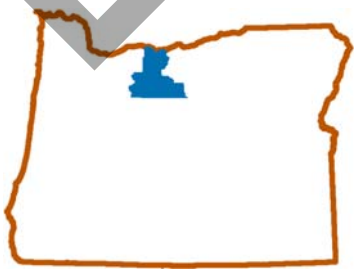
FINAL 1-??-2025

Wasco County

MULTI-JURISDICTION NATURAL HAZARDS MITIGATION PLAN



- Wasco County
- The Dalles
- Mosier
- Maupin
- Dufur

FEMA

Effective November ??, 2024 through November ??, 2029

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The Wasco County Multi-Jurisdictional Natural Hazards Mitigation Plan is a living document that will be reviewed and updated periodically. Comments, suggestions, corrections, and additions are enthusiastically encouraged to be submitted from all interested parties.

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Plan Template Disclaimer

This Natural Hazards Mitigation Plan update is based in part on a plan template developed by the University of Oregon's Institute for Policy Research and Engagement (IPRE) - Oregon Partnership for Disaster Resilience (OPDR) and used in the 2012 Wasco County NHMP. OPDR provided copies of the plan templates to communities for use in developing or updating their natural hazards mitigation plans at that time. The template is structured to address the requirements contained in 44 CFR 201.6; where language is applicable to communities throughout Oregon, standardized language is used. However, emphasis is placed on identifying and describing the unique attributes of the counties and cities for each plan. The basic format of the 2012 NHMP has been retained for this 2024 NHMP update.

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Wasco County
Natural Hazards Mitigation Plan

Table of Contents

Volume I: Basic Mitigation Plan

Executive Summary vi
Section 1: Introduction 1-1
Section 2: Risk Assessment 2-1
Section 3: Mitigation Strategy 3-1
Section 4: Plan Implementation and Maintenance 4-1

Volume II: Hazard Annexes

Drought HA-2
Earthquake HA-4
Flood HA-9
Wildland Fire HA-12
Landslides HA-15
Severe Weather HA-17
Volcanoes HA-20

Volume III: City/Special District Addenda

The Dalles TDA-1
Mosier
Maupin
Dufur

DRAFT

Small Cities **SDA-1**

Volume IV: Mitigation Resources

Appendix A: Action Items (and Acronym List) **A-1**
Appendix B: Planning and Public Process **B-1**
Appendix C: Community Profile **C-1**
Appendix D: Survey Results **D-1**
Appendix E: Grant Programs and Other Resources **E-1**
Appendix F: Maps **F-1**

DRAFT

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Executive Summary

Wasco County developed this multi-jurisdictional Natural Hazards Mitigation Plan (NHMP) in an effort to prepare for the short and long-term effects resulting from natural hazards. This plan was developed with and for the following jurisdictions: Wasco County, the City of The Dalles, the City of Maupin, the City of Mosier, and the City of Dufur. Other jurisdictions were invited to participate and declined. It is impossible to predict exactly when hazards will occur, or the extent to which they will affect the community. However, with careful planning and collaboration among public agencies, private sector organizations, and citizens within the community, it is possible to create a resilient community that will benefit from establishing mitigation actions and long-term recovery planning efforts.

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. . . .

The Federal Emergency Management Agency (FEMA) defines mitigation as ". . . an action to reduce the loss of life and property by lessening the impact of disasters." Essentially, natural hazard mitigation is a method 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. Example strategies include policy changes, such as updated ordinances; projects, such as seismic retrofits to critical facilities; and education and outreach to targeted audiences, such as Spanish speaking residents or the elderly. Natural hazard mitigation is the responsibility of the "Whole Community" - individuals, private businesses and industries, state and local governments, and the federal government.

Why Develop this Mitigation Plan?

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 . . .

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

Who Participated in Developing the Plan?

The Wasco County Natural Hazards Mitigation Plan is the result of a collaborative effort between the county, cities, special districts, citizens, public agencies, non-profit organizations, the private sector and regional organizations. The Wasco County NHMP Steering Committee

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guided the plan development process. The Steering Committee included representatives from the following organizations.

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.

- Wasco County Planning Department
- Wasco County Emergency Management
- Wasco County Public Works
- Wasco County GIS
- Wasco County Soil and Water Conservation District
- Wasco County Board of Commissioners
- Northern Wasco County School District #21
- City of The Dalles Public Works
- City of Mosier City Manager
- City of Maupin Community Liaison
- City of Dufur Mayor & City Recorder
- Mid-Columbia Fire and Rescue
- USDA Natural Resource Conservation Service
- Oregon Department of Forestry
- Department of State Fire Marshal

The Wasco County Planning Department convened the planning process and will take the lead in implementing, maintaining and updating the plan. Public participation played a key role in the development of goals and action items. At various stages during the plan update's development, partner agencies, county officials and the public were invited to learn of its progress and to comment on completed sections. This took place primarily during public presentations and outreach efforts throughout the process, including a mitigation focused public meeting known as "Disaster Movie Marathon".

The public was also given a chance for involvement in the plan update process with a survey available on our webpage. The survey was meant to gauge the priorities of the public in terms of government efforts to address natural hazards, but also contained questions that gauged the public's knowledge and awareness of the county's current plan, and thus served an additional purpose as an informational outreach tool. Finally, when a working draft of the updated plan was completed it was posted online for public comment. Members of the general public were invited to view, critique, and otherwise express any concerns they may have had with the plan update, and these comments were addressed during the final plan editing process.

How Does this Mitigation Plan Reduce Risk?

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

This natural hazard mitigation plan is intended to assist Wasco County, the City of The Dalles, the City of Maupin, the City of Mosier, and the City of Dufur to reduce the risk from natural hazards by identifying resources, information, and strategies for risk reduction. It is also intended to guide and coordinate mitigation activities throughout the County. A risk assessment, included in

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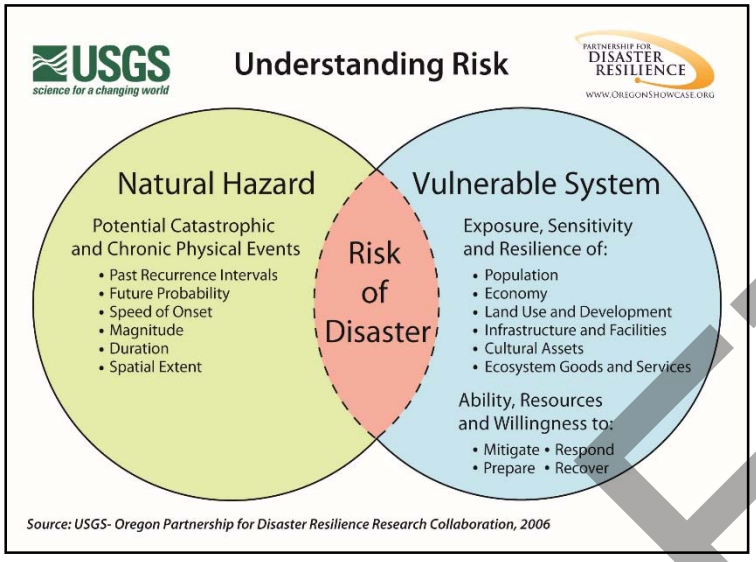
the NHMP, consists of three phases: hazard identification, vulnerability assessment, and risk analysis, as illustrated in the following graphic.

Figure i.1 Understanding Risk



Source: OPDR, 2012

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

What is the County's Overall Risk to Hazards?

Wasco County conducted a risk assessment to evaluate the probability of identified hazards as well as the vulnerability of the community to that hazard. Table i.1 below presents the overall risk assessment for Wasco County including both the County's hazard analysis and relative risk. The hazards are listed in rank order from high to low risk level, taking consideration of past historical events, vulnerability to populations, the maximum threat, and the probability, or likelihood of a particular hazard event occurring.

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Table i.1: 2024 Risk Assessment Summary

Hazard	Risk Score	2024 Risk Ranking	Risk Level
Wildland-Wildfire	235	**1**	High
Extreme Heat	230	**2**	High
Drought	225	**3**	High
Severe Weather (Storm/Winter Weather)	210	**4**	Medium
Flood	182	**5**	Medium
Earthquake	154	**6**	Low
Volcano	143	**7**	Low
Landslide	112	**8**	Low

Source: Wasco County NHMP Steering Committee Meeting April 15, 2024 Hazard Analysis

What is the Plan's Mission?

The mission of the Wasco County Natural Hazards Mitigation Plan is to "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 Wasco County."

What are the Plan Goals?

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

The plan goals describe the overall direction that the participating jurisdiction's agencies, organizations, and citizens can take toward mitigating risk from natural hazards. Wasco County's plan goals include:

- Protection of Life and Property
- Emergency Services Enhancement
- Education, Outreach, and IDEA (Inclusion, Diversity, Equity and Accessibility)
- Facilitate Partnerships and Coordination
- Natural Resource Systems Protection
- Climate Resilience

How are the Action Items Organized?

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

The mitigation action items are organized within an Action Item Matrix (located in Section 3 of the plan), which lists all of the multi-hazard and hazard-specific action items included in the NHMP. Data collection, research and the public participation process resulted in the development of the action items. The Action Item Matrix portrays the overall plan framework

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and identifies linkages between the plan goals and actions. The matrix documents the title of each mitigation action along with the coordinating organization (lead) and partner organizations, timeline, and plan goals addressed. Action items are further detailed in individual action item forms located in Appendix A of the plan.

How will the Plan be Implemented?

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 . . .

Section 4 Plan Implementation and Maintenance details the formal process that will ensure that the Wasco County Natural Hazards Mitigation Plan remains an active and relevant document. The plan will be implemented, maintained and updated by a designated convener. The convener is responsible for overseeing annual review processes. In this NHMP, the conveners are the Emergency Management Office and the Land Use Planning Department. Cities and special districts developing addenda to the County plan will also designate a convener and will work closely with the County conveners to keep the plans coordinated. Section 4 includes a schedule for monitoring and evaluating the plan annually and producing a plan revision every five years. This section also describes how the communities will integrate public participation throughout the plan maintenance process.

Plan Adoption

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] . . .

After the plan is locally reviewed and deemed ready, the Director of the Wasco County Planning Department submits it to the State Hazard Mitigation Officer at the Oregon Department of Emergency Management (OEM). The Oregon Military Department, Office of Emergency Management, reviews the plan and submits it to the Federal Emergency Management Agency (FEMA – Region X) for review. This review will address the federal criteria outlined in FEMA Interim Final Rule 44 CFR Part 201.6.

Upon pre-approval by FEMA, indicated by a letter provided from FEMA to Wasco County called the "Approval Pending Adoption" the County will then adopt the NHMP via resolution. Following County adoption, the other participating jurisdictions will need to adopt it. Once FEMA is provided with final resolution documentation, they will formally approve the Wasco County multi-jurisdictional NHMP. At that point, the County will maintain their eligibility for the Hazard Mitigation Assistance (HMA) funds. These funds are distributed through the Pre-Disaster Mitigation (PDM) program, the Hazard Mitigation Grant Program (HMGP), and the Flood Mitigation Assistance (FMA) program.

The accomplishment of the Natural Hazards Mitigation Plan goals and actions depends upon the maintenance of a competent Steering Committee and adequate support from the county and city departments reflected in the plan in incorporating the outlined action items into existing county plans and procedures.

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It is hereby directed that the appropriate county departments and programs implement and maintain the concepts in this plan. Thorough familiarity with this plan will result in the efficient and effective implementation of appropriate mitigation activities and a reduction in the risk and the potential for loss from future natural hazard events.

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Section I: Introduction

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

What is Natural Hazard Mitigation?

The Federal Emergency Management Agency (FEMA) defines mitigation as: ". . . an action to reduce the loss of life and property by lessening the impact of disasters." Essentially, natural hazard mitigation is a method 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. Example strategies include policy changes, such as updated ordinances; projects, such as seismic retrofits to critical facilities; and education and outreach to targeted audiences, such as Spanish speaking residents or the elderly. Natural hazard mitigation is the responsibility of the "Whole Community" - individuals, private businesses and industries, state and local governments, and the federal government.

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

Why Develop a Mitigation Plan?

Wasco County updated this multi-jurisdictional Natural Hazards Mitigation Plan in an effort to reduce future loss of life and damage to property resulting from natural hazards. This plan was developed with and for the following jurisdictions: Wasco County, the City of The Dalles, the City of Maupin, the City of Mosier, and the City of Dufur. For more information on other jurisdictions participation levels, see the Small Cities Addendum in Volume III of this document. It is impossible to predict exactly when natural hazard events will occur, or the extent to which they will affect community assets. However, with careful planning and collaboration among public agencies, private sector organizations, and citizens within the community, it is possible to minimize the losses that can result from natural hazards.

In addition to establishing a comprehensive community-level mitigation strategy, the Disaster Mitigation Act of 2000 (DMA2K) and the regulations contained in 44 CFR 201 require that jurisdictions maintain an approved NHMP in order to receive federal funds for

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mitigation projects. Local and federal approval of this plan ensures that Wasco County and listed cities will remain eligible for pre- and post-disaster mitigation project grants.

What Federal Requirements Does This Plan Address?

The Disaster Mitigation Act of 2000 (DMA 2000) is a key piece of federal legislation addressing mitigation planning. It reinforces the importance of mitigation planning and emphasizes planning for natural hazards before they occur. As such, this Act established the Pre-Disaster Mitigation (PDM) grant program and new requirements for the national post-disaster Hazard Mitigation Grant Program (HMGP). Section 322 of the Act specifically addresses mitigation planning at the state and local levels. State and local jurisdictions must have approved mitigation plans in place in order to qualify to receive post-disaster HMGP funds. NHMPs must demonstrate that their proposed mitigation actions are based on a sound planning process that accounts for the risk to the individual and their capabilities.

Development of the NHMP update process was pursued in compliance with subsections from 44 CFR 201.6 guidelines. These four subsections address plan requirements, the planning process, plan content, and plan review.

- Subsection (a) provides an outline of the overall plan requirements, including an overview of general plan components, exceptions to requirements, and multi-jurisdictional participation.
- Subsection (b) outlines the requirements of the planning process, with particular focus on public involvement in the update process, as well as the role of local agencies, organizations and other relevant entities in the development process, as well as standards for adequate levels of review and incorporation of existing plans and policies.
- Subsection (c) outlines requirements concerning the plan update's content, including an overview of necessary components for the update's planning process, risk assessment, mitigation strategy, plan maintenance, and overall process documentation.
- Subsection (d) outlines the steps and agencies required for proper review of the plan before finished plans are adopted by their respective communities.

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

Planning for natural hazards is an integral element of Oregon's statewide land use planning program, which began in 1973. All Oregon cities and counties have comprehensive plans 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

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

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

How was the Plan Developed?

The plan was developed following a schedule provided by the Oregon Partnership for Disaster Resilience as described in their 2017 Plan Update Training Manual.[1] This schedule flows through six stages: Organize Resources; Risk Assessment; Mission, Goals, Actions; Implementation & Maintenance; Final Plan Preparation; and Plan Implementation.

Figure 1.1: NHMP Update Timeline

Source: Oregon Partnership for Disaster Resilience Plan Update Training Manual.

The first four stages of the NHMP update process had their own corresponding Steering Committee meetings. Subcommittees were formed that included the following: the Data Gathering Subcommittee; the Outreach Subcommittee; and the Incorporated Communities

[1] Oregon Partnership for Disaster Resilience Plan Update Training Manual. University of Oregon's Community Service Center (2010). https://bpb-us-e1.wpmucdn.com/blogs.uoregon.edu/dist/3/4943/files/2017/11/NHMP_Updates_Training_Manual-17lnbxf.pdf.

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Subcommittee. These subcommittees reviewed the previous plan's process, content, and action items as well as the current hazard mitigation status of Wasco County and the incorporated communities. The subcommittees produced an outreach strategy, obtained updated community and hazard information, and developed new plan content relevant to this update. This information was then delivered to the Steering Committee for final discussion and review. The community profile was completed in the Spring of 2024 by the Data Gathering Subcommittee which included Wasco County Planning Department staff and the Wasco County Geographic Information Systems (GIS) Department. The Outreach Subcommittee solicited community feedback through the implementation of its outreach strategy, which included an online public Hazard Mitigation Plan Survey that was launched on February 7, 2024. Outreach also included advertising the mitigation plan update on several County social media platforms and holding a public meeting event "Disaster Movie Marathon" on March 13, 2024, with the primary goal of maximizing opportunity for the public to comment on the plan update. Content for the risk assessment was developed at the second Steering Committee meeting which followed the main outreach event. The risk assessment was conducted during the third Steering Committee meeting before reviewing the County's mission, goals and action items. In April, 2024, Wasco County met with the cities of Mosier, Dufur, and Maupin to discuss and rank the natural hazards that impact those communities. Additional information is provided in their respective City Addendums in Volume 3 of this plan. The mission, goals and action items section was reviewed before discussion of updates to the plan implementation and maintenance strategy at the final Steering Committee meeting, and a final draft of the plan was completed in 2024 and circulated among County officials and interested public for review and submitted to FEMA for plan pre-approval.

At various stages during the plan update's development, partner agencies, local officials and the public were invited to learn of its progress and to comment on completed sections. Multiple opportunities were provided for community members, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process, particularly during Wasco County NHMP Update Steering Committee meetings. Representatives from potential partner organizations and agencies were invited to join the Steering Committee responsible for reviewing and updating the County's plan early in the planning process, and regular attendance was achieved for organizations and agencies that have direct involvement with potential hazard mitigation activities.

During early stages of the planning process, pre-existing plans, studies, reports and other technical information from Wasco County were identified and reviewed for inclusion in the updated plan. Information and policy cultivated from this review was used to inform updates of the County's community profile, risk assessment and mitigation strategy sections, and listed where appropriate for general reference.

How is the Plan Organized?

Each volume of the mitigation plan provides specific information and resources to assist readers in understanding the hazard-specific issues facing Wasco County citizens, businesses, and the environment. Combined, the sections work in synergy to create a

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mitigation plan that furthers the community's mission to ensure the provision of essential public services, which allow the people of Wasco County to enhance the quality of their lives. These services will be delivered in an efficient, effective and respectful manner. This plan structure enables stakeholders to use the section(s) of interest to them.

Volume I: Multi-jurisdictional Natural Hazards Mitigation Plan

Section 1: Introduction

The Introduction briefly describes the countywide mitigation planning efforts and the methodology used to develop the plan. City specific planning efforts are documented in Volume III: City/Special District Addenda which includes the Small Cities Addendum.

Section 2: Risk Assessment

Section 2 provides the factual basis for the mitigation strategies contained in Section 3.

The section includes a list of existing plans, policies, and programs, a listing of community organizations, a summary of existing mitigation actions, and an overview of the hazards addressed in the plan, and describes how climate change increases the frequency and intensity of those hazards. This section allows readers to gain an understanding of the County's sensitivities – those community assets and characteristics that may be impacted by natural hazards, as well as the county's resilience – the ability to manage risk and adapt to hazard event impacts. Furthermore, the section provides analysis of the county's most vulnerable populations and describes ongoing efforts to ensure inclusion, diversity, equity and accessibility for those populations.

A Community Overview for each participating city and special district is located in Volume III: City/Special District Addenda.

Section 3: Mitigation Strategy

This section documents the plan vision, mission, goals, and actions and also describes the components that guide implementation of the identified mitigation strategies. Mitigation actions are based on community sensitivity and resilience factors and the hazard assessments in Section 2 and the Hazard Annexes. City and special district-specific mitigation actions are located in Volume III: City/Special District Addenda.

Section 4: Plan Implementation and Maintenance

This section provides information on the implementation and maintenance of the plan. It describes the process for prioritizing projects, and includes a suggested list of tasks for updating the plan to be completed at the semi-annual and 5-year review meetings. The participating cities and special districts will utilize this implementation and maintenance process as well.

Volume II: Hazard-Specific Annexes

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

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

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- Wildland-Wildfire;
- Extreme Heat;
- Drought;
- Severe Local Storm/Severe Winter Weather;
- Flood;
- Earthquake;
- Volcanoes; and
- Landslides

Volume III: City/Special District Addenda

Volume III of the plan is reserved for any city or special district addendums developed through this multi-jurisdictional planning process. Several cities and jurisdictions were approached to participate in the plan. The City of The Dalles the City of Dufur, the City of Maupin, and the City of Mosier provided addendums during the current update cycle. The City of The Dalles also provided an addendum to the previous Wasco County plan, making the addendum included in Volume III an update to the version that was completed and then adopted in 2019. The Cities of Dufur, Maupin, and Mosier have never been included in Wasco County's multi-jurisdictional hazard mitigation plan. This section also includes a review of other non-participating Small Cities in Wasco County, and their participation levels in this plan update process.

Volume IV: Mitigation Resource Appendices

The resource appendices are designed to provide the users of the Wasco County multi-jurisdictional Natural Hazards Mitigation Plan with additional information to assist them in understanding the contents of the mitigation plan, and provide them with potential resources to assist with plan implementation.

Appendix A: Action Item Forms

This appendix contains the detailed action item forms for each of the mitigation actions identified in this plan.

Appendix B: Planning and Public Process

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

Appendix C: Community Profile

This profile can be utilized to identify specific issues locally and to develop potential action items. A community profile was included as a main section in the original Wasco County Natural Hazards Mitigation Plan, whereas the expanded profile has been moved to the appendixes in the updated plan. The data in the updated profile are based on best available local, state and federal data.

The profile includes:

- a *Natural Environmental Capacity* section that details the physical geography of the county;

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- a *Socio Demographic Capacity* section that discusses the population in the county;
- a *Regional Economic Capacity* section that discusses local industry, regional affordability, economic diversity, employment and wages, and an overview of labor and commute sheds;
- a *Built Capacity* section that addresses the county's housing building stock, physical infrastructure, critical facilities, utilities (including transportation and power transmission systems), dependent facilities, and correctional facilities;
- a *Community Connectivity Capacity* section that discusses the County's social organizations, civic engagement, cultural resources, and community stability;
- and lastly a *Political Capital* section that provides an overview of the county's government structure, and existing plans and policies. In addition to describing characteristics and trends, each profile section identifies the traits that indicate sensitivity to natural hazards.

Appendix D: Survey Results

This appendix includes the survey instrument and results from the 2024 Hazard Mitigation Plan Survey that was developed by the Wasco County Planning Team and the Wasco County Public Information Officer (WC-PIO) and implemented by the WC-PIO. The survey aimed to gauge household knowledge of mitigation tools and techniques and gather potential mitigation ideas from the public to assist in reducing the risk and loss from natural hazards, as well as assessing household disaster preparedness.

Appendix E: Grant Programs

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

Appendix F: Maps

This appendix displays maps of current landscape for wildfire hazard and Potential Flame Length for a Typical Fire Day in Wasco County as compiled by the 2018 Community Planning Assistance for Wildfire, which was used in Wasco County's 2024 Community Wildfire Protection Plan. Additionally, Oregon Explorer provides maps of Fuel Model Groups and the Overall Risk to Watershed by wildfire: Oregon CWPP Planning Tool Maps (2024). The appendix also displays maps from the 2021 Oregon Department of Geologic and Mineral Industries (DOGAMI) Risk Report. These maps display building distribution, population density, liquefaction, landslide susceptibility, and wildfire risk. DOGAMI also provided maps from its 2022 Landslide Inventory and Risk Reduction study which illustrates updated landslide hazards found throughout Wasco County. This section concludes with maps of two County Overlay Zones – OZ-1 Flood Hazard Overlay and OZ-2 Geologic Hazard Overlay. The Community Profile also uses maps to graphically represent a selection of County demographic information.

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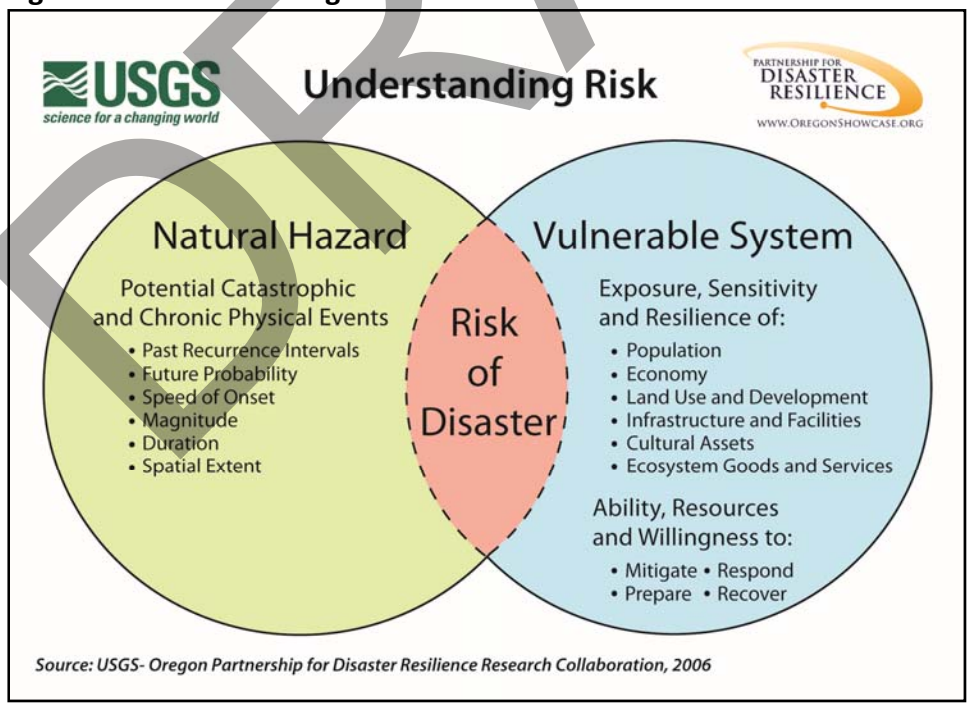
Section 2:
Risk Assessment

This section of the NHMP addresses 44 CFR 201.6(b)(2) - Risk Assessment. In addition, this chapter can serve as the factual basis for addressing Oregon Statewide Planning Goal 7 – Areas Subject to Natural Hazards. Assessing natural hazard risk begins with the identification of hazards that can affect the jurisdiction. Included in the hazard assessment is an evaluation of potential hazard impacts – the type, location, and extent of identified natural hazards. The second step in the risk assessment process is the identification of important community assets and system vulnerabilities. Example vulnerabilities include people, businesses, homes, roads, historic places and drinking water sources. The last step is to evaluate the extent to which the identified hazards overlap with, or have an impact on, the important assets identified by the community.

The information presented below, along with hazard specific information presented in the Hazard Annexes and community characteristics presented in the Community Profile Appendix, are used as the local level rationale for the risk reduction actions identified in Section 3 Mitigation Strategy. The risk assessment process is graphically depicted in Figure 2.1 below. Ultimately, the goal of hazard mitigation is to reduce the Risk of Disaster area, where natural hazards and vulnerable systems overlap.

Figure 2.1 Understanding Risk



Source: OPDR, Wasco County NHMP, August 2012

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Hazard Identification

Wasco County is regularly impacted by several natural hazards due to its geography, climate, and topography. These hazards include wildland-wildfire, extreme heat, drought, severe local weather/severe winter weather, and to a lesser extent flood. Residents of the area are also at varying risks of exposure to landslide/debris flows, earthquakes, and volcanoes. A general overview of these hazards and their threat to Wasco County are listed below in Table 2.1. This table differs slightly from the 2017 plan. Based on frequent extreme heat events since 2019, the Steering Committee decided to add Extreme Heat as a separate and distinct hazard category, separating it from the Severe Weather hazard.

Table 2.1: Wasco County Hazard Overview

Hazard	General location
Wildland-Wildfire	The entire County is vulnerable to the effects of wildfire. However, agriculture, forest/woodland areas, and individuals living in wildland urban interface (WUI) zones are at the greatest risk.
Extreme Heat	Given the frequency and probability of occurrence and overall vulnerability, extreme heat has been given its own category. Agriculture property and vulnerable populations are at the highest risk.
Drought	Countywide. Agricultural industries are particularly vulnerable to scarcity of water supplies during drought events.
Severe Weather (Storm/Winter Weather)	Countywide. Now, includes tornado. Other hazards in this in this category include ice storm, snow storm or blizzard, and windstorm
Flood	Many rivers in Wasco County historically flood every few years. These include the White River, the Deschutes River, the John Day River, and the Columbia River. Flash flooding in urban areas also occurs during heavy rainstorms.
Earthquake	A subduction zone earthquake could have impacts Countywide. Crustal quake events are most likely near The Dalles and northeast of Condon where identified faults exist.
Volcano	Wasco County may be impacted by a volcanic eruption at any time (particularly Mt. St. Helens, but also would be impacted by Mt Hood or Mt Adams eruptions).
Landslide	Wasco County has several areas where landslides have taken place and many areas that are susceptible to landslides. The slopes above the Columbia River are particularly susceptible.

Source: Wasco County NHMP Steering Committee, Updated November 2023

DRAFT

The following subsections summarize the type, effects, location, and history information for each of the hazard types listed above. For detailed information on Wasco County's natural hazards, including viewing the Significant Hazard History Tables, refer to the hazard reports in this plan's Volume II: Hazard Annexes.

There are four additional reports that relate to the Wasco County Risk Assessment:

- *Landslide Inventory and Risk Reduction of the North and Central Portions of Wasco County, Oregon* by the Oregon Department of Geology and Mineral Industries (DOGAMI) (2023);
- *Natural Hazard Risk Report for Wasco County, Oregon Including the Cities of Antelope, Dufur, Maupin, Mosier, Shaniko, The Dalles, and Unincorporated Communities of Chenoweth, Tygh Valley, Pine Hollow, and the Warm Springs Indian Reservation* by the Oregon Department of Geology and Mineral Industries (DOGAMI) (2021);
- *Final Recommendations for Wasco County, OR*, by the Community Planning Assistance for Wildfire (CPAW) (December 2018); and
- *Future Climate Projections Wasco County* report prepared by the Oregon Climate Change Research Institute (OCCRI) (August 2018).

These four reports provide important analysis related to the natural hazards identified in Table 2.1 and how they are impacted related to climate projections. The DOGAMI *Landslide Inventory and Risk Reduction of the North and Central Portions of Wasco County, Oregon* and *Risk Report* will be found in finished form at https://www.oregon.gov/dogami/pubs/Pages/pubsearch.aspx?wp8931=se:%22wasco%22 . The *Final Recommendations for Wasco County, OR* by CPAW can be found at https://www.co.wasco.or.us/departments/planning/long_range/community_wildfire_protection_plan_update/community_planning_assistance_for_wildfire_(cpaw).php. OCCRI Future Projections Report can be found on the left hand column under Additional Resources on the Wasco County NHMP webpage at https://co.wasco.or.us/departments/planning/long_range/natural_hazards_mitigation_plan.php.

Of note, the DOGAMI *Landslide Inventory and Risk Reduction of the North and Central Portions of Wasco County, Oregon* mapped "existing landslides to provide users with an updated understanding of the landslide hazard" for the north and central regions of Wasco County in order to inform and assist the public's ability to analyze susceptibility and risk from identified landslide hazard areas.

The *Final Recommendations for Wasco County, OR* by CPAW provides a wildfire hazard assessment and mapping to inform the public concerning wildfire hazard characterization, wildland-urban interface zones and mitigation difficulty in order to deliver a series of policy recommendations to address and reduce wildfire risk. These policy recommendations were added to the 2018 NHMP Plan as action items, and several have been accomplished, or are actively being addressed. These action items have ensured Wasco County is at the forefront of wildfire mitigation and have addressed many issues raised in Senate Bill 80 which directs the Oregon State Forestry Department to oversee the development and maintenance of a comprehensive statewide wildfire hazard map that displays the wildfire hazard zones.

The 2021 DOGAMI *Risk Report* includes the natural hazards of earthquakes, flood, landslides, wildfire, lahar/volcanoes, and channel migration. Channel migration was not a hazard identified

DRAFT

by the Wasco County NHMP Steering Committee and is not discussed in detail in the NHMP. The *Risk Report* does not include severe weather and drought, which are two of the natural hazards identified by the Wasco County NHMP Steering Committee.

DOGAMI describes the purpose of the *Risk Report*:

> The purpose of this project is to help communities in the study area better understand their risk and increase resilience to natural hazards that are present in their community. This is accomplished by providing them with accurate, detailed, and up to date information about these hazards and by measuring the number of people and buildings at risk.
>
> The main objectives of this study are to:
>
> - [C]ompile and/or create a database of critical facilities, tax assessor data, buildings, and population distribution data,
> - [I]ncorporate and use existing data from previous geologic, hydrologic, and wildfire hazard studies
> - [P]erform exposure and Hazus-based risk analysis
> - [S]hare this report widely so that all interested parties have access to its information and data
>
> The body of this report describes the methods and results for these objectives. Two primary methods (Hazus-MH or exposure) depending on the type of hazard, were used to assess risk. We describe the methods for creating the building and population information used in this project. Results for each hazard type are reported on a countywide basis, and community based results are reported in detail in the community profiles.

The *Risk Report* includes information about critical facilities such as what they are, where they are, what the monetary value of them is, and so forth. These critical facilities are important to note because of the essential role they play in recovery efforts. The 2019 NHMP updated its critical facilities list to match those identified by DOGAMI in their *Risk Report*. The 2024 NHMP Steering Committee has included additional facilities which include the Wasco County Fairgrounds and Tygh Valley Community Center among other vital facilities, see also the subsection "Critical Facilities and Infrastructure" in this section for additional details.

OCCRI's *Future Climate Projections* Wasco County and the Climate Change Influence on Natural Hazards in Eight Oregon Counties: Overview of County Reports, provide important information regarding the influence and impacts of climate change on existing natural hazards events such as heavy rains, river flooding, drought, heat waves, cold waves, wildfire, and air quality. The overview discusses all eight of the counties while the respective individual County reports are specific to each County. OCCRI's research and analysis focuses on how climate change is expected to influence natural hazards.

The overview describes results for the natural hazards using climate metrics in summary and as a comparison. For example, "Drought conditions, as represented by low summer soil moisture,

DRAFT

low spring snowpack, and low summer runoff, are projected to become more frequent in Wasco County by the 2050s compared to the historical baseline."[1]

Each County report describes County-specific projected changes in climate metrics related to 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.

Wildland-Wildfire

Any instance of uncontrolled burning within a wildland forested area, grassland, or brush is classified as a wildfire. Wildland fires can be referred to as brush fires, forest fires, or rangeland fires depending on the location. This document also refers to them all inclusively as wildfire.

Wasco County's wildfire season usually runs from mid-May through October. However, any prolonged period of lack of precipitation presents a potentially dangerous problem. The probability of a wildfire in any one locality on a particular day depends on fuel conditions, topography, the time of year, the past and present weather conditions, and the activities (debris burning, land clearing, camping, etc…) which are or will be taking place.

The effects of wildfires in Wasco County vary with intensity, area, and time of year. Factors affecting the degree of risk of wildfires include extent of rainfall, humidity, wind-speed, type of vegetation, slope, and proximity to fire-fighting agencies. The greatest short-term loss is the complete destruction of or damage to valuable resources, such as structures, timber, wildlife habitat, scenic vistas, and watersheds. There is also an immediate increase in vulnerability to flooding and landslides due to the damage to all or part of affected watersheds. Long-term effects include reduced amounts of timber for commercial purposes and the reduction of travel and recreational activities in the affected area.

Home building in and near wildland fuels increases the risks of damage from wildfires. These areas are referred to as the Wildland Urban Interface (WUI), which is defined by the Ready, Set, Go fire education program as "areas where homes are built near or among lands prone to wildland fire".

Often, structures have been built and maintained with minimal awareness of the need for protection from exterior fire sources, or the need to minimize interior fires from spreading to forested lands. Historically, it appears that the instance of wildfire is increasing in Wasco County and the region more generally. See the Significant Historic Hazard Tables in Volume II: Hazard Annexes. Additionally, the existence of open rangelands and large forested areas, increasing population and recreational activities, and the uncertain impact of a changing climate combine to increase the probability of a hazard event. The destruction of large tracts of forest land during these events have immediate economic impacts to the community through lost jobs and reduced taxes, while collateral economic and social effects can impact the County for years. Additionally, redevelopment of burned areas may be extremely difficult due to the loss of

[1] *Future Climate Projections Wasco County* report prepared by the Oregon Climate Change Research Institute (OCCRI) (August 2018). https://www.oregon.gov/lcd/CL/Documents/OCCRI_PDM16_WascoCoFutureProjections2018.pdf.

DRAFT

necessary ground cover vegetation, which can increase the propensity for landslide hazards. Table 2.2 below details the three Fire Management Assistance Declarations that have occurred since the previous plan update in 2018. In 2020, there were 16 declarations for the state of Oregon with two declarations in Wasco County.

Table 2.2: Recent FEMA Fire Management Assistance Declarations for Oregon – Wasco County

Declaration Number	Year	Name	Description
FM-5046-OR	2013	Government Flats Complex	11,450 acres, conflagration declared, 4 homes lost, $15 mil damage
FM-5073-OR	2014	Rowena	3,680 acres, conflagration declared
FM-5255-OR	2018	Substation Fire	78,425 acres, one fatality, conflagration declared, four homes and 48 other structures lost
FM-5265-OR	2018	South Valley Fire	20,026 acres, conflagration declared, three homes and 12 other structures lost
FM-5327-OR	2020	Mosier Creek Fire	985 acres
FM-5341-OR	2020	White River Fire	17,442 acres, over 100 dwellings ordered to evacuate
FM-5446-OR	2022	Miller Road Fire	10,847 acres, one structure destroyed
FM-5506-OR	2024	Larch Creek Fire	18,286 acres acres, at least two accessory structures destroyed

Source: FEMA, Oregon Disaster History, Fire Management Assistance Declarations, as of 6/25/24

In addition to these FEMA declarations, the state of Oregon will declare severe fires as a "Conflagration". This declaration is used for fires that involve or threaten life or structures. In 2018, there were nine conflagrations declared in the state of Oregon, three of which were in Wasco County (the two above as well as Memaloose II). Since the 2012 NHMP three other fires have been declared Conflagrations (but not FEMA Fire Management Assistance Declarations) in Wasco County as well – the Mosier Oil Train Derailment fire and the Wasson Pond Fire in 2016 and the Nena Springs fire in 2017. Table 2.4 shows the full history of Conflagrations declared in Wasco County.

DRAFT

Table 2.3: Wasco County Conflagrations

Fire Name	Year
Rowena/The Dalles	1998
The Dalles Grain Elevator	1999
Antelope	2000
Sheldon Ridge	2002
White River	2002
Microwave	2009
Government Flats Complex	2013
Rowena	2014
Mosier Oil Train Derailment	2016
Wasson Pond	2016
Nena Springs	2017
Substation	2018
South Valley	2018
Memaloose II	2018
Mosier Creek Fire	2020
White River Fire	2020
Sunset Valley Road Fire	2021
Wrentham Market Fire	2021
Miller Road Fire	2022
Larch Creek Fire	2024

Source: Wasco County Office of Emergency Management, provided on April 5, 2024; Office of Oregon Governor Tina Kotek, Executive Orders, https://www.oregon.gov/gov/pages/executive-orders.aspx (Accessed on June 27, 2024).

Extreme Heat

In 2020, Oregon began addressing extreme heat as a distinct natural hazard. Based on the state's NHMP and increased extreme heat events in Wasco County, the Wasco County NHMP Steering Committee determined that the Extreme Heat hazard should be addressed under its own category. The State of Oregon's 2020 NHMP provides that extreme heat events occur as a result of natural variability. Further, Oregon's 2020 NHMP provides several ways to measure extreme heat. Wasco County has used a common method, which is to count the number of days with temperatures above a certain threshold, such as days with temperatures above 100°F.

Extreme temperatures are common in Wasco County and the frequency of prolonged periods of high temperatures has increased. Since 2018, Wasco County has experienced at least 40-days of triple digit temperatures in the months of June, July, and August. Extreme heat can negatively influence commerce, agriculture, fisheries, and overall quality of life, especially for vulnerable populations that lack cooling resources.

Prolonged elevated temperatures pose risks to agriculture operations. Significant numbers of farm workers in Wasco County are vulnerable to long periods of extreme heat, particularly orchard farm laborers where equipment is not a primary mechanism for planting or harvest. Long periods of extreme heat have the potential to damage or destroy agricultural property, particularly those fruits, tree nuts, and berries, such as cherries, that are extremely susceptible to high heat. The United States Department of Agriculture estimates that the market value of

DRAFT

agricultural products sold for fruits, tree nuts, and berries in 2022 is $83,382,000, and all agricultural products sold is $126,013,000.[2]

Water resources in Wasco County can also be negatively impacted. The State of Oregon's 2020 Natural Hazard Mitigation Plan estimates that on average, for each degree Fahrenheit increase in temperature, plants use 2.5% - 5% more water. Extreme heat can also increase the operations and maintenance costs for county-owned facilities for heating, ventilation, and air conditioning. More information is provided in Volume 2 Hazard Annexes.

Drought

Drought is a condition of climatic dryness severe enough to reduce soil moisture and water below the minimum amount necessary for sustaining plant, animal, and human life systems. Nearly all areas of Wasco County may be vulnerable to drought. In every drought, agriculture has felt the impact, especially in non-irrigated areas. Droughts have left their major impact on individual farm owners and farm laborers, on the overall agricultural industry, and to a lesser extent, on other agriculture-related sectors.

Droughts in the County also lead to increased danger of wildfires, in which millions of board feet of timber have been lost. In many cases, erosion has occurred which caused serious damage to aquatic life, irrigation, and power development by heavy silting of streams, reservoirs, and rivers. Low stream flows have also created high temperatures, oxygen depletion, disease, and lack of spawning areas for fish resources.

All of the above effects result in economic and revenue losses for business, cities and the County as a whole, and history of drought in the County suggests a high probability of occurrence. The entire population of the County is vulnerable to the effects of drought, though transportation and communications infrastructure would be minimally impacted, if at all. The trend of relocation out of urban areas and into rural areas has in some circumstances placed more demand on limited local water resources.

See also the *Future Climate Projections Report* by OCCRI.

Severe Weather

Wasco County is vulnerable to a variety of severe weather hazards including ice, heat, snow, heavy rain and windstorms, which all have the ability to severely impact the County. Severe weather seldom cause death and serious property damage but they can cause major utility and transportation disruptions. Business, commerce and schools are also impacted.

Ice Storm

Ice storms or freezing rain (black ice) conditions can occur in Wasco County. Ice storms occur when rain falls from warm moist upper layers of the atmosphere into a cold, dry layer near the ground. The rain freezes on contact with the cold ground and accumulates on exposed surfaces. This has the possibility to create extensive damage when the ice accumulates on tree branches

[2] The United States Department of Agriculture National Agricultural Statistics Service, Census of Agriculture County Profile for Wasco County. (n.d.-b). https://www.nass.usda.gov/Publications/AgCensus/2022/Online_Resources/County_Profiles/Oregon/cp41065.pdf

DRAFT

and power lines. This can cause power outages and can obstruct transportation routes. For example, ice storms in December of 2022 and in January of 2024 closed I-84 for several days, restricting access to and from the County, impacting both businesses and residents. Most schools and State and County offices in the Gorge area were shut down during those events.

Snow Storm or Blizzard

It is possible for moderate or severe snowfall to occur in Wasco County. Wasco County has had accumulations that vary depending on geographic location. Accumulations average between 4 and 5 inches in the City of the Dalles each year. However, during December of 1884, almost 30 inches of snow fell over a 3 day period and again in 1909 more than 14 inches fell over 5 days. In November of 1921, the County received 24 inches of snow over 24 hours. Significant snow related events have continued to occur in the County's recent history, as in 2005 when the County received over 4 feet of snow during the winter season, and over the winter of 2016-17 when the record was broken for consecutive days with snow on the ground in The Dalles. In December of 2023 and January of 2024, severe winter weather storms (12-days in January) brought significant snow (1-2 feet), and extreme cold arctic air (-2°F), and closed portions of I-84. Accumulations of snow usually increase with distance and elevation as the terrain rises to the South of the Columbia River. January is usually the month with the greatest snowfall in Wasco County.

Wind Storm

The Northwest can be severely impacted by strong windstorms. In the past, peak wind gusts have gone above 100 miles per hour. The greatest windstorm in the Northwest's recorded history struck on Columbus Day in 1962, with peak gusts of 138 mph, which is equivalent to the power of a Category 3 hurricane. The strongest winds that impact Wasco County come from two sources. Frequent and widespread strong winds come from the west and are associated with strong storms moving onto the coast from the Pacific Ocean. Strong east winds may also originate from Eastern Washington and Oregon, when high atmospheric pressure is over the upper Columbia River Basin and low pressure is over the Pacific Ocean. The Columbia River Gorge acts as a funnel, concentrating the intensity of the winds as they flow to the West. This generates frequently strong winds throughout the Gorge. These wind events can cause extensive damage, including loss of power, etc. These wind storms can severely impact the area with power outages, transportation facilities blocked or closed, stranded drivers, In December 2022, a storm turned deadly, when wind gusts resulted in the death of a man who was killed after a tree fell onto his vehicle.

Tornado

Tornadoes can be an extremely violent weather phenomena. They are characterized by funnel clouds of varying sizes that generate winds as fast as 500 miles per hour. They can affect an area of ¼ to ¾ of a mile though seldom more than 16 miles long. Tornadoes normally descend from the large cumulonimbus clouds that characterize severe thunderstorms. They form when a strong crosswind intersects with strong warm updrafts in these clouds causing a slowly spinning vortex to form within a cloud. No recorded instance of a tornado causing damage in Wasco County is available.

See also the *Future Climate Projections Report* by OCCRI.

DRAFT

Flood

The main causes of Pacific Northwest floods are the moist air masses that regularly move over the region in the winter. In Wasco County, the weather that produces the most serious flooding events are extensive wet conditions that follow a period of mid and high elevation ice and snow pack development. The County is susceptible to both riverine and flash floods.

Many rivers in Wasco County historically flood every few years. These include the White River, the Deschutes River, the John Day River, and the Columbia River. Flooding on these rivers usually occurs between spring and early summer, when much of the snowpack that feeds the rivers melts in May, June and July. Long periods of heavy rainfall and mild temperatures can also contribute to flooding conditions.

In 2023, FEMA began working with the state of Oregon, Wasco County, the cities of The Dalles, Dufur, Maupin and Mosier and the Town of Shaniko to use new data and technology to update the Flood Insurance Rate Map (FIRM) within Wasco County. The new map will better represent the risk of flooding, and help communities better understand their flood risks. On July 15, 2024, FEMA sent a letter to Wasco County requiring the County change its flood hazard regulations to conform to requirements from the Federal Endangered Species Act (ESA). Wasco County is on track to update its Flood Hazard Overlay Zone in accordance with FEMA's demand. The updated Flood Hazard Overlay Zone code conforms to model Flood Hazard Overlay zoning criteria in order to help the public make informed decisions about how to protect against damage and loss from flood hazards, and meets the required ESA protections. The overlay zone is scheduled for update in December 2024. The updated Flood Insurance Rate Map is scheduled to be adopted by Wasco County in 2026.

See also the *Risk Report* by DOGAMI and the *Future Climate Projections Report* by OCCRI for more information.

Earthquake

An earthquake is the shaking of the ground caused by an abrupt shift of rock along a fracture in the earth, called a fault. There are three categories of quakes and each type may affect Wasco County. One way earthquakes is categorized is by type. The first is a shallow or crustal quake. These occur at a depth of 5 to 10 miles beneath the earth's surface. These quakes are associated with fault movement within a surface plate. The second type of earthquake is an intraplate, or "deep" earthquake. Intraplate quakes occur when an earthquake on a geologic plate affects another plate. In Pacific Northwest geology, intraplate quakes happen when the Juan de Fuca plate breaks up underneath the continental plate, approximately 30 miles beneath the earth's surface. The third type of quake is a subduction zone earthquake. These occur when two converging plates become stuck along their interface. Continued movements between the plates will build up energy across the locked surface until the plates abruptly slip along the interface when the strain is released.

Another way to categorize earthquakes is as "Convergent Boundary", Divergent Boundary" or "Transform Fault". "Convergent Boundary", where one plate is forced over another plate during movement creating a thrust fault; "Divergent Boundary", where plates are forced apart, usually forming a Rift Zone; and "Transform Fault", where plates slip by each other (also referred to as

DRAFT

Strike-Slip)[3]. The scope of damage is a function of earthquake magnitude and level of community preparedness. Damage could range from minimal to moderate loss of life and destruction of property. The entire County population, property, commerce, infrastructure and services may be vulnerable to an earthquake.

There is no recent history of major earthquakes in Wasco County, though County residents do occasionally feel some minor earthquakes. However, geology clearly shows that the County has been impacted by significant events in the last 500 years.

Earthquakes in Wasco County are most likely to originate from two sources: 1) the Cascadia Subduction Zone; and 2) faults near the eastern end of the Columbia River Gorge. Table 2.5 lists the class A (demonstrated faults of tectonic origin[4]) and B faults (faults of unknown or minor seismicity) that are located in or near the County.

Table 2.4 : Class A and B Faults Located in or near Wasco County

Name	Class	Fault ID	Primary County, State	Length (km)	Time of most recent deformation	Slip-rate category
Faults near The Dalles	A	580	Wasco County, Oregon	69 km	undifferentiated Quaternary (<1.6 Ma)	Less than 0.2 mm/yr
Unnamed faults northwest of Condon	B	814	Gilliam County, Oregon	22 km	Quaternary (<1.6 Ma)	Less than 0.2 mm/yr
Unnamed faults on Tygh Ridge	B	850	Wasco County, Oregon	26 km	undifferentiated Quaternary (<1.6 Ma)	Less than 0.2 mm/yr
Warm Springs fault zone	A	851	Wasco County, Oregon	34 km	middle and late Quaternary (<750 ka)	Less than 0.2 mm/yr

Source: U.S. Geological Survey (USGS), Quaternary Fault and Fold Database (Accessed for 2024 plan)

See also the *Risk Report* by DOGAMI and the *Future Climate Projections Report* by OCCRI for more information.

Volcano

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. There are a wide variety of hazards related to volcanoes and volcano eruption, and these hazards are typically distinguished by the different ways in which volcanic materials and other debris flow from the volcano.

In an email dated January 9, 2020, Larry G. Mastin, Ph.D. Physical Volcanologist for the United States Geological Survey explained "[a]t The Dalles, Mount St. Helens is a bigger threat than Mount Hood, because MSH erupts more frequently, and produces bigger eruptions. The only eruptions at Mount Hood in the past 10,000 years have been lava domes, and the only ash

[3] NOAA. http://oceanexplorer.noaa.gov/facts/plate-boundaries.html, Accessed June 28, 2024
[4] Crone and Wheeler (2000)

DRAFT

deposits our geologists appear to have come from ash clouds that were produced when the lava domes broke apart and cascaded down the south side of the volcano."

Dr. Mastin ran 1,000 simulations of a Mount St. Helens eruption, of the size that occurred on May 18, 1980, and randomly sampling from wind fields in the historical record. Of the thousand simulations, the maximum ash thickness at The Dalles is about 5 cm (compacted).[5]

Ash fall could also have a significant impact across the entire County. The prevailing winds in the area are out of the West. During the 1980 Mt St Helens eruption (65 miles northwest of The Dalles), areas of Wasco County were covered by up to an inch or more of ash and some vehicles could not operate as their air intakes was clogged[6]. Depending on the season of the eruption, wildfires caused by falling ash, lahars down White River, or the blast itself could be impactful as well.

Mount Hood is a potentially active volcano close to rapidly growing communities and recreation areas that could have significant effects on the daily lives of Wasco County residents. It is located 10 miles west of the Wasco County border, and 20-35 miles from population centers in the County that include The Dalles, Dufur, Tygh Valley, Pine Hollow, Wamic, Maupin, and Mosier.

If Mount Hood were to erupt, the likely widespread and hazardous consequence of an eruption will be from lahars (rapidly moving mudflows) sweeping down the entire length of the Sandy (including the Zigzag) and White River valleys. The White River runs through the Mt Hood National Forest, past a wide variety of agricultural areas in South County, and near the town of Tygh Valley on its way to the Deschutes River. 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. The degree of hazard decreases as height above a channel increases, but large lahars can affect areas more than 30 vertical meters (100 vertical feet) above river beds.

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 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, and another Cascade Range volcanic eruption could significantly impact various aspects of life in Wasco County.

See also the *Risk Report* by DOGAMI and the *Future Climate Projections Report* by OCCRI for more information.

Landslide/Debris Flow

Landslides are the sliding movement of masses of loosened rock and soil down a hillside or slope. The term landslide includes a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows. It is most common for landslides to occur on water

[5] January 9, 2020 email from Larry G. Mastin, Ph.D. Physical Volcanologist for the United States Geological Survey. See end of Risk Assessment Section.
[6] Wasco County Steering Committee discussions, April 15, 2024

DRAFT

saturated slopes when the base of the slope can no longer support the weight of the soil above it. Landslides are commonly associated with heavy rain and flooding conditions, but they may also be associated with earthquakes (the 1994 Northridge Earthquake in California caused an estimated 11,000 landslides) and with volcanic activity.

Landslides in Wasco County generally range in size from thin masses of soil a few yards wide to deep-seated bedrock slides. Travel rate may range in velocity from a few inches per month to many feet per second, depending largely on slope, material, and water content. The recognition of ancient dormant landslide masses is important as they can be reactivated by earthquakes, unusually wet winters, or following wildfire events. Also, because they consist of broken earth materials and disrupted ground water, they are more susceptible to construction-triggered sliding than adjacent undisturbed material. Landslides in the County tend to occur in isolated, sparsely developed areas threatening individual structures and remote sections of the transportation, energy and communications infrastructure. However there is a risk that a major landslide could cause the partial closure of segments of Interstate 84, or impact developed regions along the I-84 corridor; for example residential developments between The Dalles and Mosier. In the spring of 2017, a rock fall affected the Historic Columbia River Highway just below the Rowena Plateau at mile marker 64.7, blocking this transportation route for several weeks. Other examples can be found in the Significant Hazard History Tables in Volume II: Hazard Annexes.

In 2023, the Oregon Department of Geology and Mineral Industries issued a report *Landslide Inventory and Risk Reduction of the North and Central Portions of Wasco County, Oregon*, which inventoried 2,693 new landslide areas in north and central Wasco County. Most identified landslide hazard areas are not within populated areas. The updated hazard inventory map is scheduled to be adopted by Wasco County in late 2025, and will be adopted with updated model Geologic Hazards Overlay zoning criteria in order to help the public make informed decisions about how to protect against damage and loss from geologic hazards.

See also the *Risk Report* by DOGAMI and the *Future Climate Projections Report* by OCCRI for more information.

FEMA Declarations

President Dwight D. Eisenhower approved the first federal disaster declaration in May 1953 following a tornado in Georgia. Since then, federally declared disasters have been approved within every state. As of June 2024, FEMA has approved a total of 147 federal disaster declarations 41 major declarations, four emergency declarations, and 102 fire management assistance declarations (includes 36 fire suppression authorizations) in Oregon.[7] See the Significant Hazard History Tables in Volume II: Hazard Annexes.

When requesting a presidential declaration for a major disaster or emergency, governors provide detailed information about the amount of value of public and private property damage resulting from the event. FEMA uses these damage assessments to determine if the event meets the disaster declaration threshold. In addition, FEMA uses the information to determine

[7] FEMA. Declared Disasters by Year or State. http://www.fema.gov/ Accessed June 28, 2024

DRAFT

the amount of federal public and private assistance being made available as well as the specific counties being included in the declaration.

Disaster declarations can help inform hazard mitigation project priorities, by demonstrating and documenting which hazards historically have caused the most significant damage to the County. FEMA identifies three Declaration Types: Major Disaster, Emergency, and Fire Management Assistance (which replaced the Fire Suppression Authorization program in 2001). Major Disaster Declarations are for any natural event that the President determines has caused damage of such severity that it is beyond the combined capabilities of state and local governments to respond. Emergency Declarations occur for any occasion or instance when the President determines federal assistance is needed. The total amount of assistance for a single emergency may not exceed $5 million. Fire Management Assistance declarations authorize the President to provide assistance to any state, Indian tribal government, or local government for the mitigation, management and control of any fire on public or private land that threatens such destruction as would constitute a major disaster.

There have only been four Emergency Declarations in Oregon, neither of which was in Wasco County. Fire Management Assistance Declarations are addressed above in Table 2.2. The 44 Major Disasters declared for Oregon by FEMA since 1953. Table 2.5 shows that most of the Major Disaster Declarations for the state have been severe storm related. There have been no major disaster declarations in Wasco County since the 2012.

The winter of 2016-17 did see an exceptional amount of snow, with multiple instances of I-84 being closed from Troutdale to Hood River, just west of Wasco County. Additionally, The Dalles had over 70 days in a row of snow on the ground, shattering the old record of 38 set in the 1970s. Public Works agencies for both the city of The Dalles, as well as Wasco County, reported vastly exceeding their projected overtime budgets. The County did attempt to acquire a disaster declaration to help alleviate the difficulties presented by this harsh winter, but were unsuccessful due to the fact that the effects were so widely dispersed and not the result of a single identifiable event.[8] (See table 2.3 above for recent FEMA Fire Management Assistance Declarations for Wasco County.)[9]

DRAFT

Table 2.5: FEMA Major Disaster Declarations for Oregon – Wasco County by Decade

[8] Discussion, Steering Committee meeting, July 25, 2017
[9] FEMA, Oregon Disaster History, Fire Management Assistance Declarations, as of 6/25/24

Decade	Declarations	Declaration No.	Primary Incident Type During Decade
1953-1959	3	FLOOD (DR-49-OR) STORM, FLOOD (DR-60-OR) FLOOD (DR-69-OR)	Flood
1960-1969	3	SEVERE STORMS (DR-136-OR) FLOODS (DR-144-OR) Heavy Rains & Flooding (DR-184-OR)	Flood & Storms
1970-1979	3	STORMS, FLOODING (DR-301-OR) SEVERE STORMS, FLOODING (DR-319-OR) SEVERE STORMS, SNOWMELT, FLOODING (DR-413-OR)	Severe Storms
1980-1989	0	N/A	N/A
1990-1999	10	Flooding, Severe Storm (DR-853-OR) Earthquake (DR-985-OR) Earthquakes (DR-1004-OR) El Nino Effects (The Salmon Industry) (DR-1036-OR) Flash Flooding (DR-1061-OR) Severe Storms/Flooding (DR-1099-OR) Severe Storms/High Winds (DR-1107-OR) Severe Storms/Flooding (DR-1149-OR) Severe Winter Storms/Flooding (DR-1160-OR) Flooding (DR-1221-OR)	Storms & Flood
2000-2009	7	Severe Winter Windstorm with High Winds (DR-1405-OR) Severe Winter Storms (DR-1510-OR) Severe Storms, Flooding, Landslides, and Mudslides (DR-1672-OR) Severe Storms, Flooding, Landslides, and Mudslides (DR-1632-OR) Severe Winter Storm and Flooding (DR-1683-OR) Severe Storms, Flooding, Landslides, and Mudslides (DR-1733-OR) Severe Winter Storm, Record and Near Record Snow, Landslides, and Mudslides (DR-1824-OR)	Severe Storms
2010-2019	9	Severe Winter Storm, Flooding, Mudslides, Landslides, and Debris Flows (DR-1956-OR) Tsunami Wave Surge (DR-1964-OR) Severe Winter Storm, Flooding, Landslides, and Mudslides (DR-4055-OR) Severe Winter Storm (DR-4169-OR) Severe Winter Storms, Straight-line Winds, Flooding, Landslides, and Mudslides (DR-4258-OR) Oregon Severe Winter Storm and Flooding (DR-4296-OR) Severe Winter Storms, Flooding, Landslides, and Mudslides (DR-4328-OR) Severe Winter Storms, Flooding, Landslides, and Mudslides (DR-4432-OR) Severe Storms, Flooding, Landslides, and Mudslides (DR-4452-OR)	Severe Storms
2020-2024	6	Covid-19 Pandemic (DR-4499-OR) Severe Storms, Flooding, Landslides, and Mudslides (DR-4519-OR) Wildfires and Straight-line Winds (DR-4562-OR) Severe Winter Storm (DR-4599-OR) Burns Paiute Tribe Severe Storm, Flooding, Landslides, and Mudslides (DR-4733) Severe Winter Storms, Straight-line Winds, Landslides, and Mudslides (DR-4768-OR)	Severe Storms

Source: FEMA, Oregon Disaster History, Major Disaster Declarations at https://www.fema.gov/disaster/declarations

DRAFT

Inclusion, Diversity, Equity and Accessibility

Regarding equal protection under the law, the Constitution of the United States Fifth Amendment's Due Process Clause and the Fourteenth Amendment's Equal Protection Clause require government officials to practice equal protection. Specifically, the Fourteenth Amendment Section 1 provides that States shall not "deny to any person within its jurisdiction the equal protection of the laws."[10] Further, in 1954, the United States Supreme Court held in two separate landmark decisions that the Fifth Amendment's guarantee of "liberty" secured by due process also guarantees racial equality; and that "separate but equal" facilities are inherently unequal and violate the protections of the Equal Protection Clause of the Fourteenth Amendment.[11]

These constitutional protections combined with other federal laws, which include, but are not limited to multiple Civil Rights Acts (passed from 1866 to 1991) and the Americans with Disabilities Act prohibit discrimination based on race, color, religion, sex, national origin, or disabilities. They also prohibit discrimination in public accommodations and federally funded programs, which include the development and implementation of Wasco County's Natural Hazard Mitigation Plan.[12]

To maximize these protections during the planning process for Natural Hazard Mitigation Plans, FEMA has developed the Inclusion, Diversity, Equity and Accessibility in Exercises Considerations and Best Practices Guide. The Guide is designed to help communities embrace their diversity and helps ensure that equity and inclusion are included at every step of the planning process. It provides the following definitions for inclusion, diversity, equity, and accessibility (IDEA):

Inclusion: The recognition, appreciation and use of the talents and skills of people of all backgrounds.

Diversity: The practice of including the many communities, identities, races, ethnicities, backgrounds, abilities, cultures and beliefs of the American people, including underserved communities.

Equity: The consistent and systematic fair, just and impartial treatment of all individuals, including individuals who belong to underserved communities that have been denied such treatment, such as Black, Latino, and Indigenous and Native American persons, Asian Americans and Pacific Islanders and other persons of color; members of religious minorities; lesbian, gay, bisexual, transgender and queer (LGBTQ+) persons; people with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequality.

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[10] U.S. Const. amend. XIV.
[11] *Bolling v. Sharpe*. (n.d.). Oyez. Retrieved July 17, 2024, from https://www.oyez.org/cases/1940-1955/347us497; *Brown v. Board of Education of Topeka*. (n.d.). Oyez. Retrieved July 17, 2024, from https://www.oyez.org/cases/1940-1955/347us483.
[12] Office of the Assistant Secretary for Administration & Management (2024, July 17). *Legal Highlight: The Civil Rights Act of 1964.* https://www.dol.gov/agencies/oasam/civil-rights-center/statutes/civil-rights-act-of-1964#:~:text=In%201964%2C%20Congress%20passed%20Public,hiring%2C%20promoting%2C%20and%20firing; U.S. Department of Labor (2024. July 17). *Americans with Disabilities Act.* https://www.dol.gov/general/topic/disability/ada.

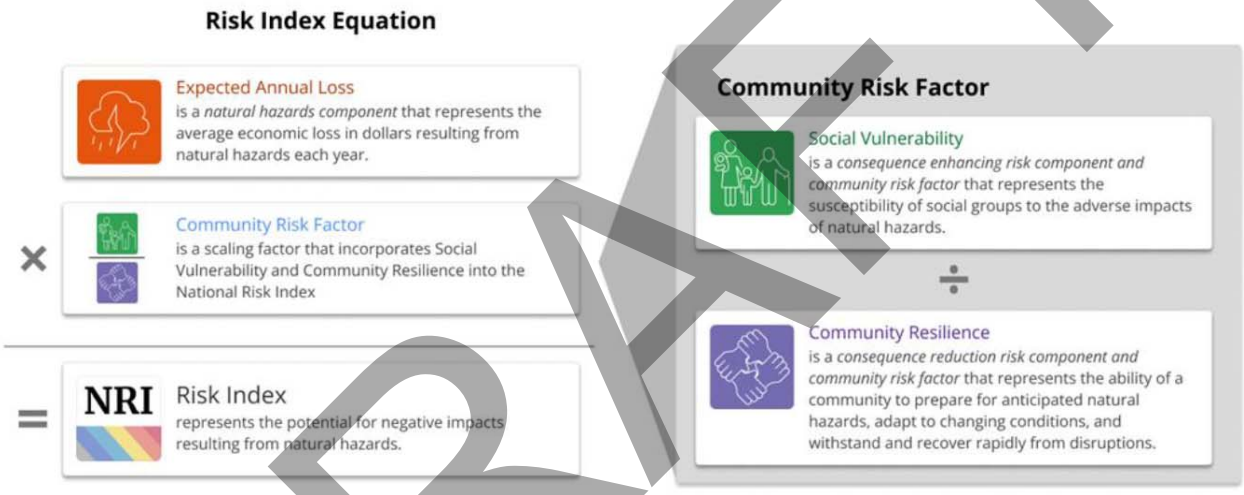
<u>Accessibility:</u> The design, construction, development and maintenance of facilities, information and communication technology, programs and services so that all people, including people with disabilities, can fully and independently use them.[13]

To further assist local planners, FEMA has developed the National Risk Index.

National Risk Index

FEMA has developed an interactive mapping tool called the National Risk Index (NRI) that among other tools can help inform communities of which natural hazards they are most at risk. The NRI tool visualizes data concerning expected annual losses to individual natural hazards, social vulnerability and community resilience, and is available at county and Census tract levels. The Risk Index Equation (Expected Annual Loss x Community Risk Factor) is used to calculate a community's overall Risk Index as illustrated by Figure 2.2.

Figure 2.2 Risk Index Equation



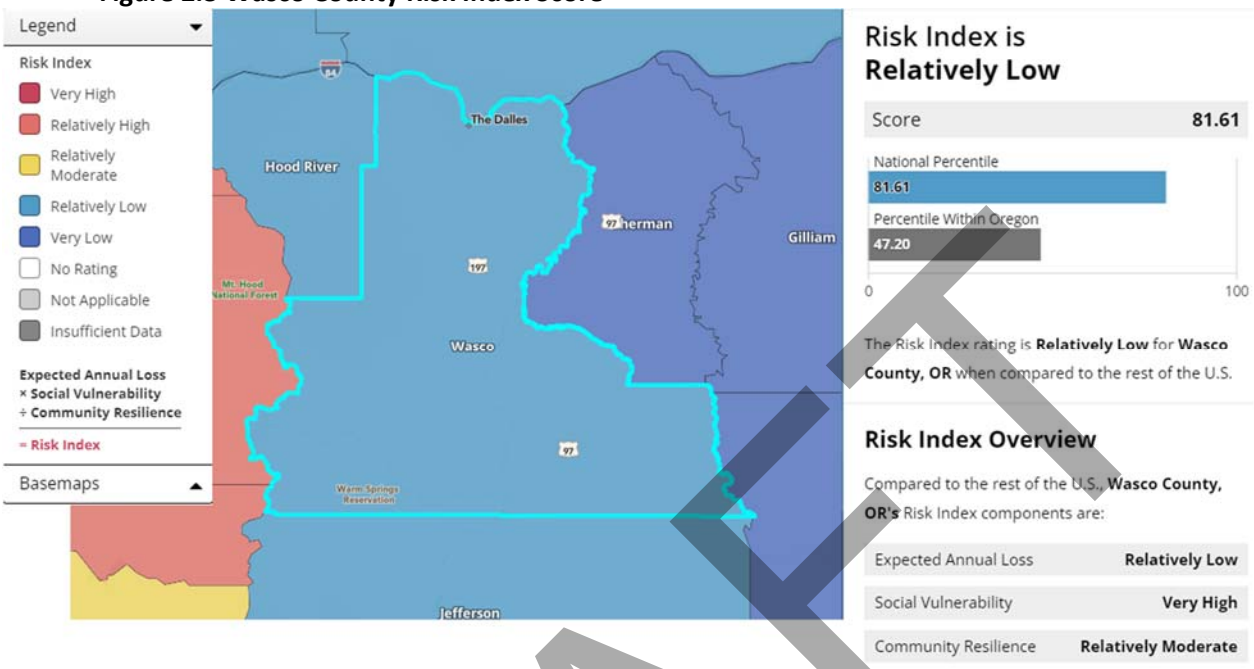
Source: Federal Emergency Management Agency National Risk Index Overview Fact Sheet (2023).

Wasco County's overall risk ranking is "Relatively Low" with an index score that is within the 81.61 percent national percentile. As shown in Figure 2.3, Wasco County's Expected Annual Loss is ranked as "Relatively Low", its Community Resilience is ranked as "Relatively Moderate"; however, the County's Social Vulnerability is ranked as "Very High".

DRAFT

[13] Federal Emergency Management Agency. (2023, pp. 20-21). *Inclusion, Diversity, Equity and Accessibility in Exercises Considerations and Best Practices Guide.*

Figure 2.3 Wasco County Risk Index Score



Source: Federal Emergency Management Agency National Risk Index Map (2024)

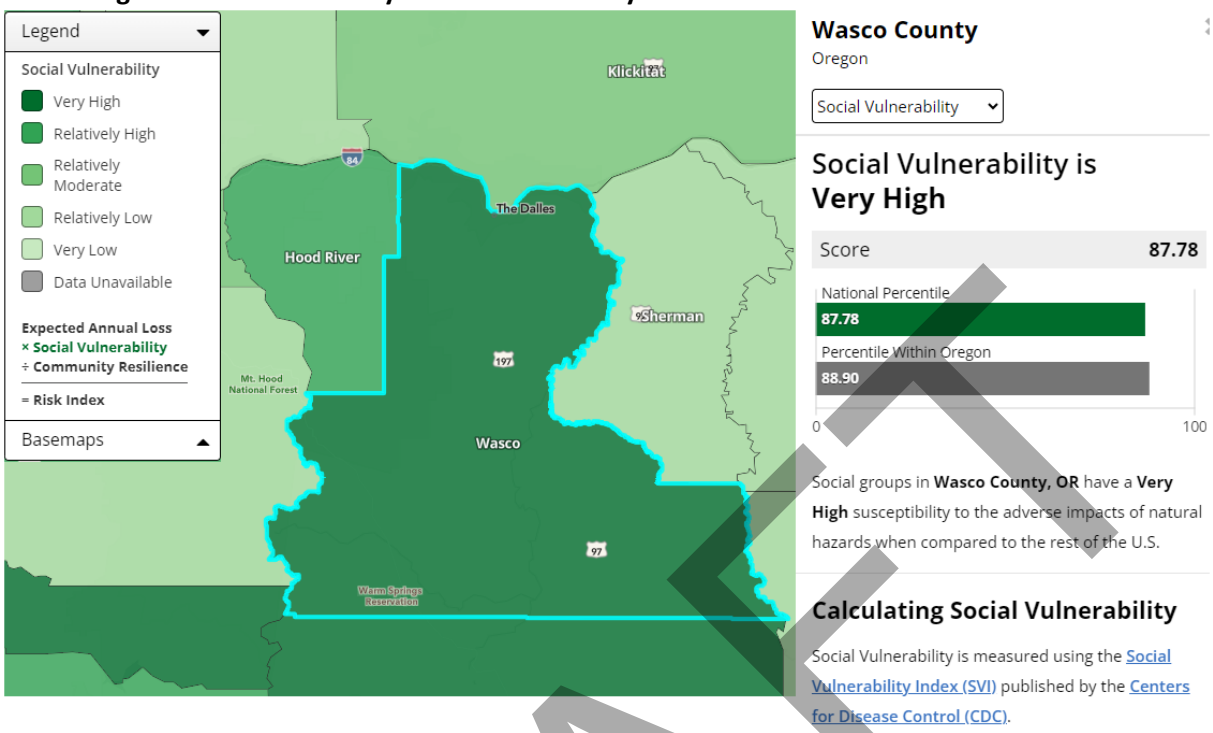
The high Social Vulnerability ranking is a lead factor in Wasco County's higher overall Risk Index Score. Understanding what Social Vulnerability is and how it relates to Wasco County's identified Vulnerable Populations can help our community develop targeted solutions to mitigate impacts from natural hazards.

Social Vulnerability

Wasco County's Social Vulnerability score is provided in Figure 2.4. The Social Vulnerability score is measured using the Social Vulnerability Index (SVI) published by the Centers for Disease Control (CDC) and Agency for Toxic Substances and Disease Registry (ATSDR).

DRAFT

Figure 2.4 Wasco County Social Vulnerability Score



Source: Federal Emergency Management Agency National Risk Index Map (2024)

The CDC and ATSDR define Social Vulnerability as the "demographic and socioeconomic factors (such as poverty, lack of access to transportation, and crowded housing) that adversely affect communities that encounter hazards and other community-level stressors."[14] The CDC/ATSDR Social Vulnerability Index (SVI) "is a place-based index, database, and mapping application designed to identify and quantify communities experiencing social vulnerability."[15]

FEMA defines Social Vulnerability and Underserved Communities as:

Social vulnerability is understood as the potential for loss within an individual or social group, recognizing that some characteristics influence an individual's or group's ability to prepare, respond, cope or recover from an event. These characteristics can overlap within populations to create heightened vulnerability, which may be compounded by infrastructure deficiencies within communities and historic or existing discriminatory government policies.[16]

Underserved Communities refers to populations sharing a particular characteristic, as well as geographic communities that have been systematically denied a full opportunity to participate in aspects of economic, social and civic life. The barriers to opportunity and participation these communities face have been occurring throughout history and continue today.[17]

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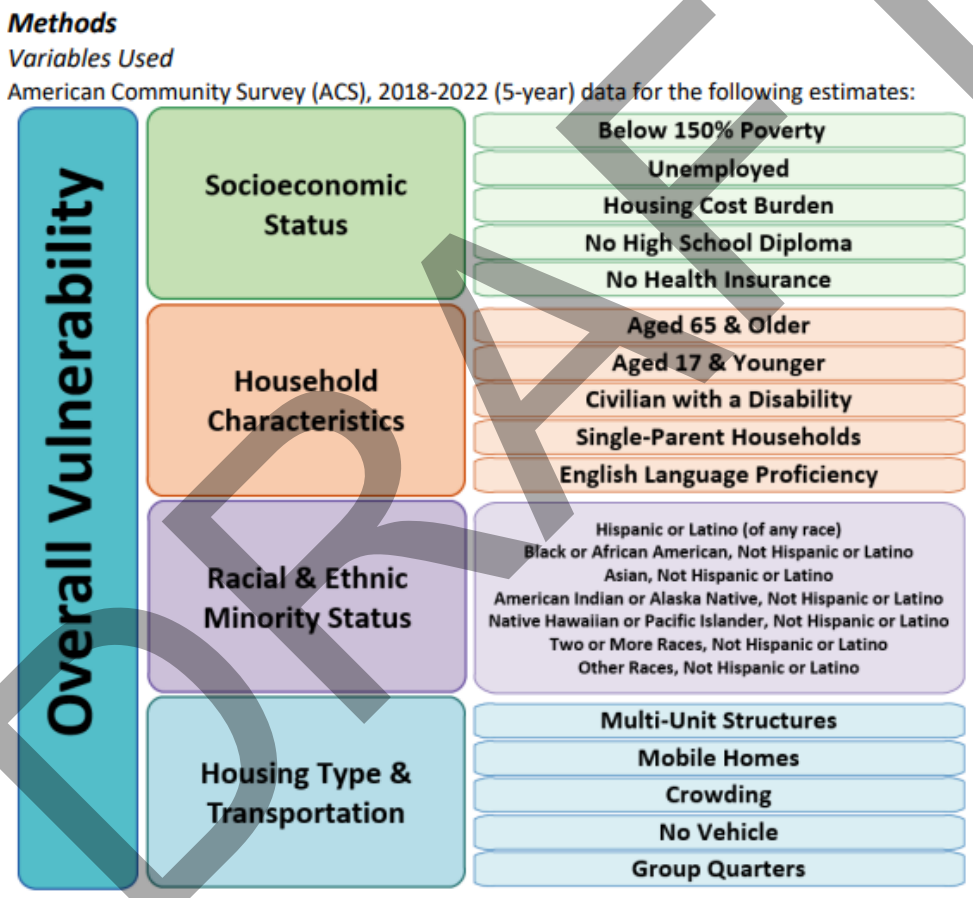
[14] Agency for Toxic Substances and Disease Registry. (2024, June 14). *CDC/ATSDR social vulnerability index (CDC/ATSDR SVI)*. Agency for Toxic Substances and Disease Registry. https://www.atsdr.cdc.gov/placeandhealth/svi/index.html.
[15] Ibid.
[16] Federal Emergency Management Agency. (2023, p. 73). *Local Mitigation Planning Policy Guide (*FP 206-21-0002). OMB Collection #1660-0062.
[17] Ibid.

DRAFT

FEMA's definition of Social Vulnerability differs slightly, but is still within the overall concept of the definition used by the CDC/ATSDR to calculate a community's Social Vulnerability Index, which is also used in FEMA's National Risk Index equation. Although a community's historical experience is considered in the planning process, the CDC/ATSDR SVI does not or cannot calculate non-quantitative experiences of systemic denial of full opportunities to participate in aspects of economic, social and civic life.

The CDC/ATSDR SVI Methodology uses 16 U.S. census variables from the 5-year American Community Survey (ACS) to identify communities that may need support before, during, or after disasters. As shown in Figure 2.4, the variables are grouped into four themes that cover four major areas of social vulnerability and then are combined into a single measure of overall social vulnerability.

Figure 2.5 CDC/ATSDR Social Vulnerability Index Variables



Source: Center for Disease Control/Agency for Toxic Substances and Disease Registry

FEMA's Social Vulnerability Score is the same as the CDC/ATSDR Social Vulnerability Index score; however, the CDC/ATSDR Social Vulnerability index provides individual scores for the four areas of vulnerability (Socioeconomic Status, Household Characteristics, Racial & Ethnic Minority Status, and Housing Type & Transportation). Table 2.6 provides the score and ranking for each of Wasco County's four areas of vulnerability.

DRAFT

Table 2.6 SVI & Area of Vulnerability Score

Total SVI Score	Area of Vulnerability	Score	Ranking
0.8937	Socioeconomic Status Score	0.7623	High
	Household Characteristics Score	0.7690	High
	Racial & Ethnic Minority Status Score	0.6402	Medium
	Housing Type & Transportation Score	0.9873	High

Source: Center for Disease Control/Agency for Toxic Substances and Disease Registry Social Vulnerability Index

Wasco County has always, and will continue to ensure that the cultural, racial, and economic status of the County is considered during the public planning process, and will always account for and incorporate our underserved communities. The County will also continue to make certain that information and opportunities to participate in the planning process are made to people with disabilities. These requirements have been taken into account throughout the planning process and in the development of the County's hazard goals and mitigation action items.

While the elimination of impacts from natural hazards is an impossibility, making certain that inclusion, diversity, equity, and accessibility are top considerations in Wasco County's planning process will significantly maximize mitigation of damage to people and property.

Community Vulnerability

Natural disasters occur as an interaction among three broad systems: natural environment (e.g., climate, rivers systems, geology, forest ecosystems, etc.), the built environment (e.g., cities, buildings, roads, utilities, etc.), and societal systems (e.g., cultural institutions, community organization, business climate, service provision, etc.). A natural disaster occurs when a hazard impacts the built environment, natural environment, or societal systems and creates adverse conditions within a community.

It is not always possible to predict exactly when natural disasters will occur or the extent to which they may affect the community. However, communities can minimize losses from disaster events through deliberate planning and mitigation, as well as by identifying distinct vulnerabilities.[18]

Populations

There are several factors that contribute to the overall vulnerability of the people who live in Wasco County. For example, population densities, non-English speaking populations, and growth rates are all factors that may impact a community's vulnerability to hazards. Several factors that are commonly considered variables in a community's collective vulnerability to disaster are listed below.

One characteristic of disasters is that they often exceed the ability of emergency response agencies to provide assistance promptly. In a major disaster, citizens maybe without general public or emergency assistance for at least three days, and might be without utilities, food and

[18] State of Oregon. (2020). *Oregon Natural Hazards Mitigation Plan*. State Interagency Hazard Mitigation Team.

DRAFT

water sources, or basic medical resources for several days. Disasters may also isolate individuals by damaging transportation routes. Not all people are able to respond to these conditions in the same way. Many people within identified vulnerable populations of Wasco County may have difficulty following official instructions and taking protective actions. For instance, someone who is developmentally disabled or deaf may not be able to hear or understand instructions on sanitation, evacuation routes, or shelter locations.

Vulnerable populations are those groups that possess specific characteristics that inhibit their ability to prepare for, respond to, or recover from a disaster. These characteristics include physical and developmental disabilities, mental illness, poverty, old age, or an inability to speak or understand English. These groups can be more heavily impacted because they may lack the necessary knowledge, skills, social support structures, or the mental and physical abilities necessary to take care of themselves. Historically, vulnerable populations present a special challenge to emergency managers and response agencies and they are more likely to be victims of a disaster.

Fortunately, many people that fall into one of these categories have families, friends, neighbors, and other caretakers that will be able to assist them. But many of them do not have adequate support and those who do may not be able to rely on it in a major event.

Non-English speaking and special cultural characteristics

According to 2020 Decennial Census, approximately 18.8% of the Wasco County population is identified as Hispanic or Latino in origin, which is 1.4% higher than was reported in 2016.[19] It should be noted that "Hispanic Origin" is considered an ethnicity, not a race, as Hispanics may be of any race. The US Census Bureau 2022 American Community Survey (ACS) 5-Year Estimates provides that 17.2% of the Wasco County population over the age of five speaks a language other than English at home.[20]

A lack of ability to speak or read the English language can present a challenge to emergency managers since instructions for self-protective action and general disaster information is usually provided only in English. The non-English speaking population might be uninformed unless they have assistance from friends or service providers who can provide instruction and information in the non-English language. In certain areas of Wasco County, it may be advisable for emergency managers and emergency response agencies to arrange for translation of instructions and information into different languages. This can include vital signage for evacuation routes or staging areas for evacuees who need public transportation.

Elderly

According to the 2022 ACS 5-Year estimates, persons 60 and older made up 28% of the total Wasco County population. This is an increase from the 26.8% ACS 5-year estimate in 2016.[21] Elderly populations have the potential to provide communities with an immense array of wisdom and experience in a wide variety of subject matter, and can help drive public participation and shape future hazard planning efforts. However, elderly populations can be extremely vulnerable to hazards due a wide variety of age related difficulties that includes the

[19] U.S. Census Bureau, Table P1: Race, 2020 Decennial Census.
[20] U.S. Census Bureau, Table S1601: Language Spoken at Home, 2022 American Community Survey 5-Year Estimates.
[21] U.S. Census Bureau, Table S0101: Age and Sex, 2022 American Community Survey 5-Year Estimates.

DRAFT

following: financial issues due to fixed incomes, or a decreased ability to financially adjust and recover from disaster; transportation issues due to the lack of an automobile or inability to drive; and mobility issues due to age related infirmities. An aging population can also negatively affect rural communities who depend primarily on volunteer emergency services such as fire or ambulance.

Transient Population

The transient population includes those who do not have a permanent residence in Wasco County. It is extremely difficult to obtain an accurate estimate of the houseless and/or transient population in Wasco County; however, Portland State University published its 2023 Oregon Statewide Homelessness Estimates that provides a Point-In-Time (PIT) count of homelessness in Wasco County on a single night in January. For the PIT count, the definition of homelessness was limited to "sheltered" (people living in an emergency shelter or some forms of transitional housing) or "unsheltered" ("a place not meant for human habitation such as a sidewalk, tent, car, etc.).[22] In 2023, Wasco County had a total homelessness count of 158 people, and had 70 shelter beds available, which was a shortfall of 88 shelter beds for the people counted. Table 2.7 provides additional racial, ethnic, gender and veteran status data for the 2023 Oregon Statewide Homelessness Estimates.

DRAFT

[22] Greene, J., Spurbeck, F. H., and Zapata, M. (2023). 2023 Oregon Statewide Homelessness Estimates. Portland State University Homelessness Research & Action Collaborative.

Table 2.7: Wasco County: 2023 Oregon Statewide Homelessness Estimates

Category	Count
Total Homelessness (Sheltered & Unsheltered)	158
Unsheltered by Race*	
American Indian, Alaska Native, or Indigenous	16
Black, African American, or African	1
White	78
Unsheltered Hispanic/Latina/E/O Only	
Hispanic/Latina/e/o	7
Non-Hispanic/Latina/e/o	88
Unsheltered Homelessness by Gender	
Female	36
Male	57
No Single Gender	1
Questioning	1
Transgender	1
Unsheltered Homelessness by Age	
<5	1
5–12	1
13–17	10
18–24	10
25–34	16
35–44	22
45–54	17
55–64	18
65+	1
Unsheltered Homelessness among Veterans	
Veteran	4
Non-veteran	80

*Races that had 0 count not shown

Source: 2023 Oregon Statewide Homelessness Estimates

DRAFT

Visitors/Travelers

Due to its proximity to the Columbia River and the cities, rivers and mountains of central Oregon, Wasco County is considered a major Northwest visitor destination. Travelers and visitors are particularly vulnerable to disasters, because they are usually unfamiliar with the hazards in the region and because they do not have the knowledge or the materials required to take care of themselves in a disaster. For example, a typical visitor or traveler may not know the best evacuation routes, or where to find shelters. A visitor might also not have their own supply of food, water, flashlights, radios, and other supplies that locals have to take care of themselves in a disaster. Finally, visitors or travelers usually do not have a local support structure of family, friends, and neighbors that locals can generally rely on.

Physically & Mentally Disabled

According to 2022 census estimates 4,838, or 18.5 %, of Wasco County's non-institutionalized citizens are living with a disability.[23] These disabilities may or may not be permanent. Table 2.7 describes the number of people throughout Wasco County with disability status or other physical difficulties.

Table 2.8: Wasco County Disability Characteristics

Disability	Number of People	Percent of Non-institutionalized Population*
Disability Status	4,838	18.50%
Hearing difficulty	1,897	7.20%
Vision difficulty	800	3.05%
Cognitive difficulty	2,123	8.10%
Ambulatory difficulty	2,547	9.72%
Self-care difficulty	1,005	3.80%
Independent living difficulty	1,767	6.70%

Source: US Census Bureau, 2022 American Community Survey 5-Year Estimates Developmentally Disabled

Sample data of people reporting a Hearing difficulty decreased by 0.11%, and Vision difficulty decreased by 9.09% from the 2016 to 2022 in the American Community Survey. However, every other reported disability increased. People reporting a Cognitive difficulty increased by 15.95%, Ambulatory difficulty increased by 10.93%, Self-care difficulty increased by 26.10%, and lastly, Independent living difficulty increased by 40.80%. The data provide that people suffering from physical and mental disabilities is on the rise in Wasco County. People with disabilities are likely to increase as the percentage of individuals over 60 rises. Similar to the elderly, disabled populations can be dependent upon fixed incomes, lack an automobile or be unable to drive, or have mobility issues.

According to the United States Census Bureau, a Cognitive difficulty is an issue due to "a physical, mental, or emotional problem, having difficulty remembering, concentrating, or making decisions (DREM)".[24] Oregon defines a "developmental disability" as a neurological condition that originates in and directly affects the brain, beginning before an individual is 22 years of age, and is a significant impairment in adaptive behavior.[25]

There is a wide variation in the vulnerability for persons with cognitive difficulties or those who are developmental disabled. Some developmentally disabled individuals may have strong support structures and a high level of care provided to them by friends, neighbors, and care

[23] U.S. Census Bureau, Table S1810: Disability Characteristics, 2022 American Community Survey 5-Year Estimates.
[24] United States Census Bureau (2021, November 21). How disability data are collected from the American Community Survey. Census.gov. https://www.census.gov/topics/health/disability/guidance/data-collection-acs.html
[25] OAR 411-320-0020

DRAFT

providers, though others may not. Some individuals may be largely self-reliant, and some may have additional disabilities in addition to their developmental disabilities.

Disaster conditions can aggravate the symptoms of those who suffer from mental illness who can be extremely sensitive to changes in their environment and living arrangements. There are case studies of this phenomenon from Clark County, Washington. During the Mt. St. Helens eruption disaster, several individuals incorporated the fall of ash into their delusional symptoms. There was a marked increase in the caseload for mental health crisis services at the Columbia River Mental Health Services. During the February 1996 floods, several mental health patients were hospitalized as a result of increased stress due to relocation, forgetting to take their medications when evacuated, and increased anxiety. Another important consideration is the ability of disaster conditions to cause mental illness. It is estimated that 10% of disaster victims can develop mental health problems, including depression and substance abuse.[26]

Low Income

Lacking sufficient financial resources during and after a disaster can be a great disadvantage. Households near or below the federal poverty guidelines can struggle to find permanent stick built housing. Solutions for higher priced stick-built neighborhoods can often be found in more affordable mobile home and recreational vehicle parks; however, these types of dwellings, especially older models, can be far less able to resist damage from flooding, windstorms, and severe weather. Low income households can also have the greatest difficulty recovering from a disaster due to the inability to pay for expenses associated with response and recovery (e.g., medical bills, insurance deductibles). According to the 2022 American Community Survey estimate, approximately 11.7% of the total population in Wasco County has income below the national poverty level, a decrease of 2.8% from 2016.

Analysis and estimates of vulnerable populations can be difficult due to data accuracy and acquisition. Similar to how a single hazard, (e.g., a volcano eruption) can cause secondary, and tertiary hazards (e.g., earthquakes and landslides), a single impact from a hazard can potentially increase a group's susceptibility to other hardships, driving that group into a vulnerable status. For example, a financially stable elderly neighborhood is significantly impacted by a natural disaster. Although the neighborhood was financially stable, many of the elderly (a vulnerable population in Wasco County) are on fixed incomes, some were underinsured due to home ownership, and many may struggle to reenter the workforce for additional income. The secondary or tertiary financial impacts of response and recovery efforts may drive a large number of affected households into financial hardship (e.g., low income), which can cascade into homelessness or even permanent or temporary mental illness. These situations are difficult to predict, but can certainly exponentially increase the number of vulnerable people within a community in a short amount of time.

Economy

Wasco County is highly susceptible to economic disturbance from natural hazards. A great deal of funding for County services, and a substantial amount of the region's income are derived from agriculture, tourism, and other sensitive industries which can be severely disrupted by

[26] 2012 Wasco County Natural Hazard Mitigation Plan

DRAFT

wildland-wildfire, extreme heat, and severe weather, all of which occur with a high likelihood of probability across the entire County.

The United States Department of Agriculture National Agricultural Statistics Service, Census of Agriculture County Profile for Wasco County, estimates that the market value of agricultural products sold (including Government payments) is $137,967,000. Estimated sales for fruits, nuts, and berries, many of which rely on irrigation and are susceptible to drought and extreme heat, are $83,382,000.[27]

Land Use and Development

To accommodate growth and development, communities engaged in mitigation planning should address infrastructure and service needs, specific engineering standards, and building codes. Eliminating or limiting development in hazard prone areas, such as but not limited to floodplains, can reduce vulnerability to hazards, and the potential loss of life, injury, and property damage. Communities in the process of developing land for housing and industry must ensure that land use and protection goals are being met to prevent future risks. However, according to the 2020 Oregon Natural Hazard Mitigation Plan, Wasco County has experienced "very little loss in the area of private land in forest, agricultural, and range uses."[28]

Southern Wasco County remains steeped in its agricultural and recreational heritage, and land use is dominated by those processes. In northern Wasco County, industry, commercial, and residential activities are concentrated within the City of The Dalles. State law requires that cities and the County jointly manage Urban Growth Areas, delineated by a city's Urban Growth Boundary (UGB) which identifies lands needed to meet population and economic demands for growth within a 20-year period.[29]

The 2021 DOGAMI *Risk Report* estimated the dollar value of structures at risk of certain hazards throughout Wasco County with Table 2.8. Further information about specific estimates of buildings and their value at risk of damage or loss from each individual hazard type can be found in Appendix tables of the 2021 DOGAMI *Risk Report* (http://www.oregongeology.org/pubs/index.htm).

DRAFT

[27] The United States Department of Agriculture National Agricultural Statistics Service, Census of Agriculture County Profile for Wasco County. (n.d.-b). https://www.nass.usda.gov/Publications/AgCensus/2022/Online_Resources/County_Profiles/Oregon/cp41065.pdf

[28] State of Oregon. (2020). *Oregon Natural Hazards Mitigation Plan*. Page 997. State Interagency Hazard Mitigation Team.

[29] 2040 Wasco County Comprehensive Land Use Plan

Table 2.9: DOGAMI Countywide Risk Assessment

Selected Countywide Results	
Total buildings: 18,481	
Total estimated building value: $3.9 billion	
2,500-year Probabilistic Magnitude 7.0 Earthquake Red-tagged buildings[a] : 1,104 Yellow-tagged buildings[b] : 2,118 Loss estimate: $870 million	**100-year Flood Scenario** Number of buildings damaged: 560 Loss estimate: $20 million
Landslide (High and Very High-Susceptibility) Number of buildings exposed: 3,013 Exposed building value: $499 million	**Wildfire Results (High Risk):** Number of buildings exposed: 4,057 Exposed building value: $694 million
[a] Red-tagged buildings are considered uninhabitable due to complete damage. [b] Yellow-tagged buildings are considered limited habitability due to extensive damage.	

Source: DOGAMI *Risk Report*, 2021

Environment

With four distinct seasons, a diverse terrain and its proximity to the Columbia Gorge, Wasco County historically has had to deal with habitual wildfires, extreme heat, drought, severe storms, and occasionally, significant floods. By identifying potential hazards, temperature and precipitation patterns, along with natural capitals such as key river systems, Wasco County can focus on key areas to better prepare, mitigate, and increase the resiliency of local communities.[30] Specific and general County-wide environmental concerns include impacts on riparian zones, forested areas, cropland, ground water levels, the Port superfund site, and The Dalles creosote plant, among others.

Critical Facilities and Infrastructure

Transportation networks, systems for power transmission, and critical facilities such as hospitals and police stations are all vital to the functioning of a County. Critical Facilities are defined as "all man-made structures or other improvements which because of their function, size, service area, or uniqueness have the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if they are destroyed, damaged, or if their services are repeatedly interrupted."[31] The Department of Homeland Security defines

[30] Wasco County NHMP Community Profile, 2024

[31] Department of Regional Development and Environment Executive Secretariat for Economic and Social Affairs Organization of American States With support from the Office of Foreign Disaster Assistance United

DRAFT

"Critical Infrastructure" as "those assets, systems, networks, and functions—physical or virtual—so vital to the United States that their incapacitation or destruction would have a debilitating impact on security, national economic security, public health or safety, or any combination of those matters".[32]

Due to the fundamental role that infrastructure plays both pre- and post-disaster, and how infrastructure is interconnected and interdependent with employment sectors, workforce participants, financial and natural resource; it deserves special attention in the context of creating more resilient communities.[33] Specific and general County-wide critical facilities and infrastructure and services are listed in Table 2.9 below. Additional information about critical facilities and infrastructure can be found in the 2021 DOGAMI *Risk Report*.

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States Agency for International Development Washington, D.C. *Primer on Natural Hazard Management in Integrated Regional Development Planning* (1991). Chapter 7 Critical Facilities Mapping. https://www.oas.org/dsd/publications/unit/oea66e/ch07.htm#chapter%207%20%20%20critical%20facilities%20mapping.

[32] Department of Homeland Security Cybersecurity & Infrastructure Security Agency, Critical Infrastructure and Key Resources Support Annex. (January 2008). Page CIKR-2. https://www.fema.gov/pdf/emergency/nrf/nrf-support-cikr.pdf.

[33] State of Oregon. (2020). *Oregon Natural Hazards Mitigation Plan*. Page 971. State Interagency Hazard Mitigation Team.

Table 2.10: Wasco County Critical Facilities and Infrastructure

Name	Type
Antelope Community Center	Civic
Antelope Fire Department	Fire Station
Ashwood Radio Site	Public Safety Radio
Backup Public Safety Answer Point	PSAP
Bakeoven Radio Site	Public Safety Radio
Big Eddy Substation	Utility
Celilo Converter Station	Utility
Chenowith Elementary School	School
Chenowith Water PUD	Utility
City waste water treatment plant	Waste Water Treatment
Clear Lake Radio Site	Public Safety Radio
Colonel Wright Elementary School	School
Dallesport Airport	Airport
Dry Hollow Elementary School	School
Dufur City Hall	Fire Station/Civic
Dufur High School	School
Dufur PUD station	Utility
Dufur Reservoir	Water supply
Fort Dalles Readiness Center	Gov Facility
Fresenius Kidney Center	Medical Facility
Fuel Site 1	Fuel Site
Fuel Site 2	Fuel Site

Name	Type
Mosier City Hall	Civic
Mosier Community School	School
Mosier Fire Department	Fire Station
NORCOR	Jail
North Central Public Health District	Public Health
Port of The Dalles	Port
Seufert Hill Radio Site	Public Safety Radio
Shaniko Fire Department	Fire Station
Shaniko Historic City Hall	Civic
Sorosis Hill Radio Site	Public Safety Radio
South Wasco County Ambulance Service	Ambulance
South Wasco County High School	School
Stacker Radio Site	Public Safety Radio
The Dalles Bridge	Transportation
The Dalles City Hall	City Hall
The Dalles Dam	Dam
The Dalles High School	School
The Dalles Middle School	School
The Dalles Police Department	Police Station
The Dalles Public Works	Civic/Utility
Tygh Valley Fire Departmnet	Fire Station
Tygh Valley School/Community Center	School

DRAFT

Fuel Site 3	Fuel Site
Fuel Site 4	Fuel Site
Fuel Site 5	Fuel Site
Highway 197	Transportation
I-84	Transportation
Juniper Flat Fire Department	Fire Station
Maupin City Hall	Civic
Maupin Fire Department	Fire Station
Maupin Grade School	School
Maupin Sewer Plant	Waste Water Treatment
Mid Columbia Fire and Rescue Station 1	Fire Station
Mid Columbia Fire and Rescue Station 2	Fire Station
Mid-Columbia Medical Center	Hospital

Union Pacific Railroad	Transportation
Wahtonka Campus	School
Wamic Community Center	Civic
Wamic Rural Fire Department	Fire Station
Wasco Count Emergency Management	EOC
Wasco County Courthouse	Courthouse
Wasco County Central Dispatch	911 Center & Dispatch
Wasco County Fairgrounds	Civic
Wasco County Public Works	Public Works (Roads)
Wasco County Sheriff's Office	Police Station
Washington Family Ranch Airstrip	Airstrip
Washington Family Ranch Fire Station	Fire Station
Wicks Water Treatment Plant	Utility

Source: 2024 Wasco County Steering Committee, February 6, 2024 Meeting

The 2021 DOGAMI *Risk Report* estimated dollar values of various critical facilities across Wasco County. The Wasco County NHMP list of critical facilities includes all of those identified in the DOGAMI report, as well as several additional structures identified by the Steering Committee or community members. Table 2.9 demonstrates the distribution of values across the County.

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Table 2.11: Waco County Critical Facility Values

Community	Hospital & Clinic		School		Police/Fire		Emergency Services		Military		Other*		Total	
	Count	Value ($)	Count	Value ($)	Count	Value ($)	Count	Value ($)	Count	Value ($)	Count	Value ($)	Count	Value ($)
(all dollar amounts in thousands)														
Unincorp. County (rural)	0	0	0	0	1	127	0	0	0	0	5	42,691	6	42,819
Chenoweth	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pine Hollow	0	0	0	0	1	1,361	0	0	0	0	0	0	1	1,361
Tygh Valley	0	0	0	0	1	452	0	0	0	0	0	0	1	452
Warm Springs Reservation	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Unincorp. County	0	0	0	0	4	2,068	0	0	0	0	6	42,907	10	44,975
Antelope	0	0	0	0	1	153	0	0	0	0	1	747	2	899
Dufur	0	0	1	20,133	0	0	0	0	0	0	1	529	2	20,662
Maupin	0	0	2	12,798	1	1,215	0	0	0	0	2	383	5	14,396
Mosier	0	0	0	0	1	220	0	0	0	0	1	79	2	299
Shaniko	0	0	0	0	1	128	0	0	0	0	1	216	2	344
The Dalles	1	26,465	6	79,377	3	9,789	2	4,394	1	6,533	8	29,440	21	155,997
Total Wasco Co.	1	26,465	9	112,308	10	13,444	2	4,394	1	6,533	19	74,085	42	237,228

Source: DOGAMI *Risk Report*, 2021

National Flood Insurance Program (NFIP)

Wasco County's Flood Insurance Rate Maps are current as of September 24, 1984, making them some of the oldest FIRMs in the state. However, in 2023, FEMA began working with the state of Oregon, Wasco County, the cities of The Dalles, Dufur, Maupin and Mosier and the Town of Shaniko to use new data and technology to update the Flood Insurance Rate Map (FIRM) within Wasco County. The new map will better represent the risk of flooding, and help communities better understand their flood risks. In 2023, FEMA began working with the state of Oregon, Wasco County, the cities of The Dalles, Dufur, Maupin and Mosier and the Town of Shaniko to use new data and technology to update the Flood Insurance Rate Map (FIRM) within Wasco County. The new map will better represent the risk of flooding, and help communities better understand their flood risks. On July 15, 2024, FEMA sent a letter to Wasco County requiring the County change its flood hazard regulations to conform to requirements from the Federal Endangered Species Act (ESA). Wasco County is on track to update its Flood Hazard Overlay Zone in accordance with FEMA's demand. The updated Flood Hazard Overlay Zone code conforms to model Flood Hazard Overlay zoning criteria in order to help the public make informed decisions about how to protect against damage and loss from flood hazards, and meets the required ESA protections. The overlay zone is scheduled for update in December 2024. The updated Flood Insurance Rate Map is scheduled to be adopted by Wasco County in 2026.

The FEMA Region 10 Regional Flood Insurance Liaison provided pertinent updated data pertaining to the National Flood Insurance Program (NFIP) for Wasco County. Table 2.10 provides that as of January 2024, there were a total of 59 NFIP policies in force with a total coverage value of nearly $15 million. There have been a total of 15 NFIP claims including one in Dufur, five in The Dalles, and nine across Wasco County in unincorporated areas.

DRAFT

Table 2.12: NFIP Summary Table

Geography		Current Policies											
State	Community	Policy in Force Count			Contracts in Force Count			Total Coverage			Total Annual Payment		
		WYO*	Direct	Total	WYO	Direct	Total	WYO	Direct	Total	WYO	Direct	Total
Total		**43**	**16**	**59**	**43**	**16**	**59**	**$11,634,000**	**$2,614,000**	**$14,248,000**	**$45,645**	**$14,973**	**$60,618**
OREGON	DUFUR, CITY OF [410231]	6	0	**6**	6	0	**6**	$1,303,000	$0	**$1,303,000**	$5,186	$0	**$5,186**
OREGON	MAUPIN, CITY OF [410233]	2	0	**2**	2	0	**2**	$560,000	$0	**$560,000**	$1,800	$0	**$1,800**
OREGON	THE DALLES, CITY OF [410237]	12	2	**14**	12	2	**14**	$3,824,000	$700,000	**$4,524,000**	$15,876	$1,621	**$17,497**
OREGON	WASCO COUNTY * [410229]	23	14	**37**	23	14	**37**	$5,947,000	$1,914,000	**$7,861,000**	$22,783	$13,352	**$36,135**

Geography					Historical Claims					
State	Community	Current Actual Premium			Total Claim Counts			Net Dollars Paid		
		WYO	Direct	Total	WYO	Direct	Total	WYO	Direct	Total
Total		**$31,482**	**$10,187**	**$41,669**	**13**	**2**	**15**	**$235,933**	**$44,003**	**$279,937**
OREGON	DUFUR, CITY OF [410231]	$4,029	$0	**$4,029**	1	0	**1**	$3,139	$0	**$3,139**
OREGON	MAUPIN, CITY OF [410233]	$1,213	$0	**$1,213**	0	0	**0**	$0	$0	**$0**
OREGON	THE DALLES, CITY OF [410237]	$11,387	$1,251	**$12,638**	4	1	**5**	$35,847	$0	**$35,847**
OREGON	WASCO COUNTY * [410229]	$14,853	$8,936	**$23,789**	8	1	**9**	$196,947	$44,003	**$240,950**

* Write-Your-Own (WYO)

Source: FEMA Region 10 Regional Flood Insurance Liaison, Policy and Claims by Geography January 2024

The FEMA Regional Flood Insurance Liaison also provided that Wasco County and its incorporated cities have zero repetitive flood loss properties as shown in Table 2.11. The date of Wasco County's last Community Assistance Visit was August 2005. The City of Mosier's last opening Community Assistance Visit was May 1994, and the City of Maupin's was April 1985. Neither Wasco County nor its incorporated cities are currently members of the Community Rating System. "The National Flood Insurance Program's (NFIP) Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements."[35] Participation in the program typically results in discounted flood insurance premium rates that reflect the reduced flood risk from community actions to meet CRS goals.

DRAFT

[35] Federal Emergency Management Agency, National Flood Insurance Program, Community Rating System, http://www.fema.gov/business/nfip/crs.shtm

Table 2.13: NFIP Repetitive Loss and Severe Repetitive Loss Summary

Jurisdiction	# SRL Properties-Validated	# SRL Properties-Pending	# RL Properties
Wasco County	0	0	0
Antelope	0	0	0
Dufur	0	0	0
Maupin	0	0	0
Mosier	0	0	0
Shaniko	0	0	0
The Dalles	0	0	0
TOTALS	**0**	**0**	**0**

Source: FEMA Region 10 Regional Flood Insurance Liaison, January 26, 2024 email.

Climate Change

FEMA's 2023 Local Mitigation Planning Policy Guide cites the U.S. Global Change Research Program, 4th National Climate Assessment, to define Climate Change as "changes in average weather conditions that persist over multiple decades or longer. Climate change encompasses both increases and decreases in temperature, as well as shifts in precipitation, changing risk of certain types of severe weather events, and changes to other features of the climate system." (Citing U.S. Global Change Research Program, 4th National Climate Assessment).[36] The U.S. Global Change Research Program, 4th National Climate Assessment defines climate adaptation as "actions taken at the individual, local, regional, and national levels to reduce risks from even today's changed climate conditions and to prepare for impacts from additional changes projected for the future."[37] Where feasible, Wasco County is preparing for climate change by including climate adaptation in the 2024 hazards mitigation planning process, goals, and action items.

In 2023, The City of The Dalles and Wasco County cooperated in a joint ad hoc Climate Resiliency Committee to produce a vision document titled: Developing Climate Resilience in Wasco County.[38] The joint effort provided relevant data pertaining to greenhouse gas (GHG) emissions, fossil fuel use, the built environment, and long and near term affects from climate change.

While the effort produced no new information pertaining to **g**reenhouse gas (GHG) emissions**, f**ossil fuel use**,** the built environment, or long and near term affects from climate change, the document proposed climate resiliency policies, and provides resources that have been useful in the development of this Plan, its goals and action items.

Since 2018, the Wasco County Natural Hazards Mitigation Plan Steering Committee has conducted thorough examinations of data pertaining to the top three hazards that affect the

[36] Federal Emergency Management Agency. (2023, p. 70). *Local Mitigation Planning Policy Guide (*FP 206-21-0002). OMB Collection #1660-0062.
[37] U.S. Global Change Research Program, Fourth National Climate Assessment, Chapter 28: Reducing Risks through Adaptation Actions, 2018; Federal Emergency Management Agency. (2023, p. 6). *Local Mitigation Planning Policy Guide (*FP 206-21-0002). OMB Collection #1660-0062.
[38] The City of The Dalles - Wasco County Joint Ad Hoc Climate Resiliency Committee. (2023). *Developing Climate Resilience in Wasco County*.

DRAFT

County on an annual basis. Based on the analysis, the Steering Committee has and continues to commit current and future efforts to understanding how climate change will increase the frequency and severity of those hazards, and prepare mitigation strategies to reduce their impact on people and property. In 2024, the Steering Committee believes that hazards where climate change will be most impactful include wildland-wildfire, extreme heat, and drought.

Wildfire data are numerous, and Wasco County's 2024 Community Wildfire Protection Plan delivers a great deal of relevant data and includes action items that will help further address the increase in frequency and severity of wildland-wildfire caused by climate change. Some of these actions include the assignment of a County Wildfire Coordinator to represent Wasco County in matters pertaining the implementation of the CWPP, Update County Fire Safety Standards, and to adopt the WUI Building Code and Standards (home hardening and defensible space).

Additionally, Wasco County has adopted Extreme Heat as an individual hazard. Emphasis on this specific natural hazard will allow the public to devote resources to mitigation efforts to protect life and property from the effects of longer periods of extreme heat caused by climate change. Some of these efforts include cooling centers for vulnerable populations (e.g., houseless and elderly) as well as other people who depend on outdoor employment (e.g., migrant workers). Other efforts can include studies to gain a better understanding of how Wasco County can become more resilient to economic and social impacts caused by extreme heat. Data collected from these studies can be linked to other hazards such as drought and wildland-wildfire.

Public Outreach and Input in the Planning Process

During the November 13, 2023 NHMP update kickoff meeting, the Steering Committee created an outreach subcommittee to develop a public outreach plan in order to deliver and obtain relevant natural hazards mitigation information from citizens during the 2024 update.

The Outreach Subcommittee met on three occasions and developed an outreach plan to maximize public involvement in the NHMP planning process. The subcommittee's members represented the County and the incorporated communities of The Dalles, Maupin, Mosier, and Dufur.

The outreach plan describes available advertising & marketing mediums, outreach events, and available materials and resources, and lists partners/stakeholders. The plan describes the primary communication strategy, which includes an online survey and a culminating public outreach event titled "Disaster Movie Marathon". The Wasco County Public Information Officer's participation in the Outreach Subcommittee was a vital component in the development of the online survey as well as organizing and advertising the Disaster Movie Marathon public outreach event.

The online survey was launched on February 9, 2024, and by August 12, 2024, had 639 respondents. Staff incentivized participation through a raffle and $10.00 gift cards for the first 75 participants. The Disaster Movie Marathon was held on March 13, 2024 at the Columbia Cinema in The Dalles. The event was an all-day (eight-hour) movie marathon event that premiered several disaster movies and allowed staff to talk with the public about the NHMP

DRAFT

update. The event also created for survey participation and conversational feedback, and was an overall success with at least 100+ participants.

Survey data are slightly skewed due to many respondents who were clearly not Wasco County residents, and appear to have taken the survey only to obtain the incentives (gift card or raffle prizes). However, the useable data provides that Wasco County residents generally rank Wildland-Wildfire, Flood, and Earthquake as their top three hazards. The survey also obtained many proposed action items that will be helpful in development of mitigation efforts throughout the County. Demographic data was also obtained that helped confirm Wasco County's vulnerable populations. Survey data also illustrated that many citizens appear to have a disaster preparedness plan and believe they are generally prepared for a natural disaster. The outreach plan, meeting minutes, survey questions and results, and photographs and information from the Disaster Movie Marathon community event are provided in Volume 4, Appendix B.

Hazard and Vulnerability: Definitions

Risk: for the purpose of hazard mitigation planning, is the potential for damage or loss created by the interaction of natural hazards with assets, such as buildings, infrastructure, or natural and cultural resources.

Hazard Characterization: determining hazard causes and characteristics; documenting historic impacts; and identifying the future probability and intensity of occurrence.

Assessing Vulnerability: inventorying and providing a description of which assets, including structures, systems, populations and other assets as defined by the community, within locations identified to be hazard-prone, are at risk from the effects of the identified hazard(s).

Combining the hazard characterization with the vulnerability assessment provides an understanding of the risk of each hazard to a community, region, or the state as a whole[39].

Natural Hazard: a source of harm or difficulty created by a meteorological, environmental, or geological event.

Probability: the likelihood of the hazard occurring or reoccurring. It may be defined in historical frequencies, statistical probabilities, hazard probability maps and/or general descriptors (e.g., unlikely, likely, highly likely). If general descriptors are used, they must be quantified or defined in the plan. For example, "highly likely" could be defined as "100% chance of occurrence next year" or "one event every year."

Impacts: are the consequences or effects of each hazard on the participant's assets identified in the vulnerability assessment. For example, impacts could be described by referencing historical disaster damages with an estimate of potential future losses (such as percentage of damage vs. total exposure).

[39] NHMP info sheet, DLCD, July 2017

DRAFT

<u>Extent:</u> is defined as the range of anticipated intensities of the identified hazards. The information must relate back to each of the plan participants or the planning area, depending on the hazard. Extent is most commonly expressed using various scientific scales. [40]

In this plan, Hazard Probability is considered to be the likelihood of future natural hazard events within a specified period of time. For the purposes of this plan, the County utilized the Oregon Emergency Management Hazard Analysis methodology which includes four categories of assessment – vulnerability, probability, history, and maximum threat.

Vulnerability is a measure of the exposure of the built environment to hazards. The exposure of community assets to hazards is critical in the assessment of the impact the community faces from each hazard. Identifying the facilities and infrastructure at risk from various hazards can assist the County in prioritizing resources for mitigation, and can assist in directing damage assessment efforts after a hazard event has occurred. The exposure of County assets to each hazard and potential implications are explained in each hazard section. Vulnerability is the percentage of population and property likely to be affected under an "average" occurrence of the hazard.

Hazard and Vulnerability: Risk Assessment

The 2024 NHMP Update Steering Committee performed a Risk Assessment. The methodology for this **hazard analysis** was first developed by FEMA in 1983. It was gradually refined by the Oregon Military Department, Office of Emergency Management (OEM) and shared with local jurisdictions across Oregon. Although nearly every jurisdiction in Oregon uses this process, the range of values is relative only within the individual jurisdiction; unless two or more jurisdictions conduct their analyses at the same time and utilize the same criteria in determining the values to apply. It is not meant to compare one jurisdiction to another. These calculations and hazard analysis should not be applied to other jurisdictions without familiarization with the process applied.

The methodology produces scores that range from 24 (lowest possible) to 240 (highest possible), one order of magnitude from lowest to highest. Vulnerability and probability are the two key components of the methodology. Vulnerability examines both typical and maximum credible events. Probability endeavors to reflect how physical changes in the jurisdiction and scientific research modify the historical record for each hazard. Vulnerability accounts for approximately 60% of the total score, and probability accounts for approximately 40%.

This particular hazard analysis is an early step in determining risk – the potential for harm – facing a community. When complete, it provides a table of relative risks to focus planning priorities on those hazards most likely to occur and cause the most damage. This analysis, therefore, is constructed to:

- Establish priorities for planning, capability development, and hazard mitigation,
- Identify needs for hazard mitigation measures,
- Educate the public as well as public officials about hazards and vulnerabilities, and

[40] Federal Emergency Management Agency. (2023). *Local Mitigation Planning Policy Guide (*FP 206-21-0002). OMB Collection #1660-0062; Federal Emergency Management Agency. (2011). *Local Mitigation Plan Review Guide*.

DRAFT

- Make informed judgments about potential risks.

Wasco County's Hazard Analysis was last completed on July 25, 2017. This current Hazard Analysis was completed by the NHMP Steering Committee on April 15, 2024, to update the 2017 analysis, and reorder the priorities if necessary.

The following four categories were examined and ranked by the Steering Committee for each of Wasco County's seven identified hazards (weights were provided by the OEM methodology):

History *(weight factor (WF): 2)* is the record of previous occurrences requiring a response.

Low:	0-1 event in the past 10 years
Medium:	2-3 events in the past 10 years
High:	4+ events in the past 10 years

Vulnerability (WF: 5) is a measure of the percentage of the population and property likely to be affected during an occurrence of an incident.

Low:	<1% affected
Medium:	1 – 10% affected
High:	>10% affected

Maximum Threat (WF: 10) is a measure of the highest percentage of the population or property which could be impacted under a worst-case scenario.

Low:	<5% affected
Medium:	5 – 25% affected
High:	>25% affected

Probability (WF: 7) is a measure of the likelihood of a future event occurring within a specified period of time.

Low:	more than 10 years between events
Medium:	from 5 to 10 years between events
High:	likely within the next 5 years

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Table 2.14: Risk Assessment Process

HAZARD	HISTORY WF = 2		VULNERABILITY WF = 5		MAX THREAT WF = 10		PROBABILITY WF = 7		RISK SCORE
Wildland-Wildfire	2 x	**10**	5 x	**9**	10 x	**10**	7 x	**10**	**235**
Earthquake	2 x	**3**	5 x	**4**	10 x	**10**	7 x	**4**	**154**
Flood	2 x	**8**	5 x	**4**	10 x	**9**	7 x	**8**	**182**
Landslide	2 x	**2**	5 x	**2**	10 x	**7**	7 x	**4**	**112**
Extreme Heat	2 x	**10**	5 x	**8**	10 x	**10**	7 x	**10**	**230**
Volcano	2 x	**1**	5 x	**8**	10 x	**10**	7 x	**1**	**143**
Drought	2 x	**10**	5 x	**9**	10 x	**9**	7 x	**10**	**225**
Severe Weather	2 x	**10**	5 x	**6**	10 x	**9**	7 x	**10**	**210**

Source: NHMP Steering Committee Meetings, April 24, 2024

Hazard and Vulnerability: Final Determination

The Steering Committee discussed and assigned values of 1-10 (low: 0 to 3, medium: 4 to 7, high: 8 to 10) to each category for each hazard, calculated the weight factor for each thus assigning a total score to each hazard (Table 2.12, Risk Assessment Process). These scores generated conversation and analysis of the final hazard ranking. Using feedback from the public outreach survey and the "Disaster Movie Marathon" event, the Steering Committee met on April 15, 2024 and examined Wasco County's community profile and then conducted the hazard analysis, which included scrutinizing the history and probability of the selected hazards, and the vulnerability and maximum threat to Wasco County from those hazards. This assessment was used to inform the Steering Committee's decision on the final ranking of hazards in Wasco County. This exercise demonstrated that there is a high concern in the County for wildland-wildfire, extreme heat, and drought, all of which can be interrelated and help cause or exacerbate the damaging effects of each hazard. Additionally, severe weather was close in ranking to the top three hazards due to its frequency (history) and severity (probability and maximum threat). The final ranking of hazard risk is provided below in Table 2.13, 2024 Risk Ranking.

DRAFT

Table 2.15: 2024 Risk Ranking

Hazard	Risk Score	2024 Risk Ranking	Risk Level
Wildland-Wildfire	235	**1**	High
Extreme Heat	230	**2**	High
Drought	225	**3**	High
Severe Weather (Storm/Winter Weather)	210	**4**	Medium
Flood	182	**5**	Medium
Earthquake	154	**6**	Low
Volcano	143	**7**	Low
Landslide	112	**8**	Low

Source: NHMP Steering Committee Meetings, April 24, 2024

DRAFT

January 9, 2020 email from Larry G. Mastin, Ph.D. Physical Volcanologist for the United States Geological Survey.

Daniel Dougherty <danield@co.wasco.or.us>

Fwd: [EXTERNAL] Mount Hood Ashfall Scenarios for Wasco County

1 message

Sheridan McClellan <sheridanm@co.wasco.or.us> Wed, Jan 5, 2022 at 1:01 PM
To: Scott Hege <scotth@co.wasco.or.us>
Cc: Kelly Howsley - Glover <kellyg@co.wasco.or.us>, Tycho Granville <tychog@co.wasco.or.us>, Daniel Dougherty <danield@co.wasco.or.us>

Commissioner Hege,

The email you sent me about Mount Hood caused me to remember that I was looking into a possible Mount Hood eruption when I first got here. Please see below email and attachments for detail. Tycho might be able to do something with the files. the email itself has a summary of the model that was run on Ash fall.

v/r

Sheridan

Sheridan McClellan | *Emergency Management Services Manager*
SHERIFF'S OFFICE

sheridanm@co.wasco.or.us | www.co.wasco.or.us
541-506-2790 | Fax 541-506-2791
511 Washington St. Suite 102 | The Dalles, OR 97058

---------- Forwarded message ---------
From: **Mastin, Larry G** <lgmastin@usgs.gov>
Date: Thu, Jan 9, 2020 at 4:00 PM
Subject: Re: [EXTERNAL] Mount Hood Ashfall Scenarios for Wasco County
To: Marcus Austin - NOAA Federal <marcus.austin@noaa.gov>
Cc: Moran, Seth C <smoran@usgs.gov>, Driedger, Carolyn L <driedger@usgs.gov>, Sheridan McClellan <sheridanm@co.wasco.or.us>

Dear Marc and Sheridan,

December was busy and I just finally got around to doing some Ash3d runs that you might be able to use for a tabletop exercise. At the Dalles, Mount St. Helens is a bigger threat than Mount Hood, because MSH erupts more frequently, and produces bigger eruptions. The only eruptions at Mount Hood in the past 10,000 years have been lave domes, and the only ash deposits our geologists appear to have come from ash clouds that were produced when the lava domes broke apart and cascaded down the south side of the volcano.

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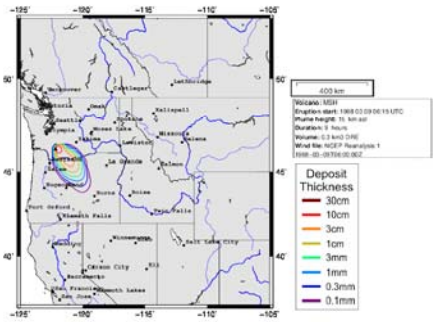
So, I've done 1,000 simulations of a Mount St. Helens eruption, of the size that occurred on May 18, 1980, randomly sampling from wind fields in the historical record. Of those thousand, the maximum ash thickness at the Dalles is about 5 cm (compacted). Here's a map of that run:



For that simulation, the ash ash cloud arrived at the Dalles about 1.05 hours after the eruption start; ash started falling at ground level 2.75 hours after, and fell for >13 hours. New-fallen ash is fluffier than compacted ash, and might be 10-15 cm or more thick. the attached zip file (Run0694.zip) contains additional model output.

