sup>2</sup> who require education and preparedness before a hazard and special attention during one, as they can clog transportation corridors due to lack of local knowledge.
- Between 2016 and 2022, the share of households making \$100,000 or more increased significantly, accounting for 40% of the County population.
- In 2022, there were 71 individuals in the County who identify as unhoused, a 27% increase from 2020. These individuals will also require special attention in both hazard preparedness and evacuation efforts as well as outreach and education.

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<sup>1</sup> Hazards Workshop Session Summary #16: Disasters, Diversity and Equity. (2000). *Natural Hazards Center*, University of Colorado, Boulder.

<sup>2</sup> Destination Analysts (2023). *Oregon Visitor Profile Report – Mt. Hood/Columbia River Gorge: 2021-2022*. Travel Oregon.

[https://www.ci.sandy.or.us/sites/default/files/fileattachments/economic\\_development/page/9051/travel-oregon-visitor-profile-2021-22-mt-hood-columbia-river-gorge-memo-of-findings-1.pdf](https://www.ci.sandy.or.us/sites/default/files/fileattachments/economic_development/page/9051/travel-oregon-visitor-profile-2021-22-mt-hood-columbia-river-gorge-memo-of-findings-1.pdf).

## Economy

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

### Economic Vulnerabilities

- Nearly 40% of County homeowners and renters spend more than 30% of their income on housing (39% and 38%, respectively). The city with the highest percentage of renters spending 30% or more of their income on housing is Hood River (49%), while Cascade Locks has the highest share of homeowners (also 49%).
- The County unemployment rate is currently 3% after peaking at nearly 14% due to the COVID-19 pandemic. This is lower than both the state of Oregon (3.7%) and other counties in the region (4.0% in Sherman County and 3.7% in Wasco County).<sup>3</sup>
- About 44% of the workforce comes into the County from outside of the County and about 39% of the County population commutes to outside of the County for work.
- The top five industry sectors in the County with the most employees are Leisure and Hospitality (17%, or 2,327); Trade, Transportation, & Utilities (15%, or 2,131); Natural Resources and Mining (15%, or 2,060); Education and Health Services (14%, or 1,911); and Manufacturing (13%, or 1,819).
- While some sectors are growing rapidly – like Education and Health Services, up 27% in employment between 2016 and 2022 – other sectors are shrinking, including Natural Resources and Mining, which decreased 30% between 2016 and 2022.

## 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. The natural environment includes land, air, water, and other resources that support and provide space to live, work and recreate.<sup>4</sup> Natural capital such as wetlands and forested hill slopes play significant roles in protecting communities and the environment from natural 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.

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<sup>3</sup> QualityInfo.org. (2023). *Unemployment Rates (LAUS): Oregon, Hood River County, Sherman County, Wasco County*. Oregon Employment Department. Retrieved February 26, 2024, from <https://www.qualityinfo.org/uesti>.

<sup>4</sup> Mayunga, J. (2007). *Understanding and Applying the Concept of Community Disaster Resilience: A capital-based approach*. Summer Academy for Social Vulnerability and Resilience Building.

## Environmental Vulnerabilities

With four distinct mild seasons, diverse terrain, and its proximity to the Columbia Gorge, Hood River County has historically dealt with habitual severe storms and wildfires, drought, flooding, and recurring landslides. Managing natural capitals with hazards in mind can increase the county's resiliency.

## Built Environment and Physical Infrastructure

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

## Housing Vulnerabilities

- Mobile homes and other non-permanent residential structures (including RVs, vans, and boats) account for 11% of the housing in the County and up to 43% in Parkdale CDP, 39% in Odell CDP, and 33% in Mount Hood CDP. These structures are particularly vulnerable to certain natural hazards, such as earthquakes, windstorms, and heavy flooding events.
- Approximately 52% of the residential housing in the County was built before the current seismic building standards of 1976.
- More than one-third (34%) of residential structures were constructed prior to the local implementation of the flood elevation requirements of 1970 (county Flood Insurance Rate Maps – FIRMs – were not completed until 1984).
- The housing vacancy rate in the County is estimated to be 7%, or 691 units.

## Critical Facilities and Infrastructure Vulnerabilities

- Virtually all roads in the County are vulnerable to multiple natural hazards including floods, landslides, and earthquakes. Impacts to the transportation system can result in the isolation of vulnerable populations, limit access to critical facilities such as hospitals, and adversely impact local commerce, employment, and economic activity.
- Countywide, just two of the 62 bridges (3%) are considered distressed and/or deficient by ODOT. These bridges are owned by the state and the County; the two major bridges operated by the Port of Cascade Locks and Port of Hood River (the Bridge of the Gods and the Hood River-White Salmon Bridge, respectively) are categorized as distressed, though the Port of Hood River is pursuing over \$500 million in funding to replace the Hood River-White Salmon Bridge.
- Of the seven (7) dams in the County, only one – the Clear Branch Dam, also known as the Laurance Lake Dam – is assigned to the high hazard potential classification. It does not qualify for the federal Rehabilitation of High Hazard Potential Dams grant program.

# How are the Action Items Organized?

The action items are organized within an action matrix (Table 3-1) included within Volume I, Section 3.

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

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

## High Priority NHMP Actions: Hood River County

This NHMP has seven (7) **high priority** actions. Refer to Volume I, Section 3 for a complete list of County actions and Volume III for a complete list of city and special district actions.

### Multi-Hazard

- 1.1 Create countywide full-time positions to manage mitigation efforts, including sourcing funding, coordinating projects, and creating outreach materials.
- 1.2 Increase interoperability and availability by upgrading 911 Computer Assisted Dispatch (CAD), dispatch radio system, County phone systems, and resilient power and internet infrastructure.
- 1.3 Update County land use plan and zoning ordinances to mitigate natural hazard risk (particularly wildfire, landslide, and flooding).
- 1.4 Retrofit or build a new facility for use as a community shelter, 911 dispatch, emergency operations center, and/or point of distribution for emergency resources (including wildfire fighting).

### Earthquake/Cascadia Subduction Zone Event

- 4.1 Address seismic issues in identified vulnerable and critical facilities via structural and non-structural retrofits.

### Wildfire

- 9.1 Expand education and outreach to increase awareness about defensible space and preparedness.
- 9.2 Develop and conduct fuels reduction projects across Hood River County, emphasizing treatment near residential communities, energy and key structures, and forestland to reduce fire intensity and aid suppression. See countywide map and list of projects throughout the county with information on project details and locations as identified by local fire districts, ODF, and USFS in Volume IV: Community Wildfire Protection Plan.

# How will the NHMP be implemented?

Volume I, Section 4 of this NHMP details the formal process that will ensure that the Hood River County NHMP remains an active and relevant document. The NHMP will be implemented, maintained, and updated by a designated convener. The Hood River County Emergency Manager is the designated convener (NHMP Convener) and is responsible for overseeing the review and implementation processes (see jurisdictional Addenda for local conveners). The NHMP maintenance process includes a schedule for monitoring and evaluating the NHMP quarterly and producing a NHMP revision every five years. This section also describes how the communities will integrate public participation throughout the NHMP maintenance process.

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

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

## NHMP Adoption

Once the NHMP is locally reviewed and deemed complete, the NHMP Convener (or their designee) submits it to the State Hazard Mitigation Officer at the Oregon Department of Emergency Management (OEM). OEM reviews the NHMP and submits it to the Federal Emergency Management Agency (FEMA – Region X) for review. This review will address the federal criteria outlined in FEMA Interim Final Rule 44 CFR Part 201.6. Once the NHMP is pre-approved by FEMA, participating jurisdictions formally adopt the NHMP via resolution. The Hood River County NHMP Convener will be responsible for ensuring local adoption of the NHMP and providing the support necessary to ensure NHMP implementation. Once the resolution is passed at the local level and documentation is provided to FEMA, the NHMP will be formally acknowledged by FEMA. This ensures that the County (and other participating local jurisdictions) will maintain eligibility for disaster and non-disaster grants, 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, City, and special district leadership. Thorough familiarity with this NHMP will result in the efficient and effective implementation of appropriate mitigation activities and a reduction in the risk and the potential for loss from future natural hazard events.

The Steering Committees for Hood River County and participating cities and special districts each met to review the NHMP update process, and their governing bodies adopted the NHMP. The county date of adoption, FEMA approval, and plan expiration is shown below. See Volume III for dates specific to each participating city and special district.

Hood River County adopted the NHMP on **May 19, 2025**. FEMA Region X approved the Hood River County NHMP on **July 8, 2025**. With approval of this NHMP, the entities listed above are now eligible to apply for the Robert T. Stafford Disaster Relief and Emergency Assistance Act's hazard mitigation project grants through **July 7, 2030**.

# Section 1: Introduction

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

## What is Natural Hazard Mitigation?

The Federal Emergency Management Agency (FEMA) defines mitigation as “. . . the effort to reduce loss of life and property by lessening the impact of disasters . . . through risk analysis, which results in information that provides a foundation for mitigation activities that reduce risk.”<sup>5</sup> Said another way, natural hazard mitigation is a method of permanently reducing or alleviating the losses of life, property and injuries resulting from natural hazards through long and short-term strategies. Example strategies include policy changes, such as updated ordinances, projects, seismic retrofits to critical facilities and education and outreach to targeted audiences, such as Spanish speaking residents or the elderly. Natural hazard mitigation is the responsibility of the “Whole Community”: individuals, private businesses and industries, state and local governments and the federal government.

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

## Why Develop a Mitigation Plan?

Hood River County updated this Multi-Jurisdictional Natural Hazard Mitigation Plan (NHMP) 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

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<sup>5</sup> FEMA. (2024). *What is Mitigation?* <http://www.fema.gov/what-mitigation>.

public agencies, private sector organizations and residents 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 to receive federal funds for mitigation projects. Local and federal approval of this NHMP ensures that the County and listed jurisdictions will remain eligible for disaster and non-disaster grants.

## What Federal Requirements Does This NHMP Address?

DMA2K reinforces the importance of mitigation planning and emphasizes planning for natural hazards before they occur. As such, this Act established the Pre-Disaster Mitigation grant program (often referred to as the non-disaster grant program) and new requirements for the national post-disaster Hazard Mitigation Grant Program (HMGP). However, as of this plan, FEMA now organizes funding as disaster and non-disaster grants. 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 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.

Title 44 Code of Federal Regulations (CFR), section 201.6, also requires a local government to have an approved NHMP in order to receive HMGP project grants.<sup>6</sup> Pursuant of Title 44 CFR, the NHMP planning processes shall include opportunity for the public to comment on the NHMP during review and the updated NHMP shall include documentation of the public planning process used to develop the NHMP.<sup>7</sup> The NHMP update must also contain a risk assessment, mitigation strategy, and a NHMP maintenance process that has been formally adopted by the governing body of the jurisdiction.<sup>8</sup> Lastly, the NHMP must be submitted to the Oregon Department of Emergency Management (OEM) for initial review and then sent to FEMA for federal approval.<sup>9</sup> Additionally, OEM also administers the Emergency Management Performance Grant (EMPG), which helps fund local emergency management programs – and like FEMA's disaster and non-disaster grants, the EMPG requires a FEMA-approved NHMP.

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<sup>6</sup> Code of Federal Regulations, Title 44, Part 201, Section 201.6, subsection (a).

<sup>7</sup> *ibid*, subsection (b).

<sup>8</sup> *ibid*, subsection (c).

<sup>9</sup> *ibid*, subsection (d).

# What is the Policy Framework for Natural Hazard 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 and implementing ordinances that are required to comply with the statewide planning goals. The challenge faced by state and local governments is to keep this network of local plans coordinated in response to the changing conditions and needs of Oregon communities.

Statewide land use planning Goal 7: Areas Subject to Natural Hazards calls for local plans to include inventories, policies, and ordinances to guide development in or away from hazard areas. Goal 7, along with other land use planning goals, has helped to reduce losses from natural hazards. Through risk identification and the recommendation of risk-reduction actions, this NHMP aligns with the goals of the jurisdiction’s Comprehensive Plan and helps each jurisdiction meet the requirements of statewide land use planning Goal 7.

The primary responsibility for the development and implementation of risk reduction strategies and policies lies with local jurisdictions. However, additional resources exist at the state and federal levels. Some of the key state agencies in this area include Oregon Department of Emergency Management (OEM), Oregon Building Codes Division (BCD), Oregon Department of Forestry (ODF), Oregon Department of Geology and Mineral Industries (DOGAMI), and the Department of Land Conservation and Development (DLCD).

## How was the NHMP Developed?

The NHMP was developed by the Hood River County NHMP Steering Committee and the Steering Committees for the cities of Cascade Locks and Hood River as well as the Port of Cascade Locks, Port of Hood River, the Hood River County Library District, Hood River County School District, and the West Side Rural Fire Protection District. The Hood River County Steering Committee formally convened on several occasions to discuss and revise the NHMP. Each of the participating city and special district Steering Committees met formally at least once. Steering Committee members contributed data 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 NHMP. The planning process included opportunities for the public, neighboring communities, local and regional agencies, businesses, and nonprofit organizations to comment on the NHMP in the research stage and during review.<sup>10</sup>

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<sup>10</sup> Code of Federal Regulations, Chapter 44. Section 201.6, subsection (b). 2015.

Hood River County developed a survey to collect input from the public (see Volume II, Appendix G) and provided the NHMP for public comment on their website.

## How is the NHMP Organized?

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

### Volume I: Basic Plan and Appendices

#### Plan Summary

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

#### Section 1: Introduction

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

#### Section 2: Hazard Identification and Risk Assessment

This section provides the factual basis for the mitigation strategies contained in Volume I, Section 3. (Additional information is included within Volume II, Appendix D, which contains an overall description of Hood River County, incorporated cities, and several Census Designated Places.) This section includes a brief description of community sensitivities and vulnerabilities. The Risk Assessment allows readers to gain an understanding of each jurisdiction’s vulnerability and resilience to natural hazards.

A hazard summary is provided for each of the hazards addressed in the NHMP. The summary includes hazard history, location, extent, vulnerability, impacts, and probability. This NHMP addresses the following hazards (listed in alphabetical order, not by hazard tier):

- Air Quality/Smoke – *new since the previous plan*
- Cascadia Subduction Zone (CSZ) Event
- Drought
- Earthquake (crustal)
- Extreme Heat – *new since the previous plan*
- Flood

- Landslide/Debris Flow
- Volcanic Event
- Wildfire
- Windstorm
- Winter Storm

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

### Section 3: Mitigation Strategy

This section documents the NHMP vision, mission, goals, and actions (mitigation strategy) and describes the components that guide implementation of the identified actions. Actions are based on Steering Committee input, community sensitivity and resilience factors, and the risk assessments detailed in Volume I, Section 2.

### Section 4: Plan Implementation and Maintenance

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

## Volume II: Appendices

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

### Appendix A: Action Item Forms

This appendix provides more detailed information about each of the high priority actions identified in the Mitigation Strategy in Volume I, Section 3. These action item forms are intended to streamline the grant application process for the County and other jurisdictions.

### Appendix B: Glossary and Acronyms

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

### Appendix C: Planning and Public Process

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

## Appendix D: Community Profile

The community profile describes the County and participating cities from several perspectives 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.

## Appendix E: Economic Analysis of Natural Hazard Mitigation Projects

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

## Appendix F: Grant Programs and Resources

This appendix lists local, state, federal, and foundation resources and programs for funding.

## Appendix G: Community Survey

The survey was designed to get a better understanding of the community's knowledge and needs relating to natural hazard mitigation throughout the County.

## Volume III: Jurisdictional Addenda

Volume III of this NHMP is reserved for any city and special district addenda developed in this multi-jurisdictional planning process. Two cities, two ports, and three special districts within the County created addenda. As such, the five-year update cycle will be the same for these cities, special districts, and the County. Hood River County Library District, Hood River County School District, and the West Side Rural Fire Protection District each developed addenda to this plan for the first time. Future updates to the NHMP will seek to incorporate other eligible special districts in the county.

## Volume IV: Community Wildfire Protection Plan

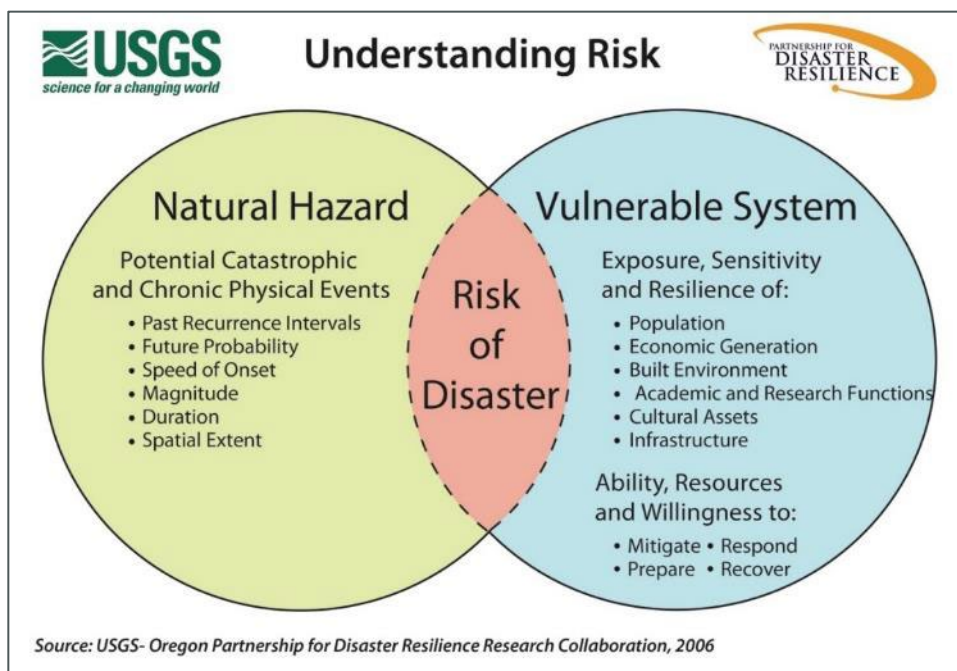
Volume IV of this NHMP contains the Community Wildfire Protection Plan (CWPP) for Hood River County, which was updated alongside the County NHMP. Applicable elements of the CWPP that comply with 44 CFR 201.6 have been incorporated (e.g., Section 4 and applicable sections with jurisdictional addenda). The CWPP volume is intended to be a standalone plan that complies with the Healthy Forests Restoration Act. Incorporating the CWPP into this NHMP increases the likelihood of receiving grant funding for fuels reduction projects and other wildfire risk reduction actions and moves the CWPP from a 10-year update timeline to more periodic updates in line with the NHMP.

# Section 2: Hazard Identification and Risk Assessment

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

This information presented in this section, along with community characteristics presented in Volume II, Appendix D, is used to inform the risk reduction actions identified Volume I, Section 2. Figure 2-1 shows how to conceptualize risk in this NHMP. 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?

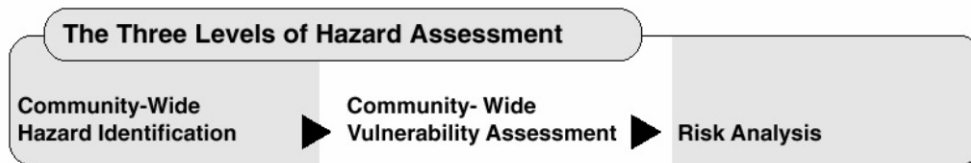
A risk assessment consists of three phases: hazard identification, vulnerability assessment, and risk analysis. Figure 2-2 illustrates the three-phase risk assessment process.

**Phase 1:** Identify hazards that can affect the jurisdiction. This includes an evaluation of potential hazard impacts – type, location, extent, etc.

**Phase 2:** Identify 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.

**Figure 2-2 Three Phases of a Risk Assessment**



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

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

## Hazard Identification

Hood River County identifies 11 natural hazards that could have an impact on participating jurisdictions (the County, cities, and special districts). Table 2-1 lists the hazards identified in the county and their general location and extent, and the hazard tier identified in the hazard risk assessment (see Table 2-2). For the purposes of this table, Earthquake (Crustal) and Cascadia Subduction Zone (CSZ) event as treated as one hazard.

**Table 2-1 Hood River County Hazard Identification**

Hazard	General Location and Extent	Hazard Tier
Wildfire	<b>Countywide;</b> steep slopes, unmanaged forests, and wind conditions intensify risk. Transportation and economic activity are both disrupted by wildfire.	High
Winter Storm	<b>Countywide;</b> severe winter storms occur annually and create dangerous driving conditions, residential isolation, and power outages.	High
Drought	<b>Countywide;</b> frequent to regular moderate droughts; affect agricultural and recreational sectors.	Moderate

**Table 2-1 Hood River County Hazard Identification**

Hazard	General Location and Extent	Hazard Tier
<b>Extreme Heat</b>	<b>Countywide;</b> defined as days with a heat index above 90 degrees; impacts many vulnerable populations, including children, houseless people, older adults, and those without air conditioning.	<b>Moderate</b>
<b>Earthquake (Crustal) and CSZ Event</b>	<b>Countywide;</b> a subduction zone earthquake would collapse buildings and damage infrastructure across the County. Crustal quake events stemming from local faults could be catastrophic to County infrastructure.	<b>Moderate</b>
<b>Air Quality/ Smoke</b>	<b>Countywide;</b> poor air quality due to wildfires elsewhere in the state, in the Western U.S., or throughout North America occur nearly annually; impacts many vulnerable populations, including children, houseless people, older adults, and those without proper air filtration.	<b>Moderate</b>
<b>Landslide/ Debris Flow</b>	Hood River County has many areas adjacent to the Columbia River Gorge where landslides have taken place; steep slopes and high precipitation increase landslide risk. Severe landslides can damage infrastructure and transportation. Heightened risk in recent wildfire burn zone.	<b>Moderate</b>
<b>Windstorm</b>	Severe winter storms occur annually and can lead to high winds along the Columbia River and in both the cities of Cascade Locks and Hood River. Winds can down trees and damage both homes and infrastructure.	<b>Low</b>
<b>Flood</b>	Rivers in Hood River County historically flood every few years. These include the Columbia River, Hood River, Indian Creek, Phelps Creek, and Herman Creek. Flood hazard areas are along the East, Middle and West forks of the Hood River, and along Emil, Odell, Baldwin, and Neal Creeks.	<b>Low</b>
<b>Volcanic Event</b>	<b>Countywide;</b> Hood River County may experience a volcanic eruption from Mt. Hood at any time, which would impact White River, Sandy, and Hood River channels with lahar flow and the rest of the county with ash fall.	<b>Low</b>

Source: Hood River County NHMP Steering Committee (2025). Analysis by OPDR.

## 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.

## Hazard Analysis Methodology

Conducting the hazard analysis is a key step in planning for hazard mitigation, response, and recovery. This method provides the jurisdiction with a sense of hazard priorities but does not predict the occurrence of a hazard. However, it does "quantify" the risk of one hazard compared to another. By doing this analysis, planning can be focused where risk is greatest.

For the purposes of this NHMP, the County, cities, and special districts utilized the Oregon Department of Emergency Management (OEM) Hazard Analysis methodology. The hazard analysis methodology in Oregon was first developed by FEMA circa 1983 and has been gradually refined by OEM over the years. The methodology produces scores that range from 24 (lowest possible) to 240 (highest possible).

Vulnerability examines both typical and maximum credible events; probability reflects 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%. In this analysis, severity ratings and weight factors are applied to the four categories of history, probability, vulnerability, and maximum threat as shown below.

## History

### Weight Factor = 2

History is the record of previous occurrences. Events to include in assessing hazard history in different jurisdictions 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 events 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 = 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 = 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 = 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 Analysis Matrix

Risk has two measurable components: (1) the magnitude of the harm that may result, and (2) the likelihood or probability of the harm occurring. Table 2-2 presents the entire updated hazard analysis matrix for Hood River County. The hazards are listed in rank order from high to low, with scores influenced by past historical events, the probability or likelihood of a hazard event occurring, the vulnerability to the community, and the maximum threat. Wildfire and Winter Storm are the two **high hazard threats** to the county. Drought, Extreme Heat, Earthquake (crustal), Air Quality/Smoke, Landslide/Debris Flow, and a Cascadia Subduction Zone Event are all **moderate hazard threats** to the county. Windstorm, Flood, and a Volcanic Event are the **low hazard threats** to the county.

**Table 2-2 Hazard Analysis Matrix**

Hazard	History (x2)	Probability (x7)	Vulnerability (x5)	Maximum Threat (x10)	Total Threat Score	Rank	Hazard Tier
Wildfire	9	9	9	10	226	1	High
Winter Storm	10	10	5	10	215	2	High
Drought	5	8	7	8	181	3	Moderate
Extreme Heat	4	8	5	8	169	4	Moderate
Crustal Earthquake	2	5	6	9	161	5	Moderate
Air Quality/Smoke	5	6	5	8	157	6	Moderate
Landslide/Debris Flow	6	7	3	8	156	7	Moderate
CSZ Event	2	6	6	8	156	8	Moderate
Windstorm	4	4	4	8	136	9	Low
Flood	4	6	3	7	135	10	Low
Volcanic Event	2	2	5	6	103	11	Low

Source: Hood River County Steering Committee (2025); Analysis by OPDR.

For local governments, conducting the hazard analysis is a useful step in planning for hazard mitigation, response, and recovery. The method provides the jurisdiction with a sense of hazard priorities but does not predict the occurrence of a particular hazard.

## Jurisdictional Specific Risk Assessment

The two participating cities and five special districts held Steering Committee meetings and completed a jurisdiction specific hazard analysis. The multi-jurisdictional risk assessment information is located herein and within the Risk Assessment of each jurisdiction’s addendum (Volume III).

## Federal Disaster and Emergency Declarations

Reviewing past events can provide a general sense of the hazards that have caused significant damage in the county. Where trends emerge, disaster declarations can help inform hazard mitigation project priorities. President Dwight D. Eisenhower approved the first federal disaster declaration in May 1953 following a tornado in Georgia. Since then, federally declared disasters have been approved in every state because of natural hazard related events. As of April 2024, FEMA has approved 41 major disaster declarations and 100 fire management assistance declarations in Oregon.<sup>11</sup> When governors ask for declarations, they stipulate which counties in their state they want included. lists the ten (10) major disasters declared in Oregon that affected Hood River County, since 1955, including severe winter and windstorms, flooding, landslides, and the COVID-19 pandemic.

**Table 2-3 FEMA Major Disaster (DR) Declarations**

Declaration Number	Declaration Date	Incident(s)	Incident(s) Period	Individual Assistance	Public Assistance Categories
DR-4768	13-Apr-24	Severe Winter Storms, Straight-line Winds, Landslides, and Mudslides	10-Jan-24 to 22-Jan-24	None	A, B, C, D, E, F, G
DR-4499	28-Mar-20	Covid-19 Pandemic	20-Jan-20 to 11-May-23	Yes	A, B
DR-4328	7-Jan-17	Severe Storms, Flooding, Landslides, and Mudslides	07-Jan-17 to 10-Jan-17	None	A, B, C, D, E, F, G
DR-4055	2-Mar-12	Severe Winter Storm, Flooding, Landslides, and Mudslides	17-Jan-12 to 21-Jan-12	None	A, B, C, D, E, F, G

<sup>11</sup> Federal Emergency Management Agency (2024). *Disaster Declarations for States and Counties: Hood River County*. Retrieved April 29, 2024, from <https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties>.

**Table 2-3 FEMA Major Disaster (DR) Declarations**

Declaration Number	Declaration Date	Incident(s)	Incident(s) Period	Individual Assistance	Public Assistance Categories
DR-1824	02-Mar-09	Sever Winter Storm, Record and Near Record Snow, landslides, and Mudslides	13-Dec-08 to 26-Dec-08	None	A, B, C, D, E, F, G
DR-1672	29-Dec-06	Severe Storms, Flooding, Landslides, and Mudslides	5-Nov-06 to 8-Nov-06	None	A, B, C, D, E, F, G
DR-1510	19-Feb-04	Severe Winter Storms	26-Dec-03 to 14-Jan-04	None	A, B, C, D, E, F, G
DR-1099	9-Feb-96	Severe Storms, Flooding	4-Feb-96 to 21-Feb-96	Yes	A, B, C, D, E, F, G
DR-413	25-Jan-74	Severe Storms, Snowmelt, Flooding	25-Jan-74	Yes	A, B, C, D, E, F, G
DR-184	24-Dec-64	Heavy Rain, Flooding	24-Dec-64	Yes	A, B, C, D, E, F, G

Source: Federal Emergency Management Agency (2024). *Disaster Declarations for States and Counties: Hood River County*. Retrieved April 29, 2024, from <https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties>.

Table 2-4 summarizes fire management assistance declarations. Fire Management Assistance (FMA) may be provided after a State submits a request for assistance to the FEMA Regional Director at the time a "threat of major disaster" for a fire emergency exists. There are four (4) fire management assistance declarations on record for the County.

**Table 2-4 FEMA Fire Management Assistance (FMA) Declarations**

Declaration Number	Declaration Date	Incident(s)	Incident(s) Period
FM-5203	03-Sept-17	Eagle Creek Fire	02-Sept-17 to 20-Sept-17
FM-5046	18-Aug-13	Government Flats Fire Complex	17-Aug-13 to 26-Aug-13
FM-2829	28-Aug-09	Microwave Fire	28-Aug-09 to 01-Sept-09
FM-2495	02-Sept-03	Herman Creek Fire	02-Sept-03 to 08-Sept-03

Source: Federal Emergency Management Agency (2024). *Disaster Declarations for States and Counties: Hood River County*. Retrieved April 29, 2024, from <https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties>.

## State Emergency Declarations

In addition to federal major disaster and fire management assistance declarations, the Governor of Oregon also issues state-level emergency declarations for natural hazard events. When issuing a declaration, the Governor specifies which counties are affected by the event. Not all events that receive a state emergency declaration receive a declaration from FEMA.

Table 2-5 lists the seven (7) natural hazard events affecting Hood River County since 2003 (the first year for which data is readily available) for which an emergency declaration was issued only by the Governor of Oregon and not FEMA.

**Table 2-5 Oregon State Emergency Declarations**

Declaration Number	Declaration Date	Incident(s)	Incident Period
23-07	9-Mar-23	Severe winter storm, heavy rain, high winds, flooding, ice accumulation, landslides, and erosion	22-Dec-22 to 6-Jan-23
22-13	25-July-22	Excessive high temperatures	25-July-22 to 30-July-22
21-26	29-July-21	Excessive high temperatures	29-July-21 to 31-July-21
21-01	04-Feb-21	Severe winter storm, heavy rains, high winds, flooding, landslides, and erosion	1-Jan-21 to 15-Jan-21
15-08	20-July-15	Drought and low water conditions	Summer 2015
14-03	30-Apr-14	Severe winter weather, landslides, snow fall, ice accumulation, and heavy rain	06-Feb-14 to 12-Feb-14
05-05	07-Apr-05	Drought and low water conditions	Summer 2005

Source: Office of Oregon Governor (2024). *Executive Orders: 2003 to Present*. Retrieved March 18, 2024, from <https://www.oregon.gov/gov/pages/executive-orders.aspx>.

## DOGAMI Risk Report

The Oregon Department of Geology and Mineral Industries (DOGAMI) conducted a multi-hazard risk assessment for Hood River County. The study was funded through the FEMA Risk MAP program and was completed in 2018. The study was updated in 2021 with additional information regarding crustal earthquake, flood, and landslide impacts. The *Natural Hazard Risk Report for Hood River County, Oregon: Including the Cities of Cascade Locks, Hood River, and Unincorporated Communities of Odell, Parkdale, and Rockford* provides a quantitative risk assessment that informs communities of their risks related to the following natural hazards: earthquake, flood, lahar (volcanic event), landslide, and wildfire. The County hereby incorporates the 2021 update to the Risk Report into this NHMP by reference to provide greater detail to hazard sensitivity and exposure. The full report can be accessed on the DOGAMI Open-File Reports webpage: <https://pubs.oregon.gov/dogami/ofr/p-OFR.htm>.

## Predicted Climate Volatility

Temperatures increased across the Pacific Northwest by 1.3°F in the period 1895–2015 (the observed record). In that same timeframe, Cascade Mountain snowpacks have declined, and higher temperatures are causing earlier spring snowmelt and spring peak streamflows. In Oregon’s forested areas, large areas have been impacted by disturbances that include wildfire in recent years, and climate change is a major factor.