These thicknesses are comparable to those in Yakima or Ritzville in 1980. There are plenty of descriptions of problems experienced in 1980 and how they were dealt with.

Among the 1,000 simulations, about 60% deposited no ash at the Dalles, because of wind conditions. Below is a plot of probability versus ash thickness at the Dalles, based on those 1,000 simulations.

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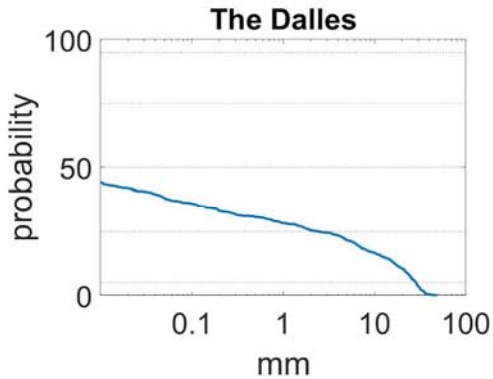

Zip files containing output from an 3 runs are also attached. The output includes Google Earth files of the deposit, of airports impacted, of arrival times, and a table of arrival times at airports in the region.

I'd be happy to discuss these results if you're going to use them for a tabletop exercise. Or to work with you to plan.

Sincerely,

Larry Mastin

From: Mastin, Larry G <lgmastin@usgs.gov>
Sent: Friday, November 22, 2019 2:40 PM
To: Marcus Austin - NOAA Federal <marcus.austin@noaa.gov>
Cc: Moran, Seth C <smoran@usgs.gov>; Driedger, Carolyn L <driedger@usgs.gov>; Sheridan McClellan <sheridanm@co.wasco.or.us>
Subject: Re: [EXTERNAL] Mount Hood Ashfall Scenarios for Wasco County

Dear Marc (and Sheridan)

I'd be happy to work with you on this. Mount Hood isn't a very big ash producer. But I could set up a bunch of simulations, each running within some historical wind field. If Sheridan is thinking of doing an exercise, we could pick one simulation that puts ash in the area you're concerned about.

The online interface makes running simulations pretty easy (at least I think so). But for planning scenarios, it's better to do a large number of simulations and find one that will impact the area you're concerned about. I would need to do that at the command line.

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Maybe we can talk next Monday or Tuesday, or the following week.

Larry

On Thu, Nov 21, 2019 at 10:48 AM Marcus Austin - NOAA Federal <marcus.austin@noaa.gov> wrote:

Seth, Carolyn and Larry,

This is Marc at the National Weather Service in Pendleton, OR. I've recently gotten a request to assist one of our county emergency managers in developing a hazardous response and mitigation plan for volcanic ash. Sheridan McClellan is the new emergency manager for Wasco county. Being so close to Mount Hood, he was curious as to whether we (NWS/USGS) might be able to provide 4 eruption/release plumes and ash accumulation maps so that all potential scenarios can be accounted for. I'm copying him and the message he relayed to me below. I understand we (NWS) can access the Ash3D program, but since he's referencing actual eruptions, I thought it might be helpful to bring your expertise into the conversation. Thanks!

Message from Sheridan:

Good morning,

thanks for your email. I am looking at a Worst Case Scenario where the top blows of Mount Hood and spews Ash, similar to Mount St. Helens. If possible I would like to have 4 plume models, 1 from each side of the mountain, east, west, north, south (since volcanoes hardly ever blow the top, it's usually at the weakest links. near the sides.

Is it possible to request these plume models? If there is a cost associated, then please hold and I will look into funding.

thanks,

--

Marc Austin
Warning Coordination Meteorologist
National Weather Service Pendleton, OR
(541) 276-7832

--

U.S. Geological Survey
David A. Johnston Cascades Volcano Observatory
1300 SE Cardinal Court, Bldg. 10, Suite 100
Vancouver, WA 98683 USA
https://www.usgs.gov/staff-profiles/larry-mastin
ORCID 0000-0002-4795-1992
tel. (360) 993-8925
fax (360) 993-8980

5 attachments

Run00005.zip
215K

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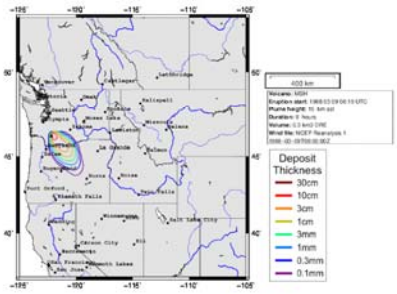

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Section 3: Mitigation Strategy

Section 3 of the Natural Hazard Mitigation Plan (NHMP) addresses 44 CFR 201.6(c)(3) – Mitigation Strategy. The information provided in Section 2 and the Hazard Annexes provide the basis and justification for the mitigation actions identified in this plan. This section provides information on the process used to develop a mission, goals and action items. It also includes an explanation of how the County intends to incorporate the mitigation strategies outlined in the plan into existing planning mechanisms and programs such as the County comprehensive land use planning process, capital improvement planning process, and building codes enforcement and implementation.

This section describes the components that guide implementation of the identified mitigation strategies and is based on strategic planning principles. City or special district specific documentation of how actions will be implemented through existing plans and policies is located in Volume III: City/Special District Addenda, which includes a Small Cities Addendum. Information on the process used to develop the mission, goals, and action items are provided below.

- Mission—The mission statement is a philosophical or value statement that answers the question "Why develop a plan?" In short, the mission states the purpose and defines the primary function of the County's multi-jurisdictional Natural Hazards Mitigation Plan. The mission is an action-oriented statement of the plan's reason to exist. It is broad enough that it need not change unless the community environment changes.

- Goals— Goals are designed to drive actions and they are intended to represent the general end toward which the county effort is directed. Goals identify how the county intends to work toward mitigating risk from natural hazards. The goals are guiding principles for the specific recommendations that are outlined in the action items.

- Action Items—The action items are detailed recommendations for activities that local departments, citizens and others could engage in to reduce risk.

Natural Hazard Mitigation Plan (NHMP) Mission

When this plan was created, Wasco County's vision was "…to be the best performing rural county government in Oregon and to preserve the beauty, livability, and economy of Wasco County for future generations." The 2006 NHMP used this as the guiding principle when developing the NHMP mission. In the 2017-2018 Wasco County Strategic Plan, the vision for the County is identified as "Pioneering Pathways to Prosperity." As in 2017, the 2024 Wasco County NHMP Steering Committee reviewed and reaffirmed the original NHMP mission at its May 29, 2024 meeting.

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The mission of the Wasco County NHMP is to:

> *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 Wasco County.*

NHMP Goals

The plan goals help guide the direction of future activities aimed at reducing risk and preventing loss from natural hazards. The goals listed here serve as checkpoints as agencies and organizations begin implementing mitigation action items. Each goal has a series of statements which further reflect and more clearly define the goals.

Background

Soliciting community input during stakeholder interviews was a critical aspect of initial goal development. Armed with stakeholder interview input, the mitigation plan goals and goal statements were drafted by the NHMP Coordinator using assistance from OPDR during the creation of the Wasco County NHMP in 2006. The draft goals were brought before the 2006 Wasco County Steering Committee for review and approval. The goals were revised with Steering Committee input before adoption by the committee.

The 2012 Steering Committee examined those goals, edited some of the statements, and removed one of the goals, "intergenerational equity," because they felt at the time that it did not fit within the scope of the NHMP. They decided to prioritize the goals and ran through a prioritization exercise within the committee, listing them in order of priority in that version of the plan.

The 2017 Wasco County NHMP Steering Committee reviewed the plan goals and determined that two of the goals, Disaster Resilient Economy and Acknowledge Responsibility were already captured within the other five goals and chose to eliminate them as stand-alone goals. The statements associated with those goals were reapportioned to more appropriate existing goals. The five remaining goals were all viewed as interrelated and equally important, and the decision was made to display that with a new graphic, rather than rank them in order.

Goal Review During Current NHMP Update Process

During the May 29, 2024 NHMP Steering Committee meeting, the Committee added Inclusion, Diversity, Equity and Accessibility (IDEA) to the Education and Outreach goal, and added Climate Change as its own separate goal.

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Table 3.1: Wasco County NHMP Goals

Goal	Statement
Protection of Life and Property	Develop and implement activities to protect human life, commerce, property, and natural resource systems.
	Reduce insurance losses and repetitive claims for chronic hazard events while promoting insurance for catastrophic hazards.
	Evaluate guideline/codes and permitting processes in addressing hazard mitigation; emphasize non-structural means of mitigating hazard impact.
	Actively acknowledge amount of loss the County is susceptible to and develop efforts to overcome that loss without significant reliance on outside resources.
	Utilize mitigation activities to minimize risks associated with hazard events.
Emergency Services Enhancement	Evaluate performance of critical facilities during a natural hazard event; implement measures to improve performance.
	Minimize threat to life safety issues.
	Ensure resources, staffing, and volunteer base keeps pace with County growth and needs.
Education & Outreach & Inclusion, Diversity, Equity and Accessibility	Develop and implement education programs to increase awareness among citizens; local, county and regional agencies; non-profit organization; businesses; and industry.
	Develop and conduct outreach programs to increase the number of local activities implemented by public and private sector organizations.
	Build community consensus through outreach, education, and activities.
	Ensure that the cultural, racial, and economic status of citizens is considered during the public planning process, and account for and incorporate underserved communities
Facilitate Partnerships & Coordination	Strengthen communication and coordination of public/private partnership and emergency services among local, county, and regional governments and the private sector.
	Incorporate hazard mitigation into the greater social, economic, and natural resource goal framework.
	Incorporate hazard mitigation as part of the County leadership's routine decision making process.
	Foster a diverse economy to reduce the impacts of a hazard event on any one sector.
	Create the conditions for a transitional economy that welcomes new development and innovative ideas that are sensitive to potential hazard risks faced by the County.
Natural Resource Systems Protection	Link watershed planning, natural resource management, and land use planning with natural hazard mitigation activities.
	Preserve and rehabilitate natural systems to serve natural hazard mitigation functions and protect recreation resources.
	Coordinate programs to increase natural hazard knowledge base and use technology to better record events and model vulnerability.
	Protect recreation and tourism industries by raising awareness of potential hazard impacts.

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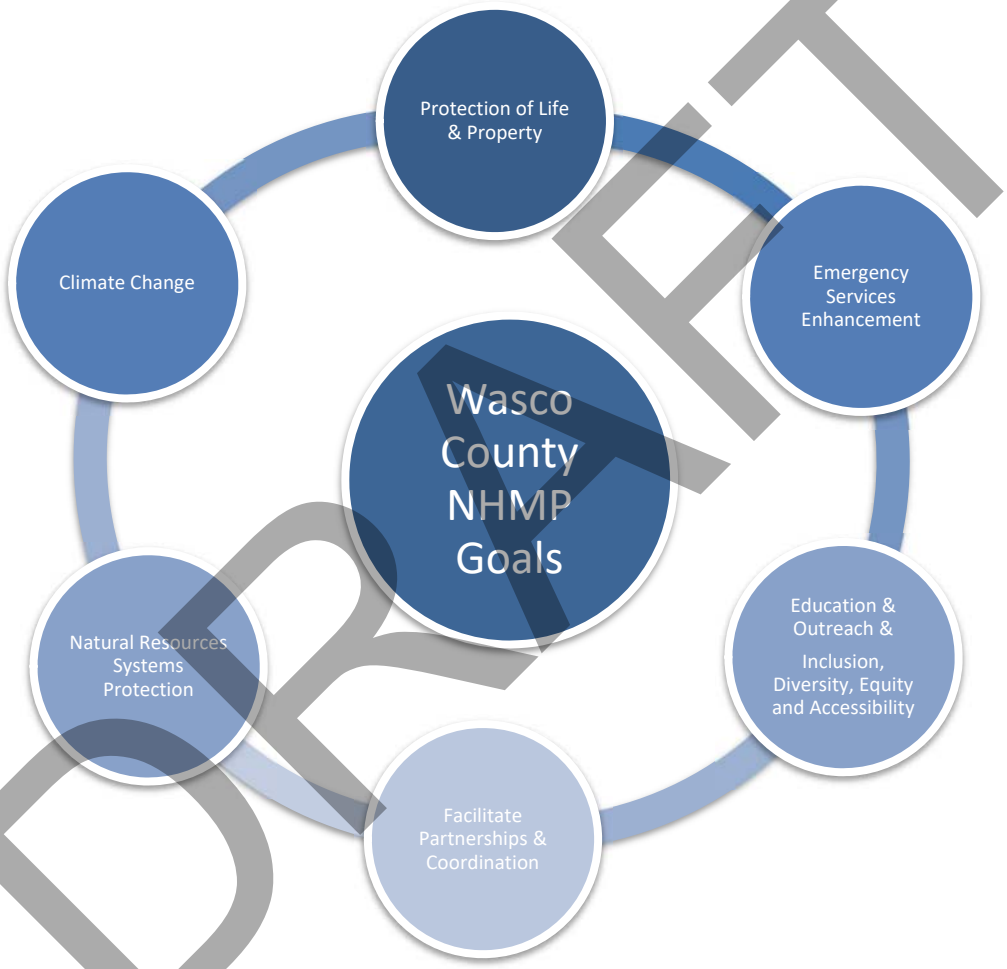
	Provide support for agricultural and forest industries to help them prepare for hazardous events.
Climate Change	Commit to efforts that will increase understanding of how climate change will increase the frequency and severity of identified hazards.
	Consider the increase in hazard frequency, duration, and severity due to climate change during the development and implementation of activities to protect human life, commerce, property, and natural resource systems.

Source: Wasco County NHMP Steering Committee, May 29, 2024

Figure 3.1 Wasco County NHMP Goals



Source: Wasco County NHMP Steering Committee, May 29, 2024

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Existing & Previous Mitigation Activities

Existing mitigation activities include current mitigation programs and activities that are being implemented by the community in an effort to reduce the community's overall risk to natural hazards. Documenting these efforts can assist participating jurisdictions to better understand risk and can assist in documenting successes. Tables 3.2 and 3.3 list existing programs, mitigation projects and other efforts that have been implemented since the Wasco County NHMP was adopted in February 2007, along with the hazards that were addressed by each mitigation activity. The tables are set up as 2012-2024.

The 2012 plan listed 39 action items, most of which were rolled over from 2007 with modifications, and are again continuing in the latest update. Since the 2012 plan, ongoing efforts towards a variety of these goals has occurred and will continue into the future (for example: continuing education, hazard fuel treatments, development of partnerships, infrastructure and facility rehabilitation, etc.). Table 3.2 identifies action items that had concrete outcomes and provides a summary update of what mitigation actions Wasco County has accomplished from the 2012 and 2024 plans.

Table 3.2: Wasco County Mitigation Activities, 2012-2024

Action Item	Title	Accomplishment
MH #5	Update County Comprehensive Plan	Comprehensive Plan update process (Wasco 2040) completed in 2020
FH #6	Removal of Passage Barriers along Fifteen Mile Sub-basin	Removed three from Fifteen Mile between 2012-2018
		Removed three from White River Watershed between 2015-2018
WH #6	Map Fire Regimes and Condition Classes	ODF completed on March 28, 2017
MH #3	Review and Update the CWPP	The Community Wildfire Protection Plan was completed in 2024
WH #1	Assessment of Non-County Roads for Response to Wildfire Hazards	Wasco County Planning has taken on-site photographs of roads and developed an assessment test. Completion is anticipated in early 2025.
LH #1	Update County Landslide Ordinance	WC-Planning has written new Land Use Zoning Code and the public planning process is anticipated to be complete at the end of 2025.
LH #3	Update Landslide Hazard Area Maps	DOGAMI has analyzed LIDAR data and identified 2,693 new landslides deposits.
FH #4	Update FIRM Maps	FEMA is in the process of finalizing updated FIRM Maps. Anticipated final maps to be released at the end of 2025-2026
FH #5	Continue to Update County Flood Ordinances as Required	WC-Planning has updated the Land use Zoning Code and the public planning process is anticipated to be complete at the end of 2025

Source: Wasco County NHMP Steering Committee, May 29, 2024

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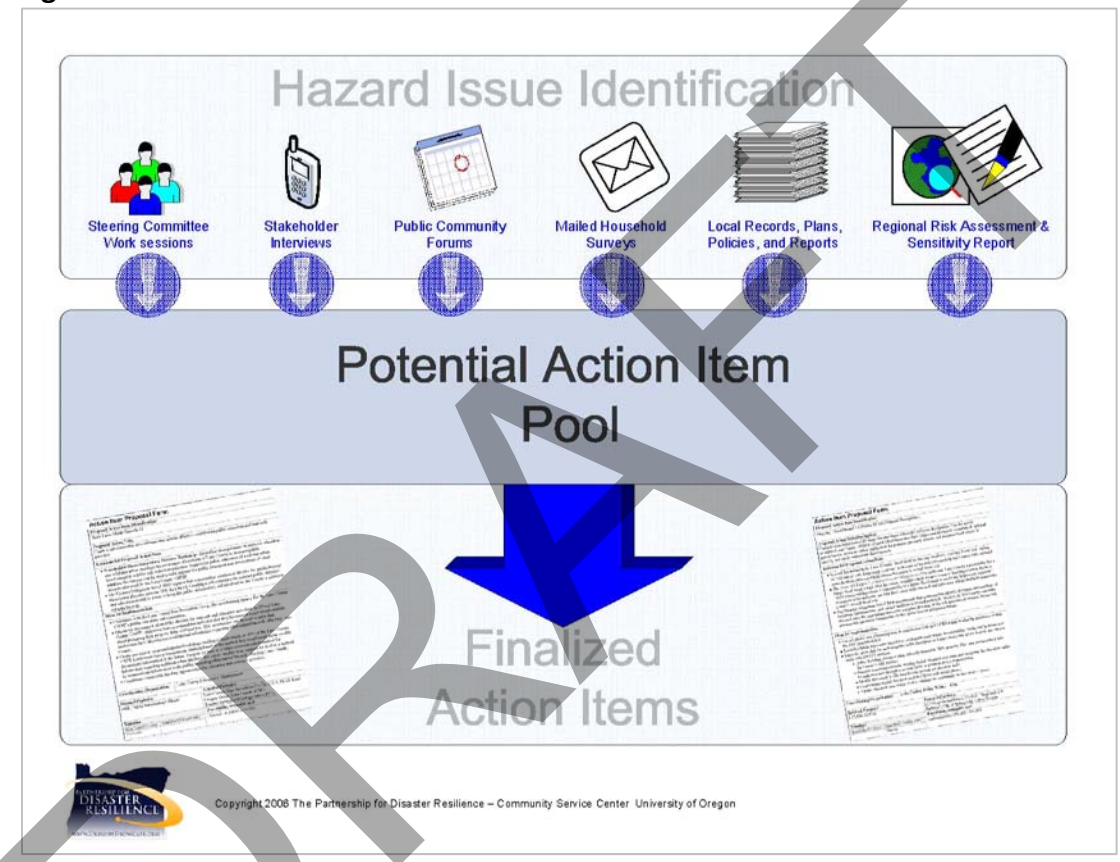
Mitigation Plan Action Items

Short and long-term action items identified through the planning process are an important part of the mitigation plan. Action items are detailed recommendations for activities that local departments, citizens and others can engage in to reduce risk. They address both multi-hazard (MH) and hazard-specific issues. Action items can be developed through a number of sources. The figure below illustrates some of these sources. A description of how the plan's mitigation actions were developed is provided below.

Figure 3.2 Action Item Sources



Source: Partnership for Disaster Resilience, 2006

Each action item has a corresponding action item worksheet describing the activity, identifying the rationale for the project, identifying potential ideas for implementation, and assigning coordinating and partner organizations. The action item worksheets can assist the community in pre-packaging potential projects for grant funding. The worksheet components are described below. These action item worksheets are located in Appendix A. They have been revised as part of this 2024 NHMP update.

Rationale or Key Issues Addressed

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

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for proposed action items is based on the information documented in Section 2 Risk Assessment and the Hazard Annexes.

Ideas for Implementation:

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

IMPLEMENTATION THROUGH EXISTING PROGRAMS

The Wasco County multi-jurisdictional Natural Hazards Mitigation Plan includes a range of action items that, when implemented, will reduce loss from hazard events in the county. Within the plan, FEMA requires the identification of existing programs that might be used to implement these action items. Wasco County currently addresses statewide planning goals and legislative requirements through its comprehensive plan, county land use and development ordinances, and building codes. To the extent possible, Wasco County will work to incorporate the mitigation actions into existing programs and procedures.

Most of the Wasco County multi-jurisdictional Natural Hazards Mitigation Plan's recommendations are consistent with the goals and objectives of the County's existing plans and policies. Where possible, Wasco County will implement the multi-jurisdictional Natural Hazards Mitigation Plan's actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, and can adapt easily to changing conditions and needs.[1] Implementing the Natural Hazards Mitigation Plan's action items through such plans and policies increases their likelihood of being supported and implemented.

Wasco County updated its Comprehensive Plan (Wasco 2040) in 2021, and the policies set forth in the 2017 NHMP update were included in the Goal #7 Areas Subject to Natural Hazards portion of the Comprehensive Plan. Additionally, the Community Wildfire Protection Plan (CWPP), approved in 2024, utilized a great deal of information and policies developed during the 2017 NHMP update process. Likewise, public input relevant to the 2017 NHMP update that was gathered during the outreach processes of the Comprehensive Plan and the CWPP was included in NHMP updates through the plan implementation and maintenance section. This document is intended to be a "living document" maintained through regular NHMP Steering Committee meetings and used consistently in conjunction with other existing plans and programs. For more information on how this plan will be maintained in a dynamic ongoing manner, see Section 4 Plan Implementation and Maintenance.

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

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

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

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

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* (ST) are activities that may be implemented with existing resources and authorities in one to two years. *Long-term action items* (LT) may require new or additional resources and/or authorities, and may take from one to five years to implement.

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 ultimately draft action item worksheets to present to the Steering Committee. Action item input was gathered through 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 action items was accomplished during the NHMP Steering Committee Goals and Action Items meeting on July 13, 2006. The method of selection and prioritization was as follows:

(1) First pass review (selection):

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Each action item was reviewed individually by the Steering Committee with the question posed: "is this an action item worth pursuing, i.e. will it effectively reduce the county's risk from natural hazards?" The action items were placed in "Yes" or "No" piles accordingly.

(2) Second pass review (prioritization):

Of those action items in the "Yes" pile, each item was reviewed individually by the Steering Committee and given a "High" or "Low" priority rating based on potential impact and feasibility.

(3) Third pass review (detail):

The details of the selected action items were discussed and debated with emphasis on rationale for the action, ideas for implementation, and the coordinating organization.

Action Item Review and Update, 2012

The action items were reviewed and revised by the 2011/2012 Wasco County NHMP Steering Committee during the Mitigation Strategy Meeting on May 23, 2012. Steering Committee Members analyzed each of the action items developed by the previous Steering Committee, and documented the status of completion for each action item over the past five years since the plan's creation. Completed action items were described and removed, or deferred if the nature of the action item made its progress or timeline "ongoing." Action items that had not been completed were either deleted or deferred. Most deferred action items were modified in some way, either in terms of the action itself, partner organizations, or the timeline for completion.

Action Item Review and Update, 2017

At the NHMP Steering Committee meetings on October 12 and November 14, 2017, the Steering Committee reviewed previous action items, and discussed proposed new ones. Completed action items were removed. Ongoing action items were updated and remain in place. Incomplete action items were reviewed for relevance and some were deleted. The Steering Committee decided to reorganize several of them to recognize their interrelatedness. Refer to the tables for the completed actions and the current ones. Two main themes of the reorganization emerged – mapping actions and education actions. Almost every category of hazard had one of each so the committee removed the individual action items and created a larger overarching goal encompassing these broad categories.

Action Item Review and Update, 2024

The 2024 NHMP update heavily pursued public participation and feedback. The Outreach Subcommittee firmly stood in favor of obtaining as much public feedback as possible in order to obtain information that could (1) assist the NHMP Steering Committee in shaping existing action items to better meet the public need; and (2) obtain the widest array of mitigation ideas and develop them into action items. In order to achieve this, the Outreach Subcommittee developed an online hazard mitigation survey and organized a major public outreach event, the "Disaster Movie Marathon". Both the survey and outreach event provided the public with hazard mitigation knowledge and an opportunity to share their opinions, ideas, and concerns.

Committee members had also been individually brainstorming and gathering new suggestions for important actions that the County can pursue in order to mitigate natural hazard risk and vulnerability over the next five years. At the May 29, 2024 Steering Committee meeting public

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feedback and Committee suggestions were examined and discussed, resulting in 24 new action items to pursue over the coming years. Several deferred action items were combined or modified, some action items were added post-2019 NHMP Publication, and in some cases removed. For 2024, there are resulting in a total of 22 multi-hazard, four severe weather, two drought, 18 wildfire, eight flood, four earthquake, three extreme heat, three volcano, and four landslide specific Action Items for a total of 68 Action Items. Of these 44 Action Items, several were identified during the editing process as "Institutionalized Actions". These are mitigation actions that have been successfully integrated into common practice. These are ongoing efforts that will need to be continuously updated and addressed. There is no completion timeline for them as they are not discrete one time actions which will be completed and removed from Wasco County's Mitigation strategy. These are identified in the Status line as "Institutionalized" (I).

Action Item Matrix

The Action Item Matrix portrays the overall action plan framework and identifies linkages between the plan goals, partnerships (coordination and partner organizations), and actions. The matrix documents a description of the action, Steering Committee identified priority, the coordinating organization, partner organizations, timeline, and the plan goals addressed.

Table 3.3: Wasco County 2024 Action Item Matrix

Source: 2024 NHMP, Appendix A: Action Items (Highlighted Items are New Action Items)

ID*	Proposed Action Title	Priority	Timeline LT=Long (3+ Years) ST=Short (0-3 Years)	Coordinating Organization	Internal Partners	External Partners
2024 Proposed Action Items						
Multi-Hazard (MH)						
MH 1	Pursue regional funding for mitigation actions and coordination of efforts	H	Long	MCCED	EM, Planning, Public Works	Cities, State Agencies, Non-Government/Quasi-governmental Organizations, Public, SWCD
MH 2	Develop Public Outreach / Educational Programs for all Hazards	H	Both Long & Short	EM (Emergency Management)	County Agencies (Planning, SWCD, Building, Public Works specifically)	Cities, State Agencies, Non-government/Quasi-governmental Organizations, Public, Media, Schools
MH 3	Annual Review and Update of the County Emergency Operations Plan, Community Wildfire Protection Plan, and Natural Hazards Mitigation Plan; Re-Adoption is required	M	Short	Wasco County Hazard Resilience Committee	Planning, BOC, EM, Public Works	OEM, OPDR
MH 4	Create Systems to Support and Maintain at-risk Populations	M	Short	EM	Public Health, Planning, Records and Assessment	Red Cross, Hospitals, OR Senior Advisory Council
MH 5	Research and develop program for expedited post disaster permitting	H	Long	Planning	BOCC, Emergency Management, Public Works	DLCD
MH 6	Create Emergency Disaster Fund	L	Long	BOC	Emergency Response, EM, Public Works	OEM, FEMA

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MH 7	Develop Small Business Awareness & Continuity Planning Campaign	L	Long	EM, BOC		Chamber of Commerce
MH 8	Maintain & Develop Partnership Programs to Reduce Vulnerability of Public Infrastructure/Facilities from hazard risks	M	Long	Emergency Management	Planning, Public Works	Cities, Utilities, Law Enforcement, DOT, ODOE, OEM, DLCD
MH 9	Pursue Agency Staff Training	L	Both Long & Short	NHMP SC	All County Departments	Training agencies, Red Cross, FEMA, OEM
MH 10	Fortify County Communication Networks	H	Both Long & Short	WCSO	Emergency Management, Fire Districts, Emergency Service providers	USFS, ODF, OEM, CERT, City of The Dalles Police Department, Oregon Office of Emergency Management, Community Emergency Response Team
MH 11	Update or Acquire Relevant Hazard Maps	M	Both Long & Short	Planning	GIS, Public Works, County Surveyor, Planning, Emergency Management	FEMA, DLCD, DOGAMI, ODF
MH 12	TSP Update: Include potential evacuation routes, new PW projects	H	Long	Public Works	Planning, Public Works, Emergency Management	DLCD, ODOT
MH 13	Building in the Scenic Area Post Disaster Pamphlet	H	Short	Planning	Building Codes Services, Emergency Management	BOCC, DLCD, Gorge Commission
MH 14	Identify or set aside money for match fund grants	H	Long	BOC	Emergency Response, Emergency Management, Public Works	OEM, FEMA, DLCD
MH 15	Decommission and remove underground fuel storage tanks (UST)	H	Short	Wasco County Public Works	Planning, BOC	DEQ, GGS
MH 16	Seek funding for hazard mitigation outreach events and for community relationship building items that will assist in education for mitigation and response to hazards.	H	Both Long & Short	Public Information Officer	Wildfire Coordinator, Planning, Emergency Management	Red Cross, NCPHD, OEM, NOAA, BOC, MCED
MH 17	Conduct Emergency Operations Plan and other response/evacuation plan Walkthroughs (workshops or orientation seminars), Tabletop exercises, Functional exercises, and Full-scale exercises	H	Both Long & Short	Emergency Management (Wasco County Sheriff's Office)	Public Information Officer, Wildfire Coordinator, Planning	Red Cross, NCPHD, OEM, NOAA, BOC, MCED
MH 18	Establish regional collocation space for redundancy/resiliency of communications. Can also be used as EOC.	H	Long	Emergency Management (Wasco County Sheriff's Office)	OEM, BOC	FEMA, Red Cross
MH 19	Seek funding opportunities and/or opportunities for assistance for the removal of junk, debris, yard waste and other hazardous materials that reduce hazard mitigation and response efforts	H	Both Long & Short	Planning (Code Compliance), NCPHD, HHW	Planning, Public Information Officer, Wildfire Coordinator, Fire Districts	BOC, DEQ, OSFM, ODOT, Public Works
MH 20	Seek funding opportunities and/or opportunities for assistance for assistance in waste tires removal	H	Both Long & Short	Planning (Code Compliance), NCPHD, HHW	Planning, Public Information Officer, Wildfire Coordinator, Fire Districts	BOC, DEQ, OSFM, ODOT, Public Works
MH 21	Seek funding opportunities and/or opportunities for assistance for the removal of abandoned Recreational Vehicles, Mobile Homes, automobiles, and other large hazardous items that reduce hazard mitigation and response efforts	H	Both Long & Short	Planning (Code Compliance), NCPHD, HHW	Planning, Public Information Officer, Wildfire Coordinator, Fire Districts	BOC, DEQ, OSFM, ODOT, Public Works, DMV
MH 22	Seek opportunities and partnerships to assist with the repair, replacement and operations and maintenance of County owned and/or maintained infrastructure	H	Long	Public Works	Planning, Emergency Services	BOC, ODOT
MH 23						

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Wildfire-Hazard (WH)						
WH 1	Assessment of Non-County Roads for Response to Wildfire Hazards	H	Short	Public Works	Planning	Rural Fire Departments, Oregon's Fire Marshall's Office, ODF
WH 2	Accomplish Defensible Space Around Structures	H	Short	Rural Fire Districts, Planning	EM, Planning	Landowners, ODF, USFS, Oregon Fire Marshal's Office
WH 3	Treat Hazard Fuels in the Wildland Urban Interface Including in The Dalles Municipal Watershed	H	Short	Rural Fire Districts, The Dalles Public Works	EM, WC Public Works, Planning	Landowners, ODF, USFS, Oregon Fire Marshall's Office
WH 4	Explore ways to increase Fire District coverage throughout the County and seek funding for Fire Districts/Rangeland Associations	H	Long	EM		Fire Districts, Oregon's Fire Marshal's Office, ODF, USFS
WH 5	Continue to fund Wildfire Coordinator or local Natural Hazard Planner position	H	Short	BOC	Planning, Emergency Management	Rural Fire Departments, Oregon's Fire Marshal's Office, ODF, USFS
WH 6*	Provide Parcel/Lot Identification Signage	M	Both Long & Short	Fire Districts	Planning, Emergency Management	Rural Fire Departments, Oregon's Fire Marshal's Office, ODF, USFS
WH 7*	Increase Wildfire Prevention Awareness and Encourage WUI Areas to Conduct Firewise Workshops	M	Long	Fire Districts	Planning, Emergency Management	Rural Fire Departments, Oregon's Fire Marshal's Office, ODF, USFS
WH 8*	Map Fire Regimes and Condition Classes		Both Long & Short	GIS	BOC	Rural Fire Districts, ODF, USFS, Oregon Fire Marshall's Office
WH 9	Update the CWPP on a five year cycle or as needed.	M	Long	Wildfire Coordinator, Planning	Emergency Management	Rural Fire Districts, ODF, USFS, Oregon Fire Marshall's Office
WH 10	Update County Fire Safety Land Use Standards.	H	Short	Planning	Wildfire Coordinator, Emergency Management	Rural Fire Districts, ODF, USFS, Oregon Fire Marshall's Office
WH 11	Adopt the WUI Code and Standards (Home hardening and defensible space) as required by state law, and/or encourage standards to mitigate loss of property and life where state law does not require.	H	Both Long & Short	Building Codes Services, OSFM	Emergency Management, Planning, Wildfire Coordinator, BOC	Rural Fire Districts, ODF, USFS, Oregon Fire Marshall's Office
WH 12	Update the Wasco County risk assessment and include WUI identification map.	M	Short	USFS, ODF, OSFM, BLM, NRCS, OSU Extension Office	Emergency Management, GIS, Planning	Rural Fire Districts, BOC
WH 13	Work with railroad to reduce maintenance work during fire season and improve ROW vegetative management	H	Long	Fire Districts	Emergency Management	ODF, USFS, Oregon Fire Marshall's Office
WH 14	Complete survey and evaluation of home sites for wildfire mitigation	H	Both Long & Short	Wildfire Coordinator, Fire Districts	Public Information Officer, Emergency Management	ODF, USFS, Oregon Fire Marshall's Office
WH 15	Assist Rural Fire Districts in upgrading their firefighting equipment, facilities and training as needed, and for operations and maintenance of equipment and facilities	H	Both Long & Short	Fire Districts	Emergency Management	ODF, USFS, Oregon Fire Marshall's Office
WH 16	Increase interagency training and cooperative planning regarding air resources for fire suppression.	M	Long	Fire Districts	Emergency Management	ODF, USFS, Oregon Fire Marshall's Office
WH 17	Reduce fire fuels along public access roads	H	Long	Public Works, WC-Soil & Water, Wildfire Coordinator	Fire Districts,	ODF, USFS, Oregon Fire Marshall's Office
Extreme Heat-Hazard (EH)						
EHH 1	Establish or construct accessible cooling centers like libraries, community centers, and public buildings	H	Long	Administrative Services, Emergency Management	BOC, North Central Public Health	Planning
EHH 2	Develop a Heat Action Plan	H	Short	Planning, Emergency Management	North Central Public Health, Public Information Officer	MCEDD, Red Cross

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EHH 3	Retrofit buildings to maximize energy efficiency	H	Long	Administrative Services	Building Codes Services, Emergency Management, MCEDD, Public Information Officer	Planning, BOC
Drought-Hazard (DH)						
DH 1	Ensure Long-range Water Resources Development and Quality	M	Both Long & Short	SWCD	BOC, Planning	Watermaster, OSU Extension, DEQ, ODFW, OECDD, DOGAMI, DLCD, City of The Dalles, ORWD, USFS, NCPHD
DH 2	Support Local Agencies Training on Water Conservation Measures and Drought Management Practices	M	Long	SWCD	Planning	OSU Extension Service, Cherry Growers, Cattlemen's Association, NRCS, Wy'East RC&D
Severe Storm-Hazard (SH)						
SH 1	Encourage Operators of Critical Facilities to Secure Emergency Power	H	Short	EM	Planning, Public Works	Cities, OEM, ODOE, DLCD, NWCPUD, Wasco Electric, Pacific Power
SH 2	Support/Encourage Electrical Utilities to Use Underground Construction Methods	H	Short	Planning	Emergency Management, GIS, Planning	Cities, Utilities, Building Contractors, Real Estate Agencies
SH 3*	Develop Partnership Programs to Reduce Vulnerability of Public Infrastructure from Severe Winter Storms	L	Long	Public Works	Emergency Management, Public Information Officer	Cities, Utilities
SH 4*	Increase and Maintain Public Awareness of Severe Storms	L	Long	Public Information Officer, Emergency Management	Utilities, Cities, American Red Cross, St. Vincent DePaul, Churches, Fire, FEMA	
Flood-Hazard (SH)						
FH 1	Mitigate Flood Event Resulting from Naturally Induced Dam Failure	M	Short	SWCD	Public Works, GIS, Fire Department, Emergency Management, City of The Dalles	Army Corps of Engineers, BPA, DEQ, WRD,DSL, DLCD, Irrigation District, BLM
FH 2	Protect Against (Repetitive) Loss from Flooding	M	Both Long & Short	Planning	BOCC	Cities, DLCD, FEMA, OEM, OECDD
FH 3	Removal of Fish Passage Barriers (Fifteen Mile Subbasin)	L	Long	SWCD	Planning, Public Works	
FH 4	Determine financial assets (structures, property value, etc.) at risk of damage or loss from flooding	L	Long	Planning	GIS, Assessor	Property Owners, DLCD, FEMA, Insurance companies
FH 5*	Update FIRM Maps	H	Long	Planning	GIS, Public Works	FEMA
FH 6*	Continue to Update County Flood Ordinances as Required	H	Long	Planning	GIS, Assessor	Property Owners, DLCD, FEMA, OEM
FH 7*	Obtain NFIP Commuity Rating System/CRS Rating System	L	Long	Planning	BOC	Cities, LCDC, FEMA, OEM, OECDD
FH 8*	Develop Flood Education & Outreach Programs	L	Long	EM, Planning, Building	SWCD, OPDR, FEMA, OEM	
Earthquake-Hazard (EH)						
EH 1	Rehabilitate Identified Vulnerable Schools, Emergency Facilities, Bridges and Public Buildings/Lifelines; Upgrade Critical Infrastructure and Facilities	L	Long	Facility Managers, WC Emergency Management	Emergency Management, BOC, Planning, GIS, Public Works	DOGAMI, OEM, DLCD, ODOT, Oregon Legislature
EH 2	Improve Knowledge of Earthquake Sources	L	Long	Emergency Management	GIS, Public Works	DOGAMI, OEM, DLCD
EH 3*	Improve Understanding of Vulnerability and Risk	L	Long	EM	GIS, Public Works	DOGAMI, OEM, DLCD
EH 4*	Educate Those at Risk	L	Long	EM, Public Information Officer	GIS, Public Works	DOGAMI, OEM, DLCD

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Volcano-Hazard (VH)						
VH 1	Use the research about plume models and prevailing winds from National Weather Service (NWS) to better determine the County's vulnerability to volcanic ash fallout	L	Short	Emergency Management	GIS, Planning	NWS, USGS, DOGAMI
VH 2*	Improve Knowledge Base of Volcanic Risk and Vulnerability	L	Long	EM	GIS	DOGAMI, OEM, USGS
VH 3*	Evaluate Emergency Response Plan and Identify Areas of Public Notification and Evacuation Routes	L	Short	EM	Emergency Response	Cities, ODF, BLM, Warm Springs
Landslide-Hazard (LH)						
LH 1	Update County Landslide Ordinance	H	Long	Planning	Planning Commission	OPDR, OEM, DOGAMI
LH 2	Improve Understanding of Landslide Risk Inside Hazard Areas and Improve Warning Systems	L	Long	GIS	Planning, Emergency Management	DOGAMI, ODF, DLCD
LH 3*	Update Landslide Hazard Area Maps	H	Long	GIS	Planning	DOGAMI
LH 4*	Provide Education/Awareness for Those at Risk	L	Both Long & Short	Planning	GIS, EM	DOGAMI, ODF, DLCD

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Section 4: Plan Implementation and Maintenance

This section of the Natural Hazard Mitigation Plan (NHMP) addresses 44 CFR 201.6(c)(4) – Plan Maintenance. Specifically, the section details the formal process that will ensure that the Wasco County multi-jurisdictional Natural Hazards Mitigation Plan remains an active and relevant document. The plan implementation and maintenance process includes a schedule for monitoring and evaluating the NHMP annually, as well as producing an updated plan every five years. Finally, this section describes how the County and participating jurisdictions will integrate public participation throughout the plan maintenance and implementation process.

Implementing the Natural Hazard Mitigation Plan (NHMP)

After the NHMP is locally reviewed and deemed ready, the Wasco County Planning Division submits it to the State Hazard Mitigation Officer at the Oregon Military, Department, Office of Emergency Management (OEM). The Office of Emergency Management reviews and submits the NHMP to the Federal Emergency Management Agency (FEMA Region X) for review. This review addresses the regulations outlined in the FEMA Interim Final Rule 44 CFR Part 201. Upon pre-approval by FEMA, indicated by a letter provided from FEMA to the County called the "Approval Pending Adoption" the County will then adopt the NHMP via resolution. Following County adoption, the participating jurisdictions will need to adopt it. Once FEMA is provided with final resolution documentation, they will formally approve the Wasco County multi-jurisdictional NHMP. At that point the County will maintain their eligibility for the Hazard Mitigation Assistance funds distributed through the Pre-Disaster Mitigation Grant Program, the Hazard Mitigation Grant Program, and the Flood Mitigation Assistance Grant Program.

Co-conveners

The Wasco County Planning Division and Wasco County Emergency Management shall serve as co-conveners of this NHMP (henceforth referred to as the conveners). The agencies shall split responsibilities with (1) Emergency Management coordinating emergency service related aspects of the NHMP and its projects; and (2) Planning Department coordinating documentation, GIS and land use related aspects.

Emergency Services Convener: Wasco 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

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responsible for the implementation and maintenance of the NHMP, Wasco County Emergency Management shall:

- Serve as a communication conduit between the Steering Committee and key stakeholders;
- Identify emergency management-related funding sources for natural hazards mitigation projects;

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LAND USE CONVENER: WASCO COUNTY PLANNING DEPARTMENT

The agency administers and enforces land use planning regulations for the County. Wasco County Planning Department 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 and enhances the beauty, livability and economy of Wasco County for future generations. As the agency responsible for the implementation and maintenance of the NHMP, the Wasco County Planning Department shall:

- Coordinate Steering Committee meeting dates, times, locations, agendas, and member notification;
- Document outcomes of Committee meetings;
- Incorporate, maintain, and update the County's natural hazards risk GIS data elements; and
- Utilize the Risk Assessment as a tool for prioritizing proposed natural hazards risk reduction projects.

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Coordinating Body

The Steering Committee serves as the coordinating body for the NHMP. The roles and responsibilities of the coordinating body include:

- Serving as the local evaluation committee for funding programs such as the Pre-Disaster Mitigation Grant Program, the Hazard Mitigation Grant Program funds, and Flood Mitigation Assistance program funds;
- Prioritizing and recommending funding for natural hazard risk reduction projects;
- Documenting successes and lessons learned;
- Evaluating and updating the Natural Hazards Mitigation Plan following a disaster;

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- Evaluating and updating the Natural Hazards Mitigation Plan in accordance with the prescribed maintenance schedule; and
- Developing and coordinating ad hoc and/or standing subcommittees as needed.
- Reviewing the status of mitigation actions.

An additional description of the Steering Committee responsibilities is included in the "Semi-Annual Meetings" section below.

MEMBERS

The following organizations were represented and served on the Steering Committee during the development of the Wasco County multi-jurisdictional Natural Hazards Mitigation Plan:

Table 4.1: Wasco County NHMP Update Steering Committee

Name	Title	Organization
Daniel Dougherty	Planning Director	Wasco County
Sean Bailey	Senior Planner	Wasco County
Stephanie Krell	Public Information Officer	Wasco County
Sheridan McClellan	Emergency Manager	Wasco County
David Jensen	Fire Chief	Mid-Columbia Fire and Rescue
Ryan Bessette	Conservation Technician/NRCS Planner	Wasco County Soil and Water Conservation District
Frank Cochran	District Conservationist	USDA National Resource Conservation Service
Kristin Dodd	Unit Forester	Oregon Department of Forestry
Eric Hanson	Deputy Public Works Director	The City of The Dalles
Steve Kramer	County Commissioner	Wasco County
Tyler Stone	Administrative Officer	Wasco County
Tycho Granville	GIS Coordinator	Wasco County
Kylee Ruby	Deputy Building Official	Wasco County
Kelly Howsley-Glover	Community Development Director	Wasco County
Arthur Smith	Public Works Director	Wasco County
Simone Cordery-Cotter	Fire Risk Reduction Specialist	Oregon State Fire Marshal
Kristin Dodd	Unit Forester	Oregon Department of Forestry
Melissa Napoli	Community Liaison	The City of Maupin
Jayme Bennett	City Manager	The City of Mosier
Kathy Bostick	City Recorder	The City of Dufur
Andrew Danies	Deputy Director of Economic Development	Mid-Columbia Economic Development District

Source: Wasco County NHMP SC meetings

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To make the coordination and review of Wasco County's multi-jurisdictional Natural Hazards Mitigation Plan as broad and useful as possible, the coordinating body will engage additional stakeholders and other relevant hazard mitigation organizations and agencies to implement the identified action items. Specific organizations have been identified as either internal or external partners on the individual mitigation action item forms found in Appendix A.

IMPLEMENTATION THROUGH EXISTING PROGRAMS

The Natural Hazards Mitigation Plan includes a range of action items that, when implemented, will reduce loss from hazard events in the County. See Chapter 3, Mitigation Strategy, for details. Within the plan, FEMA requires the identification of existing programs that might be used to implement these action items. Wasco County currently addresses statewide planning goals and legislative requirements through its comprehensive land use plan, capital improvement plans, mandated standards and building codes. To the extent possible, Wasco County will work to incorporate the recommended mitigation action items into existing programs and procedures. Many of the Natural Hazards Mitigation Plan's recommendations are consistent with the goals and objectives of the County's existing plans and policies. Where possible, Wasco County should implement the Natural Hazards Mitigation Plan'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. Implementing the Natural Hazards Mitigation Plan's action items 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
- Wasco County Budget
- Wasco County Economic Development Action Plan
- Wasco County Comprehensive Land Use Plan
- Soil and Water Conservation District.

Plan Maintenance

Plan maintenance is a critical component of the natural hazards mitigation plan. Proper maintenance of the NHMP ensures that this plan will maximize Wasco County's, the cities, and the special districts' efforts to reduce the risks posed by natural hazards. This section includes a process to ensure that a regular review and update of the plan occurs. The Steering Committee and local staff are responsible for implementing this process, in addition to maintaining and updating the NHMP through a series of meetings outlined in the maintenance schedule below.

Semi-Annual Meetings

The Committee will meet on a semi-annual basis to complete the following tasks. These meetings will occur in April and October of each year to ensure that there is less of a chance of a conflict with fire season. During the first meeting the Committee will:

- Review existing action items to determine appropriateness for funding;

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- 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 of the year the Committee will:

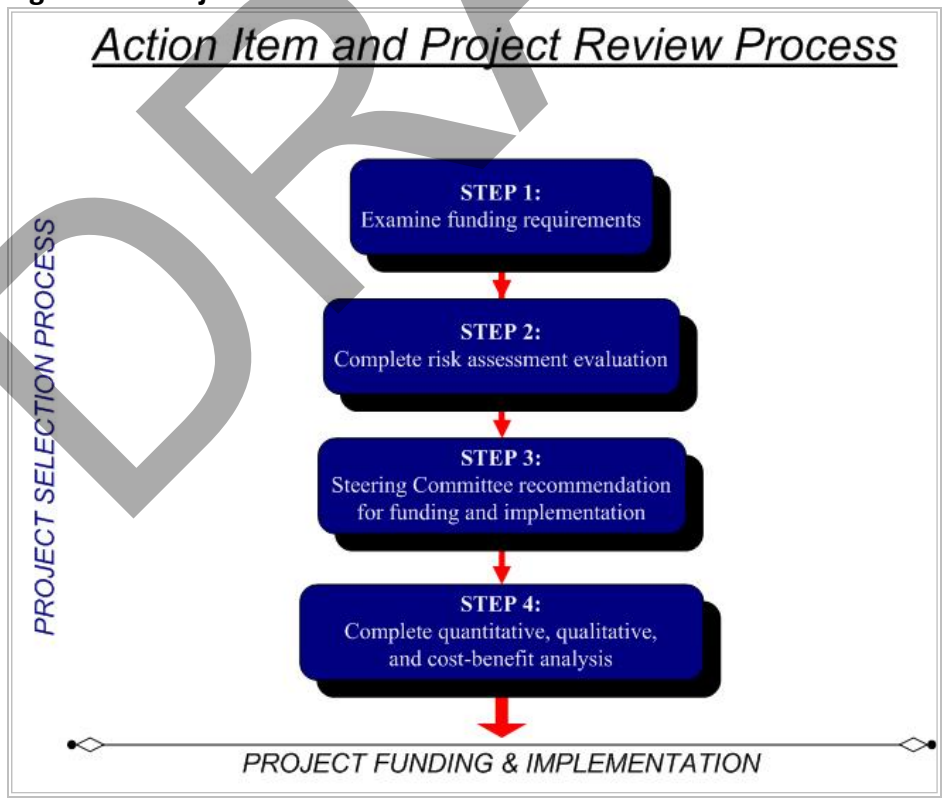
- Review existing and new risk assessment data;
- Discuss methods for continued public involvement; and
- Document successes and lessons learned during the year.

The convener will be responsible for documenting the outcome of the semi-annual meetings in Appendix B. The process the coordinating body will use to prioritize mitigation actions is detailed in the section below. The plan's format allows the County and participating jurisdictions to review and update sections when new data becomes available. New data can be easily incorporated, resulting in a NHMP that remains current and relevant to the participating jurisdictions.

Project Prioritization Process

The Disaster Mitigation Act of 2000 requires that jurisdictions identify a process for prioritizing potential actions. Potential mitigation activities often come from a variety of sources; therefore the project prioritization process needs to be flexible. Projects may be identified by committee members, local government staff, other planning documents, or the risk assessment. Figure 4.1 illustrates the project development and prioritization process.

Figure 4.1: Project Prioritization Process



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Source: Community Service Center's Partnership for Disaster Resilience at the University of Oregon, 2008.

STEP 1: EXAMINE FUNDING REQUIREMENTS

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

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

Emergency Management in Wasco County is currently funded 50% by local funds (required for grant participation) and 50% with grant monies from the Emergency Management Performance Grant (EMPG) administered through the Oregon Office of Emergency Management (OEM).

In order to receive the EMPG grant funding, the Emergency Manager is required to complete an annual work plan that is developed by the local Emergency Manager with mandatory performance actions identified by OEM. The EMPG work plan includes the Natural Hazards Mitigation Plan (NHMP) as one such performance action, with required annual reviews and a complete update to the NHMP every five years.

STEP 2: COMPLETE RISK ASSESSMENT EVALUATION

The second step in identifying the plan's action items is to examine which hazards the selected actions are associated with and where these hazards rank in terms of community risk. The coordinating body will determine whether or not the plan's risk assessment supports the implementation of eligible mitigation activities. This determination will be based on the location of the potential activities, their proximity to known hazard areas, and whether community assets are at risk. The coordinating body will additionally consider whether the selected actions mitigate hazards that are likely to occur in the future, or are likely to result in severe / catastrophic damages.

STEP 3: COMMITTEE RECOMMENDATION

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

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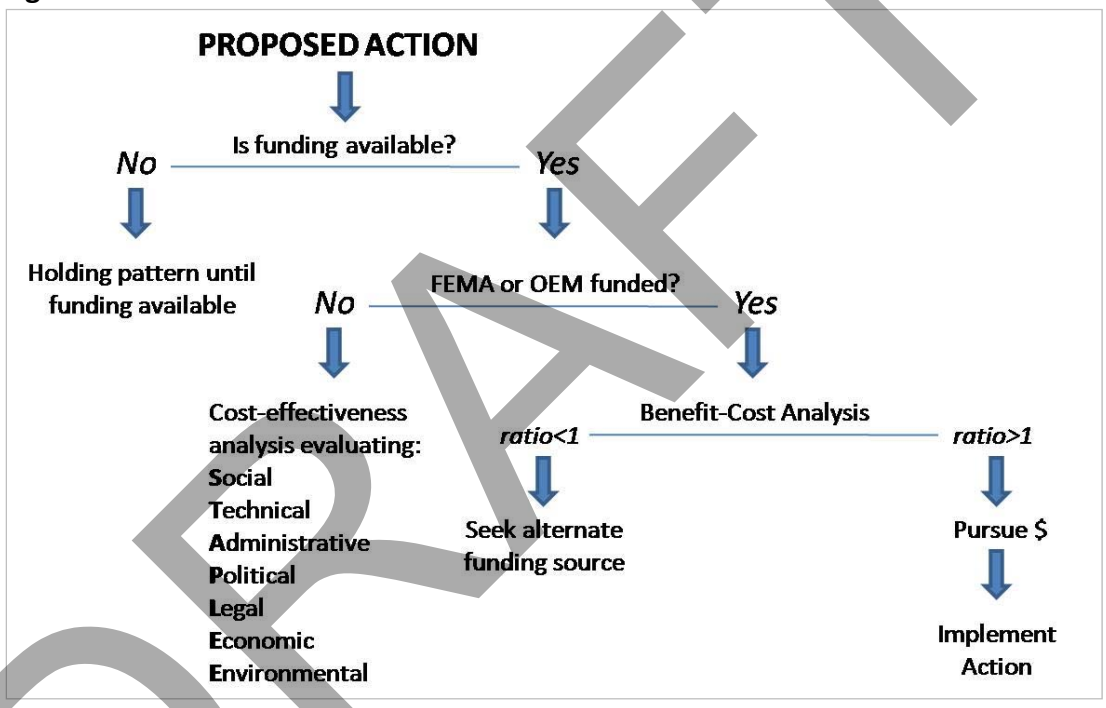
STEP 4: COMPLETE QUANTITATIVE AND QUALITATIVE ASSESSMENT, AND ECONOMIC ANALYSIS

The fourth step is to identify the costs and benefits associated with the selected natural hazard mitigation actions that result in strategies, measures or projects. Two categories of analysis that are used in this step are: (1) benefit/cost analysis, and (2) cost-effectiveness analysis. Conducting benefit/cost analysis for a mitigation activity assists in determining whether a project is worth undertaking now, in order to avoid disaster-related damages later. Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. Determining the economic feasibility of mitigating natural hazards provides decision makers with an understanding of the potential benefits and costs of an activity, as well as a basis upon which to compare alternative projects. Figure 4.2 shows decision criteria for selecting the appropriate method of analysis.

Figure 4.2: Benefit Cost Decision Criteria



Source: Community Service Center's Partnership for Disaster Resilience at the University of Oregon, 2010.

If the activity requires federal funding for a structural project, the NHMP Steering Committee will use a Federal Emergency Management Agency-approved cost-benefit analysis tool to evaluate the appropriateness of the activity. A project must have a benefit/cost ratio of greater than one in order to be eligible for FEMA grant funding.

For non-federally funded or nonstructural projects, a qualitative assessment will be completed to determine the project's cost effectiveness. The Steering Committee will prioritize these actions during the plan implementation and maintenance phase. One tool to accomplish this could be to use a multivariable assessment technique called STAPLE/E. 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. The STAPLE/E technique has been tailored for use in natural hazard action item prioritization by the Partnership for Disaster Resilience at the

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University of Oregon's Community Service Center. See Appendix D for a description of the STAPLE/E evaluation methodology. There are other methods of assessing and prioritizing projects. The method to be used will be determined at the initial post approval plan implementation and maintenance Steering Committee meeting.

Continued Public Involvement & Participation

The participating jurisdictions are dedicated to involving the public directly in the continual reshaping and updating of the Wasco County multi-jurisdictional Natural Hazards Mitigation Plan. Although members of the Steering Committee represent the public to some extent, the public will also have the opportunity to continue to provide feedback about the NHMP.

To ensure continued public engagement and support of this plan, Wasco County shall invite the public to participate in future NHMP developments in the following ways:

- Post NHMP on the Wasco County Planning Department Website for comment (http://www.co.wasco.or.us/departments/planning/long_range/natural_hazards_mitigation_plan.php)
- Post notices that invite public to participate in the semi-annual Steering Committee meetings
- Hold community hazard workshops
- Implement outreach activities documented in this NHMP (See Section 3: Mitigation Strategy)

Five-Year Review of Plan

This NHMP will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. The Wasco County Natural Hazards Mitigation Plan is due to be updated in 2029. The convener will be responsible for organizing the coordinating body to address NHMP update needs. The coordinating body will be responsible for updating any deficiencies found in the plan, and for ultimately meeting the Disaster Mitigation Act of 2000's NHMP update requirements.

The 'toolkit' in Table 4.1 can assist the convener in determining which NHMP update activities can be discussed during regularly-scheduled plan maintenance meetings, and which activities require additional meeting time and/or the formation of sub-committees.

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Table 4.2: Natural Hazards Mitigation Plan Update Toolkit

Question	Yes	No	Plan Update Action
Is the planning process description still relevant?			Modify this section to include a description of the plan update process. Document how the planning team reviewed and analyzed each section of the plan, and whether each section was revised as part of the update process. (This toolkit will help you do that).
Do you have a public involvement strategy for the plan update process?			Decide how the public will be involved in the plan update process. Allow the public an opportunity to comment on the plan process and prior to plan approval.
Have public involvement activities taken place since the plan was adopted?			Document activities in the "planning process" section of the plan update
Are there new hazards that should be addressed?			Add new hazards to the risk assessment section
Have there been hazard events in the community since the plan was adopted?			Document hazard history in the risk assessment section
Have new studies or previous events identified changes in any hazard's location or extent?			Document changes in location and extent in the risk assessment section
Has vulnerability to any hazard changed?			Document changes in vulnerability in the risk assessment section
Have development patterns changed? Is there more development in hazard prone areas?			Document changes in vulnerability in the risk assessment section
Do future annexations include hazard prone areas?			Document changes in vulnerability in the risk assessment section
Are there new high risk populations?			Document changes in vulnerability in the risk assessment section
Are there completed mitigation actions that have decreased overall vulnerability?			Document changes in vulnerability in the risk assessment section
Did the plan document and/or address National Flood Insurance Program repetitive flood loss properties?			Document any changes to flood loss property status
Did the plan identify the number and type of existing and future buildings, infrastructure, and critical facilities in hazards areas?			1) Update existing data in risk assessment section, or 2) determine whether adequate data exists. If so, add information to plan. If not, describe why this could not be done at the time of the plan update
Did the plan identify data limitations?			If yes, the plan update must address them: either state how deficiencies were overcome or why they couldn't be addressed
Did the plan identify potential dollar losses for vulnerable structures?			1) Update existing data in risk assessment section, or 2) determine whether adequate data exists. If so, add information to plan. If not, describe why this could not be done at the time of the plan update
Are the plan goals still relevant?			Document any updates in the plan goal section
What is the status of each mitigation action?			Document whether each action is completed or pending. For those that remain pending explain why. For completed actions, provide a 'success' story.
Are there new actions that should be added?			Add new actions to the plan. Make sure that the mitigation plan includes actions that reduce the effects of hazards on both new and existing buildings.
Is there an action dealing with continued compliance with the National Flood Insurance Program?			If not, add this action to meet minimum NFIP planning requirements
Are changes to the action item prioritization, implementation, and/or administration processes needed?			Document these changes in the plan implementation and maintenance section
Do you need to make any changes to the plan maintenance schedule?			Document these changes in the plan implementation and maintenance section
Is mitigation being implemented through existing planning mechanisms (such as comprehensive plans, or capital improvement plans)?			If the community has not made progress on process of implementing mitigation into existing mechanisms, further refine the process and document in the plan.

Source: Oregon Partnership for Disaster Resilience (2010).

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Volume II:
Hazard Annexes

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INTRODUCTION

Hazard Annexes

The Hazard Annexes provide additional details about natural hazards in Wasco County beyond that provided in Section 2 Risk Assessment. More specifically, the Hazard Annexes provide straight forward additional descriptions of the eight previously identified natural hazards, which were ranked with a risk level.

Table HA-0: 2024 Risk Ranking

Hazard	Risk Score	2024 Risk Ranking	Risk Level
Wildland-Wildfire	235	**1**	High
Extreme Heat	230	**2**	High
Drought	225	**3**	High
Severe Weather (Storm/Winter Weather)	210	**4**	Medium
Flood	182	**5**	Medium
Earthquake	154	**6**	Low
Volcano	143	**7**	Low
Landslide	112	**8**	Low

Source: NHMP Steering Committee Meetings, April 24, 2024

The natural hazard identification and risk levels were assessed and ascertained by the Steering Committee; they play into the establishment and prioritization of mitigation actions. It is useful to keep in mind that knowing your hazards is the key to reducing the risk. Without knowing them, the ability to reduce risk is lessoned and appropriate mitigation actions are difficult to establish. Mitigation actions for Wasco County are found in Volume I Section 3 Table 3.3 Wasco County 2024 Action Item Matrix. The City of The Dalles' mitigation actions are found in Volume III Section 4 Table 10 The Dalles 2024 NHMP Mitigation Action Item Matrix, the City of Mosier's mitigation actions are found in Volume III Section 3 Table1.9 Mosier 2024 NHMP Mitigation Action Item Matrix, the City of Dufur's mitigation actions are found in Volume III Section 1 Table 1.9 Dufur 2024 NHMP Mitigation Action Item Matrix, and the City of Maupin's mitigation actions are found in Volume III Section 2 Table 1.9 Maupin 2024 NHMP Mitigation Action Item Matrix.

While reading these Hazard Annexes, note that there are four additional reports that relate to the Wasco County Risk Assessment and that are referenced in the Wasco County NHMP:

- the *Natural Hazard Risk Report for Wasco County, Oregon Including the Cities of Antelope, Dufur, Maupin, Mosier, Shaniko, The Dalles, and Unincorporated Communities of Chenoweth, Tygh Valley, Pine Hollow, and the Warm Springs Indian Reservation* by the Oregon Department of Geology and Mineral Industries(DOGAMI) (2023); and

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- *Landslide Inventory and Risk Reduction of the North and Central Portions of Wasco County, Oregon* by the Oregon Department of Geology and Mineral Industries (DOGAMI) (2023).

- the *Future Climate Projections Wasco County* report prepared by the Oregon Climate Change Research Institute (OCCRI) in August 2018.

- *Final Recommendations for Wasco County, OR*, by the Community Planning Assistance for Wildfire (CPAW) (December 2018).

Of note, the *DOGAMI Risk Report* includes the natural hazards of earthquakes, flood, landslides, wildfire, lahar/volcanoes, and channel migration. Channel migration was not a hazard identified by the Wasco County NHMP Steering Committee and is not discussed in detail in the NHMP. The *Risk Report* does not include severe weather and drought, which are two of the natural hazards identified by the Wasco County NHMP Steering Committee.

The *Future Climate Projections: Wasco County* and the *Climate Change Influence on Natural Hazards in Eight Oregon Counties: Overview of County Reports* describe 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.

The DOGAMI *Landslide Inventory and Risk Reduction of the North and Central Portions of Wasco County, Oregon* mapped "existing landslides to provide users with an updated understanding of the landslide hazard" for the north and central regions of Wasco County in order to inform and assist the public's ability to analyze susceptibility and risk from identified landslide hazard areas.

The *Final Recommendations for Wasco County, OR* by CPAW provides a wildfire hazard assessment and mapping to inform the public concerning wildfire hazard characterization, wildland-urban interface zones and mitigation difficulty in order to deliver a series of policy recommendations to address and reduce wildfire risk.

The Significant Hazard History Tables that were prepared for each of the hazards are built from researched information from the FEMA disaster declaration website, events described in the 2012 Wasco County NHMP and the 2015 Oregon State NHMP, personal accounts of the hazard events, and other sources. The sources are listed at the bottom of each of the hazard tables. Identifying past events that have affected Wasco County helps us with planning for the future.

WILDLAND-WILDFIRE

Hazard Definition

Any instance of uncontrolled burning within a forested area is a wildland fire, whereas uncontrolled burning in grassland, brush, or woodlands is classified as a wildfire.

History

Major fires in Wasco County include the following:

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HA-1: Significant Historic Wildland-Wildfire Events	
Occurrence	**Description**
1977	Unnamed, unknown size
1979	Pine Grove
1985	Maupin
1988	Warm Springs
1994	Warm Springs
1998	Rowena, 2,208 acres
2000	Antelope
2002	Sheldon Ridge, 12,261 acres
2002	White River
2009	Microwave, 1,225 acres, conflagration declared
2011	High Cascade Complex, 101,292 acres
2013*	Government Flats Complex, 11,450 acres, conflagration declared, 4 homes lost, $15 mil damage
2014*	Rowena, 3,680 acres, conflagration declared
2016	Wasson Pond, 300 acres, structures threatened, conflagration declared
2016	Mosier Train Derailment
2017	Nena Springs, 39, 500 acres
2018*	Substation, 80,000 acres, one fatality, conflagration declared, 52 structures (4 dwellings) destroyed
2018	Long Hollow, 40,000 acres
2018*	South Valley, 25,000 acres, conflagration declared, 15 structures (3 dwellings) destroyed
2018	Memaloose II, conflagration declared, structures threatened
2020*	White River Fire, 17,442 acres, over 100 dwellings ordered to evacuate
2021	Wrentham Market Fire, 7,222 acres, 2 structures destroyed (agricultural structures)
2021	S-503 Fire; 6822 acres (Warm Springs Reservation)
2021	Sunset Valley Road Fire, 987+/- acres, several outbuildings (agricultural structures), some cars and part of a cherry orchard
2022*	Boulder Fire, 233 acres, no structures lost
2023	Antelope Creek Fire, 490 acres, no structures lost
2023	Milepost 87 Fire, 150 acres, 1 dwelling lost
2023	Simnaho Fire; 1249 acres (Warm Springs Reservation)
2023	Winslow Rd Fire, 837 acres
2024	Larch Creek Fire, 18,286 acres, $15.6 Million dollar cost, at least two structures lost
2024	Microwave Tower Fire, 1,313 acres.

(* Federal Fire Management Assistance Declaration - https://www.fema.gov/disasters)
Source: (2018 Wasco County NHMP; 2020 Oregon State NHMP; 2024 NHMP Steering Committee; and Burns et al. 2011a).

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Hazard Identification

Wasco County's fire season usually runs from mid-May through October. However, any prolonged period of lack of precipitation presents a potentially dangerous problem. The probability of a wildland fire in any one locality on a particular day depends on fuel conditions, topography, the time of year, the past and present weather conditions, and the activities (debris burning, land clearing, camping, etc.) which are or will be taking place.

Climate Change

The Oregon Climate Change Research Institute issued a report specific to Wasco County in August 2018. They modeled the following changes due to climate change:

- Wildfire risk, as expressed through the frequency of very high fire danger days, is projected to increase under future climate change in Wasco County.
- In Wasco County, the frequency of very high fire danger days per year is projected to increase on average by about 14 days (with a range of -4 to +37 days) by the 2050s under the higher emissions scenario compared to the historical baseline.
- In Wasco County, the frequency of very high fire danger days per year is projected to increase on average by about 38% (with a range of -11 to +101%) by the 2050s under the higher emissions scenario compared to the historical baseline. [1]

Vulnerability Analysis

The effects of wildland fires vary with intensity, area, and time of year. Factors affecting the degree of risk of fires include extent of rainfall, humidity, wind speed, type of vegetation, and proximity to firefighting agencies. The greatest short-term loss is the complete destruction of valuable resources, such as timber, wildlife habitat, scenic vistas, and watersheds. There is an immediate increase in vulnerability to flooding due to the destruction of all or part of the watershed. Long-term effects are reduced amounts of timber for commercial purposes and the reduction of travel and recreational activities in the affected area.

Home building in and near forests increases risks from forest fires. Wildland urban interfaces (WUI) are areas where there is a zone of transition between undeveloped land and human development. Often, structures have been built and maintained with minimal awareness of the need for protection from exterior fire sources, or the need to minimize interior fires from spreading to forested lands.

In 2018, the Community Planning Assistance for Wildfire (CPAW) produced the *Final Recommendations for Wasco County, OR* that provides an in-depth wildfire hazard assessment and mapping that informs the public concerning wildfire hazard characterization, wildland-urban interface zones and mitigation difficulty in order to deliver a series of policy recommendations to address and reduce wildfire risk. These policy recommendations were added to the 2018 NHMP Plan as action items, and several have been accomplished, or are actively being addressed.

[1] The Oregon Climate Change Research Institute. (2018) *Future Climate Projections Wasco County*. Salem, OR: Oregon Department of Land Conservation and Development.

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Wildfire data are numerous, and Wasco County's 2024 *Community Wildfire Protection Plan* delivers a great deal of relevant data and includes action items that will help further address the increase in frequency and severity of wildland-wildfire caused by climate change. Some of these actions include the assignment of a County Wildfire Coordinator to represent Wasco County in matters pertaining the implementation of the CWPP, Update County Fire Safety Standards, and to adopt the WUI Building Code and Standards (home hardening and defensible space).

In addition to CPAW's *Final Recommendations* and Wasco County's 2024 Community Wildfire Protection Plan, in 2021, the Oregon Department of Geology and Mineral Industries (DOGAMI) published the *Natural Hazard Risk Report for Wasco County, Oregon Including the Cities of Antelope, Dufur, Maupin, Mosier, Shaniko, The Dalles, and Unincorporated Communities of Chenoweth, Tygh Valley, Pine Hollow, and the Warm Springs Indian Reservation.* The DOGAMI report used the Fire Risk Index (FRI) dataset to model the level of risk from wildfires to Wasco County communities. The (high risk) model categorized areas in Wasco County as low, moderate, and high-risk zones based on wildfire impacts and wildfire probability. The model's components were fire suppression difficulty, occurrence, potential assets impacted, fire behavior, and suppression effectiveness.

Wasco Countywide DOGAMI Modeled Wildfire Exposure (High risk):

- Number of buildings: 4,057
- Exposure value: $693,559,000
- Percentage of exposure value: 18%
- Critical facilities exposed: 10
- Potentially displaced population: 5,125

Although the model tested a high risk scenario, DOGAMI estimates that nearly every community within Wasco County has approximately 50 percent exposure to moderate and high wildfire risk. DOGAMI further estimates that the areas with the highest risk exposure to wildfire are located within forested areas within the Cascade Range, along the Deschutes River valley, and within several areas of the Warm Springs Indian Reservation.

Wasco County Communities at the Highest Risk of Wildfire

- Pine Hollow
- Mosier (30 square miles between Mosier and Chenoweth high wildfire risk)
- Chenoweth (30 square miles between Mosier and Chenoweth high wildfire risk)
- Maupin (Homes within the WUI)

Historically, it is clear that the frequency, duration, and intensity of wildfire is increasing through the region due to climate change. Additionally, the existence of open rangelands and large forested areas, increasing population and recreational activities, and the increased impact of climate change suggest a **high probability of occurrence**. The destruction of large tracts of forestland and rangeland, and evacuations from recreation dependent communities would have immediate economic impact through lost revenue and jobs, reduced taxes, and increased public support while collateral economic and social effect could impact the County for years, suggesting **high vulnerability**. Accordingly, a **high risk rating** is assigned.

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For more information on wildfire maps including population density, wildland urban interface, and vegetation groups and conditions in Wasco County, see maps in Appendix F: Maps. Appendix F also includes a DOGAMI map identifying Wildfire Risk areas in Wasco County.

Conclusions

The following steps should be accomplished to preclude major loss of life and reduce the actual number of fires in hazard areas:

1. Since people start the vast majority of wildland fires, fire prevention education and enforcement programs can significantly reduce the total number of wildland fires.

2. An effective early fire detection program and emergency communications systems are essential. The importance of immediately reporting any forest fire must be impressed upon local residents and persons utilizing the forest areas.

3. An effective warning system is essential to notify local inhabitants and persons in the area of the fire. An evacuation plan detailing primary and alternate escape routes is also important.

4. Fire-safe development planning and appropriate wildfire mitigation strategy should be done by local jurisdictions, such as the implementation of safety recommendations to include.

    a. Sufficient fuel-free areas around structures.
    b. Fire resistant roofing materials.
    c. Adequate two-way (ingress and egress) routes and turnarounds for emergency response units.
    d. Adequate water supplies with backup power generation equipment or other means to cost-effectively support firefighting efforts.
    e. Development of local ordinances to control human caused fires; i.e. from debris burning, fireworks, campfires, etc.

5. Road criteria should ensure adequate escape routes for new sections of developments in forest areas.

6. Road closures should be increased during peak fire periods to reduce the access to fire-prone areas.

7. Ensure public roads obtain sufficient operations and maintenance funding.

8. Steps the public can take to better protect lives, property, and the environment from wildfires include:

    a. Maintaining appropriate defensible space around homes.
    b. Providing adequate access routes (two-way with turnaround) to homes for emergency equipment.
    c. Minimizing “fuel hazards” adjacent to homes.
    d. Using fire-resistant roofing materials
    e. Maintaining adequate water supplies.
    f. Ensuring home address is visible to first responders.

9. Some wildland fires are allowed to burn in limited areas as part of forest management.

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EXTREME HEAT

Hazard Definition

Wasco County is on the east side of the Cascade Mountains at the beginning of the Oregon high desert region. The rain shadow effect of these mountains causes the area to have almost 300 days of sun a year. In the height of summer temperatures regularly hover around 90 and occasionally cross above the 100 degree threshold. Oregon's 2020 NHMP provides several ways to measure and define extreme heat; however, for the NHMP, Wasco County uses a common method, which is to count the number of days with temperatures above 100°F.

In the height of summer, temperatures regularly hover around 90 degrees. However, because of climate change, temperatures in Wasco County during June, July, and August have begun to cross above the 100-degree threshold more often. When this excessively hot weather remains in the area for an extended period of time it is called a heat wave (extreme heat).

History

Occurrences in Oregon

HA-2: Significant Historic Extreme Heat Events

Occurrence	Description
June 28-30, 2008	An upper level ridge and thermal trough across the Pacific Northwest produced temperatures above 100 degrees for two consecutive days breaking records in many locations.
August 15-17, 2008	Excessive Heat Event: An upper level ridge and dry air brought excessive heat into eastern Oregon. Many locations experienced multiple days of at least 100-degree temperatures.
July 12-16, 2018	Major heatwave, with 5 triple digit days: 102°, 101°, 101°, 105°, 103°
June-August, 2021	Major heatwave (heatdome), governor declared emergency for Wasco County and 22 other counties. 5 triple digit days breaking records: 102°, 110°, 115°, 118°, 107° in June recorded in The Dalles. 15-days of triple digit temperatures recorded in The Dalles from July-August.
July-August, 2022	Heatwave, not as significant as the 2020 heatdome, but Wasco County experienced 20 days of triple digit temperatures overall.
July 2024	Heatwave in July with nine triple-digit days (6 in a row) ranging from 102°-109°.

Source: (2018 Wasco County NHMP; 2020 Oregon State NHMP; 2024 NHMP Steering Committee; and Loikith P. (2023) Oregon Encyclopedia, The 2021 Pacific Northwest Heatwave (HeatDome)https://www.oregonencyclopedia.org/articles/heat-dome-2021/#:~:text=On%20June%2029%2C%20Oregon%20tied,on%20August%2010%20at%20Pendleton); AccuWeather. (accessed 2024) https://www.accuweather.com/en/us/wasco/97065/july-weather/2187209?year=2024.

Hazard Identification

Extreme heat is generally limited to the summer months; however, it is clear that climate change has increased the number of days Wasco County experiences triple digit temperatures during the months of June, July, and August. The duration and intensity of these heatwaves during the daytime reduces or even negates the cooling effect at night.

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Climate Change

The Oregon Climate Change Research Institute issued a report specific to Wasco County in August 2018. They modeled the following changes due to climate change:

- Extreme heat events are expected to increase in frequency, duration, and intensity due to continued warming temperatures.
- The frequency of hot days with temperatures at or above 90°F is projected to increase on average by 28 days (with a range of 11 to 40 days) by the 2050s under the higher emissions scenario compared to the historical baseline.
- In Wasco County, the temperature of the hottest day of the year is projected to increase by 8°F (with a range of 3 to 13°F) by the 2050s under the higher emissions scenario compared to the historical baseline.[2]

Vulnerability Analysis

The Oregon 2020 NHMP concludes that climate change is extremely likely to increase the frequency and severity of extreme heat events across Oregon and Wasco County. Since 2018, Wasco County has experienced at least 40-days of triple digit temperatures in the months of June, July, and August. Extreme heat can negatively influence commerce, agriculture, fisheries, and overall quality of life, especially for vulnerable populations that lack cooling resources.

Prolonged elevated temperatures pose risks to agriculture operations. Significant numbers of farm workers in Wasco County are vulnerable to long periods of extreme heat, particularly orchard farm laborers where equipment is not a primary mechanism for planting or harvest. Long periods of extreme heat have the potential to damage or destroy agricultural property, particularly those fruits, tree nuts, and berries, such as cherries, that are extremely susceptible to high heat. The United States Department of Agriculture estimates that the market value of agricultural products sold for fruits, tree nuts, and berries in 2022 is $83,382,000, and all agricultural products sold is $126,013,000.[3]

History suggests a **high probability of occurrence**, and climate change will increase the frequency and duration of extreme heat events. The entire population of Wasco County is vulnerable to the effects of extreme heat, but in particular, the elderly and children, outside workers, and the houseless who lack indoor cooling are highly vulnerable. Some older transportation and communications infrastructure may be impacted, but the most consequential economic impacts of extreme heat events are experienced by the agriculture industry. Based on this, future impacts may be greater, suggesting **high vulnerability**. A **high risk rating** is assigned.

Conclusions

The following steps should be accomplished to preclude major loss of life, reduce heat related health incidents, and protect vulnerable property from extreme heat:

[2] Ibid.
[3] The United States Department of Agriculture National Agricultural Statistics Service, Census of Agriculture County Profile for Wasco County. (n.d.-b). https://www.nass.usda.gov/Publications/AgCensus/2022/Online_Resources/County_Profiles/Oregon/cp41065.pdf

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1. Since people may not be aware of their own vulnerabilities to extreme heat, public health outreach and education programs can help develop extreme heat health and safety awareness, especially among sensitive groups such as the elderly, children, people who work outdoors, and low-income communities.

    a. In addition, ensure that education and outreach includes the locations of existing public facilities that are designated cooling centers, or are for general public use such as libraries.
    b. Develop communication systems that provide heat warning information and appropriate responses to the public (e.g., encourage staying indoors, provide symptom reminders).

2. Encourage energy conservation to reduce demand on electricity systems and aged and/or inefficient cooling systems that can be threatened by extreme heat events.

3. Develop programs to encourage and assist vulnerable households with replacement of aged and/or inefficient cooling systems.

4. Investigate the potential for the modification of infrastructure to be constructed from materials that are more resilient and heat tolerant in order to help these systems withstand higher temperatures and reduce overall service disruption.

DROUGHT

Hazard Definition

Drought is a condition of climatic dryness severe enough to reduce soil moisture and water below the minimum necessary for sustaining plant, animal, and human life systems.

Drought is typically measured in terms of water availability in a defined geographical area. It is common to express drought with a numerical index that ranks severity. Most federal agencies use the Palmer Method that incorporates precipitation, runoff, evaporation and soil moisture. However, the Palmer Method does not incorporate snowpack as a variable. Therefore it is not believed to provide a very accurate indication of drought conditions in Oregon and the Pacific Northwest.

The Oregon Drought Severity Index is the most commonly used drought measurement in the state. It is considered a better indicator of drought severity because it incorporates both local conditions and mountain snowpack. The Oregon Drought Severity Index categorizes droughts as mild, moderate, severe, and extreme. The index is available from the Oregon Drought Council.

It is important to understand that Wasco County is on the east side of the Cascade Mountains at the beginning of the Oregon high desert region, and that drought is a common occurrence in the desert. Droughts were particularly noteworthy in the 1890s, and early Oregon records dating back to that era clearly associate drought with a departure from expected rainfall; however, concern for mountain snowpack, which feeds the streams and rivers, came later.

History

Occurrences in Oregon

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HA-3: Significant Historic Drought Events	
Occurrence	**Description**
1904-1905	Drought period of about 18 months
1917-1931	Very dry period punctuated by brief wet spells (1920, 1927)
1939-1941	Three-year intense drought
1965-1968	Three-year drought following the big regional floods of 1964-65
1976-1977	Brief very intense statewide drought
1985-1994	Generally dry period, capped by statewide droughts in 1992 and 1994
2001-2003	State drought declaration for 18 counties
2005	State drought declaration for 13 Counties
2014-2016	State drought
2018	State drought declaration for 11 Counties
2020	State drought declaration for Wasco County and 14 other Counties
2021	State drought declaration for Wasco County and 25 other Counties
2022	State drought declaration for Wasco County and 16 other Counties
2023	State drought declaration for Wasco County and 12 other Counties

Source: (2012 Wasco County NHMP; 2015 Oregon State NHMP; 2017 NHMP Steering Committee; 2024 NHMP Steering Committee, Oregon Water Resources Department Drought Declaration Status Map (2024); and Burns et al. 2011a).

Hazard Identification

Drought conditions can exist year-round; however, the effects of drought are most prominently felt during the spring and summer months when temperatures significantly rise, which increases the necessity of water for crops, livestock, wildlife, and humans.

The Oregon Climate Change Research Institute issued a report specific to Wasco County in August 2018. They modeled high and low greenhouse gas emissions scenarios. There predictions for changes in extreme heat and drought probabilities by the 2050s based on their higher emissions scenario:

- Drought conditions are projected to become more frequent compared to the historical record.[4]

Vulnerability Analysis

Nearly all areas of the county may be vulnerable to drought. The agriculture industry has been impacted by every drought, especially non-irrigated areas. The negative effects caused by

[4] The Oregon Climate Change Research Institute. (2018) *Future Climate Projections Wasco County*. Salem, OR: Oregon Department of Land Conservation and Development.

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sustained drought have seriously affected farm owners, and to a lesser extent, other agriculture-related sectors.

There is increased danger of forest fires. Millions of board feet of timber have been lost to fire, precipitating significant soil erosion in many areas, which has caused serious damage to aquatic life, irrigation, and power development by heavy silting of streams, reservoirs, and rivers.

Low stream flows caused by drought have created higher water temperatures, oxygen depletion, disease, and lack of spawning areas for our fish resources. All of the above effects result in economic and revenue losses for business, cities and Wasco County.

History suggests a **high probability of occurrence**, and climate change will increase the frequency and duration of drought. The entire population of Wasco County is vulnerable to the effects of drought. Transportation and communications infrastructure would be minimally impacted, if at all; however, the agricultural industry, estimated at $126,013,000[5] of agricultural products sold is at high risk. Additionally, as growth becomes more common in places that utilize ground reservoirs for drinking water, there will likely be more pressure on limited local resources and future impacts will be greater, suggesting **high vulnerability**. A **high risk rating** is assigned.

For more information, see Appendix F: Maps for a Liquefaction map of Wasco County from the DOGAMI Risk Report.

Conclusions

To combat the negative effects of drought, new irrigation and water conservation techniques have been developed within the agriculture industry, and federal and state governments have assumed a more active role in developing water projects and soil conservation programs. ORS 536.700 pertains to drought relief and emergency water shortage powers.

Progress is being made in dealing with the impact of droughts through proper management of Oregon's water resources. Hopefully, information being collected and shared will assist in the formulation of effective programs for future water-short years.

Additionally, the following steps should be accomplished to reduce drought related health incidents, and protect vulnerable property from drought:

1. Encourage the construction and expansion of infrastructure needed for aquifer storage, recovery, and water storage capacity, and diversify options for water supply and expand current sources.

2. Encourage the financing of systems to recycle water and practice conjunctive use where possible.

3. Develop models to understand potential water quality changes and monitor groundwater conditions, and continue to Implement watershed management.

4. Develop outreach and education programs that helps citizens understand drought and methods used to conserve water.

[5] Ibid.

DRAFT

5. Develop drought contingency plans and update emergency response plan.

SEVERE WEATHER

Hazard Definition

Communities throughout Wasco County are vulnerable to a variety of severe storm hazards, such as ice and snow storms, violent windstorms such as tornadoes, and even summer heat waves. Severe weather seldom causes death and serious property damage, but they can cause major utility and transportation disruptions.

Ice Storm

Ice storms or freezing rain (black ice) conditions can occur in Wasco County. Ice storms occur when rain falls from warm moist upper layers of the atmosphere into a cold, dry layer near the ground. The rain freezes on contact with the cold ground and accumulates on exposed surfaces. This has the possibility to create havoc when the ice accumulates on tree branches, and power lines. This can cause power outages and can obstruct transportation routes.

Snow Storm or Blizzard

It is possible for moderate snowfall to occur in Wasco County. Wasco County has had accumulations that vary depending on geographic location. For example, accumulations average between 4 – 5 inches in the City of the Dalles each year. However, during December of 1884, almost 30 inches of snow fell over a three-day period, and again in 1909, more than 14 inches fell over five days. Accumulations of snow usually increase with distance and elevation as the terrain rises to the South of the Columbia River. January is usually the month with the greatest snowfall. Moisture and cold air are required for snow to fall. While moisture is common in the winter months, the Cascades act as a barrier to moist air coming from the west. On occasion, cold air can slip in through low points in the Cascades bringing snow to the lower elevations; however, it melts quickly when the warm air moves in. It is common for cold air to come into the County from the central basins of Washington and Oregon.

Heat Wave (Extreme Heat)

The threat of summer heat waves in Wasco County has significantly increased due in part to climate change, which exposes vulnerable populations to increased risk as well as creating hazardous conditions for wildfire or drought potential. Because of the increased potential loss of life and property, the 2024 NHMP Steering Committee determined that extreme heat should be addressed under its own hazard category.

Windstorm

Every so often, the Northwest is severely impacted by strong windstorms. In the past, peak wind gusts have gone above 100 miles per hour. The strongest winds that affect Wasco County come from either east or west. Frequent and widespread strong winds come from the west and are associated with strong storms moving onto the coast from the Pacific Ocean. Strong east winds may also originate from the Eastern Washington and Oregon, when high atmospheric pressure is over the upper Columbia River Basin and low pressure is over the Pacific Ocean. The

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Columbia River Gorge acts as a funnel, concentrating the intensity of the winds as they flow to the West. This generates strong winds throughout the Gorge.

Tornado

Tornadoes characterized by funnel clouds of varying sizes that generate winds as fast as 500 miles per hour. They can affect an area of ¼ to ¾ of a mile and seldom more than 16 miles long. Tornadoes normally descend from the large cumulonimbus clouds that characterize severe thunderstorms. They form when a strong crosswind (sheer) intersects with strong warm updrafts in these clouds causing a slowly spinning vortex to form within a cloud. Eventually, this vortex may develop intensity and then descend to form a funnel cloud. When this funnel cloud touches the ground or gets close enough to the ground to affect the surface it becomes a tornado. Tornadoes can come from lines of cumulonimbus clouds or from a single storm cloud. Tornadoes are measured using the Fujita Scale ranging from F0 to F6. No instance of a tornado has been recorded in Wasco County.

History

HA-4: Significant Historic Severe Weather Events	
Occurrence	**Description**
12/16 - 12/18/1884	Heavy snow in the Columbia River Basin from Portland to The Dalles and along the Cascades foothills in the Willamette Valley; 1-day snow totals: Albany, 16.0 inches; The Dalles, 29.5 inches;Portland,12.4 inches
December 1885	Most snow recorded (6-10 feet), trains had difficulty reaching Portland
12/20/1892-12/23/1892	The record snowfall in the region occurred December 20-23, 1892. In Southwest Washington and Northwest Oregon, 15 to 30 inches of fell. Portland had 27.5 inches of snow.
1/30 - 2/3/1916	Snow and ice storm along the northern Oregon border
12/5 - 12/7/1950	Severe ice storm over the Columbia River basin east of the Cascades
1/18/1956	Freezing rain/snow produced dangerous highway conditions
10/12/1962	The Columbus Day Storm on October 12, 1962 was the worst windstorm to occur in the Northwest since records have been kept. Thirty-eight people died and monetary losses were estimated somewhere between $175 and $200 million. The Portland Airport reported a peak gust of 88 miles per hour. At the Morrison Bridge in Downtown Portland there was a peak gust of 114 mph.
1/17 - 1/19/1970	Freezing temps for a week caused severe ice buildup, damaged trees/utilities
11/22 - 11/23/1970	Freezing rain, 0.5 inch ice accumulations damaged trees
1/25/1974*	Storms/Flooding/Snow Melt

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11/13/1981-11/15/1981	The strongest windstorm since the Columbus Day Storm occurred November 13-15, 1981. This storm was nearly as strong as the Columbus Day Storm but it tracked farther west. This was actually two strong windstorms, the stronger first storm arriving November 13 and early November 14 and the second storm hit on November 15.
2/14 - 2/16/1990	Two feet of snow in the Gorge
July 1995*	Fifteen Mile Creek Flash Food, This flood was caused by a summer thunderstorm
1/16 - 1/18/1996	Freezing rain with heavy accumulations of ice in the Gorge
2/2 - 2/4/1996	Ice storm
12/26 - 12/30/1996	Ice storm, 4-5 inches of ice in the Gorge, Interstate-84 closed for 4 days, downed trees
12/26/2003 - 1/14/2004*	Winter Storms, federal disaster declared for 30/36 Counties
April 2004	Wind storm, $1000 damage
December 2004	Wind storm, $3,333 damage across Sherman, Wasco, Jefferson Counties
March 2005	Wind storm, $2,500 damage across Sherman, Wasco, Jefferson Counties
January 2007	Wind storm, $5000 damage across Gilliam, Sherman, Morrow, Wasco, Umatilla, Jefferson Counties
11/29 - 11/20/2010	4-5 inches of snow, 1/2 inch ice
1/12 - 1/18/2010	4.5 inches of snow, I84 closed due to snow and ice
November 2012	Wind storm, $120,000 damage across Gilliam, Sherman, Morrow, Wasco, Umatilla, Wallowa, Union, Jefferson Counties
December 2016 - February2017	Emergency Declaration requested, multiple highway closures, snow on the ground in The Dalles for 3 months
February 22-26, 2019	Stream of mid-level moisture resulting in a long duration snow event Wasco, Sherman, Gilliam, Morrow, and Umatilla, Counties (Eastern Columbia River Gorge)
2022	Severe ice storm, closure of I-84 several days. Severe windstorms resulted in the death of one person.
2023-2024	December & January severe winter weather storm (12-days in January) brought significant snow (1-2 feet), extreme cold arctic air (-2°F), and closed portions of I-84.

(* - Federal Disaster Declaration)

Source: (2018 Wasco County NHMP; 2020 Oregon State NHMP; 2024 NHMP Steering Committee; and Burns et al. 2011a).).

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Hazard Identification

Severe Weather can affect communities in similar ways throughout the year. Even moderate storms can bring down power lines causing widespread electrical hazards. Storms can also bring down trees and tree limbs, which obstruct roadways, and fall onto houses and other structures causing minor and significant damage. Severe windstorms will usually cause the greatest damage to ridgelines that face into the winds, and can pose a risk to newly developed areas that have been thinned of trees to make way for new structures. Large unprotected trees in these areas are more like to fall. Severe storms can cause massive power and telephone outages. Severe storms in Wasco County have left many without power. In certain areas, it may take several days for utility providers to restore power. This can create life-threatening problems for people with life support equipment such as dialysis machines, respirators, and oxygen generators.

Severe weather may create hazardous driving conditions that can slow down and completely inhibit traffic. This can hinder police, fire, and medical responses to urgent calls. These types of storms also can wreak havoc on first response operations. Law enforcement resources are often tied up in responding to welfare inquiries and in traffic control, while fire departments are tied up with electrical hazards and debris removal. Furthermore, storms can close vital road arteries that are needed for food, fuel, or emergency services. The long-term challenge for severe weather is in debris removal. Hundreds of tons of debris can pile up in residential and commercial areas.

The Oregon Climate Change Research Institute issued a report specific to Wasco County in August 2018. They modeled the following changes due to climate change:

- Cold extremes are still expected to occur from time to time, but with much less frequency and intensity as the climate warms.
- Limited research suggests very little, if any, change in the frequency and intensity of windstorms as a result of climate change.
- Limited research suggests that the risk of dust storms in summer would decrease in eastern Oregon under climate change in areas that experience an increase in vegetation cover from the carbon dioxide fertilization effect.[6]

Vulnerability Analysis

The entire County is vulnerable to the effects of a storm. High winds can cause widespread damage to trees and power lines and interrupt transportation, communications, and power distribution. Prolonged heavy rains cause the ground to become saturated, rivers and streams to rise, and often results in local flooding and landslides.

Ice storms occur when rain falls out of a warm atmospheric layer into a cold one near the ground. The rain freezes on contact with cold objects including the ground, trees, structures, and power lines, causing power lines to break.

Snowstorms primarily affect the transportation system and the availability or timing of public safety services, food, and fuel supplies. Heavy snow accumulations can also cause roofs to

[6] Ibid.

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collapse. Snow accompanied by high winds is a blizzard, which can affect visibility, cause large drifts and strand residents for up to several days. Melting snow adds to river loading and can turn an otherwise benign situation into a local disaster.

Heat waves can increase heat stress on vulnerable populations, potentially leading to heat exhaustion or heat stroke.

Each of these when in combination with any other or if accompanied 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, possibly resulting in an increase in the number of structural fires. Residents without food or water may attempt to use impassable roads and thereby increase the number of rescues.

The effects can vary with the intensity of the storm, the level of preparation of local jurisdictions and residents, and the equipment and staff available to perform necessary tasks to lessen the effects of severe weather. Climate change can increase the frequency, duration, and intensity of storms, and make predictability difficult, which can hinder emergency service preparation and response.

Weather history suggests a **high probability of occurrence**. Historical damage and cumulative costs of destructive storms suggest **high vulnerability**. Accordingly, a **high risk rating** is assigned.

Conclusion

Severe weather seldom causes death and injury and seldom results in severe property damage. However, severe storms have caused serious disasters in Wasco County and they will do so again. Perhaps the best strategy to prevent death and injury is to ensure that people stay off roads and remain in a safe place before the brunt of a storm passes. This is best accomplished through effective employee and student dismissal plans and event cancellation. It is also important to promptly notify the public of severe weather watches and warnings.

In the response to severe weather, often a sticking point is the prioritization of phone and power restoration services. Emergency managers and first responders need to work closely with utility providers and telephone companies to ensure that power and phone service is quickly restored to essential facilities.

Once the general public has weathered a severe storm and their power and phone service is restored their highest priority should be to quickly and safely remove the debris on their property and on the roads they drive. Debris removal planning is essential so that systems are in place to efficiently manage and finance prompt debris removal.

Additionally, the following steps should be accomplished to reduce flood related damage to people and property:

1. Plan for and establish alternative or on-site power supplies for critical facilities.

2. Update aged and/or inefficient critical facilities, vital equipment, and infrastructure.

3. Ensure public roads obtain sufficient operations and maintenance funding.

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4. Implement green infrastructure where appropriate.

FLOOD

Hazard Definition

The main cause of Northwest floods is the moist air masses that regularly move over the region in the winter. In Wasco County, the weather that produces the most serious flooding events are extensive wet conditions that follow a period of mid and high elevation ice and snow pack development.

Riverine and flash floods may both occur in Wasco County. Riverine floods happen when the amount of water flowing through a river channel exceeds the capacity of that channel. Riverine floods are the most common type of flooding. Flash flooding occurs during sudden rainstorms when a large amount of rain falls in a very short period of time. These happen in steeply sloping valleys and in small waterways.

A secondary category of flood is the stormwater or urban flood. Stormwater flooding occurs when runoff from rainfall concentrates in developed areas, drainage, and low-lying areas. Poor drainage, elevated groundwater levels, and ponding are all symptoms of storm water flooding that can cause property damage.

Stormwater flooding should be a concern in Wasco County because of rapid development. In the February 1996 flooding there were a surprising number of properties that were impacted that were not near a tributary. Instead these properties were in poorly drained areas where ponding and runoff patterns caused basements to flood and other types of water damage. Not all of this is due to development. Natural soil conditions and geological features often determine drainage patterns.

History

HA-5: Significant Historic Flood Events

Occurrence	Description
January 1923	Record flood levels on the Deschutes River
May 1928	Columbia River flooding occurred
March 1932	Flooding occurred on the John Day and Grande Ronde Rivers
5/30/1948	Columbia River crested at 34.4 ft. Flood stage at that time was 15 ft. This is the flood that destroyed the City of Vanport. Fifteen people died in the flood.
March 1952	Flooding occurred on the John Day and Grande Ronde Rivers, highest flood stages on these rivers in over 40 years
July 1956	Flash flooding occurred in Central Oregon
December 1964*	Region wide flooding occurred (Dec 24, 1964)

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1/25/1974*	Storms/Flooding/Snow Melt
July 1995*	Fifteen Mile Creek Flash Food, This flood was caused by a summer thunderstorm
1/1996 - 2/1996*	This widespread flood in the Pacific Northwest was the result of heavy rain and warming on heavy mid elevation snowpack, and was similar to regional flooding in December 1964. The Columbia River crested at 27.1 ft. on February 9. This flood occurred because of the confluence of several factors. The winter of 1995/96 was extremely rainy. Prior to the flooding period, the region experienced a cold snap with low elevation freezing, ice, and snow. As a result, Mill Creek flooded downtown The Dalles where heavy damage was caused. The last 850 ft. of Mill Creek before it enters the Columbia River was in a tunnel. Heavy debris flows and log jams at the tunnel inlet coupled with reduced discharge head caused by Columbia River levels backed water up and into the downtown business area. Losses were in millions of dollars.
12/1996-2/1997	Region wide flooding occurred
12/14 - 12/16/2006	Winter Storms/Flooding
August 2019	A powerful upper storm system combined with modest low and mid-level moisture to yield scattered strong to severe storms and flash flooding.
July 1995*	Fifteen Mile Creek Flash Food, This flood was caused by a summer thunderstorm
1/1996 - 2/1996*	This widespread flood in the Pacific Northwest was the result of heavy rain and warming on heavy mid elevation snowpack, and was similar to regional flooding in December 1964. The Columbia River crested at 27.1 ft. on February 9. This flood occurred because of the confluence of several factors. The winter of 1995/96 was extremely rainy. Prior to the flooding period, the region experienced a cold snap with low elevation freezing, ice, and snow. As a result, Mill Creek flooded downtown The Dalles where heavy damage was caused. The last 850 ft. of Mill Creek before it enters the Columbia River was in a tunnel. Heavy debris flows and log jams at the tunnel inlet coupled with reduced discharge head caused by Columbia River levels backed water up and into the downtown business area. Losses were in millions of dollars.
12/1996-2/1997	Region wide flooding occurred

(* - Federal Disaster Declaration)
Source: (2018 Wasco County NHMP; 2020 Oregon State NHMP; 2024 NHMP Steering Committee; and Burns et al. 2011a).

Hazard Identification

Many rivers in Wasco County historically flood every few years. These include the White River, the Deschutes River and the Columbia River. Flooding on these rivers usually occurs between October and February. Long periods of heavy rainfall and mild temperatures coupled with snowmelt contribute to flooding conditions.

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Vulnerability Analysis

According to the 2021 DOGAMI Natural Hazard Risk Report for Wasco County, Oregon, flooding can cause a significant amount of damage to persons and property.

Wasco County participates in the National Flood Insurance Program and has developed local ordinances to better regulate and direct development in flood plain areas. These local ordinances regulate planning, construction, operation, and maintenance of any structures, and improvements, private or public. They work to assure that development is properly planned, constructed, operated, and maintained to avoid adversely influencing the regimen of a stream or body of water or the security of life, health, and property against damage by floodwater.

Past examples that have been taken to mitigate the effects of flooding include the following mitigation strategies:

1. The Fifteen Mile Creek and Mill Creek Hazard Mitigation Projects

   The Fifteen Mile Hazard Mitigation Plan was developed by a local, interagency planning team and approved by the Wasco County Court; Oregon Military Department, Office of Emergency Management (OEM); and FEMA. Hazard Mitigation Grant Program (HMGP) funding was approved in fall 1996 for $202,000 and work initiated in spring 1997. Work included best management practices on private lands designed to reduce runoff and erosion in areas where frequent events damage infrastructure such as roads and bridges. Work also included upgrading culverts, and other roadway systems. The purpose of the program was to reduce damage to infrastructure from future, similar events. This project was completed in the fall of 1999.

   Mill Creek Hazard Mitigation Project was an interagency planning team identified the most feasible solution to be creation of a floodway or surface overflow outlet to carry out-of-bank flows safely to the Columbia River. Extremes from minimal land shaping to 16 x 16 ft. concrete channel were considered with considerable variation in initial cost estimates. At the last team meeting in 1997, the UPRR representative was going to investigate potential funding for a Corps of Engineers definitive study. Minimal state support has been received for this effort.

2. Corps engineering / analysis scheduled; City of The Dalles assumed sponsorship for this urban public works project. The City's urban renewal efforts in 2001 included pedestrian passage under the freeway that might double as a water outlet during flood events at the mouth of Mill Creek.

Most recently, DOGAMI used FEMA's Hazus-MH to model a 100-year flood loss in Wasco County. Among other data, the study utilized information on county buildings in a flood zone or within 500 feet of a flood zone, assessor data on occupancy type and basement presence, and building first floor height to estimate property loss and population displacement in Wasco County.

Wasco Countywide DOGAMI Modeled 100-year flood loss:

- Number of buildings damaged: 560
- Loss estimate: $19,867,000
- Loss ratio: 0.5%

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- Damaged critical facilities: 1
- Potentially displaced population: 540

Oregon Department of Geology and Mineral Industries (DOGAMI) (2018) publication entitled *Natural Hazard Risk Report for Wasco County, Oregon*.

Residents who live in floodplains face far greater risks than needed. These homeowners probably face greater financial liability than they realize. During a 30-year mortgage period, a home in a mapped floodplain has about a 26 percent chance of being damaged by a 100 year-flood event. The same structure has only about a one percent chance of being damaged by fire. Many homeowners who live in floodplains carry fire insurance, but do not carry flood insurance.

With uninsured homes located in floodplains, Wasco County homeowners are vulnerable to flood damage. Adding to this vulnerability, are increases in the percentage of households and population living in floodplains as new growth creates increasing pressure to develop more marginal land. Furthermore, as the density of development increases and permeable natural surfaces are replaced with homes and roads, the volume of stormwater runoff and the area over which it floods will increase. As a result, unknown numbers of homes that were once outside mapped floodplains will face an increased threat of flooding, a threat they were never built to withstand. In fact, 35-40 percent of the National Flood Insurance Program's claims are currently coming from outside the mapped floodplains.

In 2023, FEMA began working with the state of Oregon, Wasco County, the cities of The Dalles, Dufur, Maupin and Mosier and the Town of Shaniko to use new data and technology to update the Flood Insurance Rate Map (FIRM) within Wasco County. The new map will better represent the risk of flooding, and help communities better understand their flood risks. In 2023, FEMA began working with the state of Oregon, Wasco County, the cities of The Dalles, Dufur, Maupin and Mosier and the Town of Shaniko to use new data and technology to update the Flood Insurance Rate Map (FIRM) within Wasco County. The new map will better represent the risk of flooding, and help communities better understand their flood risks. On July 15, 2024, FEMA sent a letter to Wasco County requiring the County change its flood hazard regulations to conform to requirements from the Federal Endangered Species Act (ESA). Wasco County is on track to update its Flood Hazard Overlay Zone in accordance with FEMA's demand. The updated Flood Hazard Overlay Zone code conforms to model Flood Hazard Overlay zoning criteria in order to help the public make informed decisions about how to protect against damage and loss from flood hazards, and meets the required ESA protections. The overlay zone is scheduled for update in December 2024. The updated Flood Insurance Rate Map is scheduled to be adopted by Wasco County in 2026.

Historically, flooding occurs along one or more of the County's waterways every few years, suggesting a **moderate probability of occurrence.** Because of the relative land area and population affected, the County is exposed to **moderate vulnerability**. The frequency of flooding, the potential for simultaneous flooding events, plus the historical record of recurrent flooding and cumulative costs, all suggest the assignment of a **moderate risk rating.**

For more information on where Flood Hazard zones are located in Wasco County see Appendix F map showing Environmental Protection District 1: Flood Hazard Overlay.

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Conclusions

Floods can cause loss of life and great damage to structures, crops, land resources, flood control structures, roads, and utilities of all kinds. Building in established floodplain areas must be regulated. Human-made developments within flood plains should be limited to non-structures such as parks, golf courses, farmlands, etc. These facilities have the least potential for damage, but maximize land use.

The general public should be made aware of hazardous areas and be given flood insurance and emergency preparedness information.

The National Weather Service has an extensive river and weather monitoring system and usually provides adequate and timely warning. The National Weather Service provides weather information to local jurisdictions and the public in a variety of ways, radio, teletype, and telephone.

Additionally, the following steps should be accomplished to reduce flood related damage to people and property:

1. Plan for and establish alternative or on-site power supplies for critical facilities that are within a flood zone.

2. Update aged and/or inefficient critical facilities, vital equipment, and infrastructure that must be in the flood zone.

    a. Where feasible, remove critical facilities, vital equipment, and infrastructure from flood zones

3. Ensure public roads obtain sufficient operations and maintenance funding.

4. Implement appropriate green infrastructure where appropriate to mitigate urban flash flood impacts.

EARTHQUAKE

Hazard Definition

An earthquake is the shaking of the ground caused by an abrupt shift of rock along a fracture in the earth, called a fault. There are three categories of earthquakes and each type may affect Wasco County.

- The first is a shallow or crustal earthquake. These occur at a depth of 5 to 10 miles beneath the earth's surface. These earthquakes are associated with fault movement within a surface plate.

- The second type of earthquake is an intraplate, or "deep" earthquake. Intraplate earthquakes occur when an earthquake on a geologic plate affects another plate. In Pacific Northwest geology, intraplate earthquakes happen when the Juan de Fuca plate breaks up underneath the continental plate, approximately 30 miles beneath the earth's surface.

DRAFT

- The third type of earthquake is a subduction zone earthquake. In the Pacific Northwest this is the Cascadia Subduction Zone (CSZ) earthquake. These occur when two converging plates become stuck along their interface. Continued movements between the plates will build up energy across the locked surface until the plates abruptly slip along the interface when the strain is released.

Magnitude is the measure of the strength of an earthquake, or the strain energy released by it, as determined by seismographic observations (size or length of a seismic signal). There are several types of magnitude scales of which the Richter Scale is the best known. Magnitude is expressed in whole numbers and decimal fractions. For example, a magnitude of 5.3 might be computed for a moderate earthquake, and a strong earthquake might be rated as magnitude 6.3. Because of the logarithmic basis of the scale, each whole number increase in magnitude represents a tenfold increase in measured amplitude. As an estimate of energy, each whole number step in the magnitude scale corresponds to the release of about 31 times more energy than the amount associated with the preceding whole number value.

History

Each year since 1980, the Pacific Northwest Seismograph Network has recorded an average of more than two thousand earthquakes in Washington and Oregon; however, the vast majority are shallow earthquakes with 99% of them registering a magnitude less than 3.0.

The largest earthquake in Washington and Oregon's recorded history was a shallow earthquake which occurred in 1872 in Washington's North Cascades. The earthquake had an estimated magnitude of 7.4 and was followed by many aftershocks.

Because there is not a complete recorded history of Oregon earthquakes, there is no method to fully assess the future risk. Furthermore, in western Oregon, the high rainfall promotes erosion rates and dense ground cover, both of which tend to hide faults.

HA-6: Significant Historic Earthquake Events

Occurrence	Description
1400 BCE	Approximate Cascadian Subduction Zone (CSZ) event
1050 BCE	Approximate CSZ
600 BCE	Approximate CSZ
400	Approximate CSZ
750	Approximate CSZ
900	Approximate CSZ
1/27/1700	January 26, 1700, Offshore, Cascadia subduction zone, Approximately 9, generated a tsunami that struck Oregon, Washington and Japan; destroyed Native American villages along the coast.
11/23/1873	Oregon/California border, near Brookings, 6.8, Felt as far away as Portland and San Francisco; may have been an intraplate event because of lack of aftershocks.

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7/15/1936	Milton-Freewater, 6.4, two foreshocks and many aftershocks felt; $100,000 damage (in 1936 dollars).
4/13/1949	Olympia, Washington, 7.1, Eight deaths and $25 million damage (in 1949 dollars); cracked plaster, other minor damage in northwest Oregon.
11/5/1962	Portland/Vancouver, 5.5, Shaking lasted up to 30 seconds; chimneys cracked, windows broke, furniture moved.
May-July 1968	Adel Swarm, largest 5.1 Swarm, lasted May through July, decreasing in intensity; increased flow at a hot spring was reported.
4/12/1976	Near Maupin, 4.8, Sounds described as distant thunder, sonic booms, and strong wind.
4/25/1992	Cape Mendocino, California, 7.0, Subduction earthquake at the triple junction of the Cascadia subduction zone and the San Andreas and Mendocino faults.
3/25/1993	Scotts Mills, 5.6, On Mount Angel-Gales Creek fault; $30 million damage, including Molalla High School and Mount Angel church.
9/20/1993	Klamath Falls, 5.9 and 6.0, Two deaths, $10 million damage, including county courthouse; rock falls induced by ground motion.

Source: (2018 Wasco County NHMP; 2020 Oregon State NHMP; 2024 NHMP Steering Committee; and Burns et al. 2011).

A northwest subduction zone earthquake has not occurred locally since the 1700's. However, similar subduction zones worldwide have produced earthquakes of magnitude 8 or larger. An example is the 9.2 Alaska earthquake of 1964. Geologic evidence indicates that the Cascadia Subduction Zone has generated great earthquakes at roughly 500 year intervals, most recently about 300 years ago. Researchers estimate there is a 10% chance of a local subduction zone earthquake within the next 200 years.

Hazard Identification

The Pacific Northwest is an extreme seismically active area. Potential earthquake sources in Wasco County are not well known because there have not been a frequent number of large earthquakes here as there have been in California. Estimations of possible earthquake sources are limited to studies of many small earthquakes, investigations of known faults, and other geological surveys.

Earthquakes in Wasco County are most likely to originate from two sources: 1) the Cascadia Subduction Zone; and 2) from faults located near the eastern end of the Columbia River Gorge which create shallow or crustal earthquakes.

Cascadia Subduction Zone - The Cascadia Subduction Zone lies about 50 miles offshore, extending from near Vancouver Island to northern California. The zone is where the oceanic Juan de Fuca plate dives beneath the continental North American plate. These plates are converging at a rate of 1 – 1.5 inches per year.

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Vulnerability Analysis

The scope of damage caused by a seismic event is a function of measuring an earthquake's magnitude. When measuring preparedness, it is important to consider that the entirety of Wasco county's population, property, commerce, infrastructure and private as well as government services may be vulnerable to an earthquake.

The lack of "recent" significant seismic events in Wasco County makes it difficult to estimate the scope of damage that a high magnitude earthquake could cause; however, geology clearly shows that the county has been impacted by considerable events in the last 500 years. A 2021 probabilistic method earthquake scenario ran by Oregon's Department of Geology and Mineral Industries (DOGAMI), used a 2% in 50 years or 2,500-year (actually 2,475-year) probabilistic shaking map model. This model was deemed most appropriate for communicating earthquake risk for Wasco County. The model is based on the highest level of shaking that could reasonably be expected to occur once every 2,475 years, and for practical purposes can be considered a worst-case earthquake event. The Hazus-MH tool used a characteristic magnitude value to calculate the impacts of liquefaction and landslides, and for the study, an Mw 7.0 earthquake was used for the event.

The federal color-tagging system was utilized by DOGAMI's earthquake scenario to represent the state of damage taken by a structure. Red-tagged buildings correspond to a state of "complete" destruction and are uninhabitable while yellow-tagged buildings correspond to a state of having "extensive" damage and limited habitability. The total number of potentially displaced persons was based on the number of red and yellow tagged residences identified in the model. The potential damage to persons and property from a Mw 7.0 (magnitude) earthquake in Wasco County is as follows:

Wasco Countywide DOGAMI 2,500-year probabilistic Mw **7.0 earthquake results:**

- Number of red-tagged buildings: 1,104
- Number of yellow-tagged buildings: - 2,118
- Loss estimate: $870,172,000
- Loss ratio: 22%
- Non-functioning critical facilities: 18
- Potentially displaced population: 1,888

The above information is from the Oregon Department of Geology and Mineral Industries (DOGAMI) (2021) publication entitled *Natural Hazard Risk Report for Wasco County, Oregon*, and is located on DOGAMI's website at: https://pubs.oregon.gov/dogami/ofr/O-21-07/Wasco_County_Natural_Hazard_Risk_Report.pdf.

The results of DOGAMI's modeling scenario indicate that Wasco County would incur significant losses (22%) due to the earthquakes represented in the probabilistic shaking map. The overall results were primarily influenced by earthquake-induced landslides and a high amount (84%) of building stock situated throughout the county that was built before seismic building codes were implemented in Oregon in the 1970s.

Most injury, death, and property damage in an earthquake result from seismic impacts on structural and non-structural materials. The vulnerability of certain areas partially depends on the types of structures in that area. A wood frame residential structure that is adequately

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secured to the foundation is relatively safe. Un-reinforced masonry buildings are at greatest risk from seismic impacts. Most injuries in earthquakes result from non-structural materials such as light fixtures, equipment, and furniture, falling on people and causing injury.

In a separate Mw 7.0 earthquake simulation, DOGAMI upgraded all non-seismic code buildings to "moderate" code level. The simulation estimated that overall building loss would drop from 22 percent to 14 percent; however, the study also found for areas of high landslide or liquefaction, additional geotechnical mitigation may be necessary to have an effect on losses. The County's three most landslide vulnerable areas are estimated to be Mosier, Tygh Valley, and The Dalles.

Another factor in earthquake vulnerability is soil type. Water-saturated loose sand and silt loses its ability to support structures in an earthquake. Areas in Wasco County that are near the flood plains near the Columbia River or areas with silt deposits are also at great risk during an earthquake.

Within the limits of predictability, we must assume a **moderate probability of occurrence** for a damaging earthquake during the next 50 years. A large earthquake centered in Western Oregon could have a minor impact on Wasco County suggesting **moderate vulnerability**. Accordingly, a **moderate-risk rating** is assigned.

Conclusions

It is difficult to identify a part of the community that is not vulnerable to an earthquake. People, buildings, emergency services, hospitals, transportation lifelines, and water and wastewater utilities are susceptible to the effects of an earthquake. In addition, electric and natural gas utilities and dams have a potential to be damaged.

Earthquakes are unique in impact to structures. Injuries result from structural materials falling on people and creating hazards.

Effects of a major earthquake in the Pacific Northwest could be catastrophic, providing the worst case disaster short of war. Thousands of persons could be killed and many tens of thousands injured or left homeless. A major earthquake may create additional hazards such as pipeline line leaks and ruptures, hazardous materials releases, train derailments, and fires.

Mitigation activities such as the following should be instituted and maintained to lessen the potential problems.

1. Examination, evaluation, and enforcement of effective building and zoning codes.

2. Geologically hazardous areas should be identified and land use policies adopted to lessen risk.

3. Public information on what to do before, during, and after an earthquake should be provided to citizens.

4. Local and state governments should develop and maintain response procedures and keep mitigation programs ongoing.

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VOLCANOES

Hazard Definition

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. Volcanoes are a deadly hazard. From 1980 to 1995 volcanoes killed approximately 29,000 people, forced the evacuation of 830,000 people, and caused economic losses in excess of $3 billion (Simkin and Siebert, 1994).

There are a wide variety of hazards related to volcanoes and volcano eruption. With volcano eruptions, the hazards are distinguished by the different ways in which volcanic materials and other debris flow from the volcano. Following is a list of the different types of hazards that exist in cascade volcanoes.

Figure HA-1: Types of Volcanic Hazards

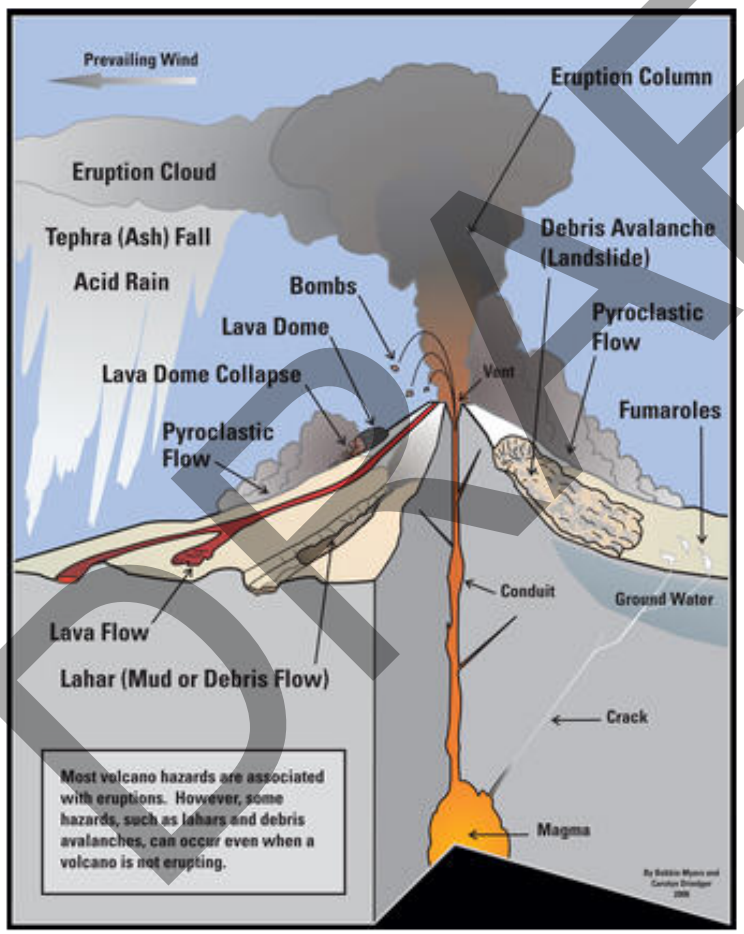

Figure A – Types of volcanic hazards United States Geological Service (Volcano Hazards in the Cascade Range)

Pyroclastic Flows and Surges

Pyroclastic flows are avalanches of hot (300-800°C), dry, volcanic rock fragments and gases that descend a volcano's flanks at speeds ranging from 20 to more than 200 miles per hour. They originate from the actual explosion related to an eruption. Pyroclastic flows and surges are a

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lethal hazard. They result in incineration, asphyxiation, burial, and impact. Because of their speed they cannot be outrun.

Pyroclastic flows are heavier than air and will seek topographically low areas. Pyroclastic surges, composed of hot mixtures of gas and rock will flow above the ground and they may go over topographical barriers such as ridges and hills.

Lava Flows

Lava flows are normally the least hazardous threat posed by volcanoes. The silica content of the lava determines the speed and viscosity of a lava flow. The higher the silica content, the more viscous (thick) the lava becomes. Low silica basalt lava can move 10 to 30 mph. High silica andesite and dacite tend to move more slowly and travel short distances. Cascades volcanoes are normally associated with slow moving andesite or dacite lava. However, 2,000 years ago Mt. St. Helens produced a large amount of basalt.

Large lava flows may destroy property and cause forest fires but, since they are slow moving, pose little threat to human life. Perhaps the greater hazard presented by lava flows is that their extreme heat can cause snow and ice to melt very quickly, adding to lahar, debris avalanche, and flooding hazards.

Tephra

The ash and the large volcanic projectiles that erupt from a volcano into the atmosphere are called tephra. The largest fragments (bombs, >64mm) fall back to the ground fairly near the vents, as close as a few meters and as far as 10 km (6 mi.). The smallest rock fragments (ash) are composed of rock, minerals, and glass that are less than two millimeters in diameter. Tephra plume characteristics are effected by wind speed, particle size, and precipitation.

Tephra falls pose a variety of threats. Ash only 1 cm thick can impede the movement of most vehicles and disrupt transportation, communication, and utility systems. During the past 15 years about 80 commercial jets have been damaged by inadvertently flying into ash, and several have nearly crashed. Airborne tephra will seldom kill people who are a safe distance from the vent. However, tephra may cause eye and respiratory problems, particularly for those with existing medical conditions. Short-term exposure should not have any long-term health effects. Some tephra material may have acidic aerosol droplets that adhere to them. This may cause acid rain or corrosion of metal surfaces they fall on.

Ash may also clog ventilation systems and other machinery. When tephra is mixed with rain it becomes a much greater nuisance. Wet ash is much heavier and it can cause structures to collapse. Most of the 330 deaths associated with the Mt. Pinatubo eruption were caused by roofs collapsing under the weight of rain soaked ash. Wet ash may also cause electrical shorts. Ash falls also decreases visibility and may cause psychological stress and panic.