The state climate change information, described in detail in the [State of Oregon’s NHMP](#), indicates that hazards projected to be impacted by climate change in the Mid-Columbia

Region (Region 5) include air quality/smoke, drought, extreme heat, and wildfire. Climate models project warmer drier summers and a decline in mean summer precipitation for Oregon. While winter storms and windstorms affect Region 5, there is little research on how climate change influences these hazards in the Pacific Northwest.

When climate variability information is available, its expected impact is noted within the “Probability” and “Vulnerability” portions of each hazard section.

As part of a FEMA non-disaster planning grant, the Department of Land Conservation and Development (DLCD) contracted with the Oregon Climate Change Research Initiative (OCCRI) to provide an analysis of predicted future climate change influences on natural hazards. OCCRI’s *Climate Change Influence on Natural Hazards in Eight Oregon Counties: Overview of County Reports*<sup>12</sup> provide important information regarding the influence and impacts of climate change on existing natural hazards events in the region such as heavy rains, river flooding, drought, heat waves, cold waves, wildfire, and air quality.

The basis of the research prepared by OCCRI uses future climate projections that are derived from 10–20 global climate models and have been “downscaled”—made locally relevant. Several climate metrics that relate to natural hazards are being calculated for historical and mid-21st century periods under two future emissions scenarios that result in varying future temperature increases for the State of Oregon.

Each county report describes county-specific projected changes in climate metrics related to the selected natural hazards. The reports present future climate projections for the 2020s (2010-2039 average) and the 2050s (2040-2069 average) compared to the 1971-2000 average historical baseline. Each hazard in the report has a box highlighting “key messages” that call out the main points of the research and analysis for that hazard.

Table 2-6 provides an overview of expected climate change impacts for Hood River County. The table shows the direction of change (increasing, decreasing, unchanging) and indicates the level of confidence in direction of change (high, medium, low). According to the OCCRI reports there is high confidence that heat waves and droughts will increase and that cold waves will decrease. The table also shows that there is medium confidence that heavy rains, river flooding, wildfire, prevalence of invasive species, and loss of wetland ecosystems will increase. The overview describes results for the natural hazards using climate metrics in summary and as a comparison. For more information, see the OCCRI report for Hood River County.<sup>13</sup>

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<sup>12</sup> Oregon Climate Change Research Initiative (2018, August). *Climate Change Influence on Natural Hazards in Eight Oregon Counties: Overview of County Reports*.

[https://www.oregon.gov/lcd/CL/Documents/OCCRI\\_PDM16\\_AllCountyOverview2018.pdf](https://www.oregon.gov/lcd/CL/Documents/OCCRI_PDM16_AllCountyOverview2018.pdf).

<sup>13</sup> Ibid; see also Dalton, M., Rupp, D., & Hawkins, L. (2018, August). *Future Climate Projections: Hood River County*. Oregon Climate Change Research Institute.

[https://www.oregon.gov/lcd/CL/Documents/OCCRI\\_PDM16\\_HoodRiverCoFutureProjections2018.pdf](https://www.oregon.gov/lcd/CL/Documents/OCCRI_PDM16_HoodRiverCoFutureProjections2018.pdf).

**Table 2-6 Overview of Expected Climate Change Impacts for Hood River County**

 Heat Waves	↑↑	 Heavy Rains	↑↑	 Poor Air Quality	↑↑
 Cold Waves	↓↓	 River Flooding	↑↑	Windstorms	=
 Drought	↑↑	 Wildfire	↑↑	Dust Storms	↓↓
		Increased Invasive Species	↑↑		
		Loss of Wetland Ecosystems	↑↑		
Level of Confidence in Direction of Change			Expected Direction of Change		
	High Confidence		Risk Increasing		↑↑
	Medium Confidence		Risk Decreasing		↓↓
	Low Confidence		Risk Unchanging		=

Source: Oregon Climate Change Research Initiative (2018, August). *Climate Change Influence on Natural Hazards in Eight Oregon Counties: Overview of County Reports*.  
[https://www.oregon.gov/lcd/CL/Documents/OCCRI\\_PDM16\\_AllCountyOverview2018.pdf](https://www.oregon.gov/lcd/CL/Documents/OCCRI_PDM16_AllCountyOverview2018.pdf).

# Hazard Profiles

The following subsections describe the characteristics, location, extent, history, and probability for each hazard addressed in the Hood River County NHMP. The hazards are discussed alphabetically rather than in order of their Total Threat Score, as determined by the 2025 Hood River County Steering Committee. Probability is described and uses the OEM Methodology; see the full description of this methodology in Volume I, Section 2, Risk Assessment. Locally specific vulnerabilities are also described.

These subsections comprise and provide a risk analysis for the natural hazards identified by Hood River County. For additional background on the hazards, vulnerabilities, and general risk assessment information for hazards in the Mid-Columbia Region (Region 5), refer to the [State of Oregon NHMP, Region 5, Mid-Columbia Region Risk Assessment](#).

Notable changes to this section include:

- Adding two hazards new to this plan: air quality/smoke and extreme heat.
- Updating the hazard history for all hazard types except volcano.
- Incorporating new crustal earthquake, flood, and landslide probability and vulnerability information based on the 2021 DOGAMI Risk Report update.
- Adding additional information on wildfire based on the simultaneous Community Wildfire Protection Plan (CWPP) update process.
- Updating previously included statistics and information with the most current data.

Changes to each hazard sub-section are noted at the beginning of each sub-section.

# Air Quality/Smoke

## Significant Changes since Previous NHMP:

The Air Quality/Smoke hazard is a new addition to the Hood River County NHMP with the 2025 update.

Development forecasts are not expected to increase or decrease the impact of this hazard. However, the population of adults aged 65 and older is increasing within this jurisdiction. As a result, the impact of this hazard may increase.

## Characteristics

Air Quality is impacted by airborne particles like dust, soot, smoke, and droplets. These particles can be measured by the amount of particulate matter or “PM” in the air. PM is a mixture of not only very small particles and liquid droplets but also many different components like acids, organic chemicals, metals, and dust. PM is measured in micrometers (microns,  $\mu\text{m}$ ). PM<sub>2.5</sub> is less than or equal to 2.5 $\mu\text{m}$  in diameter. Health studies show that there are harmful effects from breathing PM particles. PM can be inhaled deep into the lungs and can lodge there for weeks and months, aggravating asthma, heart disease, and other respiratory and heart conditions.<sup>14</sup>

The Clean Air Act of 1970 and the U.S. Environmental Protection Agency (EPA) established health-based National Ambient Air Quality Standards (NAAQS) for these relevant air pollutants:

- **Carbon Monoxide:** Carbon monoxide (CO) is a colorless and odorless gas that interferes with the body’s ability to use oxygen. CO in ambient air is formed primarily by the incomplete combustion of carbon-containing fuels and photochemical reactions in the atmosphere, with on-road mobile sources representing significant sources of CO to ambient air. Microenvironments influenced by on-road mobile sources are important contributors to ambient CO exposures, particularly in urban areas. Where present, other (non-ambient) CO sources can also be important influences on total CO exposure and on the impact of ambient CO exposure.
- **Ozone:** Ozone (O<sub>3</sub>) is part of the ozone layer in the Earth’s stratosphere. Ozone is harmful outside of the ozone layer in our lower atmosphere and at that point it is often referred to as smog, ground level ozone, or ozone pollution. Ozone typically forms on days when the temperature is warm and stable. Ground level ozone is not emitted directly into the air but is instead created by chemical reactions between oxides of nitrogen (NO<sub>x</sub>) and volatile organic compounds (VOC) in the presence of sunlight. Emissions from industrial facilities and electric utilities, motor vehicle exhaust, gasoline vapors, and chemical solvents are some of the major sources of

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<sup>14</sup> Oregon Department of Environmental Quality (n.d.). *Particulate Matter*. <https://www.oregon.gov/deq/ag/pages/particulate-matter.aspx>.

NOx and VOC. Breathing ozone can trigger a variety of health problems, particularly for children, the elderly, and people of all ages who have lung diseases such as asthma. Ground level ozone can also have harmful effects on sensitive vegetation and ecosystems.

- **Particulate Matter:** Particulate matter (PM10 and PM2.5) is the generic term for a broad class of chemically and physically diverse substances that exist as discrete liquid and/or solid particles over a wide range of sizes. PM particles originate from a variety of anthropogenic stationary and mobile sources, as well as from natural sources; they are mostly from smoke, dust, and vehicle exhaust. Particles may be emitted directly or formed in the atmosphere by transformations of gaseous emissions such as sulfur oxides (SOX), NOX, and VOCs.

The Oregon Department of Environmental Quality (DEQ) is a regulatory agency with the responsibility to protect and enhance the quality of Oregon's environment. DEQ is responsible for providing accurate scientific data concerning the State of Oregon's air quality to ensure that the state meets the NAAQS set by the EPA. Regions that fail to meet the NAAQS are designated "non-attainment" and are required to develop plans to come into compliance with the standards. Once compliance with the standard is achieved, a maintenance plan is developed to safeguard against future compromised air quality.

## Location and Extent

The entire County can experience air quality or smoke hazard events. The strength or magnitude of the hazard is variable. Factors that contribute to variability include direction and strength of prevailing winds, temperature, and emissions from wood stoves, industry, motor vehicles, and wildfires. In the past, the largest sources of air pollution in the region included industry and residential wood stoves, which emit both particulate matter and carbon monoxide. More recently, however, concerns for air quality arise when smoke from regional wildfires blows through the Columbia Gorge.

## History

Prior to 2020, the Columbia Gorge region only had a single air quality monitor located in The Dalles in Wasco County. However, in the years since, Smoke Ready Gorge, operated by the OSU Extension Service, has installed air quality monitors throughout the region and developed a Community Response Plan for Hood River and Wasco counties. More information on Smoke Ready Gorge's work can be found on [their website](#).

This lack of data significantly limits the ability to quantitatively evaluate this hazard and its history in Hood River County. However, data from the monitor in The Dalles since 2014 is shown in the air quality/smoke hazard history in Table 2-7. This data should be used for planning purposes only, as they are not fully verified or validated.

Note that this data is for PM2.5 and PM10, as there were no significant carbon monoxide or ozone events to include. Only days with an Air Quality Index (AQI) of above 100 are included, as this level of poor air quality is deemed Unhealthy for Sensitive Groups by the U.S. EPA.<sup>15</sup>

**Table 2-7 Air Quality/Smoke Hazard History Events**

Year/Date	Description
Aug. 2023	Three-day stretch with AQI reaching 224. Caused by smoke from fires throughout Canada as well as the 2023 Camp Creek Fire in Multnomah County (which burned a small area but produced a significant amount of smoke) and the 2023 Oregon and Gray fires near the city of Spokane in Washington state.
Aug. 2021	One-day peak with an AQI of 159.
Sept. 2020	Four-day stretch with AQI reaching 412 (worst recorded AQI since 2014). Caused by smoke from the 2020 Labor Day Fires that occurred throughout Oregon. This is the worst fire season on record for the state.
Aug. 2018	Three-day stretch with AQI reaching 158. Caused by smoke from fires throughout central and eastern Oregon.
Sept. 2017	A more than two-week stretch with AQI at or above 100 and reaching 191. Caused by the 2017 Eagle Creek Fire in Hood River and Multnomah counties. This fire nearly reached the city of Cascade Locks and forced evacuations throughout Hood River County and the surrounding region.
Aug. 2017	Two-day stretch with AQI reaching 122. Caused by smoke from fires throughout central and eastern Oregon.
Aug. 2015	Two-day stretch with AQI reaching 131. Caused by smoke from fires throughout central and eastern Oregon.
Sept. 2015	Two-day stretch with AQI reaching 149. Caused by smoke from fires throughout central and eastern Oregon.
Feb. 2015	Two-day stretch with AQI reaching 211.

Source: World Air Quality Index Project (2024). *The Dalles, Oregon Air Pollution: Real-time Air Quality Index (AQI)*. <https://aqicn.org/city/usa/oregon/the-dalles/>; Oregon Department of Environmental Quality (2024, March). *Wildfire Smoke Trends and the Air Quality Index: Data from 1985-2023*. <https://www.oregon.gov/deq/wildfires/Documents/wf2024wfTrendsRep.pdf>.

Note: The data from this source is pulled from both the Oregon Department of Environmental Quality and the U.S. EPA.

## Probability

Based on the available data and research, the NHMP Steering Committee rated the probability of occurrence as “moderate”, meaning one incident in the next 35 to 75 years may occur. Major air quality/smoke events occur every few years within the region, and while they are generally not long lasting, they are growing in both intensity and occurrence as wildfires continue to intensify in the region, in Oregon, and across the Western U.S.

### Future Projections

The [OCCRI Report](#) describes that the risk for major air quality/smoke events in Hood River County is increasing as the likelihood of significant wildfire events increases.

<sup>15</sup> Oregon Department of Environmental Quality (2024, March). *Wildfire Smoke Trends and the Air Quality Index: Data from 1985-2023*. <https://www.oregon.gov/deq/wildfires/Documents/wf2024wfTrendsRep.pdf>.

Increasingly poor outdoor air quality will have exponentially high impacts upon those living in older homes, manufactured housing, RVs, and campgrounds, or the unhoused. The need to install new or upgraded air conditioning systems or HVAC filtration systems will impact the cost of housing.

## Vulnerabilities

Due to insufficient data, Hood River County is currently unable to perform a quantitative risk assessment or exposure analysis for this hazard. However, based on the potential impacts discussed in this section, **the NHMP Steering Committee rated the vulnerability to air quality/smoke events as “moderate”**, meaning that between 1-10% of the region’s population or assets could be affected by a major disaster.

The DOGAMI Risk Report does not describe air quality/smoke impacts.

Air pollution affects health in several ways. Impacts range from upper respiratory tract irritation, coughing and shortness of breath to aggravating conditions such as asthma, emphysema, and bronchitis. Long-term exposure to PM2.5 is associated with reduced lung function, development of chronic bronchitis, heart disease and premature death. The small size of these particles allows them to get deep into the lungs and reach the bloodstream.

Exposure to Carbon Monoxide can reduce the oxygen-carrying capacity of the blood. People with heart disease already have a reduced capacity for pumping oxygenated blood to the heart, which can cause them to experience myocardial ischemia (reduced oxygen to the heart), often accompanied by chest pain (angina), when exercising or under increased stress. For these people, short-term CO exposure further affects their body’s already compromised ability to respond to the increased oxygen demands of exercise or exertion.

Exposure to ground-level Ozone can aggravate asthma and cause respiratory symptoms like coughing and lung inflammation. Repeated exposure may cause permanent damage to lung tissue. While the effects of acute, short-term episodes of ozone exposure are reversible, the human body’s response to long-term exposure may not be reversible. Exposure to ozone at commonly encountered levels permanently scars lungs, causing long-term impairment of lung capacity, or the volume of air that can be expelled from fully inflated lungs. Ozone may have similar effects on human lungs. Studies in animals also suggest that ozone may reduce the human immune system’s ability to fight bacterial infections in the respiratory system.

Exposure to Particulate Matter is directly linked to the size of the PM regarding their potential for causing health problems. Small particles less than 10 micrometers in diameter pose the greatest problems, because they can get deep into lungs and the bloodstream. Exposure to such particles can affect both the lungs and heart. People with heart or lung diseases, children, and older adults are the most likely to be affected by particle pollution exposure. Numerous scientific studies have linked particle pollution exposure to problems, including premature death in people with heart or lung disease, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, and increased respiratory symptoms, such as irritation of the airways, coughing or difficulty breathing.

In addition to these health impacts, air quality is also a constraining factor on transportation choices and commercial/industrial development. Cars, trucks, industry and commerce and diverse activities discharge pollutants into the air, while individuals who commute via walking, cycling or public transportation may be unable to safely travel to and from work. Poor air quality may have a significant impact on the economic life of Hood River County. Travel Oregon studies suggest that outdoor recreation drives about 50% of the tourism to the County. It is not known how air quality/smoke events affect visitor numbers.<sup>16</sup>

## Drought

### Significant Changes since Previous NHMP:

The hazard history was updated with hazard events through 2024. Several other points of data throughout this section were also updated with the most recently available data. Additionally, new figures and data were incorporated to replace the now defunct data source previously used to demonstrate water availability in the region.

No development or population changes affected the jurisdiction's overall vulnerability to this hazard. In addition, development and population forecasts are not expected to increase or decrease the impact of this hazard.

**Vulnerability was increased from “moderate” to “high”.**

## Characteristics

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

## Location and Extent

Droughts occur throughout Hood River County and may have profound effects on the economy, particularly the agricultural and recreation sectors. Drought is typically measured in terms of water availability and expressed with a numerical index that ranks severity. Most federal agencies use the Palmer Method, which incorporates precipitation, runoff, evaporation, and soil moisture. However, the Palmer Method does not incorporate

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<sup>16</sup> Destination Analysts (2023). *Oregon Visitor Profile Report – Mt. Hood/Columbia River Gorge: 2021-2022*. Travel Oregon.

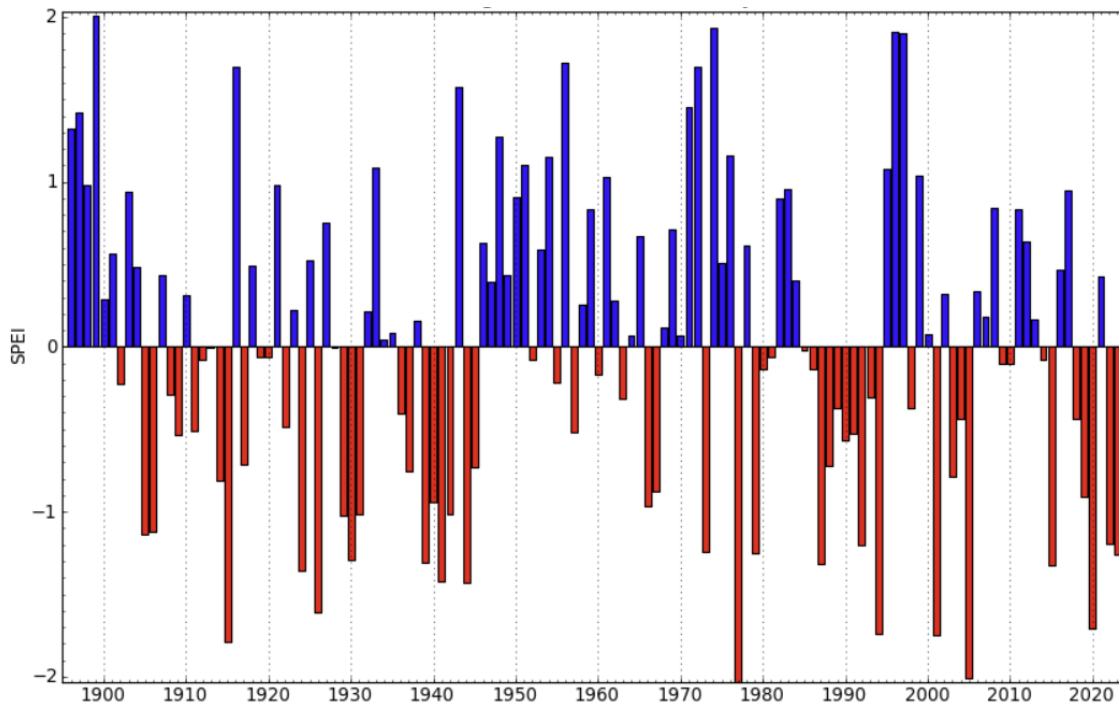
[https://www.ci.sandy.or.us/sites/default/files/fileattachments/economic\\_development/page/9051/travel-oregon-visitor-profile-2021-22-mt-hood-columbia-river-gorge-memo-of-findings-1.pdf](https://www.ci.sandy.or.us/sites/default/files/fileattachments/economic_development/page/9051/travel-oregon-visitor-profile-2021-22-mt-hood-columbia-river-gorge-memo-of-findings-1.pdf).

snowpack and is therefore not believed to provide an accurate indication of drought conditions in Oregon. The 2018 NHMP used the Surface Water Supply Index (SWSI), current water conditions with parameters derived from snow, precipitation, reservoir, and stream flow data gathered monthly from stations. SWSI has since been discontinued.

This update to the NHMP uses the Standardized Precipitation-Evapotranspiration Index (SPEI) as reported by the Western Regional Climate Center. The SPEI, utilized in other county NHMPs and the Oregon NHMP, is an index of water conditions throughout the state that is designed to account for precipitation and evapotranspiration to determine drought. Extreme drought occurs below a SPEI value of -2.0, severe drought between -2.0 and -1.5, and moderate drought between -1.5 and -1.0.

Figure 2-3 shows the water year (October 1 – September 30) history of SPEI from 1895 to 2023 for Hood River County. The SPEI record indicates that the County has experienced extreme drought in two (2) years (1977 and 2005); severe drought in five (5) years (1915, 1926, 1994, 2001, 2020); and a total of 17 years of moderate drought.

**Figure 2-3 Standardized Precipitation-Evapotranspiration Index, 12-Months Ending in September – Hood River County (1895-2023)**



Source: Western Regional Climate Center (2024). *WestWideDroughtTracker – Hood River County*. Retrieved October 16, 2024, from <https://wrcc.dri.edu/wwdt/time/>.

## History

The drought history in Hood River County and the surrounding region is characterized by several extreme droughts along with periods of frequent moderate droughts. Table 2-8 lists significant drought events for Hood River County and the surrounding region.

**Table 2-8 Drought Hazard History Events**

Year	Location	Description
2021	Hood River County and surrounding region	Received USDA federal disaster declaration as a Primary Natural Disaster Area.
2015	Hood River County; also affected Curry and Union counties	Drought lasted from July through December. Received state disaster declaration (15-08).
2005	Hood River County and surrounding region	Drought lasted from April through December. Received state disaster declaration (05-05).
2001-03	Affected half (18) of Oregon counties, including Wasco County	Drought lasted from May 2001 through June 2003. Received state disaster declaration (01-05).
1992	Hood River County and surrounding region	Drought lasted from September through October. Received state disaster declaration (92-21).
1976-77	Affected more than half (19) of Oregon counties, including Wasco County	Intense statewide drought with significant agricultural damage. Received federal disaster declaration (EM-3039). <b>Declaration did not include Hood River County but the County was still impacted severely by this drought.</b>
1965-68	Hood River County and surrounding region	Three-year drought following major regional floods of 1964-65.
1939-41	Hood River County and surrounding region	Three-year drought, with worst impacts in Hood River County from 1939 through 1940.
1904-05	Hood River County and surrounding region	18-month drought.

Source: Office of Oregon Governor (2024). *Executive Orders: 2003 to Present*. Retrieved March 18, 2024, from <https://www.oregon.gov/gov/pages/executive-orders.aspx>; Federal Emergency Management Agency (2024). *Disaster Declarations for States and Counties: Hood River County*. Retrieved April 29, 2024, from <https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties>; Oregon Water Resources Department (2024). *Public Declaration Status Report: Hood River County Drought Declarations*. Retrieved August 22, 2024, from [https://apps.wrd.state.or.us/apps/wr/wr\\_drought/declaration\\_status\\_report.aspx](https://apps.wrd.state.or.us/apps/wr/wr_drought/declaration_status_report.aspx).

## Probability

Increased droughts may occur in the Mid-Columbia region because of various factors, including reduced snowpack, rising temperatures, and likely reductions in summer precipitation and glacial melt supplementing water supply. The [OCCRI report](#) suggests that Hood River County will see a mean project increase in average temperatures of 3.7 to 4.9°F by the 2050s. Moreover, spring snowpack, summer runoff, and summer soil moisture are all projected by the 2050s, leading to the magnitude of low summer soil moisture, low spring snowpack, and low summer runoff occurring much more frequently. This combination of factors significantly exacerbates the likelihood of drought.

History and climate models suggest a high probability of occurrence. Based on the available data and research, **the NHMP Steering Committee rated the probability of occurrence as “moderate”**, meaning one incident in the next 35 to 75 years may occur.

### **Future Projections**

As stated, the [OCCRI Report](#) states that the risk of drought is increasing in Hood River County due to rising temperatures and low levels of snowpack and summer runoff. Increasingly frequent droughts will have economic and social impacts upon those who depend upon predictable growing periods (e.g., ranches, farms, vineyards, and gardeners) as well as upon the price and availability of fresh vegetables. It may also stress the ability of local water and irrigation districts to provide water for agricultural, commercial, and residential use.

## **Vulnerabilities**

All parts of Hood River County are susceptible to drought. However, the following areas and issues are of particular concern:

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

The DOGAMI Risk Report does not describe drought impacts.

Potential impacts from drought include community water shortages, limited recreation appeal, and crop loss. Longer and drier growing seasons will result in increased demand on ground water resources and increased consumption of water for irrigation, which will have potential consequences for natural systems as well as increase irrigation costs. Direct environmental effects also include livestock death or decreased production, wildland fire, impaired productivity of forest land, damage to fish habitat, loss of wetlands, and decreased air quality. Drought is also associated with insect infestation, disease, and wind erosion. Indirect effects to society include the economic and physical hardships brought on by drought and by the increased stress on residents of a drought-stricken area. Long-term drought periods of more than a year can impact forest conditions and set the stage for potentially destructive wildfires.

All the above effects result in economic and revenue losses for business, cities and the County. In Hood River County, economic losses in the recreation and agricultural sectors would be most significant. As growth places more pressure on limited local resources, future impacts may be greater, and the long-term impacts of a lengthy drought would be significant. As a result, **the NHMP Steering Committee rated the vulnerability to drought events as “high”**, meaning that 10% or more of the region’s population or assets could be affected by a major disaster.

However, given current available data, no quantitative assessment of the risk of drought was possible at the time of this NHMP update. Assessing the risk to the County from drought should remain an ongoing process determined by community characteristics and physical vulnerabilities.

# Earthquake (Cascadia Subduction Zone and Crustal)

## Significant Changes since Previous NHMP:

The hazard history was updated with historic hazard events not recorded in the previous NHMP. Several other points of data throughout this section were also updated with the most recently available data. This includes the seismic retrofit status of several public buildings.

No development or population changes affected the jurisdiction's overall vulnerability to this hazard. In addition, development and population forecasts are not expected to increase or decrease the impact of this hazard.

## Characteristics

The Pacific Northwest in general is susceptible to earthquakes from four sources: 1) the offshore Cascadia Subduction Zone; 2) deep intraplate events within the subducting Juan de Fuca Plate; 3) shallow crustal events within the North American Plate, and 4) earthquakes associated with volcanic activity. All types of earthquakes in the region are related to the subducting, or diving, of the dense, oceanic Juan de Fuca Plate under the lighter continental North American Plate.

The greatest earthquake risk to Oregon is infrequent megathrust earthquakes in the Cascadia Subduction Zone (CSZ). The other major hazard comes from smaller crustal earthquakes on faults near populated areas, which include all of Oregon's damaging historic earthquakes. Intraplate earthquakes, which have been historically damaging in the Puget Sound area, are possible in Oregon, but no damaging prehistoric or historic events are known.

**Cascadia Subduction Zone (CSZ):** A CSZ quake event occurs when two converging plates become stuck along their interface, build up energy across the locked surface, and then abruptly slip, releasing the strain. The zone is where the oceanic Juan de Fuca plate slides beneath the continental North American plate at a rate of 1.5 inches per year. The fault is usually locked, so that rather than sliding slowly and continuously, the 1.5 inches per year of subduction motion builds tremendous stress along the fault. This stress is periodically released in a megathrust earthquake, which can have a magnitude anywhere from 8.3 to 9.3.<sup>17</sup> A CSZ earthquake, and the ground shaking, subsidence, land sliding, liquefaction, and tsunamis that would accompany one are catastrophic hazards.<sup>18</sup>

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<sup>17</sup> Magnitude is the measure of the strength of an earthquake, or the strain energy released by it, as determined by seismographic observations. The Richter Scale is the best known of several measurement methods, and measures magnitude in whole numbers and decimal fractions. Due to its logarithmic base, each whole number increase in magnitude represents a tenfold increase in energetic amplitude. Each whole number increase in the magnitude scale corresponds to the release of approximately 31 times more energy.

<sup>18</sup> Allan, J. & Gabel, L. (2022, June). *DOGAMI Fact Sheet: Cascadia Earthquake Knowledge Points for Emergency Managers and the Public*. Oregon Department of Geology and Mineral Industries. <https://pubs.oregon.gov/dogami/fs/cascadia-planning-for-em-and-public.pdf>.

A northwest CSZ earthquake has not occurred locally since the 1700s. The CSZ closely mirrors the subduction zone in northern Japan that produced the 2011 Tohoku magnitude 9 earthquake and associated tsunami. Geologic evidence indicates that the Cascadia Subduction Zone has generated great earthquakes at roughly 500-year intervals, most recently about 300 years ago. The calculated odds that a Cascadia earthquake will occur in the next 50 years range from 7-12 percent for a great earthquake (magnitude 9+) affecting the entire Pacific Northwest to 37-43 percent for a very large earthquake (magnitude 8+) affecting southern Oregon and northern California.<sup>19</sup>

**Crustal or Shallow Faults:** Shallow or crustal quakes, 5 to 10 miles beneath the earth’s surface, occur regularly, with minimal to moderate severity, in Hood River County. Crustal earthquakes occur due to much smaller faults located in the North American plate. These are the more familiar “California-style” earthquakes with magnitudes in the 5 to 7 range. Although smaller than megathrust earthquakes, crustal earthquakes may occur closer to population centers, and can produce severe shaking and damage in localized areas. For many parts of eastern Oregon, crustal faults dominate the hazard, and they may also have a significant impact in the Portland region and Willamette Valley. Because only certain faults have been studied in detail and determined to be active, there may be many more crustal faults in the region capable of producing earthquakes which have not yet been identified.<sup>20</sup>

## Location and Extent

**Cascadia Subduction Zone (CSZ):** Hood River County lies within the geographical area bordering the CSZ, which is located 50 miles off the Oregon shoreline. This zone is comprised of an 800-mile sloping fault and several smaller inland and offshore faults extending from Vancouver Island in British Columbia to Cape Mendocino in Northern California. The fault system separates the Juan de Fuca and North American plates. The Cascadia Subduction Zone earthquake would impact the entire state, including Hood River County.<sup>21</sup> Hood River County borders the eastern and valley zones of Oregon; shaking will be mild to strong, landslides and liquefaction sporadic, and damage moderate. Map 2-1 shows that the County may experience “moderate” to “severe” shaking lasting two to four minutes.

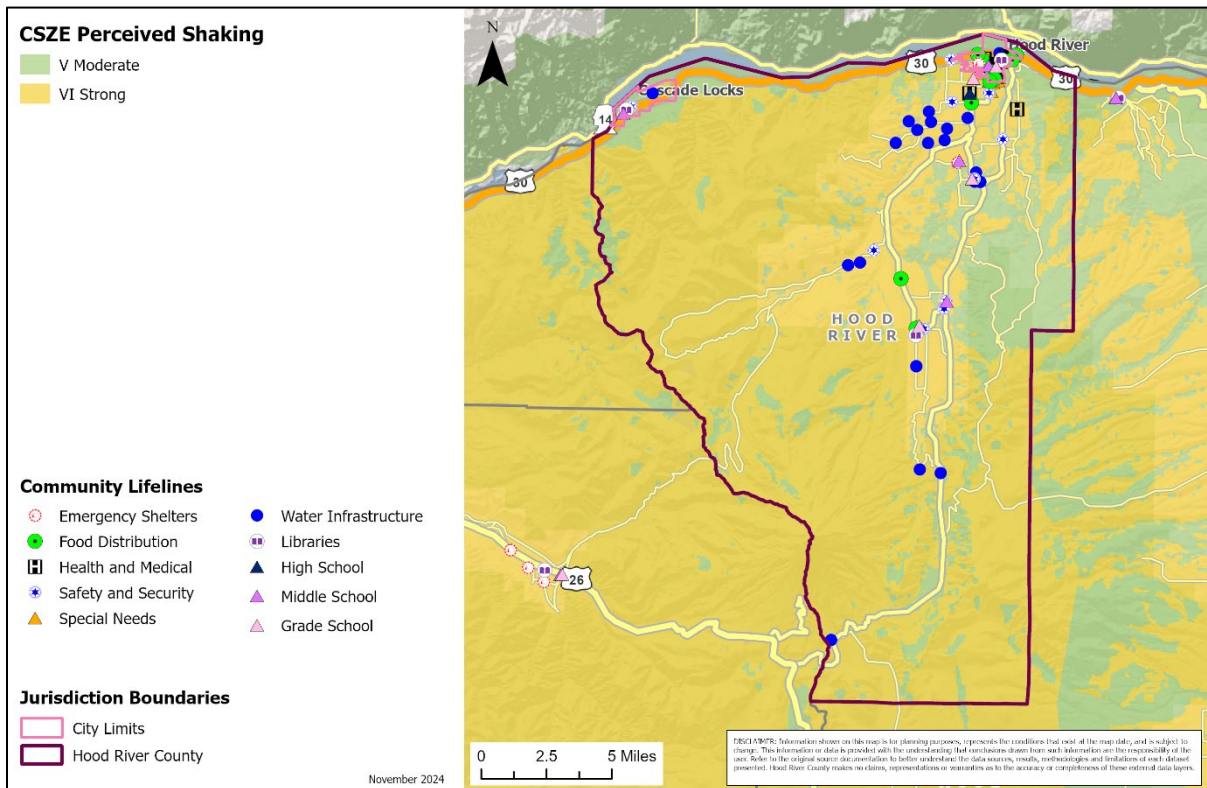
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<sup>19</sup> Ibid.

<sup>20</sup> Ibid.

<sup>21</sup> Ibid.

## Map 2-1 Expected Shaking from Cascadia Subduction Zone Earthquake



Source: Mapping by OPDR.

Data from Hood River County and Oregon Department of Geology and Mineral Industries [HazVu website](https://www.hazvu.org/).

**Crustal Faults:** Because frequent large earthquakes have not occurred locally, potential earthquake sources are not well known. Studies of many small earthquakes, investigations of known faults, and geological surveys generate the following earthquake source estimations. The U.S. Geological Survey (USGS) details four known major faults in or near Hood River County (see Table 2-9).

**Table 2-9 Class A and B Faults Located in or near Hood River County**

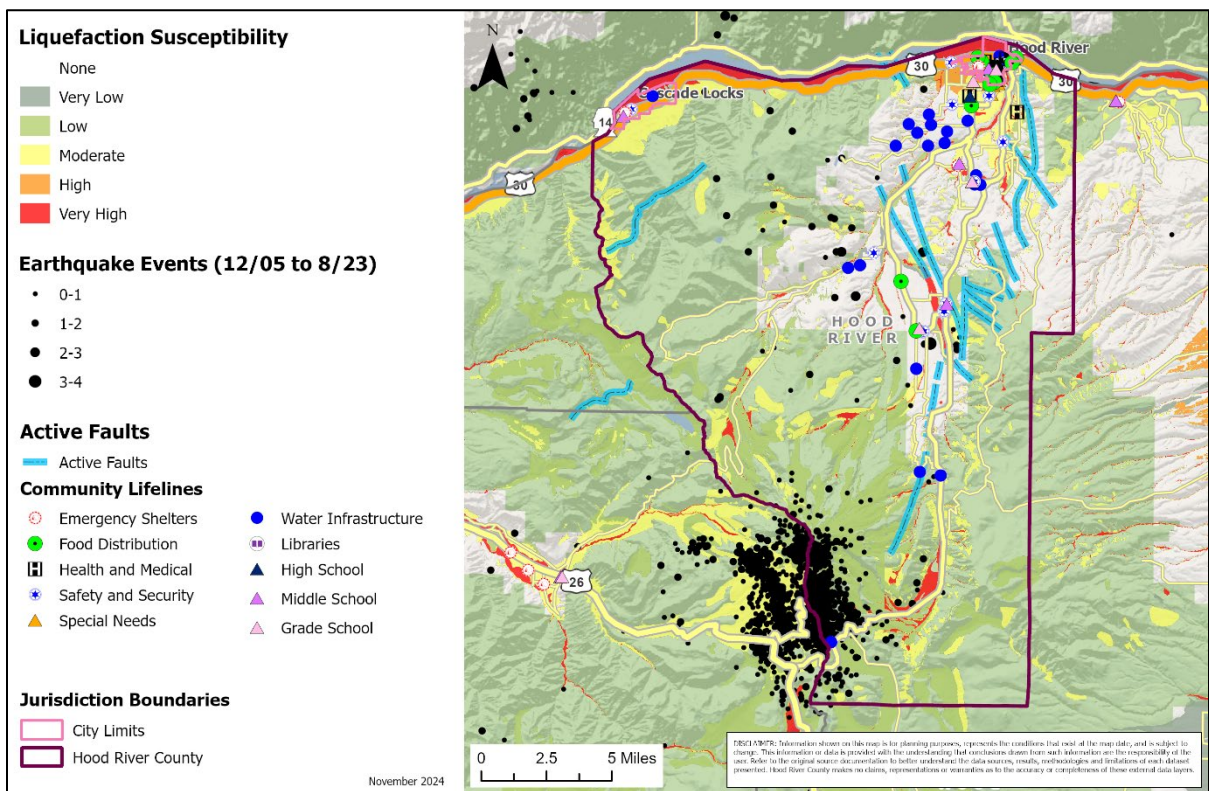
Name	Primary County	Length	Time of Most Recent Deformation	Slip-rate category
<b>Unnamed faults near The Dalles</b>	Hood River County	43 miles	Quaternary (over 1.6 million years)	Less than 0.2 mm/year
<b>Unnamed faults along Highway 35 near Parkdale</b>	Hood River County	27 miles	Quaternary (over 1.6 million years)	Less than 0.2 mm/year
<b>Blue Ridge Fault</b>	Hood River County	7 miles	Between 13,500 and 9,800 years ago	Less than 0.2 mm/year
<b>Unnamed faults northwest of Condon</b>	Gilliam County	14 miles	Quaternary (over 1.6 million years)	Less than 0.2 mm/year

Source: Scott, W. E. & Gardner, C. A. (2017). Field-Trip Guide to Mount Hood, Oregon, Highlighting Eruptive History and Hazards. USGS. <https://pubs.usgs.gov/sir/2017/5022/g/sir20175022g.pdf>.

The severity of an earthquake is dependent upon a number of factors including: 1) the distance from the earthquake’s source (or epicenter); 2) the ability of the soil and rock to conduct the earthquake’s seismic energy; 3) the degree (i.e., angle) of slope materials; 4) the composition of slope materials; 5) the magnitude of the earthquake; and 6) the type of earthquake.

Map 2-2 illustrates liquefaction potential in the County based on soft soil locations. This map also includes the location of active faults in the County as well as earthquake events that took place in the area between 2005 and 2023 (nearly all of which were relatively insignificant events below magnitude 2.0). Much of the population lives in the cities of Hood River and Cascade Locks, where the liquefaction during an earthquake is expected to be “high” or “very high”.

### Map 2-2 Liquefaction Hazard in Hood River County



Source: Mapping by OPDR.

Data from Hood River County and Oregon Department of Geology and Mineral Industries [HazVu website](#).

A new fault, the Blue Ridge Fault, was discovered with LIDAR imaging in 2011. The Blue Ridge Fault is approximately 7 miles long and 3 miles wide. It is located 10 miles west of Parkdale, near Mt. Hood, with its north end terminating 20 miles from Cascade Locks and the Bonneville Dam. The Blue Ridge Fault is part of the Mt. Hood Fault Zone, a 34 square mile area bordered by four fault segments. Geological evidence points to a single earthquake event between 13,540 and 9,835 years ago. The previous quake from this fault is estimated to have been 6.8 to 6.9 in magnitude. A future quake might be magnitude 6.5 or greater,

while the entire fault zone could cause a magnitude 7.9 quake. All populated areas within Hood River County would be threatened, as well as the highway and rail transportation corridors, Portland General Electric storage reservoirs, bridges (including those crossing the Columbia River and others throughout the County), and the power generation facilities at the Bonneville Dam.<sup>22</sup>

When all earthquake sources are added together, overall earthquake hazard is relatively high. The Oregon Department of Geology and Mineral Industries (DOGAMI), in partnership with other state and federal agencies, has undertaken a rigorous program in Oregon to identify seismic hazards, including active fault identification, bedrock shaking, tsunami inundation zones, ground motion amplification, liquefaction, and earthquake induced landslides. DOGAMI has published several seismic hazard maps that are available for communities to use. More information can be found in the DOGAMI risk report.

## History

Each year since 1981, the Pacific Northwest Seismograph Network has recorded an average of more than two thousand earthquakes in Washington and Oregon. The vast majority are shallow earthquakes, with 99% having a magnitude of less than 3.0. The shallow 1872 earthquake in the North Cascades of Washington state was the largest in the history of Washington and Oregon, with an estimated magnitude of 7.4 and many aftershocks. In 1993, a magnitude 5.6 earthquake in the Willamette Valley of Oregon caused over \$30 million in damages, including damage to the Oregon State Capital in Salem. Later in 1993, a pair of earthquakes near Klamath Falls, Oregon, with magnitudes of 5.9 and 6.0 caused two fatalities and more than \$10 million in damage. Large shallow quakes occur in the Pacific Northwest about once every 50 years.<sup>23</sup>

Table 2-10 lists the history of medium to large seismic events in the region (only including earthquakes with a magnitude of greater than 4.5). This list does not include the thousands of smaller earthquakes that have occurred in the region, including more than 4,000 quakes with a magnitude of less than 3.0 in the region since 2000.<sup>24</sup>

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<sup>22</sup> Scott, W. E. & Gardner, C. A. (2017). Field-Trip Guide to Mount Hood, Oregon, Highlighting Eruptive History and Hazards. USGS. <https://pubs.usgs.gov/sir/2017/5022/g/sir20175022g.pdf>.

<sup>23</sup> Pacific Northwest Seismic Network (2024). *Notable Events*. Retrieved August 22, 2024, from <https://www.pnsn.org/earthquakes/notable>.

<sup>24</sup> USGS Earthquake Hazards Program (2024). *Search Earthquake Catalog*. Retrieved August 22, 2024, from <https://earthquake.usgs.gov/earthquakes/search/>.

**Table 2-10 Earthquake Hazard History**

Year/Date	Location	Magnitude	Description
June 2002	Mt. Hood, OR	4.5	Felt throughout the region. Followed four hours later by a magnitude 3.8 aftershock. No damage reported.
Feb. 2001	Nisqually, WA	6.8	Caused hundreds of millions of dollars in damage, with one fatality and hundreds injured.
July 1999	Satsop, WA	5.8	Caused \$8 million in damage.
May 1996	Duvall, WA	5.4	Felt throughout the region. No damage reported.
Sep. 1993	Klamath Falls, OR	6.0	Two earthquakes occurred within two hours of each other, the first magnitude 5.9 and the second magnitude 6.0. Caused tens of millions of dollars in damage to county buildings and roads/highways as well as two fatalities. Followed three months later in December 1993 by a magnitude 5.1 aftershock. Received federal disaster declaration (DR-1004).
Mar. 1993	Scotts Mills, OR	5.6	Occurred at Mt. Angel-Gales Creek fault. Caused \$30 million in damage, including to the Oregon Capitol Building in Salem. Received federal disaster declaration (DR-985).
Apr. 1992	CSZ	7.2	Occurred at the triple junction of the Cascadia Subduction Zone, San Andreas, and Mendocino faults near Cape Mendocino, CA. Caused millions of dollars in damage and produced a small tsunami along the northern California and southern Oregon coast.
May 1991	Goat Rocks, WA	5.0	Felt throughout the region. No damage reported.
Feb. 1981	Mt. St. Helens, WA	5.2	Occurred on February 13, 1981. Centered near Mt. St. Helens and shook the Portland area.
Apr. 1976	Maupin, OR	4.8	Felt throughout the region. Sounds described as distant thunder, sonic booms, and strong wind.
Oct. 1964	Portland, OR	5.3	Occurred on Sauvie Island in the Columbia River
Nov. 1962	Vancouver, WA	5.5	Felt throughout the region. Caused over 30 seconds of shaking and minor damage.
Dec. 1953	Portland, OR	5.6	
Mar. 1893	Umatilla, OR	5.7	
Feb. 1892	Portland, OR	5.6	
Oct. 1897	Gresham, OR	6.7	
Oct. 1877	Battle Ground, WA	5.5	
Oct. 1872	North Cascades, WA	7.4	Felt throughout the region. No damage reported.
Nov. 1873	Brookings, OR	7.3	Felt throughout the region. Estimated to have occurred in the Gorda block of the Juan de Fuca plate as an intraplate event.
Jan. 1700	CSZ	9.0 (estimated)	Generated a tsunami that struck the Oregon and Washington coasts as well as Japan. Destroyed Native American villages along the Oregon and Washington coast.

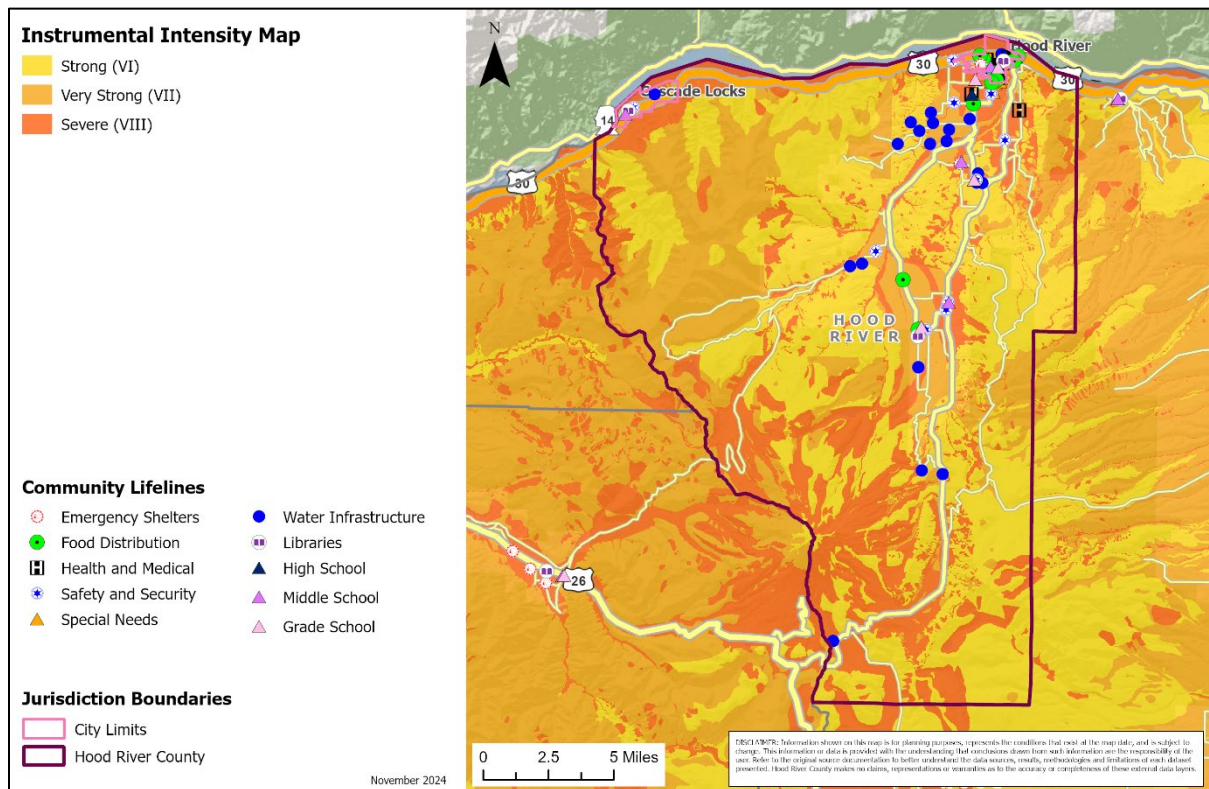
**Table 2-10 Earthquake Hazard History**

Year/Date	Location	Magnitude	Description
1400, 1050, & 600 BCE; 400, 750, & 900 AD	CSZ	8.7-9.2 (estimated)	Six events estimated to have occurred at approximately these dates. Based on studies of earthquakes and tsunamis at Willapa Bay, Washington.

Source: Pacific Northwest Seismic Network (2024). *Notable Events*. Retrieved August 22, 2024, from <https://www.pnsn.org/earthquakes/notable>; USGS Earthquake Hazards Program (2024). *Search Earthquake Catalog*. Retrieved August 22, 2024, from <https://earthquake.usgs.gov/earthquakes/search/>; Federal Emergency Management Agency (2024). *Disaster Declarations for States and Counties: Hood River County*. Retrieved April 29, 2024, from <https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties>; Wong, I. G. & Bott, J. D. (1995, February 1). A new look back at the 1969 Santa Rosa, California, earthquakes. *Bulletin of the Seismological Society of America* 85(1): 334–341. <https://doi.org/10.1785/BSSA0850010334>.

Map 2-3 depicts predicted earthquake intensity from a crustal earthquake or CSZ event in Hood River County. The entire County lies within at least “strong” intensity, which some of the Upper Valley as well as the populated areas in the Lower Hood River Valley and the City of Cascade Locks experiencing “very strong” and “severe” intensity.

**Map 2-3 Predicted Earthquake Intensity**



Source: Mapping by OPDR.

Data from Hood River County and Oregon Department of Geology and Mineral Industries [HazVu website](#).

## Probability

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

**Crustal Earthquakes:** The probabilistic earthquake hazard is defined as the maximum level of earthquake shaking and damage expected with a 2% change of occurrence in the next 50 years. In Hood River County, it ranges from moderate to high, which indicates a quake will be felt by all, weak buildings will be cracked to collapsed, with severe damage to weak buildings and to wood frame structures. Because we do not have a complete history of Oregon earthquakes, we cannot fully assess the future risk. High rainfall promotes high erosion rates and dense ground cover, both of which hide faults.

Based on this assessment, **the NHMP Steering Committee rated the probability of occurrence for both a Crustal Earthquake and a Cascadia Subduction Zone (CSZ) event as “moderate”**, meaning one incident in the next 35 to 75 years may occur.

### Future Projections

The [OCCRI Report](#) does not describe earthquake risk. However, Future development (residential, commercial, or industrial) within the County will be at risk to earthquake impacts, although this risk can be mitigated by the adoption and enforcement of high development and building standards. Reducing risks to vulnerable populations should be considered during the redevelopment of existing properties.

## Vulnerabilities

The Mid-Columbia Region is considered moderately vulnerable to earthquake hazards from earthquake induced landslides in the Cascades, ground shaking, and liquefaction. **The NHMP Steering Committee rated the County as having a “high” vulnerability for both a CSZ event and crustal earthquakes**, meaning that more than 10% of the region’s population or assets would be affected by a major crustal earthquake emergency or disaster. The secondary impacts of an earthquake, include power outages, gas leaks, and disrupted economy, could be devastating. According to the DOGAMI Risk Report, it is likely that the region would experience the equivalent of a magnitude 5 quake for 30 seconds. It is also likely that relief from elsewhere in the state would be delayed for days or weeks. The number of people in Hood River County fluctuates dramatically based on season and time of day, so the number of people impacted in a hazard event is unpredictable. Secondary impacts to electricity, natural gas, and fuel supply may also occur.

Most injury, death, and property damage in an earthquake result from seismic impacts on structural and non-structural materials. Most injuries in earthquakes result from non-

structural materials such as light fixtures, equipment, and furniture, falling on people and causing injury. Shaking could topple high-voltage transmission towers, especially near the river where water-saturated ground is likely to sink, tilt and collapse foundations.

Earthquakes are unique in their impact on structures. The entire County population, property, commerce, infrastructure, and services (including hospitals, emergency services, and transportation lifelines) are susceptible to earthquake damage. Water, wastewater, electric and natural gas utilities, and dams may also be damaged. The scope of damage results from earthquake magnitude and level of preparedness and could range from minimal to moderate. The populated areas proximal to the Columbia River are most susceptible due to soft soils. Homes built before 1994 are more vulnerable than homes built in or after 1994 due to the more rigorous building code standards passed in 1993. As noted in Volume II, Appendix D, approximately 52% of residential buildings were built prior to 1994, which increases the City's vulnerability to the earthquake hazard. Hood River County historic buildings, along with most schools and emergency response buildings, are constructed from unreinforced masonry. This is especially true in the City of Hood River's downtown area, which is also at risk of significant liquefaction.

Strong shaking from a CSZ event may be extremely damaging to transportation routes including both Interstate 84 and Highway 35. A CSZ event will likely impact the interstate bridges in the cities of Cascade Locks and Hood River and disrupt Columbia River navigation. The highway-related losses include disconnection from supplies and replacement inventory as well as the loss of tourists and other customers who must travel to do business with affected businesses. Highway closures risk stranding employees, commuters, and freight traffic, preventing economic and emergency response activity and creating significant congestion. The effects on the regional power grid and liquid fuel supply will be devastating throughout the coastal and valley regions of Oregon. It is also likely that displaced people from these regions will come to Eastern Oregon for resources.<sup>25</sup>

Seismic activity can cause great loss to businesses, either a large-scale corporation or a small retail shop. Losses not only result in rebuilding cost, but fragile inventory and equipment can be destroyed. When a company is forced to stop production for just a day, business loss can be tremendous. Residents, workers, businesses, and industry all suffer temporary loss of income when their source of finances is damaged or disrupted. Damage to shipping channels and shore facilities, and failure of Columbia River bridges west of Hood River County may have long-term impacts on freight shipments into and out the mid-Columbia region.

Structures in wetland, alluvial, and other saturated areas may be subject to liquefaction damage, particularly in areas near the Columbia River. Water-saturated loose sand and silt loses its ability to support structures in an earthquake. Areas in Hood River County that are near floodplains or areas with silt deposits are at the greatest risk during an earthquake.

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<sup>25</sup> Allan, J. & Gabel, L. (2022, June). *DOGAMI Fact Sheet: Cascadia Earthquake Knowledge Points for Emergency Managers and the Public*. Oregon Department of Geology and Mineral Industries. <https://pubs.oregon.gov/dogami/fs/cascadia-planning-for-em-and-public.pdf>.

## **Economic Losses**

DOGAMI’s Risk Report includes an earthquake damage model. The model’s results show the following building loss estimates from a 2,500-year probabilistic magnitude 7.0 crustal earthquake. These figures are all slightly higher than the previous NHMP due to the revision of the Risk Report in 2021 to include anticipated impacts from the Blue Ridge Fault:

- **Number of red-tagged buildings:** 628
- **Number of yellow-tagged buildings:** 1,929
- **Loss estimate:** \$1,309,753,000
- **Loss ratio:** 34%
- **Non-functioning critical facilities:** 31
- **Potentially displaced population:** 1,100

Loss estimates from a CSZ event were not included in the DOGAMI Risk Report.

## **Building Collapse Potential**

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

DOGAMI surveyed a total of 23 facilities and 51 buildings in Hood River County. The collapse potentials of Hood River County schools and public safety facilities are listed in Table 2-11 for the unincorporated areas of the County. City-specific information can be found in the City of Cascade Locks and City of Hood River’s jurisdictional addenda in Volume III. Additional information, along with a map of facility locations, can be found within DOGAMI’s [website for the statewide seismic needs assessment](#).

As partially noted in DOGAMI’s RVS data, County officials identified the top floor of the County building at 601 State Street in the City of Hood River as extremely high risk. This floor currently includes County 911; the Emergency Management and Emergency Operations Center; and County Finance, Budget, and Administration.

**Table 2-11 Collapse Potential of Critical Facilities: Hood River County**

Facility	Address	Site ID	Level of Collapse Potential			
			Low (<1%)	Moderate (>1%)	High (>10%)	Very High (100%)
<b>Public Safety</b>						
Parkdale RFPD	6573 Highway 35, Parkdale	Hood_fir09		X		
Parkdale RFPD (Mount Hood)	4895 Baseline Dr, Parkdale	Hood_fir01				X
Hood River County Sheriff	309 State St	Hood_pol01		X,X		
Hood River EOC/911	601 State St	Hood_eoc01		X,X		
Dee RFPD (now part of Wy'East RFPD)	5235 Lost Lake Rd	Hood_fir08		X		
Odell RFPD (now part of Wy'East RFPD)	3431 Odell Highway	Hood_fir02	X		X	
Pine Grove VFD (now part of Wy'East RFPD)	2995 Van Horn Dr	Hood_fir03	X	X	X	
<b>Schools</b>						
Parkdale Elementary School	4880 Van Nuys Dr, Parkdale	Hood_sch01	X	X		X
Mid-Valley Elementary School	3686 Davis Dr, Odell	Hood_sch07	X		X	X
Wy'East Middle School*	3000 Wy'east Rd	Hood_sch03	X,X	X		X,X

Source: Lewis, D. (2007). Open-File Report O-07-02, Statewide seismic needs assessment: Implementation of Oregon 2005 Senate Bill 2 relating to public safety, earthquakes, and seismic rehabilitation of public buildings. Oregon Department of Geology and Mineral Industries. <https://pubs.oregon.gov/dogami/ofr/p-O-07-02.htm>.

\* = Building has been rebuilt or retrofitted since this DOGAMI study was conducted in 2007.

# Extreme Heat

## Significant Changes since Previous NHMP:

The Extreme Heat hazard is a new addition to the Hood River County NHMP with the 2024 update. As a result, there are no changes to note from the previous plan.

Development forecasts are not expected to increase or decrease the impact of this hazard. However, the population of adults aged 65 and older is increasing within this jurisdiction. As a result, the impact of this hazard may increase.

## Characteristics

Extreme heat describes either a singular instance of dangerously high temperatures occurring on a given day or a prolonged period of high temperatures lasting over several days. Heat waves generally describe consecutive days of higher temperatures and most often occurring during summer. One approach to categorizing hazardous heat is when local temperatures exceed a heat index of 90 degrees Fahrenheit. This threshold is when the human body begins to suffer adverse effects of prolonged exposure to heat.

Extreme heat events are hazardous due to their risks to human health and potential impacts on infrastructure operability and reliability. Prolonged exposure to heat can increase the likelihood of exhaustion, dehydration, heat cramps, heat stroke, and even death. Between 1999 and 2020, there were nearly 16,000 heat-related deaths in the US, according to the Centers for Disease Control and Prevention.<sup>26</sup> That is more deaths than hurricanes, lightning, tornadoes, floods, and earthquakes combined.<sup>27</sup>

As a result of these public health risks, hospitals see a spike in heat-related illnesses, especially from people working outdoors, who are at are at increased risk due to prolonged exposure, as well as impacts economic activities that be disrupted due to hazardous working conditions. In addition, extremely hot and consecutive days of high heat contribute to increased wildfire risk due to such reasons at the presence of dryer fuel load. Experiencing multiple heat waves in a season, and over several years, can also drive drought conditions and put stress wildlife such as trees and riverine species such as salmon.

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<sup>26</sup> Centers for Disease Control and Prevention. (2022, August 26). *QuickStats: Deaths Involving Exposure to Excessive Heat, by Sex — National Vital Statistics System, United States, 1999–2020*. <https://www.cdc.gov/mmwr/volumes/71/wr/mm7134a5.htm>.

<sup>27</sup> National Weather Service (2023). *Weather Fatalities 2023*. National Oceanic and Atmospheric Administration. Retrieved August 27, 2024, from <https://www.weather.gov/hazstat/>.

## Location and Extent

The entire County is at risk of extreme heat hazard events, with the County experiencing an average of two days per year where the heat index exceeds 90 degrees Fahrenheit (° F). This figure is expected to rise to 12 days per year by 2050.<sup>28</sup>

However, urban and suburban areas, particularly land uses with large concrete single-story buildings and large parking areas, experience the highest temperatures. Urban and suburban areas are also where more people are concentrated and there tends to be less vegetation present to permit evaporation, as well as a greater presence of cars and factories that give off heat. Combined with the proximity of asphalt roads and buildings, these factors can create heat island effects, where certain urban and suburban areas reach temperatures of 5° F to 18° F hotter than surrounding rural areas.<sup>29</sup>

## History

The extreme heat hazard history is shown in Table 2-12.

**Table 2-12 Extreme Heat Hazard History Events**

Year/Date	Location	Description
July 2024	Statewide	Extreme heat event over one week, with temperatures exceeding 100 degrees Fahrenheit and the hottest day reaching 106 degrees Fahrenheit. This hazard event caused at least 17 fatalities in Oregon. Received state disaster declaration (24-10).
July 2022	Statewide	Extreme heat event over eight days, with temperatures exceeding 95 degrees Fahrenheit and the hottest day reaching 101 degrees Fahrenheit. This hazard event caused at least five fatalities in Oregon. Received state disaster declaration (22-13).
Aug. 2021	Statewide	Extreme heat event over a six-day stretch, with temperatures exceeding 90 degrees Fahrenheit and the hottest day reaching 105 degrees Fahrenheit. Received state disaster declaration (21-27).
June 2021	Statewide	High pressure heat dome led to a three-day stretch of extreme heat, with temperatures exceeding 100 degrees Fahrenheit and the hottest day reaching 112 degrees Fahrenheit. This heat dome caused at least 123 fatalities in Oregon, most of which can be attributed to a lack of adequate air conditioning. Received state disaster declaration (21-26).
Aug. 2019	Statewide	Multiple days of extreme heat throughout the month, including two three-day stretches with temperatures exceeding 90 degrees Fahrenheit.
Jul. – Aug. 2017	Statewide	Extreme heat event over nearly two weeks, with temperatures exceeding 95 degrees Fahrenheit and the hottest day reaching 107 degrees Fahrenheit.
Jul. – Aug. 2016	Statewide	Multiple days of extreme heat throughout the two months, including three three-day stretches with temperatures exceeding 95 degrees Fahrenheit.
Jul. 2009	Statewide	Extreme heat event over one week, with temperatures exceeding 95 degrees Fahrenheit and the hottest day reaching 108 degrees Fahrenheit.

<sup>28</sup> 2020 Oregon Natural Hazard Mitigation Plan. (2020). *Chapter 2: Risk Assessment - Region 5: Mid-Columbia, Infrastructure*. State Interagency Hazard Mitigation Team.

[https://www.oregon.gov/lcd/NH/Documents/Approved\\_2020ORNHMP\\_11\\_RA5.pdf](https://www.oregon.gov/lcd/NH/Documents/Approved_2020ORNHMP_11_RA5.pdf).

<sup>29</sup> Druckenmiller, H. (2023, March 14). *Urban Heat Islands 101*. Resources for the Future.

<https://www.rff.org/publications/explainers/urban-heat-islands-101/>.

Year/Date	Location	Description
Jul. 2006	Statewide	Extreme heat event over six days, with temperatures exceeding 100 degrees Fahrenheit and the hottest day reaching 108 degrees Fahrenheit.

Source: National Centers for Environmental Information (2024). *Storm Events Database, Extreme Heat: Hood River County*. National Oceanic and Atmospheric Administration. <https://www.ncdc.noaa.gov/stormevents/>; Weather Underground (2024). *Hood River, OR Weather History: Hood Valley Station*. <https://www.wunderground.com/history/monthly/us/or/hood-river/K452>; Office of Oregon Governor (2024). *Executive Orders: 2003 to Present*. Retrieved August 28, 2024, from <https://www.oregon.gov/gov/pages/executive-orders.aspx>; Federal Emergency Management Agency (2024). *Disaster Declarations for States and Counties: Hood River County*. Retrieved April 29, 2024, from <https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties>.

## Probability

Based on the available data and research, the NHMP Steering Committee assigned a **“moderate” probability of occurrence**, meaning one incident in the next 35 to 75 years is likely. Extreme heat events occur every few years within the region, and while they are generally not long lasting, they are growing in length, intensity, and occurrence. Predicted average increases in summer temperatures will make heat waves a greater likelihood.

### Future Projections

As stated, the [OCCRI Report](#) describes that the risk for extreme heat in Hood River County is increasing. The average temperature in the County is expected to continue increasing during the 21st Century if global emissions of greenhouse gases continue. The number, duration, and intensity of extreme heat events will increase as temperatures continue to warm. In Hood River County, the number of extremely hot days (days on which the temperature is 90°F or higher) and the temperature on the hottest day of the year are projected to increase by the 2020s and 2050s. Higher temperatures and longer/more extreme heat events will have negative impacts upon vulnerable populations such as those over 65 years of age, children under the age of 18, those living in older or temporary housing, and field workers.

## Vulnerabilities

The NHMP Steering Committee rated the County as having a **“moderate” vulnerability to extreme heat events**, meaning that between 1-10% of the region’s population or assets would be affected by a major disaster.