Lahars

Lahars are rapidly flowing mixtures of water and rock debris that originate from volcanoes. While lahars are most commonly associated with eruptions, heavy rains, debris accumulation, and even earthquakes may also trigger them. They may also be termed debris or mud flows. Lahars can travel over 50 miles downstream, reaching speeds between 20 and 40 mph. The highest recorded speed of a lahar during the 1980 Mt. St. Helens eruption was 88 mph. Beyond

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the flanks of a volcano, lahars will normally be channeled into waterways. The threat from lahars comes from their speed and from the debris they carry. Abrasion from the heavy sediment and impacts from heavy debris can destroy forests as well as human made structures including bridges, dams, roads, pipelines, buildings, and farms. Lahars may also fill in channels, obstructing shipping lanes and impact a channel's ability to handle large volumes of water.

Debris Avalanches

Volcanoes are prone to debris and mountain rock avalanches that can approach speeds of 160 kilometers per hour (100 mph). Volcanoes are characterized by steep slopes of weak rock. Volcanic rock material is weakened by the acidic ground water that seeps through rock cracks and turns rigid rock into clay. Minor eruptions, earthquakes, or releases of built up water and debris may trigger large avalanches of this material.

Volcanic Gases

All active volcanoes emit gases. These gases may include steam, carbon dioxide, sulfur dioxide, hydrogen sulfide, hydrogen, and fluorine. Sometimes, these chemicals can be absorbed by ash and impact ground water, livestock, and metal objects. Even when a volcano is not erupting, gases can escape through small surface cracks. The greatest danger to people comes when large quantities of toxic gases are emitted from several sources or when there are topographic depressions that collect gases that are heavier than air. These gases can accumulate to the point where people or animals can suffocate. Neither of these conditions exist in Cascade volcanoes, though this could change if magma were to come close to the surface. Mt. St. Helens emitted thousands of tons of Sulfur Dioxide every day in the early 80's. These gases were easily dispersed by the wind.

History

HA-7: Significant Historic Volcano Events	
Occurrence	**Description**
5/1/1980	Mt. St. Helens, ashfall in Wasco County
Various	At least five eruptions in the Cascade Range have occurred during the past 150 years.

(* - Federal Disaster Declaration)
Source: (2018 Wasco County NHMP; 2020 Oregon State NHMP; 2024 NHMP Steering Committee; and and Burns et al. 2011a).

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 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.

Hazard Identification

Mount Hood has erupted intermittently for hundreds of thousands of years, but historical observations are meager, so most of our information about its past behavior comes from geologic study of the deposits produced by prehistoric events. Observations of recent eruptions

DRAFT

at other similar volcanoes around the world allow us to better understand what future eruptions of Mount Hood might be like. A brief description of the kinds of events that have occurred at Mount Hood and are likely to happen in the future follows.

Lava Eruptions, Pyroclastic Flows, and Related Lahars

Lava has erupted at Mount Hood chiefly in two modes. Numerous lava flows issued from vents on the upper flanks and traveled up to 12 kilometers (7 miles) down valleys. Erosion of new valleys along flow margins has left many of these lava flows as ridges, such as Cathedral Ridge, that radiate out from the center of the volcano. Observations of lava flows at similar volcanoes suggest that Mount Hood flows move down valleys as tongues of fluid lava a few to tens of meters thick (10 to 200 feet) encased in a cover of hardened lava rubble. Such lava flows can destroy all structures in their paths, but they advance so slowly that they seldom endanger people. Lava domes formed stubby lava masses on the upper flanks and summit of Mount Hood as lava welled out of a vent and piled up, too viscous to flow away. A recent example is the lava dome that grew in the crater of Mount St. Helens between 1980 and 1986. Past lava domes growing on the steep upper flanks of Mount Hood were typically unstable and collapsed repeatedly as they grew higher and steeper.

Collapse of a growing lava dome or the front of a thick lava flow generates landslides of hot rock called pyroclastic flows. Pyroclastic flows are fluid mixtures of hot rock fragments, ash, and gases that sweep down the flanks of volcanoes at speeds of 50 to more than 150 kilometers per hour (30 to 90 miles per hour) destroying vegetation and structures in their paths. Most are confined to valley bottoms, but pyroclastic surges, overriding clouds of hot ash and gases, are more mobile and can overwhelm even high ridge tops. At Mount Hood, pyroclastic flows have traveled at least 12 kilometers (7 miles) from lava domes; pyroclastic surges probably traveled even farther. Pyroclastic flows and surges also produce ash clouds that can rise thousands of meters (tens of thousands of feet) into the atmosphere and drift downwind for hundreds of kilometers (hundreds of miles). The consequences of this ash are discussed in a later section called Tephra Fall.

Pyroclastic flows and surges can also melt snow and ice and generate lahars (also called volcanic mudflows or debris flows). Lahars are rapidly flowing, water-saturated mixtures of mud and rock fragments, as large as truck-size boulders that range in consistency from mixtures resembling freshly mixed concrete to very muddy water. Lahars can travel more than 100 kilometers (60 miles) down valleys. They move as fast as 80 kilometers per hour (50 miles per hour) in steep channels close to a volcano, but slow down to about 15 to 30 kilometers per hour (10-20 miles per hour) on gently sloping valley floors farther away. Past lahars at Mount Hood completely buried valley floors in the Sandy and Hood River drainages all the way to the Columbia River and in the White River drainage all the way to the Deschutes River.

Eruptive activity at Mount Hood during the past 30,000 years has been dominated by growth and collapse of lava domes. The last two episodes of eruptive activity occurred 1,500 and 200 years ago. Repeated collapse of lava domes extruded near the site of Crater Rock, Mount Hood's youngest lava dome, generated pyroclastic flows and lahars and built much of the broad smooth fan on the south and southwest flank of the volcano.

The newly formed fans of debris on the lower flanks of Mount Hood and deposits of lahars in river valleys were highly erodible, which caused additional impacts. Normal rainfall, snowmelt, and streams remobilized the sediment and continued to move it farther downstream for years

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after eruptions. For example, after the last eruptive period, the Sandy River became choked with sediment and within about a decade buried the pre-eruption valley floor over 20 meters (65 feet) deep between Sandy and Troutdale. Ultimately, much of the sediment from past eruptions entered the Columbia River. A recurrence of such events would greatly affect the Columbia River, its shipping channel, and, potentially, hydroelectric installations, such as Bonneville Dam.

Debris Avalanches and Lahars

Rapidly moving landslides, called debris avalanches, and occurred numerous times in the past when the steep upper parts of Mount Hood collapsed under the force of gravity. Warm acidic ground water that circulates in cracks and porous zones inside volcanoes alters strong rock to weak slippery clay, thereby gradually weakening them and making them more susceptible to debris avalanches than other mountains. Volcanoes are further weakened as erosion, especially by glaciers, oversteepens slopes. The destabilizing forces of magma (molten rock) pushing up into a volcanic cone prior to an eruption can trigger debris avalanches as occurred at Mount St. Helens in 1980. Unexpected earthquakes (both smaller local ones and larger distant ones) or steam explosions can also trigger debris avalanches. A debris avalanche can attain speeds in excess of 160 kilometers per hour (100 miles per hour); the larger the avalanche, the faster and farther it can move. Small-volume debris avalanches typically move only a few kilometers (1 to 3 miles), but large-volume debris avalanches are capable of reaching tens of kilometers (tens of miles) from the volcano. Debris avalanches destroy everything in their paths and can leave deposits 10 to more than 100 meters (30 to more than 300 feet) thick on valley floors. Depending upon their water content, debris avalanches can transform into lahars, which, like lahars formed by pyroclastic flows, can move down valleys for even greater distances.

About 1,500 years ago, a moderate-size debris avalanche originating on the upper southwest flank of Mount Hood (see photograph) produced a lahar that flowed down the Zigzag and Sandy River valleys. It swept over the entire valley floor in the Zigzag-Wemme- Wildwood area, and inundated a broad area near Troutdale, where the Sandy flows into the Columbia Rivera total distance of about 90 kilometers (55 miles). More than 100,000 years ago, a much larger debris avalanche and related lahar flowed down the Hood River, crossed the Columbia River, and flowed several kilometers up the White Salmon River on the Washington side. Its deposit must have dammed the Columbia River at least temporarily.

During non-eruptive periods, relatively small lahars present a hazard along channels and on floodplains on the flanks of Mount Hood. Although of modest size compared to lahars generated by eruptions or large debris avalanches, they occur much more frequently. Twenty-one lahars, including single flows as large as several hundred thousand cubic meters (cubic yards), whose effects were chiefly limited to areas within 15 kilometers (9 miles) of Mount Hood's summit, are reported in the historical record. Most occurred during autumn and early winter rains. Glacial outburst floods caused at least two and probably as many as seven others. A highly damaging lahar occurred in December 1980 when intense warm rain (with rapid snowmelt) triggered a flow in Polallie Creek that killed a camper at the creek mouth and temporarily dammed the East Fork Hood River. The ensuing dambreak flood destroyed about 10 kilometers (6 miles) of Oregon Highway 35 and other downstream facilities and caused about $13 million in damage.

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Tephra Falls

Mount Hood has typically not produced thick, extensive deposits of tephra (fragmented solidified lava that rises into the air, is carried by winds, and falls back to the ground) as has nearby Mount St. Helens. Rather, relatively modest amounts of tephra were produced during past lava-flow and lava-dome eruptions. Most tephra fallout was caused by clouds of sand- and silt-size particles that rose from moving pyroclastic flows produced by lava-dome collapse. Tephra was also generated by explosions driven by volcanic gases. Both types of tephra clouds probably reached altitudes of 1,000 to 15,000 meters (3,000 to 50,000 feet) above the volcano and were then carried away by the prevailing wind, which blows toward sectors northeast, east, or southeast of Mount Hood about 70 percent of the time. Winds that would carry tephra toward the Portland metropolitan area are rather uncommon, occurring only a few percent of the time. On the flanks of the volcano, each event deposited, at most, a few centimeters (inches) of tephra. Thickness of tephra fallout decreased rapidly downwind to probably just a few millimeters (one-tenth inch) or less at 100 to 200 kilometers (60-120 miles) from the volcano. During future explosions at Mount Hood, large, dense ballistic fragments (more than 5 cm (2 inches) in diameter) that can damage structures and kill or injure people may be thrown up to 5 kilometers (3 miles) from vents.

Tephra fallout produced by future eruptions of Mount Hood poses little threat to life or structures in nearby communities. Tephra clouds can create tens of minutes or more of darkness as they pass over a downwind area, even on sunny days, 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. A serious potential danger of tephra stems from the grave effects of even small, dilute tephra clouds on jet aircraft that fly into them. Major air routes pass by Mount Hood, and tephra clouds produced repeatedly during an eruptive episode would interfere greatly with air traffic.

Lessons learned in eastern Washington during the 1980 eruption of Mount St. Helens can help prepare governments, businesses, and citizens for future tephra falls. Communities experienced significant disruptions in transportation, business activity, and services during fallout of from 0.5 to 8 centimeters (1/4 to 3 inches) of tephra and for several days thereafter. The greater the amount of tephra that fell, the longer the recovery time. As perceived by residents, tephra falls of less than 0.5 centimeter (1/ 4 inch) were a major inconvenience, whereas falls of more than 1.5 centimeters (2/3 inch) constituted a disaster. Nonetheless, all communities resumed normal activities within about two weeks. On the basis of the type and magnitude of tephra production we would expect from Mount Hood in the future, only nearby communities, such as Government Camp, Rhododendron, and Parkdale, would likely receive a tephra thickness approaching 1.5 centimeters (2/3 inch) in any one event. However, some other nearby volcanoes in the Cascade Range do produce large explosive tephra eruptions that could affect the Mount Hood region.

DRAFT

Vulnerability Analysis

Wasco County may be impacted by a volcanic eruption at any time. The above assessments of volcano hazards consider past activity to determine the most likely pattern and probability of a future eruption. It is possible that unexpected volcanic activity may occur that may significantly impact Wasco County.

In an email dated January 9, 2020, Larry G. Mastin, Ph.D. Physical Volcanologist for the United States Geological Survey explained that "[a]t The Dalles, Mount St. Helens is a bigger threat than Mount Hood, because MSH erupts more frequently, and produces bigger eruptions. The only eruptions at Mount Hood in the past 10,000 years have been lava domes, and the only ash deposits our geologists appear to have come from ash clouds that were produced when the lava domes broke apart and cascaded down the south side of the volcano."

Dr. Mastin ran 1,000 simulations of a Mount St. Helens eruption, of the size that occurred on May 18, 1980, and randomly sampling from wind fields in the historical record. Of the thousand simulations, the maximum ash thickness at The Dalles is about 5 cm (compacted).[7]

Figure HA-B: Types of Volcanic Hazards

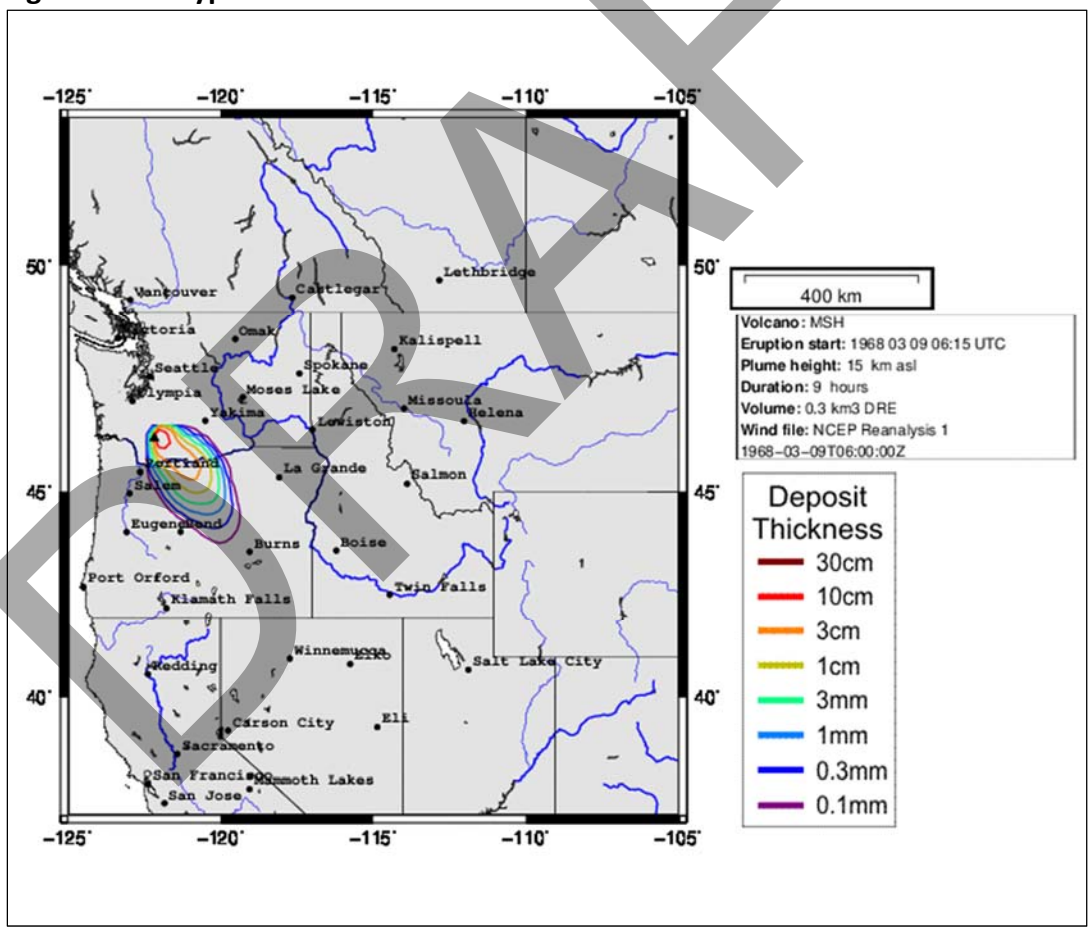

Figure B – Ash Deposit Thickness Post Mount Saint Helens Eruption

[7] January 9, 2020 email from Larry G. Mastin, Ph.D. Physical Volcanologist for the United States Geological Survey. See Page 2-41 in Risk Assessment.

DRAFT

Furthermore, Dr. Mastin provided that in the simulation, "the ash cloud arrived at the Dalles about 1.05 hours after the eruption start; ash started falling at ground level 2.75 hours after, and fell for >13 hours. New-fallen ash is fluffier than compacted ash, and might be 10-15 cm or more thick. These thicknesses are comparable to those in Yakima or Ritzville in 1980."

Dr. Maston referenced descriptions of problems experienced in 1980 during the Mount Saint Helens eruptions and provided the following link to the Volcanic Ashfall Impacts Workgroup: https://volcanoes.usgs.gov/volcanic_ash/mount_st_helens_1980.html.

Lastly, Dr. Maston detailed that among the 1,000 simulations ran, approximately 60% deposited no ash at The Dalles, because of wind conditions. Below Figure C, provides a plot of probability versus ash thickness at The Dalles, based on those 1,000 simulations.

Figure HA-C: Plot of Probability Versus Ash Thickness

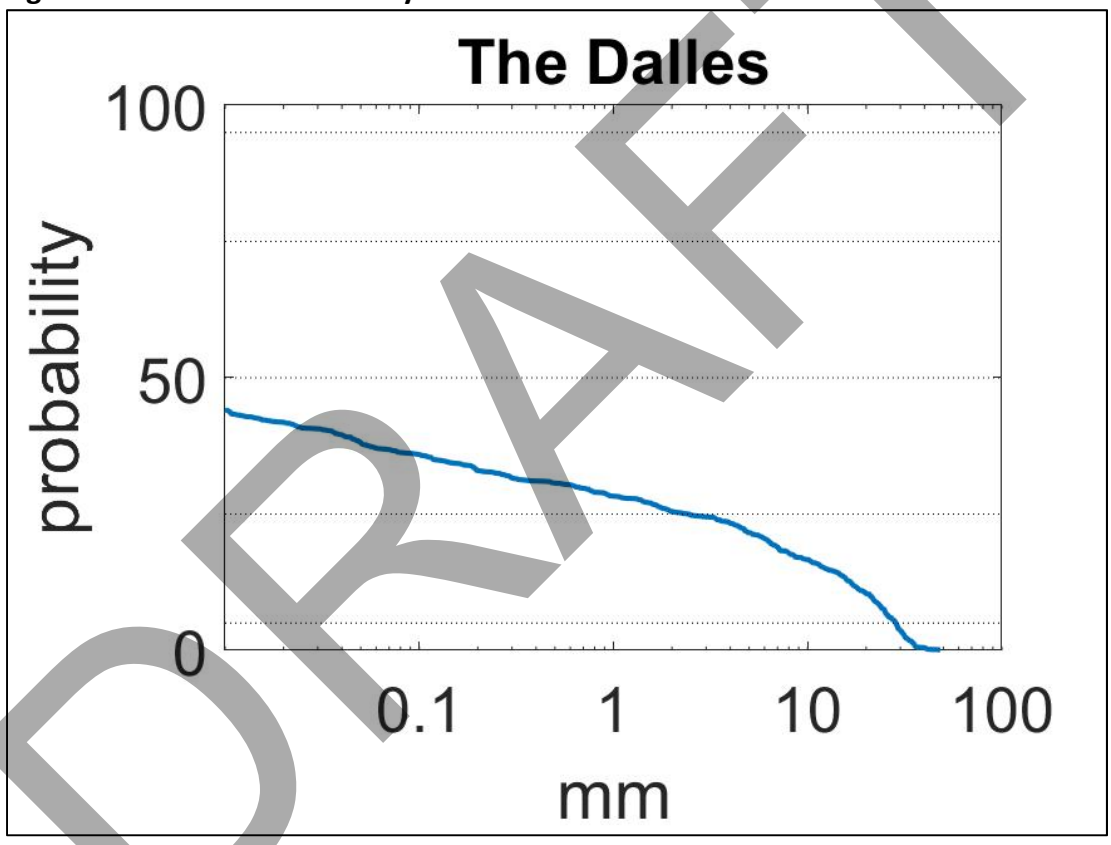

Figure C – Plot of Probability Versus Ash Thickness at The Dalles, Oregon

The factor that most limits Wasco County's vulnerability to a major eruption of Mt. Hood is the modern capability to accurately detect eruptive activity well before an eruption occurs. 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. Mt. St. Helens and Mt. Hood are both closely monitored, in terms of ground movement and seismic activity. It is up to emergency managers and other responsible agencies to ensure an aggressive response to these warnings.

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Proximal Hazard Zones

Proximal hazard zones include areas from the summit out to 24 km (15 miles) along major valleys and out to about 12 kilometers (7 miles) in between major valleys. These zones are subject to several types of rapidly moving, devastating flows. Pyroclastic flows and surges will travel out to a maximum distance of about 12 kilometers 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 (more than 5 centimeters or 2 inches) ballistic fragments within a few minutes of an explosion. 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 they would move much more slowly than these other types of flows.

During the past 1,500 years, lava-dome growth has been localized in the area around Crater Rock, the youngest lava dome on Mount Hood, which lies in a steeply sloping, breached crater south of the summit ridge. It is thought that this same area is the most likely vent location during the next eruption as well. Therefore, a proximal hazard zone A (PA), which encompasses those areas that could be affected by events accompanying dome growth at or near Crater Rock. A less likely event is the opening of a vent elsewhere on the upper east, north, or west flank. Should this occur, the corresponding hazard zone would be all or part of proximal hazard zone B (PB). Depending on vent location, especially if at the summit, all or part of zone PA also could also be at risk. On the lower south and west flanks, hazard zone PB extends beyond the limit of zone PA because a lava dome growing at the summit would be at a higher altitude than Crater Rock and would have the potential to generate farther-reaching pyroclastic flows. On the basis of past eruption frequency, we estimate the probability of an eruption impacting part of zone PA in the next 30 years (the 30-year probability) to be about 1 in 15 to 1 in 30 [4]. In contrast, the 30-year probability of part of zone PB being affected is on the order of 1 in 300 [4]. We caution that these probabilities are based solely on the long-term behavior of the volcano. Any signs of increased restlessness at Mount Hood will increase these probabilities dramatically.

Several major valleys within the proximal hazard zones are highlighted on the map by a hachured line pattern because they are more likely than others to be affected by future pyroclastic flows and lahars related to collapse of growing lava domes, especially during initial stages of dome building. These valleys, along with Polallie Creek valley, are also areas subject to frequent small lahars, floods, and debris avalanches triggered by storms or other non-eruptive causes. If a lava dome grows near Crater Rock, the White and Zigzag River valleys and the valley of Zigzag Glacier and its meltwater stream, an unnamed tributary of the upper Sandy, are the most likely pyroclastic-flow and lahar paths. If an eruptive episode continues for a long enough time period that debris fills the heads of these drainages, pyroclastic flows and lahars will be able to sweep over a broader area, which could include the Little Zigzag River, Still Creek (including the area around Government Camp), and Salmon River valleys. Likewise in zone PB on the north or east flank, the main valleys below a growing lava dome would initially be the most likely flow paths. For example, dome growth on the upper northeast flank would initially affect the valleys of Newton Creek and Eliot Branch. The large area in the proximal hazard zone between these valleys that is drained by Polallie and several other creeks does not presently head directly on the upper flanks and probably would not be affected initially. Before these

DRAFT

drainages could be inundated by pyroclastic flows, the valley heads of Newton Creek and (or) Eliot Branch would have to be partly filled with debris.

While the subdivision of the proximal area into zones PA and PB based on vent location applies well to pyroclastic flows and lahars produced by lava dome collapse, several other types of events are not so neatly restricted by this hazard zonation. First, the earthquakes and deformation associated with future intrusion of magma into Mount Hood can trigger landslides of fractured and weakened rock from the steep upper slopes. Therefore, even though dome building is localized at one site, landslides elsewhere on the upper flanks can generate debris avalanches and related lahars in valleys not otherwise affected by dome growth. Such events, largely restricted to the hachured areas in zone PB, occurred on the east, north, and west flanks during the past 1,500 years, while dome growth and collapse affected valleys on the south and southwest flanks. Furthermore, owing to the pronounced filling of valleys on the south side by debris during the past 1,500 years, the majority of high cliffs and spurs subject to landsliding lie on other flanks. Thus, regardless of which zone a dome is growing in, potential hazards from debris avalanches and lahars exist in other parts of the proximal zones. Second, explosive eruptions driven by volcanic gases can also affect both proximal zones. Explosions can generate highly mobile pyroclastic flows as material falls back to the ground and can hurl large ballistic fragments outward up to 5 kilometers (3 miles). Such events are less constrained by topographic features than are pyroclastic flows from dome collapse, so explosions at a vent in one proximal zone could impact parts of the other proximal zone, especially with ballistics.

Distal Hazard Zones

White River Drainage

Lahars spawned by lava-dome collapses swept through the White River valley about 200 years ago and inundated large parts of Tygh Valley. Hazard zone DA encompasses these deposits as well as adjacent areas that lie up to 12 meters (40 feet) higher depending on valley width. Lahars of this magnitude would inundate the broad flood plain of White River in Tygh Valley, but probably not reach the town itself. Lahars that reach the Deschutes River probably would be diluted to muddy floods that would transport large amounts of sediment into the Columbia River upstream from The Dalles Dam. The 30-year probability of an area in zone DA along White River being inundated by a debris avalanche or lahar is about 1 in 15 to 1 in 30.

History suggests a **low probability of occurrence**. Because of potential impact to the White River and Deschutes River drainages from a lahar flow, there is **low vulnerability**. Because Mt. Hood is relatively quiet, this hazard is assigned a **low risk rating**.

Conclusions

Mount Hood is a potentially active volcano close to rapidly growing communities and recreation areas. The most likely widespread and hazardous consequence of a future eruption will be for lahars (rapidly moving mudflows) to sweep down the entire length of the Sandy (including the Zigzag) and White River valleys. 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. The degree of hazard decreases as height above a channel increases, but large lahars can affect areas more than 30 vertical meters (100 vertical feet) above river beds. The probability of eruption- generated lahars affecting the Sandy

DRAFT

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.

Volcano-hazard- zonation maps outline areas potentially at risk and shows that some areas may be too close for a reasonable chance of escape or survival during an eruption. Future eruptions of Mount Hood could seriously disrupt transportation (air, river, and highway), some municipal water supplies, and hydroelectric power generation and transmission in northwest Oregon and southwest Washington.

Communities, businesses, and citizens need to plan ahead to mitigate the effects of future eruptions, debris avalanches, and lahars. Long-term mitigation includes using information about volcano hazards when making decisions about land use and siting of critical facilities. Development should avoid areas judged to have an unacceptably high risk or be planned to reduce the level of risk. For example, a real-estate development along a valley could set aside low-lying areas at greatest risk from lahars for open space or recreation, and use valley walls or high terraces for houses and businesses.

When volcanoes erupt or threaten to erupt, emergency responses are needed. Such responses will be most effective if citizens and public officials have an understanding of volcano hazards and have planned the actions needed to protect communities. 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 are at greatest risk from lahars and debris avalanches and could be inundated within one hour of an events onset.

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 before hand. Public officials need to consider issues such as public education, communications, and evacuations. Emergency plans already developed for floods may apply, with modifications, to hazards from lahars.

Businesses and individuals should also make plans to respond to volcano emergencies. Planning is prudent because once an emergency begins, public resources can often be overwhelmed, and citizens may need to provide for themselves and make informed decisions. The Red Cross recommends numerous items that should be kept in homes, cars, and businesses for many types of emergencies that are much more probable than a volcanic eruption. A map showing the shortest route to high ground will also be helpful.

The most important additional item is knowledge about volcano hazards and, especially, a plan of action based on the relative safety of areas around home, school, and work. Lahars pose the biggest threat to people living in valleys that drain Mount Hood. The best strategy for avoiding a lahar is to move to the highest possible ground. A safe height above river channels depends on many factors including size of the lahar, distance from the volcano, and shape of the valley. For areas beyond the proximal hazard zone, few lahars will rise more than 30 meters (100 feet) above river level. Be aware that an approaching lahar will cause a loud roaring noise like a gradually approaching jet plane. Once audible, a lahar may be only a few minutes away. [8]

[8] W.E. Scott, T.C. Pierson, S.P. Schilling, J.E. Costa, C.A. Gardner, J.W. Vallance, and J.J. Major, 1997, Volcano Hazards in the Mount Hood Region, Oregon: USGS Open-File Report 97-89; 2012 Wasco County NHMP, 2015 Oregon State NHMP, 2017 NHMP Steering Committee, Burns et al. 2011a.

DRAFT

LANDSLIDE

Hazard Definition

Landslides are mass movements of rock, debris, or soil most commonly downhill. There are many different types of landslides in Oregon. In Wasco County, the most common are debris flows and shallow and deep-seated landslides. Landslides can occur in many sizes, at different depths, and with varying rates of movement. Generally, they are large, deep, and slow moving or small, shallow, and rapid. Some factors that influence landslide type are hillside slope, water content, and geology.[9] The term landslide includes a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows. It is most common for landslides to occur on water saturated slopes when the base of the slope can no longer support the weight of the soil above it. Landslides are commonly associated with heavy rain and flooding conditions but they may also be associated with earthquakes (the 1994 Northridge Earthquake caused an estimated 11,000 landslides) and with volcanic activity.

Hazard History

Landslides typically occur in Wasco County during or after periods of heavy rain and flooding. The period from December 1996 to February 1997 saw a few landslides in Wasco County due to severe flooding. In 2018 a rockwall landslide at Rowena Crest temporarily closed and damaged the Historic Columbia River Highway.

HA-8: Significant Historic Landslide Events

Occurrence	Description
1980s	Kelly Avenue Landslide – slow moving landslide being mitigated to this day
12/1996- 2/1997	This period saw a few landslides following periods of heavy rains
5/7/2017	Rockfall by Rowena crest, damaged Hwy 30, temporary closure
A total of 2,819 landslide areas (2,693 within 2023 DOGAMI study area) & 126 deposits outside of study area	

Source: (2018 Wasco County NHMP; 2020 Oregon State NHMP; 2024 NHMP Steering Committee; and Burns W., Calhoun N., Franczyk J., McClaughry J., & Daniel K. (2023). Landslide Inventory and Risk Reduction of the North and Central Portions of Wasco County, Oregon. Oregon Department of Geology and Mineral Industries).

Hazard Identification

Landslides in Wasco County generally range in size from thin masses of soil of a few yards wide to deep-seated bedrock slides. Travel rate may range in velocity from a few inches per month to many feet per second, depending largely on slope, material, and water content. The recognition of ancient dormant slide masses is important as they can be reactivated by earthquakes or unusually wet winters. Also, because they consist of broken materials and disrupted ground

[9] Burns W., Calhoun N., Franczyk J., McClaughry J., & Daniel K. (2023). Landslide Inventory and Risk Reduction of the North and Central Portions of Wasco County, Oregon. Oregon Department of Geology and Mineral Industries

DRAFT

water, they are more susceptible to construction-triggered sliding than adjacent undisturbed material.

Wasco County has several areas where landslides have taken place and many areas that are susceptible to landslides. The slopes above the Columbia River are particularly susceptible.

Vulnerability Analysis

Typical effects include damage or destruction of portions of roads and railroads, sewer lines, pipelines, and water lines, electrical and communications distribution lines, and destroyed homes and public buildings. Disruption of shipping and travel routes result in losses to commerce. Many of the losses due to landslides may go unrecorded because no claims are made to insurance companies, lack of coverage by the press, or the fact that transportation network slides may be listed in records simply as "maintenance."

Recently, DOGAMI utilized data from the Oregon statewide Landslide Susceptibility Map (Open File Report O-16-02) to model the susceptibility of areas within Wasco County to landslide hazards. Critical facility and building data were overlaid on zones identified to be susceptible to landslides. This information is further described in the Natural Hazards Risk Report for Wasco County, Oregon: Including the Cities of Antelope, Dufur, Maupin, Mosier, Shaniko, The Dalles and Unincorporated Communities of Chenowith, Tygh Valley, Pine Hollow and the Warm Springs Indian Reservation (2018).

Wasco Countywide landslide exposure (High and Very High susceptibility):

- Number of buildings: 3,013
- Exposure value: $498,607,000
- Percentage of exposure value: 13%
- Critical facilities exposed: 4
- Potentially displaced population: 4,338

Oregon Department of Geology and Mineral Industries (DOGAMI) (2021) publication entitled *Natural Hazard Risk Report for Wasco County, Oregon*.
The study found that a majority of Wasco County communities are at a moderate risk to landslide hazards, and that only the communities of Mosier, Tygh Valley, and some areas within the Warm Springs Reservation are at high riskto landslides.

Vulnerable Communities

- Mosier and Tygh Valley are at the highest risk for landslides in Wasco County
- Certain neighborhoods and sections within the steeper sloped central and eastern areas of The Dalles are extremely susceptible to landslides.
- A large developed area south of the unincorporated community of Chenoweth, is susceptible to landslide hazards.

Wasco County has a history of landslides suggesting a **moderate probability of occurrence**. Landslides tend to occur in isolated, sparsely developed areas threatening individual structures and remote sections of the transportation, energy and communications infrastructure suggesting **low vulnerability**. Because of the moderate probability of occurrence, a **low risk rating** is assigned.

DRAFT

For more information, see Appendix F: Maps for a Landslide Susceptibility Map of Wasco County from the DOGAMI Risk Report, and Environmental Protection District 2: Geologic Hazards Overlay.

Conclusion

The most significant effect of landslides is the disruption of transportation and the destruction of private and public property. Some work has been done to prevent developments on top of or below slopes subject to sliding without geotechnical investigations and preventative improvements. Much more needs to be done to educate the public and to prevent development in vulnerable areas.

DRAFT

Volume III:
City/Special District Addendum

DRAFT

Table of Contents

Volume III: 1

City/Special District Addendum 1

Table of Contents 2

Purpose 4

How was the 2024 Plan Developed? 4

How Were the Action Items Developed? 5

City of Dufur 2024 Mitigation Action Items 5

Dufur Addendum 6

How Will the Plan be Implemented? 6

Implementation through Existing Programs 6

Continued Public Participation 7

Plan Maintenance 7

Dufur Community Profile 8

Geography and Climate 8

Population and Demographics 9

Employment and Economics 11

Housing 12

Land and Development 13

Transportation and Commuting Patterns 14

Critical Facilities and Infrastructure 14

Historic and Cultural Resources 15

Hazard Analysis and Issue Identification 15

Initial Work Session Overview 16

City Participants 16

Analysis & Identification Process 16

DRAFT

Natural Hazard Risk Level Ranking Table 18
Severe Weather Event ..... **Error! Bookmark not defined.**
Drought 23
Earthquake 29
Flood 34
Wildfire ..... **Error! Bookmark not defined.**
Landslide 38
Volcanic Event 40
Goals and Action Items 42
What are the Plan Goals? 42
Existing Mitigation Activities 45
Action Items 45
What are the Plan Action Items? 45
Rationale or Key Issues Addressed 45
Coordinating Organization 45
Internal Partners 45
External Partners 45
Plan Goals Addressed 46
Timeline 46
City of Dufur NHMP Mitigation Action Items Matrix 48
City of Dufur Mitigation Action Items Summary Matrix 49
Mitigation Action Items Proposal Forms 55

DRAFT

Dufur City Addendum

Purpose

This document serves as the City of Dufur's Addendum to the Wasco County Natural Hazards Mitigation Plan (NHMP). The County plan update is scheduled to be sent to FEMA for approval and adopted by the Wasco County Board of Commissioners in October - November2024. On February 6, 2024, the City of Dufur committed to producing an addendum to be part of the Wasco County Multi- Jurisdictional Natural Hazards Mitigation Plan, to include mitigation action items and an implementation strategy unique to the City of Dufur. The City's Addendum is considered part of the County's multi-jurisdictional NHMP, and meets the following requirements: (1) Multi-jurisdictional Plan Adoption §201.6(c)(5), (2) Multi-jurisdictional Participation §201.6(a)(3), (3) Multi-Jurisdictional Risk Assessment §201.6(c)(2) (iii), and (4) Multi-jurisdictional Mitigation Strategy §201.6(c)(3) (iv).

A description of the City specific planning and adoption process follows, along with detailed community specific mitigation action items. Information about the City's risk relative to the County's risk to natural hazards is documented in the rationale of the mitigation action items. The rationale indicates how the City's risk is considered greater or lesser than that of the County's.

How was the 2024 Plan Developed?

In 2023, a multijurisdictional group was convened to update the 2019 Natural Hazards Mitigation Plan. Staff from Wasco County and the City of Dufur and others conducted a climate and hazards vulnerability assessment that has become the foundation to this update. Dufur participated in Wasco County's collaborative planning process in the following ways.

1. Representatives from the City of Dufur, Mayor Merle Keys and City Recorder Kathy Bostick, served on the Wasco County Natural Hazards Mitigation Steering Committee and participated in developing the Wasco County Natural Hazards Mitigation Plan.
2. The City of Dufur received input from a number of City representatives and partners to help develop the City's Addendum, including the following:
    a. Kathy Bostick, City Recorder
    b. Merle Keys, Mayor
    c. Josiah Dean, City Counselor
    d. Jon Keyser, Dufur Fire District
    e. Jack Henderson, Dufur School District 29
    f. Carrie Pipinich, Mid-Columbia Economic Development District
3. Dufur's working group participated in a work session focused on hazard identification, critical facilities review, and action item development. During this work session the

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working group identified the City's level of risk to each hazard in comparison to the County's risk and identified and documented particular natural hazard issues faced by the City with regard to population, economy, critical facilities and the environment. The working group also reviewed draft actions developed based on the hazards. If the City identified its risk as greater than the County to certain hazards, this information was included in the rationale of the appropriate action item as well as in the County's Risk Assessment.

4. City staff developed the City of Dufur's Addendum.

5. The City Recorder Kathy Bostick sent the draft addendum and attachments to Dufur's working group to review and provide comment. The County assisted the City to make appropriate revisions. The plan was sent to OEM and FEMA for review.

6. The plan returned from FEMA with a letter called Approved Pending Adoption. Then, after the County and the cities approved the NHMP, FEMA sent an approval letter that identified their approval date and the expiration date of the NHMP.

How Were the Action Items Developed?

The City's action items were developed through a two-stage process. In stage one, the Wasco County NHMP Update Steering Committee evaluated County-wide risks and identified potential issues which were then refined by Dufur's work group to be specific to the City. In stage two, the Dufur work group developed potential actions based on the hazards and the issues identified in stage one. The work group then cross walked the City's issues with Wasco County's action items, working through the Wasco County NHMP Update Steering Committee to identify opportunities to partner where issues were shared between jurisdictions.

City of Dufur 2024 Mitigation Action Items

The following mitigation actions are described in detail in the Action Items Matrix.

- Seek Implementation Funding for Hazard Resilient Modifications to Critical Infrastructure, including but not limited to:
    - Develop backup power sources for critical facilities.
    - HVAC and Window Updates to address smoke and extreme heat conditions.
- Expand South Basin Reservoir to help address wildfire needs.
- Seismic assessment and improvements for reservoirs (City and South Basin)
- Support outreach around Emergency Preparedness at Dufur's annual festival, the Threshing Bee
- Purchase equipment to address impacts from hazards, such as a gravel truck, heavy duty vehicle to move downed trees or flood mitigation supplies, and additional firefighting equipment.
- Explore acquisition and management strategies to preserve parks, trails, and open space in the floodplain.

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- Updating equipment for Fire District–Add an additional 3000 gallon potable water tender to existing fleet, new type 6 wild land engine, and wild fire mitigation tools

Dufur Addendum Update

As the Wasco County NHMP update process began to unfold in 2024, plans were made to include the City of Dufur in the multi-jurisdictional NHMP update. The City of Dufur's Mayor Merle Keys and City Recorder Kathy Bostick, served on the Wasco County NHMP Update Steering Committee, and convened a number of meetings with relevant City staff and partners to create Dufur's City Addendum. Consulted through the process were Mid-Columbia Economic Development District Deputy Director of Economic Development Carrie Pipinich, Dufur Fire Department's Fire Chief Jon Keyser, Dufur School District 29's Superintendent Jack Henderson, and Wasco County Staff members, including Senior Planner Daniel Dougherty, Associate Planner Sean Bailey, and Long-range Planner Alice Cannon also provided assistance in the City Addendum's development.

Following those meetings, City Recorder Kathy Bostick developed the City's addendum, with particular focus on the plan's action items.

The Addendum reflects the City's Hazard Vulnerability and Issue Identification, Plan Goals, and Community Profile sections. The City Mayor approved all changes before submittal to the County.

How Will the Plan be Implemented?

The City Council will be responsible for adopting the City of Dufur's Natural Hazards Mitigation Addendum. This addendum designates a coordinating body and a convener to oversee the development and implementation of action items. Because the City Addendum is considered part of the County plan, the City will look for opportunities to partner with the County. The City's staff will re-convene 2 ½ years after re-adoption of the City of Dufur's NHMP Addendum. When the County's Steering Committee meets to review actions, the City's working group will also meet to review city-specific actions. The City Recorder will serve as the convener and will be responsible for convening the working group. The convener will also remain active in the County's planning process.

Implementation through Existing Programs

Many of the recommendations in the Natural Hazards Mitigation Plan are consistent with the goals and objectives of the City's existing plans and policies. Where possible, the City of Dufur will implement the Natural Hazards Mitigation Plan's recommended mitigation actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, and can adapt easily to changing conditions and needs. Implementing the

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Natural Hazards Mitigation Plan's action items through such plans and policies increases their likelihood of being supported and implemented.

In addition to Water, Wastewater, and Stormwater Master Plans, the City of Dufur currently has a Comprehensive Plan and Dufur City Visioning Plan. The Parks District also has a Master Plan that impacts some of the action items noted below.

The working group and the community's leadership have the option to add or implement action items at any time. This allows the working group to consider mitigation strategies as new opportunities arise, such as funding for action items that may not be of the highest priority. When new actions are identified, they should be documented using the action item form. Once a proposed action form has been submitted to the convener, the action will become part of the City's addendum.

Continued Public Participation

Keeping the public informed of the City's efforts to reduce the City's risk to future natural hazards events is important for successful plan implementation and maintenance. The City is committed to involving the public in the plan review and future updates. The City Addendum, as a chapter of the County Plan, is posted on the Wasco County and City of Dufur's websites so that the public may view the plan and submit electronic comments to the community at any time.

Dufur participated in the March 13, 2024 multi-jurisdictional natural hazards outreach event "Disaster Movie Marathon" where the public was introduced to the Natural Hazard Mitigation update and given an opportunity to provide information through a survey which garnered over 900 survey results from City of Dufur Residents. Additional information dissemination is conducted throughout the year when opportunities present themselves.

Plan Maintenance

The Wasco County Natural Hazards Mitigation Plan will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. During the county plan update process, the City will also review and update its addendum. The convener will be responsible for convening the working group to address the questions outlined below.

- Are there new partners that should be brought to the table?
- Are there new local, regional, state, or federal policies influencing natural hazards that should be addressed?
- Has the community successfully implemented any mitigation activities since the plan was last updated?
- Have new issues or problems related to hazards been identified in the community?
- Are the actions still appropriate given current resources?

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- Have there been any changes in development patterns that could influence the effects of hazards?
- Have there been any significant changes in the community's demographics that could influence the effects of hazards?
- Are there new studies or data available that would enhance the risk assessment?
- Has the community been affected by any disasters? Did the plan accurately address the impacts of this event?

These questions will help the working group determine what components of the mitigation plan need updating. The working group will be responsible for updating any deficiencies found in the plan.

The City of Dufur's Natural Hazards Mitigation Addendum includes three sections:

1. The City of Dufur Community Profile describes community vulnerability,
2. Hazard Vulnerability and Issue Identification, and
3. Action Items Matrix and detailed action items forms.

Dufur Community Profile

This section provides information on the characteristics of Dufur, in terms of geography, environment, population, demographics, employment and economics, as well as housing and transportation. Many of these community characteristics can affect how natural hazards impact communities and how communities choose to plan for natural hazard mitigation. Considering these characteristics during the planning process can assist in identifying appropriate measures for natural hazard mitigation.

Geography and Climate

Dufur is located in northern Wasco County along US HWY-197 at 45.45°N latitude and 121.15°W longitude[1]. The elevation of the City is 1,339[2] feet above sea level. The area of the City estimated by the US Census Bureau is 0.58 square miles. The closest major city is The Dalles, Oregon, which is 15 miles to the north. Portland, the largest City in the state is located 99 miles to the west.

[1] National Oceanic and Atmospheric Administration (2024). Your National Weather Service Forecast. https://forecast.weather.gov/MapClick.php?lon=-121.12834453582762&lat=45.45277327206156.
[2] U.S. Geological Survey Geographic Names Information System: Dufur, Oregon (2024). Summary Report, City of Dufur. https://edits.nationalmap.gov/apps/gaz-domestic/public/search/names/2410366.

DRAFT

The climate in Dufur varies throughout the seasons, each with its own dominant weather patterns. In the summer, temperatures range between 45 and 86 degrees. During the winter, the temperatures range from and 24 and 46 degrees. According to varied data, the City of Dufur's average snowfall is 26.7 inches annually, and the annual average rainfall is approximately 12.77 inches.

Table 1.1: Period of Record General Climate Summary, Dufur, OR (352440)

Month	Average Max. Temperature (degree F)	Average Min. Temperature (degree F)	Average Precipitation (inches)	Average Snowfall (inches)	Average Snow Depth (inches)
January	39.5	23.8	2.01	9.7	2
February	46.0	27.1	1.40	4.9	1
March	54.4	30.9	1.09	1.5	0
April	62.1	34.3	0.81	0.1	0
May	70.4	39.6	0.86	0.0	0
June	77.3	44.8	0.68	0.0	0
July	85.9	48.8	0.24	0.0	0
August	85.0	48.4	0.29	0.0	0
September	77.0	43.4	0.59	0.0	0
October	63.9	36.4	0.91	0.2	0
November	48.6	30.2	1.82	2.8	0
December	40.5	25.8	2.08	7.6	1
Annual	**62.5**	**36.1**	**12.77**	**26.7**	**0**

Source: Western Regional Climate Center, Western US Climate Historical Summaries, 0/7/1904 to 4/30/2015

Population and Demographics

The City of Dufur, incorporated in 1893, is a farming community located adjacent to US Highway 197. The area was originally called Fifteenmile Crossing, but was named for the DuFour family, who emigrated from France and settled in Wasco County in 1872. Early enterprises in Dufur focused on stock raising and sawmilling. In the 1860s, wheat was planted on surrounding lands, and its success in the local area led to the planting of the grain throughout the region.[3] It is also home to the headquarters for the Barlow Ranger District, where the station has been located since 1898.[4]

Dufur attracts bicyclists and motorcyclists in the tourist season, who come for its expansive wheat fields and orchards and proximity to the Mount Hood National Forest. Since 1971, the

[3] Dufur Oregon Website. Dufur Oregon History. (n.d.). Retrieved March 12, 2024 from https://cityofdufur.org/pages/history.

[4] Nancy Zopf. February 28, 2022. *Dufur*. Oregon Encyclopedia, A Project of the Oregon Historical Society. Retrieved March 12, 2024 from https://www.oregonencyclopedia.org/articles/dufur/.

DRAFT

annual Vintage Dufur Days Harvest Festival, formally The Threshing Bee, celebrates the agricultural culture and demonstrates the lives of early pioneers with vintage farming equipment, threshing demonstrations, and a parade.

The estimated population of Dufur, according to the 2020 US Census, was 632.[5] There are 398 total housing units in the City, and 351 housing units are occupied.[6] The average family size is 3.05.[7] The highest proportion of people in the City are those under age 20, (32%), followed by people aged 20 - 44 (29%). The median age in 2022 was 37 years old. [8] Tables 1.2 and 1.3 illustrate population and demographics of Dufur. These demographics show in numbers that the community centers around the Dufur School-with families moving into the District to attend the school, strong community engagement with youth activities and ties to local businesses for career focused educational opportunities.

Table 1.2: Total Population, City of Dufur, Wasco County, Oregon, 2010-2022

Jurisdiction	Population (2022)	Population (2020)	Population (2010)	Population Change (2010 - 2022)	Percent Change (2010 - 2022)
Dufur	611	632	604	7	1.1%
Wasco County	26,794	26,670	25,213	1,581	5.9%
Oregon	4,281,851	4,237,256	3,831,074	450,777	10.5%

Source: Portland State University Population Center, *Populations for Oregon and Its Counties and Incorporated Cities and Towns: 2000-2022*

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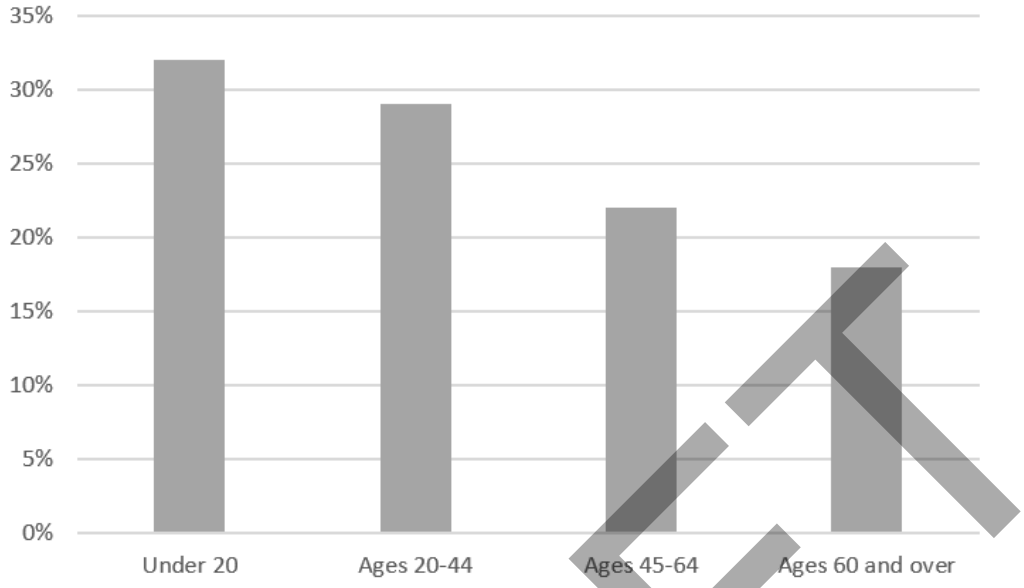
[5] U.S. Census Bureau. (n.d.). Table Decennial Census P1 Race: Dufur, Oregon. Retrieved February 29, 2024, from https://data.census.gov/table/DECENNIALPL2020.P1?g=160XX00US4120900

[6] U.S. Census Bureau. (n.d.). American Community Survey DP04 Housing: Dufur, Oregon. Retrieved March 6, 2024, from https://data.census.gov/table/ACSDP5Y2022.DP04?g=160XX00US4120900

[7] U.S. Census Bureau. (n.d.). American Community Survey DP02 Social: Dufur, Oregon. Retrieved February 29, 2024, from https://data.census.gov/table/ACSDP5Y2022.DP02?g=160XX00US4120900

[8] U.S. Census Bureau. (n.d.). American Community Survey S0101 Age: Dufur, Oregon. Retrieved February 29, 2024, from https://data.census.gov/table/ACSST5Y2022.S0101?g=160XX00US4120900&tid=ACSST5Y2022.S0101

Figure 1.3: City of Dufur Population Distribution by Age, 2022



Source: U.S. Census Bureau, American Community Survey, 2022

The impact of disasters, in terms of loss and the ability to recover from a hazard event, varies among population groups. A disproportionate burden is placed upon those with access and functional needs, particularly minority and low-income residents, who typically lack the financial resources to recover from the impact of disasters.

Data from the 2020 United States Census provides that the City of Dufur had a vast majority (90.8%) of people who self-identify as white, while 3.1% of the City's population identifies as either Hispanic or Latino.[9] According to the 2022 American Community Survey, 1.3% of residents speak a language other than English.[10] However, the Dufur School District serves a larger population area and 11% of their student population identifies as American Indian/Alaskan Native, 7% identify as Hispanic/Latino, and 7% identify as multicultural.

Of the total population of the City, 5.4% of households are estimated to have had an income below the Federal poverty level in 2022.[11] 82% of the students at Dufur School are on free and reduced lunch. Additionally, 21% of the student population has disabilities.

Employment and Economics

Dufur is a farming community where wheat, tree fruit and grapes are grown along with some hay and alfalfa. The City is located to the immediate east of US Highway 197. Retail

[9] U.S. Census Bureau. (n.d.). Table Decennial Census P9 Race: Dufur, Oregon. Retrieved February 29, 2024, from https://data.census.gov/table/DECENNIALDHC2020.P9?g=160XX00US4120900
[10] U.S. Census Bureau. (n.d.). American Community Survey TABLE S1601 Language: Dufur, Oregon. Retrieved February 29, 2024, from https://data.census.gov/table/ACSST5Y2022.S1601?g=160XX00US4120900
[11] U.S. Census Bureau. (n.d.). American Community Survey TABLE S1701 Poverty: Dufur, Oregon. Retrieved February 29, 2024, from https://data.census.gov/table/ACSST5Y2022.S1701?g=160XX00US4120900

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Trade, Education and Healthcare, and Agriculture, Forestry, and Mining are the top three industries in Dufur. After agriculture, tourism and recreation are primary industry sectors by virtue of the number of jobs they provides and due to the City's location along the Columbia River Gorge.[12] Table 1.4 shows the range of industry in Dufur.

Table 1.4: Industries by Employment, City of Dufur 2022

Industry	Percent of Employment
Retail Trade	26%
Educational services, and health care and social assistance	23%
Agriculture, forestry, fishing and hunting, and mining	14%
Other services, except public administration	9%
Construction	7%
Arts, entertainment, and recreation and accommodation and food services	5%
Wholesale trade	5%
Public administration	4%
Manufacturing	3%
Finance and insurance, and real estate and rental and leasing	2%
Information	1%

Source: US Census Bureau, American Community Survey 2022.

The household median income is rising faster than the rate of inflation. In 2022, the median household income was $74,321.[13] The median household income was $45,547 in 2015 ($57,792 in 2022 dollars).[14] The median household income in 2010 was $35,417 ($45,953 in 2022 dollars).[15]

Housing

Housing type and year-built dates are important factors in mitigation planning. Certain housing types tend to be less disaster resistant and warrant special attention: mobile homes, for example, are generally more prone to wind and water damage than standard stick-built homes. Generally the older the home is, the greater the risk of damage from natural disasters. This is because stricter building codes have been developed following improved scientific

[12] U.S. Census Bureau. (n.d.). Table Decennial Census TABLE DP03 Selected Economic Characteristics: Dufur, Oregon. Retrieved February 29, 2024, from https://data.census.gov/table/ACSDP5Y2022.DP03?g=160XX00US4120900

[13] U.S. Census Bureau. (n.d.). American Community Survey S1901 Income in the Past 12 Months (in 2022 Inflation-Adjusted Dollars): Dufur, Oregon. Retrieved March 6, 2024, from https://data.census.gov/table/ACSST5Y2022.S1901?g=160XX00US4120900

[14] U.S. Census Bureau. (n.d.). American Community Survey S1901 Income in the Past 12 Months (in 2022 Inflation-Adjusted Dollars): Dufur, Oregon. Retrieved March 6, 2024, from https://data.census.gov/table/ACSST5Y2015.S1901?g=160XX00US4120900

[15] U.S. Census Bureau. (n.d.). American Community Survey S1901 Income in the Past 12 Months (in 2022 Inflation-Adjusted Dollars): Dufur, Oregon. Retrieved March 6, 2024, from https://data.census.gov/table/ACSST5Y2010.S1901?g=160XX00US4120900

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understanding of plate tectonics and earthquake risk. For example, structures built after the late 1960s in the Pacific Northwest and California use earthquake resistant designs and construction techniques. In addition, FEMA began assisting communities with floodplain mapping during the 1970s, and communities developed ordinances that required homes in the floodplain to be elevated to one foot above Base Flood Elevation (BFE).

There are 398 housing units in Dufur (Table 1.5). Of these housing units there are 351 owner occupied homes. The median value of owner occupied housing in 2010 & 2016 was $169,600. 2022 median value has risen to $284,500. Over 100 housing units were built in the 2000-2009 (Table 1.6) with few built since. The primary heat source in Dufur is electricity (88%). Gas is the next most common heating fuel (9.4%), as wood and oil heating has decreased since 2010. [16]

Table 1.5: Housing Type Summary, City of Dufur, 2022

Housing Type	Number	Percent
1 unit	312	78.4%
2 to 9 units	9	2.3%
10 to 19 units	0	0%
20 or more units	0	0%
Mobile Home	77	19.3%
Boat, RV, Van, etc.	0	0%
Total	398	100%

Source: U.S. Census Bureau, American Community Survey, 2022.

Table 1.6: Housing Stock by Age, City of Dufur, 2022

Year Structure Built	Number	Percent
Built 2020 or later	0	0.0%
Built 2010 to 2019	5	1.3%
Built 2000 to 2009	106	26.6%
Built 1990 to 1999	38	9.5%
Built 1980 to 1989	28	7.0%
Built 1970 to 1979	69	17.3%
Built 1960 to 1969	69	17.3%
Built 1950 to 1959	14	3.5%
Built 1940 to 1949	3	0.9%
Built 1939 or earlier	66	16.60%
Total housing units	398	100%

[16] U.S. Census Bureau. (n.d.). American Community Survey DP04 Housing: Dufur, Oregon. Retrieved March 6, 2024, from https://data.census.gov/table/ACSDP5Y2022.DP04?g=160XX00US4120900

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Source: U.S. Census, American Community Survey, 2022

Land and Development

Land use goals in the City are maintained in the comprehensive plan, which is consistent to the state wide land use goals set by the Department of Land and Development Conservation (DLCD). Dufur has experienced a slight decrease in population growth since 2020. **From 2020 to 2022, Dufur's population decreased approximately 2.8% from a population of 625 people to 608 people**.[17] The City's recent land use development has focused on improving and expanding Dufur's existing wastewater system. The expansion and improvement of Dufur's wastewater systems will help facilitate further development within the city.

Transportation and Commuting Patterns

The City is located in close proximity Highway 197, which runs north and south along the eastern side of the city. Dufur Valley Road, a county road, also runs west of the City to the Mount Hood National Forest where the County road transitions to a National Forest Road (NF-44). NF-44 and Dufur Valley Road are popular roads commonly used by seasonal tourists travelling to and from the Mount Hood National Forest. There are no rail services, and no Greyhound/charter bus services, marine services, or a municipal airport in the city.

Transportation is an important consideration when planning for emergency service provisions. Growth within the City has likely put pressure on both major and minor roads, especially if the main mode of travel is by single occupancy vehicles. How people travel to work is indicative of the prevalence of single occupancy vehicle travel, and can help predict the amount of traffic congestion and the potential for accidents.

The LINK provide round trips Tuesdays and Thursdays from Maupin, Wamic, Pine Hollowy, Tygh Valley and Dufur to The Dalles. Furthermore, custom and/or ADA accessible trips can be arranged through The LINK. [18]

The majority of the inhabitants in the City commute to work by automobile (79.9% in 2022, down from 86% in 2010). 11.5% of City inhabitants walk to work, 6.5% carpool, and 6.5% work from home. [19]

Critical Facilities and Infrastructure

Critical facilities support government and first responders' ability to take action in an emergency. They are a top priority in any comprehensive hazard mitigation plan. Individual communities should inventory their critical facilities to include locally designated shelters and other essential assets.

[17] Oregon Secretary of State. (n.d.). Oregon Blue Book: Almanac and Fact Book. https://sos.oregon.gov/blue-book/Pages/local/city-population.aspx
[18] I.d. at 20.
[19] U.S. Census Bureau. (n.d.). American Community Survey S0801 Community: Dufur, Oregon. Retrieved March 6, 2024, from https://data.census.gov/table/ACSST5Y2022.S0801?g=160XX00US4120900

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A critical energy dependent infrastructure list was updated by the working group. Critical facilities within City limits or owned by the City of Dufur are listed below:

- Dufur School and Health Clinic
- Dufur PUD Substation
- Dufur Reservoir
- City Wells 1, 2 and 3 (City and South Basin)
- Dufur City Hall
- Dufur Fire Station
- Dufur City Park
- South Basin Reservoir
- Gas Station
- Dufur Valley Rd/USFS Road-44 + 197
- Wasco County Shop (fuel)
- Dufur Christian Church
- Dufur Catholic Parish Hall

Historic and Cultural Resources

Historic and cultural resources such as historic structures and landmarks can help define a community and may also be vital to the survival of recreational and tourism industries. Because of their role in defining and supporting the community, protecting historic and cultural resources from the impact of natural disasters is vital to preserving the community's culture and heritage. Protecting these resources can also help allay burdens placed on historically underrepresented population groups within a community who may have played a monumental role in the city's cultural development.

There are 12 sites in the Dufur area that have been inventoried and identified as eligible for listing by the State Historic Preservation Office, including much of the commercial district downtown. There is only one property listed on the National Register of Historic Places, the Balch Hotel. The community has a museum that houses historic artifacts from the area to continue to share its history with locals and visitors.

Table 1.8: Registered Historic Sites, City of Dufur, 2024

National Registry Status	Number of Properties
Listed Within a National Historic District	0
Listed Individually	1
Both	0

Source: Oregon Historic Sites Database, February 2024.

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Hazard Analysis and Issue Identification

Initial Work Session Overview

In April 2024, the City staff conducted a meeting in order to develop community-specific action items for the City's addendum to the Wasco County Natural Hazards Mitigation Plan. Those action items were included in the City's addendum to the Wasco County Natural Hazards Mitigation Plan.

City Participants

The following individuals participated in the meetings:

- Kathy Bostick, City Recorder
- Jon Keyser, Fire Chief
- Tom Richman, Assistant Fire Chief
- Merle Keys, Dufur Mayor
- Josiah Dean, Dufur City Council

Analysis & Identification Process

During the meetings, participants reviewed and updated the list of critical facilities in the City. Participants also provided comments on the City's risk and to identify specific hazard related issues. With information from the meetings, staff revised the NHMP Hazard Analysis and Issue Identification section. Changes were made where appropriate to reflect changes in perception to the City of Dufur's risk to natural hazards. The Wasco County Natural Hazards Steering Committee elected to move Extreme Heat from the Severe Weather Hazard category and rank Extreme Heat as its own hazard. The following is a summary of input from the Dufur working group in the development of the City's Addendum to the 2024 Wasco County Natural Hazard Mitigation Plan.

There are three additional reports that relate to the City of Dufur Risk Assessment:

- *2022 Community Wildfire Protection Plan*, by the Wasco County Planning Department, 2022.
- *Natural Hazard Risk Report for Wasco County, Oregon Including the Cities of Antelope, Dufur, Maupin, Mosier, Shaniko, The Dalles, and Unincorporated Communities of Chenoweth, Tygh Valley, Pine Hollow, and the Warm Springs Indian Reservation* by the Oregon Department of Geology and Mineral Industries (DOGAMI) (2021)
- *Future Climate Projections Wasco County* report prepared by the Oregon Climate Change Research Institute (OCCRI) in August 2018.

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These three reports provide important analysis related to the natural hazards identified in Table 1.8 and how they are impacted related to climate projections. The *DOGAMI Risk Report* will be found in finished form at http://www.oregongeology.org/pubs/index.htm .The *OCCRI Future Projections Report* for Wasco County, including Dufur's, can be found on the Wasco County Planning website, under Long Range – Natural Hazard Mitigation Plan in the Additional Information section.

Of note, the *DOGAMI Risk Report* includes the natural hazards of earthquakes, flood, landslides, wildfire, lahar/volcanoes, and channel migration. Channel migration was not a hazard identified by the Wasco County NHMP Steering Committee and is not discussed in detail in the NHMP. The *Risk Report* does not include severe weather and drought, which are two of the natural hazards identified by the Wasco County NHMP Steering Committee and the City of Dufur Working Group.

DOGAMI describes the purpose of the *Risk Report*:

"The purpose of this project is to help communities in the study area better understand their risk and increase resilience to natural hazards that are present in their community. This is accomplished by providing them with accurate, detailed, and up to date information about these hazards and by measuring the number of people and buildings at risk.

The main objectives of this study are to:

- Compile and/or create a database of critical facilities, tax assessor data, buildings, and population distribution data
- Incorporate and use existing data from previous geologic, hydrologic, and wildfire hazard studies
- Perform exposure and Hazus-based risk analysis
- Share this report widely so that all interested parties have access to its information and data

The body of this report describes the methods and results for these objectives. Two primary methods (Hazus-MH or exposure) depending on the type of hazard, were used to assess risk. We describe the methods for creating the building and population information used in this project. Results for each hazard type are reported on a countywide basis, and community based results are reported in detail in the community profiles."

The *Risk Report* includes information about critical facilities such as what they are, where they are, what the monetary value of them is, and so forth. These critical facilities are important to note because of the essential role they play in recovery efforts. DOGAMI was provided a list of the Wasco County critical facilities, including the City of Dufur, prepared by the Steering Committee. There are some differences in what DOGAMI includes in the *Risk Report* versus what is included in the NHMP, in terms of critical facilities. See also the subsection "Critical Facilities and Infrastructure" in the Wasco County section for additional details.

DRAFT

OCCRI's *Future Climate Projections Wasco County* and the *Climate Change Influence on Natural Hazards in Eight Oregon Counties: Overview of County Reports*, provide important information regarding the influence and impacts of climate change on existing natural hazards events such as heavy rains, river flooding, drought, heat waves, cold waves, wildfire, and air quality.

Each county report describes county-specific projected changes in climate metrics related to 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.

The City will consult the DOGAMI report to prioritize proposed actions before implementation.

Natural Hazard Risk Level Ranking Table

Table 1.9: Comparison of Wasco County and City of Dufur Risk Level Ranking

Hazard	Wasco Co. Rating	City Rating	Detail
Wildlands-Wildfire	High	High	The Dufur area has seen significant wildfire events in its surroundings over the last several years.
Flood	Medium	High	Fifteen Mile Creek runs through the heart of Dufur and has seen major flooding in the past
Extreme Heat	High	High	Dufur
Severe Local Storm	High	High	Ice storm, snow storm or blizzard, and windstorms.
Drought	High	Medium	Dufur has concerns about drought and its impact on water supply, wildfire fuels, and crops but does not see it as primary.
Earthquake	Low	Low	Earthquake magnitude is minimal in the Dufur area.
Volcano	Low	Low	The Dufur may be impacted by a volcanic eruption at any time (particularly from Mt. Hood and Mt. Adams)
Landslide	Low	Low	Dufur has no identified slide areas within City limits.

Source: Wasco County 2024 Natural Hazards Mitigation Plan; City of Dufur Working Group

Extreme Heat

Extreme Heat Characteristics

Heat domes have recently emerged as a deadly extreme weather event in the Pacific Northwest. A heat dome occurs when a persistent region of high-pressure traps heat over a particular area, and it can linger for days to weeks and causing extremely high temperatures. Heat domes are

DRAFT

typically linked to the behavior of the jet stream, which is a band of fast-moving winds high in the atmosphere that move in meandering wavelike patterns. When the jet stream meanders north, it moves slower and can sink, which lowers humidity. This allows the sun to create progressively hotter conditions on the ground. Air descending down mountains can also contribute to heat domes, as it warms even more.[20]

Extreme heat can affect commerce, agriculture, outdoor recreation, and overall quality of life.

Extreme Heat Probability

The State of Oregon 2020 NHMP states that the probability of future events is *extremely likely* (>95%) and that the frequency and severity of extreme heat events will increase over the next several decades (*very high confidence*).

Climate Change

The Oregon Climate Change Research Institute issued a report specific to Wasco County in August 2018. They modeled high and low greenhouse gas emissions scenarios. There predictions for changes in extreme heat and drought probabilities by the 2050s based on their higher emissions scenario:

- The frequency and intensity of extreme heat events is expected to increase due to warming temperatures. The frequency of temperatures at or above 90°F is projected to increase on average by 28 days. The hottest day of the year (intensity) is projected to increase by 8°F. [21]

- Current average maximum temperature range in Dufur is 85°-85.9°F during July and August.

Extreme Heat Vulnerability

Vulnerability is defined as the combination of sensitivity to extreme heat and level of adaptive capacity in response to extreme heat.

Adaptive capacity to extreme heat is defined here as percent of homes with air conditioning; however, the authors of the

Oregon Natural Hazard Mitigation Plan note that this measure has its flaws. First, it assumes that people who have access to cooling systems are able to afford to use them. Second, the data only includes single-family homes, which omits populations living in multi-family housing or who are house-less.

[20] National Oceanic and Atmospheric Administration. National Environmental Satellite Data and Information Service. *Extreme Heat and Severe Weather Plague Parts of North America*. June 30, 2023. Accessed 3/28/2024

[21] The Oregon Climate Change Research Institute. (2018) *Future Climate Projections Wasco County*. Salem, OR: Oregon Department of Land Conservation and Development.

DRAFT

Because extreme heat is common in Region 5 ("high" probability), many people are accustomed or prepared in terms of air conditioning when an extreme heat event occurs ("high" adaptive capacity).[22] A Northwest Energy Efficiency Alliance (NEEA) Residential Building Stock Assessment Single Family Homes 2016-12, estimated that 91% of Wasco County single-family homes have air-conditioning.[23] The NEEA follow up study did not assess regions in a similar manner. But did note that by 2022 there has been an increase in the number of homes in Oregon that have cooling systems in at least one room, with the largest increase in ductless mini-split heat pumps.[24] After nearly 100 Oregonians died in the 2021 heat dome event, the 2022 Legislature passed a bill giving tenants the right to have portable air conditioning units in rental properties. The new law added criteria that includes at least one air-conditioned room in the definition of habitability of rental properties. Owners of new or renovated rental properties are require to install cooling systems after April 2024.[25]

Sustained heat can also damage roads, bridges and railroad tracks, and the increased demand for electricity from air-conditioning use can result in power outages.[26] The increased demand for irrigation and cooling water can strain water utility infrastructure.

The medium relative vulnerability of Wasco County to extreme heat was determined by the State of Oregon by adding the rankings for sensitivity (social vulnerability) and adaptive capacity (availability of air conditioning).

Extreme Heat Resilience

Dufur School, cooling shelter.

Extreme Heat Risk

With respect to natural hazards, risk can be expressed as the probability of a hazard occurring combined with the potential for property damage and loss of life. Based on the combination of the probability of extreme heat events, sensitivity to extreme heat, and level of adaptive capacity in response to extreme heat and Wasco County's social vulnerability index, Dufur is considered to be at high risk from extreme heat by the City and by Wasco County.

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[22] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.
[23] Northwest Energy Efficiency Alliance. (2019). *Residential Build Stock Assessment Single Family Homes 2016-17*. Portland, OR.: Northwest Energy Efficiency Alliance.
[24] Northwest Energy Efficiency Alliance. (2024). 2022 *Residential Build Stock Assessment*. Portland, OR.: Northwest Energy Efficiency Alliance.
[25] Oregon State Legislature. (2022, March 23). 2022 Regular Session. Retrieved from Oregon Legislative Information: olis.oregonlegislature.gov/liz/2022R1/Measures/Overview/SB1536
[26] Oregon Capital Chronicle. Oregon Gov. Brown declares emergency as heatwave continues. Julye 27, 2022. Accessed 3/29/2024.

Severe Storm/Winter Storm

Storm Characteristics

Extreme precipitation events in the Pacific Northwest are governed by both atmospheric circulation and by how it interacts with complex topography. Atmospheric rivers – long, narrow swaths of warm, moist air that carry large amounts of water vapor from the tropics to mid-latitudes – generally result in coherent extreme precipitation events west of the Cascade Range. While closed low pressure systems often lead to isolated precipitation extremes east of the Cascade Range.[27]

Summer storms in Dufur are generally thunderstorms. The National Weather Service (NWS) defines a severe thunderstorm as any storm that produces one or more of the following elements:

- A tornado.
- Damaging winds or speeds of 58 mph (50 knots) or greater.
- Hail 1 inch in diameter or larger.

Though thunderstorms of such severity are rare in Dufur, heavy rainfall during summer thunderstorms have overwhelmed the capacity of the storm water conveyance system which has caused localized flooding and wastewater treatment plant violations.

Though damaging winds greater than 58 mph are rare in Dufur, strong winds and moisture originating from the Pacific Ocean are funneled into the Columbia River Gorge, with a potential for gusts over 100 mph, periodically impact all of Wasco County. Severe storms can damage property and disrupt utilities.

Winter storms may be ice or snow events that disrupt normal operations.

Ice storms or freezing rain (black ice) occur when rain falls from warm moist upper layers of the atmosphere into a cold, dry layer near the ground. The rain freezes on contact with the cold ground and accumulates on exposed surfaces. In addition to causing ice to accumulate on roadways, ice can accumulate on tree branches and power lines. This can cause power outages and can obstruct already icy transportation routes.

Snow is an ice particle formed by sublimation of vapor in the atmosphere as well as a collection of loosely bonded ice crystals deposited from the atmosphere. Snowfall results in an accumulation of packed ice crystals, and the condition of the snowpack determines a variety of

[27] The Oregon Climate Change Research Institute. (2018) *Future Climate Projections Wasco County*. Salem, OR: Oregon Department of Land Conservation and Development.

DRAFT

qualities, such as color, temperature, and water equivalent. As weather conditions change, the snowpack can change as well, and this affects the characteristics of the snow.[28]

Climate Change

The Oregon Climate Change Research Institute issued a report specific to Wasco County in August 2018. They modeled high and low greenhouse gas emissions scenarios. There predictions for changes in extreme precipitation probabilities by the 2050s based on their higher emissions scenario:

- The intensity of extreme precipitation events is expected to increase slightly in the future as the atmosphere warms and is able to hold more water vapor.
- In Wasco County, the magnitude of precipitation on the wettest day and the wettest consecutive five days per year is projected to increase on average by about 17-percent and 12-percent, respectively.
- The frequency of days with at least 0.75-inches of precipitation and the frequency of days exceeding a threshold for landslide risk is not projected to change substantially.

Storm Vulnerability

The working group identified winter storm impacts specific to Dufur due to the high concentration of population and potential demand for emergency response services. Roadways blocked with snow and ice can hinder police, fire, and medical response. It is not uncommon for Dufur to be isolated from other communities for a few days or longer each winter when I-197 is closed due to ice or other severe winter weather.

Extended days of extremely low temperatures can cause damage to City infrastructure due to soil movement when temperatures are 20-degrees Fahrenheit or lower. When water turns into ice underground, it expands. This can make the ground move, causing frost heave. Frost heave lifts up the ground, as well as everything on top of it. Frost heave can be strong enough to move and damage roads, bridges, buildings and water mains. When frozen ground thaws, the ice in the ground melts. The ground sinks to fill the space left by the ice. The amount of ice and how quickly it melts can vary from place to place. Because different patches of ground may not thaw at the same rate, melting ice can make the surface uneven. Uneven thawing can make roads wavy and can break water mains that are often buried under roadways.[29]

[28] National Snow and Ice Data Center, (n.d.). *What is snow?* nsidc.org/learn/parts-cryosphere/snow. Accessed 5/8/2024.
[29] National Snow and Ice Data Center, (n.d.). *All About Frozen Ground: How Does Frozen Ground Affect Land?* nsidc.org/cryosphere/frozenground/how_fg_affects_land.html. Accessed 11/25/2020.

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Storm Resilience

Historically, Wasco County, the Oregon Department of Transportation and City of Dufur plan for winter weather deployments and share resources for most efficient response.

Storm Risk

With respect to natural hazards, risk can be expressed as the probability of a hazard occurring combined with the potential for property damage and loss of life. Based the history of storm declarations, Wasco County's social vulnerability ratings, and the potential for storms to impact infrastructure and the local economy, Dufur is considered to be at high risk from storms by the City and Wasco County.

Drought

The working group determined that the City's risk to drought is medium which is lower than the County's risk of high. In addition to information found in the County's plan, the working group identified other issues specific to Dufur. The City's water supply is contingent on the snow pack (particularly from the forested Cascade foothills east of Mt. Hood), which may fluctuate greatly from year to year. Contingency plans may need to be developed to meet water needs. From a statewide 18-month drought in 1904, to the second worst drought year in the state's history in 2005, and then to another severe drought with record-low snowpack levels in 2015, Oregon has been impacted by many droughts. Droughts impact individual farm owners, the agricultural industry as a whole, and other agricultural related sectors. Additionally, during drought years, Dufur Fire (Dufur fire prevention and response public service) must draw water from greater distances to fight fires, resulting in slower response times.

Drought Characteristics

The West Wide Drought Tracker was used to provide a chart of drought events in the State of Oregon Region 5 NHMP. In this section the Tracker database was used to provide a chart of drought events specific to Wasco County using the Standard Precipitation-Evapotranspiration Index from 1895 to 2023.

The Standard Precipitation-Evapotranspiration Index (SPEI) is designed to evaluate both precipitation and potential evapotranspiration (PET) in determining drought. Thus, unlike the Standard Precipitation Index, the SPEI captures the main impact of increased temperatures on crop water demand and water supply (agricultural and hydrological drought).[30]

[30] National Center for Atmospheric Research. (n.d.). Standardized Precipitation-Evapotranspiration Index (SPEI). Retrieved from NCAR Climate Guide Data: https://climatedataguide.ucar.edu/climate-data/standardized-precipitation-evapotranspiration-index-spei. Accessed 4/10/2024

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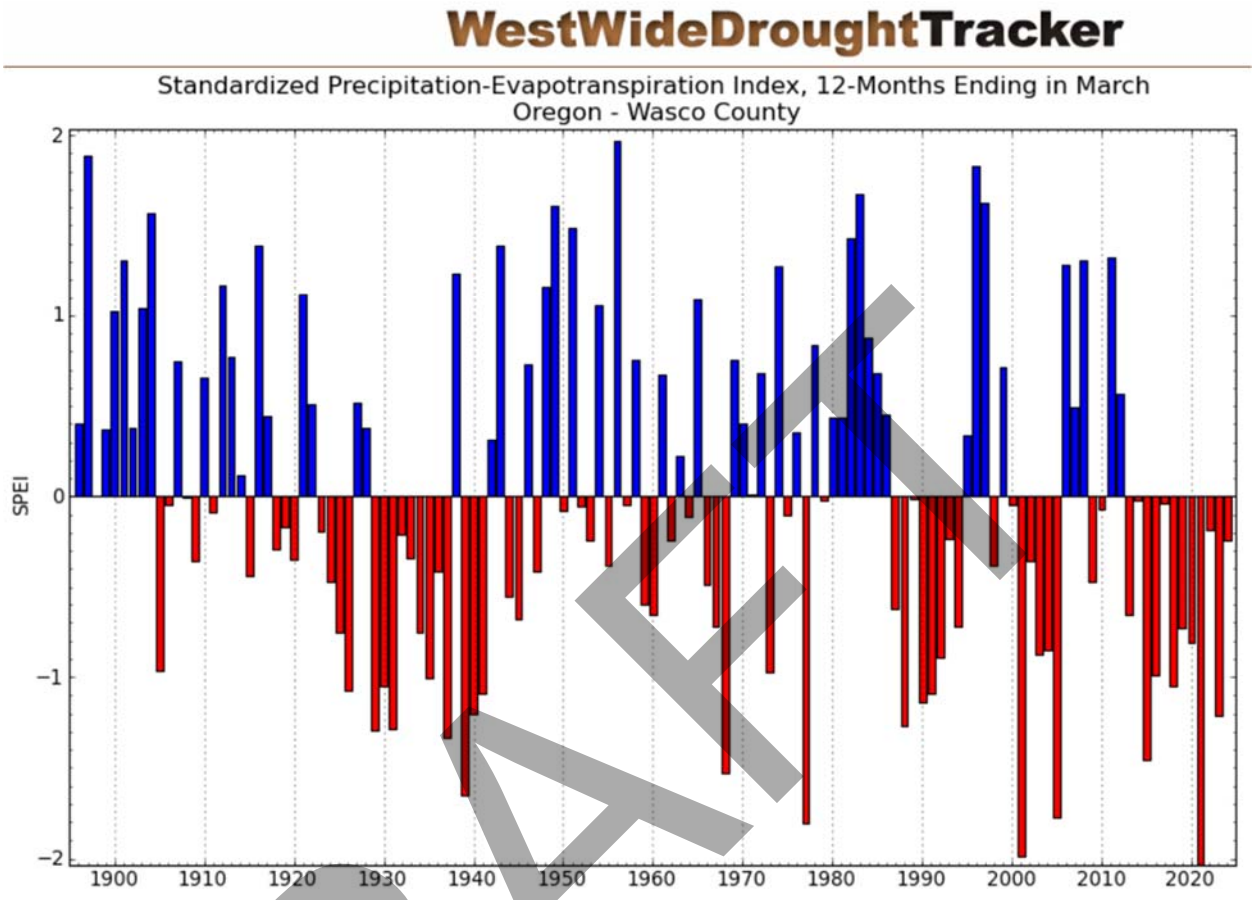

Figure 1: Drought Severity Scale: -1 to -1.49 = moderate drought; -1.5 to -1.99 = severe drought; -2.0 or less = extreme drought Source: University of Idaho West Wide Drought Tracker. (database accessed 4/9/2024) Western Regional Climate Center. wrcc.dri.edu/wwdt/time/

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Table 11: Recent Drought History – City of Dufur

Year	ENSO Condition[31]	12-mo. SPEI	Declaration
2005	El Niño most of the year[32]	-1.8	**EO-05-06** DETERMINATION OF A STATE OF DROUGHT EMERGENCY IN DESCHUTES, LAKE, WALLOWA, WASCO AND WHEELER COUNTIES DUE TO DROUGHT AND LOW WATER CONDITIONS. May 25, 2005; Expired December 31, 2005
2015	El Niño all year – 3rd strongest on record[33]	-1.5	**EO-15-05** DETERMINATION OF A STATE OF DROUGHT EMERGENCY IN DESCHUTES, GRANT, JACKSON, JOSEPHINE, LANE, MORROW, UMATILLA, AND WASCO COUNTIES DUE TO DROUGHT, LOW SNOW PACK LEVELS, AND LOW WATER CONDITIONS, May 21, 2015; Expired December 31, 2015
2020	Neutral moving to La Niña JAS	-0.8	**EO-20-31** DETERMINATION OF A STATE OF DROUGHT EMERGENCY IN DOUGLAS, GILLIAM, JOSEPHINE, CROOK, DESCHUTES, JEFFERSON AND WASCO COUNTIES DUE TO UNUSUALLY LOW WATER SUPPLIES AND HOT, DRY

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[31] Climate Prediction Center/National Center for Environmental Prediction. (2024, April 8). *ENSO: Recent Evolution, Current Status and Predictions.* Retrieved from Climate Prediction Center: cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf. Accessed 4/11/2024.

[32] National Oceanic and Atmospheric Administration. (2005). Annual 2005 El Nino/Southern Oscillation. Retrieved from National Centers for Environmental Information: ncei.noaa.gov/access/monitoring/monthly-report/enso/200513. Accessed 4/11/2024.

[33] National Oceanic and Atmospheric Administration. (2016, August 2). *2015 State of the Climate: El Nino came, saw, and conquered.* Retrieved from Climate.gov: climate.gov/news-features/understanding-climate/2015-state-climate-el-ni%C3%B1o-came-saw-and-conquered. Accessed 4/11/2024.

Year	ENSO Condition[31]	12-mo. SPEI	Declaration
			CONDITIONS, July 1, 2020; Expired December 31, 2020.
2021	La Niña except MJJ-JJA	-2.0	**EO-21-16** DETERMINATION OF A STATE OF DROUGHT EMERGENCY IN GRANT, UMATILLA, UNION, AND WASCO COUNTIES DUE TO LACK OF PRECIPITATION, UNUSUALLY LOW SNOWPACK AND STREAMFLOW. June 29, 2021; Expired December 31, 2021. **EO-21-20** DIRECTING STATE AGENCIES TO SUPPORT COMMUNITIES IN DROUGHT BY CURTAILING NONESSENTIAL WATER USE, IMPLEMENTING WATER CONSERVATION MEASURES, AND ENCOURAGING DROUGHT RESILIENCY. July 7, 2021; Expired December 31, 2021. **EO-21-27** DETERMINATION OF STATE OF EMERGENCY IN THE STATE OF OREGON DUE TO EXCESSIVE HIGH TEMPERATURES CAUSING A THREAT TO LIFE, HEALTH, AND INFRASTRUCTURE. August 10, 2021; Expired August 20, 2021.
2022	La Niña all year	-0.2	**EO-22-10** DETERMINATION OF STATE OF EMERGENCY IN MULTIPLE COUNTIES DUE TO THE NEED FOR STATE WIDE COORDINATION TO

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Year	ENSO Condition[31]	12-mo. SPEI	Declaration
			ADDRESS PERSISTENT EXTREME DROUGHT CONDITIONS. June 7, 2022; Expired December 31, 2022. **EO-22-13** DETERMINATION OF STATE OF EMERGENCY IN COLUMBIA, CLACKAMAS, CROOK, CURRY, DESCHUTES, DOUGLAS, GILLIAM, GRANT, HOOD RIVER, JACKSON, JEFFERSON, JOSEPHINE, KLAMATH, MARION, MORROW, MULTNOMAH, POLK, SHERMAN, UMATILLA, UNION, WALLOWA, WASCO, WASHINGTON, WHEELER, AND YAMHILL COUNTIES DUE TO EXCESSIVE HIGH TEMPERATURES CAUSING A THREAT TO LIFE, HEALTH, AND INFRASTRUCTURE. July 25, 2022; Expired July 31, 2022.
2023	El Niño AMJ-NDJ	-1.2	**EO-23-10** DETERMINATION OF A STATE OF DROUGHT EMERGENCY IN WASCO COUNTY. April 13, 2023; Expired December 31, 2023.

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Drought Probability

The State of Oregon 2020 NHMP lists Wasco County as a medium probability of drought. The probability was calculated based on the number of drought declarations since 1992.

Climate Change

The Oregon Climate Change Research Institute issued a report specific to Wasco County in August 2018. They modeled high and low greenhouse gas emissions scenarios. There predictions for changes in extreme heat and drought probabilities by the 2050s based on their higher emissions scenario:

- Drought conditions are projected to become more frequent compared to the historical record.[34]

Drought Vulnerability

The State of Oregon 2020 NHMP notes a difference between the local drought vulnerability assessments (high in Wasco County) compared to the State of Oregon assessment (very high in Wasco County). Though Oregon has not conducted a comprehensive statewide analysis, the Centers for Disease Control (CDC) social vulnerability index informed the State assessment.

"Wasco County's high vulnerability is driven by moderately high scores across the CDC index. Notably, however, the county scores in the 80th percentile for its share of residents without a high school diploma, percentage of residents that speak English less than "well," and percentage of persons living in institutionalized group quarters."[35]

80-percent of the City's water supply is contingent on the snow pack (particularly from the forested Cascade foothills east of Mt. Hood), which may fluctuate greatly from year to year.

Droughts impact individual farm owners, the agricultural industry as a whole, and other agricultural related sectors. Recently, City officials have noticed a decline in artesian pressure at it wells with the increased amount of orchards.

Recent Drought Losses

In 2021, the unprecedented heat wave and ongoing drought in the U.S. Pacific Northwest damaged white wheat coveted by Asian buyers and forcing fruit farm workers to harvest in the middle of the night to salvage crops and avoid deadly heat.

Farmers in Wasco County, the state's largest cherry producer, estimated about 56 percent of the acreage suffered heat damage, according to surveys by Ashley Thompson, a tree fruit extension horticulturist for Oregon State University.

[34] The Oregon Climate Change Research Institute. (2018) *Future Climate Projections Wasco County*. Salem, OR: Oregon Department of Land Conservation and Development.
[35] State Interagency Hazard Mitigation Team. (2020). *Oregon Natural Hazards Mitigation Plan*. Salem, OR: Oregon Department of Land Conservation and Development.

DRAFT

Throughout the Columbia River Gorge region, growers reported damage ranging from 15–100 percent, describing shriveled and sunburned fruit, picking cherries for brine and significant pack out reductions. Some were even turned down by processors.[36]

Drought Resilience

Pump for well was changed in 2019 due to lack of artesian water pressure. The City of Dufur installed a submersible pump.

Drought Risk

With respect to natural hazards, risk can be expressed as the probability of a hazard occurring combined with the potential for property damage and loss of life. Based the history of drought declarations, Wasco County's social vulnerability index, and the potential for drought to impact the agricultural economy, Dufur is considered to be at medium risk from drought by the City, and high by Wasco County.

Earthquake

Earthquake Characteristics

Earthquakes in Wasco County are most likely to originate from two sources: 1) the Cascadia Subduction Zone and 2) Class A Quaternary faults that could impact Dufur[37].

Cascadia Subduction Zone

Figure 1.2: Dufur Cascadia Earthquake Hazard Map

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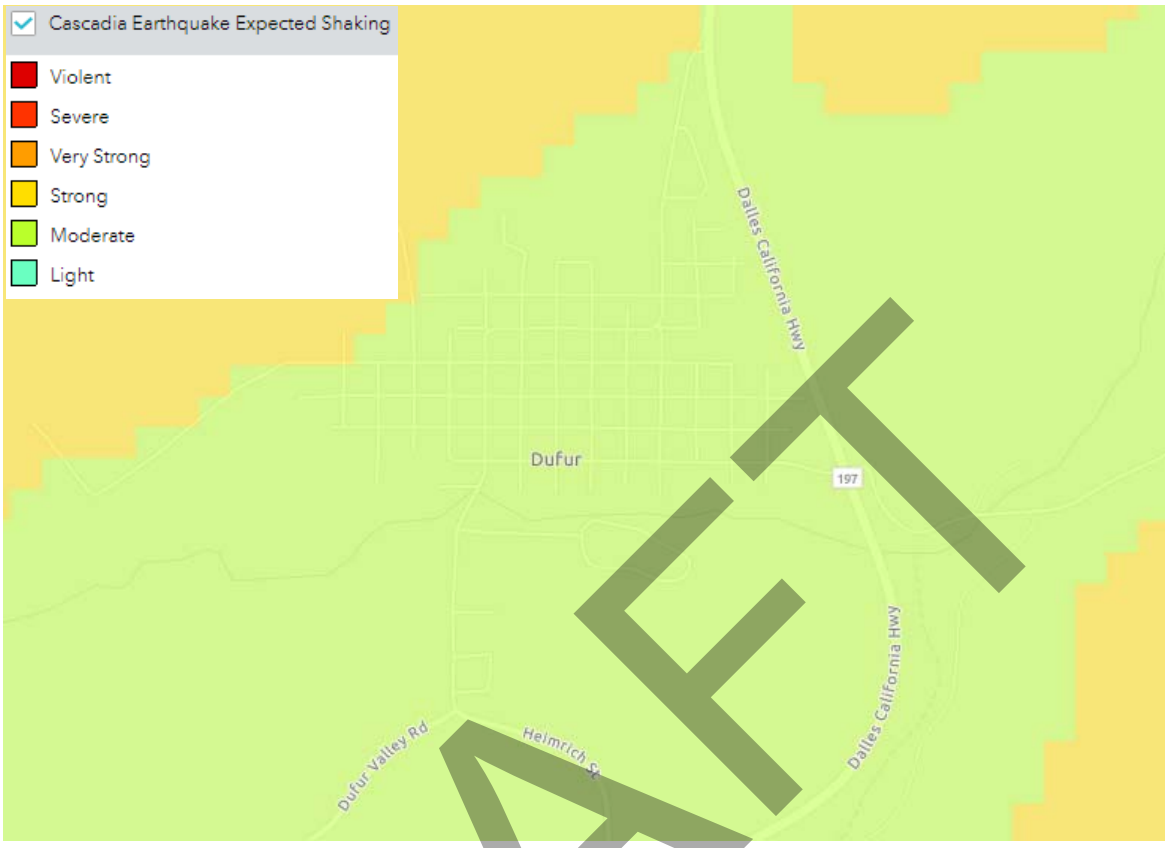
[36] Courtney,R. Mullinax, T (2021, September 7) Learning from the heat wave. Retrieved from Good Fruit Grower: goodfruit.com/learning-from-the-heat-wave/. Accessed 4/11/2024.
[37] Wasco County. (2019). *Wasco County Multi-Juristicion Natural Hazard Mitigation Plan*.



Source: Oregon HazVu: Statewide Geohazards Viewer, Oregon Department of Geology and Mineral Industries, accessed 7/29/2024

Class A Quaternary Faults

Faults that could impact Dufur have been identified by the U.S. Geological Survey. Class A faults are those that geologic evidence demonstrates the existence of a Quaternary fault of tectonic origin, whether the fault is exposed for mapping or inferred from liquefaction or other deformational features[38]. Quaternary faults are those that have been recognized at the surface and which have moved in the past 1,600,000 years, the duration of the Quaternary epoch.[39] A fault is designated as well constrained if an identifiable piercing line or feature (typically at or near the surface) is well documented or can be independently verified from mapping or logs. If an offset feature of the fault is in the subsurface, data is presented and correlations appear reliable; offset features of the fault are described or documented[40].

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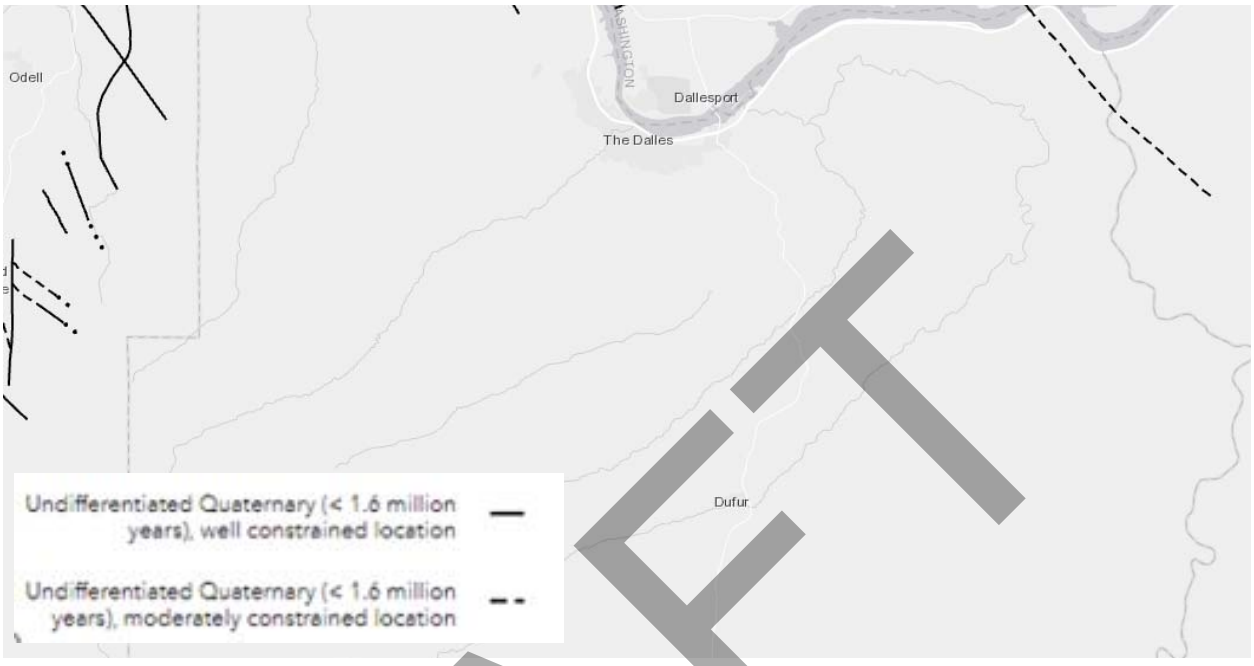
[38] U.S. Geologic Survey. n.d. *Faults*. Retrieved April 1, 2021 from Earthquake Hazards: usgs.gov/programs/earthquake-hazards/faults

[39] U.S. Geological Survey. (2009, October 27). *FAQs – Quaternary Faults*. Retreived April 1, 2021, from Earthquake Hazards Program: web.archive.org/web/20111127121851/http://earthquake.usgs.gov/learn/faq/?faqID=267

[40] Dawson, T.E., & Weldon, R.J. (2017). *Uniform California Earthquake Rupture Forecast, Version 3 (USERF3) Appendix B – Geological Slip-Rate Data and Geologic*. Menlo Park, CA: USGS Southern California Earthquake Center.

Figure 1.2: Quaternary faults located near Dufur



Source: U.S. Geologic Survey. n.d. *Faults*. Retrieved April 1, 2021 from Earthquake Hazards: usgs.gov/programs/earthquake-hazards/faults

Earthquake Probability

There's no "recent" history of earthquakes in Wasco County or Dufur. The 2020 State of Oregon NHMP included a new Earthquake probability ranking for Oregon counties that is based on the average probability of experiencing damaging shaking during the next 100 years.

- Category 1 100-year probability < 10-percent
- Category 2 100-year probability 10-20-percent
- Category 3 100-year probability 21-31-percent
- Category 4 100-year probability 32-45-percent
- Category 5 100-year probability > 45-percent

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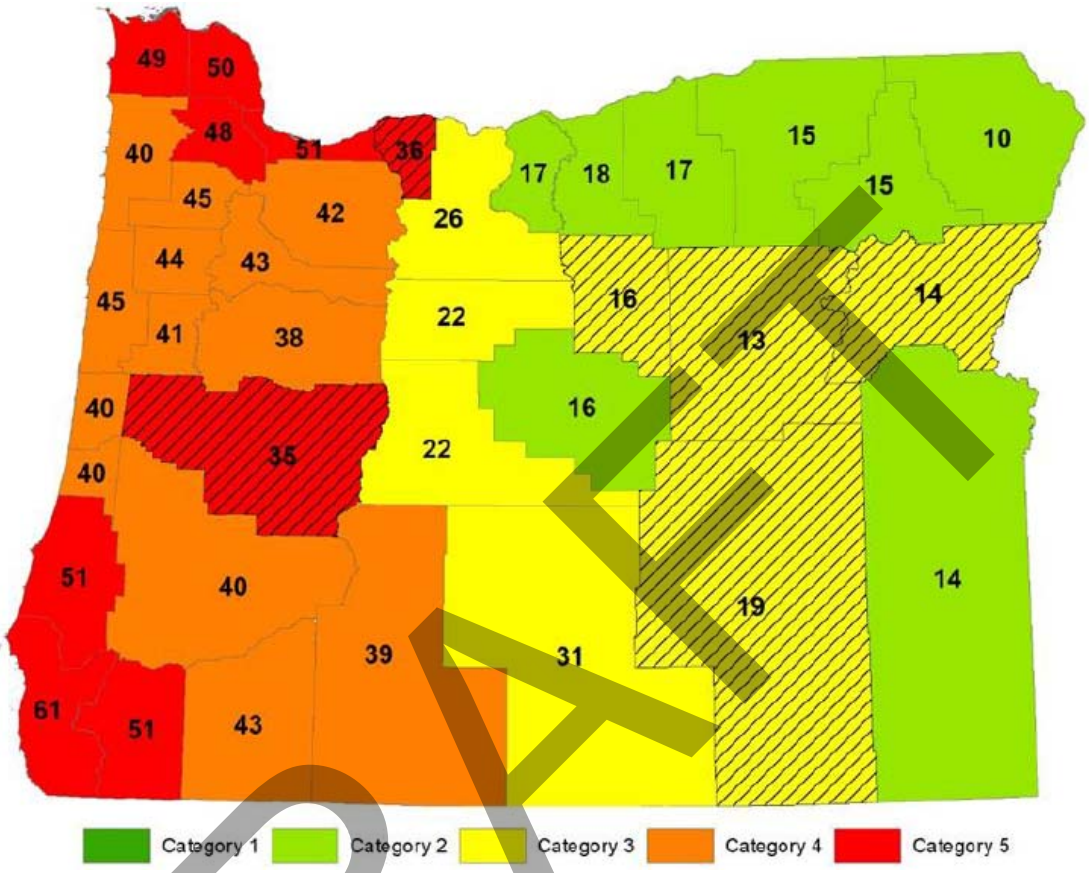
Figure 1.4: 2020 Oregon Earthquake Probability Ranking Based on Mean County Value of the Probability of Damaging Shaking and Presence of Newly Discovered Faults



Source: 2020 Oregon NHMP

Note: Counties with hatching had their probability category increased one step due to newly discovered faults.

Earthquake Vulnerability

However, the County's NHMP indicated that, "It is difficult to identify a part of the community that is not vulnerable to an earthquake. People, buildings, emergency services, hospitals, transportation lifelines, and water and wastewater utilities are susceptible to the effects of an earthquake." In the event of an earthquake, the City Hall building may be threatened. Aside from City Hall, many other buildings in downtown are constructed of un-reinforced masonry. Buildings of this construction type, as has been documented, are particularly vulnerable to sustain detrimental impacts from an earthquake. The City's drinking water treatment plant, treated water storage reservoirs, pipelines, sewage collection system, and sewage treatment plant have not been upgraded to withstand a seismic event and may susceptible to significant damage.

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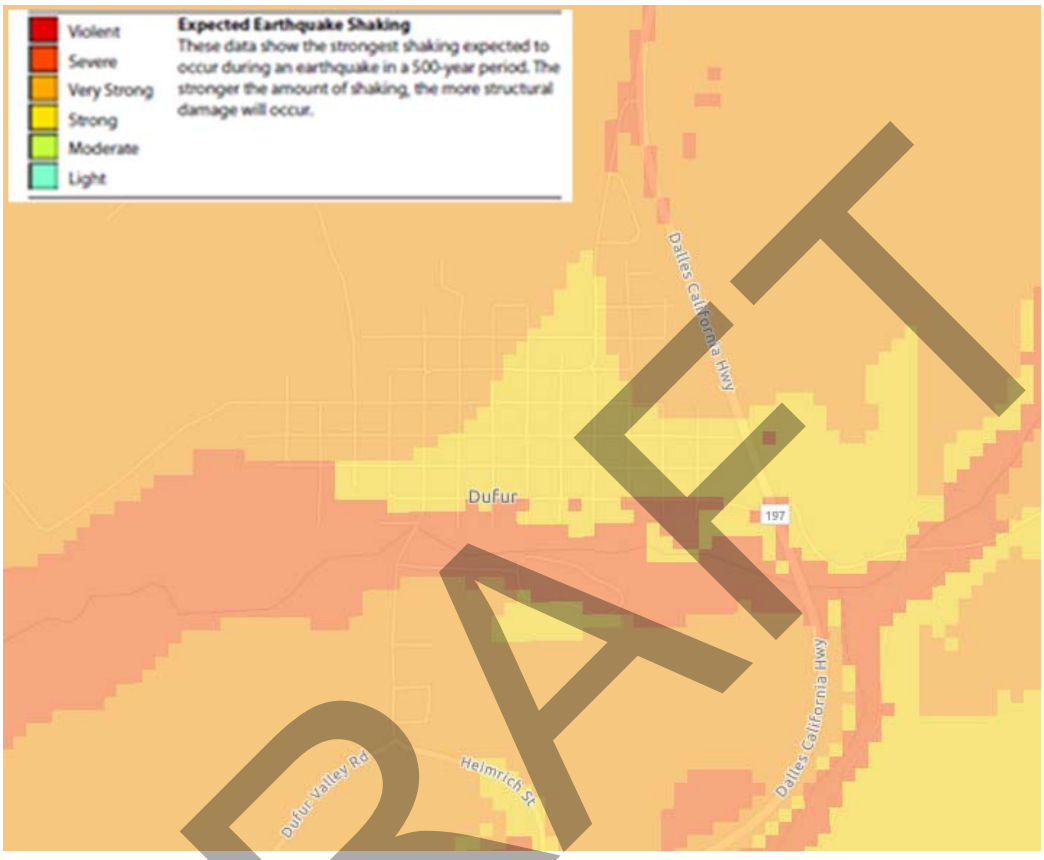
Though the 2020 DOGAMI probability ranking shows Wasco County in Category 2, the Oregon HazVu database reveals a vulnerable topography if an earthquake were to occur.

Figure 1.5: Dufur Earthquake Hazard Map



Source: Oregon HazVu: Statewide Geohazards Viewer, Oregon Department of Geology and Mineral Industries, accessed 7/29/2024

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Earthquake Resilience

Dufur School is conducted a seismic study on the old school building and have made improvement to the school in 2024. The U.S. Environmental Protection Agency requires all water utilities to conduct a risk and resilience assessment for a number of scenarios including earthquake. The assessment is used to develop an emergency response plan and to inform capital improvement plans. The assessment is required to be updated and certified every five years. The first assessment was certified in 2021. The City will begin the next assessment in 2027, to be certified in 2028.

Earthquake Risk

With respect to natural hazards, risk can be expressed as the probability of a hazard occurring combined with the potential for property damage and loss of life. Based the proximity of local

faults, vulnerable topography in Dufur, Wasco County's social vulnerability index, and the high value of properties within City Limits, Dufur is considered to be at low risk from earthquake by the City, and Wasco County.

Flood

The Federal Emergency Management Agency defines a flood as a general and temporary condition of partial or complete inundation of 2 or more acres of normally dry land area or of 2 or more properties[41].

According to the 2018 DOGAMI Natural Hazard Risk Report for Wasco County, Oregon, flooding is the most common natural hazard in the county and accounts for a significant amount of damage to persons and property[42].

Flood Probability

The Oregon Climate Change Research Institute issued a report specific to Wasco County in August 2018. They modeled high and low greenhouse gas emissions scenarios. There predictions for changes in extreme heat and drought probabilities by the 2050s based on their higher emissions scenario:

The intensity of extreme precipitation events is expected to increase slightly in the future as the atmosphere warms and is able to hold more water vapor.

- In Wasco County, the magnitude of precipitation on the wettest day and wettest consecutive five days per year is expected to increase on average about 17-percent and 12-percent, respectively, by the 2050s under the higher emissions scenario compared to the historical baseline.
- In Wasco County, the frequency of days with at least 0.75-inches of precipitation and the frequency of days exceeding a threshold for landslide risk is not projected to change substantially.

Climate Change

According to the 2020 Oregon NHMP, it is very likely (>90%) that Oregon will experience an increase in the frequency of extreme precipitation events and extreme river flows (high confidence). Furthermore, the likelihood of increases in extreme precipitation events is greater east of Cascades than west. Extreme river flow, while affected by extreme precipitation, is also driven by other conditions: soil moisture, water table, snowmelt, river network morphology, and local variability in precipitation and snowmelt. Increases in extreme river flows leading to

[41] Federal Emergency Management Agency. (2020, July 18). *FEMA Flood Insurance Terminology Index*. Retrieved November 18, 2020, from Federal Emergency Management Agency: fema.gov/flood-insurance/terminology-index
[42] Wasco County. (2019). *Wasco County Multi-Jurisdiction Natural Hazard Mitigation Plan*.

DRAFT

damaging floods will be less likely where storm water management (urban) and/or reservoir operations (river) have capacity to offset increases in flood peak.[43]

Figure 1.6: Dufur Flood Hazard Map

Source: Oregon HazVu: Statewide Geohazards Viewer, Oregon Department of Geology and Mineral Industries, accessed 7/29/2029

Table 13: Recent Flood History – Dufur

Year	Type of Flood	Description/Declaration
1996	Rain on snow	February 1996: In February 1996 widespread flooding in the Pacific Northwest resulted from heavy rain and warming on a substantial mid elevation snowpack. The Columbia River crested at 27.1 ft. on February 9. This flood occurred because of the confluence of several

[43] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.

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Year	Type of Flood	Description/Declaration
		factors. The winter of 1995/96 was extremely rainy. Prior to the flooding period, the region experienced a cold snap with low elevation freezing, ice, and snow. As a result, Fifteenmile Creek flooded parts of Dufur where heavy damage was caused. The February 1996 flood event was later determined to be a greater than 100 year event and flood levels experienced at that time have become the local high water marker for water system flood resilience.

Flood Vulnerability

Flooding has the potential to significantly impact economically valuable commercial and industrial properties. Dufur also has support infrastructure that is subject to flood risk including transportation, water and wastewater systems.

During the flood from February 6-8 1996, the City was flooded around the creek area. Much of Dufur sits above the creek, except for the city wastewater treatment ponds. There is currently upgrades being done on the waste water system that will have larger dykes.

Flood Resilience

The Federal Emergency Management Agency (FEMA) has mapped most flood-prone streams in Oregon. The maps depict the 1% flood (100-year) upon which the National Flood Insurance Program is based. Dufur Flood Insurance Rate Maps (FIRM) were in the process of update during the writing of this plan with an expected publish date of December 2024.

Flood Risk

With respect to natural hazards, risk can be expressed as the probability of a hazard occurring combined with the potential for property damage and loss of life. Based the proximity of the Fifteenmile & Pine Creek, vulnerable streamside topography in Dufur, Wasco County's social vulnerability ratings, and the high value of properties that have experienced historical floods, Dufur is considered to be at high risk from floods by City, and medium risk by Wasco County.

The working group determined that the City's risk to flood is high, which is the higher than the County's risk. In addition to information found in the County's NHMP, the working group noted that Dufur, as an urban center, has a higher density of high value properties. Flooding has the potential to significantly impact economically valuable commercial and industrial properties.

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Dufur also has a support infrastructure that is subject to flood risk including transportation, water and wastewater systems.

Wildland-Wildfire

The working group determined that the City's risk to wildfire is high, which is the same as the County's risk. In addition to information found in the County's plan, the working group identified other issues specific to Dufur. The City of Dufur is a high priority area for wildfire protection in Wasco County because of its limited firefighting resources and the fact that the fuel loading and weather conditions there are conducive to large and fast-moving fires.

- Dufur and the surrounding area are a high risk zone for wildfires. Naturally there are big/fast moving wildfires in our area every year. Some examples are in 2018 when there were three fires that impacted the City of Dufur two water systems. The three fires were the Sub-Station Fire, Long Hollow Fire, and the South Basin Fire. The last fire that was a large impact on the city water system was the 2024 Larch Creek Fire.
- Sub-Station Fire – Started on a highway 197 close to The Dalles, with surrounding volunteer agency responding as the fire spread quick to the south and south east toward Dufur
- South Basin Fire was started at a residents out building caught fire and spread across the south and south west of Dufur. The main water system available for water is the City system known as the South Basin Reservoir.
- Long Hollow Fire – This started from a piece of farm equipment to the west of Dufur
- Larch Fire – Started on private property to the south of Dufur spreading towards Tygh Valley. The city water system was a main source of water.
- These Four fires impacted the City of Dufur water supply along with the south basin reservoirs. There were times during these fires that the City of Dufur had to haul water from town to replenish the South Basin Reservoir to continue to supply water to resident. Generally speaking, most fire in and around Dufur are kept to a small to medium sized fire due to the response of the Dufur Fire Dept., Oregon department of Forestry , and other county mutual aid partners.

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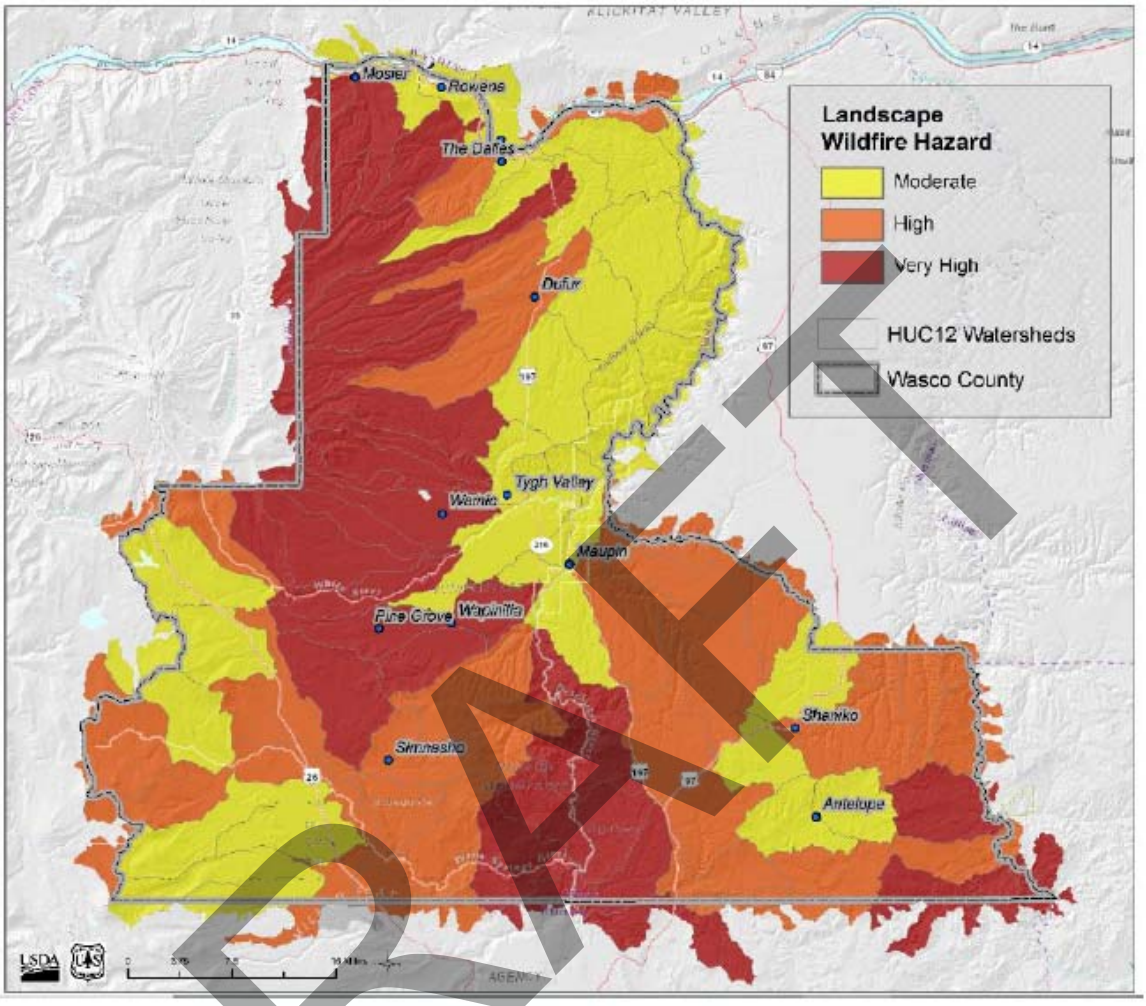
Figure 1.4: Wasco County Fire Zones and WUIs



Source: 2022 Community Wildfire Protection Plan. Wasco County Planning Department. Accessed 3/29/2024.

Landslide

Landslide Probability

The working group determined that the City's risk to landslide is low, consistent with the County's risk. While in general the risk of landslide in Dufur is low, there are areas in the City where the risk is moderate, or even high (See Figure 1.5).

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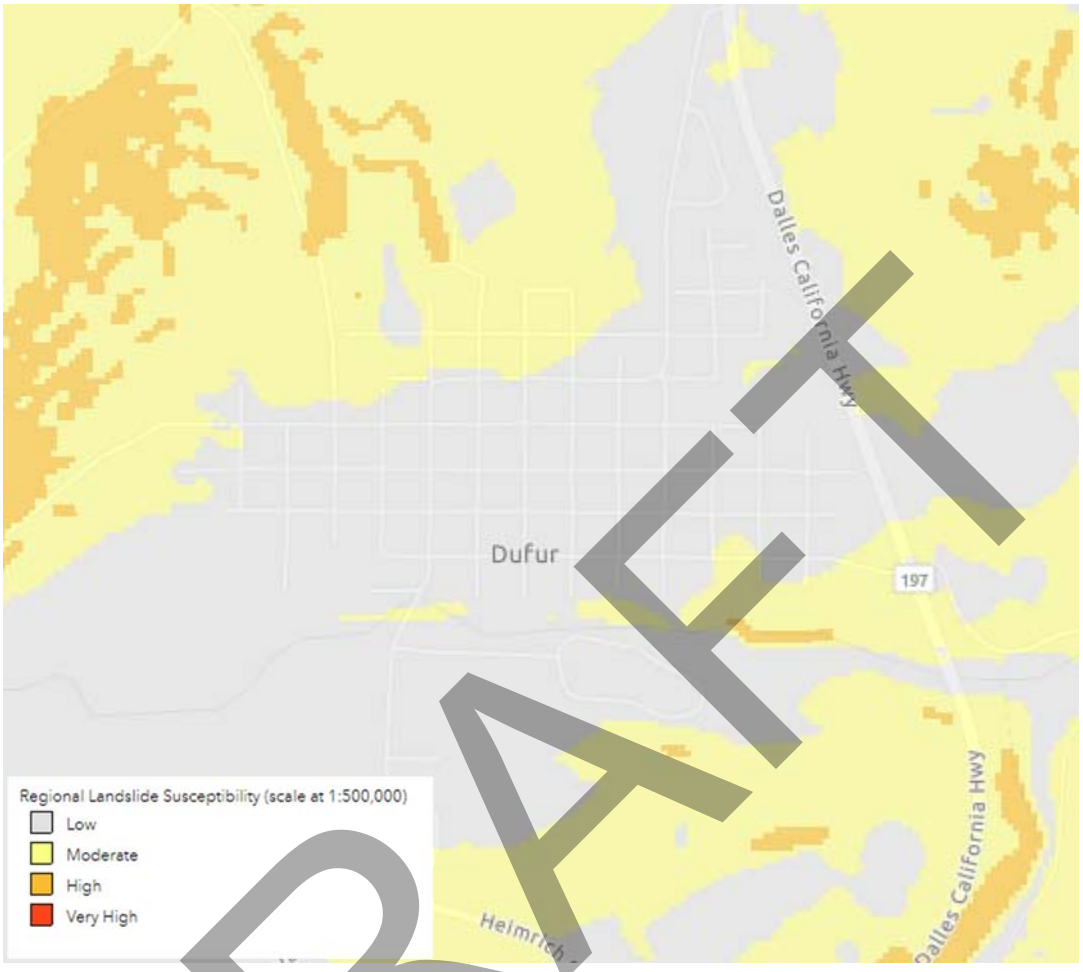
Figure 1.5: Dufur Landslide Hazard Map



Source: Oregon HazVu: Statewide Geohazards Viewer, Oregon Department of Geology and Mineral Industries, accessed 7/29/2024

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Landslide Vulnerability

As Figure 1.5 shows, areas that are considered moderate or high risk follow Fifteenmile Creek, as well as the northwest and southeast portions of city limits.

Landslide Risk

With respect to natural hazards, risk can be expressed as the probability of a hazard occurring combined with the potential for property damage and loss of life. Based geohazard conditions in Dufur and the high value of properties that have experienced impacts from landslide activity weighed against active landslide mitigation and monitoring, Dufur is considered to be at low risk from landslides by the City, and by Wasco County.

Volcanic Event

The working group determined that the City's risk to a volcanic event is low, similar to the County. In addition to information found in the County's portion of the NHMP, the working group identified other issues specific to Dufur. Dufur may be subject to tephra fallout and the secondary impacts of lahar flows along stream channels which may not occur in all areas of the County. The City's primary water supply from Dufur municipal watershed is also directly at risk.

Volcano Probability

Mount Adams is considered to be an active volcano. It was designated as a high threat volcano by the U.S. Geological Survey (USGS) in its 2018 Update to National Volcanic Threat Assessment. The risk of eruption was ranked 34 of 161 volcanoes assessed in the Cascade Range[44].

Mount Adams is located about 55 miles northwest of Dufur. Dufur Municipal Watershed are located about 55 miles south of Mount Adams. The prevailing winds in the area are out of the West so ash fall is not expected to severely impact the watershed under normal weather conditions. The impact of an eruption is expected to be similar to impacts experienced during the 1980 eruption of Mount St. Helens.

Mount Hood is an active volcano. It was designated as a very high threat volcano by the U.S. Geological Survey (USGS) in its 2018 Update to National Volcanic Threat Assessment because of how it erupts and the communities within its reach. The risk of eruption was ranked 6 of 161 volcanoes assessed in the Cascade Range[45]. USGS–Cascades Volcano Observatory and its partners currently operate eleven seismometers and six GPS receivers on and near Mount Hood[46].

Mount Hood is located 10 miles west of the Wasco County border, and 25 miles from Dufur. The upper portions of Dufur's Municipal Watershed are located about 10 miles due east of Mount Hood. The prevailing winds in the area are out of the West.

Ash fall from Mount Hood could have a significant impact across the entire County including Dufur's Municipal watershed.

Lahars can be generated by hot volcanic flows that melt snow and ice or by landslides from the steep upper flanks of the volcano. Dufur Municipal Water is located outside of the area

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[44] Ewert, J.W., Diefenbach, A.K., & Ramsey, D.W. (2018). *2018 Update to the U.S. Geological Survey National Volcanic Threat Assessment*. Reston, VA: U.S. Department of the Interior.
[45] Ewert, J.W., Diefenbach, A.K., & Ramsey, D.W. (2018). *2018 Update to the U.S. Geological Survey National Volcanic Threat Assessment*. Reston, VA: U.S. Department of the Interior.
[46] Mize, J. (2019, September 19). *Three additional monitoring stations to be installed on Mount Hood*. columbian.com/news/2019/sep/19/three-additional-monitoring-stations-to-be-installed-on-mount-hood/. Accessed 5/8/2024.

expected to experience significant impact from lahars sweeping down the entire length of the Sandy (including the Zigzag) and White River valleys[47].

Mount St. Helens erupted in 1980. Though located 75 miles northwest of Dufur, areas of Wasco County were covered by up to an inch or more of ash and some vehicles could not operate as their air intakes were clogged[48].

Mount St. Helens is still considered to be an active volcano. It was designated as a very high threat volcano by the U.S. Geological Survey (USGS) in its 2018 Update to the National Volcanic Threat Assessment. The risk of eruption was ranked 2 of 161 volcanoes assessed in the Cascade Range[49].

Volcano Vulnerability

The primary danger area around a volcano covers an approximately 20-mile radius, although there is some danger to people within 100 miles or more. Airborne ash from a volcano can affect people hundreds of miles away from the eruption. The most common volcano-related hazards are ash (tephra), lahars (volcanic mud flows), lava and debris flows, avalanches, and pyroclastic flows.