The DOGAMI Risk Report does not describe extreme heat impacts.

Very high temperatures can create serious health problems. Health problems related to high heat can include headache, dizziness and weakness. In extreme cases, heat-related illness can cause convulsions, sudden loss of consciousness, and even death. Those at greatest risk for heat-related illness include infants and children up to 4 years of age, people 65 and older, people who are overweight, and people who are ill or on certain medications, as well as

those who work outdoors such as farmworkers (many of whom live in farmworker housing that lacks air conditioning and/or are migrants).<sup>30</sup>

Without mitigation, increased numbers of extreme heat events will likely result in additional heat related morbidity and mortality, especially among vulnerable populations. As the length and intensity of extreme heat events grow, so does the need for air conditioning, which poses an inequitably high cost burden on those who are financially insecure.

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<sup>30</sup> Ibid.

# Flood

## Significant Changes since Previous NHMP:

The hazard history was updated with hazard events through 2024.

No development or population changes affected the jurisdiction's overall vulnerability to this hazard. In addition, development and population forecasts are not expected to increase or decrease the impact of this hazard.

## Characteristics

Flooding results when rain and snowmelt create water flow that exceeds the carrying capacity of rivers, streams, channels, ditches, and other watercourses. In Hood River County, serious flooding events result from wet conditions following a period of mid to high elevation snowpack development. The main cause of Northwest floods is moist air masses that regularly move over the region in the winter. Unseasonably warm weather during the winter months, which can quickly melt snow, often contributes to floods.

The principal types of flooding that occur in Hood River County are riverine floods, flash floods, and urban floods.

- **Riverine floods** are the most common types of flooding and refer to instances when river flow exceeds the river channel capacity. Severe and prolonged storms can raise rivers and streams to their flood stages for three to four days or longer. Riverine flooding is most common from October through April.
- **Flash floods** are almost always a summer phenomenon associated with intense local thunderstorms. Flash flooding is likely in steeply sloping valleys and small waterways.
- **Urban flooding** occurs in developed areas where the amount of water generated from rainfall and runoff exceeds the storm water systems' capacity. Poor drainage, elevated groundwater levels, and ponding can cause property damage. Rain flows over impervious surfaces such as concrete and asphalt and into nearby storm sewers and streams. This runoff can result in the rapid rise of floodwaters. During urban floods, streets can become inundated, and basements can fill with water.

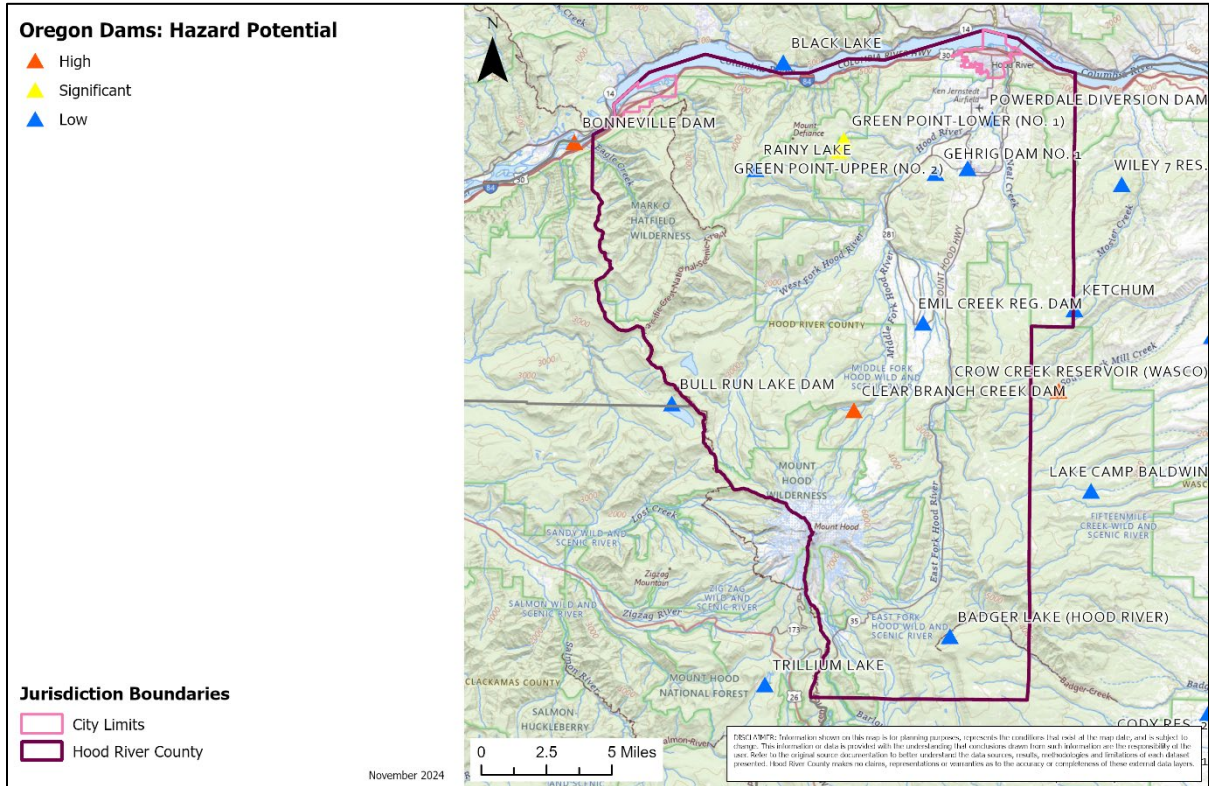
Development in the floodplain can raise the base flood elevation and cause floodwaters to expand past their historic floodplains. Rapid development makes stormwater flooding a concern in Hood River County. Lastly, a dam failure, though unlikely, could cause flooding throughout the county.

## Location and Extent

The Columbia River, Hood River, Indian Creek, Phelps Creek, and Herman Creek historically flood every few years. Flood hazard areas are along the East, Middle and West forks of the Hood River, and along Emil, Odell, Baldwin, and Neal Creeks. The Columbia itself does not pose a significant risk because of upstream dams. A swollen Columbia River, however, can

back up tributary streams to the point where they constitute a significant hazard. Floods in Hood River County have occasionally had devastating impacts. Map 2-4 depicts the Hood River Watershed and dam locations. See Appendix D, Community Profile, for more information, including on dams (the County has seven in total).

### Map 2-4 Hood River Watershed and Dams



Source: Mapping by OPDR.

Data from Hood River County and Oregon Department of Geology and Mineral Industries [HazVu website](#).

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

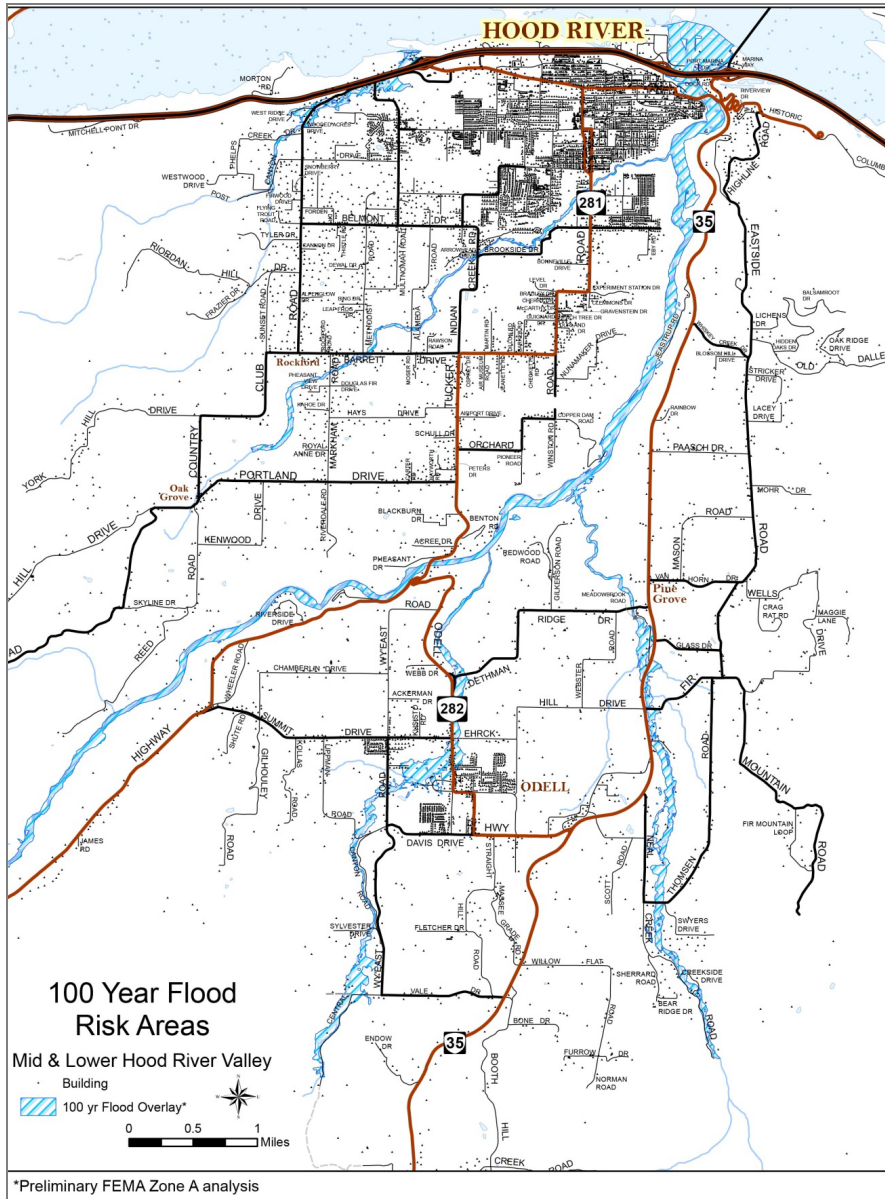
The magnitude of flood used as the standard for floodplain management in the United States is a flood having a one percent probability of occurrence in any given year. This flood is also known as the 100-year flood or base flood. The most readily available source of information regarding the 100-year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

FEMA released the current FIRMs for Hood River County in September 1984. The maps are physical, not digital, do not include recent development, and are not in a fine enough scale to

provide useful information for this hazard analysis. FEMA is in the process of updating the FIRMs and released Preliminary maps in August 2022 but determined that a Revised Preliminary map release was needed. The updated FIRMs have not yet been published as of the writing of this NHMP.<sup>31</sup>

Map 2-5, developed for the 2018 NHMP, shows development in the floodplain for the Middle and Lower Hood River Valley, which is the most populated area in the County. More information on floodplain location can be found through DOGAMI HazVU.

### Map 2-5 100 Year Flood Risk Areas, Mid and Lower Hood River Valley



<sup>31</sup> Confirmed via Quarterly Project Report update email distributed by the Strategic Alliance for Risk Reduction (STARR II), a contractor for FEMA (S. Sagarika, personal communication, July 2, 2024).

## History

The flood hazard history is shown in Table 2-13.

**Table 2-13 Flood Hazard History Events**

Year/Date	Location	Description
Jan. 2024	Affected nearly one-third (11) of Oregon counties, including Clackamas, Multnomah, and Wasco counties	Severe winter storm with flooding. Received federal disaster declaration (DR-4768).
Jan. 2023	Affected one-third (12) of Oregon counties, including Clackamas and Multnomah counties	Severe winter storm with flooding and heavy rain. Received state disaster declaration (23-01).
Feb. 2021	Affected one-fourth (9) of Oregon counties, including Clackamas and Multnomah counties	Severe winter storm with flooding and heavy snow. Received state disaster declaration (21-02).
Apr. 2017	Affected half (18) of Oregon counties, including Clackamas, Multnomah, and Wasco counties	Severe winter storm with flooding. Received state disaster declaration (17-06).
Jan. 2017	Hood River County; also affected Columbia, Deschutes, and Josephine counties	Severe winter storm with flooding. Received federal disaster declaration (DR-4328).
Dec. 2015	Affected nearly one-half (14) of Oregon counties	Severe winter storm with flooding. Received federal disaster declaration (DR-4258). <b>Declaration did not include Hood River County, but the County was still impacted severely by this storm.</b>
Jan. 2012	Affected one-third (12) of Oregon counties.	Severe winter storm with flooding. Storm lasted more than a week. Received federal disaster declaration (DR-4055).
Jan. 2011	Affected six (6) Oregon counties, including Clackamas County	Severe winter storm with flooding. Received federal disaster declaration (DR-1956). <b>Declaration did not include Hood River County, but the County was still impacted severely by this storm.</b>
Dec. 2008	Affected nearly one-third (10) of Oregon counties, including Clackamas and Multnomah counties	Severe winter storm with flooding and record/near record snow. Over 22 inches of snow fell on the City of Hood River in one day. Significant infrastructure damage as well as I-84 impacts that caused one fatality. Received federal disaster declaration (DR-1824).
Nov. 2006	Hood River County; also affected Clatsop, Lincoln, and Tillamook counties	Severe winter storm with flooding, heavy/freezing rain, and debris flow. Freezing rain closed I-84 near the City of Hood River. Debris flow from the Elliot and Newton Clark glaciers created a river delta in the Columbia River and caused millions of dollars of damage to State Highway 35, water and irrigation district infrastructure (including hydroelectric plants), several bridges, and multiple road and railroad sections. Received federal disaster declaration (DR-1672).

**Table 2-13 Flood Hazard History Events**

Year/Date	Location	Description
Sept. 2000	Hood River County	Warm, heavy rain melted portions of the White and Newton Clark glaciers, causing water and hundreds of cubic yards of rock and mud to flow down White River and Newton creeks. The flood closed twenty miles of Highway 35 and destroyed Robinhood campground, nearly killing ten hunters.
Jan. & Feb. 1999	Hood River County and surrounding region	Widespread riverine flooding on smaller rivers and streams throughout the County led to landslides and mudslides. Severe winter storm with flooding, heavy snow, and ice accumulation. Closed I-84 for four days and led to hundreds of downed trees and power lines. Received federal disaster declaration (DR-1160). <b>Declaration did not include Hood River County, but the County was still impacted severely by this storm.</b>
Dec. 1996	Affected nearly one-quarter (8) of Oregon counties	Severe winter storm with flooding, heavy rain, heavy snow, and ice accumulation. Storm was followed by warm temperatures and heavy rain that led to significant infrastructure damage, road closures, and eight fatalities. Flooding reached the third and second highest levels recorded in the City of Hood River at Tucker Bridge (16 and 17 feet, respectively) and washed out several pieces of water and irrigation district infrastructure. Received federal disaster declaration (DR-1099).
Feb. 1996	Affected nearly three-quarters (26) of Oregon counties, including Clackamas, Multnomah, and Wasco counties	Severe winter storm with flooding, heavy rain, heavy snow, and ice accumulation. Storm was followed by warm temperatures and heavy rain that led to significant infrastructure damage, road closures, and eight fatalities. Flooding reached the third and second highest levels recorded in the City of Hood River at Tucker Bridge (16 and 17 feet, respectively) and washed out several pieces of water and irrigation district infrastructure. Received federal disaster declaration (DR-1099).
Dec. 1980	Hood River County	Debris flow from Mt. Hood flowed down Polallie Creek. The Christmas Day Flood that followed was the fifth-highest level on record with a crest of nearly 15 feet at Tucker Bridge and caused millions of dollars in damage, including destroying four bridges, closing five miles of Highway 35, damaging water district infrastructure, and causing one fatality.
Jan. 1974	Affected more than half (19) of Oregon counties, including Clackamas and Wasco counties	Severe winter storm with flooding due to snowmelt. The Willamette River in Portland crested at 26 feet while the City of Hood River experienced near-record flooding, cresting at 14.5 feet at Tucker Bridge. Received federal declaration (DR-413).
Jan. 1972	Affected nearly one-third (10) of Oregon counties, including Clackamas and Multnomah counties	Widespread flooding. Received federal disaster declaration (DR-319). <b>Declaration did not include Hood River County, but the County was still impacted severely by this storm.</b>
Dec. 1964	Statewide (every county in Oregon)	Widespread flooding and heavy rain. More than 30 inches of snow fell on the City of Hood River followed by warm rain, leading to the highest level of flooding recorded, cresting at 20.5 feet at Tucker Bridge. Statewide damage exceeded \$150 million and included 17 fatalities. Received federal disaster declaration (DR-184).
Oct. 1962	Statewide	Severe windstorm with flooding. Most severe windstorm in Western Oregon due to sustained wind speeds and damage levels. Known as the "Columbus Day Storm". Wind speeds in the Willamette Valley were up to 116 mph. 84 homes were destroyed, with 5,000 severely damaged. Windstorm and flooding caused 38 fatalities and over \$200 million of

**Table 2-13 Flood Hazard History Events**

Year/Date	Location	Description
		damage across the state. Received federal disaster declaration (DR-136). <b>Declaration did not include Hood River County, but the County was still impacted severely by this windstorm.</b>
<b>June 1956</b>	Columbia River	Riverine flooding of the Columbia River. Received federal disaster declaration (DR-60).
<b>Dec. 1955</b>	Statewide	Widespread flooding and storms caused five fatalities. Received federal disaster declaration (DR-49).

Source: Hatton, R. & Taylor, G. H. (1999). *The Oregon Weather Book: A State of Extremes*. Oregon State University Press. <https://osupress.oregonstate.edu/book/oregon-weather-book>; Federal Emergency Management Agency (2024). *Disaster Declarations for States and Counties: Hood River County*. Retrieved April 29, 2024, from <https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties>.

## Probability

Flooding occurs along one or more of the County’s waterways every few years, with a significant flood every 5-7 years. Based on the available data and research, **the NHMP Steering Committee rated the probability of occurrence as “moderate”**, meaning one incident in the next 35 to 75 years may occur.

Hood River County complies with the National Flood Insurance Program through their floodplain management program and has developed a local flood damage prevention ordinance to regulate development in floodplain areas. These local ordinances direct planning, construction, operation, maintenance, and improvements of any structures in order to protect life, health, and property against flood damage and/or avoid adversely influencing bodies of water. However, with some uninsured structures located in flood plains, County homeowners and businesses are vulnerable to flood damage.

## Future Projections

The [OCCRI Report](#) describes that the risk for flooding in Hood River County is increasing. New growth increases pressure to develop more marginal land and increases the number of households living in floodplains. Furthermore, as the density of development increases and permeable natural surfaces are replaced with homes and roads, the volume and expanse of storm water runoff increase. As a result, homes once outside mapped floodplains face an increased threat of flooding, which they were not built to withstand.

## Vulnerabilities

Based on the potential impacts discussed in this section, **the NHMP Steering Committee rated the vulnerability to flood events as “low”**, meaning that less than 1% of the region’s population or assets could be affected by a major disaster.

Flooding can occur every year depending on rainfall, snowmelt, and runoff from development. Surveys by DOGAMI, the County, and FEMA have established the 100-year floodplain. Changes to development patterns since 2009 have the potential to incur

increased risk of flooding. However, County development regulations restrict, but do not prohibit, new development in areas identified as floodplain. This reduces the impact of flooding on future buildings.

The DOGAMI Risk Report includes a comprehensive flood risk assessment using HAZUS (Hazards United States), a geographic information system-based natural hazard loss estimation software package. FEMA recommends that communities use HAZUS software to produce loss estimates that accurately reflect local conditions. The HAZUS-MH Flood Model allows planners to carry out a wide range of flood hazard analyses, including:

- Studies of specific return intervals of floods (e.g., 100-year return interval)
- Studies of discharge frequencies, including analysis of discharges from specific streams and the exposure to buildings and population from the resultant flooding.
- Studies of annualized losses from flooding.
- ‘Quick look’ assessments, which allow the user to quickly evaluate potential flooding from specific flood depths at specific locations.
- ‘What if’ scenarios, which allow users to evaluate the consequences of specific actions, such as the introduction of flow regulation devices, acquisition of flood-prone properties, and other mitigation measures.

### **Economic Losses**

DOGAMI’s Risk Report includes a flood damage model. The model’s results show the following building loss estimates from a countywide 100-year flood:

- **Number of buildings damaged:** 68
- **Loss estimate:** \$1,489,000
- **Loss ratio:** 0.04%
- **Non-functioning critical facilities:** 1
- **Potentially displaced population:** 166

### **Community Repetitive Loss Policies**

The Community Repetitive Loss record identifies no Repetitive Loss<sup>32</sup> or Severe Repetitive Loss<sup>33</sup> Properties. While Hood River County uses modern, improved flood hazard data for internal planning and zoning, the County would benefit from updated floodplain information to inform development.

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<sup>32</sup> A Repetitive Loss property is any insurable building for which two or more claims of over \$1,000 were paid by the NFIP within any ten-year period since 1978. A RL property may or may not be currently insured by NFIP.

<sup>33</sup> A Severe Repetitive Loss property is a single family property (1 to 4 residences) covered under flood insurance by the NFIP that has incurred flood-related damage for which 4 or more separate claims payments have been paid under flood insurance coverage, with the amount of each payment exceeding \$5,000 and with cumulative amount of such claims payments exceeding \$20,000; or for which at least 2 separate claims payments have been made with the cumulative amount of such claims exceeding the value of the property.

# Landslide/Debris Flow

## Significant Changes since Previous NHMP:

The hazard history was updated with hazard events through 2024. Several other points of data throughout this section were also updated with the most recently available data.

No development or population changes affected the jurisdiction's overall vulnerability to this hazard. In addition, development and population forecasts are not expected to increase or decrease the impact of this hazard.

## Characteristics

A landslide is any detached mass of soil, rock, or debris that falls, slides, or flows down a slope or a stream channel. Landslides are classified according to the type and rate of movement and the type of materials that are transported. Hood River County landslides or debris flows (also known as mudslides) may affect buildings, roads, and utilities.

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

- Shaking due to earthquakes can trigger events ranging from rockfalls and topples to massive slides
- Intense or prolonged precipitation that causes flooding can also saturate slopes and cause failures leading to landslides; this is common in Hood River County
- Landslides into a reservoir can indirectly compromise dam safety, and a landslide can even affect the dam itself
- Wildfires can remove vegetation from hillsides, significantly increasing runoff and landslide potential
- The heat and debris associated with volcanic eruptions trigger extensive landslides

## Location and Extent

Landslides in Hood River County generally range in size from thin masses of soil of a few yards wide to much larger, deep-seated bedrock slides. Travel rate may range from a few inches per month to many feet per second, depending largely on slope grade, material, and water content. Ancient, dormant slide masses can be reactivated by earthquakes or unusually wet winters. Dormant slides consisting of broken materials and disrupted ground water are more susceptible to construction-triggered sliding than adjacent undisturbed material.

Landslides occur throughout this region, but areas with steeper slopes, weaker geology, and higher annual precipitation tend to have more landslides. Occasionally, major landslides sever major transportation routes, including highways and rail lines, causing temporary but significant economic damage. In April 2014, a large rockslide in Hood River closed I-84 for almost a week.

## History

Landslides occur in Hood River County during or after periods of heavy rain and flooding. The period from December 1996 to February 1997, marked by severe winter storms, saw 49 landslides in Hood River County. Many slides take place in undeveloped areas and are unreported or even unnoticed. Landslides potentially threaten water, electricity, and communications infrastructure. Table 2-14 lists historic landslides.

**Table 2-14 Landslide/Debris Flow Hazard History Events**

Year/Date	Location	Description
Jan. 2024	Affected nearly one-third (11) of Oregon counties, including Clackamas, Multnomah, and Wasco counties	Severe winter storm with landslides and mudslides. Received federal disaster declaration (DR-4768).
Jan. 2023	Affected one-third (12) of Oregon counties, including Clackamas and Multnomah counties	Severe winter storm with landslides. Received state disaster declaration (23-01).
Jan. 2022	Hood River and Multnomah counties	Debris flow on the Columbia River that closed I-84 for 22 hours.
Feb. 2021	Affected one-fourth (9) of Oregon counties, including Clackamas and Multnomah counties	Severe winter storm with landslides. Received state disaster declaration (21-02).
Jan. 2021	Hood River and Multnomah counties	Debris flow in the 2017 Eagle Creek Fire burn scar.
Jan. 2017	Hood River County; also affected Columbia, Deschutes, and Josephine counties	Severe winter storm with landslides and mudslides. Received federal disaster declaration (DR-4328).
Apr. 2014	Hood River County	Severe winter storm with landslides and a rockslide that closed I-84 for multiple days. Received state disaster declaration (14-03).
Jan. 2012	Affected one-third (12) of Oregon counties	Severe winter storm with landslides and mudslides. Received federal disaster declaration (DR-4055).
Jan. 2009	Hood River County	Small landslide that closed a portion of Highway 26 and caused nearly \$100,000 in property damage. Severe winter storm with landslides, mudslides, and record/near record snow. Over 22 inches of snow fell on the City of Hood River in one day. Significant infrastructure damage as well as I-84 impacts that caused one fatality. Received federal disaster declaration (DR-1824).
Dec. 2008	Affected nearly one-third (10) of Oregon counties, including Clackamas and Multnomah counties	Severe winter storm with debris flow, landslides, and mudslides. Freezing rain closed I-84 near the City of Hood River. Debris flow from the Elliot and Newton Clark glaciers created a river delta in the Columbia River known as the sandbar and caused millions of dollars of damage to State Highway 35, water and irrigation district infrastructure (including hydroelectric plants), several bridges, and multiple road and railroad sections. Received federal disaster declaration (DR-1672).
Nov. 2006	Hood River County; also affected Clatsop, Lincoln, and Tillamook counties	

**Table 2-14 Landslide/Debris Flow Hazard History Events**

Year/Date	Location	Description
Feb. 1996	Affected nearly three-quarters (26) of Oregon counties, including Clackamas, Multnomah, and Wasco counties	Severe winter storm with landslides. Heavy rain and melting snow contributed to hundreds of landslides and debris flows throughout the state, causing significant infrastructure damage, road closures, and eight fatalities. Log jams and dirt from Mt. Hood traveled down the Hood River and created a sandbar expansion on the Columbia River. Received federal disaster declaration (DR-1099).
Dec. 1980	Hood River County	Debris flow from Mt. Hood flowed down Polallie Creek, forming a dam in a small lake that was later breached and causing damage to roads and utility infrastructure.

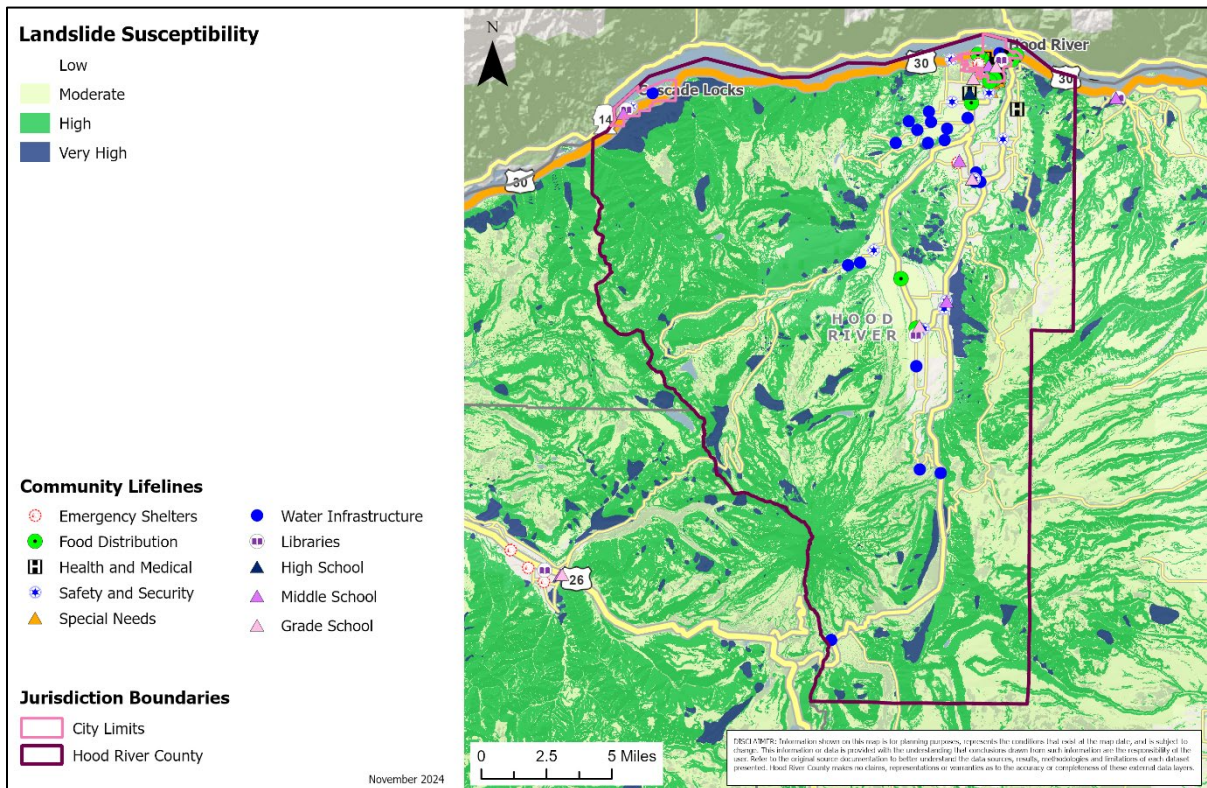
Source: Center for Emergency Management and Homeland Security (2023, February 15). *Spatial Hazard Events and Loss Database for the United States (SHELDUS)*. Arizona State University. <https://cemhs.asu.edu/sheldus>; Federal Emergency Management Agency (2024). *Disaster Declarations for States and Counties: Hood River County*. Retrieved April 29, 2024, from <https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties>.

## Probability

The probability of rapidly moving landslides occurring depends on several factors: steepness of slope, slope materials, local geology, vegetative cover, human activity, and both surface and ground water. Landslides and debris flows are strongly correlated with intensive winter storms. There is a 100% probability of landslides occurring in this region in the future, though the severity of these landslides is difficult to predict. Although we do not know exactly where and when they will occur, they are more likely to happen in the general areas where landslides have occurred in the past. Also, they will likely occur during heavy rainfall events or a future earthquake. Based on the available data and research, **the NHMP Steering Committee rated the probability of occurrence as “moderate”**, meaning one incident in the next 35 to 75 years may occur.

Within Hood River County, 7% of land has “very high” susceptibility to landslides, 51% has “high,” and 33% has “moderate” susceptibility. Map 2-6 illustrates where landslides are most likely to occur in the County. Much of this risk was heightened by the 2017 Eagle Creek Fire, which weakened soil throughout the forestland south and west of Cascade Locks, greatly increasing the risk of rapidly moving landslides and debris flows.

## Map 2-6 Landslide Susceptibility



Source: Mapping by OPDR.

Data from Hood River County and Oregon Department of Geology and Mineral Industries [HazVu website](#).

Note that even if an area has a high percentage of land in a high or very high landslide exposure susceptibility zone, that does not mean there is a high risk (vulnerability), because risk is the intersection of a hazard and assets.

### Future Projections

The [OCCRI Report](#) does not describe landslide risk for Hood River County. Landslide risk depends on multiple factors, including precipitation, earthquakes, and wildfires. Future development along slopes or adjacent to riverbanks will be a greater risk of impact from this hazard and is occurring throughout the County, especially in the City of Cascade Locks.

### Vulnerabilities

Landslides tend to occur in sparsely developed areas and threaten individual structures and remote sections of the transportation, energy, and communications infrastructure, suggesting moderate vulnerability. Landslides can affect structures (residential, commercial, industrial), utility services, transportation systems, and critical lifelines among others.

Communities may suffer immediate damage and loss of service. Disruption of infrastructure, roads, and critical facilities may also have a long-term effect on the economy. Loss of electricity has the most widespread impact on other utilities and on the whole community.

Natural gas pipes may also be at risk of breakage from slight landslide movements as small as an inch or two. Landslide damage tends to be underreported: claims are rarely made to insurance companies, the press rarely covers slides unless they are severe, and transportation network slides may be listed in records simply as “maintenance.”

Due to heavy rains, soil erosion in hillside areas can be accelerated, resulting in loss of soil support beneath high voltage transmission towers in hillsides and remote areas. Flood events can also cause landslides which impact gas lines and other infrastructure. Water and wastewater utilities may need treatment to quickly improve water quality by reducing excessive water turbidity and reestablishing wastewater disposal capability.