Volcano Resilience

Dufur does not have an open-water Municipal Water Supply.

Dufur has three groundwater wells. These wells are expected to be sufficient to supply domestic and some limited industrial needs if surface water supplies are compromised.

Volcano Risk

With respect to natural hazards, risk can be expressed as the probability of a hazard occurring combined with the potential for property damage and loss of life based the proximity of the Mount Hood to Dufur Municipal Watershed. Dufur is considered to be at low risk by Wasco County and low risk by the City of Dufur.

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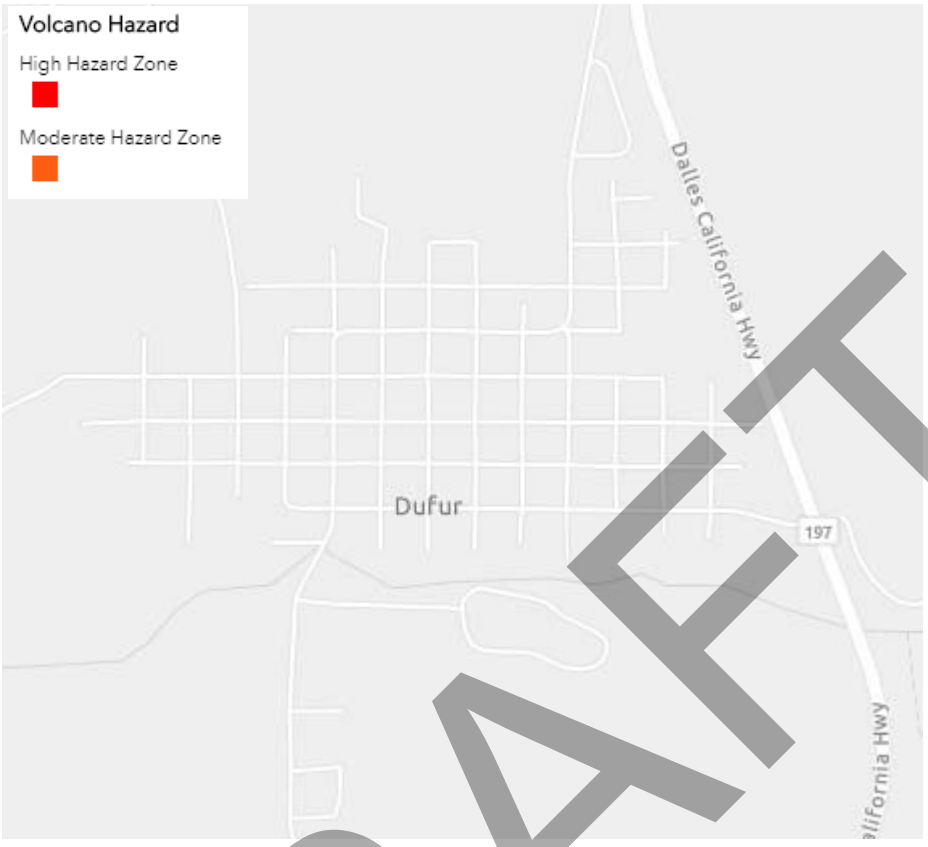
[47] Wasco County. (2019). *Wasco County Multi-Jurisdiction Natural Hazard Mitigation Plan*. The Dalles, OR: Wasco County.
[48] Wasco County. (2019). *Wasco County Multi-Jurisdiction Natural Hazard Mitigation Plan*. The Dalles, OR: Wasco County.
[49] Ewert, J.W., Diefenbach, A.K., & Ramsey, D.W. (2018). *2018 Update to the U.S. Geological Survey National Volcanic Threat Assessment*. Reston, VA: U.S. Department of the Interior.

Figure 1.6: Dufur Volcanic Event Map



Source: Oregon HazVu: Statewide Geohazards Viewer, Oregon Department of Geology and Mineral Industries, accessed 7/29/2024

Goals and Action Items

What are the Plan Goals?

The plan goals help to guide the direction of future activities aimed at reducing risk and preventing loss from future natural hazard events. In order to align with the Wasco County Natural Hazards Mitigation Plan, the City of Dufur is adopting Wasco County's goals, with no City-specific revisions.

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Table 1.10. 2024 Wasco County NHMP Goals

Goal	Statement
Protection of Life and Property	Develop and implement activities to protect human life, commerce, property, and natural resource systems.
	Reduce insurance losses and repetitive claims for chronic hazard events while promoting insurance for catastrophic hazards.
	Evaluate guideline/codes and permitting processes in addressing hazard mitigation; emphasize non-structural means of mitigating hazard impact.
	Actively acknowledge amount of loss the County is susceptible to and develop efforts to overcome that loss without significant reliance on outside resources.
	Utilize mitigation activities to minimize risks associated with hazard events.
Emergency Services Enhancement	Evaluate performance of critical facilities during a natural hazard event; implement measures to improve performance.
	Minimize threat to life safety issues.
	Ensure resources, staffing, and volunteer base keeps pace with County growth and needs.
Education & Outreach & Inclusion, Diversity, Equity and Accessibility	Develop and implement education programs to increase awareness among citizens; local, county and regional agencies; non-profit organization; businesses; and industry.
	Develop and conduct outreach programs to increase the number of local activities implemented by public and private sector organizations.
	Build community consensus through outreach, education, and activities.
	Ensure that the cultural, racial, and economic status of citizens is considered during the public planning process, and account for and incorporate underserved communities
Facilitate Partnerships & Coordination	Strengthen communication and coordination of public/private partnership and emergency services among local, county, and regional governments and the private sector.
	Incorporate hazard mitigation into the greater social, economic, and natural resource goal framework.
	Incorporate hazard mitigation as part of the County leadership's routine decision making process.
	Foster a diverse economy to reduce the impacts of a hazard event on any one sector.
	Create the conditions for a transitional economy that welcomes new development and innovative ideas that are sensitive to potential hazard risks faced by the County.
Natural Resource Systems Protection	Link watershed planning, natural resource management, and land use planning with natural hazard mitigation activities.

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	Preserve and rehabilitate natural systems to serve natural hazard mitigation functions and protect recreation resources.
	Coordinate programs to increase natural hazard knowledge base and use technology to better record events and model vulnerability.
	Protect recreation and tourism industries by raising awareness of potential hazard impacts.
	Provide support for agricultural and forest industries to help them prepare for hazardous events.
Climate Change	Commit to efforts that will increase understanding of how climate change will increase the frequency and severity of identified hazards.
	Consider the increase in hazard frequency, duration, and severity due to climate change during the development and implementation of activities to protect human life, commerce, property, and natural resource systems.

Source: Wasco County NHMP Steering Committee, May 29, 2024

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Action Items

What are the Plan Action Items?

Short and long-term mitigation action items identified through the plan update process, including the issues identification process, risk assessment, and community profile, are an important part of the mitigation plan. Action items are detailed recommendations for activities that local departments, citizens and others could engage in to reduce risk. The mitigation action items identified by the plan are intended to help the City move toward achieving the plan goals. The mitigation action items address both multi-hazard and hazard-specific issues for the hazards addressed in this plan.

In summary, there are 6 multi-hazard mitigation actions, 1 earthquake, 1 flood, and 2 wildfire actions. There are no volcano or severe weather specific mitigation actions.

Each action item has a corresponding action item worksheet describing the activity, identifying the rationale for the project, identifying potential ideas for implementation, and assigning coordinating and partner organizations. To facilitate implementation, worksheets have been filled out describing each action item with the following information.

Rationale or Key Issues Addressed

Action items should be fact based and tied directly to issues or needs identified throughout the planning process. Action items can be developed from a number of sources including participants of the planning process, noted deficiencies in local capability, or issues identified through the risk assessment.

Coordinating Organization

The coordinating organization is the lead public agency with 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 Partners

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

External Partners

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.

The internal and external partner organizations listed in the Action Item Worksheets are potential partners recommended by the project working group, but not necessarily contacted

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during the development of the plan. The coordinating organization should contact the identified partner organizations to see if they are capable of and interested in participation. This initial contact is also to gain a commitment of time and/or resources towards completion of the action items.

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* (ST) are activities that may be implemented with existing resources and authorities within one to two years.
- *Long-term action items* (LT) may require new or additional resources and/or authorities, and may take between one and five years to implement.

Could the Mitigation Action Item Proposal Form fit on this page or did you specifically want to start it on a new page? Just a formatting question.

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Mitigation Action Item Proposal Form

Each mitigation action is described in detail in the Mitigation Action Item Proposal Form and also in summary in the Mitigation Action Items Summary Matrix.

Proposed Action Item:			**Alignment with Plan Goals:**
Type of Hazard #1 – Mitigation Proposal Title			Must align with a Wasco County Goal
Alignment with Existing Plans/Policies:			
List agency and plan that supports the mitigation proposal			
Rationale for Proposed Action Item:			
• Rationale should be based on studies and data analysis, may or may not be associated with a plan			
Ideas for Implementation:			
• Ideas from plan development working groups and public input sessions			
Coordinating Organization:	City Department that will lead the mitigation effort		
Internal Partners:		**External Partners:**	
City Departments		Other public and private sector organizations	
Potential Funding Sources:		**Estimated cost:**	**Timeline: (check one)**
As identified during plan development		**If available**	☐ Short Term (0-2 years) ☐ Long Term (2-4+ years)
Form Submitted by:	**Author or Department**		
Action Item Status:	Track from original submittal year. Example: Submitted July 2006 – Revised 2012 – Revised 2018		

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City of Dufur NHMP Mitigation Action Items Matrix

Table 1.12: City of Dufur Mitigation Action Items Matrix Key

Hazard	Wasco Co. Rating	City Rating	Detail
Wildlands-Wildfire	High	High	The Dufur area has seen significant wildfire events in its surroundings over the last several years.
Flood	Medium	High	Fifteen Mile Creek runs through the heart of Dufur and has seen major flooding in the past
Extreme Heat	High	High	Dufur
Severe Local Storm	High	High	Ice storm, snow storm or blizzard, and windstorms.
Drought	High	Medium	Dufur has concerns about drought and its impact on water supply, wildfire fuels, and crops but does not see it as primary.
Earthquake	Low	Low	Earthquake magnitude is minimal in the Dufur area.
Volcano	Low	Low	The Dufur may be impacted by a volcanic eruption at any time (particularly from Mt. Hood and Mt. Adams)
Landslide	Low	Low	Dufur has no identified slide areas within City limits.

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City of Dufur Mitigation Action Items Summary Matrix

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Table 1.13. Dufur NHMP Mitigation Action Item Matrix

Action Item	Priority L=Low M=Med H=Hi	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline LT=Long ST=Short	Alignment with plan goals					
						Protection of Life & Property	Emergency Services Enhancement	Education & Outreach, and IDEA	Facilitate Partnerships & Coordination	Natural Resource Systems Protection	Climate Resilience
Multi-Hazard (MH)											
MH #1	M	Evaluate and Prioritize Critical Infrastructure for Hazard Resilience (e.g. Seismic Retrofit, Back up Power, Wildfire Protections)	City	City Council, Engineering Firms, DOGAMI, OEM, FEMA	LT	X					
MH#2	M	Seek Implementation Funding for Hazard Resilient Modifications to Critical Infrastructure. In particular, backup power and HVAC/Window upgrades.	City	City Council, Engineering Firms, DOGAMI, OEM, FEMA	LT	X					X
MH#3	M	Annual Review of Natural Hazards Mitigation Plan / Complete Review/Update/Adoption by City Council Every Five Years	City, County	City Council, OR Office of Emergency Management Federal Emergency Management Agency	ST		X				
MH#4	M	Support outreach around Emergency Preparedness at Dufur's annual festival, the Threshing Bee	City, Fire Dept	City Council, Wasco County	LT				X		
MH#5	M	Purchase equipment to address impacts from hazards, such as a gravel truck, heavy duty vehicle to move downed trees or flood mitigation supplies, and additional firefighting equipment.	Public Works	City Council, City Staff	ST	X	X				

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Action Item	Priority L=Low M=Med H=Hi	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline LT=Long ST=Short	Alignment with plan goals					
						Protection of Life & Property	Emergency Services Enhancement	Education & Outreach, and IDEA	Facilitate Partnerships & Coordination	Natural Resource Systems Protection	Climate Resilience
Earthquake Hazard (FH)											
EH #1	H	Complete Seismic Upgrades Planned for Municipally-owned Potable Water Reservoirs	City		LT	X	X			X	X
Flood Hazard (FH)											
FH#1	H	Explore acquisition and management strategies to preserve parks, trails, and open space in the floodplain	Park District, City	City Council, Park Board, Wasco County Emergency Management, DLCD, OEM, FEMA	LT	X				X	X
Wildfire Hazard (WH)											
WH#1	M	3000 Gallon Potable Water Tender	Fire Department	Fire	LT	X	X		X		
WH#2	M	Type 6 Wildland engine	Fire Department	Fire	LT		X				

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WH#3 (new)	M	Expand South Basin Reservoir to help address wildfire needs.	Public Works, City Council	City Council, Wasco County Emergency Management, Landowners, USFS, Oregon Office of State Fire Marshal	LT	X	X			X	
WH#4	M	Wild Fire Mitigation Tools	Fire Department	Fire	LT	X	X				

Source: 2024 Dufur NHMP Review Team meetings

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Mitigation Action Items Proposal Forms

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Proposed Action Item:	**Alignment with Plan Goals:**
MH #1 – Evaluate and Prioritize Critical Infrastructure for Hazard Resilience (e.g. Seismic Retrofit, Wildfire Protections)	Protection of Life & Property

Alignment with Existing Plans/Policies:	
Water System Master Plan Water System Emergency Response Plan & Public Notice Wastewater System Master Plan	Wastewater System Emergency Response Plan & Public Notice

Rationale for Proposed Action Item:

- The working group also acknowledged that many critical facilities in the City are old and that better information about their vulnerabilities is required for the best use of limited mitigation dollars
-

Ideas for Implementation:

-

Coordinating Organization:	City

Internal Partners:	**External Partners:**
City Council	Engineering Firms, DOGAMI, OEM, FEMA

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
FEMA, State and Federal Grants/Loans, City Funds		✓ Short Term (0-2 years) ☐ Long Term (2-4+ years)

Action Item Status:	Submitted July 2006 – Revised 2012 – Revised 2018

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Proposed Action Item:	**Alignment with Plan Goals:**
MH#2 - Seek Implementation Funding for Hazard Resilient Modifications to Critical Infrastructure. In particular, backup power and HVAC/Window upgrades.	Protection of Life & Property, Climate Resilience

Alignment with Existing Plans/Policies:	
Water System Master Plan Wastewater System Master Plan Comprehensive Land Use Plan	

Rationale for Proposed Action Item:

- Ensure critical infrastructure and facilities can continue to provide services in a disaster event

Ideas for Implementation:

- Ensure that critical infrastructure is documented in the Natural Hazard Mitigation Plan and in the Comprehensive Plan so facilities might be more eligible for upgrade grants
- Evaluate funding opportunities
- Complete benefit cost analysis as applicable
- Identify funding partners or other jurisdictions interested in similar retrofits
- Write grant application for funding
- Seek Flood Mitigation Assistance dollars for flood related mitigation actions addressing flood risk to critical facilities
- Seek National Fire Plan and/or Oregon Department of Forestry assistance dollars for wildfire related mitigation actions addressing wildfire risk to critical facilities

Coordinating Organization:	City

Internal Partners:	**External Partners:**
City Council	Engineering Firm, DOGAMI, OEM, FEMA

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
FEMA, State and Federal Grants/Loans, City Funds		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Action Item Status:	Submitted 2024

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Proposed Action Item:	**Alignment with Plan Goals:**
MH#3 - Annual Review of Natural Hazards Mitigation Plan / Complete Review/Update/Adoption by City Council Every Five Years	Emergency Service Enhancement
Alignment with Existing Plans/Policies:	
Emergency Management Performance Grant funding from Oregon Office of Emergency Management and FEMA requires the NHMP to be reviewed twice per year	
Rationale for Proposed Action Item:	
• FEMA requires NHMP update every 5 years to maintain HMGP funding eligibility • Annual review/update ensures operability of plans and makes 5 year update easier	
Ideas for Implementation:	
• Designate a convener to be responsible for ensuring that the review and update process take place. • Include review and update on departmental work plans. • Incorporate NHMP action items into Department and Division objectives and benchmarks.	

Coordinating Organization:	City	
Internal Partners:	**External Partners:**	
City Council	Oregon Military Department, Office of Emergency Management Federal Emergency Management Agency	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
		✓ Short Term (0-2 years) ☐ Long Term (2-4+ years)
Action Item Status:	Submitted 2024	

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Proposed Action Item:	Alignment with Plan Goals:
MH#4 - Support outreach around Emergency Preparedness at Dufur's annual festival, the Threshing Bee	Public Outreach/Engagement

Alignment with Existing Plans/Policies:

City Vision Plan
Water Master Plan
Wastewater Master Plan

Rationale for Proposed Action Item:

- Ensuring public is aware of resources and strategies to increase resilience in the event of a disaster

Ideas for Implementation:

- Collaborate with County Emergency Management, Fire Department to have a presence

Coordinating Organization:	City

Internal Partners:	External Partners:
Fire, Public Works	State Fire Marshal, Northern Wasco County PUD, Wasco Co EM

Potential Funding Sources:	Estimated cost:	Timeline:
		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Action Item Status:	Submitted 2024

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Proposed Action Item:	Alignment with Plan Goals:
MH#5 - Purchase equipment to address impacts from hazards, such as a gravel truck, heavy duty vehicle to move downed trees or flood mitigation supplies, and additional firefighting equipment.	Protection of Life & Property Emergency Services Enhancement

Alignment with Existing Plans/Policies:

City Vision Plan
Water Master Plan
Wastewater Master Plan

Rationale for Proposed Action Item:

- Ensuring public is aware of resources and strategies to increase resilience in the event of a disaster

Ideas for Implementation:

- Collaborate with County Emergency Management, Fire Department to have a presence

Coordinating Organization:	City

Internal Partners:	External Partners:
Public Works	

Potential Funding Sources:	Estimated cost:	Timeline:
		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Action Item Status:	Submitted 2024

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Proposed Action Item:	Alignment with Plan Goals:
EH#1 – Complete Seismic Upgrades Planned for Municipally-owned Potable Water Reservoirs	Protection of Life & Property, Emergency Services Enhancement, Natural Resource Systems Protection, Climate Resilience

Alignment with Existing Plans/Policies:

Water System Master Plan

Rationale for Proposed Action Item:

- The seismic enhancement of the City's above-ground reservoirs will improve seismic resiliency of the City's water system for supply of potable water for consumption, industrial use and firefighting.

Ideas for Implementation:

-

Coordinating Organization:	Public Works

Internal Partners:	External Partners:
City Council, Public Works	

Potential Funding Sources:	Estimated cost:	Timeline:
Water utility rate revenues		✓ Short Term (0-2 years) ☐ Long Term (2-4+ years)

Form Submitted by:	Public Works
Action Item Status:	Submitted 2024

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Proposed Action Item:	Alignment with Plan Goals:
FH#1 - Explore acquisition and management strategies to preserve parks, trails, and open space in the floodplain	Protection of Life & Property Natural Resource Systems Protection Climate Resilience

Alignment with Existing Plans/Policies:

Dufur Park Master Plan
City of Dufur Comprehensive Plan

Rationale for Proposed Action Item:

- The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address future development [201.6(c)(3)(ii)]. Developing acquisition and management strategies to preserve open spaces in the floodplain will prevent flood hazards by limiting or prohibiting development in these areas.
- Goal 7 of Oregon's Land Use Planning Goals requires that local governments "adopt or amend, as necessary, based on the evaluation of risk, plan policies and implementing measures...[that prohibit] the siting of essential facilities, major structures, hazardous facilities and special occupancy structures, as defined in the state building code (ORS 455.447(1) (a)(b)(c) and (e)), in identified hazard areas..." Developing acquisition and management strategies to preserve open spaces in the floodplain will fulfill goal 7 by preventing the siting of major facilities in a flood-hazard area.

Ideas for Implementation:

- Identify potential opportunities to acquire lands in the floodplain for use as parks, trail, or open space.
- Work with the Department of Land Conservation and Development, Oregon Military Department, Office of Emergency Management and FEMA to identify potential funding sources.

Coordinating Organization:	Dufur Park District

Internal Partners:	External Partners:
City Council,	Wasco County Emergency Management, DLCD, OEM, FEMA, Friends of Mill Creek

Potential Funding Sources:	Estimated cost:	Timeline:
FEMA, State and Federal Grants/Loans, Urban Renewal Agency, Private Sector		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Action Item Status:	Submitted 2024

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Proposed Action Item:	Alignment with Plan Goals:
WH#1 - 3000 Gallon Potable Water Tender	Protection of Life & Property Emergency Services Enhancement Facilitation of Partnerships & Coordination

Alignment with Existing Plans/Policies:

Wasco County Natural Hazards Mitigation Plan

Rationale for Proposed Action Item:

- The City's working group identified that their risk to wildfire is equal to that of the County.
- The City participated in the development of the County Community Wildfire Protection Plan. In the plan the City is tasked with at least one action under the Strategies By Zone section of the plan.
- The working group identified the need to continue to work with the County, ODF, and USFS on wildfire issues.

Ideas for Implementation:

- Participate in further planning and project activities with the County
- Partner with the County on education and outreach related activities
- Explore potential to distribute wildfire brochures (available through Institute for Business & Home Safety) to residents pulling building permits, who are located in the urban fringe.
- Pursue forest fire fuels reduction opportunities within Dufur's municipal watershed

Coordinating Organization:	Fire

Internal Partners:	External Partners:
Fire	

Potential Funding Sources:	Estimated cost:	Timeline:
FEMA, State and Federal Grants		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Action Item Status:	Submitted 2024

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Proposed Action Item:	Alignment with Plan Goals:
WH#2 - Type 6 Wildland engine	Emergency Services Enhancement

Alignment with Existing Plans/Policies:

Wasco County Natural Hazards Mitigation Plan

Rationale for Proposed Action Item:

- The City's working group identified that their risk to wildfire is equal to that of the County.
- The City participated in the development of the County Community Wildfire Protection Plan. In the plan the City is tasked with at least one action under the Strategies By Zone section of the plan.
- The working group identified the need to continue to work with the County, ODF, and USFS on wildfire issues.

Ideas for Implementation:

- Participate in further planning and project activities with the County
- Partner with the County on education and outreach related activities
- Explore potential to distribute wildfire brochures (available through Institute for Business & Home Safety) to residents pulling building permits, who are located in the urban fringe.
- Pursue forest fire fuels reduction opportunities within Dufur's municipal watershed

Coordinating Organization:	Fire

Internal Partners:	External Partners:
Fire	

Potential Funding Sources:	Estimated cost:	Timeline:
FEMA, State and Federal Grants		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Action Item Status:	Submitted 2024

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Proposed Action Item:	**Alignment with Plan Goals:**
WH#3 - Expand South Basin Reservoir to help address wildfire needs.	Protection of Life & Property Emergency Services Enhancement Natural Resource Systems Protection

Alignment with Existing Plans/Policies:

Wasco County Natural Hazards Mitigation Plan

Rationale for Proposed Action Item:

- The City's working group identified that their risk to wildfire is equal to that of the County.
- The City participated in the development of the County Community Wildfire Protection Plan. In the plan the City is tasked with at least one action under the Strategies By Zone section of the plan.
- The working group identified the need to continue to work with the County, ODF, and USFS on wildfire issues.

Ideas for Implementation:

- Participate in further planning and project activities with the County
- Partner with the County on education and outreach related activities
- Explore potential to distribute wildfire brochures (available through Institute for Business & Home Safety) to residents pulling building permits, who are located in the urban fringe.
- Pursue forest fire fuels reduction opportunities within Dufur's municipal watershed

Coordinating Organization:	Fire

Internal Partners:	**External Partners:**
Fire	City Council, Wasco County Emergency Management, Landowners, USFS, Oregon Office of State Fire Marshal

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
FEMA, State and Federal Grants		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Action Item Status:	Submitted 2024

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Proposed Action Item:	Alignment with Plan Goals:
WH#4 - Wild Fire Mitigation Tools	Protection of Life & Property Emergency Services Enhancement

Alignment with Existing Plans/Policies:

Wasco County Natural Hazards Mitigation Plan

Rationale for Proposed Action Item:

- The City's working group identified that their risk to wildfire is equal to that of the County.
- The City participated in the development of the County Community Wildfire Protection Plan. In the plan the City is tasked with at least one action under the Strategies By Zone section of the plan.
- The working group identified the need to continue to work with the County, ODF, and USFS on wildfire issues.

Ideas for Implementation:

- Participate in further planning and project activities with the County
- Partner with the County on education and outreach related activities
- Explore potential to distribute wildfire brochures (available through Institute for Business & Home Safety) to residents pulling building permits, who are located in the urban fringe.
- Pursue forest fire fuels reduction opportunities within Dufur's municipal watershed

Coordinating Organization:	Fire

Internal Partners:	External Partners:
Fire	USFS, Oregon Office of State Fire Marshal

Potential Funding Sources:	Estimated cost:	Timeline:
FEMA, State and Federal Grants		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Action Item Status:	Submitted 2024

DRAFT

Volume III:

City/Special District Addendum

DRAFT

Table of Contents

Volume III: 1

City/Special District Addendum 1

Table of Contents 2

Purpose 4

How was the 2024 Plan Developed? 4

How Were the Action Items Developed? 5

City of Maupin 2024 Mitigation Action Items 5

Maupin Addendum 6

How Will the Plan be Implemented? 6

Implementation through Existing Programs 7

Continued Public Participation 7

Plan Maintenance 8

Maupin Community Profile 9

Geography and Climate 9

Population and Demographics 10

Employment and Economics 12

Housing 13

Land and Development 14

Transportation and Commuting Patterns 15

Critical Facilities and Infrastructure 15

Historic and Cultural Resources 16

Hazard Analysis and Issue Identification 16

Initial Work Session Overview 16

City Participants 17

DRAFT

Analysis & Identification Process 17
Natural Hazard Risk Level Ranking Table 18
Severe Weather Event 20
Drought 21
Earthquake 28
Flood 33
Wildfire 19
Landslide 41
Volcanic Event 43
Goals and Action Items 45
What are the Plan Goals? 45
Existing Mitigation Activities ..... **Error! Bookmark not defined.**
Action Items 48
What are the Plan Action Items? 48
Rationale or Key Issues Addressed 48
Coordinating Organization 48
Internal Partners 48
External Partners 48
Plan Goals Addressed 49
Timeline 49
City of Maupin NHMP Mitigation Action Items Matrix 51
City of Maupin Mitigation Action Items Summary Matrix 52
Mitigation Action Items Proposal Forms 60

DRAFT

Maupin City Addendum

Purpose

This document serves as the City of Maupin's Addendum to the Wasco County Natural Hazards Mitigation Plan (NHMP). The County plan update is scheduled to be sent to FEMA for approval and adopted by the Wasco County Board of Commissioners in October - November2024. On June 2, 2023, the City of Maupin committed to producing an addendum to be part of the Wasco County Multi-Jurisdictional Natural Hazards Mitigation Plan, to include mitigation action items and an implementation strategy unique to the City of Maupin. The City's Addendum is considered part of the County's multi-jurisdictional NHMP, and meets the following requirements: (1) Multi-jurisdictional Plan Adoption §201.6(c)(5), (2) Multi-jurisdictional Participation §201.6(a)(3), (3) Multi-Jurisdictional Risk Assessment §201.6(c)(2) (iii), and (4) Multi-jurisdictional Mitigation Strategy §201.6(c)(3) (iv).

A description of the City specific planning and adoption process follows, along with detailed community specific mitigation action items. Information about the City's risk relative to the County's risk to natural hazards is documented in the rationale of the mitigation action items. The rationale indicates how the City's risk is considered greater or lesser than that of the County's.

How was the 2024 Plan Developed?

In 2023, a multijurisdictional group was convened to update the 2019 Natural Hazards Mitigation Plan. Staff from Wasco County and the City of Maupin and others conducted a climate and hazards vulnerability assessment that has become the foundation to this update. Maupin participated in Wasco County's collaborative planning process in the following ways.

1. A representative from the City of Maupin Administrative Office, Community Liaison Melissa Napoli, served on the Wasco County Natural Hazards Mitigation Steering Committee and participated in developing the Wasco County Natural Hazards Mitigation Plan.

2. The City of Maupin received input from a number of staff members to help develop the City's Addendum, including the following:

    a. City Manager

    b. Maupin Fire Chief

3. Maupin's working group participated in an issue identification work session. During this work session the working group identified the City's level of risk to each hazard in comparison to the County's risk and identified and documented particular natural hazard issues faced by the City with regard to population, economy, critical facilities and the environment.

4. The working group reviewed draft actions developed based on the outcomes of the first work session. If the City identified its risk as greater than the County to certain hazards, this

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information was included in the rationale of the appropriate action item as well as in the County's Risk Assessment.

5. City staff developed the City of Maupin Addendum.

6. The Community Liaison Melissa Napoli sent the draft addendum and attachments to Maupin's working group to review and provide comment. The County assisted the City to make appropriate revisions. The plan was sent to OEM and FEMA for review.

7. The plan returned from FEMA with a letter called Approved Pending Adoption. Then, after the County and the cities approved the NHMP, FEMA sent an approval letter that identified their approval date and the expiration date of the NHMP.

How Were the Action Items Developed?

The City's action items were developed through a two-stage process. In stage one, the Wasco County NHMP Update Steering Committee evaluated County-wide risks and identified potential issues which were then refined by Maupin's work group to be specific to the City. In stage two, the Maupin work group developed potential actions based on the hazards and the issues identified in stage one. The work group then cross walked the City's issues with Wasco County's action items, working through the Wasco County NHMP Update Steering Committee to identify opportunities to partner where issues were shared between jurisdictions.

City of Maupin 2024 Mitigation Action Items

The following mitigation actions are described in detail in the Action Items Matrix.

- Evaluate and Prioritize Critical Infrastructure for Hazard Resilience (e.g. Seismic Retrofit, Wildfire Protections)
- Seek Implementation Funding for Hazard Resilient Modifications to Critical Infrastructure
- Partner with the County for the Coordination of Disaster Education/Outreach & Response
- Identification and pursuit of Implementation Funding for Mitigation Actions
- Annual Review of Natural Hazards Mitigation Plan/ Complete Review/ Update/Adoption by City Council Every Five Years
- Secure Emergency Power Supply to Critical Facilities
- Small Business Awareness and Continuity Planning
- Partner with County on All-Hazard Emergency Preparedness
- Enter Into Supply Contracts and Mutual Aid Agreements

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- Ensure Critical Staff Are Identified and Trained in the NIMS-FEMA Compliant Incident Command System (ICS)
- Reduce Impacts to Roadways
- Conduct Severe Weather Risk Awareness Activities
- Assist Vulnerable Populations
- Explore the Potential for Maupin to Participate in the Community Rating System (CRS) of the Nation Flood Insurance Program (NFIP).
- Explore Acquisition and Management Strategies to Preserve Parks, Trails, and Open Space in the Floodplain.
- Ensure Continued Compliance with the National Flood Insurance Program (NFIP).
- Partner with the County to Implement the Community Wildfire Protection Plan (CWPP)
- Incorporate Wildfire Mitigation in the Comprehensive Plan
- Implement Ongoing Fuels Management Program.

Maupin Addendum Update

As the Wasco County NHMP update process began to unfold in 2024, plans were made to include the City of Maupin in the multi-jurisdictional NHMP update. The City of Maupin's Community Liaison Melissa Napoli, served on the Wasco County NHMP Update Steering Committee, and convened a number of meetings with relevant City staff to create Maupin's City Addendum. Consulted through the process were the City Manager Nick Smith, and Maupin Fire Chief Tom Troutman. Wasco County Staff members, including Senior Planner Daniel Dougherty, Associate Planner Sean Bailey, and Long-range Planner Alice Cannon also provided assistance in the City Addendum's development.

Following those meetings, Community Liaison Melissa Napoli developed the City's addendum, with particular focus on the plan's action items.

The Addendum reflects the City's Hazard Vulnerability and Issue Identification, Plan Goals, and Community Profile sections. The City Manager approved all changes before submittal to the County.

How Will the Plan be Implemented?

The City Council will be responsible for adopting the City of Maupin Natural Hazards Mitigation Addendum. This addendum designates a coordinating body and a convener to oversee the development and implementation of action items. Because the City Addendum is considered part of the County plan, the city will look for opportunities to partner with the County. The City's staff will re-convene 2 ½ years

DRAFT

after re-adoption of the City of Maupin NHMP Addendum. When the County's Steering Committee meets to review actions, the City's working group will also meet to review city-specific actions. The City Manager will serve as the convener and will be responsible for convening the working group. The convener will also remain active in the County's planning process.

Implementation through Existing Programs

Many of the recommendations in the Natural Hazards Mitigation Plan are consistent with the goals and objectives of the City's existing plans and policies. Where possible, the City of Maupin will implement the Natural Hazards Mitigation Plan's recommended mitigation actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, and can adapt easily to changing conditions and needs. Implementing the Natural Hazards Mitigation Plan's action items through such plans and policies increases their likelihood of being supported and implemented.

In addition to Water, Wastewater, Wellhead Protection and Street Design Standards Plans, the City of Maupin currently has planning documents that directly relate to natural hazard mitigation:

- The City of Maupin Comprehensive Land Use Plan, last revised in 2006, relates to natural hazard mitigation through its section that outlines goals and policies.
- The City of Maupin Capital Improvement Plan, last revised in 2009, relates to Natural Hazard Mitigation through its section on water infrastructure, which does not plan for, but has room for natural hazard mitigation planning. The plan documents upgrades and improvements which may be necessary for fire prevention and suppression.
- The City of Maupin Economic Opportunities Analysis, created in June 2019, describes Maupin's primary opportunity for employment growth as being related to the Deschutes River, a natural resource which supports the majority of Maupin's economy. Natural hazard mitigation, such as protection from floods, may relate to this plan.
- The City of Maupin Main Street Plan, created January 2022, details the preservation of the downtown district as a core value. This could include protection from natural hazards by way of fire suppression equipment or seismic retrofitting.

The working group and the community's leadership have the option to add or implement action items at any time. This allows the working group to consider mitigation strategies as new opportunities arise, such as funding for action items that may not be of the highest priority. When new actions are identified, they should be documented using the action item form. Once a proposed action form has been submitted to the convener, the action will become part of the City's addendum.

Continued Public Participation

Keeping the public informed of the City's efforts to reduce the City's risk to future natural hazards events is important for successful plan implementation and maintenance. The city is committed to involving the public in the plan review and future updates. The City Addendum, as a chapter of the

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County Plan, is posted on the Wasco County and City of Maupin websites so that the public may view the plan and submit electronic comments to the community at any time.

In addition, the Hazard and Vulnerability information is presented to the public by the City of Maupin's Planning Department and at an informational booth during the City's annual Maupin Daze event, hosted this year on May 18th at Kaiser Park in Maupin. Additional information dissemination is conducted throughout the year when opportunities present themselves.

Plan Maintenance

The Wasco County Natural Hazards Mitigation Plan will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. During the county plan update process, the city will also review and update its addendum. The convener will be responsible for convening the working group to address the questions outlined below.

- Are there new partners that should be brought to the table?
- Are there new local, regional, state, or federal policies influencing natural hazards that should be addressed?
- Has the community successfully implemented any mitigation activities since the plan was last updated?
- Have new issues or problems related to hazards been identified in the community?
- Are the actions still appropriate given current resources?
- Have there been any changes in development patterns that could influence the effects of hazards?
- Have there been any significant changes in the community's demographics that could influence the effects of hazards?
- Are there new studies or data available that would enhance the risk assessment?
- Has the community been affected by any disasters? Did the plan accurately address the impacts of this event?

These questions will help the working group determine what components of the mitigation plan need updating. The working group will be responsible for updating any deficiencies found in the plan.

The City of Maupin Natural Hazards Mitigation Addendum includes three sections:

1. The City of Maupin Community Profile describes community vulnerability,
2. Hazard Vulnerability and Issue Identification, and

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3. Action Items Matrix and detailed action items forms.

Maupin Community Profile

This section provides information on the characteristics of Maupin, in terms of geography, environment, population, demographics, employment and economics, as well as housing and transportation. Many of these community characteristics can affect how natural hazards impact communities and how communities choose to plan for natural hazard mitigation. Considering these characteristics during the planning process can assist in identifying appropriate measures for natural hazard mitigation.

Geography and Climate

Maupin is located in Central Wasco County along US HWY-197 at 45.18°N latitude and 121.09°W longitude[1]. The elevation of the City is 1,227[2] feet above sea level. The area of the City estimated by the US Census Bureau is 1.45 square miles. Maupin is located along the Deschutes River, an Oregon Scenic Waterway. The closest major city is The Dalles, Oregon, which is 40 miles away. Portland, the largest City in the state is located 101 miles to the west.

The climate in Maupin varies throughout the seasons, each with its own dominant weather patterns. In the summer, temperatures range between 50 and 85 degrees. During the winter, the temperatures range from a 26 and 46 degrees. According to varied data, the City of Maupin's average snowfall ranges from 14-24 inches annually. According to varied data, the annual average rainfall is approximately 10-14 inches.

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[1] National Oceanic and Atmospheric Administration (2024). Your National Weather Service Forecast. https://www.nws.noaa.gov/wtf/MapClick.php?lat=45.18&lon=-121.09&lg=ep.
[2] U.S. Geological Survey Geographic Names Information System: Maupin, Oregon (2024). Summary Report, City of Maupin. https://edits.nationalmap.gov/apps/gaz-domestic/public/search/names/2411052.

Table 1.1: General Climate Summary, Maupin, OR

Month	Average Max. Temperature (degree F)	Average Min. Temperature (degree F)
January	42	28
February	46	28
March	54	33
April	61	37
May	67	43
June	75	50
July	84	56
August	85	55
September	76	47
October	64	39
November	49	31
December	40	26
Annual	**62**	**39**

Source: USClimateData.com, Average Temperatures, 1981-2010.

Population and Demographics

The City of Maupin, incorporated in 1922, is located on the Lower Deschutes River in South Wasco County at the crossroads between central and eastern Oregon and the Columbia River Gorge.[3] Originally utilized for its historic ferry crossing, the city if now a river and rafting recreation location

Perry Maupin arrived at the present townsite of Maupin in 1872. He realized the possibilities of the location and constructed a ferry, which he operated from the west side of the Deschutes to the mouth of Bakeoven Creek. He continued to operate the ferry for five years, during which time he built the first house in Maupin.

In 1989 Jim Brown a stockman, established a ferry service, hiring J.H. Chastain Sr a millwright and carpenter to do the construction work, but the high water of 1903 washed the dock and ferry away. J.H. Chastain had also built a ferry that summer for R. B. Darnall, near the Oregon Truck depot at Cambrai. After the death of Mr. Darnall in 1905, W.H. Hunt purchased the Darnall holdings and thereafter Maupin was known as 'Hunt's Ferry'. Mr. Hunt's ferry washed away in 1911, but he built a new one which served the people until the building of the (first) bridge in 1912.

[3] City of Maupin, Oregon (2024) website, https://cityofmaupin.org/about-maupin/.

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On September 10th 1921 a fire that virtually destroyed every business, nearly leveled the whole town. The loss was estimated at $70,000 and was partly covered by insurance. The City of Maupin was incorporated on April 15th 1922 and the town has steadily grown to its present size.

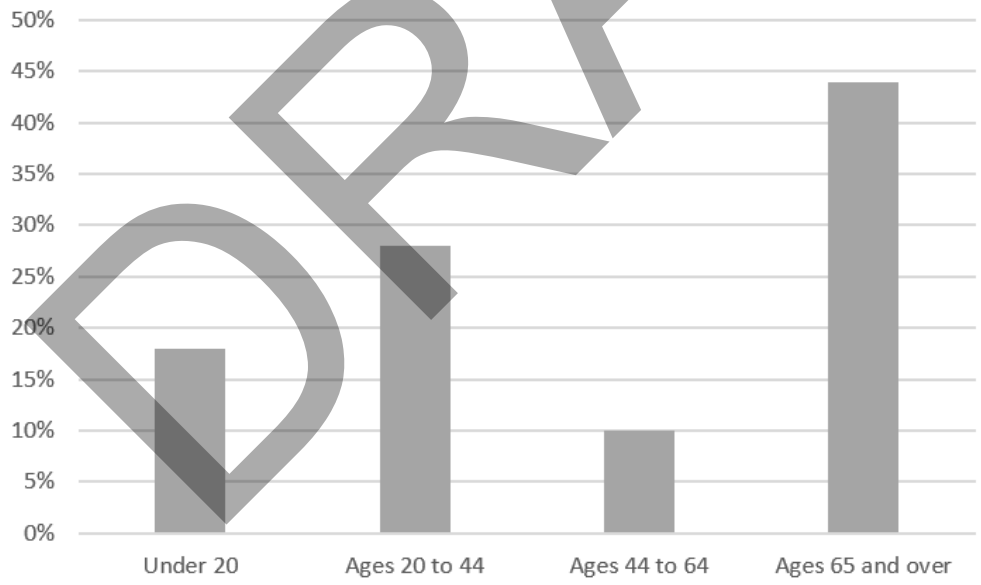
The estimated population of Maupin, according to the United States Census 2022 American Community Survey was 431. The average family size is 2.45. The median age in 2022 was 56.8 years old, compared to 54.7 years old in 2010. 44.1% of Maupin's population is 65 years and older compared to 19.3% of 65 years and older within the state of Oregon. The median age of Maupin citizens continues to slowly increase.[4] Tables 1.2 and 1.3 illustrate population and demographics of Maupin.

Table 1.2: Total Population, City of Maupin, Wasco County, Oregon, 2010-2022

Jurisdiction	Population (2022)	Population (2020)	Population (2010)	Population Change (2010 - 2022)	Percent Change (2010 - 2022)
Maupin	431	427	418	13	3.0%
Wasco County	26,794	26,670	25,213	1,581	5.9%
Oregon	4,281,851	4,237,256	3,831,074	450,777	10.5%

Source: Portland State University Population Center, *Populations for Oregon and Its Counties and Incorporated Cities and Towns: 2000-2022.*

Figure 1.3: City of Maupin Population Distribution by Age, 2022



Source: U.S. Census Bureau, American Community Survey, 2022.

The impact of disasters, in terms of loss and the ability to recover from a hazard event, varies among population groups. Disabled and aged population groups may disproportionately struggle to recover

[4] I.d.

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from natural disaster loss due to fixed incomes. People with low incomes may find recovery difficult or impossible due to the lack of financial ability. Additionally, a disproportionate burden may be placed upon specific racial and ethnic minority groups and other minority communities that lack the financial power and access to necessary resources needed to recover from the impact of disasters.

Data from the 2020 United States Census provides that 376 people in the City of Maupin self-identified as "White alone" (Non-Hispanic), which is approximately (88%) of the city's population.[5] Approximately 20 people, or approximately (0.5%) identified as "Black alone", "American Indian or Alaska Native alone", "Asian alone", "Native Hawaiian or Other Pacific Islander alone", or "Some Other Race alone". Approximately 12 people (2.8%) self-identified as Hispanic or Latino (of any race).[6] According to the 2022 American Community Survey 5-Year Estimate, only 4.5% of residents speak a language other than English.

Employment and Economics

The 2020 census demonstrated that the City of Maupin is steadily growing in both population and business. Maupin is home to small businesses that range from outdoor recreation guides, agriculture, and manufacturing. An increased population corresponds with a growing construction industry focused on residential housing development. Retail trade, arts and recreation, and construction industries make up about 60% of the city's industry.[7] Table 1.4 shows the range of industry in Maupin.

Table 1.4: Industries, City of Maupin 2022

Industry	Percent of Employment
Retail Trade	21.10%
Arts, entertainment, and recreation, and accommodation and food services	20.30%
Construction	20.30%
Transportation and warehousing, and utilities	17.20%
Educational services, and health care and social assistance	16.40%
Agriculture, forestry, fishing, and hunting and mining	4.7%
Finance and insurance, and real estate and rental and leasing	0%
Information	0%

[5] U.S. Census Bureau. (n.d.). Table Decennial Census P1 RACE: Maupin city, Oregon. Retrieved February 12, 2024, from https://data.census.gov/table/DECENNIALDHC2020.P8?g=160XX00US4146500
[6] U.S. Census Bureau. (n.d.). Table Decennial Census P1 RACE: Maupin city, Oregon. Retrieved February 12, 2024, from https://data.census.gov/table/DECENNIALDHC2020.P8?g=160XX00US4146500
[7] U.S. Census Bureau. (n.d.). 2022 Community Profile: Maupin city, Oregon. Retrieved February 12, 2024, from https://data.census.gov/profile/Maupin_city,_Oregon?g=160XX00US4146500

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Manufacturing	0%
Other services, except public administration	0%
Professional, scientific, and management, and administrative and waste management services	0%
Public Administration	0%

Source: US Census Bureau, American Community Survey 2022.

A 2019 study titled "City of Maupin Economic Opportunities Analysis" found that Maupin has a high commuter workforce. The study provided that 12% of people who work in Maupin commute from The Dalles, 5% remain from Maupin, and 5% commute from Portland.[8]

The median household income for Maupin is $44,583, compared to $75,657 for the state of Oregon.[9] The household median income is not rising faster than the rate of inflation. The median household income was $38,611 in 2010 ($50,097.17 in 2022 dollars).[10] The percentage of households in Maupin at or below the Federal poverty level in 2022 was 9.0%, compared to 12% for the state.[11]

Housing

Housing type and year-built dates are important factors in mitigation planning. Certain housing types tend to be less disaster resistant and warrant special attention: mobile homes, for example, are generally more prone to wind and water damage than standard stick-built homes. Generally, the older the home is, the greater the risk of damage from natural disasters. This is because stricter building codes have been developed following improved scientific understanding of natural hazards and their impacts on structures. For example, structures built after the late 1960s in the Pacific Northwest and California use earthquake resistant designs and construction techniques. In addition, FEMA began assisting communities with floodplain mapping during the 1970s, and communities developed ordinances that require homes built in the floodplain to be elevated to one foot above Base Flood Elevation (BFE).

There are 310 total housing units in the City (Table 1.5), and their owner occupies approximately 76.1% of those units.[12] The median value of owner occupied housing units in 2010 was $213,300 and in 2022, is $238,900. Fifty-seven percent of Maupin's housing stock is fifty years old or older. Twenty-five percent of Maupin's housing stock was built between 1970 and 2009. However, 50 housing units were built between 2010 and 2019, a number of houses in a ten-year period that had not been built since 1950-1959 decade. (Table 1.6). Most of the housing units are heated by electricity (58.3%), followed by wood

[8] City of Maupin. (2019). City of Maupin Economic Opportunities Analysis. P.12. https://www.oregon.gov/lcd/UP/Documents/Maupin_Economic_Opportunities_Analysis_FINAL.pdf
[9] U.S. Census Bureau. (n.d.). 2022 Community Profile: Maupin city, Oregon. Retrieved February 12, 2024, from https://data.census.gov/profile/Maupin_city,_Oregon?g=160XX00US4146500
[10] U.S. Census Bureau. (n.d.). 2010: ACS 5-Year Estimates Subject Table Income in the Past 12 Months (in 2022 Inflation-Adjusted Dollars): Maupin city, Oregon. Retrieved February 12, 2024, from https://data.census.gov/table/ACSST5Y2010.S1901?g=160XX00US4146500&tid=ACSST5Y2022.S1901
[11] U.S. Census Bureau. (n.d.). 2022 Community Profile: Maupin city, Oregon. Retrieved February 12, 2024, from https://data.census.gov/profile/Maupin_city,_Oregon?g=160XX00US4146500
[12] I.d.

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fire (20.9%), and gas (15.3% utility or bottled, tank, or LP). Both electric and wood heated housing units have dropped in numbers, but gas-heated housing units have increased since 2010.

Table 1.6: Housing Stock by Age, City of Maupin, 2022

Housing Type	Number	Percent
1 unit, detached	201	65%
1 unit, attached	8	3%
2 to 9 units	9	3%
10 or more units	32	10%
Mobile Home, Boat, RV, Van	60	19%
Total	310	100%

Source: U.S. Census Bureau, American Community Survey, 2022.

Table 1.6: Housing Stock by Age, City of Maupin, 2022

Year Structure Built	Number	Percent
2020 or later	11	4%
2010 to 2019	50	16%
2000 to 2009	11	4%
1990 to 1999	24	8%
1980 to 1989	26	8%
1970 to 1979	16	5%
1960 to 1969	8	3%
1950 to 1959	64	21%
1940 to 1949	27	9%
1939 or earlier	73	24%
Total housing units	310	100%

Source: U.S. Census Bureau, American Community Survey, 2022.

Land and Development

Land use goals in the city are maintained in the comprehensive plan, which is consistent to the state wide land use goals set by the Department of Land and Development Conservation (DLCD). Maupin has experienced a slight decrease in population growth over the past three decades. From 1980 to 2022, Maupin's population decreased approximately 1.9% from a population of 495 people to 427 people.[13] The 2019 "City of Maupin Economic Opportunities Analysis" found that Maupin is forecast to grow in both commercial and industrial employment sectors over the next 20-years (70 new estimated jobs).[14] Approximately 18 of the 70 jobs will be

[13] Oregon Secretary of State. (n.d.). Oregon Blue Book: Almanac and Fact Book. https://sos.oregon.gov/blue-book/Pages/local/city-population.aspx

[14] City of Maupin. (2019). City of Maupin Economic Opportunities Analysis. P.vii. https://www.oregon.gov/lcd/UP/Documents/Maupin_Economic_Opportunities_Analysis_FINAL.pdf

DRAFT

in industrial land uses, 25 in office and commercial services, and 14 in retail.[15] These jobs will require approximately 5-gross acres of commercial and industrial land. Furthermore, the study found that Maupin has enough employment land to accommodate the expected growth; however, Maupin's aging infrastructure, such as the wastewater treatment facility, must be upgraded to manage the expected growth.

Transportation and Commuting Patterns

Maupin is located in the approximate center of Wasco County. U.S. Highway 197 runs directly through the center of the city and provides a primary access point over the Deschutes River. Highway 197 is a north-south "Regional Highway with a Special Transportation Area (STA) designation in the City of Maupin."[16] Because Highway 197 passes through the City of Maupin, the city is a primary corridor to and from the City of The Dalles and Interstate 84, as well as the City of Dufur, and other unincorporated communities in Wasco County. Additionally, Maupin is host to north-south bound travel for Jefferson, Crook, Deschutes, Lake and Klamath Counties.

Transportation is an important consideration when planning for emergency service provisions. Growth within the City is likely to put pressure on both major and minor roads, especially if the main mode of travel is by single occupancy vehicles. How people travel to work is indicative of the prevalence of single occupancy vehicle travel and can help predict the amount of traffic congestion and the potential for accidents. Furthermore, the only access point over the Deschutes River is the Deschutes River Bridge (ODOT: OR 00966) in Maupin, which opened in 1929. This bridge is a key route for north-south bound travel for recreational and commercial purposes and is vital for emergency services.

The majority of the inhabitants in the City commute to work by automobile (85% in 2022, down from 86.2% in 2010), and 10.6% of those workers commute to work via carpooling.[17] Approximately 15% percent walk to work instead of driving.[18] Nearly 28.3% work from home, a significant decrease from 59.2% in 2010. [19]

Critical Facilities and Infrastructure

Critical facilities support government and first responders' ability to act in an emergency. They are a top priority in any comprehensive hazard mitigation plan. Individual communities should inventory their critical facilities to include locally designated shelters and other essential assets.

A critical energy dependent infrastructure list was updated by the working group. Critical facilities within City limits or owned by the City of Maupin are listed in Table 1.7.

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[15] i.d.
[16] Wasco County. (2009). Wasco County Transportation System Plan. P.15. https://www.oregon.gov/ODOT/Planning/TPOD/tsp/county/county_of_wasco_tsp_2009.pdf
[17] U.S. Census Bureau. (n.d.). 2022 and 2010: ACS 5-Year Estimates Table Commuting Characteristics by Sex: Maupin city, Oregon. Retrieved February 13, 2024, from https://data.census.gov/table/DECENNIALDHC2020.P8?g=160XX00US4146500S0801Commuting Characteristics by Sex
[18] I.d.
[19] I.d

Table 1.7: Critical Infrastructure and Facilities, Maupin, 2024

Infrastructure/Facility	
Civic Center	Wastewater Treatment Plant
Communications/Internet Facilities	Upper Reservoir Yard
Deschutes River Bridge	ODOT shop/yard
Electric Utility	City Park and Boat Ramp
Fire Station	BNSF Railway
Richmond's Service Station	Maupin Market
Deschutes Rim Health Clinic	Exposed Waterline from Upper Reservoir
Canyon Rim Asst'd Living	Dufur Springs and Springboxes
South Wasco School District	Springs Pumphouses
Upper Water Reservoir	Wastewater Treatment Plant

Historic and Cultural Resources

Historic and cultural resources such as historic structures and landmarks can help define a community and may also be vital to the survival of recreational and tourism industries. Because of their role in defining and supporting the community, protecting historic and cultural resources from the impact of natural disasters is vital to preserving the community's culture and heritage. Protecting these resources can also help allay burdens placed on historically underrepresented population groups within a community who may have played a monumental role in the city's cultural development.

Table 1.8: Registered Historic Sites, City of Maupin, 2024

National Registry Status	Number of Properties
Not listed, but eligible for listing	16
Listed Individually near the City limits	1

Source: Oregon Historic Sites Database, February 2024

Hazard Analysis and Issue Identification

Initial Work Session Overview

In April 2024, the City staff conducted a series of meetings in order to develop community-specific action items for the City's addendum to the Wasco County Natural Hazards Mitigation Plan. Those action items were included in the City's addendum to the Wasco County Natural Hazards Mitigation Plan.

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City Participants

The following individuals participated in the meetings:

- City Manager Nick Smith
- Community Liaison Melissa Napoli
- Maupin Fire Chief Tom Troutman

Analysis & Identification Process

During the meetings, participants discussed and developed the list of critical facilities owned by the City. Participants then provided comments on the City's risk and to identify specific hazard related issues. With information from the meetings, staff developed the NHMP Hazard Analysis and Issue Identification section. Changes were made where appropriate to reflect changes in perception to the City of Maupin's risk to natural hazards. The Wasco County Natural Hazards Steering Committee elected to move Extreme Heat from the Severe Weather Hazard category and rank Extreme Heat as its own hazard. The following is a summary of input from the Maupin working group in the development of the City's Addendum to the 2024 Wasco County Natural Hazard Mitigation Plan.

There are three additional reports that relate to the City of Maupin's Risk Assessment:

- *2022 Community Wildfire Protection Plan*, by the Wasco County Planning Department, 2022.
- *Natural Hazard Risk Report for Wasco County, Oregon Including the Cities of Antelope, Dufur, Maupin, Mosier, Shaniko, The Dalles, and Unincorporated Communities of Chenoweth, Tygh Valley, Pine Hollow, and the Warm Springs Indian Reservation* by the Oregon Department of Geology and Mineral Industries (DOGAMI) (2021)
- *Future Climate Projections Wasco County* report prepared by the Oregon Climate Change Research Institute (OCCRI) in August 2018.

These three reports provide important analysis related to the natural hazards identified in Table 1.8 and how they are impacted related to climate projections. The *DOGAMI Risk Report* will be found in finished form at http://www.oregongeology.org/pubs/index.htm .The *OCCRI Future Projections Report* for Wasco County can be found on the Wasco County Planning website, under Long Range – Natural Hazard Mitigation Plan in the Additional Information section.

Of note, the *DOGAMI Risk Report* includes the natural hazards of earthquakes, flood, landslides, wildfire, lahar/volcanoes, and channel migration. Channel migration was not a hazard identified by the Wasco County NHMP Steering Committee and is not discussed in detail in the NHMP. The *Risk Report* does not include severe weather and drought, which are two of the natural hazards identified by the Wasco County NHMP Steering Committee and the City of Maupin Working Group.

DOGAMI describes the purpose of the *Risk Report*:

"The purpose of this project is to help communities in the study area better understand their risk and increase resilience to natural hazards that are present in their community. This is accomplished by

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providing them with accurate, detailed, and up to date information about these hazards and by measuring the number of people and buildings at risk.

The main objectives of this study are to:

- Compile and/or create a database of critical facilities, tax assessor data, buildings, and population distribution data.
- Incorporate and use existing data from previous geologic, hydrologic, and wildfire hazard studies.
- Perform exposure and Hazus-based risk analysis.
- Share this report widely so that all interested parties have access to its information and data.

The body of this report describes the methods and results for these objectives. Two primary methods (Hazus-MH or exposure) depending on the type of hazard, were used to assess risk. We describe the methods for creating the building and population information used in this project. Results for each hazard type are reported on a countywide basis, and community-based results are reported in detail in the community profiles."

The *Risk Report* includes information about critical facilities such as what they are, where they are, what the monetary value of them is, and so forth. These critical facilities are important to note because of the essential role they play in recovery efforts. DOGAMI was provided a list of the Wasco County critical facilities, including the City of Maupin, prepared by the Steering Committee. There are some differences in what DOGAMI includes in the *Risk Report* versus what is included in the NHMP, in terms of critical facilities. See also the subsection "Critical Facilities and Infrastructure" in the Wasco County section for additional details.

OCCRI's *Future Climate Projections Wasco County* and the *Climate Change Influence on Natural Hazards in Eight Oregon Counties: Overview of County Reports*, provide important information regarding the influence and impacts of climate change on existing natural hazards events such as heavy rains, river flooding, drought, heat waves, cold waves, wildfire, and air quality.

Each county report describes county-specific projected changes in climate metrics related to 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.

The City will consult the DOGAMI report to prioritize proposed actions before implementation.

Natural Hazard Risk Level Ranking Table

Table 1.9: Comparison of Wasco County and City of Maupin Revised Risk Level Ranking

Hazard	Wasco Co. Rating	City Rating	Detail
Wildlands-Wildfire	High	High	The Maupin area has seen significant wildfire events in its surroundings over the last several years.

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Severe Local Storm	High	High	Ice storm, snow storm or blizzard, and windstorms.
Flood	Medium	High	The Deschutes River and Spring Creek run through Maupin.
Extreme Heat	High	High	Maupin
Earthquake	Low	Medium	Although low probability, results would be devastating to infrastructure.
Landslide	Low	Medium	Maupin has areas of Moderate, High and Very High.
Drought	High	Low	Maupin has sufficient water from Dufur Springs
Volcano	Low	Low	Maupin may be impacted by a volcanic eruption at any time (particularly from Mt. Hood and Mt. Adams)

Source: Wasco County 2018 Natural Hazards Mitigation Plan; City of Maupin Working Group

Wildfire

The working group determined that the City's risk to wildfire is high, which is the same as the County's risk. In addition to information found in the County's plan, the working group identified other issues specific to Maupin. The City of Maupin is a high priority area for wildfire protection in Wasco County because of its limited firefighting resources and the fact that the fuel loading and weather conditions there are conducive to large and fast-moving fires.

- The City's greatest vulnerability lies in the Wildland Urban Interface surrounding Maupin where juniper and sage flats provide ample fire fuels and strong winds can rush fires towards city limits, critical infrastructure and a 27-bed assisted living facility.

- The lightning-caused Boxcar Fire of 2018 burned 100,207 acres and came within one mile of Maupin city limits, threatened approximately 50 homes[20] and was fueled by sage, juniper and dry grass. The Boxcar fire was the largest of three major fires burning in the region, which included the Jackknife Fire and the South Junction Fire. [21]

- The Miller Road wildfire of 2022 Miller Road Fire near The Maupin burned more than 10,500 acres and threatened the communities of Juniper Flat and Maupin. One structure was burned. The fire was designated as an OSFM Conflagration Act (CA) incident.[22]

- The lightning caused White River Fire in 2020 burned 17,000 acres[23] southwest of Maupin near the neighboring community of Pine Grove, resulting in the death of a helicopter pilot,

[20] https://www.koin.com/news/boxcar-fire-grows-to-nearly-100k-acres/
[21] https://web.archive.org/web/20180624150313/https://inciweb.nwcg.gov/incident/article/5862/43416/
[22] https://www.centraloregondaily.com/archives/central-oregon-daily/miller-road-fire-explodes-to-10-500-acres/article_1077b174-da55-5895-a8a9-a6e0c41e3a37.html
[23] https://www.fs.usda.gov/detail/mthood/fire/?cid=fseprd1027793

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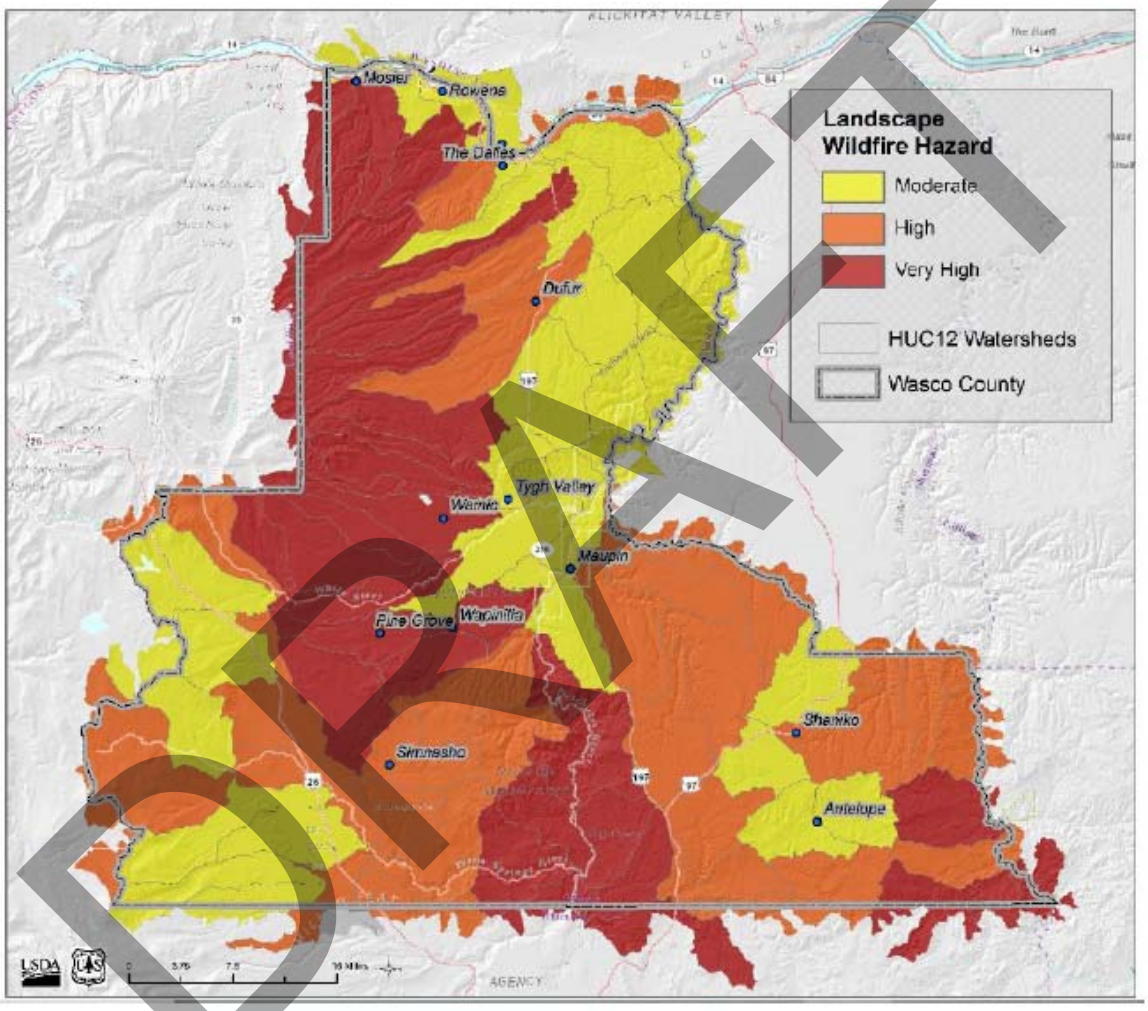
threatening more than 1,700 homes, and warranting a $3.6 million dollar award from FEMA for recovery efforts.[24]

- The log home manufacturing plant in Maupin is a potential source of fire because the number of logs onsite present a highly combustible fuel source for a fire that may encroach upon neighborhoods and businesses.

Figure 1.1: Wasco County Fire Zones and WUIs



Source: Source: 2022 Community Wildfire Protection Plan. Wasco County Planning Department. Accessed 3/29/2024.

Severe Weather Event

The County's plan adequately addresses the severe storm risks that the City faces, except for winter storms. Severe weather events periodically impact all of Wasco County, damaging property and disrupting utilities.

[24] https://ktvz.com/news/fire/2022/01/11/fema-directs-3-6-million-to-cover-firefighting-efforts-during-2020-white-river-fire/

Recently tornadoes have caused significant damage in Western Oregon and Washington. On October 12, 2017 an EF0 tornado damaged the airport in Aurora, OR. A separate tornado on the same day caused airborne debris damage on the Washington State University campus in Vancouver, WA. The Columbian newspaper reported that Matthew Cullen, meteorologist with the Portland Weather Forecast Office of the National Weather Service, said that Washington experiences one or two tornadoes per year. For example, in 2015 an EF1 tornado damaged dozens of homes in Battleground, WA[25]. But there is no recorded instance of a tornado causing damage in Maupin or Wasco County. Hence, the Wasco County NHMP Steering Committee and the Maupin working group determined that tornado was a hazard to mention but not a hazard that needed to be included specifically in the list of natural hazards that are identified with risk levels (low, medium, and high) in Table 1.8.

Winter Storm

The working group identified winter storm impacts specific to Maupin due to the potential demand for emergency response services and limited accessibility of resources. Roadways blocked with snow and ice can hinder police, fire, and medical response, as well as delivery of needed supplies. Maupin's singular route in and out of the city is by way of US 197, which can become impassable in severe winter weather. US 197 slopes steeply through a series of curves at both the east and west ends of town. These portions of roadway pose significant risk to residents seeking supplies and for emergency responders.

Storm Characteristics

Extreme precipitation events in the Pacific Northwest are governed by both atmospheric circulation and by how it interacts with complex topography. Atmospheric rivers – long, narrow swaths of warm, moist air that carry large amounts of water vapor from the tropics to mid-latitudes – generally result in coherent extreme precipitation events west of the Cascade Range. While closed low pressure systems often lead to isolated precipitation extremes east of the Cascade Range.[26]

Summer storms in Dufur are generally thunderstorms. The National Weather Service (NWS) defines a severe thunderstorm as any storm that produces one or more of the following elements:

- A tornado.
- Damaging winds or speeds of 58 mph (50 knots) or greater.
- Hail 1 inch in diameter or larger.

Though thunderstorms of such severity are rare in Mosier, heavy rainfall during summer thunderstorms have overwhelmed the capacity of the stormwater conveyance system which has caused localized flooding and wastewater treatment plant violations.

[25] Source: The Columbian, *Thursday's storm brought tornado to Vancouver neighborhood,* October 13, 2017. Accessed 4/30/2018
[26] The Oregon Climate Change Research Institute. (2018) *Future Climate Projections Wasco County*. Salem, OR: Oregon Department of Land Conservation and Development.

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Though damaging winds greater than 58 mph are rare in Mosier, strong winds and moisture funneled through the Deschutes River Valley, periodically impact all of Wasco County. Severe storms can damage property and disrupt utilities.

Winter storms may be ice or snow events that disrupt normal operations.

Ice storms or freezing rain (black ice) occur when rain falls from warm moist upper layers of the atmosphere into a cold, dry layer near the ground. The rain freezes on contact with the cold ground and accumulates on exposed surfaces. In addition to causing ice to accumulate on roadways, ice can accumulate on tree branches and power lines. This can cause power outages and can obstruct already icy transportation routes.

Snow is an ice particle formed by sublimation of vapor in the atmosphere as well as a collection of loosely bonded ice crystals deposited from the atmosphere. Snowfall results in an accumulation of packed ice crystals, and the condition of the snowpack determines a variety of qualities, such as color, temperature, and water equivalent. As weather conditions change, the snowpack can change as well, and this affects the characteristics of the snow.[27]

Climate Change

The Oregon Climate Change Research Institute issued a report specific to Wasco County in August 2018. They modeled high and low greenhouse gas emissions scenarios. There predictions for changes in extreme precipitation probabilities by the 2050s based on their higher emissions scenario:

- The intensity of extreme precipitation events is expected to increase slightly in the future as the atmosphere warms and is able to hold more water vapor.
- In Wasco County, the magnitude of precipitation on the wettest day and the wettest consecutive five days per year is projected to increase on average by about 17-percent and 12-percent, respectively.
- The frequency of days with at least 0.75-inches of precipitation and the frequency of days exceeding a threshold for landslide risk is not projected to change substantially.

Storm Probability

Extreme precipitation may occur at any time of year so design parameters in the hydraulic model for the stormwater conveyance system in Maupin are not seasonally specific. The data sources used to develop the maps in Atlas 2 Volume X – Oregon were rainfall records from the *Climatological Data for the United States by Sections* (National Climatic Center 1997-1970) and *Hourly Precipitation Data* (National Climatic Center 1940-1970).[28]

[27] National Snow and Ice Data Center, (n.d.). *What is snow?* nsidc.org/learn/parts-cryosphere/snow. Accessed 5/8/2024.
[28] National Oceanic and Atmospheric Administration. (1973). *Atlas 2 Volume X – Oregon*. Washington D.C.: U.S. Dept. of Agriculture, Soil Conservation Service, Engineering Division

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Storm Vulnerability

The working group identified winter storm impacts specific to Maupin due to the high concentration of population and potential demand for emergency response services. Roadways blocked with snow and ice can hinder police, fire, and medical response. It is not uncommon for Maupin to be isolated from other communities for a few days or longer each winter when US-197 is closed due to ice or other severe winter weather.

Extended days of extremely low temperatures can cause damage to City infrastructure due to soil movement when temperatures are 20-degrees Fahrenheit or lower. When water turns into ice underground, it expands. This can make the ground move, causing frost heave. Frost heave lifts up the ground, as well as everything on top of it. Frost heave can be strong enough to move and damage roads, bridges, buildings and water mains. When frozen ground thaws, the ice in the ground melts. The ground sinks to fill the space left by the ice. The amount of ice and how quickly it melts can vary from place to place. Because different patches of ground may not thaw at the same rate, melting ice can make the surface uneven. Uneven thawing can make roads wavy and can break water mains that are often buried under roadways.[29]

Storm Resilience

Historically, Wasco County, the Oregon Department of Transportation and City of Maupin plan for winter weather deployments and share resources for most efficient response.

Storm Risk

With respect to natural hazards, risk can be expressed as the probability of a hazard occurring combined with the potential for property damage and loss of life. Based the history of storm declarations, Wasco County's social vulnerability ratings, and the potential for storms to impact infrastructure and the local economy, Maupin is considered to be at high risk from storms by the City and Wasco County.

Drought

The working group determined that the City's risk to drought is low, based on abundant availability of spring water from Dufur Springs and lack of historical data to suggest that drought has had an impact on the city in the past. Additionally, agriculture is not a primary source of income for Maupin's residents, reducing the impact of drought on Maupin's economy which relies heavily on seasonal white water rafting and tourism. Though drought has a definite impact on rivers, the Deschutes has a unique flow that is fairly constant due to the many springs that feed the river in the upper reaches and the effects of the Pelton Reregulating Dam, which delivers a uniform flow for the last 100 miles. [30] As a result, the impact of drought on Maupin's recreational industries and economy are reduced.

Drought Characteristics

[29] National Snow and Ice Data Center, (n.d.). *All About Frozen Ground: How Does Frozen Ground Affect Land?* nsidc.org/cryosphere/frozenground/how_fg_affects_land.html. Accessed 11/25/2020.
[30] https://www.blm.gov/

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The West Wide Drought Tracker was used to provide a chart of drought events in the State of Oregon Region 5 NHMP. In this section the Tracker database was used to provide a chart of drought events specific to Wasco County using the Standard Precipitation-Evapotranspiration Index from 1895 to 2023.

The Standard Precipitation-Evapotranspiration Index (SPEI) is designed to evaluate both precipitation and potential evapotranspiration (PET) in determining drought. Thus, unlike the Standard Precipitation Index, the SPEI captures the main impact of increased temperatures on crop water demand and water supply (agricultural and hydrological drought).[31]

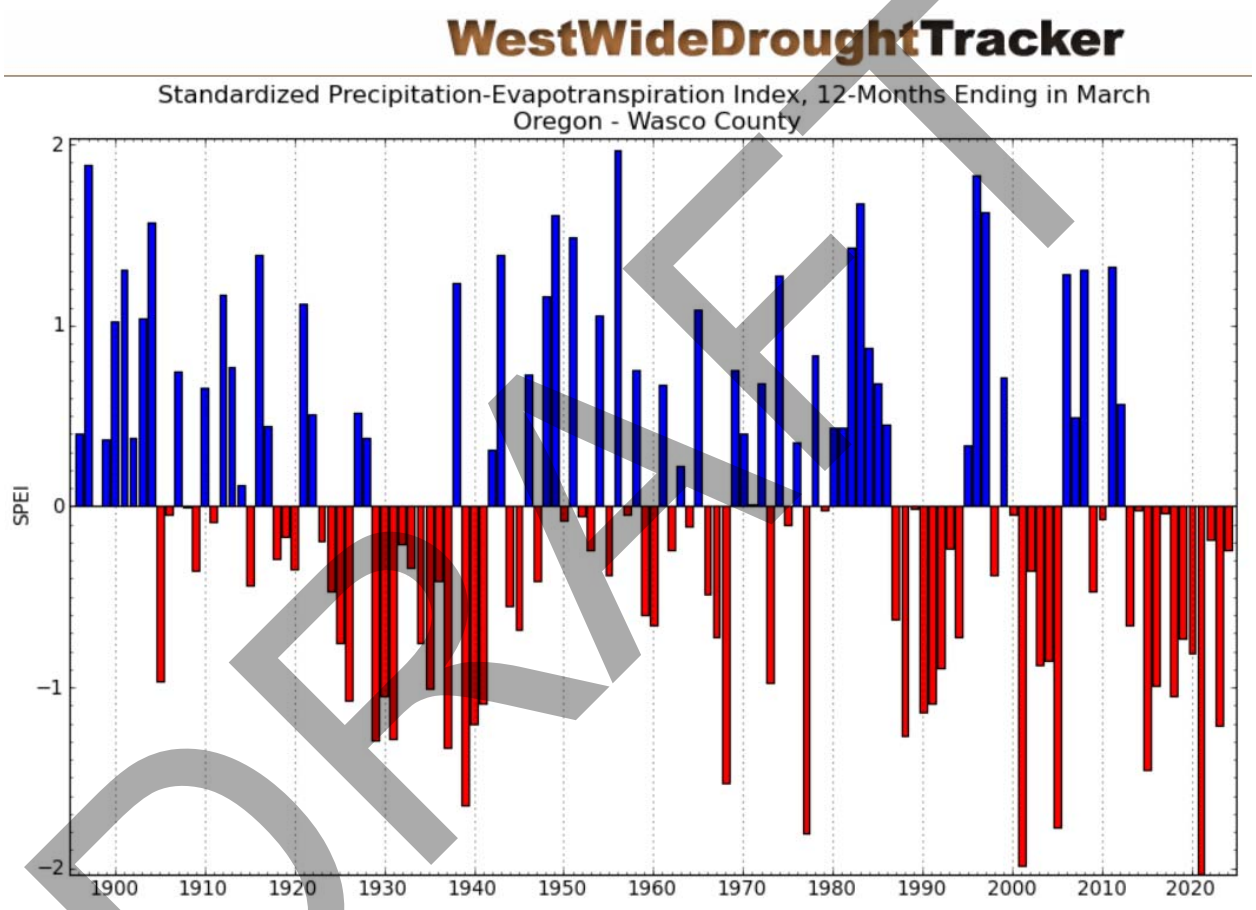

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Figure 1: Drought Severity Scale: -1 to -1.49 = moderate drought; -1.5 to -1.99 = severe drought; -2.0 or less = extreme drought Source: University of Idaho West Wide Drought Tracker. (database accessed 4/9/2024) Western Regional Climate Center. wrcc.dri.edu/wwdt/time/

[31] National Center for Atmospheric Research. (n.d.). Standardized Precipitation-Evapotranspiration Index (SPEI). Retrieved from NCAR Climate Guide Data: https://climatedataguide.ucar.edu/climate-data/standardized-precipitation-evapotranspiration-index-spei. Accessed 4/10/2024

Table 11: Recent Drought History – City of Maupin

Year	ENSO Condition[32]	12-mo. SPEI	Declaration
2005	El Niño most of the year[33]	-1.8	**EO-05-06** DETERMINATION OF A STATE OF DROUGHT EMERGENCY IN DESCHUTES, LAKE, WALLOWA, WASCO AND WHEELER COUNTIES DUE TO DROUGHT AND LOW WATER CONDITIONS. May 25, 2005; Expired December 31, 2005
2015	El Niño all year – 3rd strongest on record[34]	-1.5	**EO-15-05** DETERMINATION OF A STATE OF DROUGHT EMERGENCY IN DESCHUTES, GRANT, JACKSON, JOSEPHINE, LANE, MORROW, UMATILLA, AND WASCO COUNTIES DUE TO DROUGHT, LOW SNOW PACK LEVELS, AND LOW WATER CONDITIONS, May 21, 2015; Expired December 31, 2015
2020	Neutral moving to La Niña JAS	-0.8	**EO-20-31** DETERMINATION OF A STATE OF DROUGHT EMERGENCY IN DOUGLAS, GILLIAM, JOSEPHINE, CROOK, DESCHUTES, JEFFERSON AND WASCO COUNTIES DUE TO UNUSUALLY LOW WATER SUPPLIES AND HOT, DRY CONDITIONS, July 1, 2020; Expired December 31, 2020.

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[32] Climate Prediction Center/National Center for Environmental Prediction. (2024, April 8). *ENSO: Recent Evolution, Current Status and Predictions.* Retrieved from Climate Prediction Center: cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf. Accessed 4/11/2024.

[33] National Oceanic and Atmospheric Administration. (2005). Annual 2005 El Nino/Southern Oscillation. Retrieved from National Centers for Environmental Information: ncei.noaa.gov/access/monitoring/monthly-report/enso/200513. Accessed 4/11/2024.

[34] National Oceanic and Atmospheric Administration. (2016, August 2). *2015 State of the Climate: El Nino came, saw, and conquered.* Retrieved from Climate.gov: climate.gov/news-features/understanding-climate/2015-state-climate-el-ni%C3%B1o-came-saw-and-conquered. Accessed 4/11/2024.

Year	ENSO Condition[32]	12-mo. SPEI	Declaration
2021	La Niña except MJJ-JJA	-2.0	**EO-21-16** DETERMINATION OF A STATE OF DROUGHT EMERGENCY IN GRANT, UMATILLA, UNION, AND WASCO COUNTIES DUE TO LACK OF PRECIPITATION, UNUSUALLY LOW SNOWPACK AND STREAMFLOW. June 29, 2021; Expired December 31, 2021. **EO-21-20** DIRECTING STATE AGENCIES TO SUPPORT COMMUNITIES IN DROUGHT BY CURTAILING NONESSENTIAL WATER USE, IMPLEMENTING WATER CONSERVATION MEASURES, AND ENCOURAGING DROUGHT RESILIENCY. July 7, 2021; Expired December 31, 2021. **EO-21-27** DETERMINATION OF STATE OF EMERGENCY IN THE STATE OF OREGON DUE TO EXCESSIVE HIGH TEMPERATURES CAUSING A THREAT TO LIFE, HEALTH, AND INFRASTRUCTURE. August 10, 2021; Expired August 20, 2021.
2022	La Niña all year	-0.2	**EO-22-10** DETERMINATION OF STATE OF EMERGENCY IN MULTIPLE COUNTIES DUE TO THE NEED FOR STATE WIDE COORDINATION TO ADDRESS PERSISTENT EXTREME DROUGHT CONDITIONS. June 7, 2022; Expired December 31, 2022. **EO-22-13** DETERMINATION OF

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Year	ENSO Condition[32]	12-mo. SPEI	Declaration
			STATE OF EMERGENCY IN COLUMBIA, CLACKAMAS, CROOK, CURRY, DESCHUTES, DOUGLAS, GILLIAM, GRANT, HOOD RIVER, JACKSON, JEFFERSON, JOSEPHINE, KLAMATH, MARION, MORROW, MULTNOMAH, POLK, SHERMAN, UMATILLA, UNION, WALLOWA, WASCO, WASHINGTON, WHEELER, AND YAMHILL COUNTIES DUE TO EXCESSIVE HIGH TEMPERATURES CAUSING A THREAT TO LIFE, HEALTH, AND INFRASTRUCTURE. July 25, 2022; Expired July 31, 2022.
2023	El Niño AMJ-NDJ	-1.2	**EO-23-10** DETERMINATION OF A STATE OF DROUGHT EMERGENCY IN WASCO COUNTY. April 13, 2023; Expired December 31, 2023.

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Drought Probability

The State of Oregon 2020 NHMP lists Wasco County as a medium probability of drought. The probability was calculated based on the number of drought declarations since 1992.

Climate Change

The Oregon Climate Change Research Institute issued a report specific to Wasco County in August 2018. They modeled high and low greenhouse gas emissions scenarios. There predictions for changes in extreme heat and drought probabilities by the 2050s based on their higher emissions scenario:

- Drought conditions are projected to become more frequent compared to the historical record.[35]

Drought Vulnerability

The State of Oregon 2020 NHMP notes a difference between the local drought vulnerability assessment (high in Wasco County) compared to the State of Oregon assessment (very high in Wasco County). Though Oregon has not conducted a comprehensive statewide analysis, the Centers for Disease Control (CDC) social vulnerability index informed the State assessment.

"Wasco County's high vulnerability is driven by moderately high scores across the CDC index. Notably, however, the county scores in the 80th percentile for its share of residents without a high school diploma, percentage of residents that speak English less than "well," and percentage of persons living in institutionalized group quarters."[36]

80-percent of the City's water supply is contingent on the snow pack (particularly from the forested Cascade foothills east of Mt. Hood), which may fluctuate greatly from year to year.

Droughts impact individual farm owners, the agricultural industry as a whole, and other agricultural related sectors.

Drought Resilience

Maupin's 2022 Water System Master Plan indicates that Maupin Springs is the only source of water for the City, and if it fails to produce or is contaminated, the City will be without water.

The City currently has three operating storage reservoirs, the 280,000-gallon Lower Reservoir, the 1,030,000-gallon Upper Reservoir, and the 4,200-gallon East Maupin Reservoir.[37] Though the city has deemed this storage to be sufficient for typical conditions in a 20 year period, additional contingency plans may need to be developed to meet water needs in times of drought.

Drought Risk

With respect to natural hazards, risk can be expressed as the probability of a hazard occurring combined with the potential for property damage and loss of life. Based on the history of drought declarations, Wasco County's social vulnerability index, and the potential for drought to impact the economy, Maupin is considered to be at low risk from drought by the City, and high by Wasco County.

Earthquake

The working group determined that the City's risk to earthquake is moderate, which is the same as that of the County. There is no past "recent" history of earthquakes in Wasco County or Maupin. However,

[35] The Oregon Climate Change Research Institute. (2018) *Future Climate Projections Wasco County*. Salem, OR: Oregon Department of Land Conservation and Development.
[36] State Interagency Hazard Mitigation Team. (2020). *Oregon Natural Hazards Mitigation Plan*. Salem, OR: Oregon Department of Land Conservation and Development.
[37] https://cityofmaupin.org/wp-content/uploads/2022/03/Maupin-Final-WSMP.pdf

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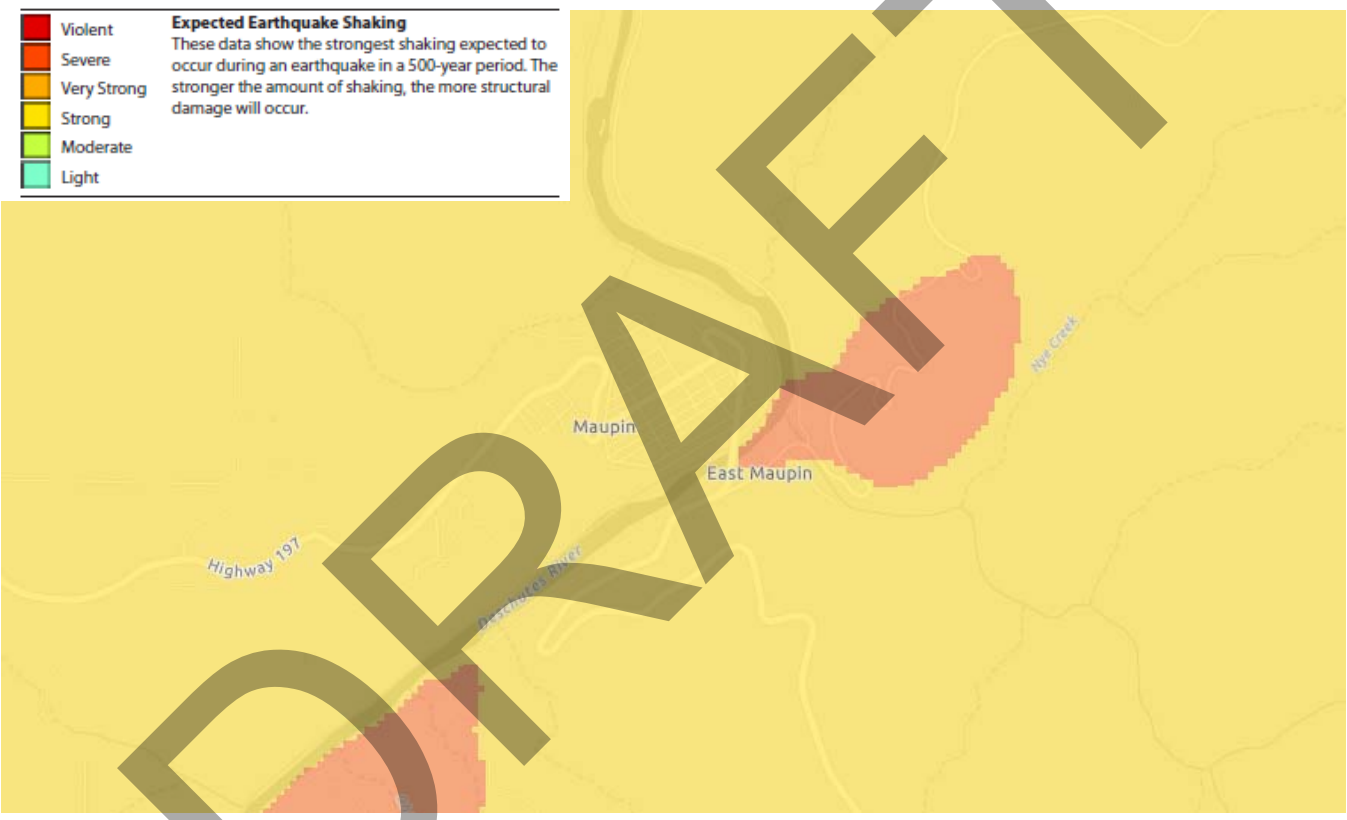
the County's NHMP indicated that, "It is difficult to identify a part of the community that is not vulnerable to an earthquake. People, buildings, emergency services, hospitals, transportation lifelines, and water and wastewater utilities are susceptible to the effects of an earthquake." In the event of an earthquake, many of Maupin's pre-code or low code structures would suffer great impacts. The City's drinking water treatment plant, treated water storage reservoirs, pipelines, sewage collection system, and sewage treatment plant have not been upgraded to withstand a seismic event and may be susceptible to significant damage. Although Maupin is currently working towards the construction of new and upgraded water and wastewater facilities and infrastructure, if an earthquake were to happen before those projects are completed the current systems may be severely damaged.

Figure 1.1: City of Maupin Earthquake Hazard Map



Source: Oregon HazVu: Statewide Geohazards Viewer, Oregon Department of Geology and Mineral Industries, accessed 6/12/2024

Earthquake Characteristics

Earthquakes in Wasco County are most likely to originate from two sources: 1) the Cascadia Subduction Zone and 2) Class A Quaternary faults that could impact Maupin.[38]

Cascadia Subduction Zone

Figure 1.2: Maupin Cascadia Earthquake Hazard Map

[38] Wasco County. (2019). *Wasco County Multi-Juristicion Natural Hazard Mitigation Plan*.

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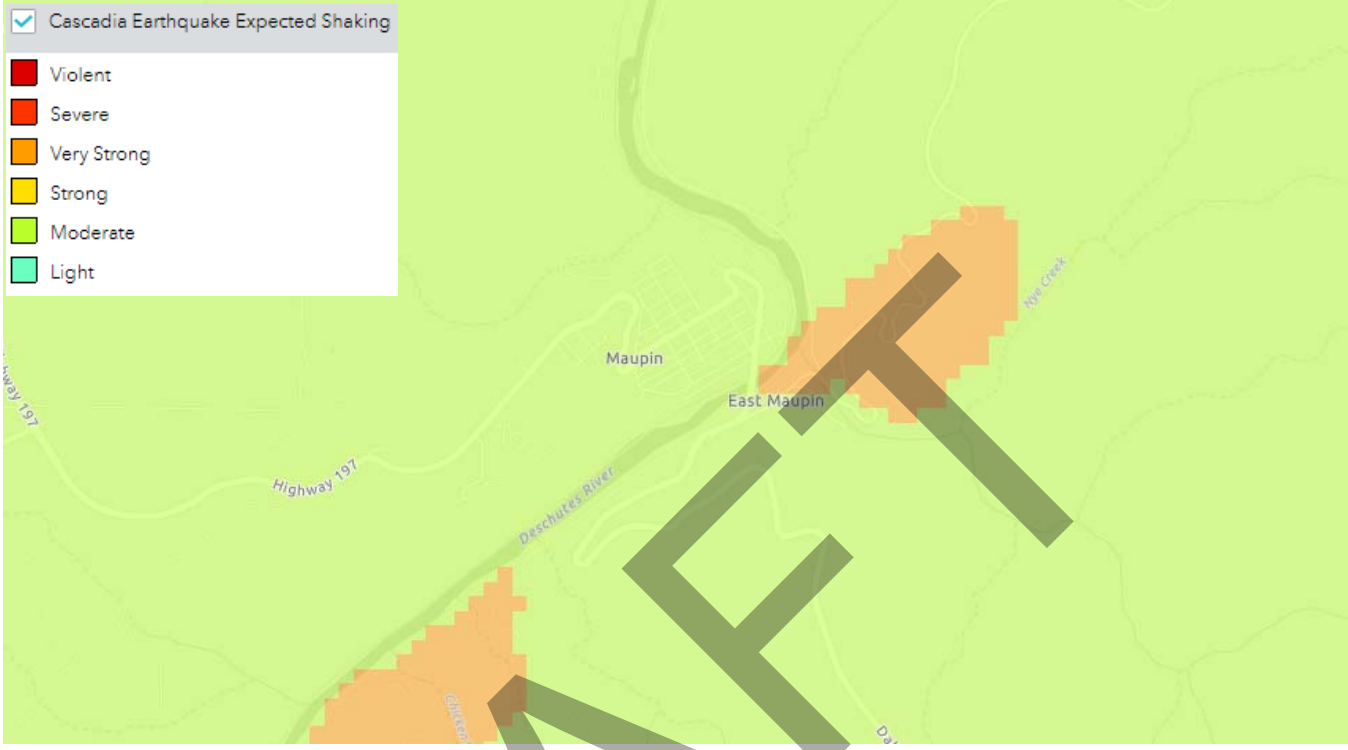

Source: Oregon HazVu: Statewide Geohazards Viewer, Oregon Department of Geology and Mineral Industries, accessed 7/29/2024

Class A Quaternary Faults

Faults that could impact Maupin have been identified by the U.S. Geological Survey. Class A faults are those that geologic evidence demonstrates the existence of a Quaternary fault of tectonic origin, whether the fault is exposed for mapping or inferred from liquefaction or other deformational features[39]. Quaternary faults are those that have been recognized at the surface and which have moved in the past 1,600,000 years, the duration of the Quaternary epoch.[40] A fault is designated as well constrained if an identifiable piercing line or feature (typically at or near the surface) is well documented or can be independently verified from mapping or logs. If an offset feature of the fault is in the subsurface, data is presented and correlations appear reliable; offset features of the fault are described or documented[41].

Figure 1.2: Quaternary faults located near Dufur

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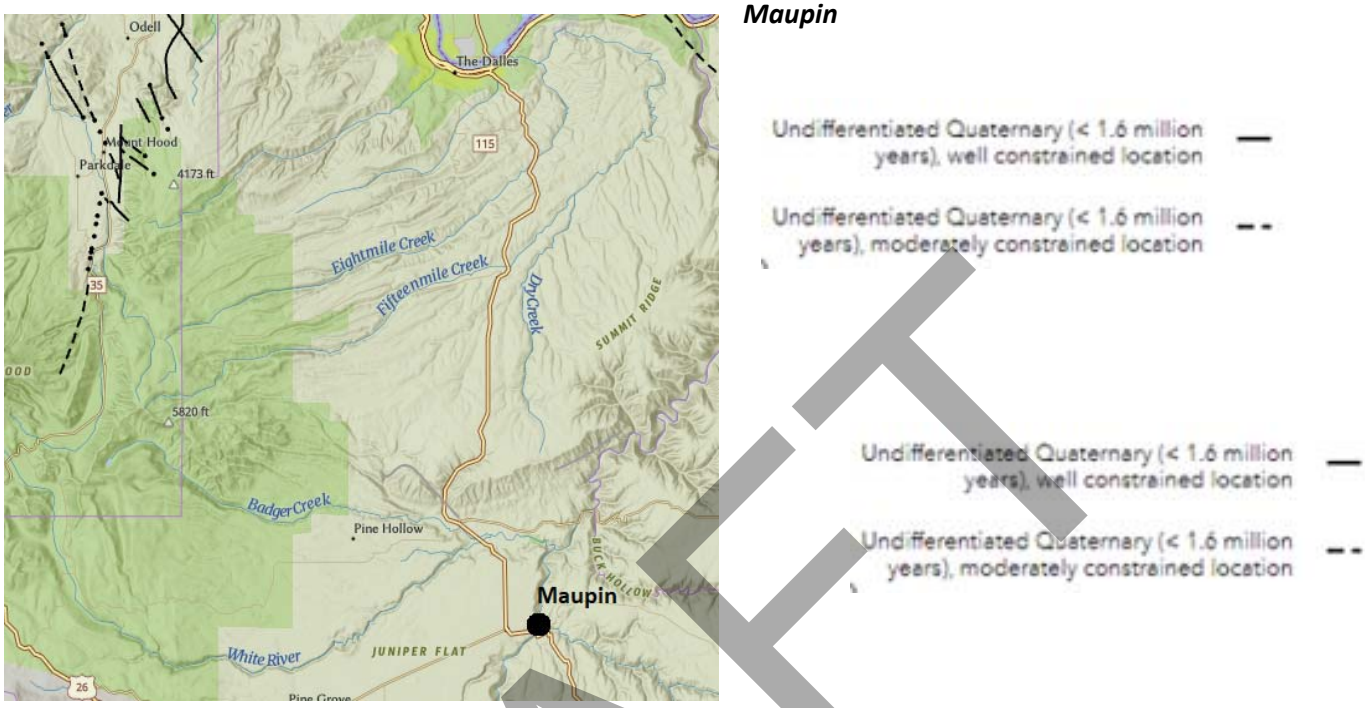
[39] U.S. Geologic Survey. n.d. *Faults*. Retrieved April 1, 2021 from Earthquake Hazards: usgs.gov/programs/earthquake-hazards/faults

[40] U.S. Geological Survey. (2009, October 27). *FAQs – Quaternary Faults*. Retreived April 1, 2021, from Earthquake Hazards Program: web.archive.org/web/20111127121851/http://earthquake.usgs.gov/learn/faq/?faqID=267

[41] Dawson, T.E., & Weldon, R.J. (2017). *Uniform California Earthquake Rupture Forecast, Version 3 (USERF3) Appendix B – Geological Slip-Rate Data and Geologic*. Menlo Park, CA: USGS Southern California Earthquake Center.

Figure 1.3: Quaternary faults located near Maupin



Source: U.S. Geologic Survey. n.d. *Faults*. Retrieved April 1, 2021 from Earthquake Hazards: usgs.gov/programs/earthquake-hazards/faults

Earthquake Probability

There's no "recent" history of earthquakes in Wasco County or Dufur. The 2020 State of Oregon NHMP included a new Earthquake probability ranking for Oregon counties that is based on the average probability of experiencing damaging shaking during the next 100 years.

- Category 1 100-year probability < 10-percent
- Category 2 100-year probability 10-20-percent
- Category 3 100-year probability 21-31-percent
- Category 4 100-year probability 32-45-percent
- Category 5 100-year probability > 45-percent

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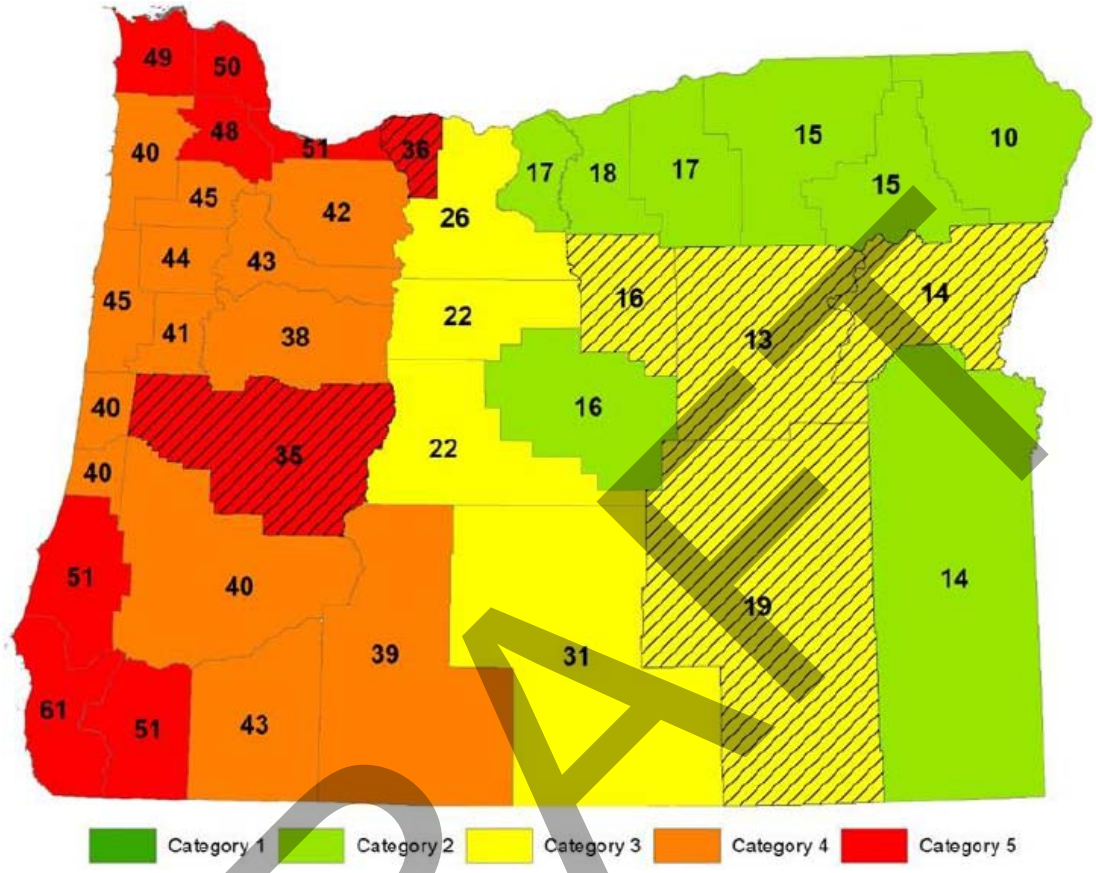
Figure 1.4: 2020 Oregon Earthquake Probability Ranking Based on Mean County Value of the Probability of Damaging Shaking and Presence of Newly Discovered Faults



Source: 2020 Oregon NHMP

Note: Counties with hatching had their probability category increased one step due to newly discovered faults.

Earthquake Vulnerability

However, the County's NHMP indicated that, "It is difficult to identify a part of the community that is not vulnerable to an earthquake. People, buildings, emergency services, hospitals, transportation lifelines, and water and wastewater utilities are susceptible to the effects of an earthquake." In the event of an earthquake, the Maupin Civic Center building may be threatened. Additionally, many other buildings in downtown are constructed of un-reinforced masonry. Buildings of this construction type, as has been documented, are particularly vulnerable to sustain detrimental impacts from an earthquake. The City's drinking water treatment plant, treated water storage reservoirs, pipelines, sewage collection system, and sewage treatment plant have not been upgraded to withstand a seismic event and may be susceptible to significant damage.

Though the 2020 DOGAMI probability ranking shows Wasco County in Category 2, the Oregon HazVu database reveals a vulnerable topography if an earthquake were to occur.

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Earthquake Resilience

The Oregon Resilience Plan sets a target timeframe for recover of 90% operation within 24 hours after the event for water utilities in Central/Eastern Oregon[42]. Though damage potential is expected to be light, the City has taken steps to mitigate impacts to the water utility. The Water Master Plan includes capital improvement plans for seismic resilience projects identified in the 2014 Steel Tank Seismic Evaluation as well as replacement of the Dog River Pipeline which was completed in 2024. Other components of the water system will be evaluated during development of an updated Water Master Plan expect to be complete in 2024.

Maupin's Fire Department and Public Works buildings were not built to seismic standards. Continuity of operations planning accounts for possible damage to these facilities.

Mitigation for other natural hazards are associated with mitigations for potential damage caused by earthquakes.

Earthquake Risk

With respect to natural hazards, risk can be expressed as the probability of a hazard occurring combined with the potential for property damage and loss of life. Based on the proximity of local faults, vulnerable topography in Maupin, Wasco County's social vulnerability index, and the high value of properties within City Limits, Maupin is considered to be at low risk from earthquakes by the City, and Wasco County.

In the event of an earthquake, the Civic Center building, where City Hall is located, may be threatened. Aside from the Civic Center, many other buildings in downtown are constructed of un-reinforced masonry. Buildings of this construction type, as has been documented, are particularly vulnerable to sustain detrimental impacts from an earthquake. The City's drinking water treatment plant, treated water storage reservoirs, pipelines, sewage collection system, and sewage treatment plant have not been upgraded to withstand a seismic event and may susceptible to significant damage. Although Maupin is currently working towards the construction of a new transmission pipeline for its water supply, if an earthquake were to happen before the project is completed (approximately within the next five years), the current pipeline may be damaged.

Flood

The Federal Emergency Management Agency defines a flood as a general and temporary condition of partial or complete inundation of 2 or more acres of normally dry land area or of 2 or more properties[43].

According to the 2018 DOGAMI Natural Hazard Risk Report for Wasco County, Oregon, flooding is the most common natural hazard in the county and accounts for a significant amount of damage to persons and property[44].

[42] State of Oregon. (2012). *Oregon Resilience Plan*. Salem, OR: State of Oregon.
[43] Federal Emergency Management Agency. (2020, July 18). *FEMA Flood Insurance Terminology Index*. Retrieved November 18, 2020, from Federal Emergency Management Agency: fema.gov/flood-insurance/terminology-index

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Flood Probability

The Oregon Climate Change Research Institute issued a report specific to Wasco County in August 2018. They modeled high and low greenhouse gas emissions scenarios. There predictions for changes in extreme heat and drought probabilities by the 2050s based on their higher emissions scenario:

The intensity of extreme precipitation events is expected to increase slightly in the future as the atmosphere warms and is able to hold more water vapor.

- In Wasco County, the magnitude of precipitation on the wettest day and wettest consecutive five days per year is expected to increase on average about 17-percent and 12-percent, respectively, by the 2050s under the higher emissions scenario compared to the historical baseline.
- In Wasco County, the frequency of days with at least 0.75-inches of precipitation and the frequency of days exceeding a threshold for landslide risk is not projected to change substantially.

Mid to low elevation tributaries that are near freezing level in winter, receiving a mix of rain and snow, may experience an increase in winter flood risk due to warmer winter temperatures causing precipitation to fall more as rain and less as snow.[45]

Climate Change

According to the 2020 Oregon NHMP, it is very likely (>90%) that Oregon will experience an increase in the frequency of extreme precipitation events and extreme river flows (high confidence). Furthermore, the likelihood of increases in extreme precipitation events is greater east of Cascades than west. Extreme river flow, while affected by extreme precipitation, is also driven by other conditions: soil moisture, water table, snowmelt, river network morphology, and local variability in precipitation and snowmelt. Increases in extreme river flows leading to damaging floods will be less likely where storm water management (urban) and/or reservoir operations (river) have capacity to offset increases in flood peak.[46]

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[44] Wasco County. (2019). *Wasco County Multi-Jurisdiction Natural Hazard Mitigation Plan*..
[45] The Oregon Climate Change Research Institute. (2018) *Future Climate Projections Wasco County*. Salem, OR: Oregon Department of Land Conservation and Development.
[46] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.

Figure 1.2: City of Maupin Flood Hazard Map

Source: Oregon HazVu: Statewide Geohazards Viewer, Oregon Department of Geology and Mineral Industries, accessed 6/12/2024

Table 13: Recent Flood History – City of The Dalles

Year	Type of Flood	Description/Declaration
1996	Rain on snow	February 1996: In February 1996 widespread flooding in the Pacific Northwest resulted from heavy rain and warming on a substantial mid elevation snowpack. The Columbia River crested at 27.1 ft. on February 9. This flood occurred because of the confluence of several factors. The winter of 1995/96 was extremely rainy. Prior to the flooding period, the region experienced a cold snap with low elevation freezing, ice, and snow.
Annual	Spring snow melt	Union Street Undercrossing is at an elevation subject to seasonal flooding. Occasionally in the spring, the road is closed during the flood event and until the road bed dries out to full weight bearing specifications.

Flood Vulnerability

Maupin, as an urban center, has a higher density of high value properties. Flooding has the potential to significantly impact economically valuable commercial and industrial properties. Maupin also has a complex, and expensive, support infrastructure that is subject to flood risk including transportation, water and wastewater systems.

The working group determined that the City's risk to flood is high, which is greater than the County's risk. Flooding has the potential to significantly impact economically valuable commercial and industrial

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properties along the Deschutes River and Bakeoven Creek. Flood waters and rapidly moving debris also pose a threat to the Deschutes River Bridge, a critical part of Maupin's transportation infrastructure as it connects residents of East Maupin to emergency services and necessary supplies.

Flood hazards include torrential flooding in major canyons and localized lowland flooding of alluvial units along the Deschutes River. For example, the 1964 flood washed a house down Bakeoven Creek and against an industrial building near the confluence of the Deschutes River.[47]

The City's floodplain ordinance, Maupin Municipal Code 14.10.050, updated most recently in 1987, tries to mitigate the impact flooding may have on the city by preventing or controlling development in the flood plain.

Flood Resilience

The Federal Emergency Management Agency (FEMA) has mapped most flood-prone streams in Oregon. The maps depict the 1% flood (100-year) upon which the National Flood Insurance Program is based. Maupin Flood Insurance Rate Maps (FIRM) were in the process of update during the writing of this plan with an expected publish date of December 2024.

Flood Risk

With respect to natural hazards, risk can be expressed as the probability of a hazard occurring combined with the potential for property damage and loss of life. Based the proximity of the Deschutes River and Bakeoven Creek, vulnerable streamside topography in Maupin, Wasco County's social vulnerability ratings, and the high value of properties that have experienced historical floods, Maupin is considered to be at high risk from floods by the City, and medium risk by Wasco County.

Extreme Heat

Extreme Heat Characteristics

Heat domes have recently emerged as a deadly extreme weather event in the Pacific Northwest. A heat dome occurs when a persistent region of high-pressure traps heat over a particular area, and it can linger for days to weeks and causing extremely high temperatures. Heat domes are typically linked to the behavior of the jet stream, which is a band of fast-moving winds high in the atmosphere that move in meandering wavelike patterns. When the jet stream meanders north, it moves slower and can sink, which lowers humidity. This allows the sun to create progressively hotter conditions on the ground. Air descending down mountains can also contribute to heat domes, as it warms even more.[48]

Extreme heat can affect commerce, agriculture, outdoor recreation, and overall quality of life.

[47] https://cityofmaupin.org/wp-content/uploads/2020/04/Maupin-Comprehensive-Land-Use-Plan.pdf
[48] National Oceanic and Atmospheric Administration. National Environmental Satellite Data and Information Service. *Extreme Heat and Severe Weather Plague Parts of North America*. June 30, 2023. Accessed 3/28/2024

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Extreme Heat Probability

The State of Oregon 2020 NHMP states that the probability of future events is *extremely likely* (>95%) and that the frequency and severity of extreme heat events will increase over the next several decades (*very high confidence*).

Climate Change

The Oregon Climate Change Research Institute issued a report specific to Wasco County in August 2018. They modeled high and low greenhouse gas emissions scenarios. There predictions for changes in extreme heat and drought probabilities by the 2050s based on their higher emissions scenario:

- The frequency and intensity of extreme heat events is expected to increase due to warming temperatures. The frequency of temperatures at or above 90°F is projected to increase on average by 28 days. The hottest day of the year (intensity) is projected to increase by 8°F. [49]
- Current average maximum temperature range in Maupin is 85°-85.9°F during July and August.

Table 14: Recent Extreme Heat History – City of Maupin (Oregon NHMP Region 5)

Year	ENSO Condition[50]	Description/Declaration
2006	La Niña moving to neutral in AMJ rapidly warming to El Niño by JAS[51]	June 24–26, 2006: A broad upper ridge of unusually high height coupled with a thermally induced surface trough of low pressure lingered over the Pacific Northwest for several days. This pattern resulted in persistent offshore flow, and therefore many days of record-smashing high temperatures. Many cities in Oregon saw record-breaking daily high temperatures for multiple days in a row. July 20-24, 2006: An unusually strong ridge of high pressure brought several days of record breaking hot and humid weather to NW Oregon. Many cities in Oregon saw record-breaking daily high temperatures for multiple days in a row. Many daily maximums were

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[49] The Oregon Climate Change Research Institute. (2018) *Future Climate Projections Wasco County*. Salem, OR: Oregon Department of Land Conservation and Development.
[50] Climate Prediction Center/National Center for Environmental Prediction. (2024, April 8). *ENSO: Recent Evolution, Current Status and Predictions.* Retrieved from Climate Prediction Center: cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf. Accessed 4/11/2024.
[51] National Oceanic and Atmospheric Administration. (2005). *Annual 2005 El Nino/Southern Oscillation*. Retrieved from National Centers for Environmental Information: ncei.noaa.gov/access/monitoring/monthly-report/enso/200513. Accessed 4/11/2024.

Year	ENSO Condition[50]	Description/Declaration
		between 10 and 20 degrees above normal. A few sites reported record high minimum temperatures during this very humid event; a couple broke all-time record high minimums as well. 4500 homes lost power during this event. In north central and eastern Oregon, daily maximum temperatures between 100 and 113 degrees were observed at lower elevations, with temperatures 90 to 100 degrees at elevations up to 4000 feet. Several people were treated for heat related illness.[52]
2008	La Niña moving to neutral in AMJ through Dec.[53]	June 28–30, 2008: An upper level ridge and thermal trough across the Pacific Northwest produced temperatures above 100 degrees for two consecutive days breaking records in many locations. Two people died of heat-related illness. August 15–17, 2008: Excessive Heat Event: An upper level ridge and dry air brought excessive heat into eastern Oregon. Many locations experienced multiple days of at least 100-degree temperatures.[54]
2010	El Niño JFM moving to neutral in AMJ to La Niña JAS[55]	July 25–26, 2010: Excessive Heat Event: Temperatures topped 100 degrees for two successive days in Hermiston, Pendleton, 5 miles northeast of Pendleton, Ione, Echo, Arlington, and Umatilla.
2011	La Niña, the warmest among all Januaries	August 1, 2011: A dry weak westerly flow aloft under a broad upper level high pressure system combined with a surface thermal trough to bring several days of

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[52] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.
[53] National Oceanic and Atmospheric Administration. (2005). *Annual 2005 El Nino/Southern Oscillation*. Retrieved from National Centers for Environmental Information: ncei.noaa.gov/access/monitoring/monthly-report/enso/200513. Accessed 4/11/2024.
[54] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.
[55] National Oceanic and Atmospheric Administration. (2011, August 17). 2010 Climate Events Connected to El Nino or La Nina. Retreived from Climate.gov: climate.gov/news-features/features/2010-climate-events-connected-el-niño-or-la-niña

Year	ENSO Condition[50]	Description/Declaration
	when La Niña was present moving to neutral in the spring, ending in La Niña OND[56]	temperatures in the 90s.
2021	La Niña except MJJ-JJA	In the summer of 2021, the Northwest experienced record-breaking high temperatures from late June through mid-July due to a heat dome.[57] More than 80 people died in Multnomah County and one heat related death occurred in The Dalles. The extreme heat caused significant crop losses for wheat and cherry growers locally.[58] Hundreds of heat related emergency room visits were noted throughout the Pacific Northwest. In addition to health impacts, there were impacts to infrastructure such as melted electric train power lines in Portland and buckling due to softened asphalt in Washington.[59] It was one of the most extreme weather events recorded globally in 2021. [60] An event such as the Pacific Northwest 2021 heatwave is still rare or extremely rare in today's climate, yet would be virtually impossible without human-caused climate change. As warming continues, it will become a lot less rare.[61] **EO-21-27** DETERMINATION OF STATE OF EMERGENCY

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[56] National Oceanic and Atmospheric Administration. (2012, January). *Annual 2011 Global Climate Report*. Retrieved from National Centers for Environmental Information: ncei.noaa.gov/access/monitoring/monthly-report/global/201113. Accessed 4/15/2024.
[57] U.S. Department of Agriculture. Climate Hubs. 2021 Northwest Heat Dome: Causes, Impacts and Future Outlook. Not dated. Accessed 3/28/2024.
[58] Reuters. 'Wither away and die:' U.S. Pacific Northwest heat wave bakes wheat, fruit crops. July 12, 2021. Accessed 3/28/2024
[59] National Public Radio. PHOTOS: The Record-Breaking Heat Wave That's Scorching The Pacific Northwest. June 29, 2022. Accessed 3/28/2024.
[60] U.S. Department of Agriculture. Climate Hubs. 2021 Northwest Heat Dome: Causes, Impacts and Future Outlook. Not dated. Accessed 3/28/2024.
[61] Sjoukje Y Philip, et al. (2021). *Rapid attribution analysis of the extraordinary heatwave on the Pacific Coast of the US and Canada June 2021*. London, UK. World Weather Attribution.

Year	ENSO Condition[50]	Description/Declaration
		IN THE STATE OF OREGON DUE TO EXCESSIVE HIGH TEMPERATURES CAUSING A THREAT TO LIFE, HEALTH, AND INFRASTRUCTURE. August 10, 2021; Expired August 20, 2021.
2022	La Niña all year	**EO-22-13** DETERMINATION OF STATE OF EMERGENCY IN COLUMBIA, CLACKAMAS, CROOK, CURRY, DESCHUTES, DOUGLAS, GILLIAM, GRANT, HOOD RIVER, JACKSON, JEFFERSON, JOSEPHINE, KLAMATH, MARION, MORROW, MULTNOMAH, POLK, SHERMAN, UMATILLA, UNION, WALLOWA, WASCO, WASHINGTON, WHEELER, AND YAMHILL COUNTIES DUE TO EXCESSIVE HIGH TEMPERATURES CAUSING A THREAT TO LIFE, HEALTH, AND INFRASTRUCTURE. July 25, 2022; Expired July 31, 2022.

Extreme Heat Vulnerability

Vulnerability is defined as the combination of sensitivity to extreme heat and level of adaptive capacity in response to extreme heat.

Adaptive capacity to extreme heat is defined here as percent of homes with air conditioning; however, the authors of the

Oregon Natural Hazard Mitigation Plan note that this measure has its flaws. First, it assumes that people who have access to cooling systems are able to afford to use them. Second, the data only includes single-family homes, which omits populations living in multi-family housing or who are house-less.

Because extreme heat is common in Region 5 ("high" probability), many people are accustomed or prepared in terms of air conditioning when an extreme heat event occurs ("high" adaptive capacity).[62] A Northwest Energy Efficiency Alliance (NEEA) Residential Building Stock Assessment Single Family Homes 2016-12, estimated that 91% of Wasco County single-family homes have air-conditioning.[63] The NEEA follow up study did not assess regions in a similar manner. But did note that by 2022 there has been an increase in the number of homes in Oregon that have cooling systems in at least one room, with the

[62] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.
[63] Northwest Energy Efficiency Alliance. (2019). *Residential Build Stock Assessment Single Family Homes 2016-17*. Portland, OR.: Northwest Energy Efficiency Alliance.

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largest increase in ductless mini-split heat pumps.[64] After nearly 100 Oregonians died in the 2021 heat dome event, the 2022 Legislature passed a bill giving tenants the right to have portable air conditioning units in rental properties. The new law added criteria that includes at least one air-conditioned room in the definition of habitability of rental properties. Owners of new or renovated rental properties are require to install cooling systems after April 2024.[65]

Sustained heat can also damage roads, bridges and railroad tracks, and the increased demand for electricity from air-conditioning use can result in power outages.[66] The increased demand for irrigation and cooling water can strain water utility infrastructure.

The medium relative vulnerability of Wasco County to extreme heat was determined by the State of Oregon by adding the rankings for sensitivity (social vulnerability) and adaptive capacity (availability of air conditioning).

Extreme Heat Resilience

The City's Civic Center, which houses City Hall and the South Wasco County Library, is intended to be utilized in both extreme heat and winter weather events as a warming and cooling center for residents. Similarly, the Deschutes Rim Health Clinic has historically offered bottled water and been open to the public as a cooling center during extreme heat events. The completion of construction on the upper floor of the Civic Center, with a targeted timeline for completion of five years, will allow a greater portion of the building to be utilized as a resilience hub during extreme weather conditions and natural disasters.

Extreme Heat Risk

With respect to natural hazards, risk can be expressed as the probability of a hazard occurring combined with the potential for property damage and loss of life. Based on the combination of the probability of extreme heat events, sensitivity to extreme heat, and level of adaptive capacity in response to extreme heat and Wasco County's social vulnerability index, Maupin is considered to be at high risk from extreme heat by the City and by Wasco County.

Landslide

The working group determined that the City's risk to landslide is moderate, which is higher than the County's risk. While in general the risk of landslide in Maupin is moderate, there are areas in the City where the risk is higher, specifically on the east side of the Deschutes River along Bakeoven Creek.

[64] Northwest Energy Efficiency Alliance. (2024). 2022 *Residential Build Stock Assessment*. Portland, OR.: Northwest Energy Efficiency Alliance.
[65] Oregon State Legislature. (2022, March 23). 2022 Regular Session. Retrieved from Oregon Legislative Information: olis.oregonlegislature.gov/liz/2022R1/Measures/Overview/SB1536
[66] Oregon Capital Chronicle. Oregon Gov. Brown declares emergency as heatwave continues. Julye 27, 2022. Accessed 3/29/2024.

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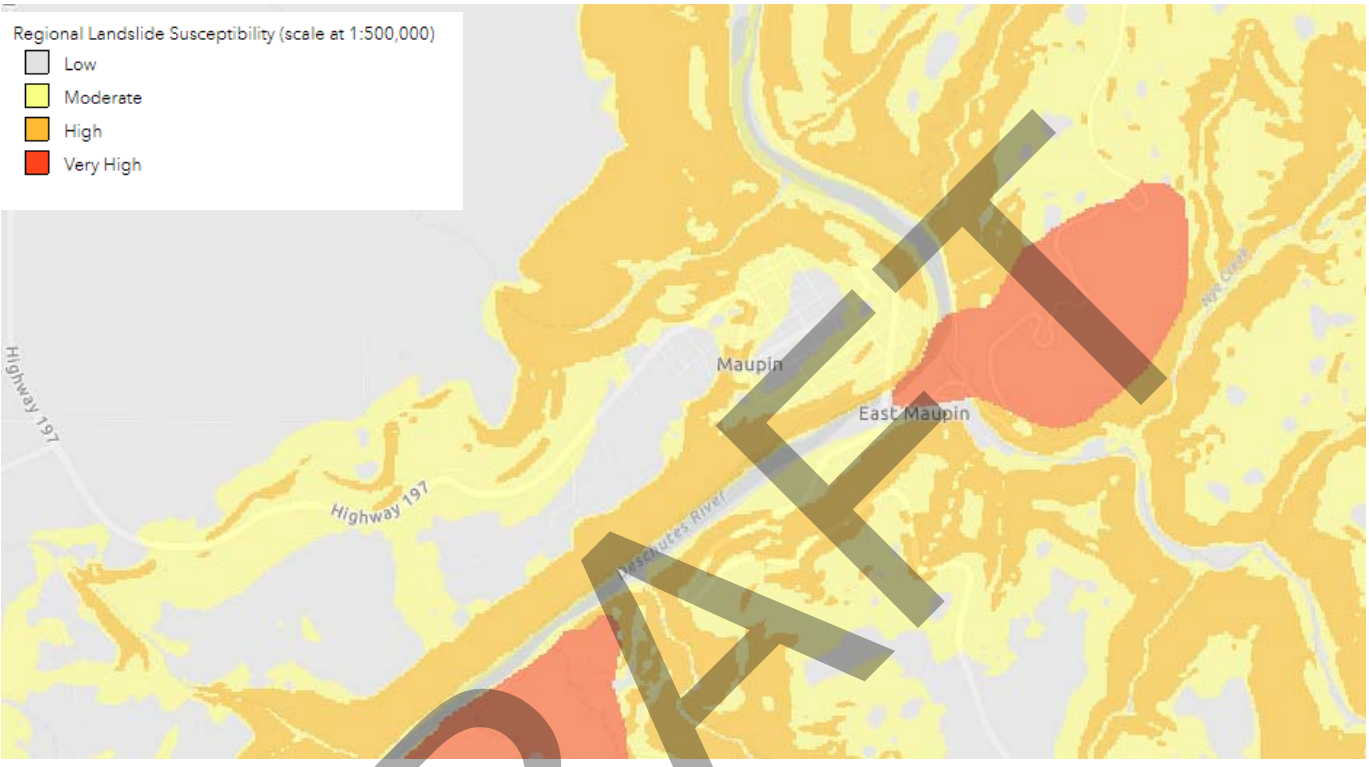
Figure 1.4: City of Maupin Landslide Hazard Map



Source: Oregon HazVu: Statewide Geohazards Viewer, Oregon Department of Geology and Mineral Industries, accessed 6/12/2024

Landslide Vulnerability

As Figure 1.4 shows, areas that are considered moderate or high risk follow Bakeoven Creek, as well as the eastern portions of city limits. The potential for sliding is produced by geologic factors and aggravated by acts of man which increase the amount of water in the ground, such as lawn watering, extensive irrigation of upslope farmland, and blocking of springs by the construction of houses and roads.

Landslide Risk

With respect to natural hazards, risk can be expressed as the probability of a hazard occurring combined with the potential for property damage and loss of life. Based on geohazard conditions in Maupin and the high value of properties that may experience impacts from landslide activity, weighed against active landslide mitigation and monitoring, the working group determined that the City's risk to landslide is moderate, which is higher than the County's risk. While in general the risk of landslide in Maupin is

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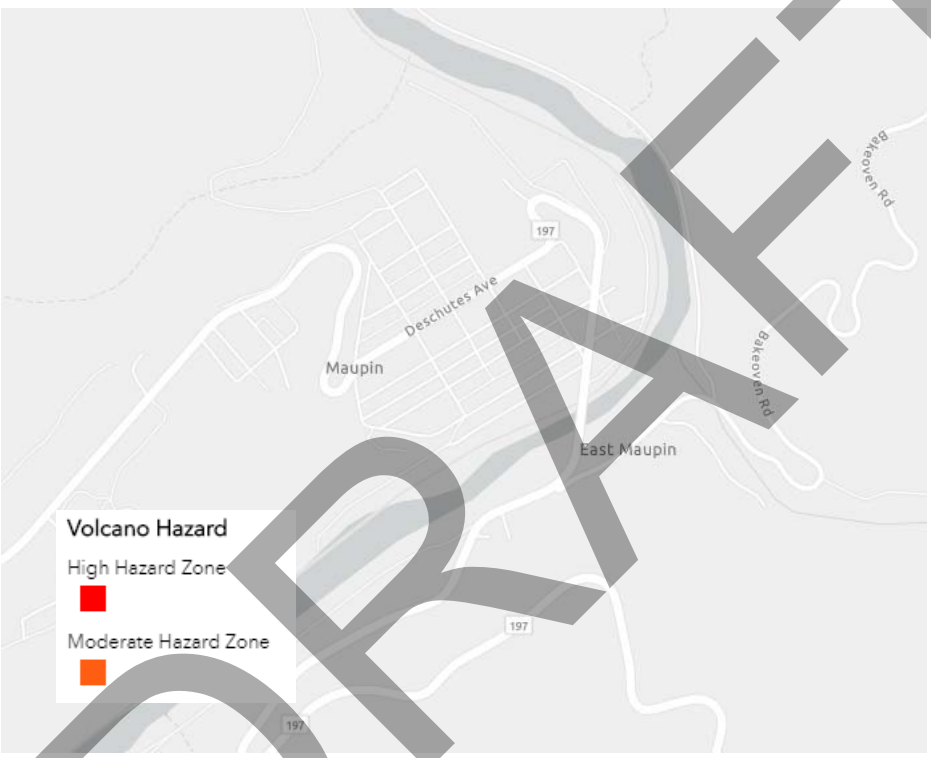
moderate, there are areas in the City where the risk is higher, specifically on the east side of the Deschutes River along Bakeoven Creek.

Volcanic Event

The working group determined that the City's risk to a volcanic event is low, even lower than the County's low risk. In addition to information found in the County's portion of the NHMP, the working group identified other issues specific to Maupin. Maupin may be subject to tephra fallout and the secondary impacts of lahar flows along river and stream channels which may not occur in all areas of the County. The City's primary water supply from Dufur Springs is also directly at risk.

Figure 1.5: The City of Maupin Volcanic Event Map



Source: Oregon HazVu: Statewide Geohazards Viewer, Oregon Department of Geology and Mineral Industries, accessed 6/14/24

Volcanic Event

The working group determined that the City's risk to a volcanic event is low, which is the same as the county. In addition to information found in the County's portion of the NHMP, the working group identified other issues specific to Maupin. Maupin may be subject to tephra fallout and the secondary impacts of lahar flows along river and stream channels which may not occur in all areas of the County. The City's primary water supply from Dufur Springs is also directly at risk.

Volcano Probability

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Mount Adams is considered to be an active volcano. It was designated as a high threat volcano by the U.S. Geological Survey (USGS) in its 2018 Update to National Volcanic Threat Assessment. The risk of eruption was ranked 34 of 161 volcanoes assessed in the Cascade Range[67].

Mount Adams is located about 75 miles northwest of Maupin. The prevailing winds in the area are out of the West so ash fall is not expected to severely impact the city under normal weather conditions. The impact of an eruption is expected to be similar to impacts experienced during the 1980 eruption of Mount St. Helens.

Mount Hood is an active volcano. It was designated as a very high threat volcano by the U.S. Geological Survey (USGS) in its 2018 Update to National Volcanic Threat Assessment because of how it erupts and the communities within its reach. The risk of eruption was ranked 6 of 161 volcanoes assessed in the Cascade Range[68]. USGS–Cascades Volcano Observatory and its partners currently operate eleven seismometers and six GPS receivers on and near Mount Hood[69].

Mount Hood is located 10 miles west of the Wasco County border, and 53 miles from Maupin. The prevailing winds in the area are out of the West.

Ash fall from Mount Hood could have a significant impact across the entire County[70]. Depending on the season of the eruption, wildfires caused by falling ash, ash fall in the surface water supply, or the blast itself could impact operations at Maupin's wastewater treatments plant or water aquifers, reservoirs and pumps.

Lahars can be generated by hot volcanic flows that melt snow and ice or by landslides from the steep upper flanks of the volcano. Maupin is located outside of the area expected to experience significant impact from lahars sweeping down the entire length of the Sandy (including the Zigzag) and White River valleys[71].

Mount St. Helens erupted in 1980. Though located 138 miles northwest of Maupin, areas of Wasco County were covered by up to an inch or more of ash and some vehicles could not operate as their air intakes were clogged[72]. However, the eruption of Mount St. Helens did not significantly impact operations at Maupin's Waste water treatment plant or water reservoirs[73].

Volcano Vulnerability

Maupin's water supply is subsurface and should be safe from ash events.

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[67] Ewert, J.W., Diefenbach, A.K., & Ramsey, D.W. (2018). *2018 Update to the U.S. Geological Survey National Volcanic Threat Assessment*. Reston, VA: U.S. Department of the Interior.

[68] Ewert, J.W., Diefenbach, A.K., & Ramsey, D.W. (2018). *2018 Update to the U.S. Geological Survey National Volcanic Threat Assessment*. Reston, VA: U.S. Department of the Interior.

[69] Mize, J. (2019, September 19). *Three additional monitoring stations to be installed on Mount Hood*. columbian.com/news/2019/sep/19/three-additional-monitoring-stations-to-be-installed-on-mount-hood/. Accessed 5/8/2024.

[70] Wasco County. (2019). *Wasco County Multi-Jurisdiction Natural Hazard Mitigation Plan*. The Dalles, OR: Wasco County.

[71] Wasco County. (2019). *Wasco County Multi-Jurisdiction Natural Hazard Mitigation Plan*. The Dalles, OR: Wasco County.

[72] Wasco County. (2019). *Wasco County Multi-Jurisdiction Natural Hazard Mitigation Plan*. The Dalles, OR: Wasco County.

[73] Anderson, D. (2020) City of The Dalles Public Work Director. (J. Hoyenga Interviewer)

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The primary danger area around a volcano covers an approximately 20-mile radius, although there is some danger to people within 100 miles or more. Airborne ash from a volcano can affect people hundreds of miles away from the eruption. The most common volcano-related hazards are ash (tephra), lahars (volcanic mud flows), lava and debris flows, avalanches, and pyroclastic flows.

Volcano Risk

With respect to natural hazards, risk can be expressed as the probability of a hazard occurring combined with the potential for property damage and loss of life based on the proximity of Mount Hood to the City of Maupin and it's water and wastewater infrastructure. Maupin is considered to be at low risk by Wasco County and low risk by the City of Maupin.

Goals and Action Items

What are the Plan Goals?

The plan goals help to guide the direction of future activities aimed at reducing risk and preventing loss from future natural hazard events. In order to align with the Wasco County Natural Hazards Mitigation Plan, The City of Maupin is adopting Wasco County's goals, with no City-specific revisions.

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Table 1.10. 2024 Wasco County NHMP Goals

Goal	Statement
Protection of Life and Property	Develop and implement activities to protect human life, commerce, property, and natural resource systems.
	Reduce insurance losses and repetitive claims for chronic hazard events while promoting insurance for catastrophic hazards.
	Evaluate guideline/codes and permitting processes in addressing hazard mitigation; emphasize non-structural means of mitigating hazard impact.
	Actively acknowledge amount of loss the County is susceptible to and develop efforts to overcome that loss without significant reliance on outside resources.
	Utilize mitigation activities to minimize risks associated with hazard events.
Emergency Services Enhancement	Evaluate performance of critical facilities during a natural hazard event; implement measures to improve performance.
	Minimize threat to life safety issues.
	Ensure resources, staffing, and volunteer base keeps pace with County growth and needs.
Education & Outreach & Inclusion, Diversity, Equity and Accessibility	Develop and implement education programs to increase awareness among citizens; local, county and regional agencies; non-profit organization; businesses; and industry.
	Develop and conduct outreach programs to increase the number of local activities implemented by public and private sector organizations.
	Build community consensus through outreach, education, and activities.
	Ensure that the cultural, racial, and economic status of citizens is considered during the public planning process, and account for and incorporate underserved communities
Facilitate Partnerships & Coordination	Strengthen communication and coordination of public/private partnership and emergency services among local, county, and regional governments and the private sector.
	Incorporate hazard mitigation into the greater social, economic, and natural resource goal framework.
	Incorporate hazard mitigation as part of the County leadership's routine decision making process.
	Foster a diverse economy to reduce the impacts of a hazard event on any one sector.
	Create the conditions for a transitional economy that welcomes new development and innovative ideas that are sensitive to potential hazard risks faced by the County.
Natural Resource Systems Protection	Link watershed planning, natural resource management, and land use planning with natural hazard mitigation activities.

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	Preserve and rehabilitate natural systems to serve natural hazard mitigation functions and protect recreation resources.
	Coordinate programs to increase natural hazard knowledge base and use technology to better record events and model vulnerability.
	Protect recreation and tourism industries by raising awareness of potential hazard impacts.
	Provide support for agricultural and forest industries to help them prepare for hazardous events.
Climate Change	Commit to efforts that will increase understanding of how climate change will increase the frequency and severity of identified hazards.
	Consider the increase in hazard frequency, duration, and severity due to climate change during the development and implementation of activities to protect human life, commerce, property, and natural resource systems.

Source: Wasco County NHMP Steering Committee, May 29, 2024

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Action Items

What are the Plan Action Items?

Short and long-term mitigation action items identified through the plan update process, including the issues identification process, risk assessment, and community profile, are an important part of the mitigation plan. Action items are detailed recommendations for activities that local departments, citizens and others could engage in to reduce risk. The mitigation action items identified by the plan are intended to help the City move toward achieving the plan goals. The mitigation action items address both multi-hazard and hazard-specific issues for the hazards addressed in this plan.

In summary, there are 10 multi-hazard mitigation actions, 3 Severe Weather/Winter Storm Hazard, 3 flood, and 3 wildfire actions. There are no volcano, extreme heat, earthquake, drought, or landslide specific mitigation actions.

Each action item has a corresponding action item worksheet describing the activity, identifying the rationale for the project, identifying potential ideas for implementation, and assigning coordinating and partner organizations. To facilitate implementation, worksheets have been filled out describing each action item with the following information.

Rationale or Key Issues Addressed

Action items should be fact based and tied directly to issues or needs identified throughout the planning process. Action items can be developed from a number of sources including participants of the planning process, noted deficiencies in local capability, or issues identified through the risk assessment.

Coordinating Organization

The coordinating organization is the lead public agency with 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 Partners

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

External Partners

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.

The internal and external partner organizations listed in the Action Item Worksheets are potential partners recommended by the project working group, but not necessarily contacted during the development of the plan. The coordinating organization should contact the identified partner

DRAFT

organizations to see if they are capable of and interested in participation. This initial contact is also to gain a commitment of time and/or resources towards completion of the action items.

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* (ST) are activities that may be implemented with existing resources and authorities within one to two years.
- *Long-term action items* (LT) may require new or additional resources and/or authorities, and may take between one and five years to implement.

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Mitigation Action Item Proposal Form

Each mitigation action is described in detail in the Mitigation Action Item Proposal Form and also in summary in the Mitigation Action Items Summary Matrix.

Proposed Action Item:			**Alignment with Plan Goals:**
Type of Hazard #1 – Mitigation Proposal Title			Must align with a Wasco County Goal
Alignment with Existing Plans/Policies:			
List agency and plan that supports the mitigation proposal			
Rationale for Proposed Action Item:			
• Rationale should be based on studies and data analysis, may or may not be associated with a plan			
Ideas for Implementation:			
• Ideas from plan development working groups and public input sessions			
Coordinating Organization:	City Department that will lead the mitigation effort		
Internal Partners:		**External Partners:**	
City Departments		Other public and private sector organizations	
Potential Funding Sources:		**Estimated cost:**	**Timeline: (check one)**
As identified during plan development		**If available**	☐ Short Term (0-2 years) ☐ Long Term (2-4+ years)
Form Submitted by:	**Author or Department**		
Action Item Status:	Track from original submittal year. Example: Submitted July 2006 – Revised 2012 – Revised 2018		

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City of Maupin NHMP Mitigation Action Items Matrix

Table 1.12: City of The Maupin Mitigation Action Items Matrix Key

Hazard	Summary	Abbreviation
Multi-Hazard	A combination of two or more identified hazards.	MH
Drought	A prolonged period of abnormally low precipitation.	DH
Earthquake	The shaking of the ground caused by an abrupt shift of rock along a fracture in the earth, called a fault.	EH
Flood	An overflow of a large amount of water beyond its normal confines, especially over what is normally dry land.	FH
Landslide	The sliding movement of masses of loosened rock and soil down a hillside or slope.	LH
Severe Heat	Heat events	HH
Volcanic Event	A vent in the earth's crust through which molten rock, rock fragments, gases or ashes are ejected	VH
Wildland-Wildfire	Any instance of uncontrolled burning within a forested area.	WH
Severe Storms/ Winter Storms	Storm hazards include ice, snow and windstorms; Tornados are a violent subset of severe storms caused by the intersection of a strong cross wind with a strong warm updraft.	SH

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City of Maupin Mitigation Action Items Summary Matrix

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Table 1.13. The City of Maupin NHMP Mitigation Action Item Matrix

Action Item	Priority L=Low M=Med H=Hi	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline LT=Long ST=Short	Alignment with plan goals					
						Protection of Life & Property	Emergency Services Enhancement	Education & Outreach, and IDEA	Facilitate Partnerships & Coordination	Natural Resource Systems Protection	Climate Resilience
Multi-Hazard (MH)											
MH #1	M	Evaluate and Prioritize Critical Infrastructure for Hazard Resilience (e.g. Seismic Retrofit, Wildfire Protections)	Public Works	City Council, Engineering Firms, DOGAMI, OEM, FEMA	LT	X					
MH#2	M	Seek Implementation Funding for Hazard Resilient Modifications to Critical Infrastructure	Public Works	City Council, Engineering Firms, DOGAMI, OEM, FEMA	LT	X					X
MH#3	M	Partner with the County for the Coordination of Disaster Education/Outreach & Response	City Council	Oregon Department of Health and Human Services, Red Cross, Adventist Health Columbia Gorge, RFPD's	LT			X			
MH#4	M	Identification and Pursuit of Implementation Funding for Mitigation Actions	Planning	City Council, Wasco County	LT				X		
MH#5	M	Annual Review of Natural Hazards Mitigation Plan / Complete Review/Update/Adoption by City Council Every Five Years	Planning	City Council, OR Office of Emergency Management Federal Emergency Management Agency	ST		X				

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Action Item	Priority L=Low M=Med H=Hi	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline LT=Long ST=Short	Alignment with plan goals					
						Protection of Life & Property	Emergency Services Enhancement	Education & Outreach, and IDEA	Facilitate Partnerships & Coordination	Natural Resource Systems Protection	Climate Resilience
Multi-Hazard (MH)											
MH#6	M	Secure Emergency Power Supply to Critical Facilities	City Council	Planning, Fire, Public Works, State Fire Marshal, Wasco Electric Co-Op	LT		X				
MH#7	M	Small Business Awareness and Continuity Planning	Chamber of Commerce	Oregon Continuity Planner Association, Wasco County	LT			X			X
MH#8	M	Partner with County on All-Hazard Emergency Preparedness	City Council	Planning, Wasco County Emergency Management	LT				X		
MH#9	M	Enter Into Supply Contracts and Mutual Aid Agreements	City Council	Public Works, Wasco County Emergency Management, National Guard, Private Sector	ST				X		

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Action Item	Priority L=Low M=Med H=Hi	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline LT=Long ST=Short	Alignment with plan goals					
						Protection of Life & Property	Emergency Services Enhancement	Education & Outreach, and IDEA	Facilitate Partnerships & Coordination	Natural Resource Systems Protection	Climate Resilience
Multi-Hazard (MH)											
MH#10	H	Identify and Train critical staff in the NIMS-FEMA Compliant Incident Command System (ICS)	City Council	Public Works, ICS Training Providers, Wasco County Emergency Mgmt	LT				X		
Severe Winter Weather Hazard (SH)											
SH#1	H	Reduce Impacts to Roadways	Public Works	City Council, ODOT, Wasco County Emergency Mgmt.,	LT	X					

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Action Item	Priority L=Low M=Med H=Hi	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline LT=Long ST=Short	Alignment with plan goals					
						Protection of Life & Property	Emergency Services Enhancement	Education & Outreach, and IDEA	Facilitate Partnerships & Coordination	Natural Resource Systems Protection	Climate Resilience
Severe Winter Weather Hazard (SH)											
SH#2	H	Conduct Severe Weather Risk Awareness Activities	City Council	Wasco County Emergency Mgmt., OEM, Maupin Volunteer Fire Dept	LT			X			X
SH#3	M	Assist Vulnerable Populations	City Council	Wasco Co. Emergency Mgmt., OEM	LT	X					
Flood Hazard (FH)											
FH #1	M	Explore the potential for Maupin to participate in the Community Rating System (CRS) of the National Flood Insurance Program (NFIP)	City Council	Wasco County Emergency Management	ST	X		X			
FH#2	M	Explore acquisition and management strategies to preserve parks, trails, and open space in the floodplain	City Council	Planning, Wasco County Emergency Management, DLCD, OEM, FEMA	LT	X				X	
FH#3	H	Ensure Continued Compliance with the National Flood Insurance Program	City Council	Wasco County Emergency Management, DLCD, OEM, FEMA	LT	X					

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Action Item	Priority L=Low M=Med H=Hi	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline LT=Long ST=Short	Alignment with plan goals					
						Protection of Life & Property	Emergency Services Enhancement	Education & Outreach, and IDEA	Facilitate Partnerships & Coordination	Natural Resource Systems Protection	Climate Resilience
Wildfire Hazard (WH)											
WH#1	H	Partner with the County to Implement the Community Wildfire Protection Plan (CWPP)	City Council	Fire, Planning, Public Works	LT				X		
WH#2	H	Incorporate Wildfire Mitigation in the Comprehensive Plan	City Council	Wasco County Emergency Management, Oregon Office of State Fire Marshal	LT	X				X	
WH#3	H	Implement Ongoing Fuels Management Program	City Council	Maupin Volunteer Fire Department, Wasco County Emergency Management, OSFM, ODF	LT	X		X	X	X	

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Mitigation Action Items Proposal Forms

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Proposed Action Item:	**Alignment with Plan Goals:**
MH #1 – Evaluate and Prioritize Critical Infrastructure for Hazard Resilience (e.g., Seismic Retrofit, Wildfire Protections)	Protection of Life & Property

Alignment with Existing Plans/Policies:	
City of Maupin Water System Master Plan Maupin Public Water System Emergency Response Plan City of Maupin Wastewater Facilities Plan	City of Maupin Comprehensive Plan City of Maupin Capital Improvement Plan

Rationale for Proposed Action Item:

- The City's 2024 work group acknowledged that most of the City's municipal buildings and infrastructure are old and that these facilities will require evaluation to better understand their vulnerabilities.
- Assessing risk to critical infrastructure will assist in identifying potential mitigation strategies that will reduce future damage caused by natural disasters.

Ideas for Implementation:

- The City could utilize Rapid Visual Screening techniques to quickly assess structures in terms of seismic and wildfire vulnerability.
- A Steel Tank Seismic Evaluation report on City reservoirs should be performed to evaluate risk.
- Evaluation of risk of wildfire to critical facilities and infrastructure, particularly those in the wildland urban interface (WUI).

Coordinating Organization:	Public Works Department

Internal Partners:	**External Partners:**
City Council	Engineering Firms, DOGAMI, OEM, FEMA

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
FEMA, State and Federal Grants/Loans, City Funds		✓ Short Term (0-2 years) ☐ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted June 2024

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Proposed Action Item:	**Alignment with Plan Goals:**
MH#2 – Seek Implementation Funding for Hazard Resilient Modifications to Critical Infrastructure	Protection of Life & Property, Climate Resilience

Alignment with Existing Plans/Policies:	
City of Maupin Water System Master Plan City of Maupin Wastewater Facilities Plan City of Maupin Comprehensive Land Use Plan	2012 Oregon Resilience Plan City of Maupin Capital Improvement Plan

Rationale for Proposed Action Item:

- As a small rural city, Maupin does not have the ability to fund large-scale Hazard Resilient Modifications to Critical Infrastructure

Ideas for Implementation:

- Ensure that critical infrastructure is documented in the Natural Hazard Mitigation Plan and in the Comprehensive Plan so facilities might be more eligible for upgrade grants.
- Evaluate funding opportunities.
- Complete benefit cost analysis as applicable
- Identify funding partners or other jurisdictions interested in similar retrofits.
- Write grant applications for funding.
- Seek Oregon State Fire Marshal assistance dollars for wildfire related mitigation actions addressing wildfire risk to critical facilities

Coordinating Organization:	Public Works

Internal Partners:	**External Partners:**
City Council	Engineering Firm, DOGAMI, OEM, FEMA

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
FEMA, State and Federal Grants/Loans, City Funds		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted June 2024

Proposed Action Item:	**Alignment with Plan Goals:**

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MH#3 - Partner with the County for the Coordination of Disaster Education/Outreach & Response	Education & Outreach

Alignment with Existing Plans/Policies:

Wasco County Natural Hazard Mitigation Plan
Wasco County Community Wildfire Protection Plan

Rationale for Proposed Action Item:

- The City's working group recognized that Maupin's vulnerability to wildfire and other disasters is greater than some areas of Wasco County due to limited ingress and egress routes which could prevent citizens from evacuating or receiving needed goods and services. Preparedness education and actions may lessen this impact.
- The Community Profile indicates that a substantial portion of Maupin's population is aging and below median income, suggesting a potential for greater vulnerability to disaster and more difficulty recovering if one occurs.
- This action was identified in the Wasco County plan.

Ideas for Implementation:

- Conduct a Household Survey. FEMA has determined that better practices for disaster communication and education have changed radically since the introduction of the iPhone in 2007.
- Efforts should focus on the following populations: Elderly, Low income, Non-English speakers, Mobile Homes, and Schools/day care.
- For improving effectiveness of outreach, partner with the Red Cross and utility providers to create informative mailings about natural hazard mitigation. Also, collaborate with the Red Cross and utility providers to create news stories about natural hazard mitigation.
- Explore forming a multi-agency South Wasco Preparedness Coalition to coordinate emergency preparedness and hazard awareness education.

Coordinating Organization:	City Council

Internal Partners:	**External Partners:**
Maupin Volunteer Fire Department	Oregon Department of Health and Human Services, Red Cross, Wasco County Emergency Management, Local RFPD's, Adventist Health Columbia Gorge

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
FEMA, State and Federal Grants/Loans, City Funds		Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted June 2024

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Proposed Action Item:	**Alignment with Plan Goals:**
MH#4 - Identification and Pursuit of Implementation Funding for Mitigation Actions	Facilitate Partnerships & Coordination

Alignment with Existing Plans/Policies:

Wasco County Natural Hazard Mitigation Plan

Rationale for Proposed Action Item:

- The reduction of risk in a community typically requires identifying and seeking external funding to implement identified actions.
- Creating an action focusing on identifying and pursuing funding will assist the City follow through on the actions identified in the plan
- This action was identified in the Wasco County plan.

Ideas for Implementation:

- Ensure the City remains an active participant of the County planning efforts.
- Identify opportunities to partner with the County or other jurisdictions to submit grant applications to leverage limited resources.

Coordinating Organization:	Planning

Internal Partners:	**External Partners:**
City Council	Wasco County

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
FEMA, State and Federal Grants/Loans		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted June 2024

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Proposed Action Item:	**Alignment with Plan Goals:**
MH#5 - Annual Review of Natural Hazards Mitigation Plan / Complete Review/Update/Adoption by City Council Every Five Years	Emergency Service Enhancement

Alignment with Existing Plans/Policies:
Emergency Management Performance Grant funding from Oregon Office of Emergency Management and FEMA requires the NHMP to be reviewed twice per year.
Rationale for Proposed Action Item:
• FEMA requires NHMP update every 5 years to maintain HMGP funding eligibility. • Annual review/update ensures operability of plans and makes 5-year update easier
Ideas for Implementation:
• Designate a convener to be responsible for ensuring that the review and update process take place. • Include review and update on departmental work plans. • Incorporate NHMP action items into Department and Division objectives and benchmarks.

Coordinating Organization:	Planning

Internal Partners:	**External Partners:**
City Council	Oregon Military Department, Office of Emergency Management, Federal Emergency Management Agency

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
		✓ Short Term (0-2 years) ☐ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted June 2024

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Proposed Action Item:	**Alignment with Plan Goals:**
MH#6 - Secure Emergency Power Supply to Critical Facilities	Emergency Services Enhancement

Alignment with Existing Plans/Policies:

City of Maupin Water Master Plan
City of Maupin Wastewater Facilities Plan

Rationale for Proposed Action Item:

- Ensuring that critical facilities have emergency power stores is part of protecting critical facilities, because without power, emergency facilities are severely compromised.
- Critical facilities typically require emergency back-up power to be able to function during and after a disaster.
- Severe storms can knock down power lines and disrupt the electrical grid.
- Critical facilities are crucial to emergency response, and all rely on electrical power to provide service. Mitigating the possibility of a sudden power outage makes the facilities more robust in the event of an incident and supports City staff in their efforts to maintain an acceptable level of service for a longer duration.
- The working group identified the lack of emergency backup power at critical facilities.

Ideas for Implementation:

- Seek capital improvements funding for emergency power supplies for all identified critical City facilities
- Identify additional funding sources
- Apply for funding and implement acquisition of back-up power as prioritized

Coordinating Organization:	City Council

Internal Partners:	**External Partners:**
Planning, Fire, Public Works	State Fire Marshal, Wasco Electric Co-Op

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
FEMA, State and Federal Grants/Loans, City Funds		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted June 2024

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Proposed Action Item:	**Alignment with Plan Goals:**
MH#7 - Small Business Awareness and Continuity Planning	Education & Outreach, Climate Resilience

Alignment with Existing Plans/Policies:

Maupin and South Wasco County Strategic Plan of Action

Rationale for Proposed Action Item:

- During the issues identification work session, the working group identified that the majority of businesses are small 'mom and pop' shops that may lack resources to recover from a disaster
- Continuity planning would assist business get back on their feet quicker
- Businesses that are prepared will help keep the local economy going
- According to the Institute for Business & Home Safety, more than 25% of businesses that close due to a natural hazard never reopen.

Ideas for Implementation:

- Explore forming a multi-agency South Wasco Preparedness Coalition to coordinate emergency preparedness and hazard awareness education.
- SWPC membership could include state and local government agencies, private businesses and non-profit organizations working toward a mission to support and coordinate community efforts to mitigate, respond to and recover from disasters large and small. Potential business association partners include – The South Wasco Chamber of Commerce, The South Wasco Alliance, and Wasco County Emergency Management.
- Utilize existing resources such as the Institute for Business & Home Safety's Open for Business Toolkit
- Work with the Oregon Continuity Planners Association to hold a continuity planning workshop for local businesses

Coordinating Organization:	Chamber of Commerce

Internal Partners:	**External Partners:**
Planning	Oregon Continuity Planner Association, Wasco County

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
FEMA, State and Federal Grants/Loans		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted June 2024

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Proposed Action Item:	**Alignment with Plan Goals:**
MH#8 - Partner with County on All-Hazard Emergency Preparedness	Facilitation of Partnerships & Coordination

Alignment with Existing Plans/Policies:

Maupin Public Water System Emergency Response Plan
Wasco County Emergency Operations Plan
Wasco County Natural Hazard Mitigation Plan

Rationale for Proposed Action Item:

- The working group identified a lack of human resources available to undertake preparedness activities.

Ideas for Implementation:

- Partner with County when possible, to leverage limited human and financial resources
- Partner with state and local government agencies, private businesses and non-profit organizations to identify and establish shelter sites.
- Partner with state and local government agencies, private businesses and non-profit organizations to establish emergency notification systems (e.g. sirens, reverse 911, etc.)
- Once emergency notification systems are in place, develop coordinated plans for all-hazard communications

Coordinating Organization:	City Council

Internal Partners:	**External Partners:**
Planning	Wasco County Emergency Management

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
FEMA, State and Federal Grants/Loans, City Funds		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted June 2024

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Proposed Action Item:	**Alignment with Plan Goals:**
MH#9 – Enter into Supply Contracts and Mutual Aid Agreements	Facilitation of Partnerships & Coordination

Alignment with Existing Plans/Policies:

- Oregon Public Works Emergency Response Cooperative Assistance Agreement through ODOT

Rationale for Proposed Action Item:

- The 2024 working group identified the need to enter into supply and service contracts to establish level of service expectations and invoice processing capability before an emergency incident.
- FEMA requires agreements to be in place before an emergency incident for many City response and recovery activities to be eligible for reimbursement.

Ideas for Implementation:

- Supply vendors may include fuel, oil, rock, sand, water haulers, pipes and fittings, Equipment rental, etc.
- Service providers may include clean-up services, waste haulers, etc.

Coordinating Organization:	City Council

Internal Partners:	**External Partners:**
Public Works	Wasco County Emergency Management, National Guard, Private Sector

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
		✓ Short Term (0-2 years) ☐ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted 2024

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Proposed Action Item:	**Alignment with Plan Goals:**
MH#10 – Ensure Critical Staff Are Identified and Trained in the NIMS-FEMA Compliant Incident Command System (ICS)	Facilitation of Partnerships & Coordination

Alignment with Existing Plans/Policies:

Wasco County Emergency Operations Plan

Rationale for Proposed Action Item:

- The 2024 working group identified the need to identify and train staff that will be expected to deploy during emergencies.
- Training needs may be identified beyond the executive level because field staff need to know ICS deployment protocols to ensure FEMA reimbursement eligibility.

Ideas for Implementation:

- Conduct initial ICS training for those identified.
- Conduct tabletop exercises planned incidents and other experiential opportunities to practice ICS protocols after initial training.
- Activate the Incident Command System during smaller scale emergencies to practice ICS protocols.
- Conduct an interagency tabletop exercise or planned incident within the five-year planning period

Coordinating Organization:	City Council

Internal Partners:	**External Partners:**
Public Works	ICS Training Providers, Wasco County Emergency Management

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
FEMA, State and Federal Grants/Loans, City Funds		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted 2024

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Proposed Action Item:	**Alignment with Plan Goals:**
SH#1- Reduce Impacts to Roadways	Protection of Life and Property

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

- Maupin's steep hills and curves, as well as several unpaved roads, make extreme winter weather treacherous to navigate.
- Maupin's current fleet of road maintenance equipment is aging and insufficient.

Ideas for Implementation:

- Planning for and maintaining adequate road and debris clearing capabilities.
- Installing roadway heating technology to prevent ice/snow buildup.

Coordinating Organization:	Public Works

Internal Partners:	**External Partners:**
	ODOT, Wasco County Emergency Management, OEM

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
FEMA, State and Federal Grants/Loans, city funds		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted 2024

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Proposed Action Item:	**Alignment with Plan Goals:**
SH #2 – Conduct Severe Weather Risk Awareness Activities	Education and Outreach, Climate Resilience

Alignment with Existing Plans/Policies:

Wasco County Emergency Operations Plan
Wasco County Natural Hazard Mitigation Plan

Rationale for Proposed Action Item:

- The 2024 Working Group determined that Maupin's aging population may have limited access to computers/internet service, may have limited financial resources and could benefit from ongoing education regarding severe weather risk.
- The Working Group determined that many of Maupin's homes are heated with wood heat, which may present risks to residents.
- The Working Group determined that Maupin's distance from medical services and supplies may require citizens to travel up to 50 miles during severe weather events.

Ideas for Implementation:

- Inform the public about severe weather impacts.
- Producing and distributing family and traveler emergency preparedness information about severe winter weather hazards.
- Encourage homeowners to install carbon monoxide monitors and alarms.
- Educating citizens that all fuel-burning equipment should be vented to the outside.
- Educate homeowners about freezing pipes and winterization activities

Coordinating Organization:	City Council

Internal Partners:	**External Partners:**
Maupin Volunteer Fire Dept	Wasco County Emergency Management, OEM

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
FEMA, State and Federal Grants/Loans, City Funds		✓ **Short Term (0-2 years)** ☐ **Long Term (2-4+ years)**

Form Submitted by:	
Action Item Status:	Submitted June 2024

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Proposed Action Item:	**Alignment with Plan Goals:**
SH#3 – Assist Vulnerable Populations	Protection of Life and Property

Alignment with Existing Plans/Policies:

Wasco County Emergency Operations Plan

Wasco County Natural Hazard Mitigation Plan

Rationale for Proposed Action Item:

- Maupin's 2024 Working Group determined that Maupin's aging population and households below the median income level make most Maupin residents vulnerable in the event of a severe winter storm.
- Maupin is home to Canyon Rim Assisted Living Facility, which may require assistance in a severe winter storm or power outage.

Ideas for Implementation:

- Identify specific at-risk populations that may be exceptionally vulnerable in the event of long-term power outages.
- Organizing outreach to vulnerable populations, including establishing and promoting accessible heating centers/shelters in the community.
- Educate citizens about severe weather risk and local resources.

Coordinating Organization:	City Council

Internal Partners:	**External Partners:**
Maupin Volunteer Fire Department	Wasco County Emergency Management, OEM,

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
FEMA, State and Federal Grants/Loans, City Funds		✓ Short Term (0-2 years) ☐ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted 2024

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Proposed Action Item:	Alignment with Plan Goals:
FH#1 - Explore the potential for Maupin to participate in the Community Rating System (CRS) of the National Flood Insurance Program (NFIP)	Protection of Life & Property Education & Outreach

Alignment with Existing Plans/Policies:

City of Maupin Comprehensive Land Use Plan

Rationale for Proposed Action Item:

- The National Flood Insurance Program's (NFIP) Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community flood plain management activities that exceed the minimum NFIP requirements. As a result, insurance premiums under the NFIP are discounted to reflect the reduced flood risk resulting from the community actions meeting the three goals of the CRS: (1) reduce flood losses; (2) facilitate accurate insurance rating; and (3) promote the awareness of flood insurance.
- The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address existing buildings and infrastructure [201.6(c)(3)(ii)]. Inclusion into the Community Rating System program can help communities in Wasco County to enhance mitigation efforts and decrease the vulnerability to floods.

Ideas for Implementation:

- Determine CRS eligibility requirements.
- Determine the best means of outreach to floodplain residents (mailing? Public meeting? Other methods?)
- Coordinate with the Department of Land Conservation and Development (DLCD) and FEMA to join the Community Rating System.
- Educate businesses and homeowners currently under the NFIP program about the CRS program and any mitigation actions they can implement to reduce their insurance premiums.

Coordinating Organization:	City Council

Internal Partners:	External Partners:
Public Works, Planning	Wasco County Emergency Management

Potential Funding Sources:	Estimated cost:	Timeline:
FEMA, State and Federal Grants		✓ Short Term (0-2 years) ☐ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted June 2024

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Proposed Action Item:	Alignment with Plan Goals:
FH#2 - Explore acquisition and management strategies to preserve parks, trails, and open space in the floodplain	Protection of Life & Property Natural Resource Systems Protection

Alignment with Existing Plans/Policies:

City of Maupin Comprehensive Land Use Plan
City of Maupin Capital Improvement Plan

Rationale for Proposed Action Item:

- The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address future development [201.6(c)(3)(ii)]. Developing acquisition and management strategies to preserve open spaces in the floodplain will prevent flood hazards by limiting or prohibiting development in these areas.
- Goal 7 of Oregon's Land Use Planning Goals requires that local governments "adopt or amend, as necessary, based on the evaluation of risk, plan policies and implementing measures...[that prohibit] the siting of essential facilities, major structures, hazardous facilities and special occupancy structures, as defined in the state building code (ORS 455.447(1) (a)(b)(c) and (e)), in identified hazard areas..." Developing acquisition and management strategies to preserve open spaces in the floodplain will fulfill goal 7 by preventing the siting of major facilities in a flood-hazard area.

Ideas for Implementation:

- Identify potential opportunities to acquire lands in the floodplain for use as parks, trails, or open space.
- Work with the Department of Land Conservation and Development, Oregon Military Department, Office of Emergency Management and FEMA to identify potential funding sources.

Coordinating Organization:	City Council

Internal Partners:	External Partners:
Planning	Wasco County Emergency Management, DLCD, OEM, FEMA

Potential Funding Sources:	Estimated cost:	Timeline:
FEMA, State and Federal Grants/Loans, Urban Renewal Agency, Private Sector		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted June 2024

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Proposed Action Item:	**Alignment with Plan Goals:**
FH#3 - Ensure continued compliance with the National Flood Insurance Program	Protection of Life & Property Education & Outreach

Alignment with Existing Plans/Policies:
City of Maupin Comprehensive Land Use Plan

Rationale for Proposed Action Item:
• The Disaster Mitigation Act of 2000 requires communities to identify a comprehensive range of mitigation actions. • Ensuring that the City remains in compliance with the National Flood Insurance Program will assist the community in continuing to maintain eligibility for the Flood Mitigation Assistance Program. • At this time, the City has no repetitive loss properties, keeping up on participation in the National Flood Insurance Program may help ensure that repetitive loss properties are mitigated, and that future development does not become repetitive loss property.

Ideas for Implementation:
• Partner with Wasco County on continuing compliance activities. • Explore opportunities to update floodplain ordinances based on new hazard knowledge provided by 2023 Wasco County FIRM. • Explore forming a multi-agency South Wasco Preparedness Coalition to coordinate flood hazard and floodplain ordinance awareness education.

Coordinating Organization:	City Council

Internal Partners:	**External Partners:**
	Wasco County Emergency Management, DLCD, OEM, FEMA

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
FEMA, State and Federal Grants/Loans, City Funds		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted June 2024

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Proposed Action Item:	**Alignment with Plan Goals:**
WH#1 - Partner with the County to Implement the Community Wildfire Protection Plan (CWPP)	Facilitation of Partnerships & Coordination

Alignment with Existing Plans/Policies:

Wasco County Natural Hazards Mitigation Plan
Wasco County Community Wildfire Protection Plan

Rationale for Proposed Action Item:

- The City's working group identified that their risk to wildfire is equal to that of the County.
- The 2021 DOGAMI Natural Hazard Risk Report for Wasco County listed the homes in the Wildland Urban Interface around Maupin as being an Area of Significant Risk for wildfire.
- The City participated in the development of the County Community Wildfire Protection Plan.
- The working group identified the need to continue to work with the County, ODF, and USFS on wildfire issues.

Ideas for Implementation:

- Participate in further planning and project activities with the County.
- Partner with the County on education and outreach related activities
- Explore potential to distribute wildfire brochures (available through Institute for Business & Home Safety) to residents pulling building permits, who are located in the urban fringe.
- Pursue fire fuels reduction opportunities within the Wildland Urban Interface (WUI).

Coordinating Organization:	City Council

Internal Partners:	**External Partners:**
Fire, Planning, Public Works	Wasco County Emergency Management, Wasco County Planning, Oregon Department of Forestry, USFS, OSFM

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
FEMA, State and Federal Grants, city funds		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted June 2024

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Proposed Action Item:	**Alignment with Plan Goals:**
WH#2 – Incorporate Wildfire Mitigation in the Comprehensive Plan	Protection of Life and Property, Natural Resource System Protection,

Alignment with Existing Plans/Policies:

City of Maupin Comprehensive Land Use Plan

Rationale for Proposed Action Item:

- The City's working group identified that their risk to wildfire is equal to that of the County.
- The 2021 DOGAMI Natural Hazard Risk Report for Wasco County listed the homes in the Wildland Urban Interface around Maupin as being an Area of Significant Risk for wildfire.
- The Working Group acknowledged that multiple factors have increased Maupin's risk to wildfire since the Comprehensive Plan was last updated in 2005 and that these changes necessitate the inclusion of wildfire mitigation strategies into City Planning.

Ideas for Implementation:

- Recognize the existence of wildfire hazards and identify areas of risk based on a wildfire vulnerability assessment.
- Write policies and recommendations for addressing wildfire risk and discouraging expansion in the Wildland Urban Interface (WUI).
- Include considerations of wildfire hazards in land use, public safety, and other elements of the Comprehensive Plan.

Coordinating Organization:	City Council

Internal Partners:	**External Partners:**
Planning	Wasco County

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
FEMA, State and Federal Grants/Loans, City Funds		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted June 2024

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
WH#3 – Implement Ongoing Fuels Management Program	Protection of Life and Property, Education and Outreach, Facilitate Partnerships and Coordination Natural Resource System Protection

Alignment with Existing Plans/Policies:

Wasco County Community Wildfire Protection Plan

Rationale for Proposed Action Item:

- The City's working group identified that the City's risk to wildfire as greater than that of the County.
- The 2021 DOGAMI Natural Hazard Risk Report for Wasco County listed the homes in the Wildland Urban Interface around Maupin as being an Area of Significant Risk for wildfire.
- Maupin's upper water reservoir, the city's wastewater treatment plant and Canyon Rim Assisted Living Facility, a 35-bed senior care facility- are located in the Wildland Urban Interface. Fire fuels management and defensible space work are critical to the protection of these community assets.

Ideas for Implementation:

- Seek funding for continued fire fuel reduction efforts in the Wildland Urban Interface and within city limits.
- Purchase air- burner for the removal of fire fuels.
- Purchase large-scale chipper for semi-annual chipping events.
- Distribute Defensible Space educational materials via mail, print advertising and social media.
- Partner with Wasco County to host annual wildfire/disaster preparedness event in South Wasco County

Coordinating Organization:	City Council

Internal Partners:	**External Partners:**
Maupin Volunteer Fire Department	OSFM, USFS, ODF

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
FEMA, State, Federal Grants, city funds		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted June 2024

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Volume III:
City/Special District Addendum

DRAFT

Table of Contents

Volume III: 1

City/Special District Addendum 1

Table of Contents 2

Purpose 4

How was the 2024 Plan Developed? 4

How Were the Action Items Developed? 5

City of Mosier 2024 Mitigation Action Items 5

Mosier Addendum 5

How Will the Plan be Implemented? 6

Implementation through Existing Programs 7

Continued Public Participation 7

Plan Maintenance 8

Mosier Community Profile 8

Geography and Climate 9

Population and Demographics 10

Employment and Economics 11

Housing 13

Land and Development ..... **Error! Bookmark not defined.**

Transportation and Commuting Patterns 14

Critical Facilities and Infrastructure 15

Historic and Cultural Resources 16

Hazard Analysis and Issue Identification 17

Initial Work Session Overview 17

City Participants 17

Analysis & Identification Process 17

DRAFT

Natural Hazard Risk Level Ranking Table 19
Severe Weather Event ..... **Error! Bookmark not defined.**
Drought ..... **Error! Bookmark not defined.**
Earthquake ..... **Error! Bookmark not defined.**
Flood ..... **Error! Bookmark not defined.**
Wildfire ..... **Error! Bookmark not defined.**
Landslide ..... **Error! Bookmark not defined.**
Volcanic Event ..... **Error! Bookmark not defined.**
Goals and Action Items 51
What are the Plan Goals? 51
Existing Mitigation Activities ..... **Error! Bookmark not defined.**
Action Items 55
What are the Plan Action Items? 55
Rationale or Key Issues Addressed 55
Coordinating Organization 55
Internal Partners 55
External Partners 55
Plan Goals Addressed 56
Timeline 56
City of Mosier NHMP Mitigation Action Items Matrix 58
City of Mosier Mitigation Action Items Summary Matrix 59
Mitigation Action Items Proposal Forms 69

DRAFT

Mosier City Addendum

Purpose

This document serves as the City of Mosier's Addendum to the Wasco County Natural Hazards Mitigation Plan (NHMP). The County plan update is scheduled to be sent to FEMA for approval and adopted by the Wasco County Board of Commissioners in October – November 2024. On March 31, 2023, the City of Mosier committed to producing an addendum to be part of the Wasco County Multi- Jurisdictional Natural Hazards Mitigation Plan, to include mitigation action items and an implementation strategy unique to the City of Mosier. The City's Addendum is considered part of the County's multi-jurisdictional NHMP, and meets the following requirements: (1) Multi-jurisdictional Plan Adoption §201.6(c)(5), (2) Multi-jurisdictional Participation §201.6(a)(3), (3) Multi-Jurisdictional Risk Assessment §201.6(c)(2) (iii), and (4) Multi-jurisdictional Mitigation Strategy §201.6(c)(3) (iv).

A description of the City specific planning and adoption process follows, along with detailed community specific mitigation action items. Information about the City's risk relative to the County's risk to natural hazards is documented in the rationale of the mitigation action items. The rationale indicates how the City's risk is considered greater or lesser than that of the County's.

How was the 2024 Plan Developed?

In 2023, a multijurisdictional group was convened to update the 2019 Natural Hazards Mitigation Plan. Staff from Wasco County and the City of Mosier and others conducted a climate and hazards vulnerability assessment that has become the foundation to this update. Mosier participated in Wasco County's collaborative planning process in the following ways.

1. A representative from the City of Mosier, City Manager Jayme Bennett, served on the Wasco County Natural Hazards Mitigation Steering Committee and participated in developing the Wasco County Natural Hazards Mitigation Plan.

2. The City of Mosier organized a group of representatives from the city, the Oregon Department of Transportation, and the Mid–Columbia Economic Development District, and also received input Wasco County Planning Staff. The City's workgroup included including the following:

    a. Ron Wright, City Councilor

    b. Jayme Bennett, City Manager

    c. Todd Reeves, Board President, Fire District

    d. Daun King, Mosier School

    e. Carrie Pipinich, Mid-Columbia Economic Development District, Deputy Director of Economic Development,

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3. Mosier's working group hosted a session focused on discussing the hazards rankings, updating critical facilities inventories, and developing appropriate action items that align with both community and County level priorities. With regard to population, economy, critical facilities and the environment.

4. City staff developed the City of Mosier Addendum.

5. The City Manager Jayme Bennett sent the draft addendum and attachments to Mosier's working group to review and provide comment. The County assisted the City to make appropriate revisions. The plan was sent to OEM and FEMA for review.

6. The plan returned from FEMA with a letter called Approved Pending Adoption. Then, after the County and the cities approved the NHMP, FEMA sent an approval letter that identified their approval date and the expiration date of the NHMP.

How Were the Action Items Developed?

The City's action items were developed through a two-stage process. In stage one, the Wasco County NHMP Update Steering Committee evaluated County-wide risks and identified potential issues which were then refined by Mosier's work group to be specific to the City. In stage two, the Mosier work group developed potential actions based on the hazards and the issues identified in stage one. The work group then cross-walked the City's issues with Wasco County's action items, working through the Wasco County NHMP Update Steering Committee to identify opportunities to partner where issues were shared between jurisdictions.

City of Mosier 2024 Mitigation Action Items

The following mitigation actions are described in detail in the Action Items Matrix.

- Evaluate and Prioritize Critical Infrastructure for Hazard Resilience (e.g. Seismic Retrofit, Wildfire Protections)
- Seek Implementation Funding for Hazard Resilient Modifications to Critical Infrastructure
- Partner with the County for the Coordination of Disaster Education/Outreach & Response
- Identification and Pursuit of Implementation Funding for Mitigation Actions
- Annual Review of Natural Hazards Mitigation Plan / Complete Review/Update/Adoption by City Council Every Five Years
- Secure Emergency Power Supply to Critical Infrastructure Sites
- Small Business Awareness and Continuity Planning
- Partner with County on All-Hazard Emergency Preparedness
- Enter Into Supply Contracts and Mutual Aid Agreements
- Identify and Train critical staff in the NIMS-FEMA Compliant Incident Command System (ICS)
- Kitchen equipment grant for food bank storage/food insecurity.
- Grant Funding for Upgrades to Water Main Transmission Line
- Grant Funding for Upgrades to the Repeater Antenna at First Station

DRAFT

- Funding for Road Upgrades within Mosier Fire District
- Funding for Upgrades to Fire Station Access
- Reduce Impacts to Roadways
- Conduct Severe Weather Risk Awareness Activities
- Assist Vulnerable Populations
- Explore the potential for Mosier to participate in the Community Rating System (CRS) of the National Flood Insurance Program (NFIP)
- Explore acquisition and management strategies to preserve parks, trails, and open space in the floodplain
- Ensure Continued Compliance with the National Flood Insurance Program
- Funding for Development of Storm Water Plan, and Improvements
- Partner with the County to Implement the Community Wildfire Protection Plan (CWPP)
- Incorporate Wildfire Mitigation in the Comprehensive Plan
- Implement Ongoing Fuels Management Program
- Funding for an emergency water storage supply in excess of 5000 gallons around top of Seven Mile Hill.
- Grant Funding for Heavy equipment for emergency removal in case of rock fall.

Mosier Addendum Update

As the Wasco County NHMP update process began to unfold in 2024, plans were made to include the City of Mosier in the multi-jurisdictional NHMP update. The City of Mosier City Manager Jayme Bennett, served on the Wasco County NHMP Update Steering Committee, and convened a number of meetings with relevant City officials and partners to create Mosier's City Addendum. Consulted through the process were the group noted above Wasco County Staff members, including Senior Planner Daniel Dougherty, Associate Planner Sean Bailey, and Long-range Planner Alice Cannon also provided assistance in the City Addendum's development.

Following those meetings, City Manager Jayme Bennett developed the City's addendum, with particular focus on the plan's action items.

The Addendum reflects the City's Hazard Vulnerability and Issue Identification, Plan Goals, and Community Profile sections. The City Manager approved all changes before submittal to the County.

How Will the Plan be Implemented?

The City Council will be responsible for adopting the City of Mosier Natural Hazards Mitigation Addendum. This addendum designates a coordinating body and a convener to oversee the development and implementation of action items. Because the City Addendum is considered part of the County plan, the City will look for opportunities to partner with the County. The City's staff will re-convene 2 ½ years after adoption of the City of Mosier NHMP Addendum. When the County's Steering Committee meets to review actions, the City's working group will

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also meet to review city-specific actions. The City Manager will serve as the convener and will be responsible for convening the working group. The convener will also remain active in the County's planning process.

Implementation through Existing Programs

Many of the recommendations in the Natural Hazards Mitigation Plan are consistent with the goals and objectives of the City's existing plans and policies. Where possible, the City of Mosier will implement the Natural Hazards Mitigation Plan's recommended mitigation actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, and can adapt easily to changing conditions and needs. Implementing the Natural Hazards Mitigation Plan's action items through such plans and policies increases their likelihood of being supported and implemented.

In addition to Water, Wastewater, Stormwater and Transportation Master Plans, the City of The Mosier currently has three planning documents that directly relate to natural hazard mitigation:

- City of Mosier Strategic Plan, created February 21, 2018
- The City of Mosier Transportation System Plan, created February 2019
- Emergency Response Plan City of Mosier Water System Wasco County, Oregon, created April 2018

The working group and the community's leadership have the option to add or implement action items at any time. This allows the working group to consider mitigation strategies as new opportunities arise, such as funding for action items that may not be of the highest priority. When new actions are identified, they should be documented using the action item form. Once a proposed action form has been submitted to the convener, the action will become part of the City's addendum.

Continued Public Participation

Keeping the public informed of the City's efforts to reduce the City's risk to future natural hazards events is important for successful plan implementation and maintenance. The City is committed to involving the public in the plan review and future updates. The City Addendum, as a chapter of the County Plan, is posted on the Wasco County and City of Mosier websites so that the public may view the plan and submit electronic comments to the community at any time.

In addition, the Hazard and Vulnerability information was presented to the public by the City Manager at an informational booth during the City's annual Spring Fest on April 20th, 2024 and Main Street Mosier Festival, on June 27, 2024. Additional information dissemination is conducted throughout the year when opportunities present themselves.

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Plan Maintenance

The Wasco County Natural Hazards Mitigation Plan will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. During the county plan update process, the City will also review and update its addendum. The convener will be responsible for convening the working group to address the questions outlined below.

- Are there new partners that should be brought to the table?
- Are there new local, regional, state, or federal policies influencing natural hazards that should be addressed?
- Has the community successfully implemented any mitigation activities since the plan was last updated?
- Have new issues or problems related to hazards been identified in the community?
- Are the actions still appropriate given current resources?
- Have there been any changes in development patterns that could influence the effects of hazards?
- Have there been any significant changes in the community's demographics that could influence the effects of hazards?
- Are there new studies or data available that would enhance the risk assessment?
- Has the community been affected by any disasters? Did the plan accurately address the impacts of this event?

These questions will help the working group determine what components of the mitigation plan need updating. The working group will be responsible for updating any deficiencies found in the plan.

The City of Mosier Natural Hazards Mitigation Addendum includes three sections:

1. The City of Mosier Community Profile describes community vulnerability,
2. Hazard Vulnerability and Issue Identification, and
3. Action Items Matrix and detailed action items forms.

Mosier Community Profile

This section provides information on the characteristics of Mosier, in terms of geography, environment, population, demographics, employment and economics, as well as housing and transportation. Many of these community characteristics can affect how natural hazards impact

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communities and how communities choose to plan for natural hazard mitigation. Considering these characteristics during the planning process can assist in identifying appropriate measures for natural hazard mitigation.

Geography and Climate

Mosier is located in North Wasco County along the Historic Columbia River Highway, United States Route 30 (U.S. 30) at 45.69°N latitude and 121.38°W longitude[1]. The elevation of the City is 102 feet[2] above sea level. The area of the City estimated by the US Census Bureau is 0.65 square miles. Mosier is located along the Columbia River, the largest river in the Pacific Northwest region of North America.[3] The closest city is Hood River, Oregon, which is approximately seven miles away. Portland, the largest City in the state is located approximately 69 miles to the west.

The climate in Mosier varies throughout the seasons, each with its own dominant weather patterns. In the summer, temperatures range between 57 and 77 degrees. During the winter, the temperatures range from 36 and 50 degrees. According to varied data, the City of Mosier's average snowfall ranges from 26 inches annually. According to varied data, the annual average rainfall is approximately 28 inches.

Table 1.1: General Climate Summary, Mosier, OR

Month	Mean Max. Temperature (degree F)	Mean Min. Temperature (degree F)	Average monthly precipitation (inches)
January	47	37	4.84
February	50	38	3.27
March	57	42	2.60
April	64	46	1.54
May	71	51	1.10
June	77	55	0.71
July	86	60	0.24
August	86	60	0.28

[1] National Oceanic and Atmospheric Administration (2024). Your National Weather Service Forecast. https://forecast.weather.gov/MapClick.php?CityName=Mosier&state=OR&site=PDT&textField1=45.6836&textField2=-121.396&e=0.

[2] U.S. Geological Survey Geographic Names Information System: Mosier, Oregon (2024). Summary Report, City of Mosier. https://edits.nationalmap.gov/apps/gaz-domestic/public/search/names/2411174.

[3] According to the United States Geological Survey fact sheet, "Largest Rivers in the United States" Archived July 9, 2017, at the Wayback Machine, "Rivers are considered large on the basis of one or more of three characteristics: total length from source to mouth, area of basin (watershed) drained by the stream, and average rate of flow (discharge) at the mouth." The Columbia is the largest river of the Pacific Northwest by all three characteristics. https://web.archive.org/web/20170709115552/https://pubs.usgs.gov/of/1987/ofr87-242/pdf/ofr87242.pdf.

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September	80	57	0.67
October	68	50	1.85
November	54	42	4.33
December	46	36	4.53

Source: Meteoblue, Mean Temperatures and Average Precipitation, 1985-2024.

Population and Demographics

The City of Mosier, incorporated in 1914, is located along the Columbia River in the Columbia River Gorge.[4] The Mosier Valley was historically inhabited by the native Wasco Tribe who lived on the south side of the Columbia River. Because of the trading routes along the Columbia River, the Mosier area also served a variety of European settlers such as fur traders and missionaries.[5] In the 1850s, the area contained a series of sawmills that provided lumber to the City of The Dalles and other communities in Wasco County. Today, Mosier serves as a key tourist destination for people visiting the Columbia Gorge National Scenic Area surrounded by productive agricultural land in the Mosier Valley.

The estimated population of Mosier, according Portland State University's Population Research Center, Mosier's 2022 population was 477. The 2022 American Community Survey indicates that the average family size is 2.37. The median age in 2022 was 36.6 years old, compared to 35.1 years old in 2010. 16.7% of Mosier's population is 65 years and older compared to 19.2% of 65 years and older within the state of Oregon.[6] The median age of Mosier citizens continues to slowly increase. Tables 1.2 and 1.3 illustrate population and demographics of Mosier.

Table 1.2: Total Population, City of Mosier, Wasco County, Oregon, 2010-2022

Jurisdiction	Population (2022)	Population (2020)	Population (2010)	Population Change (2010 - 2022)	Percent Change (2010 - 2022)
Mosier	477	468	433	44	9.2%
Wasco County	26,794	26,670	25,213	1,581	5.9%
Oregon	4,281,851	4,237,256	3,831,074	450,777	10.5%

Source: Portland State University Population Center, *Populations for Oregon and Its Counties and Incorporated Cities and Towns: 2000-2022.*

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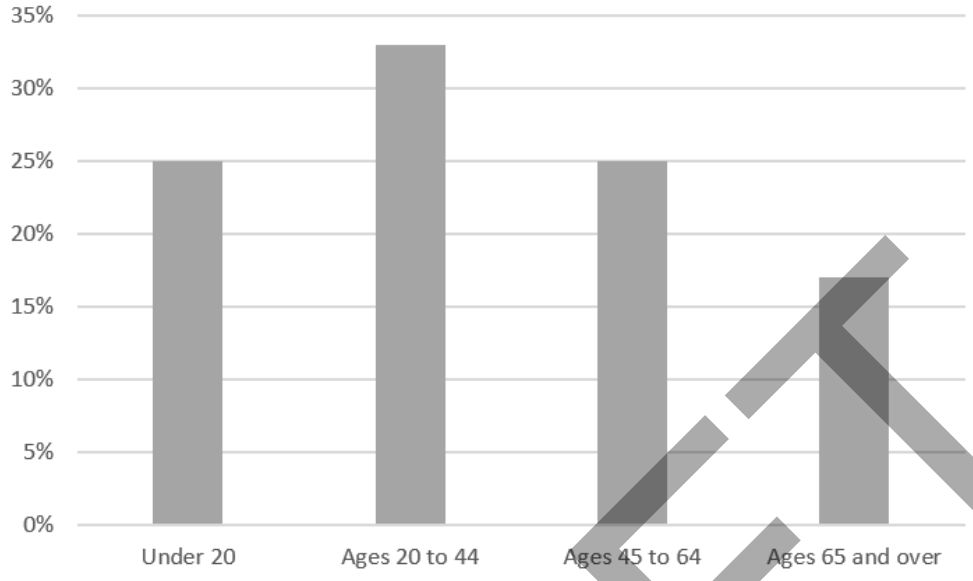
[4] City of Mosier, Oregon, The History of Mosier (2024) website, https://cityofmosier.com/community-in-mosier/the-history-of-mosier/.

[5] I.d.

[6] U.S. Census Bureau. (n.d.). Quick Facts Oregon. https://www.census.gov/quickfacts/OR.

Figure 1.3: City of Mosier Population Distribution by Age, 2022



Source: U.S. Census Bureau, American Community Survey, 2022.

The impact of disasters, in terms of loss and the ability to recover from a hazard event, varies among population groups. Disabled and aged population groups may disproportionately struggle to recover from natural disaster loss due to fixed incomes. People with low incomes may find recovery difficult or impossible due to the lack of financial ability. Additionally, a disproportionate burden may be placed upon specific racial and ethnic minority groups and other minority communities that lack the financial power and access to necessary resources needed to recover from the impact of disasters.

Data from the 2020 United States Census provides that 331 people in the City of Mosier self-identified as "White alone" (Non-Hispanic), which is approximately (70%) of the city's population.[7] Approximately 143 people (30.5%) self-identified as Hispanic or Latino (of any race).[8] According to the 2022 American Community Survey 5-Year Estimate, only 45% of residents speak a language other than English at home but almost 43% speak Spanish.

Employment and Economics

The 2020 census demonstrated that the City of Mosier is steadily growing in both population and business. Mosier is home to a range of industries from education and health care to manufacturing and agriculture. Mosier also contains a burgeoning industry focused on manufacturing.[9] Table 1.4 shows the range of industries Mosier residents have access

[7] U.S. Census Bureau. (n.d.). Table Decennial Census P1 RACE: Mosier city, Oregon. Retrieved March 5, 2024, from https://data.census.gov/table/DECENNIALPL2020.P1?g=160XX00US4150050
[8] U.S. Census Bureau. (n.d.). Table Decennial Census P9 RACE: Mosier city, Oregon. Retrieved March 5, 2024, from https://data.census.gov/table/DECENNIALDHC2020.P9?g=160XX00US4150050
[9] U.S. Census Bureau. (n.d.). 2022 Community Profile: Mosier city, Oregon. Retrieved March 5, 2024, from https://data.census.gov/profile/Mosier_city,_Oregon?g=160XX00US4150050#employment

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Table 1.4: Industries for Civilian Employed Population 16 Years and Over City of Mosier 2022

Industry	Percent of Employment
Education services, and health care and social assistance	25.30%
Manufacturing	24.10%
Arts, entertainment, and recreation, and accommodation and food services	9.40%
Other services, except public administration	9.10%
Agriculture, forestry, fishing and hunting, and mining	8.80%
Professional, scientific, and management, and administrative, and waste management services	6.80%
Public Administration	5.30%
Retail Trade	2.90%
Wholesale Trade	2.60%
Construction	1.80%
Information	1.80%
Finance and insurance, and real estate and rental and leasing	1.50%
Transportation and warehousing, and utilities	0.60%

Source: US Census Bureau, American Community Survey 2022.

Goal 1 of the 2018 City of Mosier Strategic Plan is to "Develop and Maintain a Thriving Local Economy".[10] The plan outlines several projects that will help achieve this goal. Many projects are recreational industry focused and include developing walking and bicycling routes with rest stops and investigating the feasibility, funding, and implementation of a combined city hall, fire station and multi-purpose community space.[11] A central economic challenge for Mosier outlined in the Plan was the "threat of consumption and tourism-based economy changing character of Mosier (transition of economy to rich, vacation play-zone)."[12]

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[10] City of Mosier Strategic Plan (February 21, 2018). P.8. https://zmza38.p3cdn1.secureserver.net/wp-content/uploads/2018/04/final-strategic-plan-2018.pdf
[11] I.d.
[12] I.d. at 14

The median household income for Mosier is $68,941, compared to $75,657 for the state of Oregon.[13] The household median income is not rising faster than the rate of inflation. The median household income was $43,500 in 2010 ($56,440.57 in 2022 dollars).[14] The percentage of households in Mosier at or below the Federal poverty level in 2022 was 0.8%, compared to 12% for the state.[15]

Housing

Housing type and year-built dates are important factors in mitigation planning. Certain housing types tend to be less disaster resistant and warrant special attention: mobile homes, for example, are generally more prone to wind and water damage than standard stick-built homes. Generally the older the home is, the greater the risk of damage from natural disasters. This is because stricter building codes have been developed following improved scientific understanding of natural hazards and their impacts on structures. For example, structures built after the late 1960s in the Pacific Northwest and California use earthquake resistant designs and construction techniques. In addition, FEMA began assisting communities with floodplain mapping during the 1970s, and communities developed ordinances that require homes built in the floodplain to be elevated to one foot above Base Flood Elevation (BFE).

There are 378 total housing units in the City (Table 1.6)[16], and approximately 70.4% of those units are owner occupied. The median value of owner occupied housing units in 2010 was $66,300[17] and in 2022[18], is $285,900, a 331% increase. Fifteen percent of Mosier's housing stock is fifty years old or older. Sixty-six percent of Mosier's housing stock was built between 1970 and 2009. However, 76 housing units were built between 2010 and 2019, which continued the nearly 100 units per decade trend of housing construction that began in 1990. (Table 1.6). A vast majority of housing units are heated by electricity (83.5%), followed by gas (7.9% utility or bottled, tank, or LP), solar (4.5%) and wood and other (4.1%).[19] Since 2010, electric heated housing units have steadily increased replacing wood heated units.

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[13] U.S. Census Bureau. (n.d.). 2022 Community Profile: Mosier city, Oregon. Retrieved March 6, 2024, from https://data.census.gov/profile/Mosier_city,_Oregon?g=160XX00US4150050#employment
[14] U.S. Census Bureau. (n.d.). 2010: ACS 5-Year Estimates Subject Table S1901 Income in the Past 12 Months (in 2010 Inflation-Adjusted Dollars): Mosier city, Oregon. Retrieved March 6, 2024, from https://data.census.gov/table/ACSST5Y2010.S1901?g=160XX00US4150050
[15] U.S. Census Bureau. (n.d.). 2022 Community Profile: Mosier city, Oregon. Retrieved March 6, 2024, from https://data.census.gov/profile/Mosier_city,_Oregon?g=160XX00US4150050#employment
[16] U.S. Census Bureau. (n.d.). 2022: ACS 5-Year Estimates Subject Table B25001 Housing Units: Mosier city, Oregon. Retrieved March 6, 2024, from https://data.census.gov/table/ACSDT5Y2022.B25001?q=Housing%20Units&g=160XX00US4150050&y=2022
[17] U.S. Census Bureau. (n.d.). 2010: ACS 5-Year Estimates Subject Table DP04 Selected Housing Characteristics: Mosier city, Oregon. Retrieved March 6, 2024, from https://data.census.gov/table/ACSDP5Y2010.DP04?q=Housing%20Value&g=160XX00US4150050
[18] U.S. Census Bureau. (n.d.). 2022: ACS 5-Year Estimates Subject Table DP04 Selected Housing Characteristics: Mosier city, Oregon. Retrieved March 6, 2024, from https://data.census.gov/table?q=Housing%20Value&g=160XX00US4150050
[19] I.d.

Table 1.5: Housing Type Summary, City of Mosier, 2022

Housing Type	Number	Percent
1 unit, detached	201	53%
1 unit, attached	32	8%
2 to 9 units	16	4%
10 or more units	23	6%
Mobile Home, Boat, RV, Van	106	28%
Total	**378**	**100%**

Source: U.S. Census Bureau, American Community Survey, 2022.

Table 1.6: Housing Stock by Age, City of Mosier, 2022

Year Structure Built	Number	Percent
2020 or later	0	0%
2010 to 2019	76	20%
2000 to 2009	92	24%
1990 to 1999	82	22%
1980 to 1989	20	5%
1970 to 1979	55	15%
1960 to 1969	6	2%
1950 to 1959	14	4%
1940 to 1949	0	0%
1939 or earlier	33	9%
Total housing units	378	100%

Source: U.S. Census Bureau, American Community Survey, 2022.

Transportation and Commuting Patterns

Mosier is located along a major transportation corridor. Portions of Interstate 84, US 30 (Historic Columbia River Highway), and the Union Pacific Railroad east-west mainline are all within Mosier City limits.[20] The Columbia River also runs adjacent east-west of the City. Mosier has direct access to Highway U.S. 30 and Sevenmile Hill County Road which provides access to The Dalles for tourists, farmers, and Wasco County residents year round. The Historic Columbia River Highway State Trail also provides access for bicyclists and pedestrians between Mosier and the City of Hood River.

[20] Wasco County. (2009). Wasco County Transportation System Plan. P.15. https://www.oregon.gov/ODOT/Planning/TPOD/tsp/county/county_of_wasco_tsp_2009.pdf

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Transportation is an important consideration when planning for emergency service provisions. It is also vital when considering growth within the City as it can put pressure on both major and minor roads, especially if the main mode of travel is by single occupancy vehicles. How people travel to work is indicative of the prevalence of single occupancy vehicle travel, and can help predict the amount of traffic congestion and the potential for accidents. The 2019 Mosier Transportation System Plan has also set a goal to develop "a transportation system that provides mobility choices for individuals of all ages, abilities, incomes, races, and ethnicities, specifically those who experience unequal access to transportation."[21]

The LINK provide round trips daily between Hood River, Mosier, and The Dalles. Riders can be dropped off in Mosier without calling ahead. Furthermore, custom and/or ADA accessible trips can be arranged through The LINK. [22]

The majority of the inhabitants in the City commute to work by automobile (84.7% in 2022, down from 74.2% in 2010), and 5% of those workers commute to work via carpooling.[23] Approximately 6.5% percent walk to work instead of driving.[24] Nearly 6.2% work from home, a significant decrease from 22.5% in 2010. [25]

Critical Facilities and Infrastructure

Critical facilities support government and first responders' ability to take action in an emergency. They are a top priority in any comprehensive hazard mitigation plan. Individual communities should inventory their critical facilities to include locally designated shelters and other essential assets.

A critical energy dependent infrastructure list was updated by the working group. Critical facilities within City limits or owned by the City of Mosier include:

- Mosier City Hall
- Mosier Community School
- Mosier Fire Department (including repeater)
- Mosier Waste Water Treatment Plant
- Mosier Water System Assets–Reservoir, Wells
- I-84, Hwy 30, State Road–evac routes
- Senior Center
- Grange Hall
- Gravel Pit
- Brenna's Market
- MoCo
- Fruit Co (water/pwr provision)
- Power Infrastructure
- Internet/Telecommunications
- (Rags) Ham Radio Antennas

[21] The City of Mosier, OR Transportation System Plan. February 2019. P.12. Retrieved from chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://cityofmosier.com/wp-content/uploads/2019/05/mosier-tsp_final.pdf
[22] I.d. at 20.
[23] U.S. Census Bureau. (n.d.). 2022 and 2010: ACS 5-Year Estimates Table S0801 Commuting Characteristics by Sex: Mosier city, Oregon. Retrieved March 8, 2024, from https://data.census.gov/table/ACSST5Y2022.S0801?g=160XX00US4150050
[24] I.d.
[25] I.d

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- County Yard–county fuel site-State Rd/Seven Mile site just outside of town

Table 1.7: Critical Infrastructure and Facilities, Mosier, 2024

Infrastructure/Facility	Number
Airport	0
Civic	8
Communications	2
Dam	0
Electric Utility	
EOC	
Fire Station	1
Fuel Station	1
Medical	
Hospital	0
Police	
School	1
Water Supply	1
Wastewater	1

Historic and Cultural Resources

Historic and cultural resources such as historic structures and landmarks can help define a community and may also be vital to the survival of recreational and tourism industries. Because of their role in defining and supporting the community, protecting historic and cultural resources from the impact of natural disasters is vital to preserving the community's culture and heritage. Protecting these resources can also help allay burdens placed on historically underrepresented population groups within a community who may have played a monumental role in the city's cultural development.

While there are no historic districts in Mosier, there are many properties with eligible buildings as the table below shows. There is one listed site on the National Registry, the Mosier Jefferson House. Additionally, the area is home to two historic cemeteries-the Mosier State Road Cemetery and Mosier Pioneer Cemetery. Additionally, within the Mosier community are the "Mosier Mounds" that represent old burial grounds with cultural significance to Table 1.8: Registered Historic Sites, City of Mosier, 2024.

National Registry Status	Number of Properties
Not listed, but eligible for listing	19

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Listed Individually	1

Source: Oregon Historic Sites Database, February 2024

Hazard Analysis and Issue Identification

Initial Work Session Overview

In April 2024, the City staff conducted a series of meetings in order to develop community-specific action items for the City's addendum to the Wasco County Natural Hazards Mitigation Plan. Those action items were included in the City's addendum to the Wasco County Natural Hazards Mitigation Plan.

City Participants

The following individuals participated in the meetings:

- Ron Wright, City Councilor
- Jayme Bennett, City Manager
- Todd Reeves, Board President, Fire District
- Daun King, Mosier School
- Carrie Pipinich, Mid-Columbia Economic Development District, Deputy Director of Economic Development,

Analysis & Identification Process

During the meetings, participants discussed and developed the list of critical facilities owned by the City. Participants then provided comments on the City's risk and to identify specific hazard related issues. With information from the meetings, staff developed the NHMP Hazard Analysis and Issue Identification section. Changes were made where appropriate to reflect changes in perception to the City of Mosier's risk to natural hazards. The Wasco County Natural Hazards Steering Committee elected to move Extreme Heat from the Severe Weather Hazard category and rank Extreme Heat as its own hazard. The following is a summary of input from the Mosier working group in the development of the City's Addendum to the 2024 Wasco County Natural Hazard Mitigation Plan.

There are three additional reports that relate to the City of Mosier Risk Assessment:

- *2022 Community Wildfire Protection Plan*, by the Wasco County Planning Department, 2022.
- *Natural Hazard Risk Report for Wasco County, Oregon Including the Cities of Antelope, Dufur, Maupin, Mosier, Shaniko, The Dalles, and Unincorporated Communities of Chenoweth, Tygh Valley, Pine Hollow, and the Warm Springs Indian Reservation* by the Oregon Department of Geology and Mineral Industries (DOGAMI) (2021)

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- *Future Climate Projections Wasco County* report prepared by the Oregon Climate Change Research Institute (OCCRI) in August 2018.

These two reports provide important analysis related to the natural hazards identified in Table 1.8 and how they are impacted related to climate projections. The *DOGAMI Risk Report* will be found in finished form at http://www.oregongeology.org/pubs/index.htm .The *OCCRI Future Projections Report* for Wasco County, can be found on the Wasco County Planning website, under Long Range – Natural Hazard Mitigation Plan in the Additional Information section.

Of note, the *DOGAMI Risk Report* includes the natural hazards of earthquakes, flood, landslides, wildfire, lahar/volcanoes, and channel migration. Channel migration was not a hazard identified by the Wasco County NHMP Steering Committee and is not discussed in detail in the NHMP. The *Risk Report* does not include severe weather and drought, which are two of the natural hazards identified by the Wasco County NHMP Steering Committee and the City of The Dalles Working Group.

DOGAMI describes the purpose of the *Risk Report*:

"The purpose of this project is to help communities in the study area better understand their risk and increase resilience to natural hazards that are present in their community. This is accomplished by providing them with accurate, detailed, and up to date information about these hazards and by measuring the number of people and buildings at risk.

The main objectives of this study are to:

- Compile and/or create a database of critical facilities, tax assessor data, buildings, and population distribution data
- Incorporate and use existing data from previous geologic, hydrologic, and wildfire hazard studies
- Perform exposure and Hazus-based risk analysis
- Share this report widely so that all interested parties have access to its information and data

The body of this report describes the methods and results for these objectives. Two primary methods (Hazus-MH or exposure) depending on the type of hazard, were used to assess risk. We describe the methods for creating the building and population information used in this project. Results for each hazard type are reported on a countywide basis, and community based results are reported in detail in the community profiles."

The *Risk Report* includes information about critical facilities such as what they are, where they are, what the monetary value of them is, and so forth. These critical facilities are important to note because of the essential role they play in recovery efforts. DOGAMI was provided a list of the Wasco County critical facilities, including the City of Mosier, prepared by the Steering Committee. There are some differences in what DOGAMI includes in the *Risk Report* versus what is included in the NHMP, in terms of critical facilities. See also the subsection "Critical Facilities and Infrastructure" in the Wasco County section for additional details.

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OCCRI's *Future Climate Projections Wasco County* and the *Climate Change Influence on Natural Hazards in Eight Oregon Counties: Overview of County Reports*, provide important information regarding the influence and impacts of climate change on existing natural hazards events such as heavy rains, river flooding, drought, heat waves, cold waves, wildfire, and air quality.

Each county report describes county-specific projected changes in climate metrics related to 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.

The City will consult the DOGAMI report to prioritize proposed actions before implementation.

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Natural Hazard Risk Level Ranking Table

Table 1.9: Comparison of Wasco County and City of Mosier Risk Level Ranking

Hazard	Wasco Co. Rating	City Rating	Detail
Wildland-Wildfire	High	High	Mosier wildland urban interface (WUI) zones is at the greatest risk. Frequent fire events adjacent to the community.
Severe Weather/Storm	High	High	Ice storm, snow storm or blizzard, and windstorm, including tornado. Isolates community from services. Due to road closures
Extreme Heat	High	High	City of Mosier
Drought	High	High	Aquifer challenges in the Mosier area could be exacerbated
Flood	Medium	Low	Mosier & Rock Creek, Columbia River.
Landslide	Low	Low	DOGAMI study identified risk areas.
Earthquake	Low	Low	
Volcano	Low	Low	Mosier may be impacted by a volcanic eruption at any time (particularly from Mt. Hood and Mt. Adams)

Source: Wasco County 2024 Natural Hazards Mitigation Plan; City of Mosier Working Group

Drought

Standard Precipitation-Evaporation Index

The West Wide Drought Tracker was used to provide a chart of drought events in the State of Oregon Region 5 NHMP. In this section the Tracker database was used to provide a chart of drought events specific to Wasco County using the Standard Precipitation-Evapotranspiration Index from 1895 to 2023.

The Standard Precipitation-Evapotranspiration Index (SPEI) is designed to evaluate both precipitation and potential evapotranspiration (PET) in determining drought. Thus, unlike the Standard Precipitation Index, the SPEI captures the main impact of increased temperatures on crop water demand and water supply (agricultural and hydrological drought).[26]

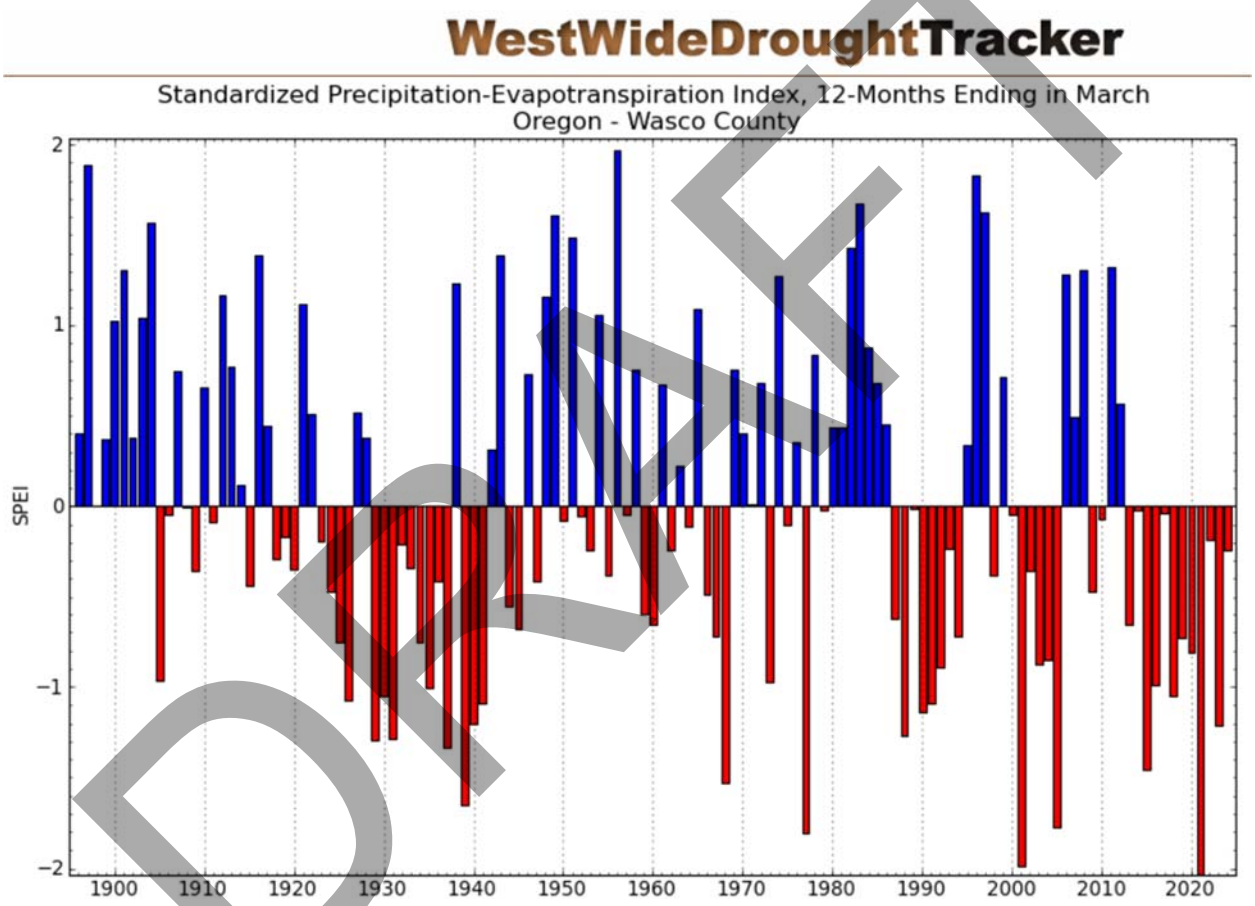

Figure 1: Drought Severity Scale: -1 to -1.49 = moderate drought; -1.5 to -1.99 = severe drought; -2.0 or less = extreme drought Source: University of Idaho West Wide Drought Tracker. (database accessed 4/9/2024) Western Regional Climate Center. wrcc.dri.edu/wwdt/time/

Groundwater System Decline

[26] National Center for Atmospheric Research. (n.d.). Standardized Precipitation-Evapotranspiration Index (SPEI). Retrieved from NCAR Climate Guide Data: https://climatedataguide.ucar.edu/climate-data/standardized-precipitation-evapotranspiration-index-spei. Accessed 4/10/2024

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The Problem

The City of Mosier relies on the Priest Rapids aquifer for 100 percent of its water supply. This aquifer and other connected aquifers, collectively the aquifer system, have been declining since the 1970s due to overuse and commingling wells. Many studies have been completed to evaluate the problem and recommend solutions. Several solutions have been implemented including the repair of commingling wells, new well drilling standards, and the drilling of exploratory deep wells. These solutions appear promising but there is much work to do to ensure the aquifer continues to provide a sustainable groundwater supply for the City of Mosier and other users in the watershed. The Mosier Watershed Group and the Wasco County Soil and Water Conservation District are, primarily, the proponents and leaders in this effort along with USGS and the Oregon Water Resources Department.

The Groundwater Setting

Groundwater from aquifers hosted by basalt flows of the Columbia River Basalt Group (CRBG), and to a minor extent the sediments of the Dalles Formation, is the primary water supply for rural domestic, irrigation, and municipal uses in the Mosier Creek watershed. Beginning in the 1970s, groundwater usage in the watershed increased significantly with drilling of new wells, primarily for irrigation and domestic uses. OWRD has documented rapid rates of water level declines in the basalt aquifers, particularly since the 1970s (Lite and Grondin, 1988). In response to the water level declines, OWRD delineated an administrative area in 1988 and withdrew the Pomona and Priest Rapids aquifers from further appropriation other than for exempt uses. Despite the withdrawal of the aquifers, water level declines continued to occur at similar rates, with total declines of 150 to 200 feet recorded in some wells. Stakeholders in the Mosier area have identified declining water levels and the consequent threat to a stable supply of water as the highest priority concern within the watershed because of the almost exclusive reliance on groundwater for potable supply in the area.[27]

Groundwater Shortage Probability

Little work has been done to estimate the probability of the City of Mosier experiencing a groundwater shortage due the declining aquifers. The City's Well No. 4 is its sole source of water supply. A backup well is currently being developed adjacent to Well No. 4 to provide facility redundancy. Well No. 4, like all wells in the watershed, is experiencing a steady decline in the groundwater level. There have been informal forecasts of the number of years before the City's well will dry up. At the current rates of decline it appears that it will be more than 100 years before the Priest Rapids aquifer is emptied. One reason the City's well is less vulnerable to a decline is because it's at the bottom of the aquifer (in terms of elevation) and also because the City has an old water right with significant seniority. In other words, the City's Priest Rapids well will be one of the last wells to go dry. Regardless the City fully supports the work of the Mosier Watershed Group as demonstrated by the City being the first well owner to repair a

[27] GSI Water Solutions Inc., MOSIER WELL EVALUATION REPORT, Prepared for: The Wasco County Soil and Water Conservation District, July 15, 2014

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commingling well. The work of the Mosier Watershed Group to date shows promise and it appears likely the groundwater declines will be reduced as more projects are completed.

Groundwater Shortage Resilience
Much work has been done and more will be done to create a resilient groundwater supply.

In recent years much of the focus of the groundwater work has shifted to developing and implementing a different set of potential solutions to stabilize the severely depleted aquifers and hopefully reverse the decline. The Mosier Watershed Council, Wasco County Soil and Water Conservation District ("the District"), and Oregon Water Resources Department (OWRD) have been working together to develop remedies to: (1) to ensure new wells are constructed to prevent commingling, (2) eliminate existing commingling wells, and (3) transfer some of the pumping stress from the depleted aquifers.[28]

In addition to Well No. 4, the City owns Well No. 2 aka the School Well. This well is in town and in a different aquifer system then Well No. 4. It's a substandard facility with limited functionality and water quality problems. However, it can be used in the event of failure of Well No. 4 but only for short periods of time. The City's Emergency Response Plan describes the use of the School Well in an emergency. Theoretically this aquifer system could be relied upon, by the City, for a long-term source of supply. Substantial improvements would be necessary to utilize this aquifer and the City currently has no plan in place for these improvements.

Groundwater Outage Risk
While the probability of a total loss of groundwater supply due to decline is low and not within the foreseeable future; the impacts of failure on the City would be devastating. A long-term total water outage in the City of Mosier would result in depopulation of the City as residents and business owners migrate to other areas that are livable. Fortunately, this scenario is very unlikely to occur. One reason that the risk is low is because the groundwater system water levels are rigorously monitored. If the decline continues to occur into the future; the City will have time to plan and implement new water supply improvements. While finding a new source of water supply will be extremely challenging; it is possible although the cost may be burdensome.

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[28] Columbia River Basalt Hydrology and Management Solutions in the Mosier Basin, Oregon Field Trip Guide – 2019 GSA Cordilleran Meeting, May 18, 2019, Kenneth E. Lite, Jr., Erik A. Thomasser, Robert B. Perkins, Jonathan L. LaMarche, Aurora C. Bouchier, Cullen B. Jones

Table 11: Recent Drought History – City of Mosier

Year	ENSO Condition[29]	12-mo. SPEI	Declaration
2005	El Niño most of the year[30]	-1.8	**EO-05-06** DETERMINATION OF A STATE OF DROUGHT EMERGENCY IN DESCHUTES, LAKE, WALLOWA, WASCO AND WHEELER COUNTIES DUE TO DROUGHT AND LOW WATER CONDITIONS. May 25, 2005; Expired December 31, 2005
2015	El Niño all year – 3rd strongest on record[31]	-1.5	**EO-15-05** DETERMINATION OF A STATE OF DROUGHT EMERGENCY IN DESCHUTES, GRANT, JACKSON, JOSEPHINE, LANE, MORROW, UMATILLA, AND WASCO COUNTIES DUE TO DROUGHT, LOW SNOW PACK LEVELS, AND LOW WATER CONDITIONS, May 21, 2015; Expired December 31, 2015
2020	Neutral moving to La Niña JAS	-0.8	**EO-20-31** DETERMINATION OF A STATE OF DROUGHT EMERGENCY IN DOUGLAS, GILLIAM, JOSEPHINE, CROOK, DESCHUTES, JEFFERSON AND WASCO COUNTIES DUE TO UNUSUALLY LOW WATER SUPPLIES AND HOT, DRY CONDITIONS, July 1, 2020; Expired December 31, 2020.
2021	La Niña except MJJ-JJA	-2.0	**EO-21-16** DETERMINATION OF A STATE OF DROUGHT EMERGENCY IN GRANT, UMATILLA, UNION, AND WASCO COUNTIES DUE TO LACK OF PRECIPITATION, UNUSUALLY LOW SNOWPACK AND STREAMFLOW. June 29, 2021; Expired December 31, 2021. **EO-21-20** DIRECTING STATE AGENCIES TO SUPPORT COMMUNITIES IN DROUGHT BY CURTAILING NONESSENTIAL WATER USE, IMPLEMENTING WATER CONSERVATION MEASURES, AND ENCOURAGING DROUGHT RESILIENCY. July 7, 2021; Expired December 31, 2021.

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[29] Climate Prediction Center/National Center for Environmental Prediction. (2024, April 8). *ENSO: Recent Evolution, Current Status and Predictions.* Retrieved from Climate Prediction Center: cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf. Accessed 4/11/2024.

[30] National Oceanic and Atmospheric Administration. (2005). Annual 2005 El Nino/Southern Oscillation. Retrieved from National Centers for Environmental Information: ncei.noaa.gov/access/monitoring/monthly-report/enso/200513. Accessed 4/11/2024.

[31] National Oceanic and Atmospheric Administration. (2016, August 2). *2015 State of the Climate: El Nino came, saw, and conquered.* Retrieved from Climate.gov: climate.gov/news-features/understanding-climate/2015-state-climate-el-ni%C3%B1o-came-saw-and-conquered. Accessed 4/11/2024.

Year	ENSO Condition[29]	12-mo. SPEI	Declaration
			EO-21-27 DETERMINATION OF STATE OF EMERGENCY IN THE STATE OF OREGON DUE TO EXCESSIVE HIGH TEMPERATURES CAUSING A THREAT TO LIFE, HEALTH, AND INFRASTRUCTURE. August 10, 2021; Expired August 20, 2021.
2022	La Niña all year	-0.2	**EO-22-10** DETERMINATION OF STATE OF EMERGENCY IN MULTIPLE COUNTIES DUE TO THE NEED FOR STATE WIDE COORDINATION TO ADDRESS PERSISTENT EXTREME DROUGHT CONDITIONS. June 7, 2022; Expired December 31, 2022. **EO-22-13** DETERMINATION OF STATE OF EMERGENCY IN COLUMBIA, CLACKAMAS, CROOK, CURRY, DESCHUTES, DOUGLAS, GILLIAM, GRANT, HOOD RIVER, JACKSON, JEFFERSON, JOSEPHINE, KLAMATH, MARION, MORROW, MULTNOMAH, POLK, SHERMAN, UMATILLA, UNION, WALLOWA, WASCO, WASHINGTON, WHEELER, AND YAMHILL COUNTIES DUE TO EXCESSIVE HIGH TEMPERATURES CAUSING A THREAT TO LIFE, HEALTH, AND INFRASTRUCTURE. July 25, 2022; Expired July 31, 2022.
2023	El Niño AMJ-NDJ	-1.2	**EO-23-10** DETERMINATION OF A STATE OF DROUGHT EMERGENCY IN WASCO COUNTY. April 13, 2023; Expired December 31, 2023.

Drought Probability

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The State of Oregon 2020 NHMP lists Wasco County as a medium probability of drought. The probability was calculated based on the number of drought declarations since 1992.

Climate Change

The Oregon Climate Change Research Institute issued a report specific to Wasco County in August 2018. They modeled high and low greenhouse gas emissions scenarios. There predictions for changes in extreme heat and drought probabilities by the 2050s based on their higher emissions scenario:

- Drought conditions are projected to become more frequent compared to the historical record.[32]

Drought Vulnerability

The State of Oregon 2020 NHMP notes a difference between the local drought vulnerability assessment (high in Wasco County) compared to the State of Oregon assessment (very high in Wasco County). Though Oregon has not conducted a comprehensive statewide analysis, the Centers for Disease Control (CDC) social vulnerability index informed the State assessment.

"Wasco County's high vulnerability is driven by moderately high scores across the CDC index. Notably, however, the county scores in the 80th percentile for its share of residents without a high school diploma, percentage of residents that speak English less than "well," and percentage of persons living in institutionalized group quarters."[33]

The City's groundwater supply is recharged from precipitation in the Mosier Creek watershed. Aquifers in the watershed are recharged from snow melt, rainfall, and human-related uses such as irrigation. The precipitation may fluctuate greatly from year to year.

Water levels in wells fluctuate seasonally in response to changes in recharge, evapotranspiration, groundwater pumping, and streamflow. Beginning in autumn and continuing through mid-spring, water levels rise as recharge from precipitation to the groundwater system exceeds discharge to evapotranspiration, groundwater pumping, and streamflow. From mid-spring until autumn, water levels decline as water drains or is pumped at increased rates from the aquifer system, and during a period when recharge from precipitation is much lower and evapotranspiration is higher. Groundwater levels respond to decadal precipitation patterns. Because the post-1970 period has higher average precipitation than for the 20 years prior, groundwater levels should be rising rather than falling as observed. Therefore, the persistent groundwater declines in the study area cannot be attributed to changes in precipitation.[34]

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[32] The Oregon Climate Change Research Institute. (2018) *Future Climate Projections Wasco County*. Salem, OR: Oregon Department of Land Conservation and Development.

[33] State Interagency Hazard Mitigation Team. (2020). *Oregon Natural Hazards Mitigation Plan*. Salem, OR: Oregon Department of Land Conservation and Development.

[34] Scientific Investigations Report 2012–5002, U.S. Department of the Interior U.S. Geological Survey, Evaluation of Long-Term Water-Level Declines in Basalt Aquifers near Mosier, Oregon

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This groundwater characteristic indicates the aquifers in the Mosier watershed have a low risk of decline due to typical drought patterns; however; the groundwater recharge may be significantly impacted by the changing climate.

Droughts impact individual farm owners, the agricultural industry as a whole, and other agricultural related sectors. Mosier, being a regional hub for shipping and receiving agricultural products, may be particularly impacted by droughts in the region.

Recent Drought Losses

In 2021, the unprecedented heat wave and ongoing drought in the U.S. Pacific Northwest damaged white wheat coveted by Asian buyers and forcing fruit farm workers to harvest in the middle of the night to salvage crops and avoid deadly heat.

Farmers in Wasco County, the state's largest cherry producer, estimated about 56 percent of the acreage suffered heat damage, according to surveys by Ashley Thompson, a tree fruit extension horticulturist for Oregon State University.

Throughout the Columbia River Gorge region, growers reported damage ranging from 15–100 percent, describing shriveled and sunburned fruit, picking cherries for brine and significant packout reductions. Some were even turned down by processors.[35]

Drought Resilience

Though no drought related water use curtailment has occurred in Mosier, the City has a Water Curtailment Element in its Water System Emergency Response Plan. Refer to the above section discussing the declining groundwater system for resilience measures. .

Drought Risk

With respect to natural hazards, risk can be expressed as the probability of a hazard occurring combined with the potential for property damage and loss of life. Based on the history of drought declarations, Wasco County's social vulnerability index, and the potential for drought to impact the agricultural economy, Mosier is considered to be at moderate risk from drought by Wasco County and the City of Mosier.

Earthquake

Earthquake Characteristics

[35] Courtney,R. Mullinax, T (2021, September 7) Learning from the heat wave. Retrieved from Good Fruit Grower: goodfruit.com/learning-from-the-heat-wave/. Accessed 4/11/2024.

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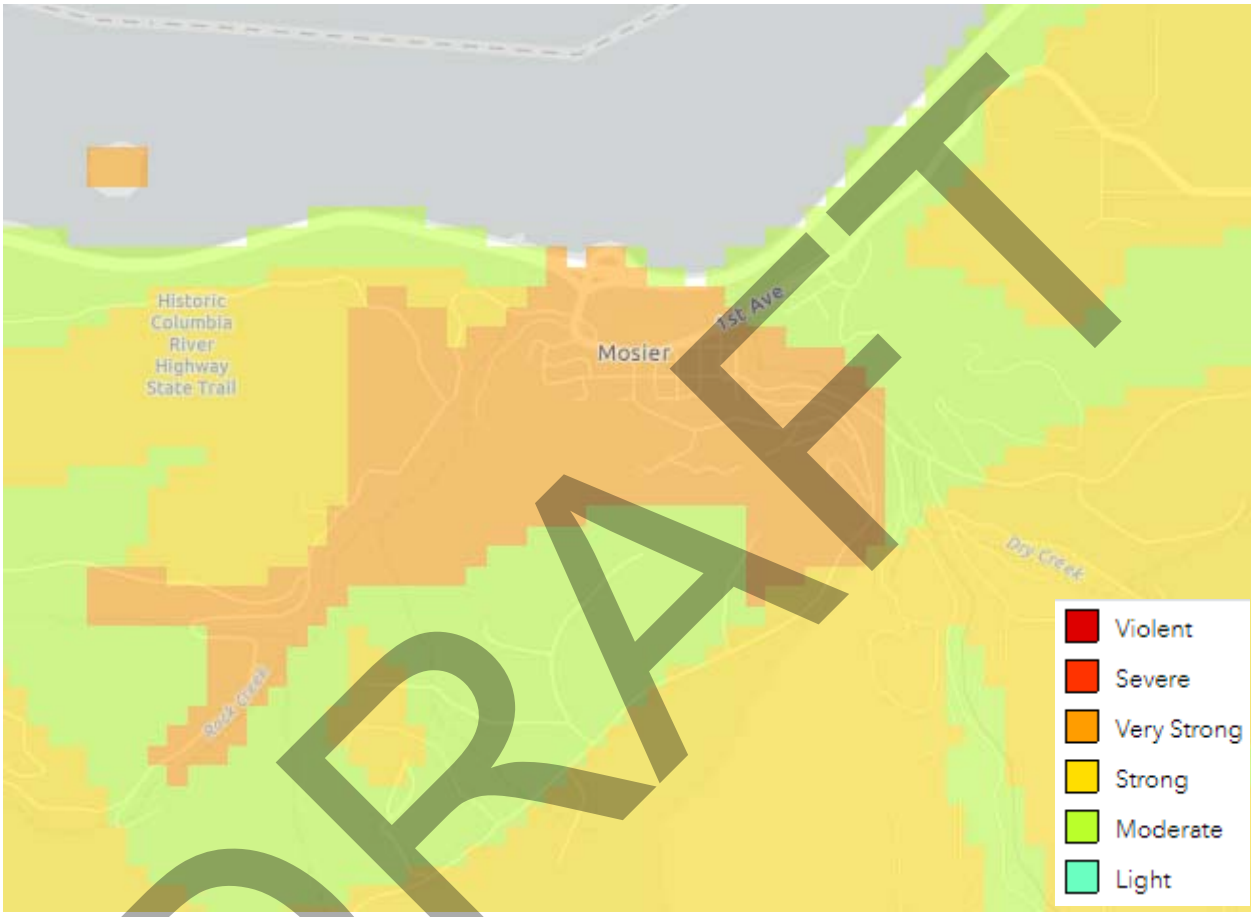
Earthquakes in Mosier are most likely to originate from two sources: 1) the Cascadia Subduction Zone and 2) Class A Quaternary faults that could impact Mosier[36].

Cascadia Subduction Zone

Figure 2: Cascadia Subduction Zone Expected Shaking



Source: Oregon HazVu: Statewide Geohazards Viewer, Oregon Department of Geology and Mineral Industries, accessed 8/7/2024

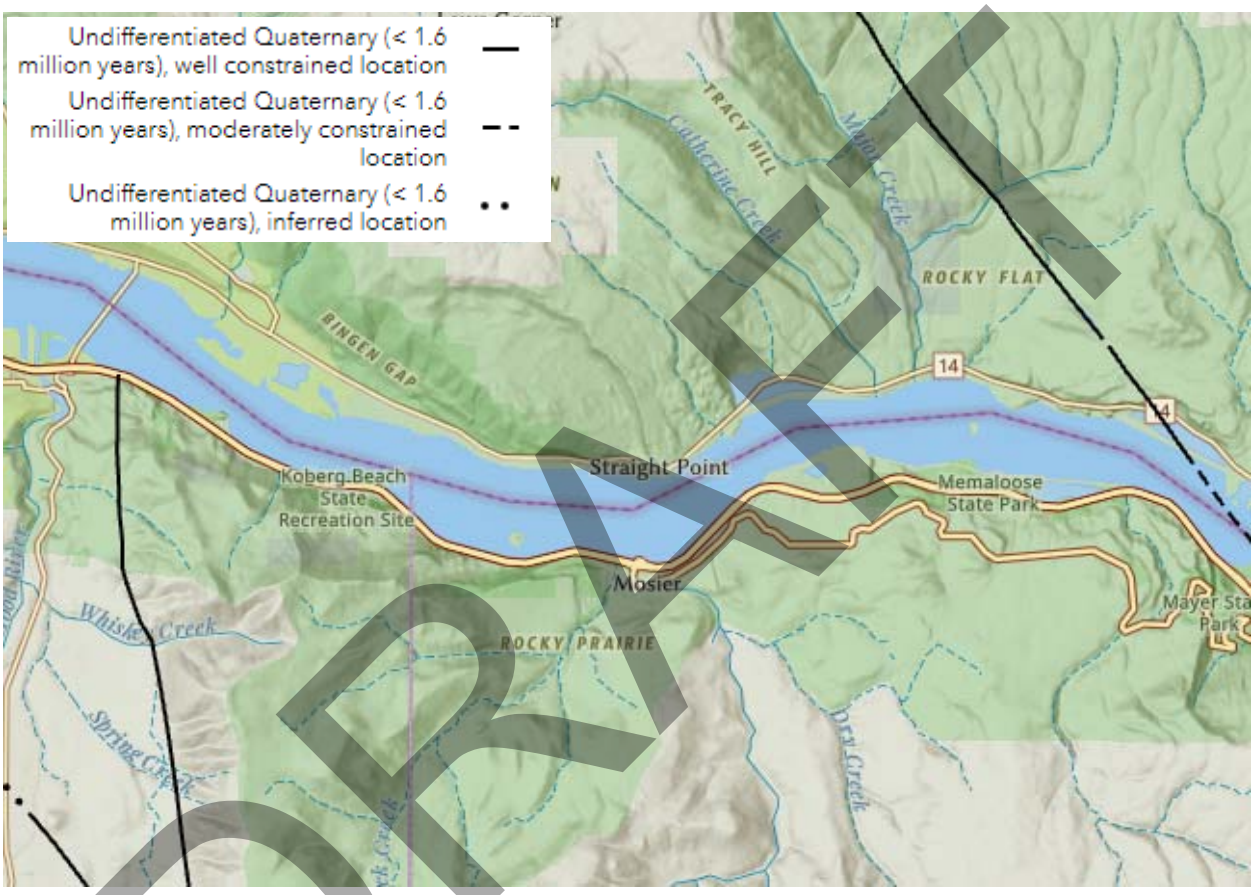
Class A Quaternary Faults

Faults that could impact The Dalles have been identified by the U.S. Geological Survey. Class A faults are those that geologic evidence demonstrates the existence of a Quaternary fault of tectonic origin, whether the fault is exposed for mapping or inferred from liquefaction or other deformational features[37]. Quaternary faults are those that have been recognized at the surface and which have moved

[36] Wasco County. (2019). *Wasco County Multi-Juristicion Natural Hazard Mitigation Plan*.
[37] U.S. Geologic Survey. n.d. *Faults*. Retrieved April 1, 2021 from Earthquake Hazards: usgs.gov/programs/earthquake-hazards/faults

in the past 1,600,000 years, the duration of the Quaternary epoch.[38] A fault is designated as well constrained if an identifiable piercing line or feature (typically at or near the surface) is well documented or can be independently verified from mapping or logs. If an offset feature of the fault is in the subsurface, data is presented and correlations appear reliable; offset features of the fault are described or documented[39].

Figure 3: Quaternary faults located near Mosier



Source: U.S. Geologic Survey. n.d. *Faults*. Retrieved August, 7 2024 from Earthquake Hazards: usgs.gov/programs/earthquake-hazards/faults

Earthquake Probability

There's no "recent" history of earthquakes in Wasco County or Mosier.

[38] U.S. Geological Survey. (2009, October 27). *FAQs – Quaternary Faults*. Retreived April 1, 2021, from Earthquake Hazards Program: web.archive.org/web/20111127121851/http://earthquake.usgs.gov/learn/faq/?faqID=267
[39] Dawson, T.E., & Weldon, R.J. (2017). *Uniform California Earthquake Rupture Forecast, Version 3 (USERF3) Appendix B – Geological Slip-Rate Data and Geologic*. Menlo Park, CA: USGS Southern California Earthquake Center.

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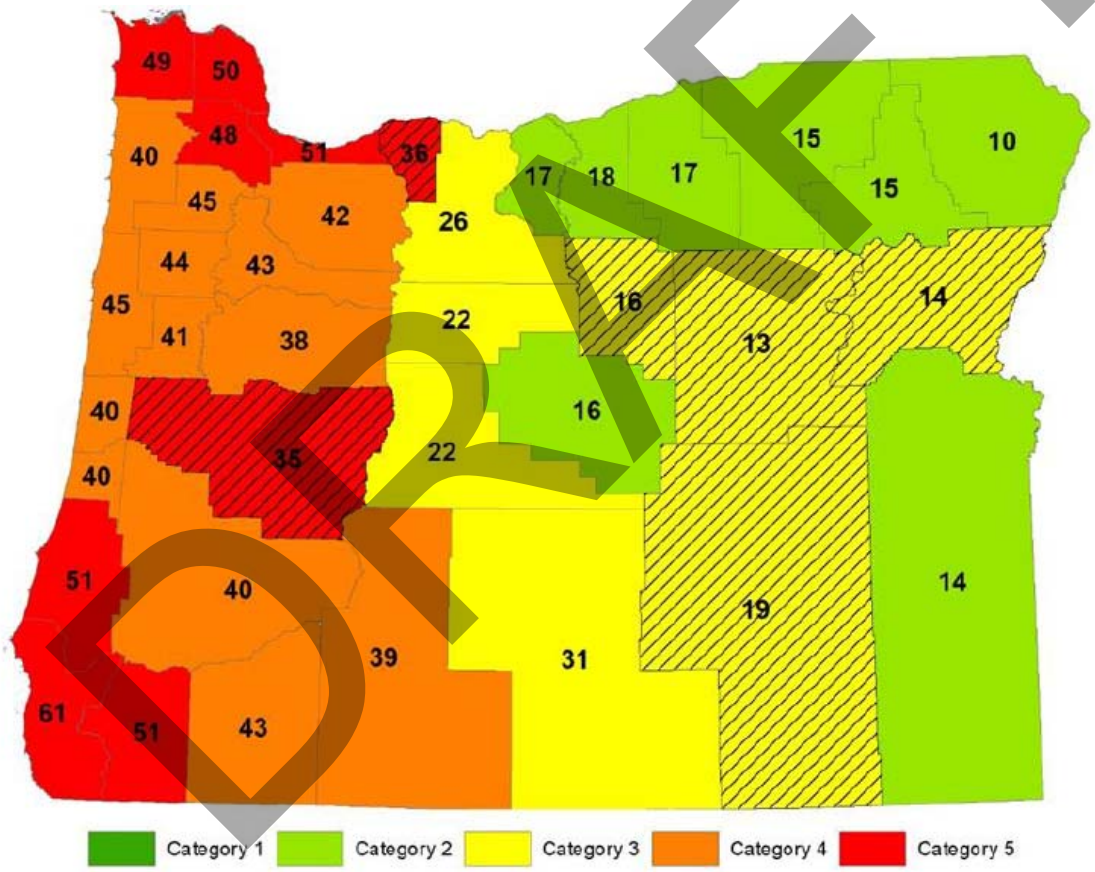
The 2020 State of Oregon NHMP included a new Earthquake probability ranking for Oregon counties that is based on the average probability of experiencing damaging shaking during the next 100 years.

- Category 1 100-year probability < 10-percent
- Category 2 100-year probability 10-20-percent
- Category 3 100-year probability 21-31-percent
- Category 4 100-year probability 32-45-percent
- Category 5 100-year probability > 45-percent

Figure 4: 2020 Oregon Earthquake Probability Ranking Based on Mean County Value of the Probability of Damaging Shaking and Presence of Newly Discovered Faults



Source: 2020 Oregon NHMP

Note: Counties with hatching had their probability category increased one step due to newly discovered faults.

Earthquake Vulnerability

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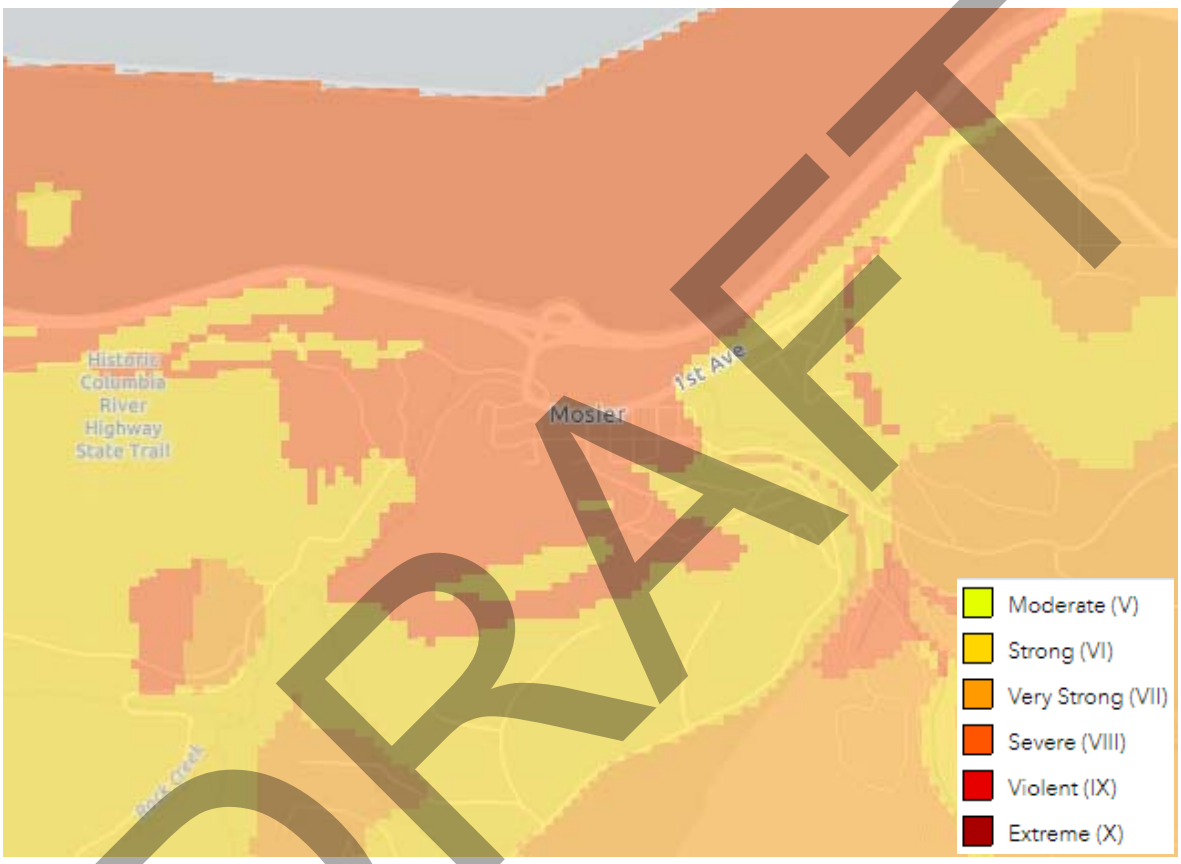
However, the County's NHMP indicated that, "It is difficult to identify a part of the community that is not vulnerable to an earthquake. People, buildings, emergency services, hospitals, transportation lifelines, and water and wastewater utilities are susceptible to the effects of an earthquake."

Though the 2020 DOGAMI probability ranking shows Wasco County in Category 2, the Oregon HazVu database reveals a vulnerable topography if an earthquake were to occur

Figure 5: Mosier Earthquake Hazard Map



Source: Oregon HazVu: Statewide Geohazards Viewer, Oregon Department of Geology and Mineral Industries, accessed 8/7/2024

Earthquake Resilience

The U.S. Environmental Protection Agency requires all water utilities to conduct a risk and resilience assessment for a number of scenarios including earthquake. The assessment is used to develop an emergency response plan and to inform capital improvement plans. The assessment is required to be updated and certified every five years.

Earthquake Risk

With respect to natural hazards, risk can be expressed as the probability of a hazard occurring combined with the potential for property damage and loss of life. Based the proximity of local faults, vulnerable

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topography in The Dalles, Wasco County's social vulnerability index, and the high value of properties within City Limits, Mosier is considered to be at low risk from earthquake by the City, and Wasco County.

Flood

The Federal Emergency Management Agency defines a flood as a general and temporary condition of partial or complete inundation of 2 or more acres of normally dry land area or of 2 or more properties[40].

According to the 2018 DOGAMI Natural Hazard Risk Report for Wasco County, Oregon, flooding is the most common natural hazard in the county and accounts for a significant amount of damage to persons and property[41].

In the February 1996 flooding there were a surprising number of properties that were impacted that were not near a waterway. Instead these properties were in poorly drained areas where ponding and runoff patterns caused basements to flood and other types of water damage. Not all storm water flooding is due to development. Natural soil conditions and geological features often determine drainage patterns[42].

Floods caused by wildfire damage to all or part of affected watersheds. The effect of wildfire on the hydrological processes within an area can be substantial. Reduced vegetation cover can lead to significant flooding, soil erosion and sedimentation, pollution from chemicals that are no longer filtered by riparian vegetation, and changes in water temperature. All of these effects can have harmful impacts on aquatic life and also affect humans who depend on watersheds for municipal water supplies[43].

Fire-induced water repellency and the loss of protective vegetative cover play a major role in the post-fire runoff and erosion. In many cases, water repellency does not substantially affect infiltration beyond the first year[44]. However, revegetation takes time even with restoration intervention, such as sowing grass seed or planting trees.

Flood Probability

The Oregon Climate Change Research Institute issued a report specific to Wasco County in August 2018. They modeled high and low greenhouse gas emissions scenarios. There predictions for changes in extreme heat and drought probabilities by the 2050s based on their higher emissions scenario:

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[40] Federal Emergency Management Agency. (2020, July 18). *FEMA Flood Insurance Terminology Index*. Retrieved November 18, 2020, from Federal Emergency Management Agency: fema.gov/flood-insurance/terminology-index
[41] Wasco County. (2019). *Wasco County Multi-Jurisdiction Natural Hazard Mitigation Plan*. Wasco County.
[42] Wasco County. (2019). *Wasco County Multi-Jurisdiction Natural Hazard Mitigation Plan*. Wasco County.
[43] Weston, D. (2010). Effects of Wildfire on Soil and Water. Retreived from Oregon Explorer Natural Resource Digital Library: oregonexplorer.info/content/effects-wildfire-soil-and-water?topic=95&ptopic=62
[44] Rocky Mountain Research Station. (2005 (revised 2008)). *Wildland Fire in Ecosystems: effects of fire on soils and water. Gen. Tech. Rep. RMRS-GTR-42-vol. 4.* Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

The intensity of extreme precipitation events is expected to increase slightly in the future as the atmosphere warms and is able to hold more water vapor.

- In Wasco County, the magnitude of precipitation on the wettest day and wettest consecutive five days per year is expected to increase on average about 17-percent and 12-percent, respectively, by the 2050s under the higher emissions scenario compared to the historical baseline.
- In Wasco County, the frequency of days with at least 0.75-inches of precipitation and the frequency of days exceeding a threshold for landslide risk is not projected to change substantially.

River flood risk in Wasco County from the Columbia River is not expected to change substantially based on insignificant projected changes in non-regulated flood magnitudes on the Columbia River.

Mid to low elevation tributaries that are near freezing level in winter, receiving a mix of rain and snow, may experience an increase in winter flood risk due to warmer winter temperatures causing precipitation to fall more as rain and less as snow.[45]

Climate Change

According to the 2020 Oregon NHMP, it is very likely (>90%) that Oregon will experience an increase in the frequency of extreme precipitation events and extreme river flows (high confidence). Furthermore, the likelihood of increases in extreme precipitation events is greater east of Cascades than west. Extreme river flow, while affected by extreme precipitation, is also driven by other conditions: soil moisture, water table, snowmelt, river network morphology, and local variability in precipitation and snowmelt. Increases in extreme river flows leading to damaging floods will be less likely where storm water management (urban) and/or reservoir operations (river) have capacity to offset increases in flood peak.[46]

Figure 6: Mosier Flood Hazard Map

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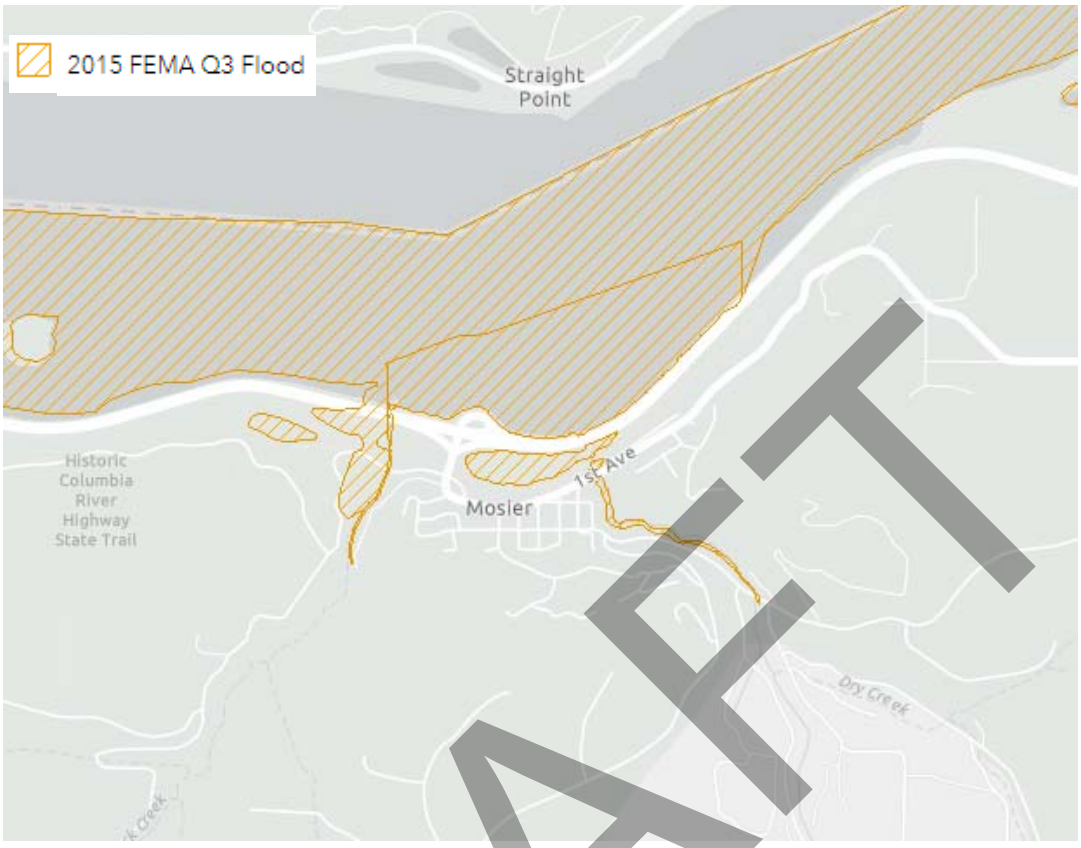
[45] The Oregon Climate Change Research Institute. (2018) *Future Climate Projections Wasco County*. Salem, OR: Oregon Department of Land Conservation and Development.
[46] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.