Because many Hood River County residents are dependent on roads and bridges for travel to work, delays and detours are likely to have an economic impact on county residents and businesses. I-84, a major County transportation lifeline, is at risk for landslides with a high potential for road closures and damage to utility lines.

### **Economic Losses**

DOGAMI’s Risk Report includes a landslide damage model. The model’s results show the following potential impacts on areas of the County exposed to landslides/debris flows:

- **Number of buildings:** 1,286
- **Value of exposed buildings:** \$286,860,000
- **Percentage of total county value exposed:** 7.4%
- **Critical facilities exposed:** 3
- **Potentially displaced population:** 1,642

Most of the area that is susceptible to landslides is remote and does not include significant development. Therefore, based on the potential impacts discussed in this section, **the NHMP Steering Committee rated the vulnerability to landslide events as “moderate”**, meaning that between 1-10% of the region’s population or assets could be affected by a major disaster.

Mitigation efforts have been taken to prevent developments on top of or below slopes subject to sliding without geotechnical investigations and preventative improvements, and to create barriers between major roadways and landslide hazard areas.

# Volcanic Event

## Significant Changes since Previous NHMP:

None.

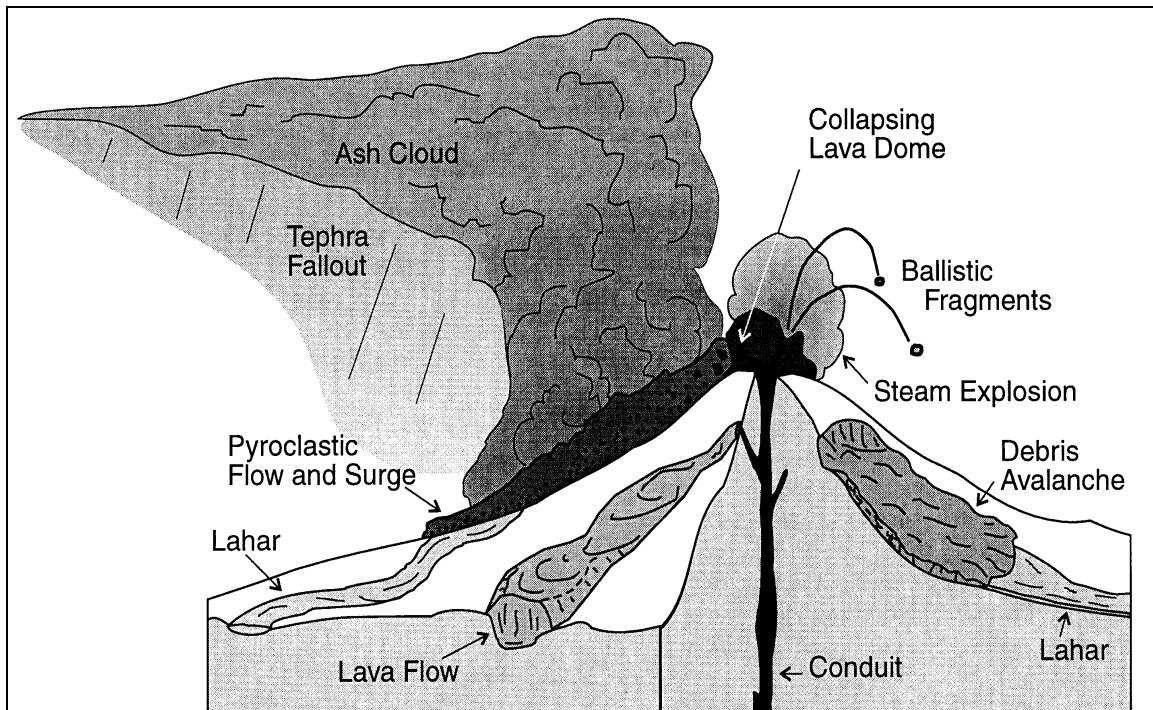
No development or population changes affected the jurisdiction's overall vulnerability to this hazard. In addition, development and population forecasts are not expected to increase or decrease the impact of this hazard.

## Characteristics

The Cascade Range is a series of mountains derived from volcanic activity which includes several active and potentially active volcanoes. Mount Hood, Mount Jefferson, and Mount Adams are all potentially active volcanoes within or close to Hood River County that can impact these communities.

A volcano is a vent in the earth's crust through which molten rock, rock fragments, gases or ashes are ejected from the earth's interior. Volcanic activity can produce many types of hazardous events (see Figure 2-4) including landslides/debris flows, ashfall, lahars, pyroclastic flows, and lava flows.

Figure 2-4 Types of Volcanic Hazards



Source: Scott et al. (1997). *Open-File Report 97-89: Volcano Hazards in the Mount Hood Region, Oregon*. U.S. Geological Survey. <https://pubs.usgs.gov/of/1997/0089/pdf/of1997-0089.pdf>.

Pyroclastic flows are fluid mixtures of hot rock fragments, ash, and gases that can move down the flanks of volcanoes at speeds of 50 to more than 150 kilometers per hour (30 to 90 miles per hour). Lahars or volcanic debris flows are water-saturated mixtures of soil and rock fragments that can travel very long distances (over 100 km) as fast as 80 kilometers per hour (50 miles per hour) in steep channels close to a volcano. Lahars can be very localized (only meters across) or can affect areas hundreds of kilometers away. Lahars can be generated by hot volcanic flows that melt snow and ice or by landslides from the steep upper flanks of the volcano. Structures close to river channels are at greatest risk of being destroyed. Large lahars can affect areas more than 30 vertical meters (100 vertical feet) above riverbeds.<sup>34</sup>

Mount Hood's eruptive history can be traced to late Pleistocene times (15,000 – 30,000 years ago) and will no doubt continue. The most recent series of events (1760 – 1810) consisted of small lahars and debris avalanches; steam explosions and minor tephra falls occurred between 1859 and 1865. Mount Hood's recent history also includes ashfalls, dome building, lahars, pyroclastic flows, and steam explosions.<sup>35</sup>

## Location and Extent

Mount Hood is an active volcano close to rapidly growing communities, recreation areas, and major transportation routes and therefore imposes heightened risk. Potential hazards include collapse of growing lava domes and generation of pyroclastic flows, which in turn melt snow and ice to form lahars that flow far down valleys; the long-term adjustment of river channels to the large quantities of volcano generated sediment dumped into valleys that head on the volcano; and landslides of hydrothermally altered material from steep upper slopes of the volcano that spawn debris avalanches and related lahars. The most likely widespread and hazardous consequence of a future eruption would be for lahars to sweep down the entire length of the Sandy and White River valleys. Modest production of tephra would also pose chiefly non-life-threatening hazards to nearby communities.

The DOGAMI Risk Report includes a comprehensive volcano (lahar) risk assessment. Areas particularly vulnerable to volcanic activity include the City of Hood River as well as the Mount Hood CDP and Parkdale community near Mount Hood. Former Mount Hood lahars (water saturated debris slides) completely buried valley floors in the Sandy and Hood River drainages to the Columbia River and in the White River drainage all the way to the Deschutes River, disrupting stream flow and channel transport.

Though most volcanic activity is considered local, lahars and ashfall can travel many miles, impacting small mountain communities, dams, reservoirs, energy generating facilities, and highways. These hazards could impact the entire County. Based on the type and magnitude of tephra (ashfall) production expected from Mount Hood, only nearby communities such as

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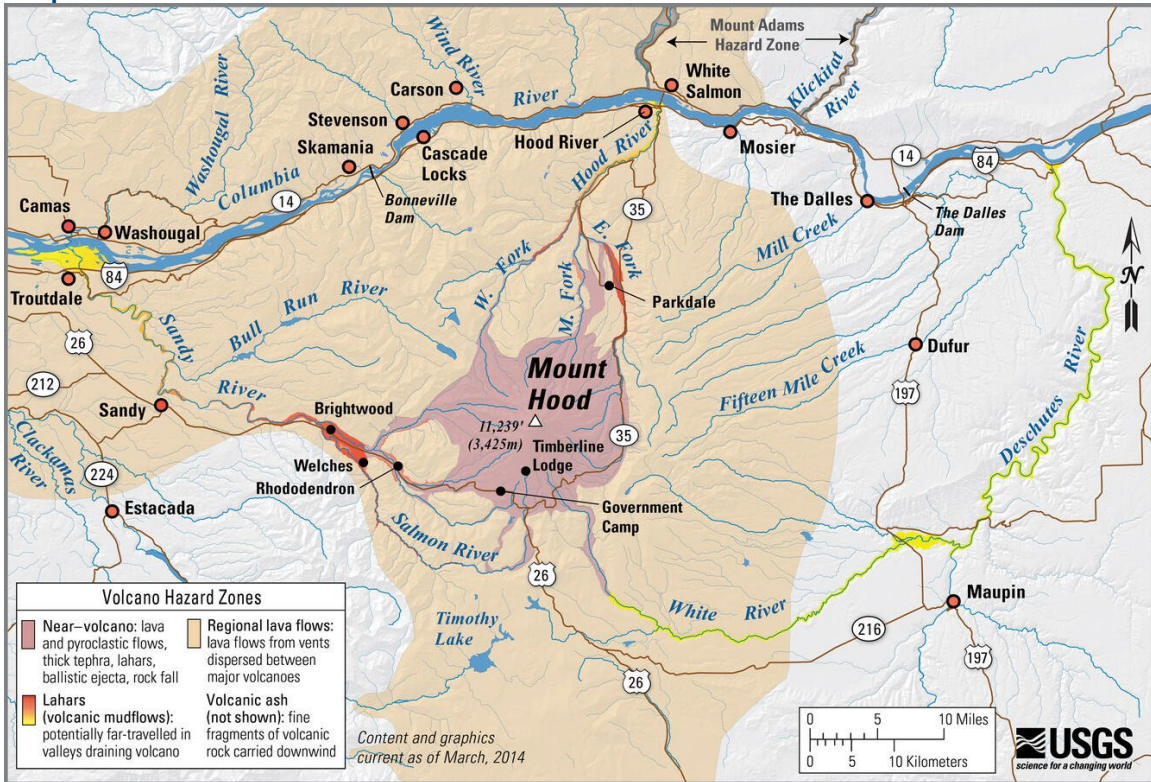
<sup>34</sup> Scott et al. (1997). *Open-File Report 97-89: Volcano Hazards in the Mount Hood Region, Oregon*. U.S. Geological Survey. <https://pubs.usgs.gov/of/1997/0089/pdf/of1997-0089.pdf>.

<sup>35</sup> Ibid.

Government Camp, Rhododendron, and Parkdale, would likely receive a tephra thickness approaching 1.5 centimeters, the perceived disaster amount, in any one event.

The general location of different volcanic hazards from Mt. Hood is shown in Map 2-7

### Map 2-7 Volcano Hazard Zones



Source: U.S. Geological Survey. (2023, November 8). *Hazards Summary for Mount Hood*. <https://www.usgs.gov/volcanoes/mount-hood/science/hazards-summary-mount-hood>.

### Proximal Hazard Zones

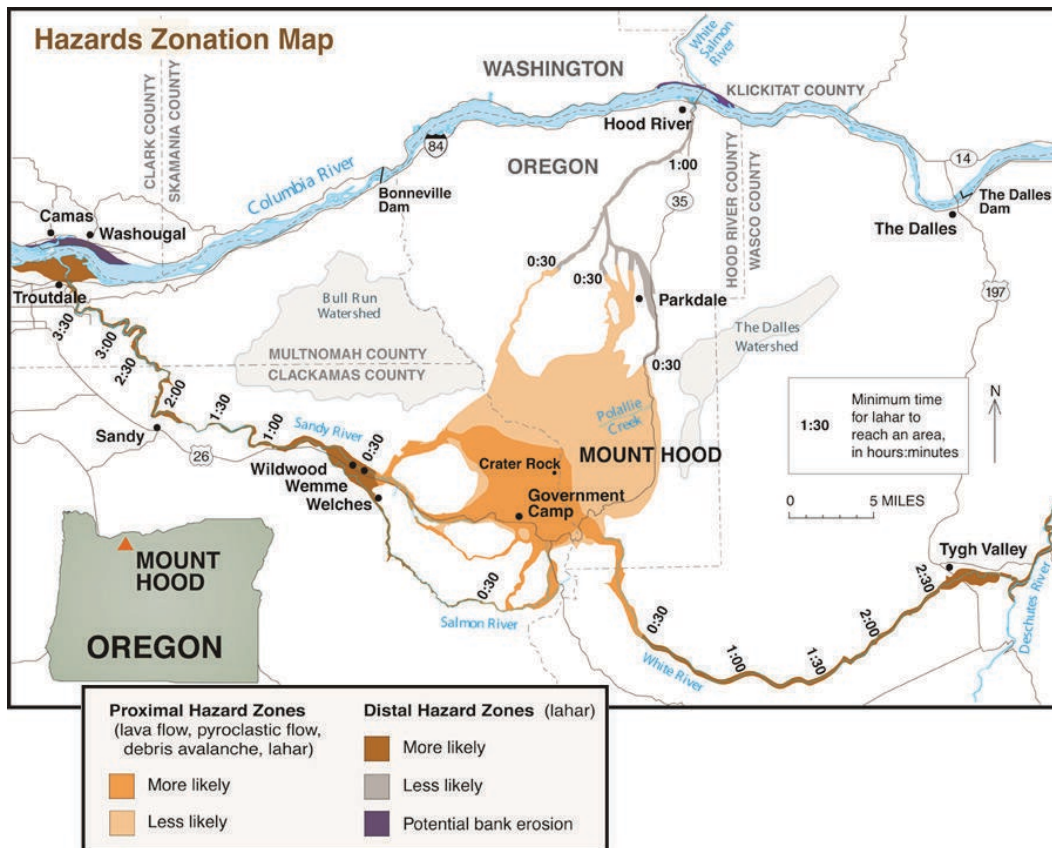
During the past 1,500 years, lava-dome growth has been localized in the area around Crater Rock, which lies in a steeply sloping crater south of the summit ridge. This is the most likely vent location during the next eruption as well. Several major valleys within the proximal hazard zones are more likely to be affected during early stages of lava dome growth. These valleys, along with Polallie Creek Valley, are also subject to frequent small lahars, floods, and debris avalanches triggered by storms or other noneruptive causes. If a lava dome grows near Crater Rock, the White and Zigzag River valleys, the valley of Zigzag Glacier and its melt water stream, an unnamed tributary of the upper Sandy, are the most likely pyroclastic-flow and lahar paths. If an eruptive episode continues long enough that debris fills the heads of these drainages, pyroclastic flows and lahars will sweep over a broader area, which could include the Little Zigzag River, Still Creek (including the area around Government Camp), and Salmon River valleys. The proximal hazard zone area between these valleys that is drained by Polallie Creek and several other creeks probably would not be initially affected.

Proximal hazard zones include areas from the summit extending out 24 km (15 miles) along major valleys and 12 km (7 miles) between major valleys. Pyroclastic flows and surges will travel out to a maximum distance of about 12 km in less than 10 minutes, whereas lahars and debris avalanches can travel out to the 24 km hazard boundary in as little as 30 minutes. Areas up to 5 kilometers (3 miles) from a vent could also be subject to showers of large ballistic fragments within a few minutes of an explosion. Such events are less constrained by topographic features than pyroclastic flows from dome collapse, so explosions at a vent in one proximal zone could impact other areas. Owing to such high speeds, escape or survival is unlikely in proximal hazard zones. Therefore, evacuation of proximal hazard zones prior to onset of an event is realistically the only way to protect lives. Lava flows issuing from vents on the upper flanks of Mount Hood would be largely restricted to proximal hazard zones but would move much more slowly.

The earthquakes and deformation associated with future intrusion of magma into Mount Hood can also trigger landslides of fractured and weakened rock from the steep upper slopes. Landslides anywhere on the mountain can generate debris avalanches and related lahars in valleys not otherwise affected by dome growth.

Map 2-8 depicts the approximate locations of proximal and distal hazard zones.

**Map 2-8 Proximal and Distal Hazard Zones**



Source: U.S. Geological Survey. (2023, November 8). *Hazards Summary for Mount Hood*. <https://www.usgs.gov/volcanoes/mount-hood/science/hazards-summary-mount-hood>.

## Distal Hazard Zones

Recent eruptions only indirectly affected upper parts of the Hood River basin, producing modest debris avalanches and related lahars. Due to the lack of evidence of recent events in the Hood River Valley, the probability of lahars or debris avalanches inundating areas along Hood River has a 30-year probability of 1 in 300. Several masses of partly altered and highly fractured rock on the steep upper east and north flanks could generate a debris avalanche and related lahar with a volume of about 50 million cubic meters (65 million cubic yards). Dome growth on the upper east or north flank could generate lahars like those produced by dome growth and collapse near Crater Rock during the past 1,500 years, but this is unlikely.

Mount St. Helens is an active volcano outside of Hood River County; it is located across the Columbia River in Washington State. However, Mt. St. Helens erupted twice in recent decades and dispersed significant ash fall across the Columbia Gorge. Depending on wind direction, ashfall from a future Mt. St. Helens eruption could impact Hood River County. Mt. St. Helens is the most active volcano in the Cascade Range and the most likely to erupt in the next generation. While some volcanic mudflows (lahars) would reach the Columbia River from the northern side, they are unlikely to directly affect Hood River County. USGS maintains a robust monitoring system at Mt. St. Helens, so future activity will be preceded by a warning.

## History

Cascade Range volcanoes in the U.S. have erupted more than 200 times during the past 12,000 years for an average of nearly two eruptions per century. At least five significant eruptions have occurred during the past 150 years. The most recent eruptions in the Cascade Range are the well-documented 1980-1986 eruptions of Mt. St. Helens, which claimed 57 lives and caused nearly a billion dollars in damage and response costs. The effects were felt throughout the northwest.

Mt. Hood has erupted episodically for about 500,000 years and hosted two major eruptive periods during the past 1,500 years. During both recent eruptive periods, growing lava domes high on the southwest flank collapsed repeatedly to form pyroclastic flows and lahars that were distributed primarily to the south and west along the Sandy River and its tributaries. The last eruptive period began in 1781 and affected the White River as well as Sandy River valleys. The Lewis and Clark Expedition explored the mouth of the Sandy River in 1805 and 1806 and described a river much different from today's river. At that time, the river was choked with sediment generated by erosion of the deposits from the eruption, which had stopped about a decade before their visit. In the mid-1800's, residents reported minor explosive activity, but since that time the volcano has been quiet.

Table 2-15 contains the volcano hazard history for the Cascade Range.

**Table 2-15 Volcano Hazard History Events**

Year/Date	Location	Description
2004-2008	Mount St. Helens (Washington)	Lava dome growth, steam, and ash.
1989-2001	Mount St. Helens (Washington)	Hydrothermal explosions.
1981-1986	Mount St. Helens (Washington)	Lava dome growth, steam, and lahars.
1980	Mount St. Helens (Washington)	Mt. St. Helens erupts, with a debris avalanche, ashfall, and flooding on the Columbia River. 57 people are killed. Received disaster declaration (DR-623).
1907	Mount Hood - Crater Rock	Steam explosions.
1859-1865	Mount Hood - Crater Rock	Steam explosions and tephra falls.
1760-1810	Mount Hood - Crater Rock/Old Maid Flat	Pyroclastic flows in upper White River; lahars in Old Maid Flat; and dome building at Crater Rock.
1,500 years ago (estimated)	Mount Hood	Timberline eruptive period: lava dome, pyroclastic flows, lahars, and tephra.
About 7,700 years ago;		
About 5,300 to 5,600 years ago	Davis Lake (Southern Cascades)	Lava flows and scoria cones in Davis Lake field.
About 7,700 years ago	Mount Hood - Parkdale	Eruption of Parkdale lava flow.
About 7,700 years ago	Crater Lake Caldera	Formation of Crater Lake caldera, pyroclastic flows, and widespread ashfall.
About 7,800 to 15,000 years ago	Cinnamon Butte (Southern Cascades)	Basaltic scoria cone and lava flows.
About 13,000 to 20,000 years ago	Mount Hood	Polallie eruptive episode: lava dome, pyroclastic flows, lahars, and tephra.
About 13,000 to 28,000 years ago	Mount St. Helens	Cougar and Swift Creek stages: eruptions with ash fall, lava domes, lava flows, pyroclastic flows, a debris avalanche, lahars, and the construction of dacite domes and fans of fragmental material.

Source: U.S. Geological Survey (2023, November). *Eruption History of Mount Hood Oregon*. <https://www.usgs.gov/volcanoes/mount-hood/science/eruption-history-mount-hood-oregon>. U.S. Geological Survey (2023, November). *Eruption History of Mount St. Helens through start of Holocene*. <https://www.usgs.gov/volcanoes/mount-st-helens/science/eruption-history-mount-st-helens-through-start-holocene>; Federal Emergency Management Agency (2024). *Disaster Declarations for States and Counties: Hood River County*. Retrieved April 29, 2024, from <https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties>.

## Probability

Based on the available data and history of eruptions, the NHMP Steering Committee rated the probability of occurrence as “low”, meaning one incident in the next 75 to 100 years may occur.

The most likely widespread and hazardous consequence of a future eruption from Mt. Hood will be for lahars (rapidly moving mudflows) to sweep down the entire length of the Sandy

(including the Zigzag) and White River valleys, neither of which are located within Hood River County. The probability of eruption-generated lahars affecting the Sandy and White River valleys is 1-in-15 to 1-in-30 during the next 30 years, whereas the probability of extensive areas in the Hood River Valley being affected by lahars is about ten times less.

Mount St. Helens remains a probable source of ashfall. It has repeatedly produced voluminous amounts of this material and has erupted much more frequently in recent historical time than any other Cascade volcano. It blanketed Yakima and Spokane, Washington during the 1980 eruption and continues to be of concern. The location, size, and shape of the area affected by ashfall are determined by the vigor and duration of the eruption and the wind direction. Because wind direction and velocity vary with both time and altitude, it is impossible to predict the direction and speed of ash transport more than a few hours in advance.

### **Future Projections**

The [OCCRI Report](#) does not describe volcanic risk for Hood River County. Geoscientists have provided some estimates of future activity in the vicinity of Crater Rock, a well-known feature on Mount Hood. They estimate a 1 in 300 chance that some dome activity will take place in a 30-year period (1996–2026). For comparison, the 30-year probability of a house being damaged by fire in the United States is about 1 in 90. The probability of 1 cm or more of ashfall from eruptions anywhere in the Cascade Range effecting Hood River County is between 1 in 500 and 1 in 1,000.

### **Vulnerabilities**

Unexpected volcanic activity may occur anytime and significantly impact Hood River County. However, Hood River County’s vulnerability is limited by the modern capability to accurately detect eruptive activity well before eruption. The USGS constantly monitors seismic activity directly underneath Cascade volcanoes. Clusters or ‘swarms’ of small earthquakes underneath a volcano have proven to be a precursor to renewed volcanic activity. Emergency managers and other responsible agencies must ensure an aggressive response to these warnings. Because an eruption can occur within days to months of the first precursory activity and because some hazardous events can occur without warning, suitable emergency plans should be made beforehand. Public officials need to consider issues such as public education, communications, and evacuations. Emergency plans already developed for floods may apply, with modifications, to lahar hazards.

Mount Hood has a settlement (Government Camp), major highways (US 26 and OR 35), and popular tourist and recreation areas (Timberline Lodge and Mount Hood Meadows Ski Area) on its flanks. Furthermore, several thousand people live within 35 kilometers (22 miles) of Mount Hood along the channels and flood plains of rivers that drain the volcano. Such areas could be inundated within one hour of event onset.

Tephra fallout produced by future eruptions of Mount Hood can create darkness lasting tens of minutes or more and reduce visibility on highways. Tephra ingested by vehicle engines can clog filters and increase wear. Deposits of tephra can short-circuit electric transformers and

power lines, especially if the tephra is wet and thereby highly conductive, sticky, and heavy. This effect could seriously disrupt hydroelectric power generation and transmission along the Columbia River and power line corridors north and east of the volcano. Tephra clouds often spawn lightning, which can interfere with electrical and communication systems and start fires. Even small, dilute tephra clouds damage and reduce visibility for jet aircraft.

Future eruptions of Mount Hood could seriously disrupt transportation and hydroelectric power generation and transmission in northwest Oregon and southwest Washington. In addition, some municipal water supplies are vulnerable to increased turbidity from falling tephra. U.S. Highway 26, a major cross-Cascades route, and Oregon Highway 35, an important recreational road, could be severed by lahars and other hazards and would probably be closed during volcanic unrest and eruption. Depending on the character and impact of a future eruption, the highways could be lost for years or decades. Large loads of sediment delivered to the Columbia River by lahars or by the Sandy and other rivers transporting sediment from eruption-impacted watersheds would have a serious effect on the Columbia River shipping channel, which could last long after an eruptive period ends. A future Mount St. Helens eruption could result in laborious cleanup of ash fall throughout the County, depending on wind direction.

### **Economic Losses**

DOGAMI's Risk Report includes a volcanic lahar damage model. The model's results show the following potential impacts on areas of the County exposed to potential volcanic lahars:

- **Number of buildings:** 141
- **Value of exposed buildings:** \$42,019,000
- **Percentage of total county value exposed:** 1.1%
- **Critical facilities exposed:** 0
- **Potentially displaced population:** 226

Because of the potential impact to the Hood River Valley from a lahar flow via the Hood River, **the NHMP Steering Committee rated the vulnerability to volcanic events as "moderate"**, meaning that between 1-10% of the region's population or assets could be affected by a major disaster.

# Wildfire

## Significant Changes since Previous NHMP:

The hazard history was updated with hazard events through 2024. Several other points of data throughout this section were also updated with the most recently available data.

No development or population changes affected the jurisdiction's overall vulnerability to this hazard. In addition, development and population forecasts are not expected to increase or decrease the impact of this hazard.

## Characteristics

Wildland fires occur in areas with large amounts of flammable vegetation that require a suppression response due to uncontrolled burning. Uncontrolled burning within a forested area is a forest fire, whereas uncontrolled burning in grassland, brush, or woodlands is classified as a Wildfire. Wildfires burn primarily in vegetative fuels outside the urban areas, and can generally be categorized as agricultural, forest, range, or wildland-urban interface fires. Fire is an essential part of Oregon's ecosystem but can also pose a serious threat to life and property, particularly in growing rural communities and in the wildland-urban interface (WUI).

The following three factors contribute significantly to wildfire behavior and can be used to identify wildfire hazard areas:

- **Topography:** As slope increases, the rate of wildfire spread increases. South-facing slopes are also subject to more solar radiation, making them drier and thereby intensifying wildfire behavior. However, ridgetops may mark the end of wildfire spread, since fire spreads more slowly or may even be unable to spread downhill.
- **Fuel:** The type and condition of vegetation plays a significant role in the occurrence and spread of wildfires. Certain types of plants are more susceptible to burning or will burn with greater intensity. Dense or overgrown vegetation increases the amount of combustible material available to fuel the fire (referred to as the "fuel load"). The risk of fire is increased significantly during periods of prolonged drought as the moisture content of both living and dead plant matter decreases. The fuel load's continuity, both horizontally and vertically, also contributes to a fire's rate of spread.
- **Weather:** The most variable factor affecting wildfire behavior is weather. Temperature, humidity, wind, and lightning can affect the chances of ignition and spread of fire. Extreme weather, such as high temperatures, low humidity, and high wind speeds, can lead to extreme wildfire activity. By contrast, cooling, higher humidity, and little to no wind often signal reduced occurrence and easier containment of a fire.

The frequency and severity of wildfires is also dependent on other factors such as lightning strikes, equipment use, railroads, recreation use, arson, and infestations. If not promptly

controlled, wildfires may grow into an emergency or disaster. Even small fires can threaten lives and resources and destroy improved properties. In addition to affecting people, wildfires may severely affect livestock and pets. Such events may require emergency watering/feeding, evacuation, and shelter.

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

The Hood River County Wildfire Protection Plan (CWPP) provides comprehensive information on the local vulnerabilities, characteristics, and risk locations for wildfires. See Volume IV for the Hood River County CWPP, which was updated at the same time as this NHMP.

## Location and Extent

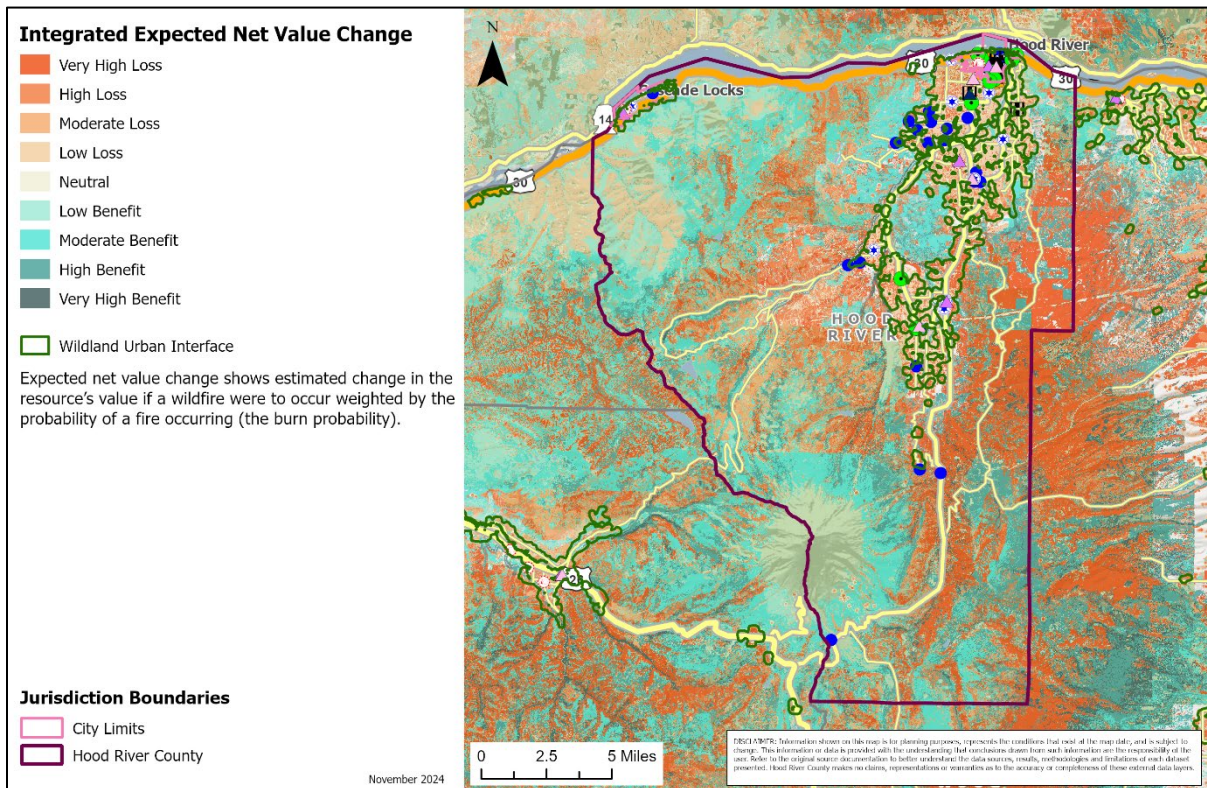
Hood River County's fire season usually runs from mid-May through October. Fire susceptibility throughout the County dramatically increases in late summer and early autumn as summer thunderstorms with lightning strikes increases and vegetation dries out. The probability of a fire in any specific time or place depends on fuel conditions, topography, the time of year, the past and present weather conditions, and the human activities (debris burning, land clearing, camping, etc.) taking place.

Map 2-9 illustrates the wildfire hazard for the County (with the WUI outlined in green) using a method known as integrated expected net value change. Integrated expected net value change maps show the estimated change in the resource's value if a wildfire were to occur weighted by the probability of a fire occurring (also known as the burn probability).

For more information on wildfire hazard in the County, see Volume IV, Community Wildfire Protection Plan (specifically Chapter 4: Risk and Preparedness Assessment).

As Map 2-9 illustrates, most of the County lies within "very high", "high", or "moderate" loss areas. The City of Cascade Locks has mostly "low" or "neutral" while the City of Hood River is mostly "moderate" or "low" loss, indicating slightly higher wildfire hazard. Much of the Upper Hood River Valley and the southeastern portion of the County has "very high" or "high" loss, indicating significant wildfire hazard.