Source: Oregon HazVu: Statewide Geohazards Viewer, Oregon Department of Geology and Mineral Industries, accessed 8/8/2024

Table 13: Recent Flood History – City of Mosier

Year	Type of Flood	Description/Declaration
1996	Rain on snow	February 1996: In February 1996 widespread flooding in the Pacific Northwest resulted from heavy rain and warming on a substantial mid elevation snowpack. The Columbia River crested at 27.1 ft. on February 9. This flood occurred because of the confluence of several factors. The winter of 1995/96 was extremely rainy. Prior to the flooding period, the region experienced a cold snap with low elevation freezing, ice, and snow. The February 1996 flood event was later determined to be a greater than 100 year event and flood levels experienced at that time have become the local high water marker for water system flood resilience.

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Flood Resilience

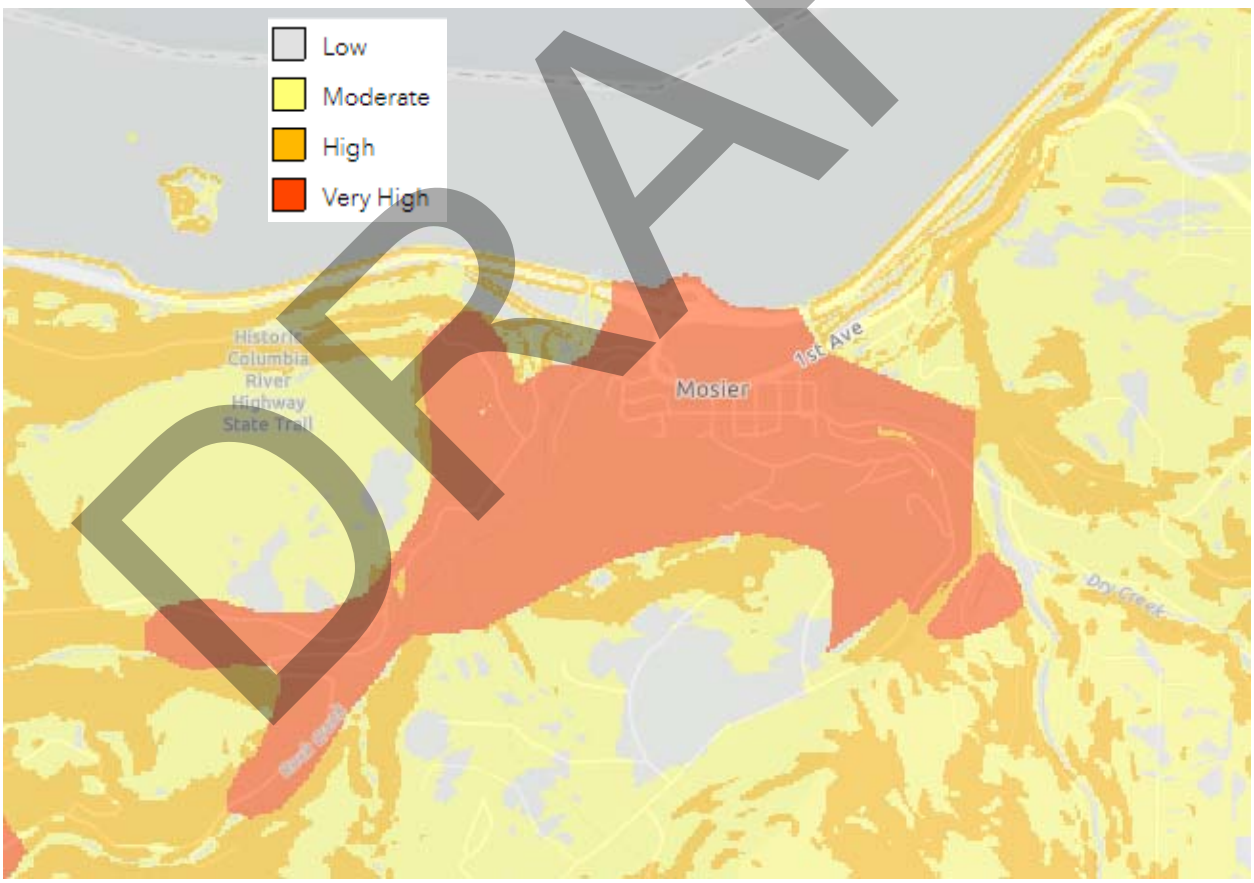
The Federal Emergency Management Agency (FEMA) has mapped most flood-prone streams in Oregon. The maps depict the 1% flood (100-year) upon which the National Flood Insurance Program is based. Mosier Flood Insurance Rate Maps (FIRM) were in the process of update during the writing of this plan with an expected publish date of December 2024.

Flood Risk

With respect to natural hazards, risk can be expressed as the probability of a hazard occurring combined with the potential for property damage and loss of life. Based the proximity of the Columbia River and Mosier & Rock Creek, vulnerable streamside topography in Mosier, Wasco County's social vulnerability ratings, and the high value of properties that have experienced historical floods, Mosier is considered to be at low risk from floods by Wasco County and by the City.

Landslide

Figure 7: Mosier Landslide Hazard Map



Source: Oregon HazVu: Statewide Geohazards Viewer, Oregon Department of Geology and Mineral Industries, accessed 8/8/2024

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Landslide Risk

With respect to natural hazards, risk can be expressed as the probability of a hazard occurring combined with the potential for property damage and loss of life. Based several geohazard assessments conducted in Mosier and the high value of properties that have experienced impacts from landslide activity weighed against active landslide mitigation and monitoring, Mosier is considered to be at low risk from landslides by Wasco County and the City.

Extreme Heat

Extreme Heat Characteristics

Heat domes have recently emerged as a deadly extreme weather event in the Pacific Northwest. A heat dome occurs when a persistent region of high-pressure traps heat over a particular area, and it can linger for days to weeks and causing extremely high temperatures. Heat domes are typically linked to the behavior of the jet stream, which is a band of fast-moving winds high in the atmosphere that move in meandering wavelike patterns. When the jet stream meanders north, it moves slower and can sink, which lowers humidity. This allows the sun to create progressively hotter conditions on the ground. Air descending down mountains can also contribute to heat domes, as it warms even more.[47]

Extreme heat can affect commerce, agriculture, fisheries, and overall quality of life.

Extreme Heat Probability

The State of Oregon 2020 NHMP states that the probability of future events is *extremely likely* (>95%) and that the frequency and severity of extreme heat events will increase over the next several decades (*very high confidence*).

Climate Change

The Oregon Climate Change Research Institute issued a report specific to Wasco County in August 2018. They modeled high and low greenhouse gas emissions scenarios. There predictions for changes in extreme heat and drought probabilities by the 2050s based on their higher emissions scenario, the frequency and intensity of extreme heat events is expected to increase due to warming temperatures. The frequency of temperatures at or above 90°F is projected to increase on average by 28 days. The hottest day of the year (intensity) is projected to increase by 8°F. [48]

Table 14: Recent Extreme Heat History – City of Mosier (Oregon NHMP Region 5)

[47] National Oceanic and Atmospheric Administration. National Environmental Satellite Data and Information Service. *Extreme Heat and Severe Weather Plague Parts of North America*. June 30, 2023. Accessed 3/28/2024

[48] The Oregon Climate Change Research Institute. (2018) *Future Climate Projections Wasco County*. Salem, OR: Oregon Department of Land Conservation and Development.

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Year	ENSO Condition[49]	Description/Declaration
2006	La Niña moving to neutral in AMJ rapidly warming to El Niño by JAS[50]	June 24–26, 2006: A broad upper ridge of unusually high height coupled with a thermally induced surface trough of low pressure lingered over the Pacific Northwest for several days. This pattern resulted in persistent offshore flow, and therefore many days of record-smashing high temperatures. Many cities in Oregon saw record-breaking daily high temperatures for multiple days in a row. July 20-24, 2006: An unusually strong ridge of high pressure brought several days of record breaking hot and humid weather to NW Oregon. Many cities in Oregon saw record-breaking daily high temperatures for multiple days in a row. Many daily maximums were between 10 and 20 degrees above normal. A few sites reported record high minimum temperatures during this very humid event; a couple broke all-time record high minimums as well. 4500 homes lost power during this event. In north central and eastern Oregon, daily maximum temperatures between 100 and 113 degrees were observed at lower elevations, with temperatures 90 to 100 degrees at elevations up to 4000 feet. Several people were treated for heat related illness.[51]
2008	La Niña moving to neutral in AMJ through Dec.[52]	June 28–30, 2008: An upper level ridge and thermal trough across the Pacific Northwest produced temperatures above 100 degrees for two consecutive days breaking records in many locations. Two people died of heat-related illness. August 15–17, 2008: Excessive Heat Event: An upper level ridge and dry air brought excessive heat into eastern Oregon. Many locations experienced multiple days of at least 100-degree temperatures.[53]

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[49] Climate Prediction Center/National Center for Environmental Prediction. (2024, April 8). *ENSO: Recent Evolution, Current Status and Predictions.* Retrieved from Climate Prediction Center: cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf. Accessed 4/11/2024.

[50] National Oceanic and Atmospheric Administration. (2005). *Annual 2005 El Nino/Southern Oscillation*. Retrieved from National Centers for Environmental Information: ncei.noaa.gov/access/monitoring/monthly-report/enso/200513. Accessed 4/11/2024.

[51] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.

[52] National Oceanic and Atmospheric Administration. (2005). *Annual 2005 El Nino/Southern Oscillation*. Retrieved from National Centers for Environmental Information: ncei.noaa.gov/access/monitoring/monthly-report/enso/200513. Accessed 4/11/2024.

[53] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.

Year	ENSO Condition[49]	Description/Declaration
2010	El Niño JFM moving to neutral in AMJ to La Niña JAS[54]	July 25–26, 2010: Excessive Heat Event: Temperatures topped 100 degrees for two successive days in Hermiston, Pendleton, 5 miles northeast of Pendleton, Ione, Echo, Arlington, and Umatilla.
2011	La Niña, the warmest among all Januaries when La Niña was present moving to neutral in the spring, ending in La Niña OND[55]	August 1, 2011: A dry weak westerly flow aloft under a broad upper level high pressure system combined with a surface thermal trough to bring several days of temperatures in the 90s.
2021	La Niña except MJJ-JJA	In the summer of 2021, the Northwest experienced record-breaking high temperatures from late June through mid-July due to a heat dome.[56] More than 80 people died in Multnomah County and one heat related death occurred in The Dalles. The extreme heat caused significant crop losses for wheat and cherry growers locally.[57] Hundreds of heat related emergency room visits were noted throughout the Pacific Northwest. In addition to health impacts, there were impacts to infrastructure such as melted electric train power lines in Portland and buckling due to softened asphalt in Washington.[58] It was one of the most extreme weather events recorded globally in 2021. [59] An event such as the Pacific Northwest 2021 heatwave is still rare or extremely rare in today's climate, yet would be virtually impossible without human-caused climate change. As warming continues, it will become a lot less rare.[60]

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[54] National Oceanic and Atmospheric Administration. (2011, August 17). 2010 Climate Events Connected to El Nino or La Nina. Retreived from Climate.gov: climate.gov/news-features/features/2010-climate-events-connected-el-niño-or-la-niña

[55] National Oceanic and Atmospheric Administration. (2012, January). *Annual 2011 Global Climate Report*. Retrieved from National Centers for Environmental Information: ncei.noaa.gov/access/monitoring/monthly-report/global/201113. Accessed 4/15/2024.

[56] U.S. Department of Agriculture. Climate Hubs. 2021 Northwest Heat Dome: Causes, Impacts and Future Outlook. Not dated. Accessed 3/28/2024.

[57] Reuters. 'Wither away and die:' U.S. Pacific Northwest heat wave bakes wheat, fruit crops. July 12, 2021. Accessed 3/28/2024

[58] National Public Radio. PHOTOS: The Record-Breaking Heat Wave That's Scorching The Pacific Northwest. June 29, 2022. Accessed 3/28/2024.

[59] U.S. Department of Agriculture. Climate Hubs. 2021 Northwest Heat Dome: Causes, Impacts and Future Outlook. Not dated. Accessed 3/28/2024.

[60] Sjoukje Y Philip, et al. (2021). *Rapid attribution analysis of the extraordinary heatwave on the Pacific Coast of the US and Canada June 2021*. London, UK. World Weather Attribution.

Year	ENSO Condition[49]	Description/Declaration
		EO-21-27 DETERMINATION OF STATE OF EMERGENCY IN THE STATE OF OREGON DUE TO EXCESSIVE HIGH TEMPERATURES CAUSING A THREAT TO LIFE, HEALTH, AND INFRASTRUCTURE. August 10, 2021; Expired August 20, 2021.
2022	La Niña all year	**EO-22-13** DETERMINATION OF STATE OF EMERGENCY IN COLUMBIA, CLACKAMAS, CROOK, CURRY, DESCHUTES, DOUGLAS, GILLIAM, GRANT, HOOD RIVER, JACKSON, JEFFERSON, JOSEPHINE, KLAMATH, MARION, MORROW, MULTNOMAH, POLK, SHERMAN, UMATILLA, UNION, WALLOWA, WASCO, WASHINGTON, WHEELER, AND YAMHILL COUNTIES DUE TO EXCESSIVE HIGH TEMPERATURES CAUSING A THREAT TO LIFE, HEALTH, AND INFRASTRUCTURE. July 25, 2022; Expired July 31, 2022.

Extreme Heat Vulnerability

Vulnerability is defined as the combination of sensitivity to extreme heat and level of adaptive capacity in response to extreme heat.

Adaptive capacity to extreme heat is defined here as percent of homes with air conditioning; however, the authors of the

Oregon Natural Hazard Mitigation Plan note that this measure has its flaws. First, it assumes that people who have access to cooling systems are able to afford to use them. Second, the data only includes single-family homes, which omits populations living in multi-family housing or who are house-less.

Because extreme heat is common in Region 5 ("high" probability), many people are accustomed or prepared in terms of air conditioning when an extreme heat event occurs ("high" adaptive capacity).[61] A Northwest Energy Efficiency Alliance (NEEA) Residential Building Stock Assessment Single Family Homes 2016-12, estimated that 91% of Wasco County single-family homes have air-conditioning.[62] The NEEA follow up study did not assess regions in a similar manner. But did note that by 2022 there has been an increase in the number of homes in Oregon that have cooling systems in at least one room, with the largest increase in ductless mini-split heat pumps.[63] After nearly 100 Oregonians died in the 2021 heat dome event, the 2022 Legislature passed a bill giving tenants the right to have portable air conditioning units in rental properties. The new law added criteria that includes at least one air-conditioned room in

[61] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.
[62] Northwest Energy Efficiency Alliance. (2019). *Residential Build Stock Assessment Single Family Homes 2016-17*. Portland, OR.: Northwest Energy Efficiency Alliance.
[63] Northwest Energy Efficiency Alliance. (2024). 2022 *Residential Build Stock Assessment*. Portland, OR.: Northwest Energy Efficiency Alliance.

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the definition of habitability of rental properties. Owners of new or renovated rental properties are require to install cooling systems after April 2024.[64]

Mosier's vulnerability is markedly intensified by its reliance on Pacific Power, a private utility with unilateral authority over preemptive power shut-offs and grid depowering, and without regulatory oversight. This contrasts with the rest of Wasco County, where publicly regulated utilities such as North Wasco County PUD and Wasco Electric, which utilize hydro-electric resources, provide a more reliable and resilient power infrastructure. Mosier's critical infrastructure, including water systems, fire response operations, and residential air conditioning, is heavily dependent on a stable power supply. The absence of backup generators, power alternatives, and community cooling or heating shelters exacerbates the risk during extreme weather and fire events. Power disruptions not only impair emergency response capabilities but also leave the community vulnerable to severe heat and cold, underscoring a significant gap in resilience. Addressing these vulnerabilities through targeted funding for backup power systems, community shelters, and infrastructure upgrades would enhance Mosier's ability to manage and recover from extreme events, aligning with broader mitigation objectives and ensuring more equitable support across Wasco County. Sustained heat can also damage roads, bridges and railroad tracks, and the increased demand for electricity from air-conditioning use can result in power outages.[65] The increased demand for irrigation and cooling water can strain water utility infrastructure.

The medium relative vulnerability of Wasco County to extreme heat was determined by the State of Oregon by adding the rankings for sensitivity (social vulnerability) and adaptive capacity (availability of air conditioning).

Extreme Heat Resilience

"Water use during extreme heat events in Mosier can activate curtailment measures as outlined in the City's Municipal Water Curtailment Element, a key component of Mosier's Water Management and Conservation Plan. Situated 17 miles from The Dalles, Mosier is classified as a food desert, where limited access to essential resources and transportation further exacerbates the community's vulnerability.

Extreme heat also results in power shut-offs, further compounding these challenges by disrupting access to cooling systems and critical services. In response, Mosier is actively raising funds to complete a joint-use facility—a battery backup, net-zero building that will serve as a fire station, city hall, community cooling and heating shelter, and regional training facility. This initiative is critical to enhancing resilience and ensuring the community can withstand extreme weather events and other emergencies."

Extreme Heat Risk

[64] Oregon State Legislature. (2022, March 23). 2022 Regular Session. Retrieved from Oregon Legislative Information: olis.oregonlegislature.gov/liz/2022R1/Measures/Overview/SB1536
[65] Oregon Capital Chronicle. Oregon Gov. Brown declares emergency as heatwave continues. Julye 27, 2022. Accessed 3/29/2024.

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With respect to natural hazards, risk can be expressed as the probability of a hazard occurring combined with the potential for property damage and loss of life. Based on the combination of the probability of extreme heat events, sensitivity to extreme heat, and level of adaptive capacity in response to extreme heat and Wasco County's social vulnerability index, Mosier is considered to be at high risk from extreme heat by Wasco County and the City.

Severe Weather- Storms (Extreme Precipitation)

Storm Characteristics

Summer storms in The Dalles are generally thunderstorms. The National Weather Service (NWS) defines a severe thunderstorm as any storm that produces one or more of the following elements:

- A tornado.
- Damaging winds or speeds of 58 mph (50 knots) or greater.
- Hail 1 inch in diameter or larger.

Though thunderstorms of such severity are rare in Mosier, heavy rainfall during summer thunderstorms have overwhelmed the capacity of the storm water conveyance system which has caused localized flooding and wastewater treatment plant violations.

Though damaging winds greater than 58 mph are rare in Mosier, strong winds and moisture originating from the Pacific Ocean are funneled into the Columbia River Gorge, with a potential for gusts over 100 mph, periodically impact all of Wasco County. Severe storms can damage property and disrupt utilities.

Winter storms may be ice or snow events that disrupt normal operations.

Ice storms or freezing rain (black ice) occur when rain falls from warm moist upper layers of the atmosphere into a cold, dry layer near the ground. The rain freezes on contact with the cold ground and accumulates on exposed surfaces. In addition to causing ice to accumulate on roadways, ice can accumulate on tree branches and power lines. This can cause power outages and can obstruct already icy transportation routes.

Snow is an ice particle formed by sublimation of vapor in the atmosphere as well as a collection of loosely bonded ice crystals deposited from the atmosphere. Snowfall results in an accumulation of packed ice crystals, and the condition of the snowpack determines a variety of qualities, such as color, temperature, and water equivalent. As weather conditions change, the snowpack can change as well, and this affects the characteristics of the snow.[66]

[66] National Snow and Ice Data Center, (n.d.). *What is snow?* nsidc.org/learn/parts-cryosphere/snow. Accessed 5/8/2024.

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Types of snowfall[67]

- A blizzard is a violent winter storm, lasting at least three hours, which combines subfreezing temperatures and very strong wind laden with blowing snow that reduces visibility to less than 0.40 kilometers (0.25 miles).
- A snowstorm features large amounts of snowfall.
- A snow flurry is snow that falls for short durations and with varying intensity; flurries usually produce little accumulation.
- A snow squall is a brief, but intense snowfall that greatly reduces visibility and which is often accompanied by strong winds.
- A snowburst is a very intense shower of snow, often of short duration, that greatly restricts visibility and produces periods of rapid snow accumulation.
- Snowpack refers to the total snow and ice on the ground, including both new snow and the previous snow and ice which have not melted.

Climate Change

The Oregon Climate Change Research Institute issued a report specific to Wasco County in August 2018. They modeled high and low greenhouse gas emissions scenarios. There predictions for changes in extreme precipitation probabilities by the 2050s based on their higher emissions scenario:

- The intensity of extreme precipitation events is expected to increase slightly in the future as the atmosphere warms and is able to hold more water vapor.
- In Wasco County, the magnitude of precipitation on the wettest day and the wettest consecutive five days per year is projected to increase on average by about 17-percent and 12-percent, respectively.
- The frequency of days with at least 0.75-inches of precipitation and the frequency of days exceeding a threshold for landslide risk is not projected to change substantially.

Storm Probability

Extreme precipitation may occur at any time of year, and the City does not have a storm water system.

Table 15: Recent Winter Storm History – City of Mosier

[67] National Snow and Ice Data Center, (n.d.). *Crysophere Glossary.* nsidc.org/learn/cryosphere-glossary. Accessed 5/8/2024.

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Year	ENSO Condition[68]	Description/Declaration
Dec. 28, 2023 – Jan. 9, 2004	Neutral[69]	FEMA 1510 DR - Oregon. Gilliam, Hood River, Morrow, Sherman, Umatilla, and Wasco Counties declared in Region 5. The most significant winter storm in several years brought snowfall to most of Oregon. ODOT closed I-84 through the Columbia Gorge twice, for almost 70 hours total. Freight trucks and passenger cars had to detour over Mount Hood where, ironically, road conditions were better than they were in downtown Portland where all vehicles were required to chain up. A frigid arctic air mass, heavy snow, sleet and freezing rain, strong east winds and blizzard conditions through and near the Columbia River Gorge snarled travel, forced school and business closures, and resulted in widespread power outages and properly damage in Northwestern Oregon. Blizzard conditions in the Columbia River Gorge: • closed I-84 between Troutdale and Hood River • closed Washington State Route 14 between Washougal, and White Salmon, Washington • Halted east-west travel through the Gorge and stranded hundreds of trucks at both ends of the Gorge[70]
Dec. 2007	Strong La Niña[71]	**EO-07-24** DETERMINATION OF STATE OF EMERGENCY IN OREGON DUE TO A SEVERE WINTER STORM THAT INCLUDES HIGH WINDS, FLOODING AND LANDSLIDES.

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[68] Climate Prediction Center/National Center for Environmental Prediction. (2024, April 8). *ENSO: Recent Evolution, Current Status and Predictions.* Retrieved from Climate Prediction Center: cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf. Accessed 4/11/2024.

[69] National Oceanic and Atmospheric Administration. (2005). *Annual 2004 El Nino/Southern Oscillation*. Retrieved from National Centers for Environmental Information: ncei.noaa.gov/access/monitoring/monthly-report/enso/200413. Accessed 5/8/2024.

[70] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.

[71] National Oceanic and Atmospheric Administration. (2008). *Annual 2007 El Nino/Southern Oscillation*. Retrieved from National Centers for Environmental Information: ncei.noaa.gov/access/monitoring/monthly-report/enso/200713. Accessed 5/8/2024.

Year	ENSO Condition[68]	Description/Declaration
Jan. 2008	La Niña moving to neutral in AMJ through Dec.[72]	Hood River, Wasco, Sherman, Gilliam, Morrow, and Umatilla Counties: Heavy freezing rain from Bonneville westward through Columbia Gorge causing accidents on I-84; one fatality[73]
Nov. 29-30, 2010		Hood River and Wasco Counties: 4-5 inches of snow reported in Cascade Locks and Hood River; 1/2 inch of ice in Corbett[74]
Jan. 12-18, 2012	La Niña DJF	Hood River and Wasco Counties: 4.5 inches of new snow reported in Hood River; I-84 closed due to ice and snow east of Troutdale.[75]
Mar. 2, 2014	Neutral JFM, FMA	Hood River County, Upper Hood River Valley, Central Columbia River Gorge: East winds brought very cold air from east of the Cascades through the Columbia River Gorge as a moist front pushed in from the Pacific. The combination of the cold air mass and frontal precipitation resulted in snow and ice for the Gorge. There were numerous reports of snow and ice in the Central Columbia River Gorge with generally 6 to 8 inches of snow. There was a quarter of an inch of ice on top of the snow in Hood River and White Salmon, and as much as 0.4 to 0.5 inch of ice in Parkdale where the cold air held on the longest.[76]
Nov. 13, 2014	El Niño SON, OND	Hood River County, Central Columbia River Gorge: An early cold snap hit the Pacific Northwest before moist Pacific air moved in and resulted in one of the earliest snow, sleet, and freezing rain events in northwestern Oregon. Sleet and freezing rain in particular created hazardous commutes for tens of thousands in the western and eastern suburbs of Portland. Snow accumulations were primarily restricted to the Cascade valleys and the central Columbia River Gorge. Spotters reported around 6 to 8 inches of snow for the Cascade Foothills followed by a quarter of an inch of ice. A combination of heavy snow and ice resulted in slick driving conditions

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[72] National Oceanic and Atmospheric Administration. (2005). *Annual 2005 El Nino/Southern Oscillation*. Retrieved from National Centers for Environmental Information: ncei.noaa.gov/access/monitoring/monthly-report/enso/200513. Accessed 4/11/2024.
[73] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.
[74] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.
[75] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.
[76] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.

Year	ENSO Condition[68]	Description/Declaration
		for the Western Columbia River Gorge. Areas in the gorge measured a quarter.[77]
Dec. 19, 2016	La Niña NDJ	Hood River County, Upper Hood River Valley, Central Columbia River Gorge: A warmer low pressure system moved into to Northwest Oregon, bringing high winds along the North and Central Oregon Coast. Cold east winds through the Columbia River Gorge continued for the first part of the event, leading to light accumulations of snow and sleet in portions of far northwest Oregon and higher accumulations in the Columbia River Gorge and Hood River Valley. Estimate the Columbia Gorge had around 0.2 to 0.5 inch of ice accumulation as temperatures in the lower 30s with reports of snow and freezing rain in Hood River. A frontal system brought high winds to the Central Oregon Coast, heavy snow to the Cascades and a mix of ice and snow in the Columbia River Gorge and Hood River Valley. SNOTELs and other stations reported a range of 12 to 25 inches of snow. Some specific reports include 25 inches at Mt Hood Meadows, 22 inches at Timberline, 14 inches at Government Camp and 12 inches at McKenzie Snotel.[78]
Jan. 7 – Mar., 2017	Neutral DJF, JFM, FMA	• Hood River County, Upper Hood River Valley, Central Columbia River Gorge: FEMA DR-4328 Columbia, Hood River, Deschutes and Josephine Counties declared. A broad shortwave trough brought multiple rounds of precipitation, including a wintry mix of snow and ice for many locations across Northwest Oregon. Strong easterly pressure gradients generated high winds through the Columbia River Gorge as well on January 8. General snowfall totals of 2-4 inches were reported, with the greatest total being 4.5 inches. Major ice accumulations occurred after the snow, with several locations reporting 0.50-1.00. The combination of snow and ice resulted in significant power outages and closures across the area.[79] • **EO-17-06** DETERMINATION OF STATE OF EMERGENCY IN Clackamas, Clatsop, Columbia, Coos, Curry, Douglas, Gilliam,

[77] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.
[78] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.
[79] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.

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Year	ENSO Condition[68]	Description/Declaration
		Grant, Harney, Hood River, Josephine, Lake, Lane, Marion, Multnomah, Tillamook, Wasco, and Washington Counties, due to a severe winter storm that includes high winds, flooding and landslides. Beginning Jan. 11, 2017 through March 2017. • Wasco, Sherman, Gilliam Counties: A strong Pacific storm system brought snow, sleet and freezing rain to many areas of the Interior Northwest February 7th through 9th. Winter storm produced a total snow accumulation of 5.25 inches with an ice accumulation of 0.25 inches on top of the snow. Occurred 5 miles SSW of Chenoweth in Wasco county.[80]
Feb. 22-26, 2019	El Niño DJF. JFM	Wasco, Sherman, Gilliam, Morrow, and Umatilla, Counties: Persistent troughing off the coast of the Pacific Northwest focused a stream of mid-level moisture over the Inland Northwest resulting in a long duration snow event as the plume drifted north and south several times between the 22nd and 27th of February.[81]
Feb. 11 & 13, 2021	La Niña DJF, JFM	**EO-21-02** DETERMINATION OF STATE OF EMERGENCY IN BENTON, CLACKAMAS, HOOD RIVER, LINN, MARION, MULTNOMAH, POLK, WASHINGTON, AND YAMHILL COUNTIES DUE TO A SEVERE WINTER STORM THAT INCLUDES HEAVY SNOW AND ICE ACCUMULATION, HIGH WINDS, FLOODING, AND LANDSLIDES (Text of executive order includes the Columbia Gorge). **EO-21-03** DECLARATION OF ABNORMAL DISRUPTION OF THE MARKET DUE TO WINTER STORMS.

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[80] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.
[81] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.

Year	ENSO Condition[68]	Description/Declaration
Jan. 18, 2024	El Niño DJF. JFM	The Governor issued a statewide emergency declaration due to a winter storm. "Thousands of people across the state have been impacted by the storm, including power outages, lack of transportation, and an array of safety concerns that come with severe weather," Governor Kotek said. "The state has been working with counties as they assess needs, including critical federal resources that can be unlocked by a statewide emergency. I declared a state of emergency in Lane County on Tuesday, and now we are heeding the call from additional counties to escalate."[82] During the state of emergency, I-84 was shut down between Troutdale and Hood River for almost a week.

Storm Vulnerability

The working group identified winter storm impacts specific to Mosier due to the high concentration of population and potential demand for emergency response services. Roadways blocked with snow and ice can hinder police, fire, and medical response. It is not uncommon for Mosier to be isolated from other communities for a few days or longer each winter when I-84 is closed due to ice or other severe winter weather.

Extended days of extremely low temperatures can cause damage to City infrastructure due to soil movement when temperatures are 20-degrees Fahrenheit or lower. When water turns into ice underground, it expands. This can make the ground move, causing frost heave. Frost heave lifts up the ground, as well as everything on top of it. Frost heave can be strong enough to move and damage roads, bridges, buildings and water mains. When frozen ground thaws, the ice in the ground melts. The ground sinks to fill the space left by the ice. The amount of ice and how quickly it melts can vary from place to place. Because different patches of ground may not thaw at the same rate, melting ice can make the surface uneven. Uneven thawing can make roads wavy and can break water mains that are often buried under roadways.[83]

Storm Resilience

Historically, Wasco County, the Oregon Department of Transportation and City of Mosier Transportation Division plan for winter weather deployments and share resources for most efficient response.

Storm Risk

[82] State of Oregon. (2024). Governor Kotek Declares Statewide Emergency Due to Severe Ice Storm. Salem, OR: State of Oregon Newsroom

[83] National Snow and Ice Data Center, (n.d.). *All About Frozen Ground: How Does Frozen Ground Affect Land?* nsidc.org/cryosphere/frozenground/how_fg_affects_land.html. Accessed 11/25/2020.

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With respect to natural hazards, risk can be expressed as the probability of a hazard occurring combined with the potential for property damage and loss of life. Based the history of storm declarations, Wasco County's social vulnerability ratings, and the potential for storms to impact infrastructure and the local economy, Mosier is considered to be at high risk from storms by Wasco County and the City.

Volcano

Volcano Probability

Mount Adams is considered to be an active volcano. It was designated as a high threat volcano by the U.S. Geological Survey (USGS) in its 2018 Update to National Volcanic Threat Assessment. The risk of eruption was ranked 34 of 161 volcanoes assessed in the Cascade Range[84].

Mount Adams is located about 35 miles northwest of Mosier. The prevailing winds in the area are out of the West so ash fall is not expected to severely impact the watershed under normal weather conditions. The impact of an eruption is expected to be similar to impacts experienced during the 1980 eruption of Mount St. Helens.

Mount Hood is an active volcano. It was designated as a very high threat volcano by the U.S. Geological Survey (USGS) in its 2018 Update to National Volcanic Threat Assessment because of how it erupts and the communities within its reach. The risk of eruption was ranked 6 of 161 volcanoes assessed in the Cascade Range[85]. USGS–Cascades Volcano Observatory and its partners currently operate eleven seismometers and six GPS receivers on and near Mount Hood[86].

Mount Hood is located 10 miles west of the Wasco County border, and about 20 miles southwest from Mosier. The prevailing winds in the area are out of the West.

Lahars can be generated by hot volcanic flows that melt snow and ice or by landslides from the steep upper flanks of the volcano

Mount St. Helens erupted in 1980. Though located 50 miles northwest of Mosier, areas of Wasco County were covered by up to an inch or more of ash and some vehicles could not operate as their air intakes were clogged[87].

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[84] Ewert, J.W., Diefenbach, A.K., & Ramsey, D.W. (2018). *2018 Update to the U.S. Geological Survey National Volcanic Threat Assessment*. Reston, VA: U.S. Department of the Interior.
[85] Ewert, J.W., Diefenbach, A.K., & Ramsey, D.W. (2018). *2018 Update to the U.S. Geological Survey National Volcanic Threat Assessment*. Reston, VA: U.S. Department of the Interior.
[86] Mize, J. (2019, September 19). *Three additional monitoring stations to be installed on Mount Hood*. columbian.com/news/2019/sep/19/three-additional-monitoring-stations-to-be-installed-on-mount-hood/. Accessed 5/8/2024.
[87] Wasco County. (2019). *Wasco County Multi-Jurisdiction Natural Hazard Mitigation Plan*. Wasco County.

Mount St. Helens is still considered to be an active volcano. It was designated as a very high threat volcano by the U.S. Geological Survey (USGS) in its 2018 Update to the National Volcanic Threat Assessment. The risk of eruption was ranked 2 of 161 volcanoes assessed in the Cascade Range[88].

Figure 11: Mosier Volcanic Event Map

Source: Oregon HazVu: Statewide Geohazards Viewer, Oregon Department of Geology and Mineral Industries, accessed 8/9/2024

The primary danger area around a volcano covers an approximately 20-mile radius, although there is some danger to people within 100 miles or more. Airborne ash from a volcano can affect people hundreds of miles away from the eruption. The most common volcano-related hazards are ash (tephra), lahars (volcanic mud flows), lava and debris flows, avalanches, and pyroclastic flows.

The Oregon Department of Geology and Mineral Industries map data depicts areas where volcanic hazards may occur during or after volcanic activity. Specifically, mudflows, debris flows, avalanches of hot volcanic material, lava flows, and landslides.[89]

Volcano Resilience

[88] Ewert, J.W., Diefenbach, A.K., & Ramsey, D.W. (2018). *2018 Update to the U.S. Geological Survey National Volcanic Threat Assessment*. Reston, VA: U.S. Department of the Interior.

[89] Oregon Department of Geology and Mineral Industries. (n.d.). *Hazards and Assets*. Retrieved from Oregon HazVu:Statewide Geohazards Viewer: oregon.gov/dogami/hazvu/Pages/hazards-assets.aspx. Accessed 5/7/2024.

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Mosier water utility has one groundwater well. This well is expected to be sufficient to supply domestic.

Volcano Risk

With respect to natural hazards, risk can be expressed as the probability of a hazard occurring combined with the potential for property damage and loss of life. Mosier is considered to be at low risk from volcanos by Wasco County and the City.

Wildfire

Wildfire Characteristics

Any instance of uncontrolled burning within a forested area, grassland, or brush is classified as a wildfire. Wasco County's wildfire season usually runs from mid-May through October. However, any prolonged period of lack of precipitation presents a potentially dangerous problem. The probability of a wildfire in any one locality on a particular day depends on fuel conditions, topography, the time of year, the past and present weather conditions, and the activities (logging activities, debris burning, land clearing, camping, etc.) which are or will be taking place[90].

Wildfire Probability

The 2005 Community Wildfire Protection Plan was updated in 2022. An analysis of wildfire activity in Wasco County over the past 10 years is also useful for understanding current patterns of wildfire activity. From 2008 to 2018, there were a total of 691 recorded fires that burned 761,799 acres. The average number of fires per year was 69, with many of these fires being small. Only about 10% of all fires were larger than 1,000 acres. Fire cause for the county was 34% lightning and 66% human. The statistics used in this analysis may not be all inclusive for the area. Data pulled includes all fires that involve Federal and State protection, but may not be all inclusive in areas that are solely Rural Fire District protection, or unprotected lands in the Eastern half of the county.

Figure 12: Relative Wildlife Hazard in Wasco County, Source: Community Planning Assistance for Wildfire (CPAW)

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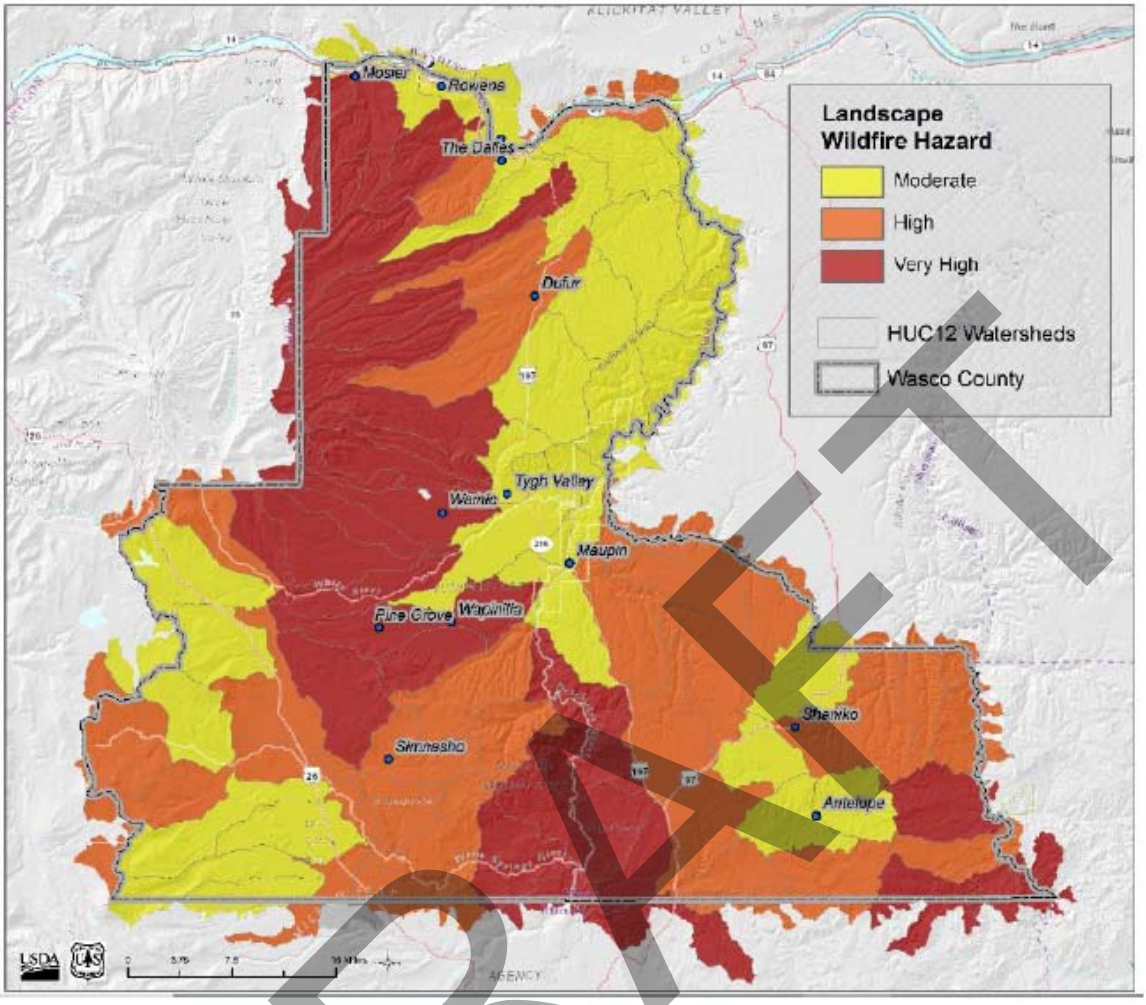
[90]Wasco County. (2019). *Wasco County Multi-Jurisdiction Natural Hazard Mitigation Plan*. Wasco County.



Source: 2022 Community Wildfire Protection Plan. Wasco County Planning Department. Accessed 3/29/2024.

Table 17: Recent FEMA Fire Management Assistance Declarations for Oregon – Wasco County

Declaration Number	Year	Name	Description
FM-5073	2014	Rowena Fire	3,680 acres, conflagration declared
FM-5255	2018	Substation Fire	78,425 acres, conflagration declared, one fatality, 4 homes and 48 other structures lost
FM-5265	2018	South Valley Fire	20,026 acres, 3 homes and 12 other structures lost

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Declaration Number	Year	Name	Description
FM-5327	2020	Mosier Creek Fire	983 acres, conflagration declared, 8 homes and 28 other structures lost[91]
FM-5341	2020	White River Fire	17,500 acres, conflagration declared[92]

Wildfire Vulnerability

The City's greatest vulnerability is not from wildfire, but fires triggered by other hazard events. However, the City of Mosier is a high priority area for wildfire protection in Wasco County because of its high population density, high economic value to the County (numerous businesses and agriculture), and the fact that the fuel loading and weather conditions there are conducive to large and fast-moving fires.

In a September 18, 2024 email correspondence, Mosier's Fire Chief Michael Carlson commented:

> *"Inability to access certain areas of the district and along the railroad tracks in event of fire or other natural emergencies that would take out the roadways (earthquake, rockslide, severe snow event) without a UTV (proven on Microwave Tower Fire as well)."*

Wildfire Risk

With respect to natural hazards, risk can be expressed as the probability of a hazard occurring combined with the potential for property damage and loss of life. Based the history of fire management assistance declarations as well as the potential for wildfire to impact the water supply. Due to Wasco County's social vulnerability ratings and the demonstrated impact of wildfire on water supply, agriculture and the local economy, Mosier is considered to be at very high risk from wildfires by Wasco County and the City.

Goals and Action Items

What are the Plan Goals?

The plan goals help to guide the direction of future activities aimed at reducing risk and preventing loss from future natural hazard events. In order to align with the Wasco County Natural Hazards Mitigation Plan, The City of The Dalles is adopting Wasco County's goals,

[91] Columbia Gorge News. (2020, August 13). *Mosier Creek Fire burns 985 acres; 75 percent contained*. columbiagorgenews.com/free_news/mosier-creek-fire-burns-985-acres-75-percent-contained/article_45553923-47ab-58ce-a28f-ffe85566b550.html. Accessed 5/8/2024.

[92] Neumann-Rea, K. (2020, September 22). *Smoke clears, regional fire threat endures: White River Fire contained*. columbiagorgenews.com/news/smoke-clears-regional-fire-threat-endures-white-river-fire-contained-firefighters-douse-small-blaze-near/article_89d0d652-f2b6-11ea-8303-6fe58e5fbf27.html. Accessed 5/8/2024.

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with no City-specific revisions.

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Table 1.10. 2024 Wasco County NHMP Goals

Goal	Statement
Protection of Life and Property	Develop and implement activities to protect human life, commerce, property, and natural resource systems.
	Reduce insurance losses and repetitive claims for chronic hazard events while promoting insurance for catastrophic hazards.
	Evaluate guideline/codes and permitting processes in addressing hazard mitigation; emphasize non-structural means of mitigating hazard impact.
	Actively acknowledge amount of loss the County is susceptible to and develop efforts to overcome that loss without significant reliance on outside resources.
	Utilize mitigation activities to minimize risks associated with hazard events.
Emergency Services Enhancement	Evaluate performance of critical facilities during a natural hazard event; implement measures to improve performance.
	Minimize threat to life safety issues.
	Ensure resources, staffing, and volunteer base keeps pace with County growth and needs.
Education & Outreach & Inclusion, Diversity, Equity and Accessibility	Develop and implement education programs to increase awareness among citizens; local, county and regional agencies; non-profit organization; businesses; and industry.
	Develop and conduct outreach programs to increase the number of local activities implemented by public and private sector organizations.
	Build community consensus through outreach, education, and activities.
	Ensure that the cultural, racial, and economic status of citizens is considered during the public planning process, and account for and incorporate underserved communities
Facilitate Partnerships & Coordination	Strengthen communication and coordination of public/private partnership and emergency services among local, county, and regional governments and the private sector.
	Incorporate hazard mitigation into the greater social, economic, and natural resource goal framework.
	Incorporate hazard mitigation as part of the County leadership's routine decision making process.
	Foster a diverse economy to reduce the impacts of a hazard event on any one sector.
	Create the conditions for a transitional economy that welcomes new development and innovative ideas that are sensitive to potential hazard risks faced by the County.
Natural Resource Systems Protection	Link watershed planning, natural resource management, and land use planning with natural hazard mitigation activities.

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	Preserve and rehabilitate natural systems to serve natural hazard mitigation functions and protect recreation resources.
	Coordinate programs to increase natural hazard knowledge base and use technology to better record events and model vulnerability.
	Protect recreation and tourism industries by raising awareness of potential hazard impacts.
	Provide support for agricultural and forest industries to help them prepare for hazardous events.
Climate Change	Commit to efforts that will increase understanding of how climate change will increase the frequency and severity of identified hazards.
	Consider the increase in hazard frequency, duration, and severity due to climate change during the development and implementation of activities to protect human life, commerce, property, and natural resource systems.

Source: Wasco County NHMP Steering Committee, May 29, 2024

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Action Items

What are the Plan Action Items?

Short and long-term mitigation action items identified through the plan update process, including the issues identification process, risk assessment, and community profile, are an important part of the mitigation plan. Action items are detailed recommendations for activities that local departments, citizens and others could engage in to reduce risk. The mitigation action items identified by the plan are intended to help the City move toward achieving the plan goals. The mitigation action items address both multi-hazard and hazard-specific issues for the hazards addressed in this plan.

In summary, there are 15 multi-hazard mitigation actions, three Severe Weather/Winter Storm Hazard, five flood, four wildfire actions, and one landslide hazard. There are no volcano, extreme heat, earthquake, drought, or landslide specific mitigation actions.

Each action item has a corresponding action item worksheet describing the activity, identifying the rationale for the project, identifying potential ideas for implementation, and assigning coordinating and partner organizations. To facilitate implementation, worksheets have been filled out describing each action item with the following information.

Rationale or Key Issues Addressed

Action items should be fact based and tied directly to issues or needs identified throughout the planning process. Action items can be developed from a number of sources including participants of the planning process, noted deficiencies in local capability, or issues identified through the risk assessment.

Coordinating Organization

The coordinating organization is the lead public agency with 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 Partners

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

External Partners

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.

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

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* (ST) are activities that may be implemented with existing resources and authorities within one to two years.

Long-term action items (LT) may require new or additional resources and/or authorities, and may take between one and five years to implement.

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Mitigation Action Item Proposal Form

Each mitigation action is described in detail in the Mitigation Action Item Proposal Form and also in summary in the Mitigation Action Items Summary Matrix.

Proposed Action Item:			**Alignment with Plan Goals:**
Type of Hazard #1 – Mitigation Proposal Title			Must align with a Wasco County Goal
Alignment with Existing Plans/Policies:			
List agency and plan that supports the mitigation proposal			
Rationale for Proposed Action Item:			
• Rationale should be based on studies and data analysis, may or may not be associated with a plan			
Ideas for Implementation:			
• Ideas from plan development working groups and public input sessions			
Coordinating Organization:	City Department that will lead the mitigation effort		
Internal Partners:		**External Partners:**	
City Departments		Other public and private sector organizations	
Potential Funding Sources:		**Estimated cost:**	**Timeline: (check one)**
As identified during plan development		**If available**	☐ Short Term (0-2 years) ☐ Long Term (2-4+ years)
Form Submitted by:	**Author or Department**		
Action Item Status:	Track from original submittal year. Example: Submitted July 2006 – Revised 2012 – Revised 2018		

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City of Mosier NHMP Mitigation Action Items Matrix

Table 1.12: City of Mosier Mitigation Action Items Matrix Key

Hazard	Summary	Abbreviation
Multi-Hazard	A combination of two or more identified hazards.	MH
Drought	A prolonged period of abnormally low precipitation.	DH
Earthquake	The shaking of the ground caused by an abrupt shift of rock along a fracture in the earth, called a fault.	EH
Flood	An overflow of a large amount of water beyond its normal confines, especially over what is normally dry land.	FH
Landslide	The sliding movement of masses of loosened rock and soil down a hillside or slope.	LH
Severe Heat	Heat events	HH
Volcanic Event	A vent in the earth's crust through which molten rock, rock fragments, gases or ashes are ejected	VH
Wildland-Wildfire	Any instance of uncontrolled burning within a forested area.	WH
Severe Storms/ Winter Storms	Storm hazards include ice, snow and windstorms; Tornados are a violent subset of severe storms caused by the intersection of a strong cross wind with a strong warm updraft.	SH

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City of Mosier Mitigation Action Items Summary Matrix

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Table 1.13. The City of Mosier NHMP Mitigation Action Item Matrix

Action Item	Priority L=Low M=Med H=Hi	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline LT=Long ST=Short	Alignment with plan goals					
						Protection of Life & Property	Emergency Services Enhancement	Education & Outreach, and IDEA	Facilitate Partnerships & Coordination	Natural Resource Systems Protection	Climate Resilience
Multi-Hazard (MH)											
MH #1	M	Evaluate and Prioritize Critical Infrastructure for Hazard Resilience (e.g. Seismic Retrofit, Wildfire Protections)	Public Works	City Council, Engineering Firms, DOGAMI, OEM, FEMA	LT	X					X
MH#2	M	Seek Implementation Funding for Hazard Resilient Modifications to Critical Infrastructure	Public Works	City Council, Engineering Firms, DOGAMI, OEM, FEMA	LT	X					X
MH#3	M	Partner with the County for the Coordination of Disaster Education/Outreach & Response	City Council	Oregon Department of Health and Human Services, Red Cross, Adventist Health Columbia Gorge, RFPD's	LT			X			
MH#4	M	Identification and Pursuit of Implementation Funding for Mitigation Actions	Planning	City Council, Wasco County	LT				X		
MH#5	M	Annual Review of Natural Hazards Mitigation Plan / Complete Review/Update/Adoption by City Council Every Five Years	Planning	City Council, OR Office of Emergency Management Federal Emergency Management Agency	ST		X				

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Action Item	Priority L=Low M=Med H=Hi	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline LT=Long ST=Short	Alignment with plan goals					
						Protection of Life & Property	Emergency Services Enhancement	Education & Outreach, and IDEA	Facilitate Partnerships & Coordination	Natural Resource Systems Protection	Climate Resilience
Multi-Hazard (MH)											
MH#6	M	Secure Emergency Power Supply to Critical Infrastructure Sites	City Council	Planning, Fire, Public Works, State Fire Marshal, Wasco Electric Co-Op	LT		X				
MH#7	M	Small Business Awareness and Continuity Planning	Chamber of Commerce	Oregon Continuity Planner Association, Wasco County	LT			X			X
MH#8	M	Partner with County on All-Hazard Emergency Preparedness	City Council	Planning, Wasco County Emergency Management	LT				X		
MH#9	M	Enter Into Supply Contracts and Mutual Aid Agreements	City Council	Public Works, Wasco County Emergency Management, National Guard, Private Sector	ST				X		

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Action Item	Priority L=Low M=Med H=Hi	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline LT=Long ST=Short	Alignment with plan goals					
						Protection of Life & Property	Emergency Services Enhancement	Education & Outreach, and IDEA	Facilitate Partnerships & Coordination	Natural Resource Systems Protection	Climate Resilience
Multi-Hazard (MH)											
MH#10	H	Identify and Train critical staff in the NIMS-FEMA Compliant Incident Command System (ICS)	City Council	Public Works, ICS Training Providers, Wasco County Emergency Mgmt	LT				X		
MH#11	H	Kitchen equipment grant for food bank storage/food insecurity.	City Council	Oregon Department of Health and Human Services, Wasco County Emergency Mgmt, Private Sector	ST		X				
MH#12	H	Grant Funding for Upgrades to Water Main Transmission Line	City Council	Oregon Department of Health and Human Services, Wasco County Emergency Mgmt Federal Emergency Management Agency	ST	X					
MH#13	H	Grant Funding for Upgrades to the Repeater Antenna at First Station	Mosier Fire	Wasco County Emergency Mgmt Federal Emergency Management Agency, Oregon State Fire Marshall	ST		X				

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Action Item	Priority L=Low M=Med H=Hi	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline LT=Long ST=Short	Alignment with plan goals					
						Protection of Life & Property	Emergency Services Enhancement	Education & Outreach, and IDEA	Facilitate Partnerships & Coordination	Natural Resource Systems Protection	Climate Resilience
Multi-Hazard (MH)											
MH#14	H	Funding for Road Upgrades Within Mosier Fire District	City Council	Wasco County Emergency Mgmt Federal Emergency Management Agency, Oregon State Fire Marshall, Public Works, ODF	LT		X				
MH#15	H	Funding for Upgrades to Fire Station Access	Mosier Fire	Wasco County Emergency Mgmt Federal Emergency Management Agency, Oregon State Fire Marshall, Public Works	ST		X				
Severe Winter Weather Hazard (SH)											
SH#1	H	Reduce Impacts to Roadways	Public Works	City Council, ODOT, Wasco County Emergency Mgmt.,	LT	X					

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Action Item	Priority L=Low M=Med H=Hi	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline LT=Long ST=Short	Alignment with plan goals					
						Protection of Life & Property	Emergency Services Enhancement	Education & Outreach, IDEA	Facilitate Partnerships & Coordination	Natural Resource Systems Protection	Climate Resilience
Severe Winter Weather Hazard (SH)											
SH#2	H	Conduct Severe Weather Risk Awareness Activities	City Council	Wasco County Emergency Mgmt., OEM, Mosier Fire District	LT			X			
SH#3	M	Assist Vulnerable Populations	City Council	Wasco Co. Emergency Mgmt., OEM	LT	X					
Flood Hazard (FH)											
FH #1	M	Explore the potential for Mosier to participate in the Community Rating System (CRS) of the National Flood Insurance Program (NFIP)	City Council	Wasco County Emergency Management	ST	X		X			
FH#2	M	Explore acquisition and management strategies to preserve parks, trails, and open space in the floodplain	City Council	Planning, Wasco County Emergency Management, DLCD, OEM, FEMA	LT	X				X	
FH#3	H	Ensure Continued Compliance with the National Flood Insurance Program	City Council	Wasco County Emergency Management, DLCD, OEM, FEMA	LT	X					
FH#4	H	Funding for Development of Storm Water Plan, and Improvements	City Council	Wasco County Emergency Management, OEM, FEMA. Oregon Department of Health and Human Services	LT	X					

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Action Item	Priority L=Low M=Med H=Hi	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline LT=Long ST=Short	Alignment with plan goals					
						Protection of Life & Property	Emergency Services Enhancement	Education & Outreach, and IDEA	Facilitate Partnerships & Coordination	Natural Resource Systems Protection	Climate Resilience
Wildfire Hazard (WH)											
WH#1	H	Partner with the County to Implement the Community Wildfire Protection Plan (CWPP)	City Council	Fire, Planning, Public Works	LT				X		
WH#2	H	Incorporate Wildfire Mitigation in the Comprehensive Plan	City Council	Wasco County Emergency Management, Oregon Office of State Fire Marshal	LT	X				X	
WH#3	H	Implement Ongoing Fuels Management Program	City Council	Mosier Fire District, Wasco County Emergency Management, OSFM, ODF	LT	X		X	X	X	
WH#4	H	Funding for an emergency water storage supply in excess of 5000 gallons around top of Seven Mile Hill.	Mosier Fire	Mosier Fire District, Wasco County Emergency Management, OSFM, ODF	ST		X				
Landslide Hazard (LH)											
LH#1	H	Grant Funding for Heavy equipment for emergency removal in case of rock fall.	City Council	Wasco County Emergency Management, FEMA, ODOT	LT		X				

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Mitigation Action Items Proposal Forms

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MH #1 – Evaluate and Prioritize Critical Infrastructure for Hazard Resilience (e.g., Seismic Retrofit, Wildfire Protections)	Protection of Life & Property, Climate Resilience
Alignment with Existing Plans/Policies:	
City of Mosier Water System Master Plan Mosier Public Water System Emergency Response Plan City of Mosier Wastewater Facilities Plan	City of Mosier Comprehensive Plan City of Mosier Capital Improvement Plan
Rationale for Proposed Action Item:	
• The City's 2024 work group acknowledged that most of the City's municipal buildings and infrastructure are old and that these facilities will require evaluation to better understand their vulnerabilities. • Assessing risk to critical infrastructure will assist in identifying potential mitigation strategies that will reduce future damage caused by natural disasters.	
Ideas for Implementation:	
• The City could utilize Rapid Visual Screening techniques to quickly assess structures in terms of seismic and wildfire vulnerability. • Evaluation of risk of wildfire to critical facilities and infrastructure, particularly those in the wildland urban interface (WUI).	
Coordinating Organization:	Public Works Department

Internal Partners:	**External Partners:**	
City Council	Engineering Firms, DOGAMI, OEM, FEMA	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
FEMA, State and Federal Grants/Loans, City Funds		✓ Short Term (0-2 years) ☐ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted June 2024

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Proposed Action Item:	Alignment with Plan Goals:
MH#2 – Seek Implementation Funding for Hazard Resilient Modifications to Critical Infrastructure	Protection of Life & Property, Climate Resilience

Alignment with Existing Plans/Policies:	
City of Mosier Water System Master Plan City of Mosier Wastewater Facilities Plan City of Mosier Comprehensive Land Use Plan	2012 Oregon Resilience Plan City of Mosier Capital Improvement Plan

Rationale for Proposed Action Item:

- As a small rural city, Mosier does not have the ability to fund large-scale Hazard Resilient Modifications to Critical Infrastructure

Ideas for Implementation:

- Ensure that critical infrastructure is documented in the Natural Hazard Mitigation Plan and in the Comprehensive Plan so facilities might be more eligible for upgrade grants.
- Evaluate funding opportunities.
- Complete benefit cost analysis as applicable
- Identify funding partners or other jurisdictions interested in similar retrofits.
- Write grant applications for funding.
- Seek Oregon State Fire Marshal assistance dollars for wildfire related mitigation actions addressing wildfire risk to critical facilities

Coordinating Organization:	Public Works

Internal Partners:	External Partners:
City Council	Engineering Firm, DOGAMI, OEM, FEMA

Potential Funding Sources:	Estimated cost:	Timeline:
FEMA, State and Federal Grants/Loans, City Funds		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted June 2024

Proposed Action Item:	Alignment with Plan Goals:
MH#3 - Partner with the County for the Coordination of Disaster Education/Outreach & Response	Education & Outreach

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Alignment with Existing Plans/Policies:		
Wasco County Natural Hazard Mitigation Plan Wasco County Community Wildfire Protection Plan		
Rationale for Proposed Action Item:		
• The City's working group recognized that Mosier's vulnerability to wildfire and other disasters is greater than some areas of Wasco County due to limited ingress and egress routes which could prevent citizens from evacuating or receiving needed goods and services. Preparedness education and actions may lessen this impact. • The Community Profile indicates that a substantial portion of Mosier's population is aging and below median income, suggesting a potential for greater vulnerability to disaster and more difficulty recovering if one occurs. • This action was identified in the Wasco County plan.		
Ideas for Implementation:		
• Conduct a Household Survey. FEMA has determined that better practices for disaster communication and education have changed radically since the introduction of the iPhone in 2007. • Efforts should focus on the following populations: Elderly, Low income, Non-English speakers, Mobile Homes, and Schools/day care. • For improving effectiveness of outreach, partner with the Red Cross and utility providers to create informative mailings about natural hazard mitigation. Also, collaborate with the Red Cross and utility providers to create news stories about natural hazard mitigation. • Explore forming a multi-agency South Wasco Preparedness Coalition to coordinate emergency preparedness and hazard awareness education.		
Coordinating Organization:	City Council	
Internal Partners:	**External Partners:**	
Mosier Volunteer Fire Department	Oregon Department of Health and Human Services, Red Cross, Wasco County Emergency Management, Local RFPD's, Adventist Health Columbia Gorge	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
FEMA, State and Federal Grants/Loans, City Funds		Short Term (0-2 years) ✓ Long Term (2-4+ years)
Form Submitted by:		
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Proposed Action Item:	**Alignment with Plan Goals:**
MH#4 - Identification and Pursuit of Implementation Funding for Mitigation Actions	Facilitate Partnerships & Coordination

Alignment with Existing Plans/Policies:

Wasco County Natural Hazard Mitigation Plan

Rationale for Proposed Action Item:

- The reduction of risk in a community typically requires identifying and seeking external funding to implement identified actions.
- Creating an action focusing on identifying and pursuing funding will assist the City follow through on the actions identified in the plan
- This action was identified in the Wasco County plan.

Ideas for Implementation:

- Ensure the City remains an active participant of the County planning efforts.
- Identify opportunities to partner with the County or other jurisdictions to submit grant applications to leverage limited resources.

Coordinating Organization:	Planning

Internal Partners:	**External Partners:**
City Council	Wasco County

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
FEMA, State and Federal Grants/Loans		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted June 2024

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Proposed Action Item:	**Alignment with Plan Goals:**
MH#5 - Annual Review of Natural Hazards Mitigation Plan / Complete Review/Update/Adoption by City Council Every Five Years	Emergency Service Enhancement

Alignment with Existing Plans/Policies:
Emergency Management Performance Grant funding from Oregon Office of Emergency Management and FEMA requires the NHMP to be reviewed twice per year.
Rationale for Proposed Action Item:
• FEMA requires NHMP update every 5 years to maintain HMGP funding eligibility. • Annual review/update ensures operability of plans and makes 5-year update easier
Ideas for Implementation:
• Designate a convener to be responsible for ensuring that the review and update process take place. • Include review and update on departmental work plans. • Incorporate NHMP action items into Department and Division objectives and benchmarks.

Coordinating Organization:	Planning

Internal Partners:	**External Partners:**
City Council	Oregon Military Department, Office of Emergency Management, Federal Emergency Management Agency

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
		✓ Short Term (0-2 years) ☐ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted June 2024

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Proposed Action Item:	**Alignment with Plan Goals:**
MH#6 - Secure Emergency Power Supply to Critical Facilities	Emergency Services Enhancement

Alignment with Existing Plans/Policies:

City of Mosier Water Master Plan
City of Mosier Wastewater Facilities Plan

Rationale for Proposed Action Item:

- Ensuring that critical facilities have emergency power stores is part of protecting critical facilities, because without power, emergency facilities are severely compromised.
- Critical facilities typically require emergency back-up power to be able to function during and after a disaster.
- Severe storms can knock down power lines and disrupt the electrical grid.
- Critical facilities are crucial to emergency response, and all rely on electrical power to provide service. Mitigating the possibility of a sudden power outage makes the facilities more robust in the event of an incident and supports City staff in their efforts to maintain an acceptable level of service for a longer duration.
- The working group identified the lack of emergency backup power at critical facilities.

Ideas for Implementation:

- Seek capital improvements funding for emergency power supplies for all identified critical City facilities
- Identify additional funding sources
- Apply for funding and implement acquisition of back-up power as prioritized

Coordinating Organization:	City Council

Internal Partners:	**External Partners:**
Planning, Fire, Public Works	State Fire Marshal, Wasco Electric Co-Op

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
FEMA, State and Federal Grants/Loans, City Funds		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

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Action Item Status:	Submitted June 2024

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Proposed Action Item:	**Alignment with Plan Goals:**
MH#7 - Small Business Awareness and Continuity Planning	Education & Outreach, Climate Resilience

Alignment with Existing Plans/Policies:

Mosier and South Wasco County Strategic Plan of Action

Rationale for Proposed Action Item:

- During the issues identification work session, the working group identified that the majority of businesses are small 'mom and pop' shops that may lack resources to recover from a disaster
- Continuity planning would assist business get back on their feet quicker
- Businesses that are prepared will help keep the local economy going
- According to the Institute for Business & Home Safety, more than 25% of businesses that close due to a natural hazard never reopen.

Ideas for Implementation:

- Explore forming a multi-agency South Wasco Preparedness Coalition to coordinate emergency preparedness and hazard awareness education.
- SWPC membership could include state and local government agencies, private businesses and non-profit organizations working toward a mission to support and coordinate community efforts to mitigate, respond to and recover from disasters large and small. Potential business association partners include – The South Wasco Chamber of Commerce, The South Wasco Alliance, and Wasco County Emergency Management.
- Utilize existing resources such as the Institute for Business & Home Safety's Open for Business Toolkit
- Work with the Oregon Continuity Planners Association to hold a continuity planning workshop for local businesses

Coordinating Organization:	Chamber of Commerce

Internal Partners:	**External Partners:**
Planning	Oregon Continuity Planner Association, Wasco County

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
FEMA, State and Federal Grants/Loans		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

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Action Item Status:	Submitted June 2024

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Proposed Action Item:	**Alignment with Plan Goals:**
MH#8 - Partner with County on All-Hazard Emergency Preparedness	Facilitation of Partnerships & Coordination

Alignment with Existing Plans/Policies:

Mosier Public Water System Emergency Response Plan
Wasco County Emergency Operations Plan
Wasco County Natural Hazard Mitigation Plan

Rationale for Proposed Action Item:

- The working group identified a lack of human resources available to undertake preparedness activities.

Ideas for Implementation:

- Partner with County when possible, to leverage limited human and financial resources
- Partner with state and local government agencies, private businesses and non-profit organizations to identify and establish shelter sites.
- Partner with state and local government agencies, private businesses and non-profit organizations to establish emergency notification systems (e.g. sirens, reverse 911, etc.)
- Once emergency notification systems are in place, develop coordinated plans for all-hazard communications

Coordinating Organization:	City Council

Internal Partners:	**External Partners:**
Planning	Wasco County Emergency Management

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
FEMA, State and Federal Grants/Loans, City Funds		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

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Proposed Action Item:	**Alignment with Plan Goals:**
MH#9 – Enter into Supply Contracts and Mutual Aid Agreements	Facilitation of Partnerships & Coordination

Alignment with Existing Plans/Policies:

- Oregon Public Works Emergency Response Cooperative Assistance Agreement through ODOT

Rationale for Proposed Action Item:

- The 2024 working group identified the need to enter into supply and service contracts to establish level of service expectations and invoice processing capability before an emergency incident.
- FEMA requires agreements to be in place before an emergency incident for many City response and recovery activities to be eligible for reimbursement.

Ideas for Implementation:

- Supply vendors may include fuel, oil, rock, sand, water haulers, pipes and fittings, Equipment rental, etc.
- Service providers may include clean-up services, waste haulers, etc.

Coordinating Organization:	City Council

Internal Partners:	**External Partners:**
Public Works	Wasco County Emergency Management, National Guard, Private Sector

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
		✓ Short Term (0-2 years) ☐ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted 2024

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Proposed Action Item:	**Alignment with Plan Goals:**
MH#10 – Ensure Critical Staff Are Identified and Trained in the NIMS-FEMA Compliant Incident Command System (ICS)	Facilitation of Partnerships & Coordination

Alignment with Existing Plans/Policies:

Wasco County Emergency Operations Plan

Rationale for Proposed Action Item:

- The 2024 working group identified the need to identify and train staff that will be expected to deploy during emergencies.
- Training needs may be identified beyond the executive level because field staff need to know ICS deployment protocols to ensure FEMA reimbursement eligibility.

Ideas for Implementation:

- Conduct initial ICS training for those identified.
- Conduct tabletop exercises planned incidents and other experiential opportunities to practice ICS protocols after initial training.
- Activate the Incident Command System during smaller scale emergencies to practice ICS protocols.
- Conduct an interagency tabletop exercise or planned incident within the five-year planning period

Coordinating Organization:	City Council

Internal Partners:	**External Partners:**
Public Works	ICS Training Providers, Wasco County Emergency Management

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
FEMA, State and Federal Grants/Loans, City Funds		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

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Proposed Action Item:	Alignment with Plan Goals:
MH#11 – Kitchen equipment grant for food bank storage/food insecurity.	Emergency Services Enhancement

Alignment with Existing Plans/Policies:
Wasco County Emergency Operations Plan

Rationale for Proposed Action Item:
• Identified need after recent emergencies

Ideas for Implementation:
• Research possible grant funding opportunities.

Coordinating Organization:	City Council

Internal Partners:	External Partners:
City Council	Oregon Department of Health and Human Services, Wasco County Emergency Mgmt, Private Sector

Potential Funding Sources:	Estimated cost:	Timeline:
FEMA, State and Federal Grants/Loans, City Funds		✓ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted 2024

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Proposed Action Item:	Alignment with Plan Goals:
MH#12 – Grant Funding for Upgrades to Water Main Transmission Line	Protection of Life & Property

Alignment with Existing Plans/Policies:
Wasco County Emergency Operations Plan

Rationale for Proposed Action Item:
• Identified need after recent emergencies • Effects entire city

Ideas for Implementation:
• Research possible grant funding opportunities.

Coordinating Organization:	City Council

Internal Partners:	External Partners:
City Council	Oregon Department of Health and Human Services, Wasco County Emergency Mgmt Federal Emergency Management Agency

Potential Funding Sources:	Estimated cost:	Timeline:
FEMA, State and Federal Grants/Loans, City Funds		✓ Short Term (0-2 years) Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted 2024

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Proposed Action Item:	Alignment with Plan Goals:
MH#13 – Grant Funding for Upgrades to the Repeater Antenna at First Station	Emergency Services Enhancement

Alignment with Existing Plans/Policies:
Wasco County Emergency Operations Plan

Rationale for Proposed Action Item:
• Identified need after recent emergencies • Trouble hearing dispatch at times

Ideas for Implementation:
• Research possible grant funding opportunities.

Coordinating Organization:	Mosier Fire

Internal Partners:	External Partners:
City Council	Wasco County Emergency Mgmt Federal Emergency Management Agency, Oregon State Fire Marshall

Potential Funding Sources:	Estimated cost:	Timeline:
FEMA, State and Federal Grants/Loans, City Funds		✓ Short Term (0-2 years) Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted 2024

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Proposed Action Item:	**Alignment with Plan Goals:**
MH#14 – Funding for Road Upgrades Within Mosier Fire District	Emergency Services Enhancement

Alignment with Existing Plans/Policies:
Wasco County Emergency Operations Plan

Rationale for Proposed Action Item:
• Identified need after recent emergencies • Unable to access portions of fire district due to access quality

Ideas for Implementation:
• Research possible grant funding opportunities.

Coordinating Organization:	Mosier Fire

Internal Partners:	**External Partners:**
City Council	Wasco County Emergency Mgmt Federal Emergency Management Agency, Oregon State Fire Marshall, Public Works, ODF

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
FEMA, State and Federal Grants/Loans, City Funds		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted 2024

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Proposed Action Item:	Alignment with Plan Goals:
MH#15 – Funding for Upgrades to Fire Station Access	Emergency Services Enhancement

Alignment with Existing Plans/Policies:
Wasco County Emergency Operations Plan

Rationale for Proposed Action Item:
• Identified need after recent emergencies • Continuous issues entering/exiting station in winter

Ideas for Implementation:
• Research possible grant funding opportunities.

Coordinating Organization:	Mosier Fire

Internal Partners:	External Partners:
City Council	Wasco County Emergency Mgmt Federal Emergency Management Agency, Oregon State Fire Marshall, Public Works

Potential Funding Sources:	Estimated cost:	Timeline:
FEMA, State and Federal Grants/Loans, City Funds		✓ Short Term (0-2 years) Long Term (2-4+ years)

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Action Item Status:	Submitted 2024

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Proposed Action Item:	Alignment with Plan Goals:
SH#1- Reduce Impacts to Roadways	Protection of Life and Property

Alignment with Existing Plans/Policies:

Wasco County Emergency Operations Plan
Wasco County Natural Hazard Mitigation Plan

Rationale for Proposed Action Item:

- Mosier's steep hills and curves, as well as several unpaved roads, make extreme winter weather treacherous to navigate.
- Mosier's current fleet of road maintenance equipment is aging and insufficient.

Ideas for Implementation:

- Planning for and maintaining adequate road and debris clearing capabilities.
- Installing roadway heating technology to prevent ice/snow buildup.

Coordinating Organization:	Public Works

Internal Partners:	External Partners:
City Council	ODOT, Wasco County Emergency Management, OEM, Public Works

Potential Funding Sources:	Estimated cost:	Timeline:
FEMA, State and Federal Grants/Loans, City Funds		**Short Term (0-2 years)** ✓ **Long Term (2-4+ years)**

Form Submitted by:	
Action Item Status:	Submitted June 2024

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Proposed Action Item:	**Alignment with Plan Goals:**
SH #2 – Conduct Severe Weather Risk Awareness Activities	Education and Outreach

Alignment with Existing Plans/Policies:

Wasco County Emergency Operations Plan
Wasco County Natural Hazard Mitigation Plan

Rationale for Proposed Action Item:

- The 2024 Working Group determined that Mosier's aging population may have limited access to computers/internet service, may have limited financial resources and could benefit from ongoing education regarding severe weather risk.
- The Working Group determined that many of Mosier's homes are heated with wood heat, which may present risks to residents.
- The Working Group determined that Mosier's distance from medical services and supplies may require citizens to travel up to 50 miles during severe weather events.

Ideas for Implementation:

- Inform the public about severe weather impacts.
- Producing and distributing family and traveler emergency preparedness information about severe winter weather hazards.
- Encourage homeowners to install carbon monoxide monitors and alarms.
- Educating citizens that all fuel-burning equipment should be vented to the outside.
- Educate homeowners about freezing pipes and winterization activities

Coordinating Organization:	City Council

Internal Partners:	**External Partners:**
Mosier Fire Dept.	Wasco County Emergency Management, OEM

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
FEMA, State and Federal Grants/Loans, City Funds		✓ **Short Term (0-2 years)** ☐ **Long Term (2-4+ years)**

Form Submitted by:	
Action Item Status:	Submitted June 2024

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Proposed Action Item:	**Alignment with Plan Goals:**
SH#3 – Assist Vulnerable Populations	Protection of Life and Property

Alignment with Existing Plans/Policies:

Wasco County Emergency Operations Plan

Wasco County Natural Hazard Mitigation Plan

Rationale for Proposed Action Item:

- Mosier's 2024 Working Group determined that Mosier's aging population and households below the median income level make most Mosier residents vulnerable in the event of a severe winter storm.
- Mosier is home to Canyon Rim Assisted Living Facility, which may require assistance in a severe winter storm or power outage.

Ideas for Implementation:

- Identify specific at-risk populations that may be exceptionally vulnerable in the event of long-term power outages.
- Organizing outreach to vulnerable populations, including establishing and promoting accessible heating centers/shelters in the community.
- Educate citizens about severe weather risk and local resources.

Coordinating Organization:	City Council

Internal Partners:	**External Partners:**
Mosier Volunteer Fire Department	Wasco County Emergency Management, OEM,

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
FEMA, State and Federal Grants/Loans, City Funds		✓ Short Term (0-2 years) ☐ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted 2024

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Proposed Action Item:	**Alignment with Plan Goals:**
FH#1 - Explore the potential for Mosier to participate in the Community Rating System (CRS) of the National Flood Insurance Program (NFIP)	Protection of Life & Property Education & Outreach

Alignment with Existing Plans/Policies:

City of Mosier Comprehensive Land Use Plan

Rationale for Proposed Action Item:

- The National Flood Insurance Program's (NFIP) Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community flood plain management activities that exceed the minimum NFIP requirements. As a result, insurance premiums under the NFIP are discounted to reflect the reduced flood risk resulting from the community actions meeting the three goals of the CRS: (1) reduce flood losses; (2) facilitate accurate insurance rating; and (3) promote the awareness of flood insurance.
- The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address existing buildings and infrastructure [201.6(c)(3)(ii)]. Inclusion into the Community Rating System program can help communities in Wasco County to enhance mitigation efforts and decrease the vulnerability to floods.

Ideas for Implementation:

- Determine CRS eligibility requirements.
- Determine the best means of outreach to floodplain residents (mailing? Public meeting? Other methods?)
- Coordinate with the Department of Land Conservation and Development (DLCD) and FEMA to join the Community Rating System.
- Educate businesses and homeowners currently under the NFIP program about the CRS program and any mitigation actions they can implement to reduce their insurance premiums.

Coordinating Organization:	City Council

Internal Partners:	**External Partners:**
Public Works, Planning	Wasco County Emergency Management

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
FEMA, State and Federal Grants		✓ Short Term (0-2 years) ☐ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted June 2024

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Proposed Action Item:	Alignment with Plan Goals:
FH#2 - Explore acquisition and management strategies to preserve parks, trails, and open space in the floodplain	Protection of Life & Property Natural Resource Systems Protection

Alignment with Existing Plans/Policies:

City of Mosier Comprehensive Land Use Plan
City of Mosier Capital Improvement Plan

Rationale for Proposed Action Item:

- The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address future development [201.6(c)(3)(ii)]. Developing acquisition and management strategies to preserve open spaces in the floodplain will prevent flood hazards by limiting or prohibiting development in these areas.
- Goal 7 of Oregon's Land Use Planning Goals requires that local governments "adopt or amend, as necessary, based on the evaluation of risk, plan policies and implementing measures...[that prohibit] the siting of essential facilities, major structures, hazardous facilities and special occupancy structures, as defined in the state building code (ORS 455.447(1) (a)(b)(c) and (e)), in identified hazard areas..." Developing acquisition and management strategies to preserve open spaces in the floodplain will fulfill goal 7 by preventing the siting of major facilities in a flood-hazard area.

Ideas for Implementation:

- Identify potential opportunities to acquire lands in the floodplain for use as parks, trails, or open space.
- Work with the Department of Land Conservation and Development, Oregon Military Department, Office of Emergency Management and FEMA to identify potential funding sources.

Coordinating Organization:	City Council

Internal Partners:	External Partners:
Planning	Wasco County Emergency Management, DLCD, OEM, FEMA

Potential Funding Sources:	Estimated cost:	Timeline:
FEMA, State and Federal Grants/Loans, Urban Renewal Agency, Private Sector		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted June 2024

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Proposed Action Item:	Alignment with Plan Goals:
FH#3 - Ensure continued compliance with the National Flood Insurance Program	Protection of Life & Property Education & Outreach

Alignment with Existing Plans/Policies:

City of Mosier Comprehensive Land Use Plan

Rationale for Proposed Action Item:

- The Disaster Mitigation Act of 2000 requires communities to identify a comprehensive range of mitigation actions.
- Ensuring that the City remains in compliance with the National Flood Insurance Program will assist the community in continuing to maintain eligibility for the Flood Mitigation Assistance Program.
- At this time, the City has no repetitive loss properties, keeping up on participation in the National Flood Insurance Program may help ensure that repetitive loss properties are mitigated, and that future development does not become repetitive loss property.

Ideas for Implementation:

- Partner with Wasco County on continuing compliance activities.
- Explore opportunities to update floodplain ordinances based on new hazard knowledge provided by 2023 Wasco County FIRM.
- Explore forming a multi-agency South Wasco Preparedness Coalition to coordinate flood hazard and floodplain ordinance awareness education.

Coordinating Organization:	City Council

Internal Partners:	External Partners:
	Wasco County Emergency Management, DLCD, OEM, FEMA

Potential Funding Sources:	Estimated cost:	Timeline:
FEMA, State and Federal Grants/Loans, City Funds		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	
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Proposed Action Item:	**Alignment with Plan Goals:**
FH#4 - Funding for Development of Storm Water Plan, and Improvements	Protection of Life & Property

Alignment with Existing Plans/Policies:

City of Mosier Comprehensive Land Use Plan

Rationale for Proposed Action Item:

- Identified need after recent emergencies
- Effects entire city

Ideas for Implementation:

- Research possible grant funding opportunities.

Coordinating Organization:	City Council

Internal Partners:	**External Partners:**
City Council	Wasco County Emergency Management, OEM, FEMA. Oregon Department of Health and Human Services

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
FEMA, State and Federal Grants/Loans, City Funds		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted June 2024

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Proposed Action Item:	**Alignment with Plan Goals:**
WH#1 - Partner with the County to Implement the Community Wildfire Protection Plan (CWPP)	Facilitation of Partnerships & Coordination

Alignment with Existing Plans/Policies:

Wasco County Natural Hazards Mitigation Plan
Wasco County Community Wildfire Protection Plan

Rationale for Proposed Action Item:

- The City's working group identified that their risk to wildfire is equal to that of the County.
- The 2021 DOGAMI Natural Hazard Risk Report for Wasco County listed the homes in the Wildland Urban Interface around Mosier as being an Area of Significant Risk for wildfire.
- The City participated in the development of the County Community Wildfire Protection Plan.
- The working group identified the need to continue to work with the County, ODF, and USFS on wildfire issues.

Ideas for Implementation:

- Participate in further planning and project activities with the County.
- Partner with the County on education and outreach related activities
- Explore potential to distribute wildfire brochures (available through Institute for Business & Home Safety) to residents pulling building permits, who are located in the urban fringe.
- Pursue fire fuels reduction opportunities within the Wildland Urban Interface (WUI).

Coordinating Organization:	City Council

Internal Partners:	**External Partners:**
Fire, Planning, Public Works	Wasco County Emergency Management, Wasco County Planning, Oregon Department of Forestry, USFS, OSFM

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
FEMA, State and Federal Grants, city funds		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted June 2024

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Proposed Action Item:	Alignment with Plan Goals:
WH#2 – Incorporate Wildfire Mitigation in the Comprehensive Plan	Protection of Life and Property, Natural Resource System Protection,

Alignment with Existing Plans/Policies:

City of Mosier Comprehensive Land Use Plan

Rationale for Proposed Action Item:

- The City's working group identified that their risk to wildfire is equal to that of the County.
- The 2021 DOGAMI Natural Hazard Risk Report for Wasco County listed the homes in the Wildland Urban Interface around Mosier as being an Area of Significant Risk for wildfire.
- The Working Group acknowledged that multiple factors have increased Mosier's risk to wildfire since the Comprehensive Plan was last updated in 2005 and that these changes necessitate the inclusion of wildfire mitigation strategies into City Planning.

Ideas for Implementation:

- Recognize the existence of wildfire hazards and identify areas of risk based on a wildfire vulnerability assessment.
- Write policies and recommendations for addressing wildfire risk and discouraging expansion in the Wildland Urban Interface (WUI).
- Include considerations of wildfire hazards in land use, public safety, and other elements of the Comprehensive Plan.

Coordinating Organization:	City Council

Internal Partners:	External Partners:
Planning	Wasco County

Potential Funding Sources:	Estimated cost:	Timeline:
FEMA, State and Federal Grants/Loans, City Funds		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted June 2024

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Proposed Action Item:	Alignment with Plan Goals:
WH#3 – Implement Ongoing Fuels Management Program	Protection of Life and Property, Education and Outreach, Facilitate Partnerships and Coordination Natural Resource System Protection

Alignment with Existing Plans/Policies:

Wasco County Community Wildfire Protection Plan

Rationale for Proposed Action Item:

- The City's working group identified that the City's risk to wildfire as greater than that of the County.
- The 2021 DOGAMI Natural Hazard Risk Report for Wasco County listed the homes in the Wildland Urban Interface around Mosier as being an Area of Significant Risk for wildfire.
- Mosier's upper water reservoir, the city's wastewater treatment plant and Canyon Rim Assisted Living Facility, a 35-bed senior care facility- are located in the Wildland Urban Interface. Fire fuels management and defensible space work are critical to the protection of these community assets.

Ideas for Implementation:

- Seek funding for continued fire fuel reduction efforts in the Wildland Urban Interface and within city limits.
- Purchase air- burner for the removal of fire fuels.
- Purchase large-scale chipper for semi-annual chipping events.
- Distribute Defensible Space educational materials via mail, print advertising and social media.
- Partner with Wasco County to host annual wildfire/disaster preparedness event in South Wasco County

Coordinating Organization:	City Council

Internal Partners:	External Partners:
Mosier Volunteer Fire Department	OSFM, USFS, ODF

Potential Funding Sources:	Estimated cost:	Timeline:
FEMA, State, Federal Grants, city funds		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted June 2024

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Proposed Action Item:	**Alignment with Plan Goals:**
WH#4 – Funding for an emergency water storage supply in excess of 5000 gallons around top of Seven Mile Hill.	Emergency Services Enhancement
Alignment with Existing Plans/Policies:	
Wasco County Community Wildfire Protection Plan	
Rationale for Proposed Action Item:	
• Identified need after recent emergencies • Effects entire fire district	
Ideas for Implementation:	
• Research possible grant funding opportunities.	

Coordinating Organization:	City Council	
Internal Partners:	**External Partners:**	
Mosier Fire Department	Mosier Fire District, Wasco County Emergency Management, OSFM, ODF	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
FEMA, State, Federal Grants, city funds		✓ Short Term (0-2 years) Long Term (2-4+ years)
Form Submitted by:		
Action Item Status:	Submitted June 2024	

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Proposed Action Item:	Alignment with Plan Goals:
LH#1 – Grant Funding for Heavy equipment for emergency removal in case of rock fall.	Emergency Services Enhancement

Alignment with Existing Plans/Policies:

Wasco County Natural Hazard Mitigation Plan

Rationale for Proposed Action Item:

- Identified need after recent emergencies
- Would increase response time in case of land slide

Ideas for Implementation:

- Research possible grant funding opportunities.

Coordinating Organization:	City Council

Internal Partners:	External Partners:
	Wasco County Emergency Management, FEMA, ODOT

Potential Funding Sources:	Estimated cost:	Timeline:
FEMA, State, Federal Grants, city funds		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted June 2024

DRAFT

Volume III:
City/Special District Addendum

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Table of Contents

Table of Contents 2
Purpose 9
How was the 2024 Plan and City Addendum Update Developed? 9
How Were the Action Items Developed? 10
City of The Dalles 2024 Mitigation Action Items 11
How Will the Plan be Implemented? 12
Implementation through Existing Programs 12
Continued Public Participation 13
Plan Maintenance 14
The Dalles Community Profile 15
Geography and Climate 15
Population and Demographics 16
Age Trends 17
Diversity Trends 18
Employment and Economics 19
Income Trends 20
Poverty Statistics 21
Housing 21
Land and Development 24
Transportation and Commuting Patterns 24
Commuting Trends 25
Critical Facilities and Infrastructure 26
Historic and Cultural Resources 27
Hazard Analysis and Issue Identification 28

DRAFT

Work Sessions Overview 28
Analysis & Identification Process 28
Natural Hazard Risk Level Ranking Table 31
FEMA National Risk Index 31
Dam Safety 32
Dam Characteristics 32
Dam Failure Probability 33
Dam Vulnerability 35
Dam Resilience 35
Dam Risk 35
Drought 36
Drought Characteristics 36
Drought Probability 40
Drought Vulnerability 40
Drought Resilience 41
Drought Risk 42
Earthquake 42
Earthquake Characteristics 42
Cascadia Subduction Zone 42
Class A Quaternary Faults 43
Earthquake Probability 45
Earthquake Vulnerability 46
Earthquake Resilience 47
Earthquake Risk 48
Flood 48

DRAFT

Flood Characteristics 48
Flood Probability 50
Flood Vulnerability 52
Flood Resilience 53
Flood Risk 53
Landslide 53
Landslide Characteristics 53
Landslide Probability 54
Landslide Vulnerability 54
Landslide Resilience 55
Landslide Risk 55
Severe Weather 56
Extreme Heat 56
Extreme Heat Characteristics 56
Extreme Heat Probability 56
Extreme Heat Vulnerability 60
Extreme Heat Resilience 61
Extreme Heat Risk 62
Storms (Extreme Precipitation) 62
Storm Characteristics 62
Storm Probability 64
Storm Vulnerability 68
Storm Resilience 68
Storm Risk 69
Volcano 69

DRAFT

Volcano Characteristics 69
Volcano Probability 69
Volcano Vulnerability 70
Volcano Resilience 71
Volcano Risk 72
Wildfire 72
Wildfire Characteristics 72
Wildfire Probability 72
Wildfire Vulnerability 74
Wildfire Resilience 75
Wildfire Risk 75
Goals and Action Items 76
What are the Plan Goals? 76
Existing Mitigation Activities 78
Action Items 80
What are the Plan Action Items? 80
Rationale or Key Issues Addressed 80
Coordinating Organization 81
Internal Partners 81
External Partners 81
Plan Goals Addressed 81
Timeline 81
City of The Dalles NHMP Mitigation Action Items Matrix 83
Mitigation Action Items Proposal Forms 91
MH #1 – Evaluate and Prioritize Critical Infrastructure for Hazard Resilience (e.g. Seismic Retrofit, Wildfire Protections) 93

DRAFT

MH#2 - Seek Implementation Funding for Hazard Resilient Modifications to Critical Infrastructure 94

MH#3 - Partner with the County for the Coordination of Special Needs Populations Disaster Education/Outreach & Response 95

MH#4 - Identification and Pursuit of Implementation Funding for Mitigation Actions 96

MH#5 - Annual Review of Natural Hazards Mitigation Plan / Complete Review/Update/Adoption by City Council Every Five Years 97

MH#6 - Secure Emergency Power Supply to Critical Facilities 98

MH#7 - Partner with the County to Implement Education/Outreach/Awareness Activities 99

MH#8 - Small Business Awareness and Continuity Planning 100

MH#9 - Partner with County on All-Hazard Emergency Preparedness 101

MH#10 – Enter Into Supply Contracts and Mutual Aid Agreements 102

MH#11 – Ensure Critical Staff Are Identified and Trained in the NIMS-FEMA Compliant Incident Command System (ICS) 103

MH#12 – Identify Priority Transportation Routes to Access and Connect Critical Facilities 104

DH#1- Develop Long-range Water Resources Plan to Accommodate Current/Project Growth and Mitigate Drought Impact 105

EH#1 – Complete Seismic Upgrades Planned for Municipally-owned Potable Water Steel Reservoirs 106

EH#2 – Complete a Seismic Analysis of the City's Water System 107

FH#1 - Explore the potential for The Dalles to participate in the Community Rating System (CRS) of the National Flood Insurance Program (NFIP) 108

FH#2 - Explore acquisition and management strategies to preserve parks, trails, and open space in the floodplain 109

FH#3 - Update Flood Insurance Rate Maps (FIRMs) 110

FH#4 - Ensure continued compliance with the National Flood Insurance Program 111

FH#5 - Open up Mill Creek tunnel between Thompson Park and the Columbia River, where the creek terminates 112

FH#6 - Chenowith Creek residential flood zone mitigation plan 113

DRAFT

FH#7 - City/County explore funding for flood mitigation on private property via public/private partnerships 114

LH #1 – Update the 2011 landslide hazard study by 2031 to inform zoning within the City UGB ... 115

SH#1 – Coordinate Transportation Division winter weather response planning, supplies and equipment 116

SH #2 – Update The Dalles 2007 Storm Water Master Plan 117

WH#1 - Partner with the County to Implement the Community Wildfire Protection Plan (CWPP). 118

WH#2 – Update The Dalles Municipal Watershed Forest Management Plan 119

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The Dalles City Addendum

Purpose

This document serves as the City of The Dalles' Addendum to the Wasco County Natural Hazards Mitigation Plan (NHMP). The County plan update is scheduled to be sent to FEMA for approval and adopted by the Wasco County Board of Commissioners in October – November 2024. The City of The Dalles' original addendum to Wasco County's NHMP was developed in the spring of 2007. The City conducted an update to its addendum in 2012, for the 2012 NHMP, and again in 2017, for the 2018 NHMP, which coincided with final stages of an update to the Wasco County NHMP. The City's Addendum is considered part of the County's multi-jurisdictional NHMP, and meets the following requirements: (1) Multi-jurisdictional Plan Adoption §201.6(c)(5), (2) Multi-jurisdictional Participation §201.6(a)(3), (3) Multi-Jurisdictional Risk Assessment §201.6(c)(2) (iii), and (4) Multi-jurisdictional Mitigation Strategy §201.6(c)(3) (iv).

A description of the City specific planning and adoption process follows, along with detailed community specific mitigation action items. Information about the City's risk relative to the County's risk to natural hazards is documented in the rationale of the mitigation action items. The rationale indicates how the City's risk is considered greater or lesser than that of the County's. This updated version of The Dalles' City Addendum is followed by a "changes memo" that describes alterations to the document, which took place during the City Addendum update process.

How was the 2024 Plan and City Addendum Update Developed?

In 2023, a multijurisdictional group was convened to update the 2024 Wasco County Natural Hazards Mitigation Plan. Staff from Wasco County and the City of The Dalles and others conducted a climate and hazards vulnerability assessment that has become the foundation to this update. The Dalles participated in Wasco County's collaborative planning process in the following ways.

1. A representative from the City of The Dalles Public Works Department (Eric Hansen, Deputy Public Works Director) served on the Wasco County Natural Hazards Mitigation Steering Committee and participated in developing the Wasco County Natural Hazards Mitigation Plan.

2. Eric Hansen convened an internal working group at the City of The Dalles. Staff members on the working group included the following:

    a. Joshua Chandler, Community Development Department Director;

    b. Daniel Hunter, Human Resources Director

    c. Jill Hoyenga, Regulatory Compliance Manager;

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d. David Mills, Transportation Division Manager

e. Steve Byers, Wastewater Collection Division Manager

f. Jerry Anderson, Water Distribution Division Manager; and

g. Larry McCollum, Water Quality Manager.

3. The Dalles working group participated in an issue identification work session. During this work session the working group identified the City's level of risk to each hazard in comparison to the State and the County's risk assessment. Working group members identified and documented particular natural hazard issues faced by the City with regard to population (with considerations for vulnerable populations), economy, critical facilities, climate change and the environment.

4. The working group reviewed draft actions developed based on the outcomes of the first work session. If the City identified its risk as greater or lesser than the County to certain hazards, this information was included in the rationale of the appropriate action item.

5. City staff updated the City Addendum.

6. The City sent the draft Addendum and attachments to the County working group to review and provide comment. The County assisted the City make appropriate revisions. The plan was sent to the State of Oregon Office of Emergency Management (OEM) and the Federal Emergency Management Agency (FEMA) for review.

7. The plan returned from FEMA with a letter called Approved Pending Adoption. Then, after the County and the cities approved the NHMP, FEMA sent an approval letter that identified their approval date and the expiration date of the NHMP.

The current version of the Addendum reflects changes decided upon during the 2023-2024 meetings. Other documented changes include a revision of the City's Hazard Vulnerability and Issue Identification, Plan Goals, and Community Profile sections. The Public Works Director approved all changes before submittal to the County.

How Were the Action Items Developed?

The City's action items were developed through a two-stage process. In stage one, the Wasco County NHMP Update Steering Committee evaluated County-wide risks and identified potential issues which were then refined by an interdisciplinary team of City staff to be specific to the City. In stage two, City Public Works staff developed potential actions based on the hazards and the issues identified by the working groups. City staff then also cross walked the City's issues with Wasco County's action items, working through the Wasco County NHMP Update Steering Committee to identify opportunities to partner where issues were shared between jurisdictions.

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City of The Dalles 2024 Mitigation Action Items

The following mitigation actions are described in detail in the Action Items Matrix.

- Evaluate and Prioritize Critical Infrastructure for Hazard Resilience (e.g. Seismic Retrofit, Wildfire Protections)
- Seek Implementation Funding for Hazard Resilient Modifications to Critical Infrastructure
- Partner with the County to Coordinate Disaster Education/Outreach & Response for Vulnerable Populations
- Identification and Pursuit of Implementation Funding for Mitigation Actions
- Annual Review of Natural Hazards Mitigation Plan / Complete Review/Update/Adoption by City Council Every Five Years
- Secure Emergency Power Supply to Critical Facilities
- Partner with the County to Implement Education/Outreach/Awareness Activities
- Small Business Awareness and Continuity Planning
- Partner with County on All-Hazard Emergency Preparedness
- Enter Into Supply Contracts and Mutual Aid Agreements
- Ensure Critical Staff Are Identified and Trained in the NIMS-FEMA Compliant Incident Command System (ICS)
- Identify Priority Transportation Routes to Access and Connect Critical Facilities
- Develop Long-range Water Resources Plan to Accommodate Current/Project Growth and Mitigate Drought Impact
- Complete Seismic Upgrades Planned for Municipally-owned Potable Water Steel Reservoirs
- Complete a Seismic Analysis of the City's Water System
- Explore the potential for The Dalles to participate in the Community Rating System (CRS) of the National Flood Insurance Program (NFIP)
- Explore acquisition and management strategies to preserve parks, trails, and open space in the floodplain
- Update Flood Insurance Rate Maps (FIRMs)
- Ensure continued compliance with the National Flood Insurance Program (NFIP)

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- Open up Mill Creek tunnel between Thompson Park and the Columbia River, where the creek terminates
- Develop Chenowith Creek residential flood zone mitigation plan
- City/County explore funding for flood mitigation on private property via public/private partnerships
- Update the 2011 landslide hazard study by 2031 to inform zoning within the City UGB
- Transportation Division winter weather response planning, supplies and equipment
- Update The Dalles Storm Water Master Plan
- Partner with the County to Implement the Community Wildfire Protection Plan (CWPP)
- Update The Dalles Municipal Watershed Forest Management Plan

How Will the Plan be Implemented?

The City Council will be responsible for adopting the City of The Dalles Natural Hazards Mitigation Addendum. This addendum designates a coordinating body and a convener to oversee the development and implementation action items. Because the City Addendum is considered part of the County plan, the City will look for opportunities to partner with the County. When the County's Steering Committee meets to review actions, the City's working group will also meet to review city-specific actions. The Public Works Department will serve as the convener and will be responsible for convening the City's working group. The convener will also remain active in the County's planning process.

Implementation through Existing Programs

Many of the recommendations in the Natural Hazards Mitigation Plan are consistent with the goals and objectives of the City's existing plans and policies. Where possible, the City of The Dalles will implement the Natural Hazards Mitigation Plan's recommended mitigation actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, and can adapt easily to changing conditions and needs. Implementing the Natural Hazards Mitigation Plan's action items through such plans and policies increases their likelihood of being supported and implemented.

In addition to Water, Wastewater, Stormwater and Transportation Master Plans, the City of The Dalles currently has five planning documents that directly relate to natural hazard mitigation:

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- The Dalles Comprehensive Land Use Plan, last revised in February 2024[1], relates to natural hazard mitigation through its section that outlines The Dalles' goals, policies, and implementing measures.

- The Dalles Riverfront Plan, last revised in October 1989, relates to natural hazard mitigation through its land use section, which does not plan for, but has room for natural hazard mitigation planning. The riverfront is listed as being a limited resource that needs to be enhanced and protected, which could mean protection from floods and other hazards.

- The City of The Dalles Land Use and Development Ordinance, last revised in January 2024, outlines which permits are required to develop in areas deemed to have unstable land.[2]

- City of The Dalles Geologic Hazards Study, created in March 2011[3].

- Steel Tank Seismic Evaluation, created in December 2014[4]. The 2024 Water Master Plan will include an updated seismic evaluation.

The working group and the community's leadership have the option to add or implement action items at any time. This allows the working group to consider mitigation strategies as new opportunities arise, such as funding for action items that may not be of the highest priority. When new actions are identified, they should be documented using the action item form. Once a proposed action form has been submitted to the convener, the action will become part of the City's addendum.

Continued Public Participation

Keeping the public informed of the City's efforts to reduce the City's risk to future natural hazards events is important for successful plan implementation and maintenance. The City is committed to involving the public in the plan review and updated process. The City Addendum, as a chapter of County Plan, is posted on the Wasco County and City of The Dalles websites so that the public may view the plan and submit electronic comments to the community at any time.

In addition, the Hazard and Vulnerability information is presented to the public by the City of The Dalles Public Works Department at an informational booth during appropriate events, such as the annual Get Ready Preparedness Event coordinated by NW Natural. Additional

[1] The Dalles, Oregon Comprehensive Land Use Plan (2024) https://library.qcode.us/lib/the_dalles_or/pub/comp_plan, accessed 3/5/2024
[2] The Dalles Municipal Code Title 10 Land Use and Development (2024) ecode360.com/44564006#44564006, accessed 6/3/2024
[3] Mark Yinger, R.G. (2011) *City of the Dalles Geologic Hazards Study.* Sister, OR: Mark Yinger Associates
[4] Berg, P.A. (2014). *Steel Tank Seismic Evaluation.* Corvallis, OR: CH2M HILL

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information dissemination is conducted throughout the year when opportunities present themselves.

Plan Maintenance

The Wasco County Natural Hazards Mitigation Plan will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. During the County plan update process, the City will also review and update its addendum. The convener will be responsible for convening the working group to address the questions outlined below.

- Are there new partners that should be brought to the table?
- Are there new local, regional, state, or federal policies influencing natural hazards that should be addressed?
- Has the community successfully implemented any mitigation activities since the plan was last updated?
- Have new issues or problems related to hazards been identified in the community?
- Are the actions still appropriate given current resources?
- Have there been any changes in development patterns that could influence the effects of hazards?
- Have there been any significant changes in the community's demographics that could influence the effects of hazards?
- Are there new studies or data available that would enhance the risk assessment?
- Has the community been affected by any disasters? Did the plan accurately address the impacts of this event?

These questions will help the working group determine what components of the mitigation plan need updating. The working group will be responsible for updating any deficiencies found in the plan.

The City of The Dalles Natural Hazards Mitigation Addendum includes three sections:

1. The Dalles Community Profile describes community vulnerability,
2. Hazard Vulnerability and Issue Identification, and
3. Action Items Matrix and detailed action items forms.

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The Dalles Community Profile

This section provides information on the characteristics of The Dalles, in terms of geography, environment, population, demographics, employment and economics, as well as housing and transportation. Many of these community characteristics can affect how natural hazards impact communities and how communities choose to plan for natural hazard mitigation. Considering these characteristics during the planning process can assist in identifying appropriate measures for natural hazard mitigation.

Geography and Climate

The Dalles is located in the Mid-Columbia Gorge at 45° N latitude and 121° S longitude. The elevation of the City is 102 to 400[5] feet above sea level. The area of the City estimated by the US Census Bureau is 5.63 square miles. The Dalles is located along the Columbia River, the nation's second largest river defined by the volume of water it carries. The closest major city is Hood River, which is 21 miles away. Portland, the largest City in the State is located 83 miles to the west.

The climate in The Dalles varies throughout the seasons, each with its own dominant weather patterns. In the summer, temperatures range between 58° F and 85° F. During the winter, the temperature ranges from an average low of 30° F and high of 44° F. At lower elevations, the City receives an average of 4.6 inches of snow during the winter (19.8 inches according to more widely varying 100+ year data). The annual average rainfall is approximately 14.6 inches.

Table 1: Period of Record General Climate Summary, The Dalles, OR (358407)

Month	Average Max. Temperature (degree F)	Average Min. Temperature (degree F)	Average Temperature (degree F)	Average Total Precipitation (inches)	Average Total SnowFall (inches)
January	41.4	28.4	34.9	2.5	9.6
February	48.3	31.3	39.8	1.8	2.9
March	57.6	36.0	46.8	1.2	0.7
April	66.0	41.3	53.7	0.7	0.0
May	73.5	47.7	60.6	0.6	0.0
June	79.9	54.0	67.0	0.5	0.0
July	87.8	58.9	73.4	0.2	0.0
August	87.4	57.6	72.5	0.2	0.0
September	79.8	50.3	65.1	0.5	0.0
October	67.2	42.0	54.6	1.0	0.0

[5] Fujitani Hilts & Associates. (1991). *Landslide Hazard Study South Slope Area The Dalles, Oregon.* Portland, OR: Fujitani Hilts & Associates.

DRAFT

Month	Average Max. Temperature (degree F)	Average Min. Temperature (degree F)	Average Temperature (degree F)	Average Total Precipitation (inches)	Average Total SnowFall (inches)
November	51.6	35.0	43.3	2.3	2.1
December	43.0	30.8	36.9	2.6	4.5
Annual	**65.3**	**42.8**	**54.0**	**14.0**	**19.8**

Source: Western Regional Climate Center, Western US Climate Historical Summaries, 1/1/1893 to 4/30/2016

Population and Demographics

The Dalles was initially incorporated by the Oregon Territorial Government in 1857 and was made the county seat shortly thereafter.[6] The site of the City was a major trade center for Native Americans for at least 10,000 years, and the surrounding area (Horsethief Lake, Wakemap Mound, Atlatl Valley, Roadcut) comprises one of the most significant archaeological regions in North America. The City's location next to treacherous rapids on the Columbia River, called "Le Grand Dalles de la Columbia" by French Canadian fur traders, positioned the City to become a hub for the east-west passage of trade and distribution of goods as well as early settlers to the Pacific Northwest. Today The Dalles still serves as a trading hub for the Mid-Columbia area shipping agricultural crops and wood products. The Dalles provides easy access to recreational opportunities, cultural and historical sites. [7]

Table 2 presents a profile of City of The Dalles demographics from the 2010 and 2020 Census. This includes the total area the Urban Growth Boundary (UGB) of The Dalles, not just city limits. It also presents the estimated population of this area in 2023 based on PSU estimates.

- The Dalles is a City of over 16,400 people (City), and over 17,550 people (UGB), located in Wasco County in the Columbia River Gorge on the northern border of Oregon.
- Based on the UGB population, The Dalles is the 38th largest city in the state by population, and the largest city in Wasco County.
- The Dalles has experienced moderate growth, growing 11% since 2010 within the UGB. In contrast, Wasco County and the State experienced population growth of 5.4% and 11.4% respectively. (US Census and PSU Population Research Center)
- The Dalles is home to an estimated 6,800 households in 2023, an increase of roughly 425 households since 2010. The percentage of families fell somewhat between 2010 and 2023 from 62.9% to 60.5% of all households. Average household size has remained flat during this period. The city has a similar share of family households as Wasco County (63.2%) and the State (61.9%).

[6] City of Dalles Oregon (2018) website, accessed 2/21/2018
[7] Historic The Dalles website, Wasco County Pioneer Association, accessed 2/21/2018

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- The Dalles' average household size is 2.51 persons as of the 2020 Census. This is somewhat larger than the Wasco County average of 2.47 and the statewide average of 2.44. [8]

Table 2: Populations, Households, Families, and Year-Round Housing Units

	2010 (Census)	2020 (Census)	Growth 2010-20	2023 PSU	Growth 2020-23
Population[9]	15,792	17.124	8%	17,552	2%
Households[10]	6,345	6,708	6%	6,768	1%
Families[11]	3,990	4,060	2%	4,096	1%
Housing Units[12]	6,776	7,079	4%	7,171	1%
Group Quarters Population[13]	469	515	10%	529	3%
Household Size (non-group)	2.4	2.51	5%	2.51	0%
Average Family Size	3.15	3.16	0%	3.16	0%

Source: U.S. Census Bureau, PSU Population Center and Johnson Economics.
Census Tables: DP-1; DP-3 (2000); S110; S19301.

Age Trends

The following figure shows the share of the population falling in different age cohorts between the 2000 Census and the most recent 5-year American Community Survey estimates. As Table 3 shows, there is a general trend for middle-age cohorts to fall as share of total population, while older cohorts have grown in share. This is in keeping with the national trend caused by the aging of the Baby Boom generation. At the same time, the number of younger people has remained fairly steady as a share of population.

- In general, the distribution of the population is shifting upwards in age as the Baby Boom generation is well into the retirement years (currently roughly 60 to 80 years of age).
- An estimated 81% of the population is under 65 years of age, and 21% of the population consists of children under the age of 15.
- Wasco County in comparison features a smaller share of people in younger cohorts, and larger share of those aged 55 to 74 years.
- As of the 2021 ACS, the estimated local median age was 39 years, compared to 40 years in Oregon.
- The greatest growth was in the 55 to 64 age range, coinciding with the center of the Baby Boom cohort. This cohort grew from 9% to 12% of the population.

[8] Johnson Economics. (2023). City of The Dalles, OR Housing and Residential Land Needs Assessment 20-Year Housing Need 2023 – 2043. Portland, OR: Johnson Economics. Pp 2-3.
[9] From PSU Population Research Center, growth rate 2010-2022 extended to 2023.
[10] 2021 households = (2021 population – Group Quarters Population)/2021 Household size.
[11] Ratio of 2023 families to total households is based on 2020 Census.
[12] 2021 housing units are the 2020 Census total plus new units permitted from 2020 – 2022 (source Census, City).
[13] Ratio of 2023 Group Quarters Population to Total Population is kept constant from 2020.

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- 19% of the population is now 65 years or older.[14]

Table 3: Age Cohort Trends, 2000 – 2021

Age Cohort	The Dalles 2000 (Census)	The Dalles 2021 (ACS 5-yr Estimate)	Change between 2000 and 2021	Wasco County 2021 (ACS 5-yr Estimate)
Under 15 years	20%	21%	1% increase	19%
15-24 years	12%	12%	No change	11%
25-34 years	11%	13%	2% increase	13%
35-44 years	14%	13%	1% decrease	13%
45-54 years	16%	10%	6% decrease	11%
55-64 years	9%	12%	3% increase	14%
65-74 years	8%	10%	2% increase	13%
75-84 years	7%	5%	2% decrease	5%
85+ years	3%	3%	No change	3%

Note: 2021 Percentages do not total 100% presumably due to rounding issues.
Source: U.S. Census, Johnson Economics LLC
Census tables: DP-1 (2000); S0101 (2021 ACS 5-yr Estimates)

Diversity Trends

The impact of disasters, in terms of loss and the ability to recover from a hazard event, varies among population groups. A disproportionate burden is placed upon those with access and functional needs, particularly minorities and the poor, who typically lack the financial resources to recover from the impact of disasters.

The Dalles is roughly 74% white with a smaller share of other racial groups. Wasco County has a similar share of white residents (74%), while Oregon is 75% white.

The Hispanic or Latino community has increased more significantly in The Dalles. From roughly 2,300 individuals in the 2010 Census, or 17% of the population, the Latino population grew by over 1,200 people by the 2020 Census, to roughly 3,560 people, or 22% of the population. This is higher than the 18% Latino population in Wasco County, and higher than the 14% share across the state. (The Census tracks Latino heritage as a separate ethnic category and not as a racial category. Those identifying as Latino, may also fall into any of the racial categories.)

Table 4: Racial Diversity, 2020

	2020 (Census)
White	74%
Latino (of any race)	22%
Two or more races	13%
Other race	9%
Native American	2%
African American	1%
Asian	1%
Pacific Islander	1%

[14] Johnson Economics. (2023). City of The Dalles, OR Housing and Residential Land Needs Assessment 20-Year Housing Need 2023 – 2043. Portland, OR: Johnson Economics. Pp 5-6.

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Note: 2020 Percentages total 126% presumably due to the design of the U.S. Census survey.
Source: U.S. Census, Johnson Economics LLC
Census tables: DP-1 (2020)

Immigration

The 2021 American Community Survey, estimates 8.5% of The Dalles' population is foreign-born, up from 7% in 2000. Of these, 73% were born in Latin America, 17% were born in Europe, and roughly 6% were born in Asia.

As of 2021, the percentage of the population speaking a language other than English at home was 14%, up from 12% in 2000.[15]

Disability

In The Dalles among the civilian noninstitutionalized population in 2018-2022, 18.9 percent reported a disability. The likelihood of having a disability varied by age - from 7.2 percent of people under 18 years old, to 16.8 percent of people 18 to 64 years old, and to 40.2 percent of those 65 and over.[16]

Social Vulnerability Index

The Centers for Disease Control and Prevention (CDC) has calculated a social vulnerability index to assess community resilience to externalities such as natural hazard events. It employs fifteen social vulnerability factors and uses data from the US Census Bureau's American Community Survey. The index is reported in quintiles (1–5). Social vulnerability scores do not vary by hazard.

According to the CDC Social Vulnerability Index, Wasco, Umatilla, and Morrow Counties are highly socially vulnerable and the most vulnerable in the Oregon Natural Hazard Mitigation designation, Region 5: Mid-Columbia, Gilliam, Hood River, Morrow, Sherman, Umatilla, and Wasco Counties.

Wasco County's high vulnerability is driven by moderately high scores across the CDC index. Notably, however, the county scores in the 80th percentile for its share of residents without a high school diploma, percentage of residents that speak English less than "well," and percentage of persons living in institutionalized group quarters.[17]

Employment and Economics

The Dalles serves as the center of commerce for the Mid-Columbia area that includes Wasco, OR; Hood River, OR; Sherman, OR; Skamania, WA; and Klickitat, WA counties. The Mid-Columbia region has weathered the last several recessions comparatively well as a result of the diversity of businesses in the region. Community leaders are working to

[15] Johnson Economics. (2023). City of The Dalles, OR Housing and Residential Land Needs Assessment 20-Year Housing Need 2023 – 2043. Portland, OR: Johnson Economics. Pp 6.
[16] US Census Bureau, 2022 American Community Survey 5-year Estimates Narrative
[17] State Interagency Hazard Mitigation Team. (2020). *Oregon Natural Hazards Mitigation Plan*. Salem, OR: Oregon Department of Land Conservation and Development.

DRAFT

strengthen several diverse industry sectors to improve regional resiliency from economic shocks. Regional key industry sectors include: natural resources and value-added agriculture, manufacturing/beverage manufacturing, tech: unmanned systems, healthcare, utilities and renewable energy, and art/culture/tourism/recreation.[18]

According to the 2018-2022 American Community Survey, The Dalles, 56.3 percent of the population 16 and over were employed; 39.1 percent were not currently in the labor force. The civilian employed population 16 years and older in The Dalles worked in the industries shown in Table 5.

Table 5: Industry Employment, The Dalles, 2018-2022

Industry	Percent of Employment 2022	Percent of Employment 2016	Change
Educational services, and health care and social assistance	24.8%	27.2%	-2.4%
Retail trade	11.6%	16.0%	-4.4%
Arts, entertainment, and recreation, and accommodation and food services	10.8%	9.5%	1.3%
Professional, scientific, and management, and administrative and waste management services	8.9%	8.9%	0.0%
Manufacturing	8.3%	6.8%	1.5%
Public administration	8.3%	3.7%	4.6%
Construction	6.0%	5.7%	0.3%
Other services, except public administration	5.5%	3.7%	1.8%
Agriculture, forestry, fishing and hunting, and mining	4.7%	5.2%	-0.5%
Transportation and warehousing, and utilities	4.7%	3.4%	1.3%
Finance and insurance, and real estate and rental and leasing	3.2%	3.7%	-0.5%
Wholesale trade	2.0%	3.8%	-1.8%
Information	1.3%	2.4%	-1.1%

Source: US Census, 2018-2022 American Community Survey 5-Year Estimates

Income Trends

The Dalles' estimated median household income was $62,000 in 2023. This is roughly 7% higher than the Wasco County median of $57,800.

- The Dalles' per capita income is roughly $37,300.

[18] 2017-2022 & 2022-2027 Columbia Gorge Economic Development Strategy, Mid-Columbia Economic Development District

DRAFT

- Median income has grown an estimated 49% between 2010 and 2023, in real dollars. Inflation was an estimated 38% over this period, so the local median income has outpaced inflation.

- The household median annual income increased faster in 2022 than the rate of inflation by a larger margin than any study period since 2005.[19]

An estimated 72.3 percent of households received earnings. An estimated 37.2 percent of households received Social Security and an estimated 25.4 percent of households received retirement income other than Social Security. The average income from Social Security was $20,629. These income sources are not mutually exclusive; that is, some households received income from more than one source.[20]

Poverty Statistics

Following the Office of Management and Budget's (OMB) Statistical Policy Directive 14, the Census Bureau uses a set of money income thresholds that vary by family size and composition to determine who is in poverty. If a family's total income is less than the family's threshold, then that family and every individual in it is considered in poverty. The official poverty thresholds do not vary geographically, but they are updated for inflation using the Consumer Price Index (CPI-U). The official poverty definition uses money income before taxes and does not include capital gains or noncash benefits (such as public housing, Medicaid, and food stamps).[21]

According to the US Census, the official poverty rate in The Dalles is an estimated 9.5% over the most recent period reported (2021 5-year estimates). This is roughly 1,470 individuals in The Dalles. In comparison, the official poverty rate in Wasco County is a similar 9.7%, and at the state level is 12%. In the 2017-21 period:

- The Dalles poverty rate is low among most groups, but highest among children at 11%. The rate is 9% among those aged 18 to 64 years. The estimated rate for those 65 and older is 8%.

- For those with only a high school diploma, the poverty rate is 11%. For those with higher rates of education, that rate falls to 3%.

- Among those who are employed the poverty rate is just 4%, while it is 13% for those who are unemployed.[13]

Housing

Housing type and year-built dates are important factors in mitigation planning. Certain housing types tend to be less disaster resistant and warrant special attention: mobile homes, for example, are generally more prone to wind and water damage than standard stick-built homes.

[19] Johnson Economics. (2023). City of The Dalles, OR Housing and Residential Land Needs Assessment 20-Year Housing Need 2023 – 2043. Portland, OR: Johnson Economics.
[20] US Census Bureau, 2022 American Community Survey 5-year Estimates Narrative
[21] U.S. Census Bureau. (2023, June 15). How the Census Bureau Measures Poverty. Retrieved from U.S. Census Bureau: census.gov/topics/income-poverty/poverty/guidance/poverty-measures.html

DRAFT

Generally, the older the home is, the greater the risk of damage from natural disasters. This is because stricter building codes have been developed following improved scientific understanding of plate tectonics and earthquake risk. For example, structures built after the late 1970s in Oregon use earthquake resistant designs and construction techniques in accordance with building code. In addition, FEMA began assisting communities with floodplain mapping during the 1970s. Communities used this information to develop ordinances that required homes in the floodplain to be elevated to one foot above Base Flood Elevation (BFE).

Type of Housing Stock

The Dalles UGB had an estimated 6,768 housing units in 2023, with a vacancy rate of 5% (includes ownership and rental units). The housing stock has increased by roughly 400 units since 2010, or growth of 6%.

Table 6 shows the estimated number of units by type as of 2021. Detached single-family homes represent an estimated 68% of housing units. Larger apartment complexes of five or more units represent 12% of units, and mobile homes represent 9.4%. Smaller attached units such as townhomes, and "plexes" represent a combined 10% of units. (Attached single family generally includes townhomes, some condos, and plexes which are separately metered.)

As shown in Table 6, the Census provides an estimate of the share of households living in RV's, boats, or other unconventional homes. Note that the City of the Dalles, like most cities, does not consider these to be permanent dwellings or part of the long-term housing stock. [22]

The median value of owner occupied housing in 2010 was $181,200 and in 2016 was $177,500. In 2018-2022, the median property value for owner-occupied houses in The Dalles city, Oregon was $284,100.[23]

Table 6: Housing Type Summary, The Dalles, 2021

	The Dalles	Wasco County
Single Family Detached	67.7%	66%
5+ Units Multi-family Residential	12.3%	8%
Manufactured Homes	9.4%	18%
3- or 4-Plex	4.4%	3%
Single Family Attached	3.3%	2%
Duplex	2.2%	1%
Boat, Recreational Vehicle, Other	0.7%	1%

Source: U.S. Census
Census Tables: B25032 (2021 American Community Survey 5-year Estimates

[22] Johnson Economics. (2023). City of The Dalles, OR Housing and Residential Land Needs Assessment 20-Year Housing Need 2023 – 2043. Portland, OR: Johnson Economics.
[23] U.S. Census Bureau, American Community Survey, 5 year Estimates, 2010, 2016 & 2018-2022

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Age of Housing Stock

The Dalles' housing stock reflects the pattern of settlement in the area. Nearly 85% of the housing stock is pre-1990 with the remainder being post-1990. 45% of the housing stock dates from the 1950's or earlier. Owner-occupied households are somewhat more likely to live in newer housing on average, and renter households in older housing.[24]

Most of the housing units heated by electricity (78.3%). Gas is the next most common heating fuel (17.8%), note that this category includes utility, bottled, tank, or LP gas. The percentage of homes heated with electricity and gas has increased slightly.[25]

Seismic Building Code in Oregon

In 1974, a statewide building code was adopted as a means to bring the building criteria for every city and county under one all-inclusive code. Chapter 23, Earthquake Regulations, Section 2314 dealt with the structural design criteria for all structures. All of Oregon was deemed to be in Seismic Risk Zone 2, which equated to the structure being subjected to moderate damage seismic event equivalent to intensity VII on the Modified Mercalli Intensity Scale (M.M.) and carried a 0.5 multiplier value in the formulation.

Over the years, new faults were discovered and seismic risk was updated accordingly. Throughout the updates, the City's seismic building code requirements have remained consistent to structures being subjected to moderate damage seismic event equivalent to intensity VII on the Modified Mercalli Intensity Scale (M.M.). However, the seismic code for this risk assignment has changed.

- 1978 the Seismic Risk Zone for Oregon did not change but code changes resulted in about a 5-percent increase in base shear.
- A significant shift occurred in the 1988 when the formulation to determine base shear changed to include a more precise designation of the type of lateral force resisting system.
- With the adoption of the 1991 UBC (1993 OSSC), additional significant changes occurred in the treatment of seismic loading and analysis.
- Effective Oct. 1, 1998, the formulation for determining seismic base shear was revised with factors that considered location to known seismic faults and soils conditions at the site.[26]

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[24] Johnson Economics. (2023). City of The Dalles, OR Housing and Residential Land Needs Assessment 20-Year Housing Need 2023 – 2043. Portland, OR: Johnson Economics. Pp 12
[25] U.S. Census Bureau, American Community Survey, 5 year Estimates, 2018-2022
[26] Judson, S. (2012) Earthquake Design History. Salem, OR: State of Oregon Building Codes Division.