## Map 2-9 Wildfire Hazard



Source: Mapping by OPDR.

Data from USFS Pacific Northwest Region Wildfire Risk Assessment (PNRA) and Oregon Explorer’s [CWPP Planning Tool](#).

Hood River County and the surrounding region have unique geographic features, weather characteristics, a history of unmanaged fuels, and an expanding urban interface that make the area susceptible to wildfire. Douglas fir, grand fir, and western hemlock (150-400-year fire intervals) dominate in the wetter forests of the western Columbia River Gorge, while ponderosa pine, Oregon white oak brush, and grass are more characteristic toward the east (15-year fire intervals). North and east facing slopes are typically forested while south and westerly aspects are generally open and grass covered.

The Mt. Hood National Forest covers roughly half (50%) of Hood River County’s 533 square miles. Private and county forestland covers another roughly one-fifth (20%) of land within the county. Where the damp forests of the west Cascades tend to see fewer fires, fires tend to be large and cause high rates of tree mortality; the east Cascades sees increased fire frequency, however fires tend to be less intense.

Many of the larger fires in the west Cascades and Columbia River Gorge burn in steep, forested terrain—a geography where few residences are located, and the main hazards are to infrastructure such as water supplies and high-voltage power lines. The west end of this heavily wooded region is pinched between the Columbia River and the near vertical sides of the river gorge. As the percentage of slope increases, more preheating of fuels preceding the fire front will occur. The fire front will proceed up the hill at a faster rate and the fire will

burn more intensely. Coupled with high winds and low humidity, this region has the potential for a severe wildfire similar to the 2017 Eagle Creek Fire in Multnomah County that entered Hood River County from the west and forced the evacuation of the City of Cascade Locks.

Fires also have the potential to spread from Washington State across the Columbia River into the County via long-range spotting. This region is subject to weather patterns that can contribute significantly to extreme fire behavior. Winds can attain speeds of 80 mph, halt truck traffic, and damage a variety of structures and facilities. Areas along the Gorge experience 20–30 mph winds daily and, at times, winds exceed 40 mph. Significant drying occurs due to sustained winds, high daytime temperatures, and drier air from the desert.

Sources of human-caused ignition include discarded cigarettes, motor cars and trucks, railroads, mowing, acts of nature, and fire emanating from adjoining land. Most fires adjacent to the freeway start in fine grasses and can rapidly progress into conifers that line the safety zone for almost the entire breadth of the region’s west end.

For more information on forest compositions, fuel loads, and slope grades in the County, see the Hood River County CWPP in Volume IV. The CWPP explains how fire ecology varies across the County landscape and how best to manage fires in the human impacted environment.

## History

The wildfire hazard history since 2000 is shown in Table 2-16. There are two additional fires that occurred prior to 2000 in and near Hood River County to note:

- **Skyhook Fire (September 1971)** – burned over 5,000 acres in Mt. Hood National Forest southwest of the City of Hood River.
- **Falls Fire (October 1991)** – burned over 1,100 acres between Multnomah Falls and Bridal Veil, forcing evacuations and the deployment of 1,400 firefighters and more than 200,000 gallons of fire-retardant foam on the historic Multnomah Lodge.

Between 2000 and 2022, the Oregon Department of Forestry reported 305 wildfires in Hood River County.<sup>36</sup> While most of these fires remained small, they still posed considerable threat. The 2003 Herman Creek Fire was suppressed at 375 acres – but not before the fire jumped Interstate 84 five times, destroyed three structures, and cost local, state, and federal agencies over \$600,000.<sup>37</sup> It was caused by downed power lines during an east wind event characteristic to the area during late summer. The 2017 Eagle Creek Fire reached nearly 50,000 acres, burned for several weeks, and led to the evacuation of the City of Cascade Locks. The region has largely recovered from the economic impacts of the Eagle Creek Fire.

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<sup>36</sup> Oregon Department of Forestry (2024). *Oregon Department of Forestry Fire History 2000-2022: Fire occurrence points*. Oregon.gov Open Data Portal. Retrieved August 14, 2024, from <https://data.oregon.gov/stories/s/92y3-mdk3>.

<sup>37</sup> Federal Emergency Management Agency (2024). *Disaster Declarations for States and Counties: Hood River County*. Retrieved April 29, 2024, from <https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties>.

**Table 2-16 Wildfire Hazard History**

Year/Date	Name	Location	Description
Aug. – Sept. 2024	Whiskey Creek Fire	Southeast of Cascade Locks	Burned over 2,000 acres. Forced the closure of hiking trails throughout the Mark O. Hatfield wilderness and contributed to poor air quality in the region.
Jul. – Aug. 2024	Microwave Tower Fire	East of Hood River on the border of Hood River and Wasco counties	Burned over 1,300 acres. Forced the closure of the Historic Columbia River Highway State Trail from Mosier to Hood River.
July 2023	Tunnel Five Fire	Northwest of Hood River across the Columbia River in Washington state	Burned over 500 acres. Forced some evacuations and cancellation of Fourth of July celebration in Hood River. Included due to smoke impacts throughout Hood River County and concerns about the fire crossing the river. Received federal disaster declaration (FM-5467).
Aug. 2020	Fir Mountain Fire	Southwest of Hood River	Burned over 300 acres. Part of worst fire season in Oregon state history.
Sept. 2017	Eagle Creek Fire	Columbia Gorge National Scenic Area (Multnomah/Hood River counties)	Burned over 50,000 acres across Multnomah and Hood River counties and forced evacuation of Cascade Locks. Received federal disaster declaration (FM-5203).
July 2017	Indian Creek Fire	Southwest of Cascade Locks	Burned over 500 acres. Merged with Eagle Creek Fire in Sept. 2017.
Aug. 2013	Government Flats Fire Complex	The Dalles Watershed (southeast of Hood River)	Burned over 11,000 acres. Destroyed 13 structures and incurred suppression costs of more than \$12 million. Received federal disaster declaration (FM-5046).
Sept. 2012	MP 66 Fire	Hood River	Burned 60 acres. Notable due to being caused by railroad brakeshoe.
Aug. 2011	Dollar Lake Fire	Mt. Hood National Forest	Burned over 6,000 acres. Incurred suppression costs of more than \$15 million. Started by lightning.
Aug. – Sept. 2009	Microwave Fire	Mark O’Hatfield State Park (southeast of Hood River)	Burned over 1,200 acres. Received federal disaster declaration (FM-2829).
Aug. 2008	Gnarl Ridge Fire	South of Hood River	Burned over 3,200 acres. Started by lightning.
Aug. 2006	Gumjuwac Fire/ Bluegrass Ridge Fire	Mt. Hood National Forest	Burned over 2,000 acres. Fires on both east and west sides of Highway 35 south of Parkdale, forcing highway to close. Incurred suppression costs of more than \$10 million.
Sept. 2003	Herman Creek Fire	Cascade Locks	Burned over 300 acres. Incurred suppression costs of over \$600,000. Received federal disaster declaration (FM-2495).

Source: Oregon Wildfire Risk Explorer (2024). Oregon Department of Forestry and U.S. Forest Service. Retrieved August 14, 2024, from <https://oregonexplorer.info/topics/wildfire-risk?ptopic=2>; Federal Emergency Management Agency (2024). *Disaster Declarations for States and Counties: Hood River County*. Retrieved April 29, 2024, from <https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties>.

## Probability

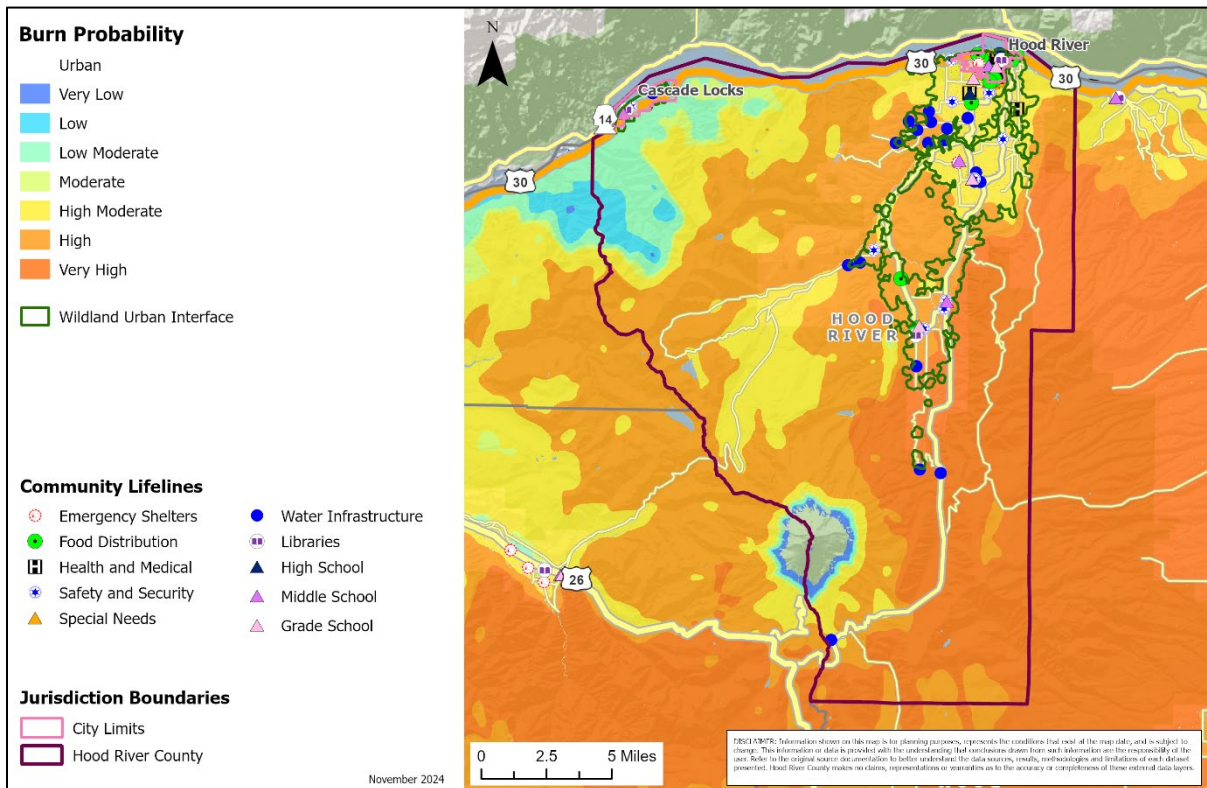
Based on the available data, **the NHMP Steering Committee rated the probability of occurrence as “high”**, meaning one incident in the next 35 years may occur. In fact, wildfire events occur annually, and when certain conditions occur, they become severe hazards.

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

Human use of the WUI increases the probability of loss to fire and fire ignition. Hood River County has become national famous for its plentiful recreation opportunities. As a result, the County has experienced more tourism from outdoor enthusiasts in the form of mountain biking, hiking, camping, wind surfing, kite boarding, and fishing. The peak month for these activities is August, when fire season is at or near its peak. Tourism increases the risk of a fire ignition and wildfires endanger tourists in the area who are not as familiar with wildfire preparedness or evacuation routes.

Map 2-10 illustrates the wildfire burn probability within the County, with the WUI outlined in green. Burn probability varies throughout the County, with the cities of Cascade Locks and Hood River having “low” and “low moderate” probabilities but most of the unincorporated portions of the County have “high moderate”, “high”, and even “very high” probabilities. Taken in conjunction with the wildfire hazard data in Map 2-9, Hood River County is at very high risk of experiencing severe wildfire events.

## Map 2-10 Wildfire Burn Probability



Source: Mapping by OPDR.

Data from USFS Pacific Northwest Region Wildfire Risk Assessment (PNRA) and Oregon Explorer’s [CWPP Planning Tool](#).

While the largest fires have been caused by lightning, human induced fires present a significant risk to Hood River County. The 2017 Eagle Creek Fire was ignited by the release of an illegal firework on a public trail. Industrial ignitions from power lines (Microwave, 2009) and railroad (MP 66, 2012) are likely to remain constant in the valley and their risk is mitigated through the clearing of ladder fuels in the right of way.<sup>38</sup> Fires caused by vehicles are also likely to remain a constant risk for fires due to high traffic volumes. In 2022, Interstate 84 had an annual average daily traffic volume (AADT) of approximately 32,000 vehicles, while Oregon Highway 35 had an AADT of approximately 11,000 vehicles.<sup>39</sup>

<sup>38</sup> Oregon Department of Forestry (2024). *Oregon Department of Forestry Fire History 2000-2022: Fire occurrence points*. Oregon.gov Open Data Portal. Retrieved August 14, 2024, from <https://data.oregon.gov/stories/s/92y3-mdk3>.

<sup>39</sup> Oregon Department of Transportation (2024). *Traffic Volume Tables for State Highways 2022*. <https://www.oregon.gov/odot/data/pages/traffic-counting.aspx>.

Looking at the largest fires in the County only paints part of the picture of fire risk. From 2000 to 2022, ODF reports that 305 ignitions burned close to 12,000 acres (excluding the 2017 Eagle Creek Fire), but the median fire burned just 0.05 acres.<sup>40</sup> While these fires are small, every ignition has the chance to become a fully involved wildfire. Looking at the historical sources of fire ignition, Hood River fire prevention should focus on landowner education to reduce fire starts caused by debris burning and equipment use. Further preventative education should focus on the education of recreationalists.

Land ownership, and resultant management and suppression capabilities and protocols, also affect the potential for wildfires. In Hood River County, the most significant land ownership falls to federal agencies, and includes forested and wilderness areas. Federal lands in this area are characterized by dense stands, heavy underbrush, and ladder fuels, increasing the potential for wildfires. County, state, and private lands contribute to the remainder. These lands have a variety of management practices resulting in a mix of stand conditions and resultant fire potential.

### Future Projections

The [OCCRI Report](#) describes that wildfire risk in Hood River County is increasing due to rising temperatures, stronger wind events, and the increased risk of drought. Instances of wildfire are also increasing throughout the region due to the existence of open lands and large forested areas, increasing population and recreational activities, a higher concentration of residences in the WUI, and the overall impacts of a changing climate.

## Vulnerabilities

Based on available data and the potential impacts discussed in this section, **the NHMP Steering Committee rated the vulnerability to wildfire events as “high”**, meaning that 10% or more of the region’s population or assets could be affected by a major disaster.

Large lightning-induced fires will continue to pose a significant risk to Hood River County and the surrounding area, especially as a warming climate is predicted to contribute to a longer growing season and increased lightning frequency. The destruction of large tracts of forest land would have an immediate economic impact to the community through lost jobs, reduced taxes, and a decrease in tourism, while collateral economic and social effects could impact the County for years. The cost of fire suppression has increased more than 200% over the past two decades.<sup>41</sup> Steep terrain and roadside fuels along I-84 can make fire protection and suppression difficult. More than half (50%) Hood River County land is owned and managed by USFS; other forests are managed by the County or ODF. Prevailing strong west winds in eastern Hood River County, paired with fuel load to the west, results in extreme

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<sup>40</sup> Oregon Department of Forestry (2024). *Oregon Department of Forestry Fire History 2000-2022: Fire occurrence points*. Oregon.gov Open Data Portal. Retrieved August 14, 2024, from <https://data.oregon.gov/stories/s/92y3-mdk3>.

<sup>41</sup> Davis, M. (2023, September 18). *Cost of Suppressing Wildfires Up 200% Over Past 20 Years: Analysis of National Interagency Fire Center Data*. ValuePenguin. <https://www.valuepenguin.com/wildfires-suppression-cost-study>.

forest fire risk. The near constant presence of hazardous materials, prevalent in the rural farming communities, and in transportation corridors on Union Pacific railway and I-84, creates a secondary hazard of explosion.

The economic stability of Hood River County and the surrounding region is dependent on a major interstate highway (I-84). Closures can be expected in the face of low or no visibility resulting from wildfires or inclement winter weather. Additional economic sectors that could be affected by wildfire are agriculture, forest products, tourism, manufacturing, recreation, and power generation. Community and natural resources at risk of wildfire include agriculture and livestock, wildlife and salmonids, and historic buildings. The greatest short-term loss from fires is the destruction of valuable resources, such as timber, wildlife habitat, scenic vistas, and watersheds. An immediate increase in vulnerability to flooding follows wildfires due to the destruction of all or part of the watershed. Landslide risk would be expected to increase as well due to ground cover loss.

Vulnerability is a direct result of early detection and emergency personally response time. For Hood River County, it is critical to suppress a fire before it grows larger than one tenth of an acre. A response time of ten to twelve minutes is the commonly accepted threshold. Four of the five fire districts in Hood River County depend predominantly on volunteer response, hence a ten-to-twelve-minute response time must additionally include transport time to the fire station to retrieve necessary apparatus.

Disruption to the municipal water supply and irrigation water supply from wildfires would negatively impact all residents and agricultural operators that depend on this resource by reducing water quality and availability. Roads, bridges, and evacuation routes could be compromised, limiting the ability of firefighters to reach the fire as well as inhibiting evacuation procedures. Utilities including Bonneville Power Administration power lines, Portland General Electric and Northwest Natural Gas electrical and gas distribution lines and communication infrastructure are also at risk. Any significant amount of time that I-84 is closed will impact County fuel and food supply and distribution.

### **Economic Losses**

DOGAMI's Risk Report includes a wildfire damage model. The model's results show the following potential impacts on portions of the County in high wildfire hazard areas:

- **Number of buildings:** 2,537
- **Value of exposed buildings:** \$700,357,000
- **Percentage of total county value exposed:** 18%
- **Critical facilities exposed:** 5
- **Potentially displaced population:** 4,142

For more information on the WUI extent, wildfire risk, and other key information related to wildfire mitigation in Hood River County, see the Hood River County CWPP in Volume IV.

# Windstorm

## Significant Changes since Previous NHMP:

The hazard history was updated with hazard events through 2024. Several other points of data throughout this section were also updated with the most recently available data.

No development or population changes affected the jurisdiction's overall vulnerability to this hazard. In addition, development and population forecasts are not expected to increase or decrease the impact of this hazard.

## Characteristics

A windstorm is generally a short duration event involving straight-line winds and/or gusts of more than 50 mph. Two sources generate strong winds that impact Hood River County. Frequent and widespread strong winds from the west are associated with storms inland from the Pacific Ocean and/or a pressure differential between the upper Columbia River Basin (high atmospheric pressure) and the Pacific Ocean (low atmospheric pressure). Furthermore, the Columbia River Gorge is the most significant east-west gap in the Cascade Mountains between California and Canada, and acts as a funnel, concentrating the intensity of winds as they flow. High winds can cause widespread damage to trees and power lines and interrupt transportation, communications, and power distribution.

Tornadoes are not common in Hood River County, but they have been observed in the surrounding region, sometimes producing significant property damage and even injury. Tornadoes are the most concentrated and violent storms produced by the atmosphere and can produce winds of more than 300 mph. Most Oregon tornadoes are caused by intense local thunderstorms, common between April and October. Tornadoes can affect an area of one-quarter to three-quarters of a mile and seldom more than 16 miles long. They form when a strong crosswind intersects with strong warm updrafts causing a slowly spinning vortex to form within a cloud. Eventually, this vortex may develop intensity and descend to form a funnel cloud. When this funnel cloud gets close enough to the ground to affect the surface it becomes a tornado.

## Location and Extent

Although windstorms can affect the entire 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 a significant amount of storm related debris. Severe windstorms usually cause the greatest damage to ridgelines that face into the winds. There is an additional hazard in newly developed areas that have been thinned of trees to make way for new structures, as unprotected trees in these areas are more likely to fall. Widespread power outages from downed power lines are the most significant impact of windstorms in Hood River County.

High winds in the Columbia Gorge are well documented, leading to special building code standards. Peak local wind gust speeds have been 100 miles per hour. The average wind speed at Hood River is 13 mph.<sup>42</sup> All manufactured homes in the County that are within 30 miles of the Columbia River must meet special anchoring standards.

Tornadoes are not a normal occurrence in the Northwest because the climate does not normally generate the temperature variations conducive to tornado formation. Tornadoes in Washington and Oregon tend to be light or moderate, with winds ranging from 40 to 112 mph. There are three notable exceptions: the April 1972 Portland-Vancouver tornadoes; the December 2010 Aumsville tornado; and the October 2016 Manzanita tornado.<sup>43</sup>

## History

There are no recorded instances of a tornado causing damage within Hood River County. Table 2-17 lists windstorm hazard event history.

**Table 2-17 Windstorm Hazard History Events**

Year/Date	Location	Description
Jan. 2024	Affected nearly one-third (11) of Oregon counties, including Clackamas, Multnomah, and Wasco counties	Severe winter storm with straight-line winds. Received federal disaster declaration (DR-4768).
Jan. 2023	Affected one-third (12) of Oregon counties, including Clackamas and Multnomah counties	Severe winter storm with straight-line winds. Received state disaster declaration (23-01).
Feb. 2021	Affected one-fourth (9) of Oregon counties, including Clackamas and Multnomah counties	Severe winter storm with straight-line winds. Received state disaster declaration (21-02).
Apr. 2017	Affected half (18) of Oregon counties, including Clackamas, Multnomah, and Wasco counties	Severe winter storm with straight-line winds. Received state disaster declaration (17-06).
Dec. 2015	Affected nearly one-half (14) of Oregon counties	Severe winter storm with straight-line winds. Received federal disaster declaration (DR-4258). <b>Declaration did not include Hood River County, but the County was still impacted severely by this windstorm.</b>
Dec. 2008	Affected nearly one-third (10) of Oregon counties, including Clackamas and Multnomah counties	Severe winter storm with straight-line winds. Over 22 inches of snow fell on the City of Hood River in one day. Significant infrastructure damage as well as I-84 impacts that caused one fatality. Received federal disaster declaration (DR-1824).

<sup>42</sup> WINDEXchange (2012). Oregon 30-Meter Residential-Scale Wind Resource Map. U.S. Department of Energy Office of Energy Efficiency & Renewable Energy. Retrieved August 26, 2024, from <https://windexchange.energy.gov/maps-data/216>.

<sup>43</sup> National Weather Service Storm Prediction Center (2011). U.S. Annual Tornado Maps (1952-2011). National Oceanic and Atmospheric Administration. Retrieved August 26, 2024, from <https://www.spc.noaa.gov/wcm/annualtornadomaps/>.

**Table 2-17 Windstorm Hazard History Events**

Year/Date	Location	Description
Apr. 2004	Hood River County and surrounding region	Windstorm caused over \$25,000 in property damage in Hood River and Wasco counties.
Nov. 1997	Hood River County and surrounding region	Windstorm with wind speeds up to 52 mph. Uprooted trees and caused considerable damage to small airports throughout the region.
Dec. 1995	Hood River County and surrounding region	Windstorm caused widespread damage.
Jan. 1993	Hood River County and surrounding region	Windstorm caused widespread damage, including to utilities.
Jan. 1980	Hood River County and surrounding region	Severe winter storm with straight-line winds. Impacts included significant power outages and six fatalities. Most severe windstorm in Western Oregon due to sustained wind speeds and damage levels. Known as the "Columbus Day Storm". Wind speeds in the Willamette Valley were up to 116 mph. 84 homes were destroyed, with 5,000 severely damaged. Windstorm caused 38 fatalities and over \$200 million of damage across the state. Received federal disaster declaration (DR-136). <b>Declaration did not include Hood River County, but the County was still impacted severely by this windstorm.</b>
Oct. 1962	Statewide	
Nov. 1958	Statewide	Windstorm with wind speeds of 51 mph and up to 71 mph gusts. All major state highways blocked by fallen trees.
Dec. 1955	Statewide	Windstorm with wind speeds of 45-55 mph and up to 69 mph gusts. Caused considerable damage to buildings and utility lines.
Nov. 1951	Statewide	Windstorm with wind speeds of 40-60 mph and up to 80 mph gusts. Caused widespread transmission and utility lines damage.
Dec. 1935	Hood River County and surrounding region	Windstorm with gusts up to 120 mph.
Apr. 1931	Hood River County and surrounding region	Windstorm with wind speeds up to 78 mph. Caused significant damage to fruit orchards and timber in the County.

Source: Hatton, R. & Taylor, G. H. (1999). *The Oregon Weather Book: A State of Extremes*. Oregon State University Press. <https://osupress.oregonstate.edu/book/oregon-weather-book>; Federal Emergency Management Agency (2024). *Disaster Declarations for States and Counties: Hood River County*. Retrieved April 29, 2024, from <https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties>.

## Probability

High winds occur yearly in the Columbia River Gorge. History and geography suggest a high probability of occurrence; however, most of these events do not cause significant damage. A 100-year event in this region consists of 1-minute average winds of 90 mph. A 50-year event has 1-minute average winds of 80 mph, while a 25-year event has average winds of 75 mph.

Based on the available data and research, **the NHMP Steering Committee rated the probability of occurrence as “moderate”**, meaning one incident in the next 35 to 75 years may occur.

### **Future Projections**

The [OCCRI Report](#) describes that the risk of windstorms is increasing for Hood River County along with the risks of other types of major storm events (including winter storms). Those impacted by windstorms at present, including older residential or commercial developments with above-ground utilities, poor insulation or older construction, heavy tree canopies, or poor storm drainage, will continue to be impacted by windstorms in the future.

## **Vulnerabilities**

Many buildings, utilities, and transportation systems are vulnerable to wind damage. This is especially true in open areas, such as natural grasslands or farmlands. It also is true in forested areas, along tree-lined roads and electrical transmission lines, and on residential parcels where trees have been planted or left for aesthetic purposes. Structures most vulnerable to high winds include insufficiently anchored manufactured homes and older buildings in need of roof repair.

The DOGAMI Risk Report does not address windstorm impacts.

Fallen trees can block roads and rails for long periods, which can affect emergency operations. In addition, uprooted or shattered trees can down power and/or utility lines and effectively halt local economic activity and other essential services. Uprooted trees growing next to a house have destroyed roofs when they fall due to windstorms. In some situations, strategic pruning is useful.

Due to the nature of the hazard, it is impossible to predict the location or extent of future events with any probability, although it can be assumed that all residential and critical facilities and infrastructure within the County are at risk.

Because there are no recorded events, there is no demonstrated likelihood of tornadoes impacting Hood River County. It is extremely rare for tornado warnings to be issued in the Pacific Northwest. However, there is limited awareness of tornado threat in Oregon and local forecasting and warning systems are under-developed. There is little public awareness of the warning systems and self-protection measures common to the tornado prone states.

Based on the potential impacts discussed in this section, **the NHMP Steering Committee rated the vulnerability to windstorm events as “moderate”**, meaning that between 1-10% of the region’s population or assets could be affected by a major disaster. The NHMP Steering Committee determined that proper protections have been taken to reduce the impacts of a windstorm event, decreasing vulnerability. A major event could still cause significant disruption.

# Winter Storm

## Significant Changes since Previous NHMP:

The hazard history was updated with hazard events through 2024, with older storms lacking data removed from the history. Several other points of data throughout this section were also updated with the most recently available data.

No development or population changes affected the jurisdiction's overall vulnerability to this hazard. In addition, development and population forecasts are not expected to increase or decrease the impact of this hazard.

## Characteristics

Severe winter weather in the region can be characterized by extreme cold, snow, ice, and sleet, caused by frigid air moving westward out of the Wallowa Mountains through the Columbia River Gorge. Winter storm events are an annual occurrence regionally. Severe weather conditions usually do not last long; consequently, winter-preparedness is a moderate priority. This is advantageous as, in general, the region is well prepared for winter storms, and those visiting the region during the winter usually come prepared. However, there are occasions when preparation cannot meet the challenge. Severe local storms seldom cause death and serious property damage but can cause utility and transportation disruptions. Although major winter storms are often accompanied by wind, windstorms are described in a separate section because they have distinct causes and impacts.

The three principal types of winter storms that occur are:

- **Snowstorms:** Snowstorms require three variables: cold air, moisture, and air disturbance. Blizzards are included in this category.
- **Ice storms:** Ice storms are a type of winter storm that forms when a layer of warm air is trapped between two layers of cold air. Frozen precipitation melts when it hits the warm air layer and freezes when hitting the cold air layer below the inversion. Ice storms can include sleet (when the rain freezes before hitting the ground) or freezing rain (when the rain freezes once hitting the ground). Sleet and hail can create hazards for motorists when it accumulates, but freezing rain can cause the most dangerous conditions within a community. Ice buildup can bring down trees, communication towers, and wire, creating hazards for property owners, motorists, and pedestrians.
- **Extreme Cold:** Low temperatures often accompany winter storms. Low temperatures can become dangerous because snow and ice storms can cause power outages, leaving many people without adequate heating.

Rain arriving from the west can fall on frozen streets, cars, and other sub-freezing surfaces, creating dangerous conditions. Rain on snow events happen periodically in the Pacific Northwest and tend to be very impactful.

## Location and Extent

The entire County is susceptible to damaging severe weather. The impacts of winter storms are variable and compounding throughout Hood River County. Mid-latitude storms approaching from the West are forced to rise as they encounter the Cascades, releasing large amounts of precipitation on the western slopes. Areas of the County at higher elevations have an increased risk of snow and ice, however, the entire County is susceptible to dangerous winter storm impacts. Prolonged heavy rains cause the ground to become saturated, rivers and streams to rise, and often results in local flooding and landslides.

Hood River County snow accumulations vary depending on location. For example, the Mt. Hood National Forest experiences accumulations of more than 150 inches around the higher elevations surrounding Mt. Hood. In the area of the Hood River Experimental Station, average snowfall may accumulate to approximately 12 inches, depending on the year.<sup>44</sup> Accumulations of snow usually increase as the terrain rises to the south of the Columbia River. The greatest snowfall usually occurs in January.

## History

The winter storm hazard history is shown in Table 2-18.

**Table 2-18 Winter Storm Hazard History**

Year/Date	Location	Description
Jan. 2024	Affected nearly one-third (11) of Oregon counties, including Clackamas, Multnomah, and Wasco counties	Flooding, landslides, mudslides, and straight-line winds. Received federal disaster declaration (DR-4768).
Jan. 2023	Affected one-third (12) of Oregon counties, including Clackamas and Multnomah counties	Flooding, heavy rain, ice accumulation, landslides, and straight-line winds. Received state disaster declaration (23-01).
Feb. 2021	Affected one-fourth (9) of Oregon counties, including Clackamas and Multnomah counties	Flooding, heavy snow, ice accumulation, landslides, and straight-line winds. Received state disaster declaration (21-02).
Apr. 2017	Affected half (18) of Oregon counties, including Clackamas, Multnomah, and Wasco counties	Flooding, landslides, and straight-line winds. Received state disaster declaration (17-06).
Jan. 2017	Hood River County; also affected Columbia, Deschutes, and Josephine counties	Flooding, landslides, and mudslides. Received federal disaster declaration (DR-4328).
Dec. 2015	Affected nearly one-half (14) of Oregon counties	Flooding, landslides, mudslides, and straight-line winds. Received federal disaster declaration (DR-4258). <b>Declaration did not include Hood River County, but the County was still impacted severely by this storm.</b>

<sup>44</sup> Northwest River Forecast Center: Snow-Station Information. (2024). *MT HOOD TEST SITE SNOTEL (MTH03*. National Oceanic and Atmospheric Administration. Retrieved August 14, 2024, from <https://www.nwrfc.noaa.gov/snow/snowplot.cgi?MTH03>.

**Table 2-18 Winter Storm Hazard History**

Year/Date	Location	Description
<b>Apr. 2014</b>	Hood River County	Heavy snow, ice accumulation, and landslides. Received state disaster declaration (14-03).
<b>Jan. 2012</b>	Affected one-third (12) of Oregon counties.	Flooding, landslides, and mudslides. Storm lasted more than a week. Received federal disaster declaration (DR-4055).
<b>Jan. 2011</b>	Affected six (6) Oregon counties, including Clackamas County	Debris flows, flooding, landslides, and mudslides. Received federal disaster declaration (DR-1956). <b>Declaration did not include Hood River County, but the County was still impacted severely by this storm.</b>
<b>Dec. 2009</b>	Hood River County and surrounding region	Freezing rain and heavy snow. Impacts throughout the region led ODOT to close I-84 for 22 hours.
<b>Dec. 2008</b>	Affected nearly one-third (10) of Oregon counties, including Clackamas and Multnomah counties	Flooding, landslides, mudslides, straight-line winds, and record/near record snow. Over 22 inches of snow fell on the City of Hood River in one day. Significant infrastructure damage as well as I-84 impacts that caused one fatality. Received federal disaster declaration (DR-1824).
<b>Nov. 2006</b>	Hood River County; also affected Clatsop, Lincoln, and Tillamook counties	Debris flow, flooding, freezing rain, landslides, and mudslides. Freezing rain closed I-84 near the City of Hood River. Debris Flow from the Elliot and Newton Clark glaciers created a river delta in the Columbia River known as the sandbar and caused millions of dollars of damage to State Highway 35, water and irrigation district infrastructure (including hydroelectric plants), several bridges, and multiple road and railroad sections. Received federal disaster declaration (DR-1672).
<b>Dec. 2003 - Jan. 2004</b>	Affected nearly all (30) Oregon counties	Heavy snow and ice accumulation shut down Portland area along with most of the state. Received federal disaster declaration (DR-1510).
<b>Feb. 2002</b>	Hood River County and surrounding region	Storm caused over \$6 million in damage, including downed power lines and trees. Power outages led to water supply problems in some areas.
<b>Dec. 1996</b>	Affected nearly one-quarter (8) of Oregon counties	Flooding, heavy snow, and ice accumulation closed I-84 for four days and led to hundreds of downed trees and power lines. Received federal disaster declaration (DR-1160). <b>Declaration did not include Hood River County, but the County was still impacted severely by this storm.</b>
<b>Feb. 1996</b>	Affected nearly three-quarters (26) of Oregon counties, including Clackamas, Multnomah, and Wasco counties	Flooding, heavy rain, heavy snow, ice accumulation, and landslides. Severe winter storms followed by warm temperatures and heavy rain led to significant infrastructure damage, road closures, and eight fatalities. Received federal disaster declaration (DR-1099).
<b>Feb. 1990</b>	Hood River County and surrounding region	Heavy snow that led to 24-35 inches of snow in the Columbia Gorge, including both the cities of Cascade Locks and Hood River.

**Table 2-18 Winter Storm Hazard History**

Year/Date	Location	Description
Jan. 1980	Hood River County and surrounding region	Multiple storms with freezing rain, heavy snow, ice accumulation, and straight-line winds. Impacts included significant power outages and six fatalities.
Jan. 1974	Affected more than half (19) of Oregon counties, including Clackamas and Wasco counties	Flooding due to snowmelt. The Willamette River in Portland crested at 26 feet while the City of Hood River experienced near-record flooding, cresting at 14.5 feet at Tucker Bridge. Received federal declaration (DR-413).
Jan. 1972	Affected nearly one-third (10) of Oregon counties, including Clackamas and Multnomah counties	Flooding. Received federal disaster declaration (DR-319). <b>Declaration did not include Hood River County, but the County was still impacted severely by this storm.</b>
Jan. 1970	Hood River County	Ice accumulation followed by thaw led to major orchard damage, especially in Dee. Known as "Silver Thaw". Received state disaster declaration.
Dec. 1964	Statewide (every county in Oregon)	Flooding and heavy rains. More than 30 inches of snow fell on the City of Hood River followed by warm rain, leading to the highest level of flooding recorded, cresting at 20.5 feet at Tucker Bridge. Received federal disaster declaration (DR-184).
Jan. 1950	Hood River County and surrounding region	Freezing rain, heavy snow, and straight-line winds closed all highways west of the Cascades and caused hundreds of thousands of dollars in damage to roads and power and communication lines. Monthly snowfall reached 64 inches in the city of Hood River and up to 10 feet elsewhere in the County, especially in Parkdale.
Jan. 1919	Hood River County	Extreme temperatures and ice accumulation led to the Columbia River freezing. The temperatures reached negative 27 degrees and killed nearly all of the apple trees in the County. Damage was part of countywide shift to orchards growing more resistant pears instead of apples.

Source: Office of Oregon Governor (2024). *Executive Orders: 2003 to Present*. Retrieved March 18, 2024, from <https://www.oregon.gov/gov/pages/executive-orders.aspx>; Federal Emergency Management Agency (2024). *Disaster Declarations for States and Counties: Hood River County*. Retrieved April 29, 2024, from <https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties>.

## Probability

Based on the available data and research, the NHMP Steering Committee rated the probability of occurrence as “high”, meaning one incident in the next 35 years may occur. In fact, history demonstrates that winter storms are likely to occur annually, with severe storms occurring about every three (3) years.

### Future Projections

The [OCCRI Report](#) for Hood River County identifies that while the risk of heavy precipitation is expected to increase, the risk of freezing temperatures is anticipated to decrease. The

intensity of extreme precipitation is expected to increase as the atmosphere warms and holds more water vapor. Vulnerable populations will be more likely to experience the negative impacts of winter storms in the future, particularly the unhoused and the elderly.

## Vulnerabilities

Based on the potential impacts discussed in this section, **the NHMP Steering Committee rated the vulnerability to winter storm events as “high”**, meaning that 10% or more of the region’s population or assets could be affected by a major disaster. However, given current available data, no quantitative assessment of the risk of winter storm was possible at the time of this NHMP update. Assessing the risk to the County from winter storms should remain an ongoing process determined by community characteristics and physical vulnerabilities. Weather forecasting can give County resources (emergency vehicles, warming shelters) time to prepare for an impending storm; the changing character of the County population and resources will determine the impact of winter storms on life and property in Hood River County.

The DOGAMI Risk Report does not address winter storm impacts.

Historical damage and cumulative costs of destructive storms suggest high vulnerability. The effects vary with storm intensity, the level of preparation by local jurisdictions and residents, and equipment and staff available. Deaths related to winter storms can occur because of traffic accidents on icy roads, and hypothermia from prolonged exposure to the cold. Low temperatures and temporary loss of home heating can be particularly hard on the elderly, young children, and other vulnerable individuals. In the last five years, I-84 has closed every year due to winter storm impacts. While most Hood River County critical infrastructure has backup power, distribution to residential and commercial buildings – particularly in the upper valley and Cascade Locks - remains extremely vulnerable.

Hood River County contains the commodity flow route to Eastern Oregon and beyond. With long road closures, the communities suffer from the loss of traffic and revenue. Drifting and blowing snow has brought highway traffic to a standstill, while windy and icy conditions have closed Oregon’s principal east-west transportation route, I-84, for hours or even days. For residents, heating, food, fuel and the care of livestock and farm animals are everyday concerns. High volumes on major transportation routes also pose challenges. In 2022, Interstate 84 had an annual average daily traffic volume (AADT) of approximately 32,000 vehicles, while Oregon Highway 35 had an AADT of approximately 11,000 vehicles.<sup>45</sup>

Severe storms cause massive power and telephone outages. Even moderate storms can bring down power lines and/or tree limbs, obstruct roadways and damage structures. Severe storms in Hood River County have left thousands without power. In certain areas, several days may pass before power is restored, creating life-threatening problems for people with life support equipment such as dialysis machines, respirators, and oxygen generators. Days

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<sup>45</sup> Oregon Department of Transportation (2024). *Traffic Volume Tables for State Highways 2022*. <https://www.oregon.gov/odot/data/pages/traffic-counting.aspx>.

without a heated home can also be life-threatening for any person during cold winter temperatures. Severe storms also create hazardous driving conditions that can slow down or inhibit traffic, which in turn hinders police, fire, and medical responses to urgent calls. Law enforcement resources are often occupied with welfare inquiries and traffic control, while fire districts/departments focus on electrical hazards and debris removal, a short- and long-term challenge. Following severe storms, hundreds of tons of debris can pile up in residential and commercial areas.

Combinations of storm types or accompaniment by freezing temperatures can exacerbate a storm's impact. Isolated residents without power are more likely to use wood fires to stay warm or to cook, increasing the risk of structural fires. Residents without food or water may attempt to use impassable roads and thereby increase the number of rescues.

Ensuring that people stay off roads and remain in safe places until a storm passes is the best strategy for mitigating harm. Effective employee and student dismissal plans and event cancellation support safety. It is important to promptly notify the public of severe weather watches and warnings. In responding to severe storms, phone and power restoration services must be prioritized, after which debris can be removed from roads and properties.

## Community Lifelines

The 2018 NHMP included a detailed list of community lifelines in Hood River County. As defined by FEMA, a Community Lifeline enables the continuous operation of critical government and business functions and is essential to human health and safety or economic security. FEMA identifies eight (8) categories of lifelines, described below. More information on lifelines can be found on FEMA's [website](#).

- **Safety and Security:** Law Enforcement/Security, Fire Service, Search and Rescue, Government Service, Community Safety
- **Food, Hydration, Shelter:** Food, Hydration, Shelter, Agriculture
- **Health and Medical:** Medical Care, Public Health, Patient Movement, Medical Supply Chain, Fatality Management
- **Energy:** Power Grid, Fuel
- **Communications:** Infrastructure, Responder Communications, Alerts Warnings and Messages, Finance, 911 and Dispatch
- **Transportation:** Highway/Roadway/Motor Vehicle, Mass Transit, Railway, Aviation, Maritime
- **Hazardous Materials:** Facilities, HAZMAT, Pollutants, Contaminants
- **Water Systems:** Potable Water Infrastructure, Wastewater Management

Given that the status, type, and even location of community lifelines can change significantly between plan updates, Hood River County Emergency Management opted to remove the static table of community lifelines and instead rely on a dynamic, frequently updated online GIS website maintained with Hood River County Community Development. This Hood River County EMS Webmap can be found at the following URL:

<https://webmap.hoodrivercounty.gov/ems/>.

# Section 3: Mitigation Strategy

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

## Mitigation Plan Mission

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

The mission of the Hood River County NHMP is:

**Reduce the risk to life, property, and the natural environment by minimizing the impact of disasters on Hood River County.**

The 2025 NHMP Steering Committee (County, cities, and special districts) reviewed the previous NHMP’s mission statement and modified it to make the mission actionable. The previous mission was: *Protect life, property and the environment through coordination and cooperation among public and private partners, which will reduce risk and loss, and enhance the quality of life for the people of Hood River County.*

## Mitigation Plan Goals

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

Stakeholder participation was a key aspect in developing the original NHMP goals in 2006 and 2007. Meetings with the project Steering Committee, stakeholder interviews, public workshops, and guidance from the Oregon Partnership for Disaster Resilience (OPDR) all served as methods to obtain input and priorities in developing goals for reducing risk and preventing loss for natural hazards in Hood River County.

The 2025 Hood River County NHMP Steering Committee (county, cities, and special districts) reviewed the previous NHMP goals in comparison to the State Natural Hazard Mitigation

Plan (2020) goals and determined that they would add one goal to emphasize the important of equity (Goal 7). They also added goal statements to provide more information about the intended outcomes within each of the seven NHMP goals.

All the NHMP goals are important and are listed below in no order of priority. Developing community priorities within action items neither negates nor eliminates any goals, but it establishes which action items to consider implementing first, should funding become available. This differs from the 2018 NHMP, which listed Goals 1, 2, and 3 as primary goals. This change was made to allow for more flexibility in identifying high priority action items without making any one goal or set of goals carry more weight.

Below is a list of the NHMP goals:

### **Goal 1: Protecting Life, Property, and Natural Resources**

- Establish mitigation projects and policies that minimize losses and repetitive damages from recurring disasters while promoting insurance coverage for severe hazards.
- Develop and implement mitigation and climate adaptation projects and policies that aid in protecting lives by making homes, businesses, community lifelines, and other property more resilient to natural hazards and impacts from climate change.

### **Goal 2: Developing a Disaster Resilient Built Environment**

- Improve hazard identification and risk assessment information to inform and provide recommendations for enhanced resilience in new development decisions and promote preventative measures for existing development in areas vulnerable to natural hazards.
- Coordinate hazard planning and preparedness work with other state, regional, and local resilient infrastructure planning.

### **Goal 3: Conducting Education, Outreach, and Engagement**

- Empower residents, workers, visitors, and organizations with the knowledge, resources, and decision-making tools necessary to understand and reduce risk and increase preparedness.

### **Goal 4: Facilitating Partnerships and Coordination**

- Conduct meaningful and impactful communication, collaboration, and coordination among agencies at all levels of government, nonprofit, and community-based organizations, and the private sector to mitigate natural hazards.

### **Goal 5: Acknowledging Responsibility**

- Collaborate with agencies at all levels of government countywide to ensure a unified and clear delineation of responsibilities in hazard preparedness, mitigation, response, and recovery.

## Goal 6: Enhancing Emergency Services

- Seek opportunities to leverage funding, expertise, and resources to increase hazard preparedness, mitigation, response, and recovery efforts at all levels of government.

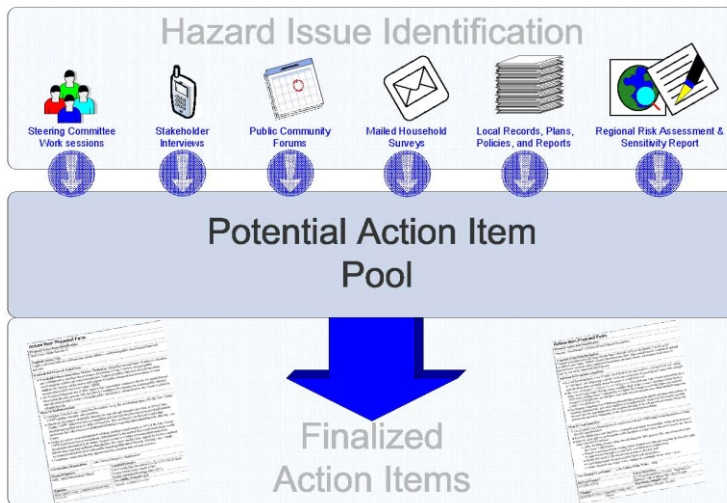
## Goal 7: Mitigating Inequitable Impacts of Natural Hazards

- Prioritize the directing of resources and efforts to build resilience and engagement in the most vulnerable communities least able to prepare, respond, and recover.
- Strengthen efforts aimed at increasing engagement, outreach, and collaboration with community and cultural organizations and agencies that provide services and support to vulnerable and underserved communities.

# Action Item Development Process

Development of action items was a multi-step, iterative process that involved brainstorming, discussion, review, and revisions. Action items can be developed through many sources.

**Figure 3-1 Development of Action Items**



Source: Developed by OPDR.

Most of the action items were first created during the previous NHMP planning processes. During these processes, steering committees developed maps of local vulnerable populations, facilities, and infrastructure in respect to each identified hazard. Review of these maps generated discussion around potential actions to mitigate impacts to the vulnerable areas. The Oregon Partnership for Disaster Resilience (OPDR) provided guidance in the development of action items by presenting and discussing actions that were used in other communities. OPDR also took note of ideas that came up in Steering Committee meetings and drafted specific actions that met the intent of the Steering Committee. All actions were then reviewed by the Steering Committee, discussed at length, and revised as necessary before becoming a part of this document.

## Action Items

Table 3-1 documents the title of each action along with, the lead organization, partners, timeline, cost, potential funding resources, and connection to community lifelines and vulnerable populations. Due to resource constraints during the development of the 2018 NHMP, Hood River County and participating jurisdictions listed a set of high priority actions to focus attention on an achievable set of high leverage activities over the next five years. This plan identifies priority actions based on an evaluation of high impact hazards, resource availability, and FEMA identified best practices.

*See Volume III for the action items for each participating jurisdiction.*

## Action Item Forms

Each high priority action item for Hood River County 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 forms can assist the community in pre-packaging potential projects for grant funding. Form components are described below. These action item worksheets are located in Volume II, Appendix A. Non-priority action items do not have forms.

## Background

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 throughout the NHMP.

## 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.

## Implementation through Existing Programs

Many of the recommendations in the NHMP are consistent with the goals and objectives of the county's existing plans and policies. Where possible, Hood River County will implement the NHMP's recommended actions 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.<sup>46</sup> Implementing the NHMP action items through such plans and policies increases their likelihood of being supported and implemented.

## Coordinating 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 Forms 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.

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.

## Plan Goals Addressed

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.

## 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* (S) are activities that may be implemented with existing resources and authorities in the next one to two years. *Medium-term* and *long-term action items* (M and L, respectively) may require new or additional resources and/or authorities and may take from three to five years or five years or more (respectively) to implement. *Ongoing* refers to actions that are currently in progress and take additional steps to complete or refers to actions that occur on a regular basis.

## Action Item Development

The 2006 NHMP Coordinator led the effort to collect and document action item ideas, disperse action worksheets to government agencies and community stakeholders, and draft action item worksheets to present to the Steering Committee. Input was gathered through

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<sup>46</sup> Burby, Raymond J. (1998). *Cooperating with Nature: Confronting Natural Hazards with Land-Use Planning for Sustainable Communities*.

the NHMP Community Stakeholder Forum, stakeholder interviews, and Steering Committee meetings. The Steering Committee was charged with the selection of draft action items to document in the plan and prioritization (high or low) of action items to help guide implementation. Selection and prioritization of items was accomplished during a four-stage review process of selection, prioritization, providing detail, and identifying critical actions.

## Action Item Review and Update of the 2018 NHMP

The 2006-2007 mitigation action items were reviewed and revised by the 2011-2012 Hood River County NHMP Steering Committee, the 2018 Steering Committee, and the 2025 Steering Committee. Members analyzed each of the action items developed by the previous Steering Committees and documented the progress made over the past five years.

Existing 2018 NHMP mitigation actions were reviewed and organized as follows:

- Completed action items were described and either removed or deferred if the nature of the action item made its progress ongoing.
- Action items that had not been completed were either deleted or deferred.
- Action items that had become institutionalized to the point of becoming routine maintenance were described and removed from the action item list.
- Action items that were identified as outside of the County's authority were removed.
- Most deferred action items were modified in some way, either in terms of the action itself, partner organizations, or the timeline for completion.

The actions taken by the 2025 Hood River County NHMP Steering Committee during their review of the plan's action items, along with justifications for these decisions, can be found in Volume II, Appendix C.

## Action Items for the 2025 NHMP

Table 3-1 is the result of the 2025 update process. There are 35 mitigation actions in total: seven (7) high priority actions (highlighted in **orange** and with **bolded** text) and 28 other actions. These portray the overall action plan framework. For each item, the table includes a description, the FEMA community lifelines it addresses, potential funding sources, the coordinating organization, partner organizations, timeline, cost, and the NHMP goals addressed. For the timeline, O=Ongoing (continuous), S=Short (1-2 years), M=Medium (3-5 years), and L=Long (5 or more years). For cost, L=Low (\$50,000 or less), M=Medium (\$50,000 to \$500,000), H=High (\$500,000 to \$5 million), and VH=Very High (\$5 million or more).

Greater detail for the high priority actions can be found in Volume II, Appendix E.

Table 3-1 Mitigation Action Items

Action Item #	Mitigation Action Title	Community Lifelines							Potential Funding Sources	Coordinating Organization	Partner Organizations	Timeline	Cost	Plan Goals Addressed
		Safety and Security	Food, Hydration, Shelter	Health and Medical	Energy	Communications	Transportation	Hazardous Materials						
Multi-Hazard														
1.1	Create countywide full-time positions to manage mitigation efforts, including sourcing funding, coordinating projects, and creating outreach materials.	X				X			HMA; State Funding (OEM, ODF)	Emergency Management	County Agencies; Cities; Ports; Fire Districts; School District	M	M	2, 3, 4, 5, 7
1.2	Increase interoperability and availability by upgrading 911 Computer Assisted Dispatch (CAD), dispatch radio system, County phone systems, and resilient power and internet infrastructure.	X				X			HMA; State Funding (OEM); Bond	Emergency Management	County Agencies; Cities; Fire Districts; Sheriff's Office; 911 Advisory Board	M	H	4, 5, 6
1.3	Update County land use plan, building codes, and zoning ordinances to mitigate natural hazard risk (particularly wildfire, flooding, and landslide).	X							HMA; State Funding (DLCD)	Community Development	County Agencies; County Commissioners; Cities; Ports; State Agencies (DLCD, DOGAMI, OSFM)	M	M	1, 2
1.4	Retrofit or build a facility for use as a community shelter, 911 dispatch, Emergency Operations Center, and/or point of distribution for emergency resources (including wildfire fighting).	X	X	X			X		HMA; State Funding (OEM, ODF, ODHS); Bond	Emergency Management/ Port of Hood River	County Agencies; Cities; State Agencies (ODF, OEM); USFS	L	VH	2, 4, 5, 6
1.5	Enhance public outreach and educational programs for all hazards.					X			State Funding (OEM, ODHS); Existing Staff Resources	Emergency Management	County Agencies; Cities; Ports; Fire Districts; School District; State Agencies (ODF, OSFM); USFS	O	M	3, 7
1.6	Develop shelter plan and prepare facilities to provide shelter-in-place services. Assist local businesses, local governments, and nonprofits in providing community resilience spaces as alternatives to overnight shelters.	X	X	X	X				HMA; State Funding (OHDS); Economic Development Agency; Existing Staff Resources	Emergency Management	County Agencies; Cities; Ports; Fire Districts; School District; Library District; Granges and Town Halls; State Agencies (OEM); FEMA	L	M	1, 4, 5, 6, 7

Table 3-1 Mitigation Action Items

Action Item #	Mitigation Action Title	Community Lifelines								Potential Funding Sources	Coordinating Organization	Partner Organizations	Timeline	Cost	Plan Goals Addressed
		Safety and Security	Food, Hydration, Shelter	Health and Medical	Energy	Communications	Transportation	Hazardous Materials	Water Systems						
1.7	Develop emergency evacuation, situational awareness, and public notification tool.	X	X				X			HMA; Existing Staff Resources	Emergency Management	County Agencies; Cities; Ports; Fire Districts; School District; State Agencies (OEM); FEMA	O	M	1, 4, 5, 6, 7
1.8	Develop plan for improving seismic and other hazard resilience at the County buildings at 309 and 611 State Street (including either renovation or construction of new building).	X				X				HMA; State Funding (Seismic Rehabilitation Grant Program); Bond	Emergency Management	County Agencies; City of Hood River	L	M	4, 5, 6
1.9	Acquire power generators and fuel/resilient power sources for critical facilities across the county (including for public and private communication towers) and develop plan for emergency storage, allocation, and distribution of fuel and generators.	X	X		X	X			X	HMA; Economic Development Agency	Emergency Management	County Agencies; Cities; Ports; School District; Library District; Businesses with privately-owned communication towers	S	H	2, 6
1.10	Explore options for incentivizing the creation of and investment in major care facilities (including medical, childcare, and elder care) in the City of Cascade Locks.			X						Private Sector Investment	City of Cascade Locks	County Agencies; Port of Cascade Locks; Existing Major Care Facilities	L	VH	1, 4, 6, 7
1.11	Evaluate options for constructing new building to house City and Port of Cascade Locks staff as well as serving as a warming/cooling shelter and a bunkhouse for emergency response operations.	X	X		X	X				HMA; State Funding (OEM, ODF); Economic Development Agency; Bond	City of Cascade Locks/ Port of Cascade Locks	County Agencies; Fire Districts; State Agencies (ODF); USFS	M	VH	2, 4, 5, 6

Table 3-1 Mitigation Action Items

Action Item #	Mitigation Action Title	Community Lifelines								Potential Funding Sources	Coordinating Organization	Partner Organizations	Timeline	Cost	Plan Goals Addressed
		Safety and Security	Food, Hydration, Shelter	Health and Medical	Energy	Communications	Transportation	Hazardous Materials	Water Systems						
1.12	Develop education campaign and planning regarding potential hazard impacts on tribal in-lieu fishing sites along the Columbia River.	X	X			X				HMA; State Funding (DLCD); Existing Staff Resources	Emergency Management	County Agencies; Cities; Ports; Columbia River Inter-Tribal Fish Commission	M	M	1, 3, 4, 7
1.13	Increase response capability by improving participation and training with volunteer organizations such as Community Emergency Response Teams (CERTs), Search and Rescue (SAR), Medical Reserve Corps (MRC), and AUXComm.		X	X		X		X		HMA; State Funding (OEM, ODF, OSFM); FEMA (Assistance to Firefighters); USFS (Community Wildfire Defense Grant)	Emergency Management/ County Sheriff's Office/County Public Health	Cities; State Agencies (OHA, OEM)	M	L	1, 3, 4
1.14	Create a regional all-hazards Type 3 Incident Management Team (IMT) as recommended by the After-Action Report (AAR) for the 2024 Microwave Tower Fire.	X				X				HMA; State Funding (OEM, ODF, DLCD); FEMA (Assistance to Firefighters); Existing Staff Resources	Emergency Management	County Agencies; Cities; Fire Districts; State Agencies (OEM)	M	L	1, 3, 4
1.15	Identify, map, condition, and prioritize assets to mitigate for all natural hazards, including landslides, wildfire, and flooding.	X	X	X	X	X	X	X		HMA; State Funding (DLCD, DOGAMI); FEMA; Existing Staff Resources	Emergency Management	County Agencies; Cities; School District	M	M	1, 4, 5, 6, 7
1.16	Update the Capital Improvement Plan (CIP), Transportation System Plan, County Standards, County Code, and other County plans as needed to ensure effective management of the road system in the event of an incident. This may include conducting construction and other projects currently identified in the CIP to support road management.	X							X	HMA; State Funding (DLCD); Bond; Existing Staff Resources	Emergency Management	County Agencies; Cities; Fire Districts; School District; State Agencies (ODOT)	M	M	4, 5, 6

Table 3-1 Mitigation Action Items

Action Item #	Mitigation Action Title	Community Lifelines							Potential Funding Sources	Coordinating Organization	Partner Organizations	Timeline	Cost	Plan Goals Addressed
		Safety and Security	Food, Hydration, Shelter	Health and Medical	Energy	Communications	Transportation	Hazardous Materials						
Air Quality/Smoke														
2.1	Evaluate options for improving and decarbonizing HVAC systems in the county, including County buildings, schools, libraries, and other key buildings (for both day-to-day operations and for use as community shelters).	X	X						HMA; State Funding (OEM, ODHS, ODE); Economic Development Agency; Bond; Existing Staff Resources	Emergency Management	County Agencies; Cities; Ports; School District; Library District	M	H	1, 2
2.2	Expand shelter planning to include smoke sites for vulnerable populations (especially farmworkers and in-lieu tribal fishers).		X						HMA; Economic Development Agency; Existing Staff Resources	Emergency Management	County Agencies; Cities; Ports; Fire Districts; School District; Library District; Gorge Grown Food Network; Granges and Town Halls; Hood River Rotary; State Agencies (OEM); FEMA	L	H	1, 4, 5, 6, 7
2.3	Purchase personal protective equipment (PPE) such as masks to improve response caches.	X	X	X					HMA; State Funding (OEM, ODHS); FEMA (Assistance to Firefighters)	Emergency Management	County Agencies; Cities; Ports; School District; Library District; State Agencies (OEM, OHCS)	M	M	1, 4, 5, 6, 7
Drought														
3.1	Ensure long-range water resources conservation.		X					X	State Funding (DLCD); Existing Staff Resources	Hood River Watershed Group	County Agencies; Cities; Ports; Irrigation and Water Districts; OSU Extension Services; Gorge Grown Food Network; State Agencies (OWRD)	O	M	1, 2

Table 3-1 Mitigation Action Items

Action Item #	Mitigation Action Title	Community Lifelines							Potential Funding Sources	Coordinating Organization	Partner Organizations	Timeline	Cost	Plan Goals Addressed	
		Safety and Security	Food, Hydration, Shelter	Health and Medical	Energy	Communications	Transportation	Hazardous Materials							Water Systems
Earthquake/CSZ Event															
4.1	Address seismic issues in identified vulnerable and critical facilities via structural and non-structural retrofits.	X	X							HMA; State Funding (Seismic Rehabilitation Grant Program); Bond	Emergency Management/ Public Works	County Agencies; County Commissioners; Cities; Ports; Fire Districts; School District; Library District; State Agencies (DLCD, DOGAMI, OEM)	M	VH	1, 2, 4
Extreme Heat															
5.1	Expand shelter planning to include extreme heat sites for vulnerable populations (especially farmworkers and in-lieu tribal fishers).		X							HMA; Economic Development Agency; Existing Staff Resources	Emergency Management	County Agencies; Cities; Ports; Fire Districts; School District; Library District; Gorge Grown Food Network; Granges and Town Halls; Hood River Rotary; State Agencies (OEM); FEMA	L	H	1, 4, 5, 6, 7
Flood															
6.1	Increase planning capacity for implementation of updated FEMA Flood Insurance Rate Maps (FIRMs) and compliance with FEMA Pre-Implementation Compliance Measures.	X						X		HMA; State Funding (DLCD)	Community Development	County Agencies	M	M	1, 4, 5, 6, 7

Table 3-1 Mitigation Action Items

Action Item #	Mitigation Action Title	Community Lifelines							Potential Funding Sources	Coordinating Organization	Partner Organizations	Timeline	Cost	Plan Goals Addressed
		Safety and Security	Food, Hydration, Shelter	Health and Medical	Energy	Communications	Transportation	Hazardous Materials						
Landslide/Debris Flow														
7.1	Incorporate mitigation projects and other key lessons learned from 2024-25 countywide landslide risk reduction project led by DOGAMI into long-term planning practices.	X							HMA; State Funding (DOGAMI, DLCDD); Existing Staff Resources	Community Development	County Agencies; State Agencies (DLCDD, DOGAMI, ODF); USGS	M	M	2, 4
7.2	Work with Multnomah County to create a shared landslide/debris flow response plan.	X	X		X		X		HMA; State Funding (DOGAMI, DLCDD); Existing Staff Resources	Emergency Management	County Agencies; Multnomah County; Cities; Ports; State Agencies (DOGAMI)	L	M	1, 4, 5, 6
Volcanic Event														
8.0	Given that Volcanic Event is categorized as low risk in the hazard vulnerability assessment, the 2025 NHMP Steering Committee decided not to develop any mitigation action items for this hazard.													
Wildfire														
9.1	Expand education and outreach to increase awareness about defensible space and preparedness.	X				X			HMA; State Funding (ODF, OSFM); USFS (Community Wildfire Defense Grant); Existing Staff Resources	Emergency Management/ Fire Districts	County Agencies; Cities; Fire Districts; Columbia Gorge Tourism Association; State Agencies (ODF, OSFM); Federal Agencies (USFS)	M	M	1, 2, 3, 4, 7
9.2	Develop and conduct fuels reduction projects across the County, emphasizing treatment near residential communities, energy and key structures, and forestland to reduce fire intensity and aid suppression. <i>See countywide map and list of projects throughout the County with information on project details and locations as identified by local fire districts, ODF, and USFS in Volume IV: Community Wildfire Protection Plan.</i>	X			X		X		HMA; State Funding (ODF, OSFM); USFS (Community Wildfire Defense Grant); Existing Staff Resources	Fire Districts/ ODF/USFS	County Agencies; Cities; Ports; State Agencies (OSFM)	M	H	1, 2, 4, 5, 6

Table 3-1 Mitigation Action Items

Action Item #	Mitigation Action Title	Community Lifelines							Potential Funding Sources	Coordinating Organization	Partner Organizations	Timeline	Cost	Plan Goals Addressed
		Safety and Security	Food, Hydration, Shelter	Health and Medical	Energy	Communications	Transportation	Hazardous Materials						
9.3	Enhance interagency cooperation regarding both emergency response and fuel reduction projects.	X				X			HMA; State Funding (OSFM, ODF); USFS (Community Wildfire Defense Grant)	Fire Districts	County Agencies; Cities; State Agencies (ODF, OSFM); USFS	O	M	1, 4, 5, 6
9.4	Conduct countywide policy review to reduce wildfire risk and enhance response capabilities.	X							HMA; State Funding (DLCD, OSFM, ODF); USFS (Community Wildfire Defense Grant); Existing Staff Resources	Community Development	County Agencies; Cities; Ports; Fire Districts; State Agencies (ODF, OSFM); USFS	S	M	4, 5, 6
9.5	Ensure proper road continuity, numbering, and naming.	X							HMA; State Funding (OSFM, ODF); USFS (Community Wildfire Defense Grant)	Community Development	County Agencies; Cities; Fire Districts; State Agencies (ODOT)	M	M	2, 4, 5, 6
9.6	Conduct public information campaign regarding fire awareness via social media and increased signage for visitors (with a focus on the Historic Columbia River Highway State Trail and County/State Parks).	X				X	X		HMA; State Funding (OSFM, ODF, ODOT); USFS (Community Wildfire Defense Grant)	Fire Districts	County Agencies; Cities; Ports; State Agencies (ODF, OSFM, ODOT); USFS	M	M	1, 2, 3, 4, 7
<b>Windstorm</b>														
10.0	Given that Windstorm is categorized as low risk in the hazard vulnerability assessment, the 2025 NHMP Steering Committee decided not to develop any mitigation action items for this hazard.													
<b>Winter Storm</b>														
11.1	Continue partnership programs to reduce vulnerability of public infrastructure to severe winter storms.	X			X				HMA; State Funding (ODOT); Existing Staff Resources	Emergency Management	County Agencies; Cities; Ports; School District; State Agencies (ODOT)	O	M	1, 2, 4, 5, 6
11.2	Develop countywide plan for addressing trucks stranded during storms on I-84 without using Port of Cascade Locks or Port of Hood River property.	X					X		HMA; State Funding (ODOT); Existing Staff Resources	Port of Hood River/ Port of Cascade Locks	County Agencies; Cities; State Agencies (ODOT)	M	M	1, 4, 5, 6

Source: Hood River County NHMP Steering Committee, updated 2025. For Potential Funding Sources: HMA = FEMA’s Hazard Mitigation Assistance disaster and non-disaster grant programs. For Timeline: O=Ongoing (continuous), S=Short (1-2 years), M=Medium (3-5 years), L=Long (5 or more years). For Cost: L=Low (\$50,000 or less), M=Medium (\$50,000 to \$500,000), H=High (\$500,000 to \$5 million), VH=Very High (\$5 million or more).