Table 7: Housing Stock by Age, The Dalles, 2021

Year Built	The Dalles	Wasco County	Seismic Building Code – Oregon
1939 or earlier	21%	25%	
1940 - 1969	31%	35%	
1970 - 1979	13%	14%	1974 first building code; Oregon Seismic Risk Zone 2
1980 - 1989	4%	10%	1988 Oregon Seismic Risk Zone 2B
1990 - 1999	12%	7%	1993 Eastern Oregon Seismic Risk Zone 2B
2000 - 2009	8%	2%	2004 2,500-year return period earthquake versus a 500-year return period in previous addition
2010 - 2019	11%	7%	2017 Wasco County Seismic Design Category C

Source: U.S. Census; State of Oregon Building Codes Division

Census Tables: B25036 (2021 American Community Survey 5-year Estimates

Land and Development

Land use goals in the City are maintained in the comprehensive plan, which is consistent to the state-wide land use goals set by the Department of Land and Development Conservation (DLCD).[27]

The Dalles Municipal Code Title 10 Land Use and Development encourages the most appropriate and efficient use of land; to accommodate orderly growth; to provide adequate public parks and open space; to protect and improve the aesthetic and visual qualities of the living environment; to aid in securing safety from fire, natural disaster, and other dangers; to facilitate the adequate provision of public improvements and sanitary conditions; to provide adequate access to and through property; to assist the public in identifying and understanding regulations affecting the development and use of specific parcels of land; to promote the public health, safety and general welfare; and, to implement the City of The Dalles Comprehensive Plan and to guide and manage the future growth in the City in accordance with that Plan.[28]

Transportation and Commuting Patterns

The City is located in close proximity to Interstate 84, which is the major east/west corridor, and Highway 197, which runs north and south. There is rail service, Greyhound / charter bus services, and marine service local in the area. The Dalles Municipal Airport is located two miles northeast of the City across the Columbia River in Dallesport and is jointly owned by the City of The Dalles and Klickitat County.

Transportation is an important consideration when planning for emergency service provisions. Growth within the City is likely put pressure on both major and minor roads, especially if the main mode of travel is by single occupancy vehicles. How people travel to work is indicative of the prevalence of single occupancy vehicle travel, and can help predict the amount of traffic congestion and the potential for accidents.

[27] The Dalles, Oregon Comprehensive Land Use Plan. February 2024. Accessed online: 3/36/2024

[28] eCode360. (2024, May 14). Chapter 10.1 General Provisions. Retrieved from The Dalles Municipal Code. ecode360.com/44564007.

DRAFT

The majority of the inhabitants in the City commute to work by single occupancy automobile:

- 81.1-percent in 2018-2022 according to the American Community Census 2022;
- 78.2-percent in 2016 according to the previous City Addendum;
- 88.5-percent in 2010 according to the previous City Addendum.

8.5-percent of City inhabitants commute to work via carpooling or public transportation, and just over four percent walk or ride their bike to work instead of driving. 6.2-percent worked from home. [29]

Commuting Trends

This section provides an overview of employment and industry trends in The Dalles that are related to commuting. Though the distance traveled by commuters from out of town is generally within 20 miles, based on the high number of such commuters, disaster planning in The Dalles should consider potential shelter in place needs for commuters from elsewhere.

Figure 1 shows the inflow and outflow of commuters to The Dalles according to the Census Employment Dynamics Database. These figures reflect "covered employment" as of 2019, the most recent year available. Covered employment refers to those jobs where the employee is covered by federal unemployment insurance. This category does not include many contract employees and self-employed and therefore is not a complete picture of local employment. The figure discussed here is best understood as indicators of the general pattern of commuting and not exact figures.

As of 2020, the Census estimated there were roughly 7,670 covered employment jobs located in The Dalles. Of these, an estimated 3,200 or 42%, were held by local residents, while roughly 4,500 employees commuted into the city from elsewhere. This general pattern is fairly common among many communities within commuting distance to the Metro area. The most common places of residence of workers commuting into the city are Chenoweth, Hood River and Mosier.

Similarly, of the estimated 7,300 employed The Dalles residents, 56% of them commute elsewhere to their employment. The most common destinations for The Dalles commuters are Hood River and Portland.[30]

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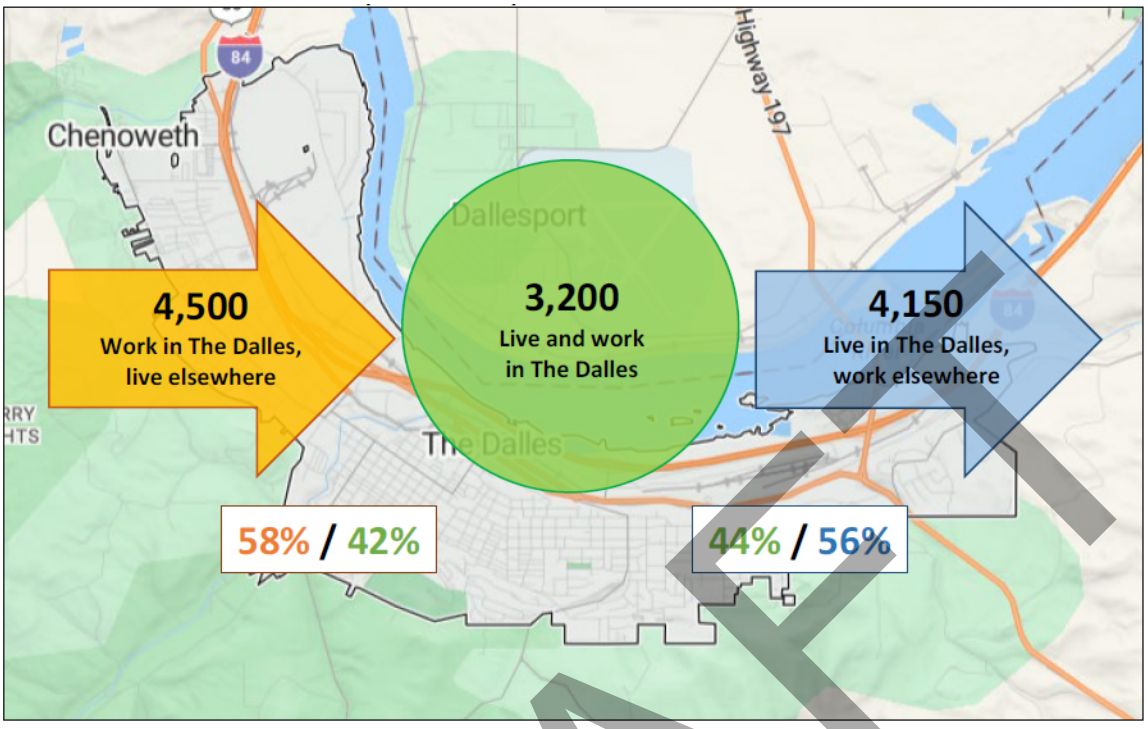
[29] US Census Bureau, 2022 American Community Survey 5-year Estimates

[30] Johnson Economics. (2023). City of The Dalles, OR Housing and Residential Land Needs Assessment 20-Year Housing Need 2023 – 2043. Portland, OR: Johnson Economics. Pp 8-9.

Figure 1: Commuting Patterns (Primary Jobs), The Dalles



Source: U.S. Census Longitudinal Employer-Household Dynamics, via Johnson Economics.

Critical Facilities and Infrastructure

Critical facilities support government and first responders' ability to take action in an emergency. They are a top priority in any comprehensive hazard mitigation plan. Individual communities should inventory their critical facilities to include locally designated shelters and other essential assets.

A critical energy dependent infrastructure list was updated by the working group in 2017. In 2024, the working group decided to include Chenowith Water PUD infrastructure since about 30-percent of City inhabitants are served from this utility. Critical facilities within City limits, owned by the City of The Dalles or serving the inhabitants of the City are listed in Table 8. A memorandum that provides a detailed inventory is saved in the plan development folder.

Table 8: Critical Infrastructure and Facilities Inventory, The Dalles, 2024

Infrastructure/Facility	Number
Airport	1
Civic	12
Communications	4
Dam	2
Electric Utility	1
Wasco County Emergency Operations Center	1
Fire Station	2

DRAFT

Infrastructure/Facility	Number
Fuel Station	1
Hospital	1
Medical Clinic/Urgent Care	4
Police	3
School	10
Wastewater	9
Water Supply	18

Historic and Cultural Resources

Historic and cultural resources such as historic structures and landmarks can help define a community and may also be sources of tourism dollars. Because of their role in defining and supporting the community, protecting these resources from the impact of disasters is important. Two historic districts are listed within the City limits.

The Dalles Commercial Historic District was originally registered with the National Parks Service as a historic district in 1989, the registration was updated in 1998. The District is located downtown bounded by I-84; Laughlin Street; Fifth Street; Midblock between Union and Liberty Streets.[31]

Trevitt's Addition Historic District was registered with the National Parks Service as a historic district in 1995. The District is adjacent to the commercial district, encompassing about 24.5 acres. The irregular shaped Trevitt's Addition Historic District is bounded on the north by the West Second Street (the re-aligned Columbia River Highway or U.S. Highway 30). The eastern boundary extends south along the east side of Pentland Street then jogs to the east following West Third Street until its intersection with Lincoln Street. The boundary then continues south along the east side of Lincoln Street until its intersection with the alley between West Third Street and West Fourth Street. The boundary then extends along the north side of the alley until its intersection with Liberty Street. Liberty Street defines the eastern boundary (including two tax lots on the east side of Liberty). [32]

The National Register of Historic Places lists many historic buildings and landmarks in The Dalles.

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[31] U.S Dept. of the Interior National Parks Service. (1998, April 20). National Register of Historic Places Continuation Sheet. Retrieved from NP Gallery Digital Asset Management System: npgallery.nps.gov/GetAsset/aa3c5865-2bcd-4828-8da9-bc2da51cc1f3/.

[32] U.S Dept. of the Interior National Parks Service. (1995, June 20). National Register of Historic Places Continuation Sheet. Retrieved from NP Gallery Digital Asset Management System: npgallery.nps.gov/pdfhost/docs/NRHP/Text/95000686.pdf.

Table 9: Registered Historic Sites, The Dalles 2017

National Registry Status	Number of Properties
Listed Within a National Historic District	160
Listed Individually	22
Both	7

Source: Oregon Historic Sites Database, accessed 3/6/2024

Hazard Analysis and Issue Identification

Work Sessions Overview

In September 2017, the City staff conducted a series of meetings in order to develop community-specific action items for the City's addendum to the Wasco County Natural Hazards Mitigation Plan.

In 2024 the action items were hazard analysis and action items were reviewed by the City's internal working group.

Analysis & Identification Process

During meetings, participants provided comments on the City's risk and to identify specific hazard related issues. The action items were updated accordingly. Participants reviewed and updated draft versions during addendum development. Changes were made where appropriate to reflect changes in perception to the City of The Dalles' risk to natural hazards.

Via email, participants reviewed and updated the list of critical facilities owned by the City and that serve inhabitants of the City.

Two reports that informed the 2017 City of The Dalles Risk Assessment:

- the *Natural Hazard Risk Report for Wasco County, Oregon Including the Cities of Antelope, Dufur, Maupin, Mosier, Shaniko, The Dalles, and Unincorporated Communities of Chenoweth, Tygh Valley, Pine Hollow, and the Warm Springs Indian Reservation* by the Oregon Department of Geology and Mineral Industries (DOGAMI) (draft dated 8/3/2018) and
- the *Future Climate Projections Wasco County* report prepared by the Oregon Climate Change Research Institute (OCCRI) in August 2018.

These two reports provide important analysis related to the natural hazards identified in Table 10 and how they are impacted related to climate projections. The reports can be found on the Wasco County Planning website, under Long Range – Natural Hazard Mitigation Plan in the Additional Information section.

Of note, the *DOGAMI Risk Report* includes the natural hazards of earthquakes, flood, landslides, wildfire, lahar/volcanoes, and channel migration. Channel migration was not a hazard identified by the Wasco County NHMP Steering Committee and is not discussed in detail in the NHMP. The

DRAFT

Risk Report does not include severe weather and drought, which are two of the natural hazards identified by the Wasco County NHMP Steering Committee and the City of The Dalles Working Group.

DOGAMI describes the purpose of the *Risk Report*:

"The purpose of this project is to help communities in the study area better understand their risk and increase resilience to natural hazards that are present in their community. This is accomplished by providing them with accurate, detailed, and up to date information about these hazards and by measuring the number of people and buildings at risk.

The main objectives of this study are to:

- Compile and/or create a database of critical facilities, tax assessor data, buildings, and population distribution data
- Incorporate and use existing data from previous geologic, hydrologic, and wildfire hazard studies
- Perform exposure and Hazus-based risk analysis
- Share this report widely so that all interested parties have access to its information and data

The body of this report describes the methods and results for these objectives. Two primary methods (Hazus-MH or exposure) depending on the type of hazard, were used to assess risk. We describe the methods for creating the building and population information used in this project. Results for each hazard type are reported on a countywide basis, and community based results are reported in detail in the community profiles."

The *Risk Report* includes information about critical facilities such as what they are, where they are, what the monetary value of them is, and so forth. These critical facilities are important to note because of the essential role they play in recovery efforts. DOGAMI was provided a list of the Wasco County critical facilities, including the City of The Dalles, prepared by the Steering Committee. There are some differences in what DOGAMI includes in the *Risk Report* versus what is included in the NHMP, in terms of critical facilities. See also the subsection "Critical Facilities and Infrastructure" in the Wasco County section for additional details.

OCCRI's *Future Climate Projections Wasco County* and the *Climate Change Influence on Natural Hazards in Eight Oregon Counties: Overview of County Reports*, provide important information regarding the influence and impacts of climate change on existing natural hazards events such as heavy rains, river flooding, drought, heat waves, cold waves, wildfire, and air quality.

Each county report describes county-specific projected changes in climate metrics related to 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.

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The City will continue to consult the DOGAMI report to prioritize proposed actions before implementation.

Two additional resources informed the 2024 City of The Dalles hazard analysis:

- The 2020 Oregon Natural Hazard Mitigation Plan (NMHP) Region 5 Risk Assessment was reviewed. The format of the addendum was updated to align with the methodology and reporting framework used by the State of Oregon. Where appropriate, the City reviewed the sources cited in the Oregon NHMP to ensure the most up-to-date information.
- City of The Dalles Incident Command System records archived for incidents since 2018.

Numerous other hazard analysis resources are cited as footnotes for easy access to original material.

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Natural Hazard Risk Level Ranking Table

Table 10: Comparison of Wasco County and City of The Dalles Revised Risk Level Ranking

Hazard	OR NHMP Rating	Wasco Co. Rating	City Rating	Detail
Drought	High	High	High	The Dalles Municipal Watershed is at the greatest risk
Earthquake	High	Medium	High	Crustal quake events are most likely near The Dalles where identified faults exist
Flood	Very High	Medium	High	The Columbia River historically floods annually in The Dalles at Union Street
Landslide	Very High	Low	Medium	The Dalles has an identified slide area within the City limits that is actively mitigated
Severe Weather	High	High	High	Extreme heat events, summer thunderstorm and windstorm, blizzard, ice storm or snow storm
Volcano	High	Low	High	The Dalles may be impacted by a volcanic eruption at any time (particularly from Mt. Hood and Mt. Adams)
Wildfire	Very High	Medium	High	The Dalles Municipal Watershed is at the greatest risk

Source: 2020 Oregon Natural Hazard Mitigation Plan; 2018 Wasco County Multi-Jurisdictional Natural Hazard Mitigation Plan; 2024 City of The Dalles Working Group

FEMA National Risk Index

The FEMA Risk Index includes three components:

- A natural hazard component expressed as expected annual loss.
- A consequence enhancing component expressed as structural and/or social vulnerability.
- A consequence reduction component expressed as community resilience.

This section of the City Addendum addresses each of these components to the degree possible.[33]

[33] Federal Emergency Management Agency. (n.d.) National Risk Index. Retrieved from Department of Homeland Security. hazards.fema.gov/nri/determining-risk. Accessed 4/11/2024.

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Dam Safety

The Oregon Water Resources Department (OWRD) is the state authority for dam safety with specific authorizing laws and implementing regulations. Oregon's statutory size threshold for dams to be regulated by OWRD is at least 10 feet high and storing at least 3 million gallons.

Oregon's dam safety laws were re-written by HB 2085 which passed through the legislature and was signed by Governor Brown in 2019. This law became effective on July 1, 2020.[34] Dam safety rules had not been updated since 1929.[35]

The City of The Dalles owns and operates Crow Creek Dam, Certificate 44917, located on South Fork Mill Creek in The Dalles Municipal Watershed. The dam is certificated for municipal use of 955.00-acre feet (311.19 million gallons).[36]

Dam Characteristics

Under normal loading conditions dams are generally at very low risk of failure. Specific events are associated with most dam failures. Events that might cause dams to fail include:

- An extreme flood that exceeds spillway capacity and causes an earthen dam to fail;
- Extended high water levels in a dam that has no protection against internal erosion;
- Movement of the dam in an earthquake; and
- A large rapidly moving landslide impacting the dam or reservoir.[37]

Where a dam's failure is expected to result in loss of life downstream of the dam, an Emergency Action Plan (EAP) must be developed. The EAP contains a map showing the area that would potentially be inundated by floodwaters from the failed dam. These dams are often monitored so that conditions that pose a potential for dam failure are identified to allow for emergency evacuations.

The current Crow Creek Dam EAP was published in 1999.

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[34] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.
[35] Perkowski, M. (2019, June 7). Dam safety overhaul approved by Oregon lawmakers. Retrieved from East Oregonian: eastoregonian.com/news/state/dam-safety-overhaul-approved-by-oregon-lawmakers/article_130f2a91-c339-531e-bdad-f144bf4b6a3f.html. Accessed 5/14/2024.
[36] Oregon Dept. of Water Resources. (2024, May 14). Water Rights Information Query. Retrieved from Oregon Dept. of Water Resources: apps2.wrd.state.or.us/apps/wr/wrinfo/wr_details.aspx?snp_id=97316. Accessed 5/14/2024.
[37] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.

Dam Hazard Rating

Oregon follows national guidance for assigning hazard ratings to dams and for the contents of Emergency Action Plans, which are now required for all dams rated as "high hazard." Each dam is rated according to the anticipated impacts of its potential failure. The state has adopted these definitions (ORS 540.443–491) for state-regulated dams:

- "High Hazard" means loss of life is expected if the dam fails.
- "Significant Hazard" means loss of life is not expected if the dam fails, but extensive damage to property or public infrastructure is.
- "Low Hazard" is assigned to all other state-regulated dams.
- "Emergency Action Plan" means a plan that assists a dam owner or operator, and local emergency management personnel, to perform actions to ensure human safety in the event of a potential or actual dam failure.

Hazard ratings may change for a number of reasons. For example, a dam's original rating may not have been based on current inundation analysis methodologies, or new development may have changed potential downstream impacts.[38]

The 2020 Oregon Natural Hazard Mitigation Plan lists Crow Creek Dam with a high hazard rating due to extensive inhabited areas in the inundation area if the dam fails.

Dam Failure Probability

Dam safety regulators determine the condition of high hazard rated dams, both state- and federally regulated. A dam's condition is considered public information for state-regulated dams.

Oregon uses FEMA's condition classifications. These classifications are subject to change and revisions are being considered at the national level. Currently, FEMA's condition classifications are:

- "Satisfactory" means no existing or potential dam safety deficiencies are recognized. Acceptable performance is expected under all loading conditions (static, hydrologic, seismic) in accordance with the applicable regulatory criteria or tolerable risk guidelines.
- "Fair" means no existing dam safety deficiencies are recognized for normal loading conditions. Rare or extreme hydrologic and/or seismic events may result in a dam safety deficiency. Risk may be in the range to take further action.

[38] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.

DRAFT

- "Poor" means a dam safety deficiency is recognized for loading conditions that may realistically occur. Remedial action is necessary. A poor rating may also be used when uncertainties exist as to critical analysis parameters that identify a potential dam safety deficiency. Further investigations and studies are necessary.

- "Unsatisfactory" means a dam safety deficiency is recognized that requires immediate or emergency remedial action for problem resolution.

- "Not Rated" means the dam has not been inspected, is not under State jurisdiction, or has been inspected but, for whatever reason, has not been rated.

The 2020 Oregon Natural Hazard Mitigation Plan lists Crow Creek Dam with a fair condition classification. The most recent State of Oregon dam inspection report, dated December 2023, affirms this condition.

Climate Change

Most climate change models indicate there may be more extreme precipitation due to the increased energy in the oceanic and atmospheric systems. Of main concerns for dams is the potential for larger floods than experienced in the past. Almost half of the historical dam failures around the world have been due the floods that exceed the flow capacity of the spillway and overtop the dam.[39]

The Oregon Climate Change Research Institute issued a report specific to Wasco County in August 2018. They modeled high and low greenhouse gas emissions scenarios. There predictions for changes in extreme precipitation probabilities by the 2050s based on their higher emissions scenario:

- The intensity of extreme precipitation events is expected to increase slightly in the future as the atmosphere warms and is able to hold more water vapor.

- In Wasco County, the magnitude of precipitation on the wettest day and the wettest consecutive five days per year is projected to increase on average by about 17-percent and 12-percent, respectively.

- The frequency of days with at least 0.75-inches of precipitation and the frequency of days exceeding a threshold for landslide risk is not projected to change substantially.

[39] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.

DRAFT

Wildfire

Wildfires may increase the risk of debris flows (though wildfire generated debris flows are typically on the smaller size scale). Wildfires and windstorms can also result in large woody debris that can block spillways, also a risk to dam integrity.[40]

The lightning caused Blackburn Fire, the largest of the Government Flats Complex Fires in 2013, burned 11,400 acres near The Dalles including 5,400 acres within the Mill Creek Watershed which is the primary source of drinking water for the City. The fire threatened both the operation and the structures of the water treatment plant, as well as water quality during the subsequent years.[41] However, the burned area was in the lower watershed below Crow Creek reservoir and dam; with no effect on either of these City facilities.[42]

The Oregon Department of Forestry considers the City of The Dalles Municipal Watershed to be a high priority wildfire protection area.[43]

Dam Vulnerability

Given the information presented about state-regulated high hazard dams (county and condition; failure expected to result in loss of life) and significant hazard dams (county; failure expected to result in extensive property or infrastructure damage), no Oregon Region 5 counties, which includes Wasco County, are considered "most vulnerable jurisdictions" because none have high hazard dams in poor or unsatisfactory condition.[44]

Dam Resilience

City of The Dalles has taken several steps to maintain the safety of Crow Creek Dam.

- The dam location, as part of the broader protected watershed, is restricted from public access.
- City staff conduct dam inspections at least monthly.
- The spillway is maintained (debris and brush clearing) to maximize potential flow.
- Alarm equipment and telemetry is tested periodically.[45]

Dam Risk

With respect to natural hazards, risk can be expressed as the probability of a hazard occurring combined with the potential for property damage and loss of life. Based on the history of dam

[40] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.
[41] City of The Dalles. (2021). America's Water Infrastructure Act Risk & Resilience Assessment. The Dalles, OR: City of the Dalles.
[42] McCollum, L. (2024). City of The Dalles Water Quality Manager. (J. Hoyenga, Interviewer)
[43] City of The Dalles. (2021). America's Water Infrastructure Act Risk & Resilience Assessment. The Dalles, OR: City of the Dalles.
[44] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.
[45] McCollum, L. (2024). City of The Dalles Water Quality Manager. (J. Hoyenga, Interviewer)

DRAFT

failure in Oregon, Wasco County's social vulnerability index, and the potential for dam failure to cause loss of life and property weighed against active dam safety measures and monitoring as well as the fact that the most recent inspection concluded that no existing dam safety deficiencies are recognized for normal loading conditions; The Dalles Crow Creek Dam is considered to be at low risk from failure by the State of Oregon, not rated by Wasco County and low risk of failure by the City of The Dalles.

Drought

Drought Characteristics

Drought is a deficiency in precipitation over an extended period. It is a normal, recurrent feature of climate that occurs in virtually all climate zones. The duration of droughts varies widely. There are cases when drought develops relatively quickly and lasts a very short period of time, exacerbated by extreme heat and/or wind, and there are other cases when drought spans multiple years, or even decades. The four most common types of drought are:

- Meteorological Drought based on the degree of dryness (rainfall deficit) and the length of the dry period.
- Hydrological Drought based on the impact of rainfall deficits on water supply.
- Agricultural Drought is based on rainfall deficit, soil water deficits and reduced availability of irrigation water.
- Socioeconomic Drought is based on the impact of one or more of the previously listed types of drought on the supply and demand of economic goods.[46]

El Niño-Southern Oscillation (ENSO)

The El Niño-Southern Oscillation is a recurring climate pattern resulting from changes in ocean water temperatures in the central and eastern tropical Pacific Ocean. The warming and cooling pattern can have a noticeable influence on weather in Pacific Northwest. There are three named (ENSO) conditions:

- El Niño: Above average sea surface temperatures (Oceanic Niño Index is greater than or equal to +0.5°C), often resulting in warmer and drier conditions.
- Neutral: Average sea surface temperatures, are expected to lead to average temperatures and rain patterns.
- La Niña: Below average sea Surface temperatures (Oceanic Niño Index is less than or equal to -0.5°C), typically leading to colder and wetter conditions.[47]

[46] National Weather Service. (2018) *Drought Fact Sheet*. Retrieved from https://www.weather.gov/media/owlie/2018_Drought.pdf. Accessed 4/10/2024
[47] National Weather Service. (n.d.). *What is ENSO?* Retrieved from Weather.gov: https://www.weather.gov/mhx/ensowhat#. Accessed 4/10/2024

DRAFT

By historical standards, to be classified as a full-fledged El Niño or La Niña episode, the Oceanic Niño Index thresholds must be exceeded for a period of at least 5 consecutive overlapping 3-month seasons.[48]

Standard Precipitation-Evaporation Index

The West Wide Drought Tracker was used to provide a chart of drought events in the State of Oregon Region 5 NHMP. In this section the Tracker database was used to provide a chart of drought events specific to Wasco County using the Standard Precipitation-Evapotranspiration Index from 1895 to 2023.

The Standard Precipitation-Evapotranspiration Index (SPEI) is designed to evaluate both precipitation and potential evapotranspiration (PET) in determining drought. Thus, unlike the Standard Precipitation Index, the SPEI captures the main impact of increased temperatures on crop water demand and water supply (agricultural and hydrological drought).[49]

DRAFT

[48] Climate Prediction Center/National Center for Environmental Prediction. (2024, April 8). *ENSO: Recent Evolution, Current Status and Predictions.* Retrieved from Climate Prediction Center: cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf. Accessed 4/11/2024.

[49] National Center for Atmospheric Research. (n.d.). Standardized Precipitation-Evapotranspiration Index (SPEI). Retrieved from NCAR Climate Guide Data: https://climatedataguide.ucar.edu/climate-data/standardized-precipitation-evapotranspiration-index-spei. Accessed 4/10/2024

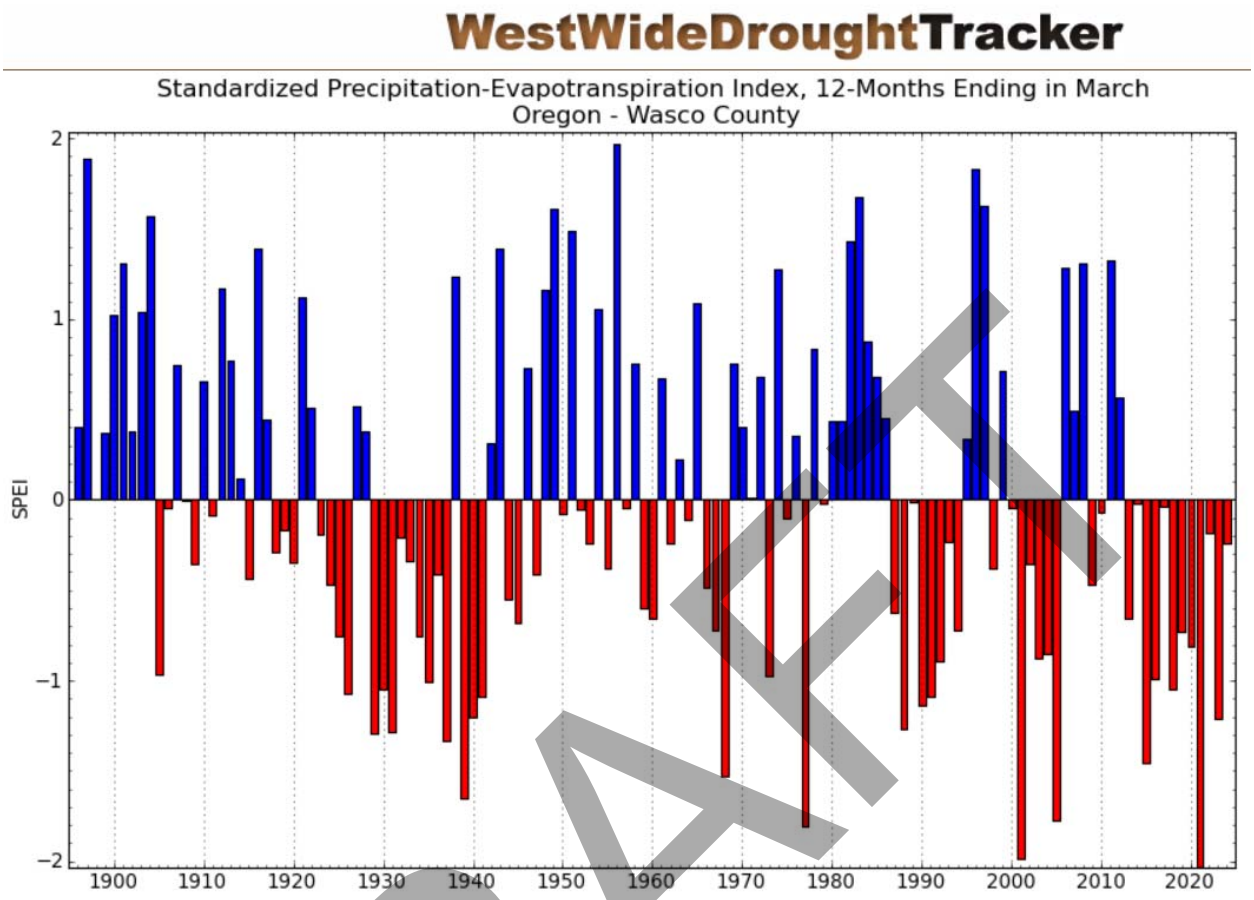

Figure 1: Drought Severity Scale: -1 to -1.49 = moderate drought; -1.5 to -1.99 = severe drought; -2.0 or less = extreme drought Source: University of Idaho West Wide Drought Tracker. (database accessed 4/9/2024) Western Regional Climate Center. wrcc.dri.edu/wwdt/time/

DRAFT

Table 11: Recent Drought History – City of The Dalles

Year	ENSO Condition[50]	12-mo. SPEI	Declaration
2005	El Niño most of the year[51]	-1.8	**EO-05-06** DETERMINATION OF A STATE OF DROUGHT EMERGENCY IN DESCHUTES, LAKE, WALLOWA, WASCO AND WHEELER COUNTIES DUE TO DROUGHT AND LOW WATER CONDITIONS. May 25, 2005; Expired December 31, 2005
2015	El Niño all year – 3rd strongest on record[52]	-1.5	**EO-15-05** DETERMINATION OF A STATE OF DROUGHT EMERGENCY IN DESCHUTES, GRANT, JACKSON, JOSEPHINE, LANE, MORROW, UMATILLA, AND WASCO COUNTIES DUE TO DROUGHT, LOW SNOW PACK LEVELS, AND LOW WATER CONDITIONS, May 21, 2015; Expired December 31, 2015
2020	Neutral moving to La Niña JAS	-0.8	**EO-20-31** DETERMINATION OF A STATE OF DROUGHT EMERGENCY IN DOUGLAS, GILLIAM, JOSEPHINE, CROOK, DESCHUTES, JEFFERSON AND WASCO COUNTIES DUE TO UNUSUALLY LOW WATER SUPPLIES AND HOT, DRY CONDITIONS, July 1, 2020; Expired December 31, 2020.
2021	La Niña except MJJ-JJA	-2.0	**EO-21-16** DETERMINATION OF A STATE OF DROUGHT EMERGENCY IN GRANT, UMATILLA, UNION, AND WASCO COUNTIES DUE TO LACK OF PRECIPITATION, UNUSUALLY LOW SNOWPACK AND STREAMFLOW. June 29, 2021; Expired December 31, 2021. **EO-21-20** DIRECTING STATE AGENCIES TO SUPPORT COMMUNITIES IN DROUGHT BY CURTAILING NONESSENTIAL WATER USE, IMPLEMENTING WATER CONSERVATION MEASURES, AND ENCOURAGING DROUGHT RESILIENCY. July 7, 2021; Expired December 31, 2021. **EO-21-27** DETERMINATION OF STATE OF EMERGENCY IN THE STATE OF OREGON DUE TO EXCESSIVE HIGH TEMPERATURES CAUSING A THREAT TO LIFE, HEALTH, AND INFRASTRUCTURE. August 10, 2021; Expired August 20, 2021.
2022	La Niña all year	-0.2	**EO-22-10** DETERMINATION OF STATE OF EMERGENCY IN MULTIPLE COUNTIES DUE TO THE NEED FOR STATE WIDE COORDINATION TO ADDRESS PERSISTENT EXTREME DROUGHT CONDITIONS. June 7, 2022; Expired December 31, 2022. **EO-22-13** DETERMINATION OF STATE OF EMERGENCY IN COLUMBIA, CLACKAMAS, CROOK, CURRY, DESCHUTES, DOUGLAS, GILLIAM, GRANT, HOOD RIVER, JACKSON, JEFFERSON, JOSEPHINE, KLAMATH, MARION, MORROW, MULTNOMAH, POLK, SHERMAN, UMATILLA, UNION, WALLOWA, WASCO, WASHINGTON, WHEELER, AND YAMHILL COUNTIES DUE TO EXCESSIVE HIGH TEMPERATURES CAUSING A THREAT TO LIFE, HEALTH, AND INFRASTRUCTURE. July 25, 2022; Expired July 31, 2022.

DRAFT

[50] Climate Prediction Center/National Center for Environmental Prediction. (2024, April 8). *ENSO: Recent Evolution, Current Status and Predictions.* Retrieved from Climate Prediction Center: cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf. Accessed 4/11/2024.

[51] National Oceanic and Atmospheric Administration. (2005). Annual 2005 El Nino/Southern Oscillation. Retrieved from National Centers for Environmental Information: ncei.noaa.gov/access/monitoring/monthly-report/enso/200513. Accessed 4/11/2024.

[52] National Oceanic and Atmospheric Administration. (2016, August 2). *2015 State of the Climate: El Nino came, saw, and conquered.* Retrieved from Climate.gov: climate.gov/news-features/understanding-climate/2015-state-climate-el-ni%C3%B1o-came-saw-and-conquered. Accessed 4/11/2024.

Year	ENSO Condition[50]	12-mo. SPEI	Declaration
2023	El Niño AMJ-NDJ	-1.2	**EO-23-10** DETERMINATION OF A STATE OF DROUGHT EMERGENCY IN WASCO COUNTY. April 13, 2023; Expired December 31, 2023.

Drought Probability

The State of Oregon 2020 NHMP lists Wasco County as a medium probability of drought. The probability was calculated based on the number of drought declarations since 1992.

Climate Change

The Oregon Climate Change Research Institute issued a report specific to Wasco County in August 2018. They modeled high and low greenhouse gas emissions scenarios. There predictions for changes in extreme heat and drought probabilities by the 2050s based on their higher emissions scenario:

- Drought conditions are projected to become more frequent compared to the historical record.[53]

Drought Vulnerability

The State of Oregon 2020 NHMP notes a difference between the local drought vulnerability assessment (high in Wasco County) compared to the State of Oregon assessment (very high in Wasco County). Though Oregon has not conducted a comprehensive statewide analysis, the Centers for Disease Control (CDC) social vulnerability index informed the State assessment.

"Wasco County's high vulnerability is driven by moderately high scores across the CDC index. Notably, however, the county scores in the 80th percentile for its share of residents without a high school diploma, percentage of residents that speak English less than "well," and percentage of persons living in institutionalized group quarters."[54]

80-percent of the City's water supply is contingent on the snow pack (particularly from the forested Cascade foothills east of Mt. Hood), which may fluctuate greatly from year to year.

Droughts impact individual farm owners, the agricultural industry as a whole, and other agricultural related sectors. The Dalles, being a regional hub for shipping and receiving agricultural products, may be particularly impacted by droughts in the region.

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[53] The Oregon Climate Change Research Institute. (2018) *Future Climate Projections Wasco County*. Salem, OR: Oregon Department of Land Conservation and Development.
[54] State Interagency Hazard Mitigation Team. (2020). *Oregon Natural Hazards Mitigation Plan*. Salem, OR: Oregon Department of Land Conservation and Development.

Recent Drought Losses

In 2021, the unprecedented heat wave and ongoing drought in the U.S. Pacific Northwest damaged white wheat coveted by Asian buyers and forcing fruit farm workers to harvest in the middle of the night to salvage crops and avoid deadly heat.

The heat peaked in late June 2021, in the thick of the harvest of cherries. Temperatures reached 118 degrees Fahrenheit (48 Celsius) on June 28 at The Dalles, Oregon, along the Washington border, near the heart of cherry country. [55]

Picture taken in a cherry orchard in The Dalles, OR posted on Facebook July 1, 2021.

Farmers in Wasco County, the state's largest cherry producer, estimated about 56 percent of the acreage suffered heat damage, according to surveys by Ashley Thompson, a tree fruit extension horticulturist for Oregon State University.

Throughout the Columbia River Gorge region, growers reported damage ranging from 15–100 percent, describing shriveled and sunburned fruit, picking cherries for brine and significant packout reductions. Some were even turned down by processors.[56]

Drought Resilience

Though no drought related water use curtailment has occurred in The Dalles since water meters were installed in the 1990s, the City has an Oregon Water Resources Department approved Municipal Water Curtailment Element of The Dalles Water Management and Conservation Plan. The America's Water Infrastructure Act Water Emergency Response Plan includes an emergency water distribution appendix.

The 2006 Water System Master Plan included plans to better utilize Lone Pine well in the event of drought. According to the Master Plan, Lone Pine well production is sufficient to serve as supply to replace a large percentage of lost surface water capacity during an extended drought. However, distribution constraints limit the City's ability to serve the entire system from that

[55] Ingwersen, J. (2021, July 12). *'Wither away and die:' U.S. Pacific Northwest heat wave bakes wheat, fruit crops. July 12, 2021*. Retrieved from Reuters: reuters.com/world/us/wither-away-die-us-pacific-northwest-heat-wave-bakes-wheat-fruit-crops-2021-07-12/. Accessed 3/28/2024.

[56] Courtney,R. Mullinax, T (2021, September 7) Learning from the heat wave. Retrieved from Good Fruit Grower: goodfruit.com/learning-from-the-heat-wave/. Accessed 4/11/2024.

DRAFT

groundwater source.[57] The 2024 Water Master plan is expected to include projects to remedy theses constraints.[58]

Other drought resilience projects include the construction of an aquifer storage and recovery (ASR) well and associated reservoir with expected completion in late 2024.[59]

Additional contingency plans may need to be developed to meet water needs in time of drought.

Drought Risk

With respect to natural hazards, risk can be expressed as the probability of a hazard occurring combined with the potential for property damage and loss of life. Based the history of drought declarations, Wasco County's social vulnerability index, and the potential for drought to impact the agricultural economy, The Dalles is considered to be at high risk from drought by the State of Oregon, Wasco County and the City of The Dalles.

Earthquake

Earthquake Characteristics

Earthquakes in The Dalles are most likely to originate from two sources: 1) the Cascadia Subduction Zone and 2) Class A Quaternary faults that could impact The Dalles[60].

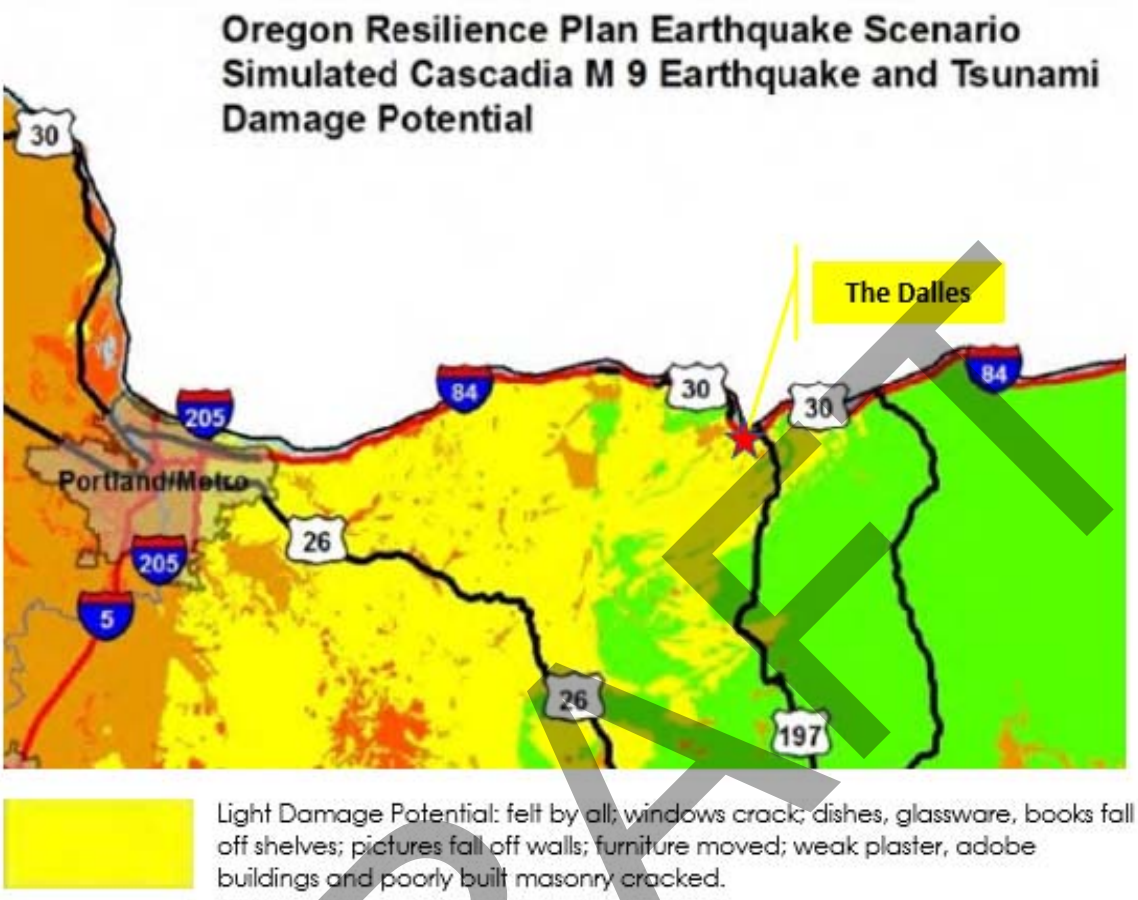
Cascadia Subduction Zone

Earthquake impacts have been estimated in the 2012 Oregon Resilience Plan, published by the Oregon Seismic Safety Policy Advisory Commission. Simulation of a magnitude 9.0 earthquake showed light damage potential in The Dalles[61].

DRAFT

[57] CH2MHill. (2006). *Water System Master Pla*n. The Dalles, OR: City of The Dalles.
[58] Anderson, J. (2024, June 5). Water Distribution Manager. (J. Hoyenga, Interviewer)
[59] Anderson, J. (2024, June 5). Water Distribution Manager. (J. Hoyenga, Interviewer)
[60] Wasco County. (2019). *Wasco County Multi-Juristicion Natural Hazard Mitigation Plan*. pp. 2-9 to 2-10. The Dalles, OR: Wasco County
[61] State of Oregon. (2012). *Oregon Resilience Plan*. Salem, OR: State of Oregon.

Figure 2: Cascadia Subduction Zone earthquake damage potential map



Source: 2012 Oregon Resilience Plan

Class A Quaternary Faults

Faults that could impact The Dalles have been identified by the U.S. Geological Survey. Class A faults are those that geologic evidence demonstrates the existence of a Quaternary fault of tectonic origin, whether the fault is exposed for mapping or inferred from liquefaction or other deformational features[62]. Quaternary faults are those that have been recognized at the surface and which have moved in the past 1,600,000 years, the duration of the Quaternary epoch.[63] A fault is designated as well constrained if an identifiable piercing line or feature (typically at or near the surface) is well documented or can be independently verified from mapping or logs. If

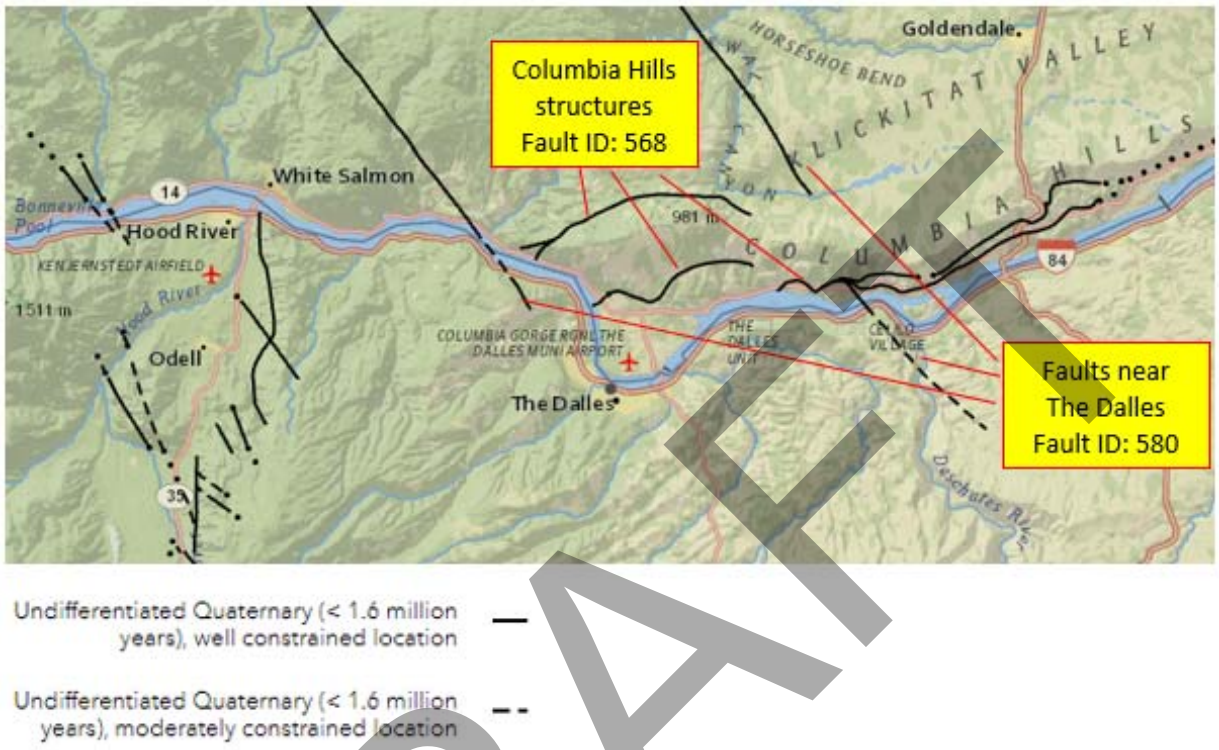
DRAFT

[62] U.S. Geologic Survey. n.d. *Faults*. Retrieved April 1, 2021 from Earthquake Hazards: usgs.gov/programs/earthquake-hazards/faults

[63] U.S. Geological Survey. (2009, October 27). *FAQs – Quaternary Faults*. Retreived April 1, 2021, from Earthquake Hazards Program: web.archive.org/web/20111127121851/http://earthquake.usgs.gov/learn/faq/?faqID=267

an offset feature of the fault is in the subsurface, data is presented and correlations appear reliable; offset features of the fault are described or documented[64].

Figure 3: Quaternary faults located near The Dalles



Source: U.S. Geologic Survey. n.d. *Faults*. Retrieved April 1, 2021 from Earthquake Hazards: usgs.gov/programs/earthquake-hazards/faults

Table 12: Characteristics of Quaternary faults that could impact The Dalles

Class A Quaternary faults that could impact The Dalles

Class	Fault ID	Location	Total fault length	Slip-rate per year	Date of last review
Faults near The Dalles	580	WA & OR in 3 segments	69 km 43 mi.	< 0.2 mm	10/6/2016
Columbia Hills structures	568	WA in 3 segments	160 km 99 mi.	< 0.2 mm	6/15/2016

Source: U.S. Geologic Survey. n.d. *Faults*. Retrieved April 1, 2021 from Earthquake Hazards: usgs.gov/programs/earthquake-hazards/faults

[64] Dawson, T.E., & Weldon, R.J. (2017). *Uniform California Earthquake Rupture Forecast, Version 3 (USERF3) Appendix B – Geological Slip-Rate Data and Geologic*. Menlo Park, CA: USGS Southern California Earthquake Center.

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According to USGS interactive maps, no Quaternary faults have been identified in The Dalles Municipal Watershed nor in proximity to Wicks Water Treatment Plant.

Earthquake Probability

There's no "recent" history of earthquakes in Wasco County or The Dalles. According to a Department of Geology and Mineral Industries (DOGAMI) 1999 report on relative earthquake hazards maps, the City of The Dalles:

- Amplification hazard is generally low, with a small area of moderate hazard at the east end of the urban area.
- Liquefaction hazard is nil throughout most of the urban area and low to moderate to the east.
- Earthquake-induced landslide hazard is generally low on the valley floors, with some areas of moderate hazard on steeper slopes in the hills.[65]

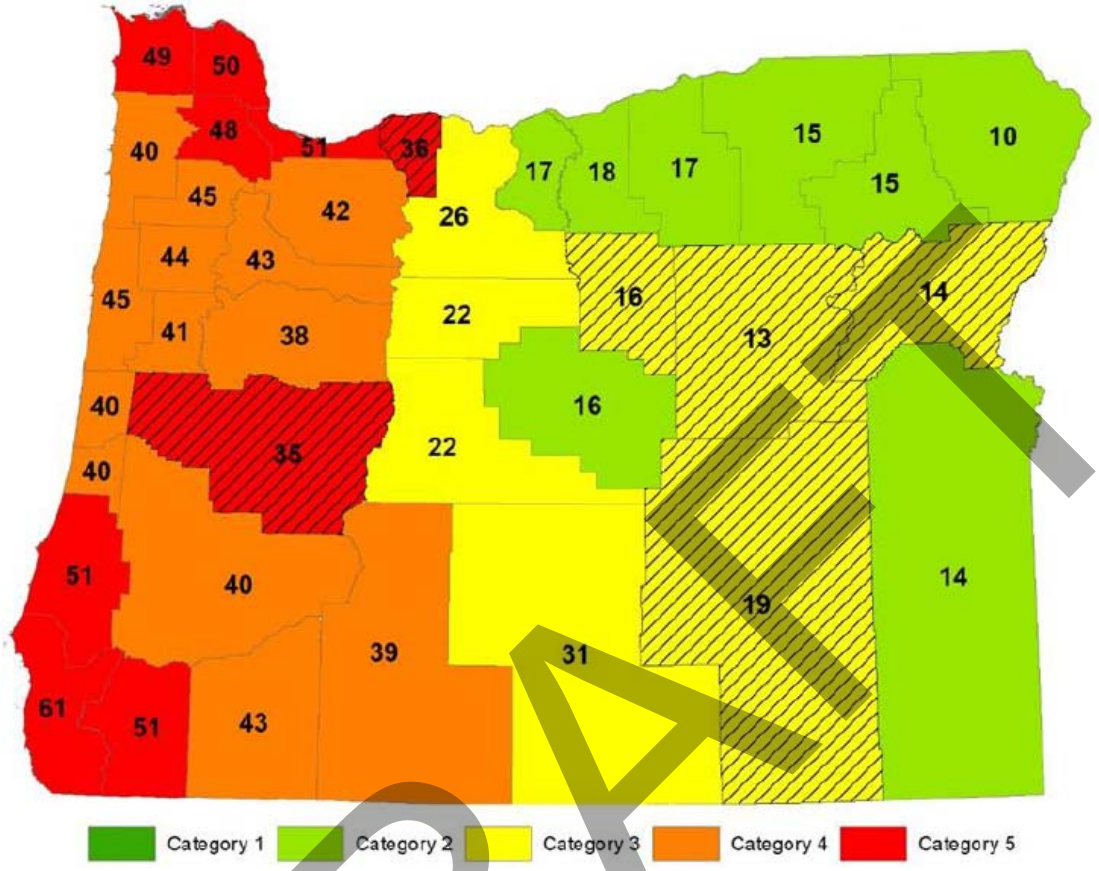
The 2020 State of Oregon NHMP included a new Earthquake probability ranking for Oregon counties that is based on the average probability of experiencing damaging shaking during the next 100 years.

- Category 1 100-year probability < 10-percent
- Category 2 100-year probability 10-20-percent
- Category 3 100-year probability 21-31-percent
- Category 4 100-year probability 32-45-percent
- Category 5 100-year probability > 45-percent

DRAFT

[65] Department of Geology and Mineral Industries. 1999. Interpretive Map Series 7 – Relative Earthquake Hazard Maps

Figure 4: 2020 Oregon Earthquake Probability Ranking Based on Mean County Value of the Probability of Damaging Shaking and Presence of Newly Discovered Faults



Source: 2020 Oregon NHMP

Note: Counties with hatching had their probability category increased one step due to newly discovered faults.

Earthquake Vulnerability

However, the County's NHMP indicated that, "It is difficult to identify a part of the community that is not vulnerable to an earthquake. People, buildings, emergency services, hospitals, transportation lifelines, and water and wastewater utilities are susceptible to the effects of an earthquake." In the event of an earthquake, the City Hall building may be threatened. Aside from City Hall, many other buildings in downtown are constructed of un-reinforced masonry. Buildings of this construction type, as has been documented, are particularly vulnerable to sustain detrimental impacts from an earthquake. The City's drinking water treatment plant, treated water storage reservoirs, pipelines, sewage collection system, and sewage treatment plant have not been upgraded to withstand a seismic event and may susceptible to significant damage.

Though the 2020 DOGAMI probability ranking shows Wasco County in Category 2, the Oregon HazVu database reveals a vulnerable topography if an earthquake were to occur

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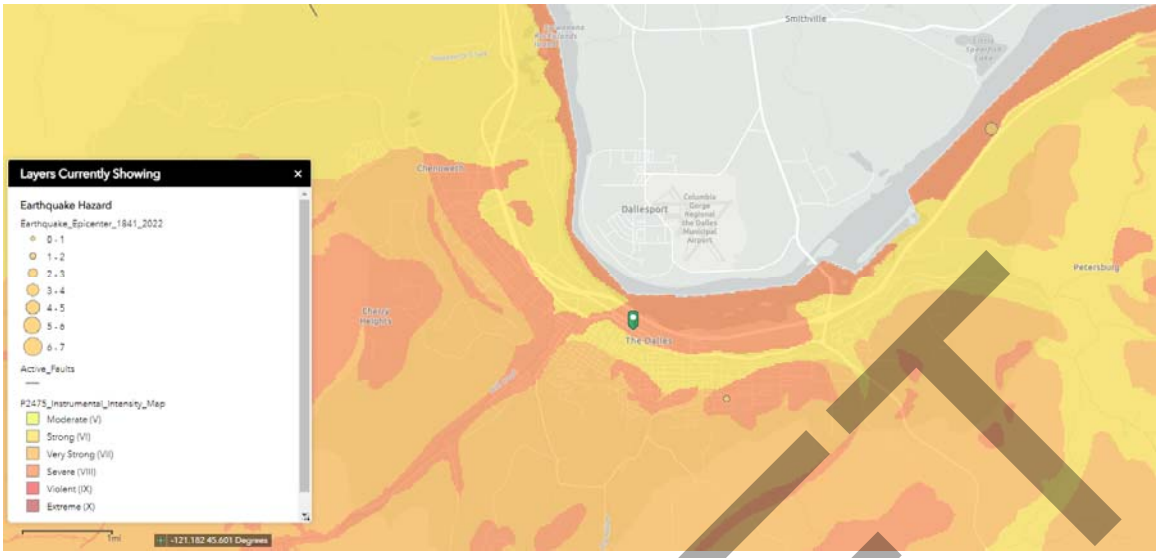
Figure 5: The Dalles Earthquake Hazard Map



Source: Oregon HazVu: Statewide Geohazards Viewer, Oregon Department of Geology and Mineral Industries, accessed 3/29/2024

Earthquake Resilience

The U.S. Environmental Protection Agency requires all water utilities to conduct a risk and resilience assessment for a number of scenarios including earthquake. The assessment is used to develop an emergency response plan and to inform capital improvement plans. The assessment is required to be updated and certified every five years. The first assessment was certified in 2021. The City will begin the next assessment in 2025, to be certified in 2026.

The Oregon Resilience Plan sets a target timeframe for recover of 90% operation within 24 hours after the event for water utilities in Central/Eastern Oregon[66]. Though damage potential is expected to be light, the City has taken steps to mitigate impacts to the water utility. The Water Master Plan includes capital improvement plans for seismic resilience projects identified in the 2014 Steel Tank Seismic Evaluation as well as replacement of the Dog River Pipeline which was completed in 2024. Other components of the water system will be evaluated during development of an updated Water Master Plan expect to be complete in 2024.

The USGS ShakeAlert® Earthquake Early Warning System became available in Oregon on March 11, 2021. ShakeAlert does not predict when or where an earthquake will occur or how long it will last. It detects earthquakes that have already begun, offering seconds of advance warning that allow people and systems to take actions to protect life and property from destructive shaking. No sign up is required to receive ShakeAlert notifications, and no action needs to be

[66] State of Oregon. (2012). *Oregon Resilience Plan*. Salem, OR: State of Oregon.

DRAFT

taken other than enabling emergency alerts on a cell phone[67]. Directors and managers in the Public Works Department are expected to enable alerts on their cell phones.

City Hall, the Police Department building, Wicks Water Treatment Plant and the Public Works main office buildings were not built to seismic standards. Continuity of operations planning accounts for possible damage to these facilities.

Mitigation for other natural hazards, such as landslide, are associated to mitigations for potential damage caused by earthquake.

Earthquake Risk

With respect to natural hazards, risk can be expressed as the probability of a hazard occurring combined with the potential for property damage and loss of life. Based the proximity of local faults, vulnerable topography in The Dalles, Wasco County's social vulnerability index, and the high value of properties within City Limits, The Dalles is considered to be at high risk from earthquake by the State of Oregon, medium risk by Wasco County and high risk by the City of The Dalles.

Flood

The Federal Emergency Management Agency defines a flood as a general and temporary condition of partial or complete inundation of 2 or more acres of normally dry land area or of 2 or more properties[68].

According to the 2018 DOGAMI Natural Hazard Risk Report for Wasco County, Oregon, flooding is the most common natural hazard in the county and accounts for a significant amount of damage to persons and property[69].

Flood Characteristics

The main causes of Pacific Northwest floods are the moist air masses that regularly move over the region in the winter. In Wasco County, the weather that produces the most serious flooding events are extensive wet conditions that follow a period of mid and high elevation ice and snow pack development. The County is susceptible to both riverine and flash floods[70].

DRAFT

[67] Oregon Office of Emergency Management. (n.d.). *ShakeAlert® in Oregon*. oregon.gov/oem/hazardsprep/Pages/orshakealert.aspx. Accessed 5/8/2024.
[68] Federal Emergency Management Agency. (2020, July 18). *FEMA Flood Insurance Terminology Index*. Retrieved November 18, 2020, from Federal Emergency Management Agency: fema.gov/flood-insurance/terminology-index
[69] Wasco County. (2019). *Wasco County Multi-Jurisdiction Natural Hazard Mitigation Plan*. The Dalles, OR: Wasco County.
[70] Wasco County. (2019). *Wasco County Multi-Jurisdiction Natural Hazard Mitigation Plan*. The Dalles, OR: Wasco County.

Flash floods occur during sudden rainstorms when a large amount of rain falls in a very short period of time. These happen in steeply sloping valleys and in small waterways[71].

Riverine floods happen when the amount of water flowing through a river channel exceeds the capacity of that channel. Riverine floods are the most common type of flooding. Many rivers in Wasco County historically flood every few years. These include the White River, the Deschutes River, the John Day River, and the Columbia River[72].

Storm water floods occur when runoff from rainfall concentrates in developed areas, drainage, and low-lying areas. Poor drainage, elevated groundwater levels, and ponding are all symptoms of storm water flooding that can cause property damage. Storm water flooding can be particularly problematic in older areas of the City that still are served by the legacy combined storm water and wastewater collection system.

In the February 1996 flooding there were a surprising number of properties that were impacted that were not near a waterway. Instead these properties were in poorly drained areas where ponding and runoff patterns caused basements to flood and other types of water damage. Not all storm water flooding is due to development. Natural soil conditions and geological features often determine drainage patterns[73].

Floods caused by wildfire damage to all or part of affected watersheds. The effect of wildfire on the hydrological processes within an area can be substantial. Reduced vegetation cover can lead to significant flooding, soil erosion and sedimentation, pollution from chemicals that are no longer filtered by riparian vegetation, and changes in water temperature. All of these effects can have harmful impacts on aquatic life and also affect humans who depend on watersheds for municipal water supplies[74].

Fire-induced water repellency and the loss of protective vegetative cover play a major role in the post-fire runoff and erosion. In many cases, water repellency does not substantially affect infiltration beyond the first year[75]. However, revegetation takes time even with restoration intervention, such as sowing grass seed or planting trees.

In The Dalles, the most common type of flooding is associated with unseasonably warm weather during the winter months, which can quickly melt snow. This condition has produced

DRAFT

[71]Wasco County. (2019). *Wasco County Multi-Jurisdiction Natural Hazard Mitigation Plan*. The Dalles, OR: Wasco County.
[72] Wasco County. (2019). *Wasco County Multi-Jurisdiction Natural Hazard Mitigation Plan*. The Dalles, OR: Wasco County.
[73] Wasco County. (2019). *Wasco County Multi-Jurisdiction Natural Hazard Mitigation Plan*. The Dalles, OR: Wasco County.
[74] Weston, D. (2010). Effects of Wildfire on Soil and Water. Retreived from Oregon Explorer Natural Resource Digital Library: oregonexplorer.info/content/effects-wildfire-soil-and-water?topic=95&ptopic=62
[75] Rocky Mountain Research Station. (2005 (revised 2008)). *Wildland Fire in Ecosystems: effects of fire on soils and water. Gen. Tech. Rep. RMRS-GTR-42-vol. 4.* Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

devastating floods, such as the 1996 100-year flood event. Flooding in the summer months is a phenomenon associated with intense local thunderstorms. Though these events are short duration, summer thunderstorms can result in significant damage, such as the August 2019 event listed in Table 13.

Flood Probability

The Oregon Climate Change Research Institute issued a report specific to Wasco County in August 2018. They modeled high and low greenhouse gas emissions scenarios. There predictions for changes in extreme heat and drought probabilities by the 2050s based on their higher emissions scenario:

The intensity of extreme precipitation events is expected to increase slightly in the future as the atmosphere warms and is able to hold more water vapor.

- In Wasco County, the magnitude of precipitation on the wettest day and wettest consecutive five days per year is expected to increase on average about 17-percent and 12-percent, respectively, by the 2050s under the higher emissions scenario compared to the historical baseline.
- In Wasco County, the frequency of days with at least 0.75-inches of precipitation and the frequency of days exceeding a threshold for landslide risk is not projected to change substantially.

River flood risk in Wasco County from the Columbia River is not expected to change substantially based on insignificant projected changes in non-regulated flood magnitudes on the Columbia River at The Dalles.

Mid to low elevation tributaries that are near freezing level in winter, receiving a mix of rain and snow, may experience an increase in winter flood risk due to warmer winter temperatures causing precipitation to fall more as rain and less as snow.[76]

Climate Change

According to the 2020 Oregon NHMP, it is very likely (>90%) that Oregon will experience an increase in the frequency of extreme precipitation events and extreme river flows (high confidence). Furthermore, the likelihood of increases in extreme precipitation events is greater east of Cascades than west. Extreme river flow, while affected by extreme precipitation, is also driven by other conditions: soil moisture, water table, snowmelt, river network morphology, and local variability in precipitation and snowmelt. Increases in extreme river flows leading to

[76] The Oregon Climate Change Research Institute. (2018) *Future Climate Projections Wasco County*. Salem, OR: Oregon Department of Land Conservation and Development.

DRAFT

damaging floods will be less likely where storm water management (urban) and/or reservoir operations (river) have capacity to offset increases in flood peak.[77]

Figure 6: The Dalles Flood Hazard Map

Source: Oregon HazVu: Statewide Geohazards Viewer, Oregon Department of Geology and Mineral Industries, accessed 2/21/2018

Table 13: Recent Flood History – City of The Dalles

Year	Type of Flood	Description/Declaration
1996	Rain on snow	February 1996: In February 1996 widespread flooding in the Pacific Northwest resulted from heavy rain and warming on a substantial mid elevation snowpack. The Columbia River crested at 27.1 ft. on February 9. This flood occurred because of the confluence of several factors. The winter of 1995/96 was extremely rainy. Prior to the flooding period, the region experienced a cold snap with low elevation freezing, ice, and snow. As a result, Mill Creek flooded downtown The Dalles where heavy damage was caused. The last 850 feet of Mill Creek before it enters the Columbia River was in a tunnel. Heavy debris flows and log jams at the tunnel inlet coupled with reduced discharge head caused by Columbia River levels backed water up and into the downtown business area. Losses were in millions of dollars[78]. The February 1996 flood event was later determined to be a greater than 100 year event and flood levels experienced at that time have become the local high water marker for water system flood resilience. The transmission mains from the water treatment plant to the City were breached and floodwaters entered the mains. Repairs took nearly 30 days to complete during which time about 200 customers were without water service. Due to groundwater supplies, water service within the City Limits was not affected.[79]
Annual	Spring snow melt	Union Street Undercrossing is at an elevation subject to seasonal flooding. Occasionally in the spring, the road is closed during the flood event and until the road bed dries out to full weight bearing specifications.

[77] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.
[78] Wasco County. (2019). *Wasco County Multi-Jurisdiction Natural Hazard Mitigation Plan*. The Dalles, OR: Wasco County.
[79] Anderson, D. (2020) City of The Dalles Public Work Director. (J. Hoyenga, Interviewer)

DRAFT

Year	Type of Flood	Description/Declaration
2015	Stormwater	December 7, 2015: Heavy rain caused a sudden influx of combined sewer and stormwaters causing two of the influent pumps at the wastewater treatment plant to become semi-plugged with rags and debris. Untreated effluent was discharged into the Columbia River resulting in an NPDES permit violation. (
2019	Stormwater	August 9, 2019: Heavy rain caused a sudden influx of combined sewer and stormwaters causing the ultraviolet channels of the wastewater treatment plant to be inundated. The electrical wiring and switches for ultraviolet system were submerged. Untreated effluent was discharged into the Columbia River resulting in an NPDES permit violation. (OERS 2019-2038)
2023	Stormwater	November 4, 2023: There was a high-intensity rain event in The Dalles which caused the plant to bypass 140-gallons of untreated influent to the Columbia River. The bypass was caused by the high volume of influent flow into the plant from the rain event. The 1-in-5-year rain event for The Dalles is 1.80" in 24 hours. This equates to an average rainfall rate of 0.075" per hour. The rain event on November 4 peaked for a short time at a rainfall rate of about 1.15" per hour, about 15 times the average rainfall rate for a 1 in 5 year event. In the hour immediately before the bypass event, 0.35" of rain fell in one hour; this is over 4.6 times time average rainfall rate for a 1-in-5-year. Rainfall intensity is relevant because the City's collection systems are linear and don't store water; rainfall-resultant flows are carried to the treatment plant as the storm event occurs with only a slight amount of attenuation due to distance. As a result, the influent flow rates into the treatment far exceeded those associated with a 1-in-5-year rain event and the plant influent pumping systems could not keep up with the excess flows which resulted in the bypass. Staff working in the Influent Pump Station observed that the rain event also caused a power spike that caused the dedicated Influent Pump Station generator to start and tripped circuit breakers for 2 of the 3 Influent Pumps. It is important to note that even with only one Influent Pump operating, the treatment plant successfully pumped and treated influent volumes well in excess of those that would have resulted from rainfall rates associated with a 1-in-5-year rain event. (OERS 2023-2750)

Flood Vulnerability

The 2017 working group noted that The Dalles, as an urban center, has a higher density of high value properties. Flooding has the potential to significantly impact economically valuable commercial and industrial properties. The Dalles also has a complex, and expensive, support infrastructure that is subject to flood risk including transportation, water and wastewater systems.

During the Mill Creek flood from February 6-8 1996, the City was flooded through much of downtown, particularly between Fourth St. and Second St., due to record rains and melting from a heavy snow pack. The flood caused over $2 million in damages to downtown businesses. Streets and culverts were also damaged. The same pattern of flooding could occur again from Mill Creek, which passes directly west of The Dalles downtown. Such floods could impact water transmission lines while also impacting City Hall and the police station.

The City's floodplain ordinance, updated most recently in 2024, tries to mitigate the impact flooding may have on the City. In addition, the flood damaged the City's water treatment plant and finished water pipelines, making the systems as the City's primary water supply unavailable for 30 days. While the City has no repetitive flood loss properties, it does have 3 single loss

DRAFT

properties with losses valued at $35,846. In addition, the City of The Dalles has 23 flood policies in affect valued at $5,479,900.[80]

Flood Resilience

The Federal Emergency Management Agency (FEMA) has mapped most flood-prone streams in Oregon. The maps depict the 1% flood (100-year) upon which the National Flood Insurance Program is based. The Dalles Flood Insurance Rate Maps (FIRM) were in the process of update during the writing of this plan with an expected publish date of December 2024.

In 2024, the City convened a working group to consider unburying the section of Mill Creek between Thompson Park and the Columbia River, where the creek terminates. During the floods in 1996, the water volume overwhelmed the pipe on the side of Thompson Park, forcing the water eastward, which caused the severe downtown flooding.

Mill Creek project stakeholders include Oregon Department of Transportation, Union Pacific Railroad and Army Corps of Engineers. The expected outcome of this project is to reduce the flood vulnerability of the downtown area.

In 2024, The Dalles Municipal Code Title 10 Land Use and Development was updated to minimize building in areas vulnerable to flooding.

Flood Risk

With respect to natural hazards, risk can be expressed as the probability of a hazard occurring combined with the potential for property damage and loss of life. Based the proximity of the Columbia River and Mill Creek, vulnerable streamside topography in The Dalles, Wasco County's social vulnerability ratings, and the high value of properties that have experienced historical floods, The Dalles is considered to be at high risk from floods by the State of Oregon, medium risk by Wasco County and high risk by the City of The Dalles.

Landslide

Landslide Characteristics

A landslide is defined as the movement of a mass of rock, debris, or earth down a slope. The term "landslide" encompasses five modes of slope movement: falls, topples, slides, spreads, and flows. These are further subdivided by the type of geologic material (bedrock, debris, or earth). Debris flows (commonly referred to as mudflows or mudslides) and rock falls are examples of common landslide types.

Almost every landslide has multiple causes. Slope movement occurs when forces acting down-slope (mainly due to gravity) exceed the strength of the earth materials that compose the slope. Causes include factors that increase the effects of down-slope forces and factors that contribute to low or reduced strength. Landslides can be initiated in slopes already on the verge of

[80] Source: State NFIP Coordinator, Christine Shirley, DCLD, October 2017, FEMA CIS

DRAFT

movement by rainfall, snowmelt, changes in water level, stream erosion, changes in ground water, earthquakes, volcanic activity, disturbance by human activities, or any combination of these factors.[81]

Landslide Probability

According to a Department of Geology and Mineral Industries (DOGAMI) study conducted in 1977[82], "mass movement in The Dalles includes active sliding in the Scenic Drive – Kelly Avenue area, in-active deep bedrock slides along parts of the cliffs overlooking the Chenoweth district, and in the east parts of town, talus at the base of cliffs, and rockfall and rockslides."

Shannon and Wilson, Inc. delivered the Scenic Drive Embankment Failure Report in August 2011. The 2011 and 2013 geohazard assessment described shallow landslide area (10 feet) within the deeper Kelly Avenue landslide area (180 feet) that likely occurred due to stormwater system damage caused by the Kelly Avenue slide in the 1980's.

Figure 7: The Dalles Landslide Hazard Map

Source: Oregon HazVu: Statewide Geohazards Viewer, Oregon Department of Geology and Mineral Industries, accessed 3/29/2024

Landslide Vulnerability

A 1991 study delineated areas of town according to the three categories of high, somewhat high, and low risks of sliding, which may have led to a noted decrease in property values[83]. Documented landslides in the City, which damaged homes, also likely contributed to decreases in property values. Two very important community businesses, The Columbia Gorge Community

[81] U.S. Geological Survey. (n.d.). *What is a landslide and what causes one?* Retrieved from U.S. Geological Survey. usgs.gov/faqs/what-a-landslide-and-what-causes-one. Accessed 5/7/2024.
[82] Baeulieu, J.D. (1977). *Bulletin 91 Geologic Hazards of Parts of Northern Hood River, Wasco, and Sherman Counties, Oregon.* Portland, OR: State of Oregon Department of Geology and Mineral Industries.
[83] Fujitani Hilts & Associates. (1991). *Landslide Hazard Study South Slope Area The Dalles, Oregon.* Portland, OR: Fujitani Hilts & Associates.

DRAFT

College and Adventist Health Columbia Gorge (regional hospital), are located in a portion of The Dalles that is susceptible to landslides.

A geotechnical study completed for the City in 2006 by the firm of Shannon and Wilson Inc. confirmed a significant rockfall hazard along Brewery Grade, the primary route to Adventist Health Columbia Gorge (regional hospital), and developed a conceptual mitigation plan. The potential for sliding is produced by geologic factors and aggravated by acts of man which increase the amount of water in the ground, such as lawn watering, extensive irrigation of upslope orchards, and blocking of springs by the construction of houses and roads. Deep bedrock failures are evident east of Dry Hollow in terrain analogous to that of the Scenic Drive – Kelly Avenue slide. The slides are located in the Dalles Formation immediately above the contact with the Columbia River Basalt."[84]

Landslide Resilience

In a May 2013 report, geotechnical and environmental consultants Shannon & Wilson, Inc.[85] noted that the Kelly Avenue slide has been stabilized, "Dewatering wells were installed in the late 1980s to mitigate the landslide movements and, since that time, the landslide has been stable with only very small movements recorded in inclinometer casings used to monitor the landside. Prior to the installation of dewatering wells, the landslide-induced settlement severely cracked the pavement and surrounding hard surfaces throughout the [E. Scenic Drive] project area." Dewatering wells are checked weekly to ensure that they are functioning properly. Shannon & Wilson Inc. monitors inclinometers and submit reports to the City three times a year.

A soldier pile wall with lagging was selected by the design team as the most viable slope stabilization for the E. Scenic Drive embankment failure. Retaining wall and stormwater system construction was implemented in 3 phases from 2019-2022. The embankment is now considered stabilized. Inclinometer casings remain in place and are monitored at least annually.

Rock fall catchments are in place on Brewery Grade, Dry Hollow Road and E. Scenic Drive. Mesh has been draped over the rock fall on Brewery Grade to contain movement when rocks and boulders detach from the slope. Debris is removed as necessary to maintain appropriate containment within the catchment area.

Landslide Risk

With respect to natural hazards, risk can be expressed as the probability of a hazard occurring combined with the potential for property damage and loss of life. Based several geohazard assessments conducted in The Dalles and the high value of properties that have experienced impacts from landslide activity weighed against active landslide mitigation and monitoring, The

[84] Shannon & Wilson, Inc. (2011). *Scenic Drive Embankment Failure The Dalles, OR.* Lake Oswego, OR: Shannon & Wilson, Inc.
[85] Shannon & Wilson, Inc. (2013) Geotechnical Report Scenic Drive Embankment Stabilization Design. Lake Oswego, OR.

DRAFT

Dalles is considered to be at high risk from landslides by the State of Oregon, low risk by Wasco County and medium risk by the City of The Dalles.

Severe Weather

Severe weather in The Dalles includes extreme heat events, summer thunderstorms and windstorms, blizzards, ice storm and snow storms. Models suggest that severe weather may increase in frequency and intensity due to climate change.

Extreme Heat

Extreme Heat Characteristics

Heat domes have recently emerged as a deadly extreme weather event in the Pacific Northwest. A heat dome occurs when a persistent region of high-pressure traps heat over a particular area, and it can linger for days to weeks and causing extremely high temperatures. Heat domes are typically linked to the behavior of the jet stream, which is a band of fast-moving winds high in the atmosphere that move in meandering wavelike patterns. When the jet stream meanders north, it moves slower and can sink, which lowers humidity. This allows the sun to create progressively hotter conditions on the ground. Air descending down mountains can also contribute to heat domes, as it warms even more.[86]

Extreme heat can affect commerce, agriculture, fisheries, and overall quality of life.

Extreme Heat Probability

The State of Oregon 2020 NHMP states that the probability of future events is *extremely likely* (>95%) and that the frequency and severity of extreme heat events will increase over the next several decades (*very high confidence*).

Climate Change

The Oregon Climate Change Research Institute issued a report specific to Wasco County in August 2018. They modeled high and low greenhouse gas emissions scenarios. There predictions for changes in extreme heat and drought probabilities by the 2050s based on their higher emissions scenario:

- The frequency and intensity of extreme heat events is expected to increase due to warming temperatures. The frequency of temperatures at or above 90°F is projected to increase on average by 28 days. The hottest day of the year (intensity) is projected to increase by 8°F. [87]
- Current normal maximum temperature range in The Dalles is 85°-90°F.

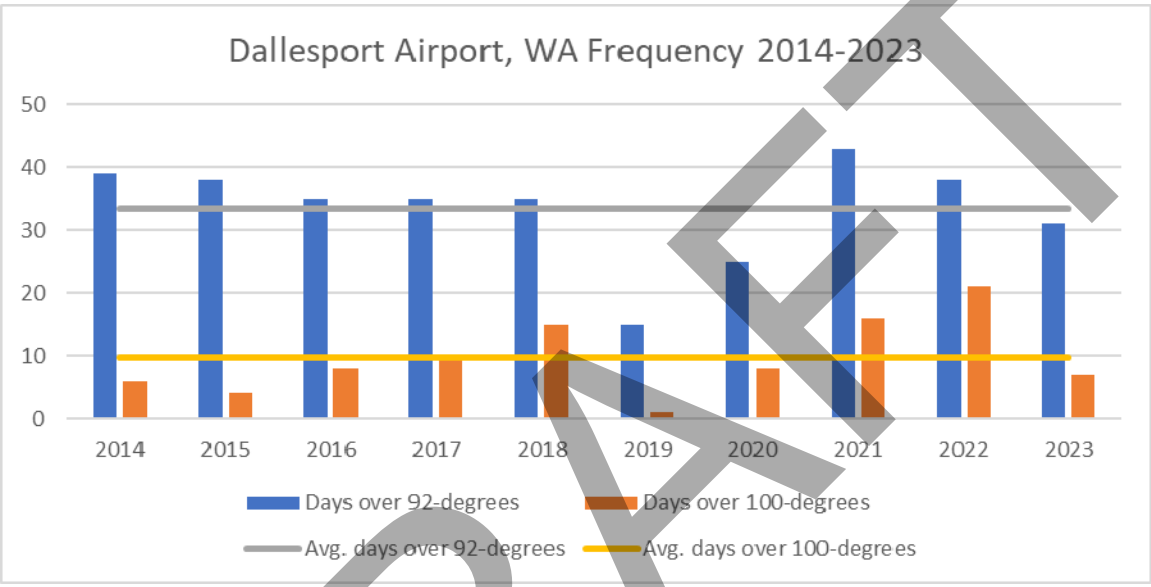
[86] National Oceanic and Atmospheric Administration. National Environmental Satellite Data and Information Service. *Extreme Heat and Severe Weather Plague Parts of North America*. June 30, 2023. Accessed 3/28/2024

[87] The Oregon Climate Change Research Institute. (2018) *Future Climate Projections Wasco County*. Salem, OR: Oregon Department of Land Conservation and Development.

DRAFT

- The average frequency of temperatures over 92°F in the past 10 years: 33.4 of 92 days June-August. Highest frequency occurred in 2021, 43 days.
- The average hottest day of the year in the past 10 years: 108.4°F in the months of June - August. Highest temperature occurred in June 2021, 118°F.
- The average duration of temperatures over 92°F in the past 10 years: 9.5 consecutive days of 92 days June - August. Longest duration was in 2015, 15 consecutive days. [88]

Figure 8: Recent High Temperature Trends 2014-2023, Frequency – Dallesport Airport, WA



Source: Climate: NOWData NOAA Online Weather Data

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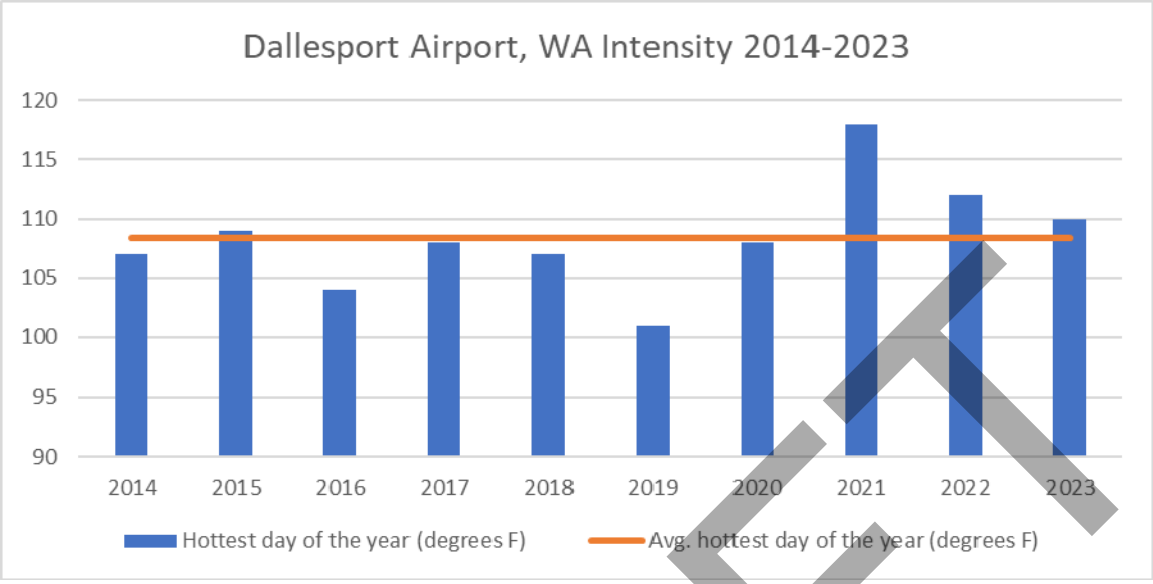
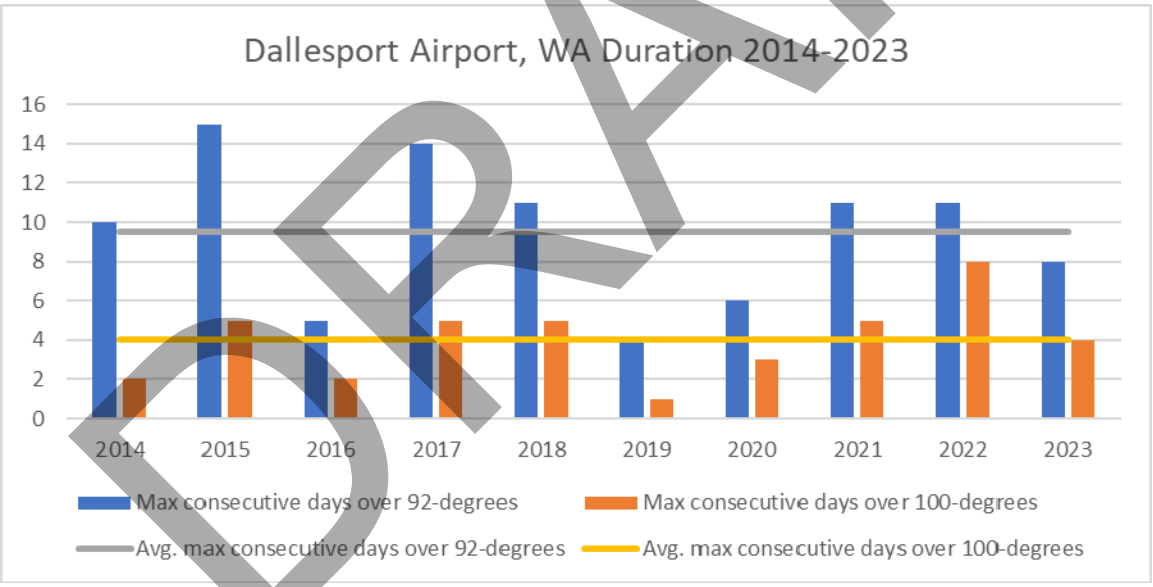
[88] National Oceanic and Atmospheric Administration. (2024). *Climate: NOWData NOAA Online Weather Data*. Retrieved from National Weather Service: National Weather Service weather.gov/wrh/climate. Accessed 4/15/2024.

Figure 9: Recent High Temperature Trends 2014-2023, Intensity – Dallesport Airport, WA



Source: Climate: NOWData NOAA Online Weather Data

Figure 10: Recent High Temperature Trends 2014-2023, Duration– Dallesport Airport, WA



Source: Climate: NOWData NOAA Online Weather Data

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Table 14: Recent Extreme Heat History – City of The Dalles (Oregon NHMP Region 5)

Year	ENSO Condition[89]	Description/Declaration
2006	La Niña moving to neutral in AMJ rapidly warming to El Niño by JAS[90]	June 24–26, 2006: A broad upper ridge of unusually high height coupled with a thermally induced surface trough of low pressure lingered over the Pacific Northwest for several days. This pattern resulted in persistent offshore flow, and therefore many days of record-smashing high temperatures. Many cities in Oregon saw record-breaking daily high temperatures for multiple days in a row. July 20-24, 2006: An unusually strong ridge of high pressure brought several days of record breaking hot and humid weather to NW Oregon. Many cities in Oregon saw record-breaking daily high temperatures for multiple days in a row. Many daily maximums were between 10 and 20 degrees above normal. A few sites reported record high minimum temperatures during this very humid event; a couple broke all-time record high minimums as well. 4500 homes lost power during this event. In north central and eastern Oregon, daily maximum temperatures between 100 and 113 degrees were observed at lower elevations, with temperatures 90 to 100 degrees at elevations up to 4000 feet. Several people were treated for heat related illness.[91] • Dallesport Airport, WA records 27 days over 92-degrees and 5 days over 100-degrees.
2008	La Niña moving to neutral in AMJ through Dec.[92]	June 28–30, 2008: An upper level ridge and thermal trough across the Pacific Northwest produced temperatures above 100 degrees for two consecutive days breaking records in many locations. Two people died of heat-related illness. August 15–17, 2008: Excessive Heat Event: An upper level ridge and dry air brought excessive heat into eastern Oregon. Many locations experienced multiple days of at least 100-degree temperatures.[93] • Dallesport Airport, WA records 21 days over 92-degrees and 9 days over 100-degrees.
2010	El Niño JFM moving to neutral in AMJ to La Niña JAS[94]	July 25–26, 2010: Excessive Heat Event: Temperatures topped 100 degrees for two successive days in Hermiston, Pendleton, 5 miles northeast of Pendleton, Ione, Echo, Arlington, and Umatilla. • Dallesport Airport, WA records 20 days over 92-degrees and 7 days over 100-degrees.
2011	La Niña, the warmest among all Januaries when La Niña was present moving to	August 1, 2011: A dry weak westerly flow aloft under a broad upper level high pressure system combined with a surface thermal trough to bring several days of temperatures in the 90s. • Dallesport Airport, WA records 11 days over 92-degrees and 0 days over 100-

[89] Climate Prediction Center/National Center for Environmental Prediction. (2024, April 8). *ENSO: Recent Evolution, Current Status and Predictions.* Retrieved from Climate Prediction Center: cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf. Accessed 4/11/2024.

[90] National Oceanic and Atmospheric Administration. (2005). *Annual 2005 El Nino/Southern Oscillation*. Retrieved from National Centers for Environmental Information: ncei.noaa.gov/access/monitoring/monthly-report/enso/200513. Accessed 4/11/2024.

[91] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.

[92] National Oceanic and Atmospheric Administration. (2005). *Annual 2005 El Nino/Southern Oscillation*. Retrieved from National Centers for Environmental Information: ncei.noaa.gov/access/monitoring/monthly-report/enso/200513. Accessed 4/11/2024.

[93] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.

[94] National Oceanic and Atmospheric Administration. (2011, August 17). 2010 Climate Events Connected to El Nino or La Nina. Retreived from Climate.gov: climate.gov/news-features/features/2010-climate-events-connected-el-niño-or-la-niña

DRAFT

Year	ENSO Condition[89]	Description/Declaration
	neutral in the spring, ending in La Niña OND[95]	degrees.
2021	La Niña except MJJ-JJA	In the summer of 2021, the Northwest experienced record-breaking high temperatures from late June through mid-July due to a heat dome.[96] More than 80 people died in Multnomah County and one heat related death occurred in The Dalles. The extreme heat caused significant crop losses for wheat and cherry growers locally.[97] Hundreds of heat related emergency room visits were noted throughout the Pacific Northwest. In addition to health impacts, there were impacts to infrastructure such as melted electric train power lines in Portland and buckling due to softened asphalt in Washington.[98] It was one of the most extreme weather events recorded globally in 2021. [99] An event such as the Pacific Northwest 2021 heatwave is still rare or extremely rare in today's climate, yet would be virtually impossible without human-caused climate change. As warming continues, it will become a lot less rare.[100] **EO-21-27** DETERMINATION OF STATE OF EMERGENCY IN THE STATE OF OREGON DUE TO EXCESSIVE HIGH TEMPERATURES CAUSING A THREAT TO LIFE, HEALTH, AND INFRASTRUCTURE. August 10, 2021; Expired August 20, 2021. • Dallesport Airport, WA records 43 days over 92-degrees and 16 days over 100-degrees. Record maximum temperature day 118°F June 28, 2021.
2022	La Niña all year	**EO-22-13** DETERMINATION OF STATE OF EMERGENCY IN COLUMBIA, CLACKAMAS, CROOK, CURRY, DESCHUTES, DOUGLAS, GILLIAM, GRANT, HOOD RIVER, JACKSON, JEFFERSON, JOSEPHINE, KLAMATH, MARION, MORROW, MULTNOMAH, POLK, SHERMAN, UMATILLA, UNION, WALLOWA, WASCO, WASHINGTON, WHEELER, AND YAMHILL COUNTIES DUE TO EXCESSIVE HIGH TEMPERATURES CAUSING A THREAT TO LIFE, HEALTH, AND INFRASTRUCTURE. July 25, 2022; Expired July 31, 2022. • Dallesport Airport, WA records 38 days over 92-degrees and 21 days over 100-degrees.

Extreme Heat Vulnerability

Vulnerability is defined as the combination of sensitivity to extreme heat and level of adaptive capacity in response to extreme heat.

Adaptive capacity to extreme heat is defined here as percent of homes with air conditioning; however, the authors of the

[95] National Oceanic and Atmospheric Administration. (2012, January). *Annual 2011 Global Climate Report*. Retrieved from National Centers for Environmental Information: ncei.noaa.gov/access/monitoring/monthly-report/global/201113. Accessed 4/15/2024.
[96] U.S. Department of Agriculture. Climate Hubs. 2021 Northwest Heat Dome: Causes, Impacts and Future Outlook. Not dated. Accessed 3/28/2024.
[97] Reuters. 'Wither away and die:' U.S. Pacific Northwest heat wave bakes wheat, fruit crops. July 12, 2021. Accessed 3/28/2024
[98] National Public Radio. PHOTOS: The Record-Breaking Heat Wave That's Scorching The Pacific Northwest. June 29, 2022. Accessed 3/28/2024.
[99] U.S. Department of Agriculture. Climate Hubs. 2021 Northwest Heat Dome: Causes, Impacts and Future Outlook. Not dated. Accessed 3/28/2024.
[100] Sjoukje Y Philip, et al. (2021). *Rapid attribution analysis of the extraordinary heatwave on the Pacific Coast of the US and Canada June 2021*. London, UK. World Weather Attribution.

DRAFT

Oregon Natural Hazard Mitigation Plan note that this measure has its flaws. First, it assumes that people who have access to cooling systems are able to afford to use them. Second, the data only includes single-family homes, which omits populations living in multi-family housing or who are house-less.

Because extreme heat is common in Region 5 ("high" probability), many people are accustomed or prepared in terms of air conditioning when an extreme heat event occurs ("high" adaptive capacity).[101] A Northwest Energy Efficiency Alliance (NEEA) Residential Building Stock Assessment Single Family Homes 2016-12, estimated that 91% of Wasco County single-family homes have air-conditioning.[102] The NEEA follow up study did not assess regions in a similar manner. But did note that by 2022 there has been an increase in the number of homes in Oregon that have cooling systems in at least one room, with the largest increase in ductless mini-split heat pumps.[103] After nearly 100 Oregonians died in the 2021 heat dome event, the 2022 Legislature passed a bill giving tenants the right to have portable air conditioning units in rental properties. The new law added criteria that includes at least one air-conditioned room in the definition of habitability of rental properties. Owners of new or renovated rental properties are require to install cooling systems after April 2024.[104]

Sustained heat can also damage roads, bridges and railroad tracks, and the increased demand for electricity from air-conditioning use can result in power outages.[105] The increased demand for irrigation and cooling water can strain water utility infrastructure.

The medium relative vulnerability of Wasco County to extreme heat was determined by the State of Oregon by adding the rankings for sensitivity (social vulnerability) and adaptive capacity (availability of air conditioning).

Extreme Heat Resilience

Water use during extreme heat events can trigger curtailment criteria in the City's Municipal Water Curtailment Element of The Dalles Water Management and Conservation Plan.

The City has supported local non-governmental organizations, such as Mid-Columbia Community Action Council (MCCAC), to open cooling shelters during extreme weather events, including extreme heat. However, for various reasons, cooling shelters were not used.

[101] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.
[102] Northwest Energy Efficiency Alliance. (2019). *Residential Build Stock Assessment Single Family Homes 2016-17*. Portland, OR.: Northwest Energy Efficiency Alliance.
[103] Northwest Energy Efficiency Alliance. (2024). 2022 *Residential Build Stock Assessment*. Portland, OR.: Northwest Energy Efficiency Alliance.
[104] Oregon State Legislature. (2022, March 23). 2022 Regular Session. Retrieved from Oregon Legislative Information: olis.oregonlegislature.gov/liz/2022R1/Measures/Overview/SB1536
[105] Oregon Capital Chronicle. Oregon Gov. Brown declares emergency as heatwave continues. Julye 27, 2022. Accessed 3/29/2024.

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Therefore, MCCAC now distributes cooling kits to the unhoused and people in housing that doesn't have air conditioning.[106]

Extreme Heat Risk

With respect to natural hazards, risk can be expressed as the probability of a hazard occurring combined with the potential for property damage and loss of life. Based on the combination of the probability of extreme heat events, sensitivity to extreme heat, and level of adaptive capacity in response to extreme heat and Wasco County's social vulnerability index, The Dalles is considered to be at high risk from extreme heat by the State of Oregon, XXXX risk by Wasco County and high risk by the City of The Dalles.

Storms (Extreme Precipitation)

Storm Characteristics

The Britannica Dictionary defines a storm as an occurrence of bad weather in which there is a lot of rain, snow, etc., and often high winds.[107]

Extreme precipitation events in the Pacific Northwest are governed by both atmospheric circulation and by how it interacts with complex topography. Atmospheric rivers – long, narrow swaths of warm, moist air that carry large amounts of water vapor from the tropics to mid-latitudes – generally result in coherent extreme precipitation events west of the Cascade Range. While closed low pressure systems often lead to isolated precipitation extremes east of the Cascade Range.[108]

Summer storms in The Dalles are generally thunderstorms. The National Weather Service (NWS) defines a severe thunderstorm as any storm that produces one or more of the following elements:

- A tornado.
- Damaging winds or speeds of 58 mph (50 knots) or greater.
- Hail 1 inch in diameter or larger.

Though thunderstorms of such severity are rare in The Dalles, heavy rainfall during summer thunderstorms have overwhelmed the capacity of the stormwater conveyance system which has caused localized flooding and wastewater treatment plant violations.

[106] Sadiq, S. (2023, July 31). No cooling centers for unhoused people in the Gorge this summer. Retrieved from Oregon Public Broadcasting Think Out Loud: opb.org/article/2023/07/24/columbia-river-gorge-summer-heat-cooling/

[107] The Britannica Dictionary. (n.d.). *Storm*. Retrieved from The Britannica Dictionary: britannica.com/dictionary/storm. Accessed 5/7/2024

[108] The Oregon Climate Change Research Institute. (2018) *Future Climate Projections Wasco County*. Salem, OR: Oregon Department of Land Conservation and Development.

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Though damaging winds greater than 58 mph are rare in The Dalles, strong winds and moisture originating from the Pacific Ocean are funneled into the Columbia River Gorge, with a potential for gusts over 100 mph, periodically impact all of Wasco County. Severe storms can damage property and disrupt utilities.

Winter storms may be ice or snow events that disrupt normal operations.

Ice storms or freezing rain (black ice) occur when rain falls from warm moist upper layers of the atmosphere into a cold, dry layer near the ground. The rain freezes on contact with the cold ground and accumulates on exposed surfaces. In addition to causing ice to accumulate on roadways, ice can accumulate on tree branches and power lines. This can cause power outages and can obstruct already icy transportation routes.

Snow is an ice particle formed by sublimation of vapor in the atmosphere as well as a collection of loosely bonded ice crystals deposited from the atmosphere. Snowfall results in an accumulation of packed ice crystals, and the condition of the snowpack determines a variety of qualities, such as color, temperature, and water equivalent. As weather conditions change, the snowpack can change as well, and this affects the characteristics of the snow.[109]

Types of snowfall[110]

- A blizzard is a violent winter storm, lasting at least three hours, which combines subfreezing temperatures and very strong wind laden with blowing snow that reduces visibility to less than 0.40 kilometers (0.25 miles).
- A snowstorm features large amounts of snowfall.
- A snow flurry is snow that falls for short durations and with varying intensity; flurries usually produce little accumulation.
- A snow squall is a brief, but intense snowfall that greatly reduces visibility and which is often accompanied by strong winds.
- A snowburst is a very intense shower of snow, often of short duration, that greatly restricts visibility and produces periods of rapid snow accumulation.
- Snowpack refers to the total snow and ice on the ground, including both new snow and the previous snow and ice which have not melted.

[109] National Snow and Ice Data Center, (n.d.). *What is snow?* nsidc.org/learn/parts-cryosphere/snow. Accessed 5/8/2024.
[110] National Snow and Ice Data Center, (n.d.). *Crysophere Glossary.* nsidc.org/learn/cryosphere-glossary. Accessed 5/8/2024.

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Climate Change

The Oregon Climate Change Research Institute issued a report specific to Wasco County in August 2018. They modeled high and low greenhouse gas emissions scenarios. There predictions for changes in extreme precipitation probabilities by the 2050s based on their higher emissions scenario:

- The intensity of extreme precipitation events is expected to increase slightly in the future as the atmosphere warms and is able to hold more water vapor.
- In Wasco County, the magnitude of precipitation on the wettest day and the wettest consecutive five days per year is projected to increase on average by about 17-percent and 12-percent, respectively.
- The frequency of days with at least 0.75-inches of precipitation and the frequency of days exceeding a threshold for landslide risk is not projected to change substantially.

Storm Probability

Extreme precipitation may occur at any time of year so design parameters in the hydraulic model for the stormwater conveyance system in The Dalles are not seasonally specific. The modeling effort used two design storm events to develop an understanding of both the system as it functions now, and how it could react during a future storm event. The current system responsiveness was modeled using the current percent buildout and a 5-year, 24-hour design storm event. The future conditions looked at a build out condition and a 25-year, 24-hour design event. National Oceanic and Atmospheric Administration Atlas 2 Volume X - Oregon isopluvial maps were used to define the 5-year and 25-year 24-hour storm events. Rainfall totals of 1.8-inches and 2.6-inches, respectively, were used with the Soil Conservation Service (SCS) Type 1 A analysis method to develop rainfall hyetographs in the Storm Water Master Plan.[111] The data sources used to develop the maps in Atlas 2 Volume X – Oregon were rainfall records from the *Climatological Data for the United States by Sections* (National Climatic Center 1997-1970) and *Hourly Precipitation Data* (National Climatic Center 1940-1970).[112]

Table 15: Probability of Extreme Precipitation – City of The Dalles

Frequency	Inches in 24-hours	Avg Inches per Hour	Description
2-Year	1.40	0.058	• An extreme precipitation event occurred on June 2, 1998[113]. A thunderstorm moved through The Dalles dumped up to 0.67 inches of rain in 20 minutes. [This precipitation rate exceeds the 100-year event.] The wind blew trees and tree
5-Year	1.80	0.075	
10-Year	2.25	0.094	

[111] Kennedy/Jenks Consultants. (2007). *City of The Dalles Storm Water Master Plan*. Portland, OR: Kennedy/Jenks Consultants.
[112] National Oceanic and Atmospheric Administration. (1973). *Atlas 2 Volume X – Oregon*. Washington D.C.: U.S. Dept. of Agriculture, Soil Conservation Service, Engineering Division
[113] Source: Greco, S.D. (1998). *June 1998 Volume 40 Number 6 Storm Data and Unusual Weather Phenomena with Late Reports and Corrections.* Asheville, NC: National Climactic Data Center

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Frequency	Inches in 24-hours	Avg Inches per Hour	Description
25-Year	2.60	0.108	limbs onto power lines causing power outages to much of the east side of town. Heavy rain caused minor street flooding, flooding of basements and businesses, and caused manhole covers to come loose. Rock slides were reported along hillsides. Pea sized hail was also reported.
50-Year	2.80	0.117	
100-Year	3.00	0.125	• An extreme precipitation event occurred on August 9, 2019. Recorded rainfall at the wastewater treatment plant was 0.75-inches total (no record of the peak inches per hour). The afterhours serviceperson was called out at about 9:00 p.m. due to several manhole covers lifted out into the roadway, a lift station was flooded, power was out at Public Works so called out staff had to open the gates manually. Police closed three intersections due to flooding. Traffic disruption and flood debris was cleaned up by August 10, 2019 at 3:30 p.m.[114] The wastewater treatment plant was inundated. The ultraviolet disinfection system was submerged and off line from August 9, 2019 at 11:02 p.m. to August 10, 2019 4:30 a.m. for a total of 328 minutes. 400 gallons of wastewater bypassed straight to the river; 716,890 gallons were discharged without disinfection. Oregon Department of Environmental Quality required river access to be posted "no human contact" from August 10 – 13, 2019.[115] • There was a high-intensity rain event in The Dalles on November 4, 2023 which caused the wastewater treatment plant to bypass 140 gallons of untreated influent to the Columbia River. The rain event peaked for a short time at a rainfall rate of about 1.15-inches per hour, about 15 times the average rainfall rate for a 1 in 5-year event, this is over 4.6 times time average rainfall rate for a 1 in 5-year event.[116]

Moderate snowfall normally occurs annually in The Dalles. Accumulations average between 4 – 5 inches. Snowfall can occur anytime between November and February. However, January is usually the month with the greatest snowfall. [117]

Table 16: Recent Winter Storm History – City of The Dalles

Year	ENSO Condition[118]	Description/Declaration
Dec. 28, 2023 – Jan. 9, 2004	Neutral[119]	FEMA 1510 DR - Oregon. Gilliam, Hood River, Morrow, Sherman, Umatilla, and Wasco Counties declared in Region 5. The most significant winter storm in several years brought snowfall to most of Oregon. ODOT closed I-84 through the Columbia Gorge twice, for almost 70 hours total. Freight trucks and passenger cars had to detour over Mount Hood where, ironically, road conditions were better than they were in downtown Portland where all vehicles were required to chain up. A frigid

[114] City of The Dalles. (2019). *OERS Incident #: 2019-2038 Activity Log (ICS 214).* The Dalles, OR: City of The Dalles.
[115] City of The Dalles. (2019). *OERS Incident #: 2019-2038 Report*. The Dalles, OR: City of The Dalles.
[116] City of The Dalles. (2023). *Department of Environmental Quality SSO Reporting Form*. The Dalles, OR: City of The Dalles.
[117] (Wasco County, 2019, pp. HA-22)
[118] Climate Prediction Center/National Center for Environmental Prediction. (2024, April 8). *ENSO: Recent Evolution, Current Status and Predictions.* Retrieved from Climate Prediction Center: cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf. Accessed 4/11/2024.
[119] National Oceanic and Atmospheric Administration. (2005). *Annual 2004 El Nino/Southern Oscillation*. Retrieved from National Centers for Environmental Information: ncei.noaa.gov/access/monitoring/monthly-report/enso/200413. Accessed 5/8/2024.

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Year	ENSO Condition[118]	Description/Declaration
		arctic air mass, heavy snow, sleet and freezing rain, strong east winds and blizzard conditions through and near the Columbia River Gorge snarled travel, forced school and business closures, and resulted in widespread power outages and properly damage in Northwestern Oregon. Blizzard conditions in the Columbia River Gorge: • closed I-84 between Troutdale and Hood River • closed Washington State Route 14 between Washougal, and White Salmon, Washington • Halted east-west travel through the Gorge and stranded hundreds of trucks at both ends of the Gorge[120]
Dec. 2007	Strong La Niña[121]	**EO-07-24** DETERMINATION OF STATE OF EMERGENCY IN OREGON DUE TO A SEVERE WINTER STORM THAT INCLUDES HIGH WINDS, FLOODING AND LANDSLIDES.
Jan. 2008	La Niña moving to neutral in AMJ through Dec.[122]	Hood River, Wasco, Sherman, Gilliam, Morrow, and Umatilla Counties: Heavy freezing rain from Bonneville westward through Columbia Gorge causing accidents on I-84; one fatality[123]
Nov. 29-30, 2010		Hood River and Wasco Counties: 4-5 inches of snow reported in Cascade Locks and Hood River; 1/2 inch of ice in Corbett[124]
Jan. 12-18, 2012	La Niña DJF	Hood River and Wasco Counties: 4.5 inches of new snow reported in Hood River; I-84 closed due to ice and snow east of Troutdale.[125]
Mar. 2, 2014	Neutral JFM, FMA	Hood River County, Upper Hood River Valley, Central Columbia River Gorge: East winds brought very cold air from east of the Cascades through the Columbia River Gorge as a moist front pushed in from the Pacific. The combination of the cold air mass and frontal precipitation resulted in snow and ice for the Gorge. There were numerous reports of snow and ice in the Central Columbia River Gorge with generally 6 to 8 inches of snow. There was a quarter of an inch of ice on top of the snow in Hood River and White Salmon, and as much as 0.4 to 0.5 inch of ice in Parkdale where the cold air held on the longest.[126]
Nov. 13, 2014	El Niño SON, OND	Hood River County, Central Columbia River Gorge: An early cold snap hit the Pacific Northwest before moist Pacific air moved in and resulted in one of the earliest snow, sleet, and freezing rain events in northwestern Oregon. Sleet and freezing rain in particular created hazardous commutes for tens of thousands in the western and eastern suburbs of Portland. Snow accumulations were primarily restricted to the Cascade valleys and the central Columbia River Gorge. Spotters reported around 6 to 8 inches of snow for the Cascade Foothills followed by a quarter of an inch of ice. A

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[120] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.
[121] National Oceanic and Atmospheric Administration. (2008). *Annual 2007 El Nino/Southern Oscillation*. Retrieved from National Centers for Environmental Information: ncei.noaa.gov/access/monitoring/monthly-report/enso/200713. Accessed 5/8/2024.
[122] National Oceanic and Atmospheric Administration. (2005). *Annual 2005 El Nino/Southern Oscillation*. Retrieved from National Centers for Environmental Information: ncei.noaa.gov/access/monitoring/monthly-report/enso/200513. Accessed 4/11/2024.
[123] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.
[124] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.
[125] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.
[126] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.

Year	ENSO Condition[118]	Description/Declaration
		combination of heavy snow and ice resulted in slick driving conditions for the Western Columbia River Gorge. Areas in the gorge measured a quarter.[127]
Dec. 19, 2016	La Niña NDJ	Hood River County, Upper Hood River Valley, Central Columbia River Gorge: A warmer low pressure system moved into to Northwest Oregon, bringing high winds along the North and Central Oregon Coast. Cold east winds through the Columbia River Gorge continued for the first part of the event, leading to light accumulations of snow and sleet in portions of far northwest Oregon and higher accumulations in the Columbia River Gorge and Hood River Valley. Estimate the Columbia Gorge had around 0.2 to 0.5 inch of ice accumulation as temperatures in the lower 30s with reports of snow and freezing rain in Hood River. A frontal system brought high winds to the Central Oregon Coast, heavy snow to the Cascades and a mix of ice and snow in the Columbia River Gorge and Hood River Valley. SNOTELs and other stations reported a range of 12 to 25 inches of snow. Some specific reports include 25 inches at Mt Hood Meadows, 22 inches at Timberline, 14 inches at Government Camp and 12 inches at McKenzie Snotel.[128]
Jan. 7 – Mar., 2017	Neutral DJF, JFM, FMA	• Hood River County, Upper Hood River Valley, Central Columbia River Gorge: FEMA DR-4328 Columbia, Hood River, Deschutes and Josephine Counties declared. A broad shortwave trough brought multiple rounds of precipitation, including a wintry mix of snow and ice for many locations across Northwest Oregon. Strong easterly pressure gradients generated high winds through the Columbia River Gorge as well on January 8. General snowfall totals of 2-4 inches were reported, with the greatest total being 4.5 inches. Major ice accumulations occurred after the snow, with several locations reporting 0.50-1.00. The combination of snow and ice resulted in significant power outages and closures across the area.[129] • **EO-17-06** DETERMINATION OF STATE OF EMERGENCY IN CLACKAMAS, CLATSOP, COLUMBIA, COOS, CURRY, DOUGLAS, GILLIAM, GRANT, HARNEY, HOOD RIVER, JOSEPHINE, LAKE, LANE, MARION, MULTNOMAH, TILLAMOOK, WASCO, AND WASHINGTON COUNTIES, DUE TO A SEVERE WINTER STORM THAT INCLUDES HIGH WINDS, FLOODING AND LANDSLIDES. Beginning Jan. 11, 2017 through March 2017. • Wasco, Sherman, Gilliam Counties: A strong Pacific storm system brought snow, sleet and freezing rain to many areas of the Interior Northwest February 7th through 9th. Winter storm produced a total snow accumulation of 5.25 inches with an ice accumulation of 0.25 inches on top of the snow. Occurred 5 miles SSW of Chenoweth in Wasco county.[130]
Feb. 22-26, 2019	El Niño DJF. JFM	Wasco, Sherman, Gilliam, Morrow, and Umatilla, Counties: Persistent troughing off the coast of the Pacific Northwest focused a stream of mid-level moisture over the

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[127] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.
[128] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.
[129] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.
[130] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.

Year	ENSO Condition[118]	Description/Declaration
		Inland Northwest resulting in a long duration snow event as the plume drifted north and south several times between the 22nd and 27th of February.[131]
Feb. 11 & 13, 2021	La Niña DJF, JFM	**EO-21-02** DETERMINATION OF STATE OF EMERGENCY IN BENTON, CLACKAMAS, HOOD RIVER, LINN, MARION, MULTNOMAH, POLK, WASHINGTON, AND YAMHILL COUNTIES DUE TO A SEVERE WINTER STORM THAT INCLUDES HEAVY SNOW AND ICE ACCUMULATION, HIGH WINDS, FLOODING, AND LANDSLIDES (Text of executive order includes the Columbia Gorge). **EO-21-03** DECLARATION OF ABNORMAL DISRUPTION OF THE MARKET DUE TO WINTER STORMS.
Jan. 18, 2024	El Niño DJF. JFM	The Governor issued a statewide emergency declaration due to a winter storm. "Thousands of people across the state have been impacted by the storm, including power outages, lack of transportation, and an array of safety concerns that come with severe weather," Governor Kotek said. "The state has been working with counties as they assess needs, including critical federal resources that can be unlocked by a statewide emergency. I declared a state of emergency in Lane County on Tuesday, and now we are heeding the call from additional counties to escalate."[132] During the state of emergency, I-84 was shut down between Troutdale and Hood River for almost a week.

Storm Vulnerability

The working group identified winter storm impacts specific to The Dalles due to the high concentration of population and potential demand for emergency response services. Roadways blocked with snow and ice can hinder police, fire, and medical response. It is not uncommon for The Dalles to be isolated from other communities for a few days or longer each winter when I-84 is closed due to ice or other severe winter weather.

Extended days of extremely low temperatures can cause damage to City infrastructure due to soil movement when temperatures are 20-degrees Fahrenheit or lower. When water turns into ice underground, it expands. This can make the ground move, causing frost heave. Frost heave lifts up the ground, as well as everything on top of it. Frost heave can be strong enough to move and damage roads, bridges, buildings and water mains. When frozen ground thaws, the ice in the ground melts. The ground sinks to fill the space left by the ice. The amount of ice and how quickly it melts can vary from place to place. Because different patches of ground may not thaw at the same rate, melting ice can make the surface uneven. Uneven thawing can make roads wavy and can break water mains that are often buried under roadways.[133]

Storm Resilience

Historically, Wasco County, the Oregon Department of Transportation and City of The Dalles Transportation Division plan for winter weather deployments and share resources for most

[131] State of Oregon. (2020). *Oregon Natural Hazard Mitigation Plan*. Salem, OR: State of Oregon Department of Land Conservation and Development.
[132] State of Oregon. (2024). Governor Kotek Declares Statewide Emergency Due to Severe Ice Storm. Salem, OR: State of Oregon Newsroom
[133] National Snow and Ice Data Center, (n.d.). *All About Frozen Ground: How Does Frozen Ground Affect Land?* nsidc.org/cryosphere/frozenground/how_fg_affects_land.html. Accessed 11/25/2020.

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efficient response. However, when preparing for the 2023-2024 winter weather season, the City was notified that, due to reduced resources, neither of these agencies would have resources available for mutual aid. This proved to be the case during the January 2024 severe winter storm event.

Storm Risk

With respect to natural hazards, risk can be expressed as the probability of a hazard occurring combined with the potential for property damage and loss of life. Based the history of storm declarations, Wasco County's social vulnerability ratings, and the potential for storms to impact infrastructure and the local economy, The Dalles is considered to be at high risk from storms by the State of Oregon, Wasco County and the City of The Dalles.

Volcano

Volcano Characteristics

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. There are a wide variety of hazards related to volcanoes and volcano eruption, and these hazards are typically distinguished by the different ways in which volcanic materials are ejected and other debris flows from the volcano[134].

Volcano Probability

Mount Adams is considered to be an active volcano. It was designated as a high threat volcano by the U.S. Geological Survey (USGS) in its 2018 Update to National Volcanic Threat Assessment. The risk of eruption was ranked 34 of 161 volcanoes assessed in the Cascade Range[135].

Mount Adams is located about 45 miles northwest of The Dalles. The Wicks Water Treatment Plant and The Dalles Municipal Watershed are located about 55 miles south of Mount Adams. The prevailing winds in the area are out of the West so ash fall is not expected to severely impact the watershed under normal weather conditions. The impact of an eruption is expected to be similar to impacts experienced during the 1980 eruption of Mount St. Helens.

Mount Hood is an active volcano. It was designated as a very high threat volcano by the U.S. Geological Survey (USGS) in its 2018 Update to National Volcanic Threat Assessment because of how it erupts and the communities within its reach. The risk of eruption was ranked 6 of 161 volcanoes assessed in the Cascade Range[136]. USGS–Cascades Volcano Observatory and its

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[134] Wasco County. (2019). *Wasco County Multi-Jurisdiction Natural Hazard Mitigation Plan*. The Dalles, OR: Wasco County.
[135] Ewert, J.W., Diefenbach, A.K., & Ramsey, D.W. (2018). *2018 Update to the U.S. Geological Survey National Volcanic Threat Assessment*. Reston, VA: U.S. Department of the Interior.
[136] Ewert, J.W., Diefenbach, A.K., & Ramsey, D.W. (2018). *2018 Update to the U.S. Geological Survey National Volcanic Threat Assessment*. Reston, VA: U.S. Department of the Interior.

partners currently operate eleven seismometers and six GPS receivers on and near Mount Hood[137].

Mount Hood is located 10 miles west of the Wasco County border, and 20 miles from The Dalles[138]. The Wicks Water Treatment Plant is about 21 miles northeast of Mount Hood's peak. The upper portions of The Dalles Municipal Watershed are located about 10 miles due east of Mount Hood. The prevailing winds in the area are out of the West.

> ***Ash fall*** from Mount Hood could have a significant impact across the entire County including Wicks Water Treatment Plant[139]. Depending on the season of the eruption, wildfires caused by falling ash, ash fall in the surface water supply, or the blast itself could impact operations at Wicks Water Treatment Plant.
>
> ***Lahars*** can be generated by hot volcanic flows that melt snow and ice or by landslides from the steep upper flanks of the volcano. Wicks Water Treatment Plant is located outside of the area expected to experience significant impact from lahars sweeping down the entire length of the Sandy (including the Zigzag) and White River valleys[140].

Mount St. Helens erupted in 1980. Though located 65 miles northwest of The Dalles, areas of Wasco County were covered by up to an inch or more of ash and some vehicles could not operate as their air intakes were clogged[141]. However, the eruption of Mount St. Helens did not significantly impact operations at Wicks Water Treatment Plant[142].

Mount St. Helens is still considered to be an active volcano. It was designated as a very high threat volcano by the U.S. Geological Survey (USGS) in its 2018 Update to the National Volcanic Threat Assessment. The risk of eruption was ranked 2 of 161 volcanoes assessed in the Cascade Range[143].

Volcano Vulnerability

During an eruption event at Mount Hood the City expects to experience impacts to The Dalles Municipal Watershed due to prevailing winds and proximity to the volcano. The Watershed is a surface water source and 80-percent of the City's water supply. Impacts include increased

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[137] Mize, J. (2019, September 19). *Three additional monitoring stations to be installed on Mount Hood*. columbian.com/news/2019/sep/19/three-additional-monitoring-stations-to-be-installed-on-mount-hood/. Accessed 5/8/2024.

[138] Wasco County. (2019). *Wasco County Multi-Jurisdiction Natural Hazard Mitigation Plan*. The Dalles, OR: Wasco County.

[139] Wasco County. (2019). *Wasco County Multi-Jurisdiction Natural Hazard Mitigation Plan*. The Dalles, OR: Wasco County.

[140] Wasco County. (2019). *Wasco County Multi-Jurisdiction Natural Hazard Mitigation Plan*. The Dalles, OR: Wasco County.

[141] Wasco County. (2019). *Wasco County Multi-Jurisdiction Natural Hazard Mitigation Plan*. The Dalles, OR: Wasco County.

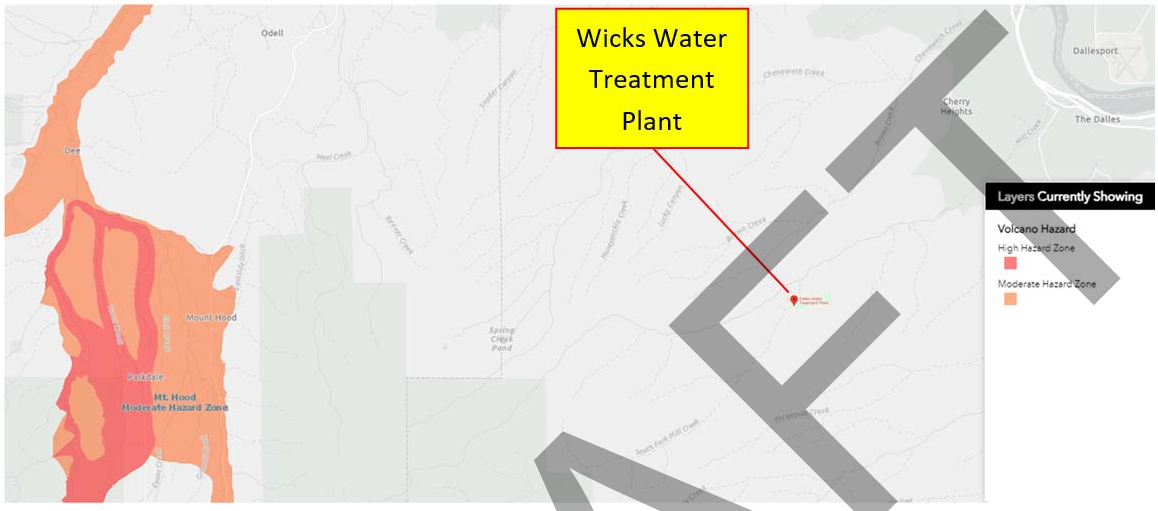
[142] Anderson, D. (2020) City of The Dalles Public Work Director. (J. Hoyenga Interviewer)

[143] Ewert, J.W., Diefenbach, A.K., & Ramsey, D.W. (2018). *2018 Update to the U.S. Geological Survey National Volcanic Threat Assessment*. Reston, VA: U.S. Department of the Interior.