# Section 4: Plan Implementation and Maintenance

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This section details the formal process that will ensure that the NHMP remains an active and relevant document. The plan implementation and maintenance process include a schedule for monitoring and evaluating the NHMP semi-annually, as well as producing an updated plan every five years. Finally, this section describes how the County will integrate public participation throughout the NHMP maintenance and implementation process.

## Implementing the NHMP

The success of the Hood River County NHMP depends on how well the outlined action items are implemented. In an effort to ensure that the activities identified are implemented, the following steps will be taken: 1) the NHMP will be formally adopted, 2) a Steering Committee will be assigned, 3) a convener shall be designated, 4) semi-annual meetings will be held, 5) the identified activities will be prioritized and evaluated, and 6) the NHMP will be implemented through existing plans, programs and policies.

## NHMP Adoption

The Hood River County NHMP was developed and will be implemented through a collaborative process. After the NHMP is locally reviewed and deemed complete, the Hood River County Emergency Manager, or their designee, shall submit it to the State Hazard Mitigation Officer at the Oregon Department of Emergency Management (OEM). OEM submits the NHMP to FEMA-Region X for review. This review addresses the federal criteria outlined in the FEMA Interim Final Rule 44 CFR Part 201. Upon acceptance by FEMA, the County will adopt the NHMP via resolution. At that point, the County will gain eligibility for disaster and non-disaster grants, the Hazard Mitigation Grant Program, and Flood Mitigation Assistance program funds. Following adoption by the County, the participating jurisdictions should convene local decision makers and adopt the Hood River County Multijurisdictional NHMP.

## Co-Conveners

Hood River County Emergency Management and Hood River County Community Development Department shall serve as co-conveners of this plan. The agencies shall split responsibilities with (1) Emergency Management coordinating emergency service related

aspects of the plan and its projects; and (2) Community Development Department coordinating GIS and land use related aspects.

## Emergency Services Convener: Hood River County Emergency Management

The County's Emergency Management system strives to coordinate activities to mitigate, prepare for, respond to, and recover from major emergencies or disasters. As the agency responsible for the implementation and maintenance of the mitigation plan, Hood River County Emergency Management shall:

- Serve as a communication conduit between the Steering Committee and key plan stakeholders;
- Coordinate Steering Committee meeting dates, times, locations, agendas, and outcomes;
- Utilize the Risk Assessment as a tool for prioritizing proposed natural hazards risk reduction projects;
- Identify emergency management-related funding sources for natural hazard mitigation projects;
- Prioritize and recommend funding sources for natural hazard risk reduction projects;
- Document successes and lessons learned; and
- Develop and coordinate ad hoc and/or standing subcommittees as needed.

## Land Use Convener: Hood River County Community Development

The agency administers and enforces land use planning regulations for the county. Hood River County Community Development strives to protect life, property, the environment, and economic health of the county by (1) coordinating private development with the provision of public services and infrastructure and (2) determining how and where development occurs in a way that preserves for future generations. As the agency responsible for the implementation and maintenance of the mitigation plan, the Hood River County Community Development Department shall:

- Incorporate, maintain, and update Hood River County's natural hazards risk and community development GIS data elements;
- Incorporate, maintain, and update Hood River County's land use plans and codes to help mitigate hazards and risk elements; and
- Utilize the Risk Assessment as a tool for prioritizing land use plans and code updates.

## Steering Committee

The Hood River County Convener will maintain a Natural Hazard Steering Committee for updating and implementing the NHMP. The Steering Committee responsibilities include:

- Review and evaluate opportunities to develop funding programs such as the Building Resilient Infrastructure and Communities Program, the Hazard Mitigation Grant

Program funds, and Flood Mitigation Assistance program funds; and other public or private funding and grants to enhance implementation of mitigation projects;

- Prioritize and recommend natural hazard risk reduction projects;
- Coordinating body agencies will continue to pursue opportunities to develop these mitigation projects to enhance fulfillment of this plan leveraging regional collaboration;
- Evaluate the NHMP following a disaster and update as needed; and
- Serve as key stakeholders to promote, facilitate, and enhance mitigation projects.

## Members

The following jurisdictions, agencies and organizations served on the Steering Committee during the development of the Hood River County NHMP and may be represented during implementation and maintenance (for a list of individuals, see *Acknowledgements*):

- Hood River County Emergency Management
- Hood River County Emergency Management
- Hood River County Administration
- Hood River County Community Development Department
- Hood River County Public Health
- Hood River County Forestry Department
- City of Cascade Locks
- City of Hood River
- Port of Cascade Locks
- Port of Hood River
- Cascade Locks Fire Department
- Hood River Fire Department
- Parkdale Fire District
- West Side Fire District
- Wy'East Fire District
- Hood River County School District
- Hood River County Library District
- Hood River Valley Parks and Recreation District
- Columbia Area Transit
- Crystal Springs Water District
- Ice Fountain Water District
- Mid-Columbia Economic Development District
- Oregon State University Extension Service
- Fire Adapted Communities Learning Network
- Oregon Department of Transportation – Columbia River Gorge National Scenic Area
- Oregon Department of Forestry
- Oregon State Fire Marshal's Office
- U.S. Forest Service – Mount Hood National Forest
- Hood River Forest Collaborative

To make the coordination and review of the Hood River County NHMP as broad and useful as possible, the Steering Committee will engage additional stakeholders and other relevant hazard mitigation organizations and agencies to implement the identified action items. Specific organizations have been identified as partners in the action item matrices.

## Implementation through Existing Programs

The NHMP includes a range of action items that, when implemented, will reduce loss from hazard events in the county. Within the NHMP, FEMA requires the identification of existing programs that might be used to implement these action items. Hood River County and the participating cities currently address statewide planning goals and legislative requirements through their comprehensive land use plans, capital improvement plans, mandated standards and building codes. To the extent possible, Hood River County and participating cities will work to incorporate the recommended mitigation action items into existing programs and procedures.

Many of the recommendations contained in the NHMP are consistent with the goals and objectives of the participating City and County's existing plans and policies. Where possible, Hood River County and participating cities should implement the recommended actions contained in the NHMP through existing plans and policies. Plans and policies already in existence often have support from residents, businesses, and policy makers. Many land-use, comprehensive and strategic plans get updated regularly and can adapt easily to changing conditions and needs. Implementing the action items contained in the NHMP through such plans and policies increases their likelihood of being supported and implemented.

Examples of plans, programs or agencies that may be used to implement mitigation activities include:

- Community Wildfire Protection Plan (see Volume IV)
- Hood River County Budget, ordinances, and work plans
- Hood River Fire Defense Board budget, plans, and projects
- Hood River County Emergency Management/Emergency Operations Center budget, plans, and projects
- Hood River County Economic Development Action Plan
- Hood River County Comprehensive Plan
- Hood River County building codes
- Hood River County Community Development work plans
- Hood River County Soil and Water Conservation District plans
- Hood River County Energy Plan

For additional examples of plans, programs or agencies that may be used to implement mitigation activities refer to list of plans in Volume I, Section 2.

# Capability Assessment

The Capability Assessment identifies and describes the ability of Hood River County to implement the mitigation strategy and associated action items. This is a key component of the 2025 NHMP update. Capabilities can be evaluated through an examination of broad categories, including existing authorities, policies, programs, funding, and resources. Information from the 2018 NHMP was not integrated into other planning mechanisms, in part due to the impact of the COVID-19 pandemic. The County and local jurisdictions intend to integrate information from the 2025 NHMP before the next NHMP update.

## Existing Authorities

Hazard mitigation can be executed at a local scale through three (3) methods: integrating hazard mitigation actions into other local planning documents (i.e., plan integration), adopting building codes that account for best practices in structural hardening, and codifying land use regulations and zoning designations that prescribe mitigation into development requirements. The extent to which a municipality or multi-jurisdictional effort leverages these approaches is an indicator of that community's capabilities.

## Comprehensive Plan

Oregon's Statewide Planning Goal 7 requires comprehensive planning within every jurisdiction that is designed to reduce risks to people and property from natural hazards.

The Hood River County Comprehensive Plan provides the policy and regulatory foundation for all land use management in Hood River County. It integrates policies and recommendations to meet the Oregon Statewide Planning Goals, including Statewide Planning Goal 7, Natural Hazards.

Chapter V, County Comprehensive Plan and Zone Map Index, implements Statewide Planning Goal 7. This section was last amended in 2011 but remains largely based upon information and hazard assessments developed in the mid-1980s. It does include policies related to geologic or hydrologic hazards, and conservation area policies for streams, rivers, and wetlands. Soils and engineering geologic studies are required for developments with slopes of 30 percent or greater.

Planned updates to the jurisdiction's Goal 7 element or its broader comprehensive plan will reflect the data and findings within this NHMP and integrate analyses of future climate and natural hazard impacts into the community's long-range plans.

## Land Use Regulations

Existing land use policies that define zoning and address hazardous conditions provide another source of mitigation capability. Any new codes or policies that are adopted are intentionally aligned with this NHMP.

## Land Use Codes

Hood River County Community Development Department regulates land use, development, and planning – as well as administering state, regional, and local land use and zoning regulations – in unincorporated areas throughout the county, including floodplain management. The Department reviews residential, commercial, and industrial development land use permits and develops long-range planning and economic development strategies.

### Article 44 – Floodplain Zone (FP)

The county regulates development in the floodplain through the establishment and administration of the **Floodplain Zone (FP)** as described in Article 44. This oversight includes requirements to apply for Floodplain Development permits for all development within the FP and ensures that applicants elevate new construction or renovations at least two feet above the base flood elevation, anchor structures to prevent flotation, and floodproof any construction that occurs below the base flood elevation.

Lands designated as belonging to the FP are derived from the Hood River County Comprehensive Plan and informed by the following documents:

- Federal Emergency Management Agency, Flood Insurance Rate Map (FIRM) September 24, 1984;
- State of Oregon, Department of Geology & Mineral Industries Bulletin #91, Geologic Hazards of Parts of Northern Hood River, Wasco & Sherman Counties, 1977, and State Geologic Hazard Maps accompanying that report, prepared by J.D. Beaulieu, 1977; and
- Hood River County Generalized Floodplain Report, U.S. Department of Agriculture, Soil Conservation Service, 1975.

This code section has not been updated since initial implementation in 1984. The County anticipates adopting new FEMA flood hazard maps and zoning regulations by 2027.

## Structural Building Codes

The Oregon Legislature recently adopted updated building codes for both residential (2021 adoption) and commercial structures (2022) since the last update of the NHMP. These building codes are based on the 2021 version of the International Building Code, International Fire Code, and International Existing Building Code. New wildfire defensible space code is scheduled to be completed soon, with an effective date announced in late 2024. Fire hardening requirements were adopted on October 1, 2022, and effective April 1, 2023.

Though Hood River County currently administers and enforces codes for residential zones last updated in 2018, the county does utilize the most recent Oregon Structural and Specialty Codes (2022) for commercial zones. As a result, new commercial structures will be required to build according to the latest seismic and wind hardening standards.

## Policies and Programs

The NHMP directs Hood River County to explore integration into other planning documents and processes. Hood River County has made significant progress in integrating the NHMP into its portfolio of planning processes and programs over the last five years.

### Capital Improvement Plans

Though Hood River County does not maintain any county-level Capital Improvement Plans, many of the special districts within the County have developed such plans. See the “Partnering with Special Districts” section for more information.

### Hood River County Energy Plan, 2018

The Hood River County Energy plan is a planning document describing the county’s current energy use and goals for energy in 2030, including methods for increasing energy independence and reducing reliance on out-of-state nonrenewable energy (e.g., imported fossil fuels) as well as increasing local resiliency and investment. This is particularly salient in the context of this NHMP given two key pieces of data presented in the Energy Plan: first, that climate change is worsening natural disasters (e.g., severe winter storms, prolonged drought, and increasing wildfire risks), and second, that given that Hood River County imports all of its liquid fuels from other regions, the county is exceedingly vulnerable in both access to and cost of energy during emergencies.

### Hood River County Community Wildfire Fire Protection Plan, 2025

The Community Wildfire Protection Plan, drafted in 2013 and updated in 2025 (see Volume IV), has been incorporated into this NHMP as a functioning annex. This plan seeks to reduce the risk of wildfire to life, property, and natural resources in Hood River County by coordinating public agencies, community organizations, private landowners, and the public to increase their awareness of and responsibility for fire issues.

### National Flood Insurance Program

Hood River County participates in the National Flood Insurance Program. The County Community Development Director is responsible for administering the day-to-day activities of the County’s floodplain program.

Specifically, the floodplain manager:

- maintains and administers Hood River County’s floodplain regulations;
- reviews and issues floodplain development permits;
- maintains elevation certificates for all new and substantially improved structures (and maintains an extensive database of historic elevation certificates);
- ensures that encroachments do not occur within the regulated floodway;
- implements measures to ensure that new and substantially improved structures are protected from flood losses;

- maintains floodplain studies and maps and makes this information available to the public;
- maintains a flood information website with digital flood insurance rate map (DFIRM) data;
- conducts site visits to assess conditions and provide technical assistance to the public;
- maintains a library of historical flood related information;
- informs the public of flood insurance requirements; and
- conducts outreach and training about flood hazards and development within the floodplain.

Date of last Community Assistance Visit (CAV): N/A

Number and location of repetitive loss structures (if any): none

## CERT and Firewise

There is one Community Emergency Response Team (CERT) in Hood River County: the Columbia Gorge CERT, headquartered in Hood River. CERT is a FEMA program that trains volunteers in basic disaster response skills like fire safety, search and rescue, and disaster medical operations.

There are currently four Firewise communities in the County with the development of a fifth community in progress:

- Stonegate HOA: 13 homes participating
- Baldwin Creek: 15 homes participating
- Rocky Ridge Court: 8 homes participating
- Hess Road: 15 homes participating
- Prospect and Montello Aves: 8 homes participating – *in progress*

## Personnel

The following Hood River County personnel have assignments related to natural hazard mitigation planning and implementation:

- **Emergency Management:** Charles Young, Emergency Manager
- **Public Information Officer:** None.
- **Floodplain Manager:** Eric Walker, Hood River County Community Development Director
- **Grant writing (for Public Works or emergency management):** Cori Wiessner, Public Works Director; Bronte Dod, Grants Manager
- **Capital improvement planning:** Eric Walker, Community Development Director
- **Capital improvement execution:** Cori Wiessner, Public Works Director

These personnel integrate hazards and resilience planning into their greater work programs to the best of their abilities. However, there is limited capacity to expand upon their capabilities or workloads.

## County Administration

The Hood River County Board of Commissioners has the responsibility of developing and adopting the annual County budget. Integrating hazard mitigation goals and projects into the budget is key to implementing the NHMP. The Board of Commissioners tries to broadly address resilience planning needs while it determines County and departmental priorities and looks for multiple-impact projects wherever possible. They also work with staff to apply for federal and state grant funding to pursue larger projects outside of general fund capacity.

## County Emergency Management

Hood River County Emergency Management is a division of the County Sheriff's Office. The department's purview includes natural and man-made disasters and large-scale emergencies, for which they prepare, coordinate response and logistical support, and conduct mitigation and community recovery efforts. They also serve as the primary coordination point between local, State, and Federal agencies when emergency activities are affecting more than one jurisdiction, county department, incorporated city, unincorporated area, special district, or other partner agencies.

## Partnering with Special Districts

Hood River County works with several of the special districts and other organizations throughout the county, including the regional watershed council. It is mutually beneficial to have coordination between NHMP flood mitigation action items and watershed council objectives and projects listed in their action plans. Descriptions of the four main entities and the mutual work conducted together are listed below.

- **Hood River Soil & Water Conservation District**
  - Hood River Soil & Water Conservation District is one of 45 conservation districts throughout Oregon incorporated in 1953. This organization initiated the Hood River Watershed Group described in this section in 1993.
  - The District has worked alongside the county to provide landowners technical and financial assistance to implement an array of projects, including installing efficient irrigation systems, fencing livestock out of water ways, planting native trees along streams, screening and piping irrigation canals, and enhancing riparian habitat.
- **Hood River Watershed Group**
  - The Hood River Watershed Group was established by the Hood River SWCD in 1993 and authorized by the Hood River County Board of Commissioners as the official watershed for Hood River County in 1996.

- The Watershed Group has worked with the county to plan instream habitat restoration projects that reduce erosion, implement water conservation programs (including irrigation efficiency improvements), and conduct riparian enhancement projects to restore streamside vegetation and reduce flooding impacts.
- **Port of Cascade Locks**
  - The Port of Cascade Locks is situated within the City of Cascade Locks and was incorporated in 1935. The Port owns and operates the Bridge of the Gods, which connects Oregon and Washington over the Columbia River, as well as the Cascade Locks Marine Park and the Sternwheeler Columbia Gorge paddlewheel boat.
  - The Port’s main priorities for projects center on the Bridge of the Gods, including a strengthening project completed in 2021 with the Oregon Department of Transportation (ODOT), the Washington State Department of Transportation, and the Federal Highway Administration. The Port and ODOT are currently pursuing funding for a seismic analysis and further retrofit of the bridge (see Earthquake #4.1 and #4.2 in Volume III, Port of Cascade Locks addendum).
- **Port of Hood River**
  - The Port of Hood River is situated within the City of Hood River and was incorporated in 1933. The Port owns and operates the Hood River-White Salmon Bridge, a highly trafficked bridge over the Columbia River connecting Oregon and Washington, as well as a marine park, a wide array of economic development projects throughout the City of Hood River, and the Ken Jernstedt Airfield.
  - The Port has carried out many infrastructure projects over the past several decades alongside the City, the County, and other local and state partners. The Port is currently advocating on behalf of the Hood River-White Salmon Bridge Authority (HRWSBA) for state and federal funding to replace the Hood River-White Salmon Bridge, which is the primary and most significant infrastructure project planned by the Port (see Earthquake #4.1 in Volume III, Port of Hood River addendum).

## Capital Projects

Hood River County has implemented recommendations from the last NHMP into its capital improvement projects over the last 5 years, including:

- Fir Mountain Road at Neal Creek Bridge Replacement
- Hood River Courthouse Security Capital Improvement Project
- Kingsley Reservoir capacity expansion

## Capital Resources

Hood River County maintains several capital resources that have important roles to play in the implementation of the NHMP, including:

- **Communication towers:** None operated by the County.
- **Critical facilities with power generators:**
  - Hood River County Public Works Fueling Station (918 18th Street)
- **Warming/cooling/smoke shelters:**
  - Hood River Shelter Services (1733 Oak Street) – warming only
  - Hood River Valley Adult Center (2010 Sterling Place) – cooling only
  - Hood River Library (502 State Street) – cooling only
- **Community shelters:**
  - Hood River Shelter Services (1733 Oak St, Hood River)
- **Food pantries:**
  - FISH Food Bank in Hood River (1130 Tucker Rd, Hood River)
  - FISH Food Bank in the Cascade Locks City Hall Gymnasium (140 Wa Na Pa Street, Cascade Locks)
  - Hood River Valley Adult Center (2010 Sterling Place, Hood River)
- **Fueling storage:**
  - Hood River County Public Works Fueling Station (918 18th Street) – 1000-gallon tank

## Findings

Several important findings from this capability assessment informed the design of the Plan’s mitigation strategy and aided in prioritizing action items.

### Staffing Limitations and Capacity

Hood River County staff are assigned hazard mitigation responsibilities as a part of their larger job responsibilities. Limited capacity reduces the breadth of the programming the community can undertake in any year. The County relies upon its relationships with the County and other cities within its region to expand its operations.

### Reliance upon outside funding streams and local match requirements

Hood River County operates on a limited budget with a small staff. This leaves few opportunities for using local financial resources to implement hazard mitigation work. They lean heavily upon state and federal grant funds as the primary means for securing mitigation funding. Hazard mitigation grants such as BRIC require a 25% local funding match, as well as extra staff capacity and expertise to navigate the application process and manage funding.

# NHMP Maintenance

NHMP maintenance is a critical component of the NHMP. Proper maintenance of the NHMP ensures that it will maximize the County and participating Cities' efforts to reduce the risks posed by natural hazards. This section was developed by OPDR and includes a process to ensure that a regular review and update of the NHMP occurs. The Steering Committee and local staff are responsible for implementing this process, in addition to maintaining and updating the NHMP through a series of meetings outlined in the schedule below.

## Meetings

The Steering Committee will meet on a **semi-annual basis** to complete the following tasks. During the first meeting the Steering Committee will:

- Review existing action items to determine appropriateness for funding;
- Educate and train new members on the NHMP and mitigation in general;
- Identify issues that may not have been identified when the NHMP was developed; and
- Prioritize potential mitigation projects using the methodology described below.

During the second meeting, the Steering Committee will:

- Review existing and new risk assessment data;
- Discuss methods for continued public involvement;
- Evaluate effectiveness of the NHMP at achieving its purpose and goals (use Table 4-1 as one tool to help measure effectiveness); and
- Document successes and lessons learned during the year.

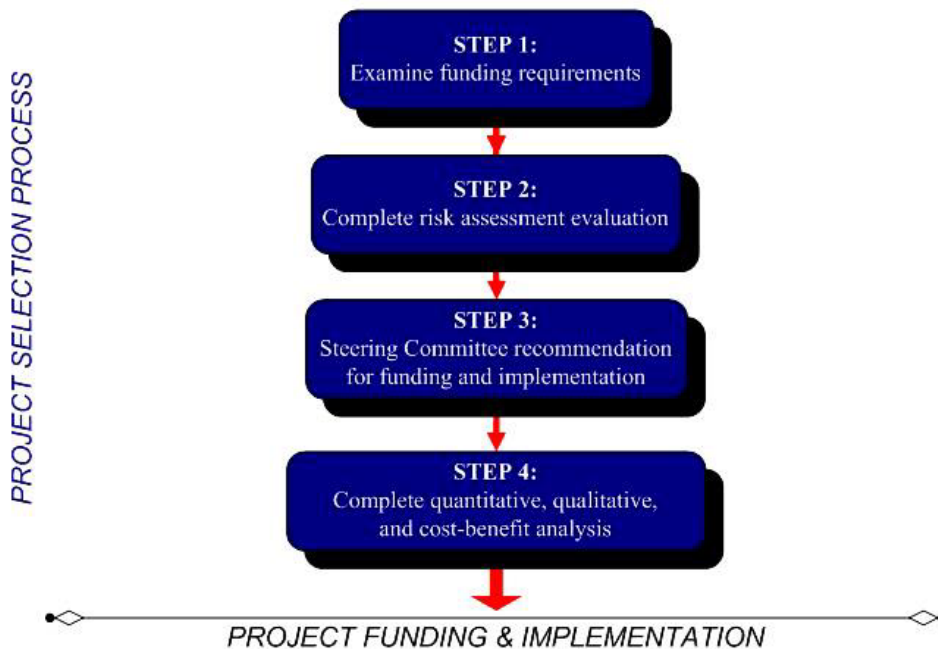
These meetings are an opportunity for the cities and special districts to report back to the County on progress that has been made towards their components of the NHMP.

The Hood River County Emergency Manager will be responsible for documenting the outcome of the semi-annual meetings in Volume II, Appendix C. The process the Steering Committee will use to prioritize mitigation projects is detailed in the section below. The NHMP's format allows the County and participating Cities to review and update sections when new data becomes available. New data can be easily incorporated, resulting in a NHMP that remains current and relevant to the participating jurisdictions.

## Project Prioritization Process

The Disaster Mitigation Act of 2000 requires that jurisdictions identify a process for prioritizing potential actions. Potential mitigation activities often come from a variety of sources; therefore, the project prioritization process needs to be flexible. Committee members, local government staff, other planning documents or the risk assessment may be the source to identify projects. Figure 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 1: Examine funding requirements

The first step in prioritizing the NHMP’s action items is to determine which funding sources are open for application. Several funding sources may be appropriate for the County’s proposed mitigation projects. Examples of mitigation funding sources include but are not limited to: FEMA’s disaster and non-disaster grants, Flood Mitigation Assistance (FMA) program, Hazard Mitigation Grant Program (HMGP), National Fire Plan (NFP), Community Development Block Grants (CDBG), local general funds and private foundations, among others. Please see Volume II, Appendix F for a more comprehensive list of potential grant programs.

Because grant programs open and close on differing schedules, the Steering Committee will examine upcoming funding streams’ requirements to determine which mitigation activities would be eligible. The Steering Committee may consult with the funding entity, Oregon Department of Emergency Management (OEM), or other appropriate state or regional organizations about project eligibility requirements. This examination of funding sources and requirements will happen during the Steering Committee’s semi-annual NHMP maintenance meetings.

## Step 2: Complete risk assessment evaluation

The second step in prioritizing the NHMP's action items is to examine which hazards the selected actions are associated with and where these hazards rank in terms of community risk. The Steering Committee will determine whether the NHMP's risk assessment supports the implementation of eligible mitigation activities. This determination will be based on the location of the potential activities, their proximity to known hazard areas and whether community assets are at risk. The Steering Committee will additionally consider whether the selected actions mitigate hazards that are likely to occur in the future or are likely to result in severe/catastrophic damages.

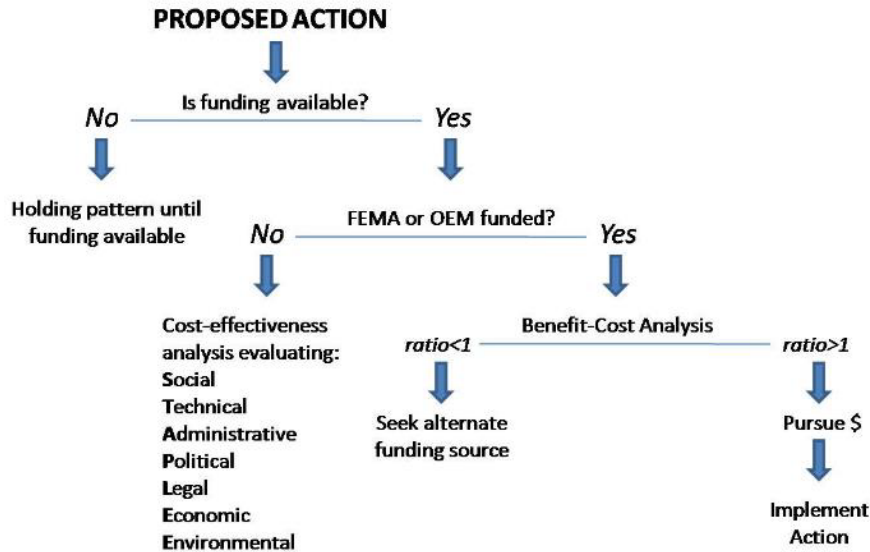
## Step 3: Steering Committee Recommendation

Based on the steps above, the Steering Committee will recommend which mitigation activities should be moved forward. If the Steering Committee decides to move forward with an action, the coordinating organization designated in the matrix will be responsible for taking further action and, if applicable, documenting success upon project completion. The Steering Committee will convene a meeting to review the issues surrounding grant applications and to share knowledge and/or resources. This process will afford greater coordination and less competition for limited funds.

## Step 4: Complete quantitative and qualitative assessment and economic analysis

The fourth step is to identify the costs and benefits associated with the selected natural hazard mitigation strategies, measures, or projects. Two categories of analysis that are used in this step are: (1) cost-benefit analysis and (2) cost-effectiveness analysis. Conducting cost-benefit analysis for a mitigation activity assists in determining whether a project is worth undertaking now, 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 Steering Committee will use a FEMA-approved cost-benefit analysis tool to evaluate the appropriateness of the activity. A project must have a cost-benefit ratio of greater than one in order to be eligible for FEMA grant funding.

For non-federally funded or nonstructural projects, a qualitative assessment will be completed to determine the project’s cost effectiveness. The Steering Committee will use a multivariable assessment technique called STAPLE/E to prioritize these actions. STAPLE/E stands for Social, Technical, Administrative, Political, Legal, Economic and Environmental. Assessing projects based upon these seven variables can help define a project’s qualitative cost effectiveness. OPDR at the University of Oregon’s Community Service Center has tailored the STAPLE/E technique for use in natural hazard action item prioritization.

## Continued Public Involvement and Participation

The participating jurisdictions are dedicated to involving the public directly in the continual reshaping and updating of the Hood River County NHMP. To ensure that these opportunities will continue, the County and participating jurisdictions will:

- Post copies of their plan on corresponding websites;
- Place articles in the local newspaper directing the public where to view and provide feedback; and
- Use existing newsletters such as schools and utility bills to inform the public where to view and provide feedback.

In addition to the involvement activities listed above, Hood River County, cities, and special districts will ensure continued public involvement by posting a link to the Hood River County NHMP on their websites.

## Five-Year Review of NHMP

This NHMP will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. The Convener will be responsible for organizing the Steering Committee to address NHMP update needs. The Steering Committee will be responsible for updating any deficiencies found in the NHMP and for ultimately meeting the Disaster Mitigation Act of 2000’s NHMP update requirements.

The following ‘toolkit’ (Table 4-1) can assist the Convener in determining which NHMP update activities can be discussed during regularly scheduled NHMP maintenance meetings and which activities require additional meeting time and/or the formation of sub-committees.

**Table 4-1 NHMP 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

**Table 4-1 NHMP Plan Update Toolkit**

Question	Yes	No	Plan Update Action
Did the plan identify the number and type of existing and future buildings, infrastructure, and critical facilities in hazards areas?			1) Update existing data in risk assessment section, or 2) determine whether adequate data exists. If so, add information to plan. If not, describe why this could not be done at the time of the plan update
Did the plan identify data limitations?			If yes, the plan update must address them: either state how deficiencies were overcome or why they couldn't be addressed
Did the plan identify potential dollar losses for vulnerable structures?			1) Update existing data in risk assessment section, or 2) determine whether adequate data exists. If so, add information to plan. If not, describe why this could not be done at the time of the plan update
Are the plan goals still relevant?			Document any updates in the plan goal section
What is the status of each mitigation action?			Document whether each action is completed or pending. For those that remain pending explain why. For completed actions, provide a 'success' story.
Are there new actions that should be added?			Add new actions to the plan. Make sure that the mitigation plan includes actions that reduce the effects of hazards on both new and existing buildings.
Is there an action dealing with continued compliance with the National Flood Insurance Program?			If not, add this action to meet minimum NFIP planning requirements
Are changes to the action item prioritization, implementation, and/or administration processes needed?			Document these changes in the plan implementation and maintenance section
Do you need to make any changes to the plan maintenance schedule?			Document these changes in the plan implementation and maintenance section
Is mitigation being implemented through existing planning mechanisms (such as comprehensive plans, or capital improvement plans)?			If the community has not made progress on process of implementing mitigation into existing mechanisms, further refine the process and document in the plan.

Source: Oregon Partnership for Disaster Resilience, 2010.

Source: Oregon Partnership for Disaster Resilience, 2010.