DRAFT

turbidity in the sedimentation basin due to ash fall, which would lead to an increased need for pretreatment chemicals (e.g. flocculent) and an increased need for the backwash cycle in the filter beds. Powder activated carbon might also be needed for taste and odor mitigation. The City may need to activate wells as alternate water supplies if the water quality from the Watershed became untreatable, or if the treatment plant had to be evacuated.

Figure 11: The Dalles Volcanic Event Map



Source: Oregon HazVu: Statewide Geohazards Viewer, Oregon Department of Geology and Mineral Industries, accessed 5/7/2024

The primary danger area around a volcano covers an approximately 20-mile radius, although there is some danger to people within 100 miles or more. Airborne ash from a volcano can affect people hundreds of miles away from the eruption. The most common volcano-related hazards are ash (tephra), lahars (volcanic mud flows), lava and debris flows, avalanches, and pyroclastic flows.

The Oregon Department of Geology and Mineral Industries map data depicts areas where volcanic hazards may occur during or after volcanic activity. Specifically, mudflows, debris flows, avalanches of hot volcanic material, lava flows, and landslides.[144]

Volcano Resilience

Though not often used, powder activated carbon is stored at the Wicks Water Treatment Plant in case of emergencies that could affect taste and odor. The City maintains supply contracts that can expedite delivery of pretreatment chemicals if needed.

The Dalles water utility has three groundwater wells and two others under construction. These wells are expected to be sufficient to supply domestic and some limited industrial needs if surface water supplies are compromised.

[144] Oregon Department of Geology and Mineral Industries. (n.d.). *Hazards and Assets*. Retrieved from Oregon HazVu:Statewide Geohazards Viewer: oregon.gov/dogami/hazvu/Pages/hazards-assets.aspx. Accessed 5/7/2024.

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Volcano Risk

With respect to natural hazards, risk can be expressed as the probability of a hazard occurring combined with the potential for property damage and loss of life. Based the proximity of the Mount Hood to The Dalles Municipal Watershed and the very high threat assessment of the U.S. Geological Survey, The Dalles is considered to be at high risk and high likelihood from volcano according to the 2021 America's Water Infrastructure Act Risk & Resilience Assessment.[145] The Dalles is considered to be at high risk from volcanos by the State of Oregon, low risk by Wasco County and high risk by the City of The Dalles.

Wildfire

Wildfire Characteristics

Any instance of uncontrolled burning within a forested area, grassland, or brush is classified as a wildfire. Wasco County's wildfire season usually runs from mid-May through October. However, any prolonged period of lack of precipitation presents a potentially dangerous problem. The probability of a wildfire in any one locality on a particular day depends on fuel conditions, topography, the time of year, the past and present weather conditions, and the activities (logging activities, debris burning, land clearing, camping, etc.) which are or will be taking place[146].

Human caused fires are unfortunately more common that lightning caused fires. According to the Wasco County Natural Hazard Mitigation Plan, 70-90% of all wildfires locally are started by humans[147].

Lightning caused fires are a natural hazard, especially for forest lands such as The Dalles Municipal Watershed[148].

Wildfire Probability

The 2005 Community Wildfire Protection Plan was updated in 2022. An analysis of wildfire activity in Wasco County over the past 10 years is also useful for understanding current patterns of wildfire activity. From 2008 to 2018, there were a total of 691 recorded fires that burned 761,799 acres. The average number of fires per year was 69, with many of these fires being small. Only about 10% of all fires were larger than 1,000 acres. Fire cause for the county was 34% lightning and 66% human. The statistics used in this analysis may not be all inclusive for the area. Data pulled includes all fires that involve Federal and State protection, but may not be all

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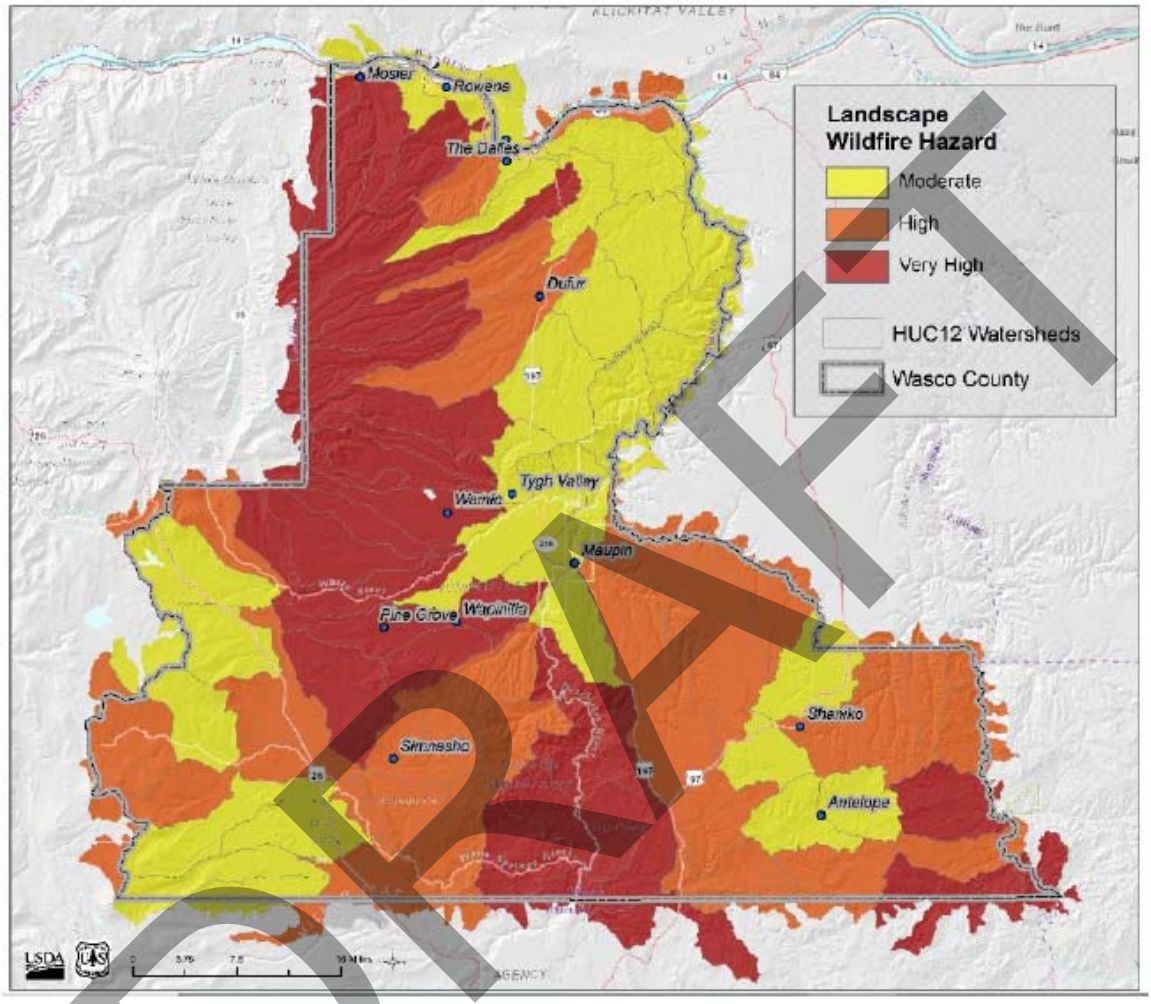
[145] City of The Dalles. (2021). *America's Water Infrastructure Act Risk & Resilience Assessment*. The Dalles, OR: City of The Dalles.
[146]Wasco County. (2019). *Wasco County Multi-Jurisdiction Natural Hazard Mitigation Plan*. The Dalles, OR: Wasco County.
[147] (Wasco County. (2019). *Wasco County Multi-Jurisdiction Natural Hazard Mitigation Plan*. The Dalles, OR: Wasco County.
[148] Wasco County. (2019). *Wasco County Multi-Jurisdiction Natural Hazard Mitigation Plan*. The Dalles, OR: Wasco County.

inclusive in areas that are solely Rural Fire District protection, or unprotected lands in the Eastern half of the county.

Figure 12: Relative Wildlife Hazard in Wasco County, Source: Community Planning Assistance for Wildfire (CPAW)



Source: 2022 Community Wildfire Protection Plan. Wasco County Planning Department. Accessed 3/29/2024.

Table 17: Recent FEMA Fire Management Assistance Declarations for Oregon – Wasco County

Declaration Number	Year	Name	Description
FM-5046	2013	Government Flats Complex	The lightning caused Blackburn Fire, the largest of the Government Flats Complex Fires, burned 11,775 acres[149] near The Dalles including 5,400 acres within the Mill Creek Watershed. The

[149] Denson, B. (2013, August 24). Blackburn Fire Has burned through nearly 12,000 acres at The Dalles. Portland, OR: The Oregonian

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Declaration Number	Year	Name	Description
			fire threatened both the operation and the structures of the water treatment plant, as well as water quality during the subsequent years[150].
FM-5073	2014	Rowena Fire	3,680 acres, conflagration declared
FM-5255	2018	Substation Fire	78,425 acres, conflagration declared, one fatality, 4 homes and 48 other structures lost
FM-5265	2018	South Valley Fire	20,026 acres, 3 homes and 12 other structures lost
FM-5327	2020	Mosier Creek Fire	983 acres, conflagration declared, 8 homes and 28 other structures lost[151]
FM-5341	2020	White River Fire	17,500 acres, conflagration declared[152]

Wildfire Vulnerability

The City's greatest vulnerability is not from wildfire, but fires triggered by other hazard events. However, the City of The Dalles is a high priority area for wildfire protection in Wasco County because of its high population density, high economic value to the County (numerous businesses and agriculture), and the fact that the fuel loading and weather conditions there are conducive to large and fast-moving fires.

The increased potential of fire starts in the Chenowith and Cherry Heights areas, shown in the map, are mitigated with fast response time from the Mid-Columbia Fire and Rescue and the Oregon Department of Forestry[153].

The Mill Creek Watershed (City of The Dalles Municipal Watershed) is a high priority area for the Oregon Department of Forestry. No one lives in the area, but it is highly valued because it is the source of 80-percent of the water supply to the City. The potential for human caused fires starting in the area is low because there are no homes. However, the hazard rating is one of the highest in the Wasco County Community Wildfire Protection Plan based on the heavy forest fuels throughout the watershed and the strong potential for crown fires. Also, because the protection capability is moderate with a response time of more than 10 minutes.[154]

The School Marm Fire (1967) demonstrated that wildfire within The Dalles Watershed poses a tremendous risk to City-owned water-control infrastructure and public health. The area is

[150] Anderson, D. (2018, June22). City of The Dalles Public Works Director. (J.Hoyenga, Interviewer)
[151] Columbia Gorge News. (2020, August 13). *Mosier Creek Fire burns 985 acres; 75 percent contained*. columbiagorgenews.com/free_news/mosier-creek-fire-burns-985-acres-75-percent-contained/article_45553923-47ab-58ce-a28f-ffe85566b550.html. Accessed 5/8/2024.
[152] Neumann-Rea, K. (2020, September 22). *Smoke clears, regional fire threat endures: White River Fire contained*. columbiagorgenews.com/news/smoke-clears-regional-fire-threat-endures-white-river-fire-contained-firefighters-douse-small-blaze-near/article_89d0d652-f2b6-11ea-8303-6fe58e5fbf27.html. Accessed 5/8/2024.
[153] Hulbert, J.H. (2005). *Wasco County, Oregon Wildfire Protection Plan.* The Dalles, OR: Wasco County
[154] Hulbert, J.H. (2005). *Wasco County, Oregon Wildfire Protection Plan.* The Dalles, OR: Wasco County

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currently at extreme risk of high-intensity wildfire due to declining forest health and increased fuel loadings; contributing factors include drought, root disease, insect infestations and the encroachment of Grand Fir into drier ecosystems. The School Marm Fire burn is currently over-stocked with scrub oak.[155] In addition, Columbia Gorge winds create extreme fire behavior in this area (Sheldon Ridge Fire, 2002; Blackburn Fire, 2013; smaller fire in 2017). Recent studies from Oregon State University point out that wildfire vulnerability is increasing due to drought and heat dome weather events.[156]

Wildfire Resilience

From Wasco County Community Wildfire Protection Plan: "Apply for a grant to do hazard fuel treatment on City-owned lands in The Dalles Municipal Watershed. Priority-High." This project ranked 22nd in 2006 for recommended funding (ID# 2006-119)[157] The City received the grant and performed the work.[158]

Wildfire Risk

With respect to natural hazards, risk can be expressed as the probability of a hazard occurring combined with the potential for property damage and loss of life. Based the history of fire management assistance declarations as well as the potential for wildfire to impact the water supply. The Dalles is considered to be at high risk and high likelihood from wildfire according to the 2021 America's Water Infrastructure Act Risk & Resilience Assessment.[159] Due to Wasco County's social vulnerability ratings and the demonstrated impact of wildfire on water supply, agriculture and the local economy, The Dalles is considered to be at very high risk from wildfires by the State of Oregon, medium risk by Wasco County and high risk by the City of The Dalles.

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[155] Anderson, D. (2006). Grant Application to the Community Assistance and Wildland Urban Interface Program, National Fire Plan. *5190-3 (FS)/9211 (BLM) (OR-934)*. The Dalles, OR: City of The Dalles Public Works Department
[156] Lincoln County Leader. Tree Scorching: New report shows 'heat dome' damage. Feb 6, 2023 Updated Feb 20, 2023. Steve Lundeberg. Accessed 3/29/2024.
[157] Cordes, E. (2006, June 15). Pacific Northwest Wildfire Coordinating Group Correspondence. *5190-3 (FS)/9211 (BLM) (OR-934)*. Madras, OR: Jefferson County Rural Fire District #1
[158] City of The Dalles Finance Department. (2012). *Comprehensive Annual Financial Report.* The Dalles, OR: City of The Dalles
[159] City of The Dalles. (2021). *America's Water Infrastructure Act Risk & Resilience Assessment*. The Dalles, OR: City of The Dalles.

Goals and Action Items

What are the Plan Goals?

The plan goals help to guide the direction of future activities aimed at reducing risk and preventing loss from future natural hazard events. In order to align with the Wasco County Natural Hazards Mitigation Plan, The City of The Dalles is adopting Wasco County's goals, with no City-specific revisions.

Table 18. 2024 Wasco County NHMP Goals

Goal	Statement
Protection of Life and Property	Develop and implement activities to protect human life, commerce, property, and natural resource systems.
	Reduce insurance losses and repetitive claims for chronic hazard events while promoting insurance for catastrophic hazards.
	Evaluate guideline/codes and permitting processes in addressing hazard mitigation; emphasize non-structural means of mitigating hazard impact.
	Actively acknowledge amount of loss the County is susceptible to and develop efforts to overcome that loss without significant reliance on outside resources.
	Utilize mitigation activities to minimize risks associated with hazard events.
Emergency Services Enhancement	Evaluate performance of critical facilities during a natural hazard event; implement measures to improve performance.
	Minimize threat to life safety issues.
	Ensure resources, staffing, and volunteer base keeps pace with County growth and needs.
Education & Outreach & Inclusion, Diversity, Equity and Accessibility	Develop and implement education programs to increase awareness among citizens; local, county and regional agencies; non-profit organization; businesses; and industry.
	Develop and conduct outreach programs to increase the number of local activities implemented by public and private sector organizations.
	Build community consensus through outreach, education, and activities.
	Ensure that the cultural, racial, and economic status of citizens is considered during the public planning process, and account for and incorporate underserved communities
Facilitate Partnerships & Coordination	Strengthen communication and coordination of public/private partnership and emergency services among local, county, and regional governments and the private sector.
	Incorporate hazard mitigation into the greater social, economic, and natural resource goal framework.
	Incorporate hazard mitigation as part of the County leadership's routine decision making process.

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	Foster a diverse economy to reduce the impacts of a hazard event on any one sector.
	Create the conditions for a transitional economy that welcomes new development and innovative ideas that are sensitive to potential hazard risks faced by the County.
Natural Resource Systems Protection	Link watershed planning, natural resource management, and land use planning with natural hazard mitigation activities.
	Preserve and rehabilitate natural systems to serve natural hazard mitigation functions and protect recreation resources.
	Coordinate programs to increase natural hazard knowledge base and use technology to better record events and model vulnerability.
	Protect recreation and tourism industries by raising awareness of potential hazard impacts.
	Provide support for agricultural and forest industries to help them prepare for hazardous events.
Climate Change	Commit to efforts that will increase understanding of how climate change will increase the frequency and severity of identified hazards.
	Consider the increase in hazard frequency, duration, and severity due to climate change during the development and implementation of activities to protect human life, commerce, property, and natural resource systems.

Source: Wasco County NHMP Steering Committee, May 29, 2024

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Existing Mitigation Activities

Existing mitigation activities include current programs and activities that are being implemented by the community in an effort to reduce the community's overall risk to natural hazards. Documenting these efforts can assist participating jurisdictions to better understand risk and can assist in documenting successes. Table 19 lists existing City programs, mitigation projects and other efforts that have been implemented since the Wasco County NHMP was adopted in 2012, along with the hazards that were addressed by each mitigation activity.

The 2012 plan listed 17 action items specific to the City of The Dalles, all of which are carried over into the latest update. In 2018, six additional action items were added. Since the 2012 plan, ongoing efforts towards a variety of these goals have occurred and will continue into the future (for example: continuing education, hazard fuel treatments, development of partnerships, infrastructure and facility rehabilitation, etc.). Table19 identifies City specific action items that had concrete outcomes and provides a summary update of the mitigation actions the City of The Dalles has accomplished since the 2012 plan.

Table 19: City of The Dalles Mitigation Activities, 2012-2024

Action Item	Title	Accomplishment
MH #1	Evaluate and Prioritize Critical Infrastructure for Hazard Resilience	Completed *Steel Tank Seismic Evaluation* in 2014
		Completed seismic upgrades to the Columbia View Reservoir
		Contracted for seismic upgrades to the Sorosis Reservoir
		Sorosis Reservoir seismic upgrade, repairs and painting
		The EPA-required Municipal Water System Risk and Resilience Assessment (RRA) certified in June 2021
		EPA-Required update to Municipal Water Emergency Response Plan (ERP) certified in December 2021
MH #3	Partner with the County and other relevant community partners to Coordinate Disaster Education/Outreach & Response for Vulnerable Populations	Connected with the State of Oregon Safety Manager for the office of Aging and People with Disabilities and the local network of childcare regulators when developing the Water ERP.
		City staff served on the County led 2020 COVID-19 state of emergency response
MH #4	Identification and Pursuit of Implementation Funding for Mitigation Actions	Dog River Pipeline Replacement Project completed and in service in 2023 using grants, loans and City matching funds
MH #6	Encourage Critical Facilities to Secure Emergency Power	Installed a second emergency back-up generator at the Wastewater Treatment Plant
		Installed Co-Gen technology to generate electricity from methane gas at the Wastewater Treatment Plant.
		Installed emergency back-up generators to the Jordan and Meadows sewer lift stations.
		Applied for a grant through FEMA to purchase and install emergency generators at city owned wells and booster pump stations.

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Action Item	Title	Accomplishment
MH #7	Partner with the County and other relevant community partners to Implement Education/ Outreach Activities	Participated in the Get Ready event, organized by NW Natural, since 2019
MH #8	Small Business Awareness and Continuity Planning	Updated City website with water quality reopening procedures
		As part of Water ERP development, the City reached out to The Dalles Chamber of Commerce, sent links for small business emergency planning resources
MH #9	Partner with County and other relevant community partners on All-Hazard Emergency Preparedness	Consulted with North Central Public Health when developing the Cyanotoxin Communication & Action Plan in 2019
		Consulted with North Central Public Health when updating the Wastewater Emergency Action & Public Notice Plan in 2020
		Consulted with North Central Public Health when developing the Water ERP in 2021
		Mercury disposal and emergency response bill insert in English and Spanish in cooperation with Tri-County Hazardous Waste & Recycling Program
MH #11	Ensure Critical Staff Are Identified and Trained in the NIMS-FEMA Compliant Incident Command System (ICS)	In 2018 initiated 3-Year Plan for training all Divisions in The Dalles Public Works Department; by 2023 all Divisions had participated in at least one internal exercise
		City staff have participated in external training and exercises
DH #1	Develop Long-range Water Resource Plan to Accommodate Current/Projected Growth and Mitigate Drought Impact	Completed a Watershed Post-Fire Rehabilitation Project with multiple funding partners.
		Evaluated feasibility of Aquifer Storage and Recovery (ASR); applied for a Limited License to implement ASR
		ASR well and reservoir built in 2024
FH #2	Explore acquisition and management strategies to preserve parks, trails and open space in the floodplain	Design of the Mill Creek Greenway was initiated in cooperation with Northern Wasco County Parks and Recreation District.
FH #3	Update Flood Insurance Rate Maps (FIRMs)	Updated FIRMs are expected to be finalized in December 2024
FH #5	Open up Mill Creek tunnel between Thompson Park and the Columbia River, where the creek terminates	City applied for US Army Corps of Engineers grant for Mill Creek Tunnel upgrade planning; supported by Union Pacific Railroad and Oregon Department of Transportation
LH #1	Implementation of E Scenic Drive Stabilization Project	The design and construction for the E Scenic Drive Stabilization Project was completed in 3 phases: Phase 1 was completed using ODOT State Transportation Plan funds; Phases 2 & 3 utilized City funds; the project was completed in 2022
WH #2	Forest Management in The Dalles Municipal Watershed	A salvage timber sale was conducted in The Dalles Municipal Watershed following the 2013 Government

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Action Item	Title	Accomplishment
		Flats Complex Fire.
		City supported US Forest Service Polywog forest-health improvement/rules reduction project in 2021
WH #2	Forest Management in The Dalles Municipal Watershed	Grant funding secured to updated The Dalles Municipal Watershed Forest Management Plan which will include a carbon capture element
		Funding secured for a watershed tree planting project in Fall 2024

Sources: 2012 NHMP, 2018 The Dalles NHMP Review team meetings; COTD 2019 Action Item Tracking Spreadsheet

Action Items

What are the Plan Action Items?

Short and long-term mitigation action items identified through the plan update process, including the issues identification process, risk assessment, and community profile, are an important part of the mitigation plan. Action items are detailed recommendations for activities that local departments, citizens and others could engage in to reduce risk. The mitigation action items identified by the plan are intended to help the City move toward achieving the plan goals. The mitigation action items address both multi-hazard and hazard-specific issues for the hazards addressed in this plan.

In summary, the 2024 addendum includes 12 multi-hazard mitigation actions, 1 drought action item, 2 earthquake mitigation actions, 7 flood action items, 1 landslide mitigation action, 2 severe weather mitigation actions and 2 wildfire actions. There are no volcano specific mitigation actions. One mitigation action was completed in 2022 and has been removed from the 2024 list, Implementation of E Scenic Drive Stabilization Project.

Each action item has a corresponding action item worksheet describing the activity, identifying the rationale for the project, identifying potential ideas for implementation, and assigning coordinating and partner organizations. To facilitate implementation, worksheets have been filled out with details suggestions about how to achieve each action item.

Rationale or Key Issues Addressed

Action items should be fact based and tied directly to issues or needs identified throughout the planning process. Action items can be developed from a number of sources including participants of the planning process, noted deficiencies in local capability, or issues identified through the risk assessment.

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Coordinating Organization

The coordinating organization is the lead public agency with 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 Partners

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

External Partners

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.

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

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* (ST) are activities that may be implemented with existing resources and authorities within one to two years.
- *Long-term action items* (LT) may require new or additional resources and/or authorities, and may take between one and five years to implement.

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Mitigation Action Item Proposal Form

Each mitigation action is described in detail in the Mitigation Action Item Proposal Form and also in summary in the Mitigation Action Items Summary Matrix.

Proposed Action Item:			**Alignment with Plan Goals:**
Type of Hazard #1 – Mitigation Proposal Title			Must align with a Wasco County Goal
Alignment with Existing Plans/Policies:			
List agency and plan that supports the mitigation proposal			
Rationale for Proposed Action Item:			
• Rationale should be based on studies and data analysis, may or may not be associated with a plan			
Ideas for Implementation:			
• Ideas from plan development working groups and public input sessions			
Coordinating Organization:	City Department that will lead the mitigation effort		
Internal Partners:		**External Partners:**	
City Departments		Other public and private sector organizations	
Potential Funding Sources:		**Estimated cost:**	**Timeline: (check one)**
As identified during plan development		**If available**	☐ Short Term (0-2 years) ☐ Long Term (2-4+ years)
Form Submitted by:	**Author or Department**		
Action Item Status:	Track from original submittal year. Example: Submitted July 2006 – Revised 2012 – Revised 2018		

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City of The Dalles NHMP Mitigation Action Items Matrix

Table 20: City of The Dalles Mitigation Action Items Matrix Key

Hazard	Summary	Abbreviation
Multi-Hazard	Actions that address a combination of two or more identified hazards.	MH
Drought	A prolonged period of abnormally low precipitation.	DH
Earthquake	The shaking of the ground caused by an abrupt shift of rock along a fracture in the earth, called a fault.	EH
Flood	An overflow of a large amount of water beyond its normal confines, especially over what is normally dry land.	FH
Landslide	The sliding movement of masses of loosened rock and soil down a hillside or slope.	LH
Severe Weather	Extreme heat events, summer thunderstorm and windstorm, blizzard, ice storm or snow storm	SH
Volcanic Event	A vent in the earth's crust through which molten rock, rock fragments, gases or ashes are ejected	VH
Wildfire	Any instance of uncontrolled burning within a forested area, grassland, or brush	WH

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Table 21. The Dalles NHMP Mitigation Action Item Matrix

Action Item	Priority L=Low M=Med H=Hi	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline LT=Long ST=Short	Alignment with plan goals					
						Protection of Life & Property	Emergency Services Enhancement	Education, Outreach & IDEA	Facilitate Partnerships & Coordination	Climate Resilience	Natural Resource Systems Protection
Multi-Hazard (MH)											
MH #1	M	Evaluate and Prioritize Critical Infrastructure for Hazard Resilience (e.g. Seismic Retrofit, Wildfire Protections)	Public Works	City Council, Engineering Firms, DOGAMI, OEM, FEMA; Q-Life; City IT	ST	X					
MH#2	M	Seek Implementation Funding for Hazard Resilient Modifications to Critical Infrastructure	Public Works	City Council, Engineering Firms, DOGAMI, OEM, FEMA	LT	X					
MH#3	M	Partner with the County to Coordinate Disaster Education/Outreach & Response for Vulnerable Populations	County BOC	City Council, Oregon Department of Health and Human Services, Red Cross, Mid-Columbia Medical Center; City PIO	LT			X	X		
MH#4	M	Identification and Pursuit of Implementation Funding for Mitigation Actions	Planning	City Council, Wasco County	LT				X		
MH#5	M	Annual Review of Natural Hazards Mitigation Plan / Complete Review/Update/Adoption by City Council Every Five Years	Public Works	City Council, Oregon Emergency Management Federal Emergency Management Agency	ST		X		X		

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Action Item	Priority L=Low M=Med H=Hi	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline LT=Long ST=Short	Alignment with plan goals					
						Protection of Life & Property	Emergency Services Enhancement	Education, Outreach & IDEA	Facilitate Partnerships & Coordination	Climate Resilience	Natural Resource Systems Protection
Multi-Hazard (MH)											
MH#6	M	Secure Emergency Power Supply to Critical Facilities	City Council	Planning, Fire, Police, Public Works, State Fire Marshal, Northern Wasco County PUD	LT		X				
MH#7	M	Partner with the County to Implement Education/Outreach/Awareness Activities	City Council	Private Sector, Non-Profit Sector, State & Local Government, OEM, FEMA; City PIO	LT			X	X		
MH#8	M	Small Business Awareness and Continuity Planning	Chamber of Commerce	Planning, Oregon Continuity Planner Association, Wasco County, The Dalles Chamber of Commerce; The Dalles Main Street Program	LT			X			
MH#9	M	Partner with County on All-Hazard Emergency Preparedness	City Council	Planning, Wasco County Emergency Management	LT				X		
MH#10	M	Enter Into Supply Contracts and Mutual Aid Agreements	City Council	Public Works, Wasco County Emergency Management, ORWARN, OEM, Private Sector	ST				X		
MH#11	H	Ensure Critical Staff Are Identified and Trained in the NIMS-FEMA Compliant Incident Command System (ICS)	City Council	Public Works, Police, ICS Training Providers	LT				X		

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Action Item	Priority L=Low M=Med H=Hi	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline LT=Long ST=Short	Alignment with plan goals					
						Protection of Life & Property	Emergency Services Enhancement	Education, Outreach & IDEA	Facilitate Partnerships & Coordination	Climate Resilience	Natural Resource Systems Protection
Multi-Hazard (MH)											
MH#12	M	Identify Priority Transportation Routes to Access and Connect Critical Facilities	Public Works	City Council, Wasco County Emergency Management; North Wasco County School District; Mid-Columbia Fire and Rescue; Columbia Area Transit; MCEDD (The Link Bus)	LT				X		
Drought Hazard (DH)											
DH#1	H	Develop Long-range Water Resources Plan to Accommodate Current/Project Growth and Mitigate Drought Impact	City Council	Public Works, Fire, Chenowith Water PUD, Watermaster, DEQ, OHA, OWRD, Private Sector	LT					X	X
Earthquake Hazard (EH)											
EH #1	H	Complete Seismic Upgrades Planned for Municipally-owned Potable Water Steel Reservoirs	Public Works	City Council, Engineering Firms	ST	X	X				
EH #2	H	Complete a Seismic Analysis of the City's Water System	Public Works	Engineering Firms, Oregon Health Authority (OHA)	ST	X	X				

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Action Item	Priority L=Low M=Med H=Hi	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline LT=Long ST=Short	Alignment with plan goals					
						Protection of Life & Property	Emergency Services Enhancement	Education, Outreach & IDEA	Facilitate Partnerships & Coordination	Climate Resilience	Natural Resource Systems Protection
Flood Hazard (FH)											
FH #1	M	Explore the potential for The Dalles to participate in the Community Rating System (CRS) of the National Flood Insurance Program (NFIP)	Planning	City Council, Public Works, Wasco County Emergency Management	ST	X		X		X	
FH#2	H	Explore acquisition and management strategies to preserve parks, trails, and open space in the floodplain	Planning	City Council, Urban Renewal Agency, Wasco County Emergency Management, DLCD, OEM, FEMA	LT	X				X	X
FH#3	M	Update Flood Insurance Rate Maps (FIRMs)	Planning	City Council, Wasco County Emergency Management, DLCD, OEM, FEMA	ST	X				X	
FH#4	M	Ensure continued compliance with the National Flood Insurance Program	Planning	City Council, Wasco County Emergency Management, DLCD, OEM, FEMA	LT	X		X		X	
FH#5	M	Open up Mill Creek tunnel between Thompson Park and the Columbia River, where the creek terminates	Public Works	City Council, Planning, ODOT, Union Pacific, OEM, DLCD, FEMA, ACE	ST	X				X	X
FH #6	M	Develop Chenowith Creek residential flood zone mitigation plan	Planning	City Council, Planning, OEM, DLCD, FEMA	LT	X				X	X
FH #7	H	City/County explore funding for flood mitigation on private property via public/private partnerships	Planning	City Council, Planning, OEM, DLCD, FEMA	LT	X				X	X

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Action Item	Priority L=Low M=Med H=Hi	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline LT=Long ST=Short	Alignment with plan goals						
						Protection of Life & Property	Emergency Services Enhancement	Education, Outreach & IDEA	Facilitate Partnerships & Coordination	Climate Resilience	Natural Resource Systems Protection
Landslide Hazard (LH)												
LH #1	L	Update the 2011 landslide hazard study by 2031 to inform zoning within the City UGB	Planning		ST	X						
Severe Weather Hazard (SH)												
SH #1	H	Coordinate Transportation Division winter weather response planning, supplies and equipment	Public Works	Wasco County, ODOT	ST	X			X	X		
SH #2	M	Update The Dalles Storm Water Master Plan	Public Works	City Council	LT	X				X		
Wildfire Hazard (WH)												
WH#1	M	Partner with the County to Implement the Community Wildfire Protection Plan (CWPP)	City Council	Fire, Planning, Public Works	LT				X	X		
WH#2	M	Update The Dalles Municipal Watershed Forest Management Plan	Public Works	City Council, Wasco County Emergency Management, Landowners, USFS, Oregon Office of State Fire Marshal	ST	X			X	X	X	

Source: 2018 The Dalles NHMP Review Team meetings

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Mitigation Action Items Proposal Forms

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Proposed Action Item:	Alignment with Plan Goals:
MH #1 – Evaluate and Prioritize Critical Infrastructure for Hazard Resilience (e.g. Seismic Retrofit, Wildfire Protections)	Protection of Life & Property

Alignment with Existing Plans/Policies:

COTD Water System Master Plan COTD Water System Emergency Response Plan & Public Notice COTD Wastewater System Master Plan	COTD Wastewater System Emergency Response Plan & Public Notice Emergency Action Plan Crow Creek Dam Failure COTD Transportation System Plan

Rationale for Proposed Action Item:

- The City's 2024 working group affirmed that the risk to earthquakes and landslide in the City is greater than that of the County. This is due in part to the number of buildings and infrastructure within the City as it is the major population center and the County seat.
- The 2024 working group also affirmed that many critical facilities in the City are old and that better information about their vulnerabilities is required for the best use of limited mitigation dollars.
- According to the Mid-Columbia Household Survey, conducted by the Oregon Natural Hazards Workgroup in the spring of 2006, 96% of respondents indicated that it is very important or somewhat important for the community to protect critical facilities. In addition, over 91% indicated that it is very important or somewhat important to protect and reduce damage to utilities and strengthen emergency services.
- A flood event in 1996, Mill Creek caused damage in the City's downtown, impacting critical infrastructure. Flooding in 2019 and 2023 caused wastewater treatment damage and violations. Assessing flood risks to critical infrastructure will assist in identifying potential mitigation strategies to reduce future flood damages.

Ideas for Implementation:

- As of 2017 the critical energy dependent and other critical facilities upgrades for The Dalles is substantially complete. The City is committed to an ongoing update cycle to capture new facilities and upgrades to listed facilities.
- The City could utilize Rapid Visual Screening techniques to quickly assess structures in terms of seismic vulnerability. Reference: FEMA P-154, Rapid Visual Screening of Buildings for Potential Seismic Hazards.
- A Steel Tank Seismic Evaluation report on City reservoirs was prepared in 2014 to prioritize facilities for retrofit or reconstruction. As of 2017, some seismic upgrades have occurred. Additional upgrades are planned during the next planning period. The 2024 Water System Master Plan will include an updated seismic assessment.

Coordinating Organization:	Public Works Department

Internal Partners:	External Partners:
City Council; Information Technology Dept.	Engineering Firms, DOGAMI, OEM, FEMA, Q-life

Potential Funding Sources:	Estimated cost:	Timeline:
FEMA, State and Federal Grants/Loans, City Funds		✓ Short Term (0-2 years) ☐ Long Term (2-4+ years)

Form Submitted by:	Dave Anderson
Action Item Status:	Submitted July 2006 – Revised 2012 – Revised 2018 – Revised 2024

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
MH#2 - Seek Implementation Funding for Hazard Resilient Modifications to Critical Infrastructure	Protection of Life & Property

Alignment with Existing Plans/Policies:	
COTD Water System Master Plan COTD Wastewater System Master Plan EAP Crow Creek Dam Failure Comprehensive Land Use Plan	2014 Steel Tank Seismic Evaluation Report 2012 Oregon Resilience Plan COTD Transportation System Plan

Rationale for Proposed Action Item:

- The City's working group identified that their risk to earthquakes and landslide were greater than that of the County. This is due in part to the number of buildings and infrastructure within the City as it is the major population center and the County seat.
- According to the Mid-Columbia Household Survey, conducted by the Oregon Natural Hazards Workgroup in the spring of 2006, 96% of respondents indicated that it is very important or somewhat important for the community to protect critical facilities. In addition, over 91% indicated that it is very important or somewhat important to protect and reduce damage to utilities and strengthen emergency services.

Ideas for Implementation:

- Ensure that critical infrastructure is documented in the Natural Hazard Mitigation Plan and in the Comprehensive Plan so facilities might be more eligible for upgrade grants
- Evaluate funding opportunities
- Complete benefit cost analysis as applicable
- Identify funding partners or other jurisdictions interested in similar retrofits
- Write grant application for funding
- Seek Flood Mitigation Assistance dollars for flood related mitigation actions addressing flood risk to critical facilities
- Seek National Fire Plan and/or Oregon Department of Forestry assistance dollars for wildfire related mitigation actions addressing wildfire risk to critical facilities

Coordinating Organization:	Public Works

Internal Partners:	External Partners:
City Council	Engineering Firm, DOGAMI, OEM, FEMA

Potential Funding Sources:	Estimated cost:	Timeline:
FEMA, State and Federal Grants/Loans, City Funds		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	Public Works Department
Action Item Status:	Submitted July 2006 – Revised 2012 – Revised 2018 – Reviewed 2024

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
MH#3 - Partner with the County for the Coordination of Special Needs Populations Disaster Education/Outreach & Response	Education & Outreach Facilitation of Partnerships & Coordination

Alignment with Existing Plans/Policies:

COTD Public Works Communication Plan

Rationale for Proposed Action Item:

- The City's working group identified that their risk to earthquakes and landslide were greater than that of the County. This is due in part to the number of buildings and infrastructure within the City as it is the major population center and the County seat.
- The Community Profile indicates that the community includes vulnerable populations.
- According to the Mid-Columbia Household Survey, conducted by the Oregon Natural Hazards Workgroup in the spring of 2006, television news (53%), mail (49%), and newspaper stories (48%) were the most effective ways of receiving information about how to mitigate the impact of natural hazards. In terms of identifying specific news sources that are trusted by the public, 40% of respondents cited the Red Cross as the most trusted source of news. The second most trusted sources were utility companies, cited by 38% of respondents.
- This action was identified in the Wasco County plan.

Ideas for Implementation:

- Conduct another Mid-Columbia Household Survey. FEMA has determined that better practices for disaster communication and education have changed radically since the introduction of the iPhone in 2007.
- Efforts should focus on vulnerable populations including but not limited to: Elderly, Low income, Non-English speakers, Mobile Home residents, Incarcerated persons, and Schools/day care
- For improving effectiveness of outreach, partner with the Red Cross and utility providers to create informative mailings about natural hazard mitigation. Also, work with the Red Cross and utility providers to create news stories about natural hazard mitigation, and work with local news media to have the stories run both in print and on television.
- Explore forming a multi-agency Mid-Columbia Preparedness Coalition to coordinate emergency preparedness and hazard awareness education.

Coordinating Organization:	County BOC

Internal Partners:	External Partners:
City Council; City & Public Works Public Information Officers	Oregon Department of Health and Human Services, Red Cross, Mid-Columbia Medical Center

Potential Funding Sources:	Estimated cost:	Timeline:
		✓ Short Term (0-2 years) ☐ Long Term (2-4+ years)

Form Submitted by:	Public Works Department
Action Item Status:	Submitted July 2006 – Revised 2012 – Revised 2018 – Revised 2024

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
MH#4 - Identification and Pursuit of Implementation Funding for Mitigation Actions	Facilitate Partnerships & Coordination

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

- The City's working group identified that their risk to earthquakes and landslide were greater than that of the County. This is due in part to the number of buildings and infrastructure within the City as it is the major population center and the County seat.
- The reduction of risk in a community typically requires identifying and seeking external funding to implement identified actions.
- Creating an action focusing on identifying and pursuing funding will assist the City follow through on the actions identified in the plan
- This action was identified in the Wasco County plan.

Ideas for Implementation:

- Ensure the City remains an active participant of the County planning efforts.
- Identify opportunities to partner with the County or other jurisdictions to submit grant applications to leverage limited resources.

Coordinating Organization:	Planning

Internal Partners:	External Partners:
City Council	Wasco County

Potential Funding Sources:	Estimated cost:	Timeline:
FEMA, State and Federal Grants/Loans		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted July 2006 – Revised 2012 – Reviewed 2018 – Reviewed 2024

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
MH#5 - Annual Review of Natural Hazards Mitigation Plan / Complete Review/Update/Adoption by City Council Every Five Years	Emergency Service Enhancement

Alignment with Existing Plans/Policies:

Emergency Management Performance Grant funding from Oregon Office of Emergency Management and FEMA requires the NHMP to be reviewed twice per year

Rationale for Proposed Action Item:

- FEMA requires NHMP update every 5 years to maintain Hazard Mitigation Grant Program funding eligibility
- Annual review/update ensures operability of plans and makes 5-year update easier

Ideas for Implementation:

- Designate a convener to be responsible for ensuring that the review and update process take place.
- Include review and update on departmental work plans.
- Incorporate NHMP action items into Department and Division objectives and benchmarks.

Coordinating Organization:	Planning

Internal Partners:	External Partners:
City Council	Oregon Military Department, Office of Emergency Management Federal Emergency Management Agency

Potential Funding Sources:	Estimated cost:	Timeline:
		✓ Short Term (0-2 years) ☐ Long Term (2-4+ years)

Form Submitted by:	Public Works
Action Item Status:	Submitted July 2006 – Revised 2012 – Revised 2018 – Reviewed 2024

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
MH#6 - Secure Emergency Power Supply to Critical Facilities	Emergency Services Enhancement

Alignment with Existing Plans/Policies:

COTD Water Master Plan

COTD Wastewater Master Plan

Rationale for Proposed Action Item:

- The City's working group identified that their risk to earthquakes and landslide were greater than that of the County. This is due in part to the number of buildings and infrastructure within the City as it is the major population center and the County seat.
- According to the Mid-Columbia Household Survey, conducted by the Oregon Natural Hazards Workgroup in the spring of 2006, 96% of respondents indicated that it is very important or somewhat important for the community to protect critical facilities. In addition, over 91% indicated that it is very important or somewhat important to protect and reduce damage to utilities and strengthen emergency services. Ensuring that critical facilities have emergency power stores is part of protecting critical facilities, because without power, emergency facilities are severely compromised.
- Severe storms have the ability to knock down power lines and disrupt the electrical grid.
- Critical facilities are crucial to emergency response and all rely on electrical power to provide service. Mitigating the possibility of a sudden power outage makes the facilities more robust in the event of an incident and supports City staff in their efforts to maintain an acceptable level of service for a longer duration.
- Though several backup generators have been installed at the City since the initial NHMP and a grant was still in process in 2024, the working group identified the lack of emergency backup power at additional critical facilities including but not limited to, lift stations, Police Dept., airport, radio repeater sites.

Ideas for Implementation:

- Incremental progress has been made on this action item during the previous planning period. Continue to prioritize remaining critical facilities that require emergency power
- Seek capital improvements funding for emergency power supplies for all identified critical City facilities
- Identify additional funding sources
- Apply for funding and implement acquisition of back-up power as prioritized

Coordinating Organization:	City Council

Internal Partners:	External Partners:
Planning, Fire, Police, Public Works	State Fire Marshal, Northern Wasco County PUD

Potential Funding Sources:	Estimated cost:	Timeline:
FEMA, State and Federal Grants/Loans, City Funds		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted July 2006 – Revised 2012 – Revised 2018 – Revised 2024

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
MH#7 - Partner with the County to Implement Education/Outreach/Awareness Activities	Education & Outreach Facilitation of Partnerships & Coordination

Alignment with Existing Plans/Policies:

Wasco County Natural Hazards Mitigation Plan
COTD Public Works Communication Plan

Rationale for Proposed Action Item:

- The City's working group identified that their risk to earthquakes and landslide were greater than that of the County. This is due in part to the number of buildings and infrastructure within the City as it is the major population center and the County seat.
- The working group identified the need to conduct education and outreach activities for City residents.
- Outreach efforts should include Non-English speaking populations and vulnerable populations.
- According to the Mid-Columbia Household Survey, conducted by the Oregon Natural Hazards Workgroup in the spring of 2006, television news (53%), mail (49%), and newspaper stories (48%) were the most effective ways of receiving information about how to mitigate the impact of natural hazards. In terms of identifying specific news sources that are trusted by the public, 40% of respondents cited the Red Cross as the most trusted source of news. The second most trusted source were utility companies, cited by 38% of respondents.

Ideas for Implementation:

- Conduct another Mid-Columbia Household Survey. FEMA has determined that better practices for disaster communication and education have changed radically since the introduction of the iPhone in 2007.
- Explore forming a multi-agency Mid-Columbia Preparedness Coalition (MCPC) to coordinate emergency preparedness and hazard awareness education. RARE AmericCorps staffing could augment representation from membership organizations.
- MCPC membership could include state and local government agencies, private businesses and non-profit organizations working toward a mission to support and coordinate community efforts to mitigate, respond to and recover from disasters large and small.
- MCPC outreach efforts could include a website, community workshops, development of brochures and guides, media stories (e.g. TV, newspaper, etc.), a preparedness theme booth at community events and community-wide drills. MCPC outreach efforts could leverage the momentum of annual "National Weeks/Months" and disaster drill/awareness days (e.g. The Great Oregon ShakeOut).
- MCPC Workshop outreach topics could include fire resistant plants, limitations of infrastructure in an emergency; upgrade private roadways to accommodate emergency vehicles, and more.
- Based on City demographics, outreach materials should be translated into Spanish
- Maintain a natural hazard display at a local museum (Fort Dalles Museum, Third Street Fire Museum, Columbia Gorge Discovery Center & Museum)

Coordinating Organization:	City Council

Internal Partners:	External Partners:
Public Works Department; City Public Information Officer	Private Sector, Non-Profit Sector, State & Local Government, OEM, FEMA

Potential Funding Sources:	Estimated cost:	Timeline:
Planning, Fire, Public Health, Public Works		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted July 2006 – Revised 2012 – Revised 2018 – Revised 2024

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
MH#8 - Small Business Awareness and Continuity Planning	Education & Outreach

Alignment with Existing Plans/Policies:

COTD Public Works Communication Plan

Rationale for Proposed Action Item:

- During the issues identification work session, the working group identified that the majority of businesses are small 'mom and pop' shops that may lack resources to recover from a disaster. Women, minority owned and Non-English speaker businesses might be especially vulnerable.
- Continuity planning would assist business get back on their feet quicker.
- Businesses that are prepared will help keep the local economy going and provide needed services.
- According to the Institute for Business & Home Safety, more than 1/4 of businesses that close due to a natural hazard never reopen.
- The City's working group identified that their risk to earthquakes and landslides were greater than that of the County. This is due in part to the number of buildings and infrastructure within the City as it is the major population center and the County seat.

Ideas for Implementation:

- Explore forming a multi-agency Mid-Columbia Preparedness Coalition (MCPC) to coordinate emergency preparedness and hazard awareness education.
- MCPC membership could include state and local government agencies, private businesses and non-profit organizations working toward a mission to support and coordinate community efforts to mitigate, respond to and recover from disasters large and small. Potential business association partners include – Chamber, Downtown Business Association, Rotary International.
- Utilize existing resources such as the Institute for Business & Home Safety's Open for Business Toolkit.
- Work with the Oregon Continuity Planners Association to hold a continuity planning workshop for local businesses.

Coordinating Organization:	Chamber of Commerce

Internal Partners:	External Partners:
Planning; City & Public Works Public Information Officers	Oregon Continuity Planner Association, Wasco County, The Dalles Main Street Program; Small Business Administration

Potential Funding Sources:	Estimated cost:	Timeline:
		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	Public Works
Action Item Status:	Submitted July 2006 – Revised 2012 – Revised 2018 – Revised 2024

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
MH#9 - Partner with County on All-Hazard Emergency Preparedness	Facilitation of Partnerships & Coordination

Alignment with Existing Plans/Policies:

COTD Water System Emergency Response Plan

COTD Wastewater System Emergency Response Plan & Public Notice

Rationale for Proposed Action Item:

- The City's working group identified that their risk to earthquakes and landslides were greater than that of the County. This is due in part to the number of buildings and infrastructure within the City as it is the major population center and the County seat.
- The working group identified a lack of human resources available to undertake preparedness activities.

Ideas for Implementation:

- Partner with County when possible to leverage limited human and financial resources
- Partner with state and local government agencies, private businesses and non-profit organizations to identify and establish shelter sites
- Partner with state and local government agencies, private businesses and non-profit organizations to establish emergency notification systems (e.g. sirens, reverse 911, etc.)
- Once emergency notification systems are in place, develop coordinated plans for all-hazard communications (e.g. creek/river contamination)

Coordinating Organization:	City Council

Internal Partners:	External Partners:
Planning; City & Public Works Public Information Officers	Wasco County Emergency Management

Potential Funding Sources:	Estimated cost:	Timeline:
		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	Public Works
Action Item Status:	Submitted 2006 – Revised 2018 – Revised 2024

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
MH#10 – Enter Into Supply Contracts and Mutual Aid Agreements	Facilitation of Partnerships & Coordination

Alignment with Existing Plans/Policies:

- Oregon Public Works Emergency Response Cooperative Assistance Agreement through ODOT
- Mutual Aid and Assistance Agreement for the Provision of Emergency Services Related to Water and Wastewater Utilities through OR-WARN

Rationale for Proposed Action Item:

- The 2017 working group identified the need to enter into supply and service contracts to establish level of service expectations and invoice processing capability before an emergency incident.
- The City is already a member or the Oregon Water and Wastewater Agency Response Network, an organization composed of member utilities that provide voluntary assistance to each other during an emergency incident.
- FEMA requires agreements to be in place before an emergency incident for many City response and recovery activities to be eligible for reimbursement.

Ideas for Implementation:

- Supply vendors may include fuel, oil, rock, sand, water haulers, pipes and fittings, Equipment rental, etc.
- Service providers may include clean-up services, waste haulers, etc.

Coordinating Organization:	City Council

Internal Partners:	External Partners:
Public Works	Wasco County Emergency Management, ORWARN, OEM, Private Sector

Potential Funding Sources:	Estimated cost:	Timeline:
		✓ Short Term (0-2 years) ☐ Long Term (2-4+ years)

Form Submitted by:	Public Works
Action Item Status:	Submitted 2018 – Revised 2024

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
MH#11 – Ensure Critical Staff Are Identified and Trained in the NIMS-FEMA Compliant Incident Command System (ICS)	Facilitation of Partnerships & Coordination

Alignment with Existing Plans/Policies:

The Dalles Public Works 3-Year ICS Training Cycle Plan
City of the Dalles Continuity of Operations Plan

Rationale for Proposed Action Item:

- The 2017 working group identified the need to identify and train staff that will be expected to deploy during emergencies.
- Training needs may be identified beyond the Continuity of Operations Plan Team Roster because field staff needs to know ICS deployment protocols to ensure FEMA reimbursement eligibility.

Ideas for Implementation:

- Conduct initial ICS training for those identified.
- Continue to conduct table top exercises, planned incidents and other experiential opportunities to practice ICS protocols after initial training.
- Activate the Incident Command System during smaller scale emergencies as a way to practice ICS protocols.
- Conduct an interagency table top exercise or planned incident within the 5-year planning period

Coordinating Organization:	City Council

Internal Partners:	External Partners:
Public Works, Police	ICS Training Providers, Wasco County Emergency Management

Potential Funding Sources:	Estimated cost:	Timeline:
		✓ Short Term (0-2 years) ☐ Long Term (2-4+ years)

Form Submitted by:	Public Works
Action Item Status:	Submitted 2018 – Revised 2024

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
MH#12 – Identify Priority Transportation Routes to Access and Connect Critical Facilities	Facilitation of Partnerships & Coordination

Alignment with Existing Plans/Policies:
COTD Winter Weather Response Plan COTD Transportation System Plan

Rationale for Proposed Action Item:
• The 2017 working group identified the need to enhance community coordination on the priority transportation routes to access and connect critical facilities during emergencies.

Ideas for Implementation:
• Establish community consensus on emergency transportation route priority. • Harmonize local emergency transportation maps maintained by local preparedness partners. • Prioritize seismic upgrades for transportation infrastructure (bridges, etc.) located on emergency transportation routes.

Coordinating Organization:	Public Works

Internal Partners:	External Partners:
City Council	Wasco County Emergency Management; North Wasco County School District; Mid-Columbia Fire and Rescue; Columbia Area Transit; Mid-Columbia Economic Development District (The Link Bus)

Potential Funding Sources:	Estimated cost:	Timeline:
		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	Public Works
Action Item Status:	Submitted 2018 – Revised 2024

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
DH#1- Develop Long-range Water Resources Plan to Accommodate Current/Project Growth and Mitigate Drought Impact	Climate Resilience Natural Resource Systems Protection

Alignment with Existing Plans/Policies:

COTD Water Management and Conservation Plan (includes Chapter 4 Municipal Curtailment Element)
COTD Water System Master Plan
ORWD Integrated Water Resources Strategy

Rationale for Proposed Action Item:

- The City's working group identified that their risk to drought and wildfire were equal to that of the County, however, changing community characteristics indicate the need for long-range water resource planning.
- The City water resource planning needs to identify and mitigate climate change impacts.
- The issue identification indicated that when the Urban Growth Boundary expands, more businesses, industry and people will need access to water sources.
- In 2024, water system buildout includes two new wells, one of which has aquifer storage and recovery (ASR) capability.

Ideas for Implementation:

- Identify funding to complete the study (is this study/plan complete and available?)
- Complete the study/plan
- Identify and seek project funding
- Begin project implementation

Coordinating Organization:	City Council

Internal Partners:	External Partners:
Public Works, Fire, Chenowith Water PUD	Watermaster, DEQ, OHA, OWRD, Private Sector

Potential Funding Sources:	Estimated cost:	Timeline:
State and Federal Grants, City Funds, Private Sector Investment		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted July 2006 – Revised 2012 – Revised 2018 – Revised 2024

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
EH#1 – Complete Seismic Upgrades Planned for Municipally-owned Potable Water Steel Reservoirs	Protection of Life & Property Emergency Services Enhancement

Alignment with Existing Plans/Policies:

Steel Tank Seismic Evaluation, December 2014
COTD Water System Master Plan

Rationale for Proposed Action Item:

- The seismic enhancement of the City's above-ground steel drinking water reservoirs will improve seismic resiliency of the City's water system for supply of potable water for consumption, industrial use and firefighting.
- The 2024 Water System Master Plan will include an updated seismic assessment.

Ideas for Implementation:

- Complete seismic upgrades identified in the 2024 Water System Master Plan.

Coordinating Organization:	Public Works

Internal Partners:	External Partners:
City Council, Public Works	

Potential Funding Sources:	Estimated cost:	Timeline:
Water utility rate revenues; Grants		✓ Short Term (0-2 years) ☐ Long Term (2-4+ years)

Form Submitted by:	Public Works
Action Item Status:	Submitted 2018 – Revised 2024

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
EH#2 – Complete a Seismic Analysis of the City's Water System	Protection of Life & Property Emergency Services Enhancement

Alignment with Existing Plans/Policies:

State Drinking Water Regulations, OAR 333-061-0060, 5(a)(J)
COTD Water System Master Plan

Rationale for Proposed Action Item:

- Conducting a seismic risk assessment and developing a mitigation plan is required by state regulations for water systems located within certain seismic hazard zones.
- The 2024 Water System Master Plan will include an updated seismic assessment. Completion of a seismic risk analysis and mitigation plan will help guide the development of an appropriate Capital Improvement Plan that will increase the seismic resiliency of the City's water system.

Ideas for Implementation:

- A seismic analysis should be conducted as part of an update to the City's Water System Master Plan if required. An update to the Water System Master Plan is will be published in 2024 and will include a seismic assessment as required.

Coordinating Organization:	Public Works

Internal Partners:	External Partners:
City Council, Public Works	Consultants

Potential Funding Sources:	Estimated cost:	Timeline:
Water utility rate revenues, Water system development charges		✓ Short Term (0-2 years) ☐ Long Term (2-4+ years)

Form Submitted by:	Public Works
Action Item Status:	Submitted 2018 – Revised 2024

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
FH#1 - Explore the potential for The Dalles to participate in the Community Rating System (CRS) of the National Flood Insurance Program (NFIP)	Protection of Life & Property Education & Outreach Climate Resilience

Alignment with Existing Plans/Policies:

The Dalles Comprehensive Land Use Plan (current edition February 2024)

Rationale for Proposed Action Item:

- The National Flood Insurance Program's (NFIP) Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community flood plain management activities that exceed the minimum NFIP requirements. As a result, insurance premiums under the NFIP are discounted to reflect the reduced flood risk resulting from the community actions meeting the three goals of the CRS: (1) reduce flood losses; (2) facilitate accurate insurance rating; and (3) promote the awareness of flood insurance.
- The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address existing buildings and infrastructure [201.6(c)(3)(ii)]. Inclusion into the Community Rating System program can help communities in Wasco County to enhance mitigation efforts and decrease the vulnerability to floods.

Ideas for Implementation:

- Determine CRS eligibility requirements
- Determine the best means of outreach to floodplain residents (mailing? Public meeting? Other methods?)
- Coordinate with the Oregon Department of Land Conservation and Development (DLCD) and FEMA to join the Community Rating System.
- Educate businesses and homeowners currently under the NFIP program about the CRS program and any mitigation actions they can implement to reduce their insurance premiums.

Coordinating Organization:	Planning

Internal Partners:	External Partners:
City Council, Public Works	Wasco County Emergency Management

Potential Funding Sources:	Estimated cost:	Timeline:
FEMA, State and Federal Grants		✓ Short Term (0-2 years) ☐ Long Term (2-4+ years)

Form Submitted by:	Public Works
Action Item Status:	Submitted July 2007 – Revised 2012 – Revised 2018 – Revised 2024

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
FH#2 - Explore acquisition and management strategies to preserve parks, trails, and open space in the floodplain	Protection of Life & Property Climate Resilience Natural Resource Systems Protection

Alignment with Existing Plans/Policies:

The Dalles Comprehensive Land Use Plan (current edition February 2024)
Urban Renewal Plan Section 600.9. Mill Creek Greenway Property Development

Rationale for Proposed Action Item:

- The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address future development [201.6(c)(3)(ii)]. Developing acquisition and management strategies to preserve open spaces in the floodplain will prevent flood hazards by limiting or prohibiting development in these areas.
- Goal 7 of Oregon's Land Use Planning Goals requires that local governments "adopt or amend, as necessary, based on the evaluation of risk, plan policies and implementing measures...[that prohibit] the siting of essential facilities, major structures, hazardous facilities and special occupancy structures, as defined in the state building code (ORS 455.447(1) (a)(b)(c) and (e)), in identified hazard areas..." Developing acquisition and management strategies to preserve open spaces in the floodplain will fulfill goal 7 by preventing the siting of major facilities in a flood-hazard area.

Ideas for Implementation:

- Identify additional potential opportunities to acquire lands in the floodplain for use as parks, trail, or open space as was done by a recent Wasco County acquisition.
- Work with the Department of Land Conservation and Development, Oregon Military Department, Office of Emergency Management and FEMA to identify potential funding sources.

Coordinating Organization:	Northern Wasco County Park & Recreation District

Internal Partners:	External Partners:
City Council, Urban Renewal Agency	Wasco County Emergency Management, DLCD, OEM, FEMA, Friends of Mill Creek, Watershed Council

Potential Funding Sources:	Estimated cost:	Timeline:
FEMA, State and Federal Grants/Loans, Urban Renewal Agency, Private Sector		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	Public Works
Action Item Status:	Submitted July 2007 – Revised 2018 – Revised 2024

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
FH#3 - Update Flood Insurance Rate Maps (FIRMs)	Protection of Life & Property Climate Resilience

Alignment with Existing Plans/Policies:

The Dalles Comprehensive Land Use Plan (current edition February 2024)

Rationale for Proposed Action Item:

- The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address future development [201.6(c)(3)(ii)]. Updating the City's FIRM will allow for a better understanding of the flood risk, which can lead to better land use and future development decisions.
- 2002 Oregon's Land Use Planning Goal 7: Areas Subject to Natural Hazards, requires that local governments "Adopt or amend, as necessary, based on the evaluation of risk, plan policies and implementing measures prohibiting the siting of essential facilities, major structures, hazardous facilities and special occupancy structures, as defined in the state building code (ORS 455.447(1)(a)(b)(c) and (e)), in identified hazard areas, where the risk to public safety cannot be mitigated, unless an essential facility is needed within a hazard area in order to provide essential emergency response services in a timely manner."

Ideas for Implementation:

- The FIRMs are expected to be updated in 2024.
- Work with FEMA and DLCD on specific areas to update as funding becomes available.
- Explore opportunities to update floodplain ordinances based on new hazard knowledge provided by new FIRM.

Coordinating Organization:	Planning

Internal Partners:	External Partners:
City Council	Wasco County Emergency Management, DLCD, OEM, FEMA, DOGAMI

Potential Funding Sources:	Estimated cost:	Timeline:
FEMA, State and Federal Grants		✓ Short Term (0-2 years) ☐ Long Term (2-4+ years)

Form Submitted by:	Public Works
Action Item Status:	Submitted July 2007 – Revised 2012 – Revised 2018 – Revised 2024

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
FH#4 - Ensure continued compliance with the National Flood Insurance Program	Protection of Life & Property Education & Outreach Climate Resilience

Alignment with Existing Plans/Policies:

The Dalles Comprehensive Land Use Plan (current edition February 2024)

Rationale for Proposed Action Item:

- The Disaster Mitigation Act of 2000 requires communities to identify a comprehensive range of mitigation actions
- Ensuring that the City remains in compliance with the National Flood Insurance Program will assist the community in continuing to maintain eligibility for the Flood Mitigation Assistance Program.
- At this time, the City has no repetitive loss properties, keeping up on participation in the National Flood Insurance Program may help ensure that repetitive loss properties are mitigated and that future development does not become repetitive loss property.

Ideas for Implementation:

- Partner with Wasco County on continuing compliance activities.
- Explore opportunities to update floodplain ordinances based on new hazard knowledge provided by new FIRMs.
- Explore forming a multi-agency Mid-Columbia Preparedness Coalition (MCPC) to coordinate flood hazard and floodplain ordinance awareness education.

Coordinating Organization:	Planning

Internal Partners:	External Partners:
City Council	Wasco County Emergency Management, DLCD, OEM, FEMA

Potential Funding Sources:	Estimated cost:	Timeline:
		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	Public Works
Action Item Status:	Submitted July 2007 – Revised 2018 – Revised 2024

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Proposed Action Item:	Alignment with Plan Goals:
FH#5 - Open up Mill Creek tunnel between Thompson Park and the Columbia River, where the creek terminates	Protection of Life & Property Climate Resilience Natural Resource Systems Protection

Alignment with Existing Plans/Policies:

2015 Wasco County Watershed Councils: The Dalles Watershed Action Plan
Mill Creek Flood Analysis 1997

Rationale for Proposed Action Item:

- During the floods in 1996, the water volume overwhelmed the pipe on the side of Thompson Park, forcing water eastward, which caused severe downtown flooding.
- The City has already taken some steps towards implementing this action including a study completed by the Army Corps of Engineers.
- 2015 Wasco County Watershed Councils: The Dalles Watershed Action Plan Goal 2, Strategy 2, Action 2-A-2 Targets the Mill Creek Tunnel as a fish passage focus area.
- In 2023 the City convened stakeholders to plan and budget for this project as well as prepare for grant writing.

Ideas for Implementation:

- Get the project listed on Capital Improvement Plans for the Oregon Department of Transportation and Union Pacific Railroad
- Explore funding opportunities.

Coordinating Organization:	Public Works

Internal Partners:	External Partners:
City Council, Planning	ODOT, Union Pacific, OEM, DLCD, FEMA, ACE

Potential Funding Sources:	Estimated cost:	Timeline:
FEMA, State and Federal Grants/Loans, City Funds		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	The Dalles Planning Department
Action Item Status:	Submitted July 2007 – Revised 2012 – Revised 2018 – Revised 2024

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
FH#6 - Chenowith Creek residential flood zone mitigation plan	Protection of Life & Property Climate Resilience Natural Resource Systems Protection

Alignment with Existing Plans/Policies:
2024 Flood Insurance Rate Maps (FIRMs)

Rationale for Proposed Action Item:
• The 2024 FIRMs identified residential areas around Chenowith Creek as new areas vulnerable to flood risk. • The Chenowith Creek residential areas have a large number of people in vulnerable population categories who may have difficulty with private property mitigation planning and costs.

Ideas for Implementation:
• Seek grant funding for flood risk mitigation planning. • Once the plan is adopted, seek grant funding for implementation

Coordinating Organization:	Planning

Internal Partners:	External Partners:
City Council, Planning	FEMA

Potential Funding Sources:	Estimated cost:	Timeline:
FEMA, State and Federal Grants/Loans, City Funds		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	Community Development Department
Action Item Status:	Submitted 2024

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Proposed Action Item:	Alignment with Plan Goals:
FH#7 - City/County explore funding for flood mitigation on private property via public/private partnerships	Protection of Life & Property Climate Resilience Natural Resource Systems Protection

Alignment with Existing Plans/Policies:
2024 Flood Insurance Rate Maps (FIRMs)

Rationale for Proposed Action Item:
• The new flood insurance rate maps expand the number of properties that have been identified as potentially impacted by floods. Property owners and businesses will need to explore mitigation options. This is more efficiently done on a community-wide basis rather than individually. • Transitioning property vulnerable to flood risk to publicly-owned open space is not always a reasonable option. Mitigation costs may exceed the financial resources of private landowners.

Ideas for Implementation:
• Seek funding for flood mitigation on private property via public/private partnership.

Coordinating Organization:	Planning

Internal Partners:	External Partners:
City Council, Planning	FEMA

Potential Funding Sources:	Estimated cost:	Timeline:
FEMA, State and Federal Grants/Loans, City Funds		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	Community Development Department
Action Item Status:	Submitted 2024

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Proposed Action Item:	Alignment with Plan Goals:
LH #1 – Update the 2011 landslide hazard study by 2031 to inform zoning within the City UGB	Protection of Life & Property

Alignment with Existing Plans/Policies:
Update the 2011 landslide hazard study by 2031 to inform zoning within the City UGB

Rationale for Proposed Action Item:
• An update is merited as DOGAMI learns more about the geology and faults near The Dalles.

Ideas for Implementation:
• Possibly partner with Wasco County to co-fund an update or apply for hazard identification grants.

Coordinating Organization:	Planning

Internal Partners:	External Partners:
City Council, Planning	Wasco County

Potential Funding Sources:	Estimated cost:	Timeline:
FEMA, State and Federal Grants/Loans, City Funds		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	The Dalles Community Development Department (Planning)
Action Item Status:	Submitted 2024

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Proposed Action Item:	Alignment with Plan Goals:
SH#1 – Coordinate Transportation Division winter weather response planning, supplies and equipment	Protection of Life & Property Facilitation of Partnerships & Coordination Climate Change

Alignment with Existing Plans/Policies:

City of The Dalles Winter Weather Response Plan

Rationale for Proposed Action Item:

- The City's working group identified that the risk of winter weather is greater than the County due to the concentration of emergency services including but not limited to, hospital and medical clinics, fire station, County offices and public works shop, State offices and ODOT shop.
- Historically, Wasco County, the Oregon Department of Transportation and City of The Dalles Transportation Division plan for winter weather deployments and share resources for most efficient response. However, when preparing for the 2023-2024 winter weather season, the City was notified that due to reduced resources neither of these agencies would have resources available for mutual aid.

Ideas for Implementation:

- Continue to coordinate planning and deployment with Wasco County and ODOT as resources allow.
- Make strategic equipment and supply purchases ahead of each winter season.

Coordinating Organization:	Public Works

Internal Partners:	External Partners:
	Wasco County Public Works, ODOT

Potential Funding Sources:	Estimated cost:	Timeline:
FEMA, State and Federal Grants		☐ Short Term (0-2 years) ☐ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted 2024

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Proposed Action Item:	Alignment with Plan Goals:
SH #2 – Update The Dalles 2007 Storm Water Master Plan	Protection of Life & Property Climate Resilience

Alignment with Existing Plans/Policies:
2007 Storm Water Master Plan 2024 Flood Insurance Rate Maps (FIRMs)

Rationale for Proposed Action Item:
• Use information from the 2024 Flood Insurance Rate Maps (FIRMs) to update the storm water conveyance system hydraulic model to identify areas that should be upgraded.

Ideas for Implementation:
• Hire a consultant to complete the plan update. • Develop a capital plan and fund the improvements.

Coordinating Organization:	Public Works

Internal Partners:	External Partners:
City Council, Public Works	Consultants

Potential Funding Sources:	Estimated cost:	Timeline:
		☐ Short Term (0-2 years) ✓ Long Term (2-4+ years)

Form Submitted by:	Public Works
Action Item Status:	Submitted 2024

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Proposed Action Item:	Alignment with Plan Goals:
WH#1 - Partner with the County to Implement the Community Wildfire Protection Plan (CWPP)	Facilitation of Partnerships & Coordination Climate Resilience

Alignment with Existing Plans/Policies:

Wasco County Natural Hazards Mitigation Plan

Rationale for Proposed Action Item:

- The City's working group identified that their risk to wildfire is equal to that of the County.
- The City participated in the development of the County Community Wildfire Protection Plan. In the plan the City is tasked with at least one action under the Strategies By Zone section of the plan.
- The working group identified the need to continue to work with the County, ODF, and USFS on wildfire issues.

Ideas for Implementation:

- Participate in further planning and project activities with the County
- Partner with the County on education and outreach related activities
- Explore potential to distribute wildfire brochures (available through Institute for Business & Home Safety) to residents pulling building permits, who are located in the urban fringe.
- Pursue forest fire fuels reduction opportunities within The Dalles municipal watershed

Coordinating Organization:	City Council

Internal Partners:	External Partners:
Fire, Planning, Public Works	Oregon Department of Forestry, USFS

Potential Funding Sources:	Estimated cost:	Timeline:
FEMA, State and Federal Grants		☐ Short Term (0-2 years) ☐ Long Term (2-4+ years)

Form Submitted by:	
Action Item Status:	Submitted July 2006 – Revised 2012 – Reviewed January 2018

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Proposed Action Item:	Alignment with Plan Goals:
WH#2 – Update The Dalles Municipal Watershed Forest Management Plan	Protection of Life & Property Facilitate Partnerships & Coordination Climate Resilience Natural Resource Systems Protection

Alignment with Existing Plans/Policies:

Wildland Fire Management: National Fire Plan
Wasco County Community Wildfire Protection Plan (CWPP)
Hood River County Community Wildfire Protection Plan

Rationale for Proposed Action Item:

- The Dalles Municipal Watershed is jointly managed by the City of The Dalles and Oregon Department of Fish & Wildlife. The watershed provides 90% of the City's annual water supply. During the season of highest water demand, City well water supply is insufficient to meet demand without activating the City curtailment plan.
- A healthy forest in The Dalles Municipal Watershed provides high quality water at the source, thus minimizing cost for treatment to potable water standards. Degradation due to wildfire could significantly impact source water quality and potentially impact the cost of treatment for many years after such an incident.
- The ability of the City to maintain a reliable, high quality water supply is critical to protect public health, provide fire suppression and sustain a robust economy.
- The School Marm Fire (1967) demonstrated that wildfire within The Dalles Watershed poses a tremendous risk to City-owned water-control infrastructure and public health. The area is currently at extreme risk of high-intensity wildfire due to declining forest health and increased fuel loadings; contributing factors include drought, root disease, insect infestations and the encroachment of Grand Fir into drier ecosystems. The School Marm Fire burn is currently over-stocked with scrub oak. Columbia Gorge winds create extreme fire behavior in this area (Sheldon Ridge Fire, 2002; Blackburn Fire, 2013; smaller fire in 2017). From Wasco County CWPP: "Apply for a grant to do hazard fuel treatment on City-owned lands in The Dalles Municipal Watershed. Priority-High." This project ranked 22nd in 2006 for recommended funding (ID# 2006-119).

Ideas for Implementation:

- Seek stable, ongoing funding to reduce the fuel load and manage forestland in The Dalles Municipal watershed.
- Develop a proposal for a Forestry Carbon Project similar to the project proposed by The Climate Trust and the Hood River County Forestry Department to Hood River County Board of Commissioners in Fall 2023.
- Coordinate hazard fuel reduction efforts with adjacent private lands and Federal/State Forest lands to increase forest management effectiveness.

Coordinating Organization:	City Council

Internal Partners:	External Partners:
Public Works	Wasco County Emergency Management, Landowners, USFS, Oregon Office of State Fire Marshal

Potential Funding Sources:	Estimated cost:	Timeline:
National Fire Plan, Oregon Department of Forestry, State Drinking Water State Revolving Loan Funds, State Drinking Water Source Protection Fund, City Funds		✓ Short Term (0-2 years) ☐ Long Term (2-4+ years)

Form Submitted by:	Public Works
Action Item Status:	Submitted 2018; Revised 2024

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Small Cities Addendum

Antelope

Description

Antelope is Wasco County's smallest and most southern city. It is located along Oregon Route 218 and is located 34 miles Northeast of Madras, OR. The Population Research Center estimated the population to be at 51 in 2016 and forecasted to remain at 51 over the next fifty years.[1] However, in 2022, the population estimate was revised to be 37 and forecasted to decrease to 19 people over the next 32 years.[2]

Antelope was incorporated by its first mayor in 1896. Although now a touristic ghost town; it once was a booming center for big sheep ranches and cattle and had a population of almost 2000. At dawn of the 20th century, Antelope reportedly enjoyed the services of a post office, three mercantile shops, four hotels, seven saloons, two newspapers, a community center, and gas-lit boardwalks.[3] Antelope saw a decline in the early 1900's when the range wars, along with a town fire and relocation of a highway saw less people passing through.[4] Antelope didn't see too much population growth until 1981, when Bhagwan Shree Rajneesh and his 2000 followers, a quasi-religious community, established a large commune on the neighboring "Big Muddy" ranch. In 1984, Antelope's name was amended to "Rajneesh", until tensions rose with Oregon officials, and the commune was disbanded and dissolved in 1985.[5] Most of the "Rajneeshees" then left the area, and the remaining residents voted to restore the original name. After the collapse of the commune, the property returned to the Oregon's ownership and in 1999 was bought, and is still operated, by Young Life Christian camp.[6] According to Oregon Department of Human Services (DHS) Office of Forecasting, Research, and Analysis; Antelope has been identified as a "Poverty Hotspot", meaning that it was measured as a census tract which had poverty rates of 20 percent or more for two consecutive surveys.[7]

Hazard vulnerability

Antelope is Wasco County's southern and eastern most city. Most of the land in the area is ranchland used for cattle grazing with many dry creek beds, draw, and hollows forming a topographic complex

[1] Coordinated Population Forecast: 2016 through 2066, Wasco County. June 30, 2016. Population Research Center (Portland State University).
[2] Coordinated Population Forecast: 2024 through 2074, Wasco County. June 25, 2024. Population Research Center (Portland State University).
[3] *Antelope*. (n.d.). *Historic The Dalles*. Retrieved October 10, 2024, from https://historicthedalles.org/antelope/.
[4] Ibid.
[5] Ibid; *Antelope, Oregon: The town we like to call Rajneesh*. (March 2, 2016). *Noosphere Geologic Blog.* Retrieved October 10, 2024, from https://noospheregeologic.com/blog/2016/03/02/antelope-oregon-the-town-we-like-to-call-rajneesh-because-were-insane/.
[6] *City of Antelope and Muddy Ranch*. (February 25, 2022). Oregon Encyclopedia. Retrieved October 10, 2024, from https://www.oregonencyclopedia.org/articles/city_of_antelope_muddy_ranch/.
[7] DHS County Quick Facts. *Oregon Office of Business Intelligence (DHS) and the Office of Forecasting, Research and Analysis (DHS|OHA Shared Service)*, January 2017.

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landscape of ridges and valleys. This extensive farm use is vulnerable to extended droughts. With juniper, sage, and native grasses as the predominant vegetation, large, fast moving wildfires are common. There is little annual rain fall and no flood or geologic hazard zones inside the city limits. The population is steady but aging and will be increasingly vulnerable to disasters that require medical attention or evacuation. In 2024, the Bennett Fire burned approximately 631 acres near Antelope, and precipitated a level 3 evacuation.[8]

NHMP Participation

As part of the public outreach effort, city jurisdictions were notified in 2023-2024 through multiple sources of the NHMP update. The cities of Mosier, Maupin, and Dufur elected to participate in the 2024 NHMP update. The city of Antelope did not request to be part of this multi-jurisdictional Natural Hazards Mitigation Plan.

Figure 1: Oregon Route 218 entering Antelope from the Northwest

Source: Photo credit: Ian Poellet.

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[8] Hanson, K. (2024, August 5). Bennet Fire prompts evacuation of Antelope. *The Madras Pioneer*. https://www.madraspioneer.com/news/bennet-fire-prompts-evacuation-of-antelope/article_f342d29c-5352-11ef-8690-d783fb094169.html.

Shaniko

Description

Shaniko was once the southern terminus of a Union Pacific rail line and known as the "Wool Capital of the World".[9] As of the 2020 census, it had a population of 30.[10] In 2016, the Population Research Center estimated the population would stay at 36 for the next fifty years.[11] However, in 2022, the population estimate was revised to be 30 and forecasted to decrease to 16 people over the next 32 years.[12] Shaniko lies in the south of Wasco County, about eight miles north of Antelope. Its elevation is 3,343 feet from sea level, and Shaniko Plateau's vegetation consists mainly of sage, juniper, and bunchgrass.[13] Nearby mountain peaks are visible from the city. When the railroad stopped going through Shaniko in 1942, it saw a decline and traffic and is now most visited for its "ghost town" attraction.[14] According to Oregon Department of Human Services (DHS) Office of Forecasting, Research, and Analysis; Shaniko has been identified as a "Poverty Hotspot".[15]

Hazard Vulnerability

Surrounded by juniper, sage, and grassland, large swaths of the area are used for ranching, increasing the regional vulnerability to extended droughts. These vegetation types are also highly susceptible to large, fast moving wildfires, which are common in the southern and eastern portion of Wasco County. Shaniko has been damaged in the past by windstorms as strong winds are common across the ridges in this area. In 2024, the Bennett Fire burned approximately 631 acres near Shaniko, and precipitated a level 1 evacuation.[16]

NHMP Participation

In November 2017, the Shaniko City Recorder, Susan Paterson, provided information to the Wasco County Steering Committee about previous disasters in the city, including a wildfire ten years ago, a wind event eight years ago, and wind events from the previous year. These events destroyed significant and historical structures in the City, including the only bed and breakfast in town, a historic water tower,

[9] *Shaniko Branch*. (n.d.). Union Pacific. Retrieved October 10, 2024, from http://www.trainweb.org/highdesertrails/up/Shanikobranch.html; *Shaniko. A Story from Oregon* (n.d.). Shaniko. Retrieved October 10, 2024, from https://www.shaniko.org/.
[10] U.S. Census Bureau, Table P1: Race, 2020 Decennial Census.
[11] Coordinated Population Forecast: 2016 through 2066, Wasco County. June 30, 2016. Population Research Center (Portland State University).
[12] Coordinated Population Forecast: 2024 through 2074, Wasco County. June 25, 2024. Population Research Center (Portland State University).
[13] *Shaniko topographic map.* (n.d). topographic-map.com. Retrieved October 10, 2024, from https://en-us.topographic-map.com/map-4r6nnh/Shaniko/?center=44.97547%2C-120.81103&zoom=12
[14] Goran. D. (2016). Shaniko: Once thought to be the "best" ghost town in Oregon. *The Vintage News*. https://www.thevintagenews.com/2016/09/05/shaniko-once-thought-to-be-the-best-ghost-town-in-oregon/.
[15] DHS County Quick Facts. *Oregon Office of Business Intelligence (DHS) and the Office of Forecasting, Research and Analysis (DHS|OHA Shared Service)*, January 2017.
[16] Hanson, K. (2024, August 5). Bennet Fire prompts evacuation of Antelope. *The Madras Pioneer*. https://www.madraspioneer.com/news/bennet-fire-prompts-evacuation-of-antelope/article_f342d29c-5352-11ef-8690-d783fb094169.html.

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schoolhouse and other structures. As the city thrives on business from travelers interested in one of Oregon's premier "Ghost Towns", the loss of interesting and historic structures is significant. Susan also contributed to the identification of Shaniko's critical facilities and infrastructure and expressed in interest in rebuilding their fire department as a potential mitigation action item, which was then added to the action item list. As part of the public outreach effort, city jurisdictions were notified in 2023-2024 through multiple sources of the NHMP update. The cities of Mosier, Maupin, and Dufur elected to participate in the 2024 NHMP update. The city of Antelope did not request to be part of this multi-jurisdictional Natural Hazards Mitigation Plan.

Figure 2: Downtown Shaniko, winter 2017

Source: Photo Credit: Wasco County.

NOTE: All small cities have received regular updates on the NHMP Steering Committee's progress and have consistently had the opportunity to provide feedback.

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Appendix A: Action Items

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Proposed Action Item:	**Alignment with Plan Goals:**
MH #1 - Pursue regional funding for mitigation actions and coordination of efforts	• *Facilitate Partnerships and Coordination* • *Emergency Services Enhancement*

Rationale for Proposed Action Item:

- The switch from planning to implementation is the step that begins the reduction of risk
- Current County agencies do not have the staffing to oversee the implementation of the NHMP or CWPP recommendations and actions.
- There are many agencies and organizations involved with hazard protection efforts in Wasco County and there is a need to have a county employee who will represent the county at various meetings and activities associated with hazard issues.
- CWPP Specific
  - Coordination of, and assistance to, rural fire districts.
  - Assistance with grant writing efforts.
  - A close link between the County Court and fire departments.
  - Implementation of SB-360.
  - Need to keep the Wasco County CWPP current and to help implement it.

Ideas for Implementation:

- Form partnerships with cities, other counties, and state agencies. Use these partnerships to apply for federal and local (local bonds, measures) mitigation grants
- Create a part-time position to assist Emergency Manager and coordinate wildfire / other hazard mitigation efforts
- Create a regional position to oversee plan implementation, education & outreach for the region. The position could be placed under the jurisdiction of the Mid-Columbia Council for Economic Development though an MOU with the participating counties**.**
  Quarterly meeting of NHMP Steering Committee to address plan implementation until a position can be filled

Coordinating Organization:	MCCED, CERT
Internal Partners:	**External Partners:**
Emergency Management, Planning, Public Works	Cities, State Agencies, Non-Government/Quasi-governmental Organizations, Public, SWCD

Timeline:

☐ Short Term (0-3 years)
X Long Term (3+ years)

Form Submitted by:	NHMP Steering Committee (2017), Updated NHMP SC (2024)
Action Item Status:	**Institutionalized**

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Proposed Action Item:	Alignment with Plan Goals:
MH#2 - Develop Public Outreach / Educational Programs for all Hazards	• *Education & Outreach & Inclusion, Diversity, Equity and Accessibility* • *Facilitate Partnerships and Coordination*

Rationale for Proposed Action Item:

- Developing education programs aimed at mitigating the risk posed by hazards are effective and cost efficient ways to reduce the risk
- With continued urban and near-urban development, areas with significant hazard risk will face development pressures. Land use development should provide for mitigating potential losses from landslide hazards
- Educate identified vulnerable residential and commercial building owners, occupants, and developers helps those with the greatest risk and streamlines use of County resources
- Focusing on the benefits of mitigation activities through education aimed at households and businesses and targeting of special needs populations ensures community wide coverage
- If we can understand the risk from hazards closer to reality, we can plan and use resources more appropriately to prepare against this hazard

Ideas for Implementation:

ALL HAZARD

- Identify and map vulnerable populations;
- Use internet websites, local fairs, news articles, brochures, etc to get the data to the public.
- Create a natural hazard display to place at library, planning department, court house, and other public buildings
- Create a hazard information page as part of the Wasco County website on the Emergency Management page
- Use public service radio announcements to educate public on emergency procedures
- Sustain education/outreach program for local jurisdictions
  - o Coordinate county wide EM training & exercises
  - o Train local jurisdictions
  - o Inform local jurisdictions of available resources, grants, opportunities and other assistance
  - o Disseminate OEM and FEMA information
- Collect additional information and add to existing informational sources on public education materials for protecting life, property, and the environment from storm events
- Distribute educational materials to County residents and public and private sector organizations regarding evacuation routes during road closures
- Distribute audience-specific educational materials to schools, churches, and other public and private sector organizations
- Develop methods of improving emergency warning system
- Distribute educational materials to County residents and public and private sector organizations regarding preparedness for no-power situations
- Include MCEDD, EDC in small business awareness/continuity planning. They have been working with others (Regional Solutions, SBDC, Ports, Chambers, Cities, Counties, etc.) to develop outreach pieces during/after wildfires that let businesses know about resources available to support).

SEVERE WEATHER

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- Educate public about resources to reduce personal risk from ice, heat, snow, heavy rain, and windstorms

DROUGHT

- Educate public about water conservation methods/importance

WILDFIRE

- Create self-guided "staff rides" (tours) of local fires/prescribed fires to educate public about fire effects, firewise planning, and the effectiveness of risk reduction measures
- Educate business owners so that they understand the necessity of having policies that allow fire department volunteers to respond when needed.

FLOOD

- Create a flood education curriculum, a speaker-training program, and outreach aimed at specific populations i.e., schools, households, businesses, etc…;
- Collaborate with existing program managers to develop a flood education component that supports fish habitat and water quality education curricula;
- Identify existing watershed education programs and determine which programs would support a flood education component;
- Identify and provide mitigation guidance to owners of properties at risk from flooding;
- Encourage development of outreach programs to business organizations that must manage for flood protection;
- Raise awareness level of property owners and developers that impacts upstream result in impacts downstream, and lack of storm water best management practices can result in an increase in flooding events;
- Consider implementing tax incentives for property owner maintaining their private facilities;
- Educate private property owners on restoring natural systems within the floodplain to manage riparian areas and wetlands for flood abatement;
- Erect "monuments" over piped creeks throughout the county and floodplain elevation markers to bring flood awareness to home and business owners who live near them;
- Develop a "Clean Stream" sponsorship program, using the "Friends of Fanno Creek" model. Erect signage recognizing individuals, households, businesses, and organizations committed to the ongoing care of a waterway section. Develop a brochure as an educational tool

EARTHQUAKE

- Educate the public about earthquake history, how to prepare and the potential in Wasco County
- Educate Those at Risk
- Provide education media to identified vulnerable residential and commercial building owners and occupants. Explain structural and non-structural rehabilitation techniques and encourage rehabilitation
- Education/Awareness for Those at Risk
- Provide educational media to identified vulnerable residential and commercial building owners, occupants, and developers, which explain structural and non-structural reduction techniques such as local drainage improvements

VOLCANO

- Educate public about risks associated with volcanic eruption that could impact Wasco County

LANDSLIDE

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• Educate public about landslide hazard areas and mitigation strategies to reduce associated risk. • Distribute DOGAMI landslide brochure (pick up at Planning office)		
Coordinating Organization:	Emergency Management	
Internal Partners:		**External Partners:**
County Agencies (Planning, GIS, SWCD, Building, Public Works specifically)		Cities, State Agencies, Non-Government/Quasi-governmental Organizations, Public, Media, Schools, DOGAMI, OEM, DLCD, Utilities, American Red Cross, St. Vincent DePaul, Churches, Fire, FEMA, USGS, OPDR, MCEDD, EDC
Timeline:		
x Short Term (0-3 years) x Long Term (3+ years)		
Form Submitted by:	NHMP Steering Committee (2017), Updated NHMP SC (2024)	
Action Item Status:	**Institutionalized**	

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Proposed Action Item:	Alignment with Plan Goals:
MH#3 - Annual Review and Update of the County Emergency Operations Plan, Regular Updates of other relevant plans such as Community Wildfire Protection Plan, Natural Hazards Mitigation Plan; and Comprehensive Plans Re-Adoption is required on a regular basis	• *Facilitate Partnerships and Coordination*

Rationale for Proposed Action Item:

- FEMA requires NHMP update every 5 years to maintain HMGP funding eligibility
- CWPP was updated in 2024, and should be updated every 5 years
- Comprehensive Plans should be regularly reviewed, but generally are updated every 20 years
- Annual review/update ensures operability of plans, increases awareness & implementation and makes 5 year update easier

Ideas for Implementation:

- County Emergency Management will coordinate plan updates annually and complete reviews at least every five years. During the complete reviews, the plans will be evaluated with respect to the county's Zoning Ordinance and Comprehensive Land Use Plan.
- Consider the goals and action items from the County Natural Hazards Mitigation Plan for implementation in other county documents and programs, where appropriate.
- Review the Natural Hazards Mitigation Plan for opportunities to update the county's Comprehensive Land Use Plan and supporting plans and documents. Statewide Planning Goal 7 is designed to protect life and property from natural disasters and hazards through planning strategies.
- Consider how components of the county's Natural Hazards Mitigation Plan might be used in updating current and future capital improvement plans.
- Integrate goals and action items into the county's storm water management program and Oregon Water Resources Department place based integrated water resources planning as well as Natural Resources Conservation Services and Wasco County Soil and Water Conservation District.

Coordinating Organization:	NHMP SC (2024)
Internal Partners:	**External Partners:**
Planning, BOC, Emergency Management, Public Works	OEM, OPDR, DLCD

Timeline:

x Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	NHMP Steering Committee (2017); Updated NHMP SC (2024)
Action Item Status:	**Institutionalized**

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Proposed Action Item:	Alignment with Plan Goals:
MH#4 - Create Systems to Support and Maintain at-risk Populations	• *Facilitate Partnerships and Coordination* • *Emergency Services Enhancement* • *Education & Outreach & Inclusion, Diversity, Equity and Accessibility* • *Climate Resilience*

Rationale for Proposed Action Item:

- Special needs populations (elderly, disabled, low income, non-English speaking) are at greatest risk during a hazard event.
- Vulnerable populations disproportionately suffer from the long-term impacts of climate change.

Ideas for Implementation:

- Database showing location of disabled persons could allow for information sharing by assisting agencies, with HIPAA restrictions on medical information privacy protocols in place.
- Website w/ assistance information
- Media campaign
- Establish a neighbor to neighbor network of voluntary organizations
- Partner with the Hospital Preparedness Program Region 6 (HPP6)
- Established Evacuation Areas for the disabled, elderly, and those who lack automobiles
- Database showing locations of vulnerable populations and future forecasting how climate change may impact those populations

Coordinating Organization:	Emergency Management
Internal Partners:	**External Partners:**
Planning, Records and Assessment	Red Cross, Hospitals, OR Senior Advisory Council, HPP6, OHA, NCPHD

Timeline:

x Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	NHMP Coordinator (2012), Updated NHMP SC (2024)
Action Item Status:	**Deferred / Modified**

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Proposed Action Item:	**Alignment with Plan Goals:**
MH#5 - Research and develop program for expedited post disaster permitting	• *Emergency Services Enhancement* • *Facilitate Partnerships & Coordination* • *Education & Outreach & Inclusion, Diversity, Equity and Accessibility*

Rationale for Proposed Action Item:

- In the case of disaster where numerous structures (dwellings, accessory structures, or agricultural structures) are lost, land use permitting to replace structures should be expedited to reduce costs, complexity, and time involved.
- Expedited permitting will assist vulnerable populations in obtaining necessary permits to rebuild

Ideas for Implementation:

- Pre-Developed Findings for Visibility
- Pre-Approved Building Plans
- Age Inventory of existing Development
- Fee Waivers (pre-approved)
- Identify subdivisions within County most vulnerable (infrastructure)

Coordinating Organization:	Planning

Internal Partners:	**External Partners:**
BOC, Emergency Management, Public Works, Urban Jurisdictions	DLCD, Gorge Commission

Timeline:

☐ Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	Planning (2024)
Action Item Status:	**NEW**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
MH#6 - Create Emergency Disaster Fund	• *Emergency Services Enhancement* • *Facilitate Partnerships and Coordination* • *Natural Resource Systems Protection*

Rationale for Proposed Action Item:

- A fund at the local level can be used to pay for mitigation efforts or leverage state and federal assistance in grants. The agency that would oversee and manage this fund will need to be identified and approved by local governments.
- Communities willing to actively fund mitigation projects are more likely to receive grant money to make up the difference.

Ideas for Implementation:

- Contract third party to perform need analysis in order to identify priorities for funding distribution.
- Partner with local banks.
- Encourage state and local agencies to create pre-disaster contracts.
- Define steps necessary to apply for and distribute funds, determine eligibility, and other details.

Coordinating Organization:	BOC
Internal Partners:	**External Partners:**
Emergency Response, Emergency Management, Public Works	OEM, FEMA, DLCD

Timeline:

☐ Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	NHMP Coordinator (2012)
Action Item Status:	**Deferred / Modified**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
MH#7 – Develop Small Business Awareness & Continuity Planning Campaign	• *Education & Outreach & Inclusion, Diversity, Equity and Accessibility* • *Facilitate Partnerships and Coordination*

Rationale for Proposed Action Item:

- Majority of businesses are small "mom & pop" shops or farms/ranches which may lack resources to recover from a disaster
- Continuity planning would assist businesses get back on their feet quicker
- Business that are prepared will help keep the local economy going

Ideas for Implementation:

- Use OPDR and others business continuity planning materials & methods
- Hold workshops
- Partner with the City of The Dalles, Red Cross, Main Street, Chamber of Commerce, Rotary, Kiwanis, Lions, MCEDD, North Central RST
- NHMP Steering Committee annual review

Coordinating Organization:	Emergency Management / BOC
Internal Partners:	**External Partners:**
	Chamber of Commerce, MCEDD, SBA, North Central RST

Timeline:

☐ Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	OPDR (2012)
Action Item Status:	**Deferred / Modified**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
MH#8 – Maintain & Develop Partnership Programs to Reduce Vulnerability of Public Infrastructure/Facilities from hazard risks	• *Protection of Life & Property* • *Facilitate Partnerships and Coordination* • *Emergency Services Enhancement*

Rationale for Proposed Action Item:

- Partnerships between County, communities, and utilities distributes burdens of risk and cost
- Partnerships facilitate participation in risk reduction activities in communities with little government resources

Ideas for Implementation:

- Partner with responsible agencies and organizations to design and implement programs that reduce risk to life, property, and utility systems;
- Develop partnerships between utility providers and county and local public works agencies to document known hazard areas and minimize risk
- Incorporate any statewide update of Rapid visual screening data (DOGAMI) to update our critical facilities list
- Do inspection and review with critical infrastructure list from natural hazards mitigation plan on every two years
- Rebuild Shaniko Fire station

Coordinating Organization:	Emergency Management
Internal Partners:	**External Partners:**
Planning, Public Works	Cities, Utilities, Law Enforcement, DOT, ODOE, OEM, DLCD

Timeline:

☐ Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	NHMP Coordinator (2012), Updated by NHMP SC (2017)
Action Item Status:	**Institutionalized**

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
MH#9 Pursue Agency Staff Training	• *Education & Outreach & Inclusion, Diversity, Equity and Accessibility* • *Facilitate Partnerships & Coordination*

Rationale for Proposed Action Item:

- Well trained staff county wide leads to stronger focus on mitigating the risks associated with natural hazards and ensures the necessary skills to accomplish County goals are available locally.
- Better able to function collaboratively with internal and external partners.

Ideas for Implementation:

- ICS training
- COOP training, Encourage organizations to establish COOP plans
- HAZUS certification
- Communications training
- PIO training

Coordinating Organization:	NHMP SC
Internal Partners:	**External Partners:**
All County Departments	Training agencies, Red Cross, FEMA, OEM

Timeline:

x Short Term (0-3 years)
x Long Term (3+ years

Form Submitted by:	Planning (2017)
Action Item Status:	**Institutionalized**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
MH #10 Fortify County Communication Networks	• *Emergency Services Enhancement* • *Protection of Life & Property*

Rationale for Proposed Action Item:

- In any potential disaster, communication between emergency service providers is crucial for efficient response. A well-coordinated response can reduce the severity of an incident and lessen the impact of the disaster, reducing human and financial consequences.
- Many of Wasco County's common networks are located in hazardous areas, do not have back-up generators or have redundancies if the network should go down.
- Alignment with Emergency Operations Plan

Ideas for Implementation:

- Pursue acquisition of Incident Command Mobile unit, upgrade current Mobile Communications Platform
- Ensure repeater sites are data based and not just radio
- Coordinate with local HAM radio operators
- Provide communication protocol training
- Enhance EOC capacity

Coordinating Organization:	WCSO

Internal Partners:	**External Partners:**
Emergency Management, Fire Districts, Emergency Service providers	USFS, ODF, OEM, CERT, City of The Dalles Police Department, Oregon Office of Emergency Management, Community Emergency Response Team

Timeline:

x Short Term (0-3 years)
x Long Term (3+ years

Form Submitted by:	WCSO, MCEDD (2017)
Action Item Status:	**Institutionalized**

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
MH#11 – Update or Acquire Relevant Hazard Maps	• *Protection of Life & Property* • *Natural Resource Systems Protection* • *Education & Outreach & Inclusion, Diversity, Equity and Accessibility* • *Climate Resilience*

Rationale for Proposed Action Item:

- Obtaining updated hazard maps can be combined with information obtain to implement **MH# 4**: Create Systems to Support and Maintain at-risk Populations, in order to best understand and forecast long-term impacts to Wasco County Vulnerable populations.

FIRE

- The 2017 ODF Fire Regime Condition Class map for the county will help determine where the highest priorities are for doing hazard fuel reduction work.
- Fire is constantly changing the landscape and these need to be kept current.

FLOOD

- FIRM maps were created in 1984 and are an approximation of flood hazard areas. These need to be updated with accurate data. FEMA projects potential updates in 2026.
- Flood ordinances out of date
- Required for NFIP & CRS programs

EARTHQUAKE

- Wasco County has access to regularly updated DOGAMI earthquake hazard and fault line maps.

VOLCANO

- Review volcanic hazard reports including Crater Lake, Mt. Hood, Mt. Jefferson, Newberry Volcano, and the Sisters Region. The many smaller volcanoes along the Cascade Mountains have not been evaluated for hazards. These smaller volcanoes may not pose far-reaching hazards, but are a hazard to local communities and travelers.

LANDSLIDE

- The current landslide hazard maps are a compilation of the existing maps. These maps are a work in progress" and have been compiled at widely varying scales and sometimes only depict risk for certain types of landslides. These various scales and levels of detail may lead to people to believe that some areas have no slope hazard, when the case is that those areas just have not been evaluated yet. Systematic upgrading of these maps will lead to greater understanding of hazard locales.

DRAFT

- In 2022 DOGAMI published new landslide maps in the "Landslide Inventory and Risk Reduction of the North and Central Portions of Wasco County, Oregon". The adoption of these maps and updated land use code will improve land use planning and provide for more efficient and cost effective development.

Ideas for Implementation:

- Seek assistance and training from the Forest Service which has experience in mapping Fire Regime Condition Class.
- Utilize county GIS mapping technology to incorporate Fire Regime Condition Class data.
- Place high priority on completing maps of risk areas in the Wildland Urban Interface areas adjacent to National Forest lands in Wasco County.
- Work with FEMA on specific areas to update as funding becomes available
- Suggest to FEMA to incorporate 'ground-truthing' models with updates to FIRM
- Assign County Planning staff to research and draft ordinance update
- Incorporate 2016 DOGAMI Statewide landslide susceptibility map. Sponsor and collect LIDAR surveys to inexpensively vastly improve the landslide hazard model. Continue field-based science research by detailed mapping of existing landslide-prone areas. Once sufficient data is collected, perform modeling to predict areas of future higher to lower instability potential.
- Prepare maps of hazards related to these smaller, yet important, volcanoes.
- Incorporate DOGAMI levee data, evaluate how it would affect County
- Update flood plain maps with data from LIDAR surveys
- Incorporate new maps into Comprehensive Plan update

Coordinating Organization:	Planning
Internal Partners:	**External Partners:**
GIS, Public Works, County Surveyor, Planning, Emergency Management	FEMA, DLCD, DOGAMI, ODF

Timeline:

x Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	NHMP SC (2017), Updated NHMP SC (2024)
Action Item Status:	**Institutionalized**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
MH#12 - TSP Update: Include potential evacuation routes, new PW projects	• *Protection of Life & Property* • *Emergency Services Enhancement* • *Facilitate Partnerships & Coordination*

Rationale for Proposed Action Item:

- TSP will guide the management and development of transportation facilities within Wasco County, incorporating the county's vision, while remaining consistent with state and local plans and policies.
- TSPs are required by the Transportation Planning Rule (TPR) as documented in Oregon Administrative Rule (OAR) 660-012-0015 for non-metropolitan areas and 660-012-0100 for metropolitan areas.
- State of Oregon planning rules require that the TSP be based on the current comprehensive plan land use map and must also provide a transportation system that accommodates the expected 20-year growth in population and employment.

Ideas for Implementation:

- County Public Works will coordinate with Planning and Emergency Management to pursue funding for requisite TSP Plan update
- TSP project development and community growth may outpace the plan, so consistent analysis should be accomplished every five years to determine the TSP relevance.

Coordinating Organization:	Public Works
Internal Partners:	**External Partners:**
Planning, Emergency Management	DLCD, ODOT

Timeline:

☐ Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	Public Works (2024)
Action Item Status:	**NEW**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
MH#13 - Building in the Scenic Area Post Disaster Pamphlet	• *Protection of Life & Property* • *Education & Outreach & Inclusion, Diversity, Equity and Accessibility* • *Natural Resource Systems Protection* • *Climate Resilience*

Rationale for Proposed Action Item:

- Approximately 39,000 acres of Wasco County lands are under the jurisdiction of the Management Plan for the Columbia River Gorge National Scenic Area (NSA) for land use development. The NSA provides for rigorous land development rules, which may significantly delay or deprive landowners or residents of the ability to rebuild after a disaster.
- Post-disaster recovery can be both financially and physiologically detrimental, especially to vulnerable populations. Easy to understand layperson guides to assist in recovery and reconstruction can help ensure future development is better resilient to hazards.
- The Management Plan provides rules for scenic and landscape resources, natural resources, cultural and historic resources, and recreation resources. Understanding and complying with these rules can be oppressively onerous, especially for vulnerable populations who live within the NSA. Easy to understand layperson guides can help ensure future development avoids undue or unscrupulous costs associated with recovery and reconstruction.
- Guides to assist with post-disaster recovery and reconstruction that emphasize and demonstrate the benefits of climate and hazard mitigation building techniques and materials will help mitigate future loss of life and property from natural hazards.

Ideas for Implementation:

- Planning will pursue funding for the development of Building in the Scenic Area Post Disaster Pamphlet
- Planning will ensure that requisite requirements for NSA development are provided and ensure all required items are distinguished with recommended items.
- Planning will coordinate with Building Codes Services to ensure best practices for natural disaster mitigating construction techniques and building materials are included in the pamphlet.

Coordinating Organization:	Planning
Internal Partners:	**External Partners:**
Building Codes Services, Emergency Management	BOCC, DLCD, Gorge Commission

Timeline:

x Short Term (0-3 years)
☐ Long Term (3+ years)

Form Submitted by:	Planning (2024)
Action Item Status:	**NEW**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
MH#14 - Identify or set aside money for match fund grants for hazard mitigation projects	• *Emergency Services Enhancement* • *Facilitate Partnerships and Coordination* • *Natural Resource Systems Protection*

Rationale for Proposed Action Item:

- Match fund grants can be difficult to obtain without existing dollars dedicated for such purposes.
- A dedicated grant match fund at the local level can be used to help pay match funds for mitigation focused grants. The agency that would oversee and manage this fund will need to be identified and approved by local governments.
- Communities able to provide match funding for mitigation grant projects are more likely to receive those funds.

Ideas for Implementation:

- Identify which agency or organization will oversee, manage, and distribute funding
- Organize methodology for funding distribution
- Identify partners willing to donate to fund

Coordinating Organization:	BOC
Internal Partners:	**External Partners:**
Emergency Response, Emergency Management, Public Works	OEM, FEMA, DLCD

Timeline:

☐ Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	NHMP SC (2024)
Action Item Status:	**NEW**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
MH#15 - Decommission and remove underground fuel storage tanks (UST)	• *Protection of Life & Property* • *Emergency Services Enhancement* • *Facilitate Partnerships & Coordination*

Rationale for Proposed Action Item:

- The underground fuel storage tanks are aged and pose significant risk from a number of natural hazards:
  - Flooding: Rising water levels can cause buoyancy, lifting the tank and potentially damaging its connections, leading to leaks.
  - Erosion and Scour: Rapid water flow can erode soil around the tank, causing instability and potential structural damage.
  - Earthquakes: Seismic activity can cause ground shifting, leading to cracks in the tank or its piping.
  - Landslides: Soil movement during a landslide can disrupt the tank's position and integrity

Ideas for Implementation:

- Seek funding for the removal and replacement of underground fuel storage tanks (UST).
- Once funding is secured, remove and replace underground fuel storage tanks.

Coordinating Organization:	Public Works
Internal Partners:	**External Partners:**
Planning, BOC	DEQ, GGS

Timeline:

x Short Term (0-3 years)
☐ Long Term (3+ years)

Form Submitted by:	Public Works (2024)
Action Item Status:	**NEW**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
MH#16 – Conduct hazard mitigation outreach events and for community relationship building items that will assist in education for mitigation and response to hazards.	• *Education & Outreach & Inclusion, Diversity, Equity and Accessibility* • *Facilitate Partnerships & Coordination* • *Climate Resilience*

Rationale for Proposed Action Item:

- Mitigation outreach educates the public about potential natural hazards in their area, empowers them to take proactive steps to reduce the impact of disasters on their lives and property, and helps build more resilient communities by increasing awareness and encouraging participation in mitigation efforts, leading to less damage and faster recovery times after a disaster.
- Climate Resilience focused outreach is decisive in educating community members on how individual actions can coalesce into community wide resilience to the impacts from natural hazards that have become more frequent or more sever due to climate change.
- Funding for mitigation focused events assist local implementers with the planning and execution of the event.
- Funding can provide transportation for vulnerable populations (e.g., elderly, disabled, those without personal transportation), provide food and drink for participants, provide a venue to host the event, and provide mitigation and response oriented items (e.g., emergency blankets and mitigation pamphlets)

Ideas for Implementation:

- Seek funding for hazard mitigation outreach events
- Seek funding for hazard mitigation and hazard response community relationship building items
- Develop hazard mitigation outreach plan for Wasco County and Urban jurisdictions
  - Annual Outreach Events for North and South Counties
- Utilize existing public events for outreach
- Coordinate with schools and local stakeholders for outreach

Coordinating Organization:	Public Information Officer

Internal Partners:	**External Partners:**
Wildfire Coordinator, Planning, Planning (Code Compliance), Emergency Management	Red Cross, NCPHD, OEM, NOAA, BOC, MCED

Timeline:

x Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	Public Information Officer (2024)
Action Item Status:	**NEW**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
MH#17 – Conduct Walkthroughs (workshops or orientation seminars), Tabletop exercises, Functional exercises, and Full-scale exercises regarding Emergency Operations Plan and other response/evacuation plans	• *Protection of Life & Property* • *Emergency Services Enhancement* • *Education & Outreach & Inclusion, Diversity, Equity and Accessibility* • *Facilitate Partnerships & Coordination*

Rationale for Proposed Action Item:

- Emergency drills and exercises are hands-on activities that help participants (the public and public officials) build muscle memory and learn skills related to emergency preparedness and response.
- Exercises at all levels requires resources (e.g., money, venue, time, etc…)
- Preparedness will mitigate loss of property and life when an actual natural disaster occurs
- A wide variety of exercises exist that can ensure the public and public officials are prepared:
  - Tabletop exercises: A discussion-based session where team members review their roles, procedures, and responses to an emergency situation. A facilitator guides participants through one or more scenarios.
  - Functional exercises: Similar to a full-scale exercise, but without equipment. It simulates an incident in a realistic way to test the damage assessment plan.
  - Seminars and workshops: Discussion-based exercises that can be used to develop or familiarize players with plans, policies, agreements, and procedures.
  - Games: A discussion-based exercise that can be used to develop or familiarize players with plans, policies, agreements, and procedures.

Ideas for Implementation:

- Seek funding for Walkthroughs (workshops or orientation seminars), Tabletop exercises, Functional exercises, and Full-scale exercises.

Coordinating Organization:	Emergency Management (Wasco County Sheriff's Office)

Internal Partners:	**External Partners:**
Public Information Officer, Wildfire Coordinator, Planning	Red Cross, NCPHD, OEM, NOAA, BOC, MCED

Timeline:

x Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	Planning & Public Information Officer (2024)
Action Item Status:	**NEW**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
MH#18 – Establish regional collocation space for redundancy/resiliency of communications. The space can also be used as an EOC.	• *Protection of Life & Property* • *Emergency Services Enhancement* • *Facilitate Partnerships & Coordination*

Rationale for Proposed Action Item:

- Resilience in communication is important because it allows individuals, teams, and communities to maintain effective communication even during challenging or disruptive situations.
- Redundancy of communications allows individuals, teams, and communities to adapt, respond appropriately, and recover from hazards, ultimately fostering stability and facilitating problem solving in times of crisis or uncertainty.
- Redundancy and resiliency in communication networks secures the ability to maintain vital communication channels despite disruptions, ensuring information flow and coordinated action which in mitigates loss of life and property.

Ideas for Implementation:

- Identify partners willing to participate.
- Identify suitable locations to establish a regional collocation space.
- Identify funding sources for the purchase, construction, and operations and maintenance of a regional collocation space.

Coordinating Organization:	Emergency Management
Internal Partners:	**External Partners:**
OEM, BOC	FEMA, Red Cross

Timeline:

☐ Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	Emergency Management (2024)
Action Item Status:	**NEW**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
MH#19 – Seek funding opportunities and/or opportunities for assistance for the removal of junk, debris, yard waste and other hazardous materials that reduce hazard mitigation and response efforts.	• *Protection of Life & Property* • *Facilitate Partnerships and Coordination* • *Education & Outreach & Inclusion, Diversity, Equity and Accessibility* • *Natural Resource Systems Protection* • *Climate Resilience*

Rationale for Proposed Action Item:

- Code Compliance plays a key role in educating the public in regards to hazard mitigation through the care and upkeep of property.
- Removing junk, debris, yard waste, and hazardous materials is crucial for hazard mitigation and response efforts because it significantly reduces natural hazard safety risks to people.
- It allows for quicker access to affected areas for emergency responders, prevents further damage to property, and enables a faster recovery process after a disaster.
- Debris and hazardous materials left behind can pose health hazards, contaminate the environment, and complicate emergency response.

Ideas for Implementation:

- Regular clean-up initiatives and community-wide disposal events
- Utilizing specialized collection services for hazardous materials
- Targeted educational campaigns for vulnerable landowners & residents
- Promoting responsible waste management practices
- Utilize public existing events to promote
- Pursue grants for Waste Reduction, Abatement and other refuse disposal opportunities

Coordinating Organization:	Planning (Code Compliance), NCPHD, HHW

Internal Partners:	**External Partners:**
Planning, Public Information Officer, Wildfire Coordinator, Fire Districts	BOC, DEQ, OSFM, ODOT, Public Works

Timeline:

x Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	Planning (2024)
Action Item Status:	**NEW**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
MH#20 – Seek funding opportunities and/or opportunities for assistance in waste tires removal	• *Protection of Life & Property* • *Facilitate Partnerships and Coordination* • *Education & Outreach & Inclusion, Diversity, Equity and Accessibility* • *Natural Resource Systems Protection* • *Climate Resilience*

Rationale for Proposed Action Item:

- Code Compliance plays a key role in educating the public in regards to hazard mitigation through the care and upkeep of property.
- Waste tires can pose significant environmental hazards. There is an increased potential for creating vectors for disease carrying insects, as well as soil and water contamination.
- Waste tires can also pose significant fire risks due to their flammable nature. Proper storage and disposal/recycling can mitigate fire intensity where wildfires occur.

Ideas for Implementation:

- Regular collection and recycling events
- Utilizing specialized collection services for collection events
- Targeted educational campaigns for vulnerable landowners & residents
- Promoting responsible waste tire practices
- Utilize public existing events to
- Pursue grants for Waste Tire Recycling, Abatement and other tire recycling opportunities

Coordinating Organization:	Planning (Code Compliance), NCPHD, HHW

Internal Partners:	**External Partners:**
Planning, Public Information Officer, Wildfire Coordinator, Fire Districts	BOC, DEQ, OSFM, ODOT, Public Works

Timeline:

x Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	Planning (2024)
Action Item Status:	**NEW**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
MH#21 – Seek funding opportunities and/or opportunities for assistance for the removal of abandoned Recreational Vehicles, Mobile Homes, automobiles, and other large hazardous items that reduce hazard mitigation and response efforts	• *Protection of Life & Property* • *Facilitate Partnerships and Coordination* • *Education & Outreach & Inclusion, Diversity, Equity and Accessibility* • *Natural Resource Systems Protection*

Rationale for Proposed Action Item:

- Code Compliance plays a key role in educating the public in regards to hazard mitigation through the care and upkeep of property.
- Recreational Vehicles (RVs), mobile homes, and automobiles often contain flammable and hazardous materials such as gasoline, diesel, and oil, which can easily ignite and spread, and are difficult to extinguish.
- They often contain other environmentally hazardous materials such as antifreeze, Freon, asbestos, which can contaminate soil and groundwater.
- Removing these large items, helps prevent damage to property and the environment, and ensure swift and efficient response to emergencies.

Ideas for Implementation:

- Targeted conversations with community leaders, partner organizations & stakeholders
- Utilizing specialized collection services for hazardous materials
- Targeted educational campaigns for vulnerable landowners & residents
- Promoting proper vehicle storage and responsible disposal practices
- Utilize public existing events to promote
- Pursue grants or other funding for proper disposal, recycling, or reuse opportunities

Coordinating Organization:	Planning (Code Compliance), NCPHD, HHW

Internal Partners:	**External Partners:**
Planning, Public Information Officer, Wildfire Coordinator, Fire Districts	BOC, DEQ, OSFM, ODOT, Public Works, DMV

Timeline:

x Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	Planning (2024)
Action Item Status:	**NEW**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
MH#22 – Seek opportunities and partnerships to assist with the repair, replacement and operations and maintenance of County owned and/or maintained infrastructure	• *Protection of Life & Property* • *Emergency Services Enhancement* • *Facilitate Partnerships and Coordination* • *Natural Resource Systems Protection*

Rationale for Proposed Action Item:

- Replacing aged or repairing and upgrading infrastructure is a proactive approach to hazard mitigation. By investing in essential systems, communities can significantly reduce the impact of natural disasters, protect lives, and promote long-term sustainability.
- Repairing, replacing, and continual operations and maintenance of infrastructure is a crucial component of hazard mitigation for the following reasons:
  - Reduced Damage and Loss: Well-maintained infrastructure is more resistant to natural disasters like earthquakes and floods. Strong bridges, sturdy buildings, and robust power grids can withstand significant stress, minimizing damage and loss of life.
  - Economic Loss: Infrastructure damage or decay due to lack of operations and maintenance can disrupt supply chains, delay emergency services, hinder transportation, and affect businesses. By investing in repairs and upgrades, communities can protect their economic vitality and mitigate hazard severity and impact.
  - Faster Recovery: Functional infrastructure, such as roads and communication networks, allows emergency responders to reach affected areas quickly and efficiently.
  - Restored Services: Repaired power lines, water systems, and transportation networks enable essential services to be restored promptly, accelerating the recovery process.
  - Enhanced Resilience: By identifying vulnerabilities and addressing them through repairs and upgrades, communities can build resilience against future hazards.
  - Adaptability: Modernizing infrastructure can incorporate climate change considerations, making it more adaptable to extreme weather events and other long-term changes.
  - Community Safety and Well-being: Strong infrastructure safeguards lives by preventing building collapses, power outages, and other hazards. Reliable infrastructure, including clean water, sanitation, and transportation, contributes to a higher quality of life for residents.

Ideas for Implementation:

- Assess Infrastructure and identify condition and necessity for repair or replacements.
- Assess operations and maintence costs associated with infrastructure.
- Prioritize and determine which projects are most urgent and will yield the greatest benefits to mitigate hazard damage to property and life.
- Seek Opportunities and Partnerships to address infrastructure needs.

Coordinating Organization:	Public Works
Internal Partners:	**External Partners:**
Planning, Public Information Officer, Wildfire Coordinator, Fire Districts	BOC, DEQ, OSFM, ODOT

Timeline:

DRAFT

x Short Term (0-3 years) x Long Term (3+ years)	
Form Submitted by:	Planning (2024)
Action Item Status:	**NEW**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
MH#23 – Perimeter Mapping Software	• *Protection of Life and Property* • *Emergency Services Enhancements* • *Facilitate Partnerships & Coordination*

Rationale for Proposed Action Item:

- **Enhanced Situational Awareness:** Perimeter's map platform provides real-time visualization of critical data like evacuation zones, road closures, and the location of emergency responders. This shared view improves coordination and decision-making during emergencies.
- **Improved Communication and Coordination:** The platform facilitates communication between emergency responders, government agencies, and the public. This leads to faster response times and more effective resource allocation.
- **Increased Public Safety:** By providing timely and accurate information to the public through the platform (e.g., evacuation routes, shelter locations), Wasco County can help residents make informed decisions and stay safe during emergencies. The platform also works hand-in-hand with our existing citizen alert system.
- **Data-Driven Decision Making:** Perimeter's platform allows for data analysis and reporting, providing valuable insights for post-event evaluation and future emergency preparedness planning.

Ideas for Implementation:

- Implement the platform in stages, starting with key departments like emergency management, fire, and law enforcement and gradually expand access to other agencies.
- Roll-out outreach campaign to include other agencies, community members and businesses.
- Provide regular and ongoing training for all personnel who will be using the platform.
- Establish a process for gathering feedback from users (both internal and public) to identify areas for improvement and ensure the platform remains relevant and effective.
- Allocate sufficient funds in the county budget or research funding opportunities

Coordinating Organization:	PIO, Emergency Manager

Internal Partners:	**External Partners:**
Sheriff's Office/911 Dispatch, Public Works, Planning, GIS	Hood River County, Rural Fire Protection Districts, Rural Fire Protection Associations, incorporated cities, ODF

Timeline:

☐ Short Term (0-3 years)
☑ Long Term (3+ years)

Form Submitted by:	Wasco County PIO
Action Item Status:	**NEW**

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
WH#1 - Assessment of Roads for Response to Wildfire Hazards	• *Protection of Life & Property* • *Emergency Services Enhancement*

Rationale for Proposed Action Item:

- There are some roads in Wasco County which would limit the ability of fire fighting vehicles to safely access structures during a wildfire event. Some homes may not be saved as fire fighters choose to not defend them because of safety concerns.
- With some situations, substandard roads may not allow residents to evacuate the area during a wildfire.
- Some roads can act as de-facto firebreaks for wildfires. If properly maintained, these roads can help to mitigate the spread of particular wildfires, which can mitigate loss of property and life from wildfire.

Ideas for Implementation:

- An inventory of roads and a process to analyze and illustrate the condition of publicly dedicated (non-publicly maintained) roads has been completed by Wasco County Planning staff and analysis of that inventory has begun. This process can be repeated on additional roads and other areas throughout the county.
- Continue to develop an inventory showing the condition of roads serving the wildland urban interface and throughout the county. Identify roads which need improvement to allow safe and efficient access for fire fighting vehicles.
- Use information collected as part of the 2023-2024 Road Inventory Analysis to provide information for other wildfire mitigation projects and help develop measurements for success for said projects.
- Use information collected as part of the 2012 County Home Survey to help identify problem roads.
- Prioritize roads as follows: A. Road is adequate and needs no improvement, B. Road needs minor improvement, C. Road needs significant improvement.
- Concentrate inventory efforts on the following communities: Pine Grove, Sportsman's Park, Taylorville/Sportman's Paradise, Mosier/Seven Mile Hill, Shady Brook area, Pine Hollow.

Coordinating Organization:	Wasco County Public Works
Internal Partners:	**External Partners:**
Planning	Rural Fire Departments, Oregon's Fire Marshal's Office, ODF, USFS

Timeline:

x Short Term (0-3 years)
☐ Long Term (3+ years)

Form Submitted by:	Unknown (2012), Updated by NHMP SC (2017), Updated by Planning (2024)
Action Item Status:	**Deferred / Modified**

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
WH#2 - Accomplish Defensible Space Around Structures	• *Protection of Life & Property* • *Emergency Services Enhancement*

Rationale for Proposed Action Item:

- Many homes within Wildland Urban Interface areas do not have adequate defensible space to allow fire fighters to safely defend their property.
- Creation of defensible space is the best measure a landowner can undertake to protect their property during a wildfire situation.

Ideas for Implementation:

- Seek grant funding from the National Fire Plan and other programs to assist landowners in accomplishing defensible space work.
- Encourage landowners to undertake defensible apace work even if grant funding is not available.
- Place information on the county web site which explains the need for defensible space and measures which homeowners can take to accomplish it.
- Determine potential for code compliance, community corrections, and/or youth services programs as partners in assisting property owners in mitigating their risk from fire through the creation or improvement of defensible space.
- Investigate other community's programs for potential adoption by Wasco County (such as Deschutes County's Project Wildfire), and arrange for knowledgeable individuals to attend future NHMP SC plan maintenance meetings as a guest speaker.
- Provide information to property owners with handouts in the planning department.

Coordinating Organization:	Rural Fire Districts / Planning

Internal Partners:	External Partners:
Emergency Management, Planning	Landowners, ODF, USFS, Oregon Fire Marshal's Office

Timeline:

x Short Term (0-3 years)
☐ Long Term (3+ years)

Form Submitted by:	CWPP Coordinator (2012), Updated by NHMP SC (2017)
Action Item Status:	**Institutionalized**

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
WH#3 - Treat Hazard Fuels in the Wildland Urban Interface Including in The Dalles Municipal Watershed	• *Protection of Life & Property* • *Natural Resource Systems Protection* • *Emergency Services Enhancement*

Rationale for Proposed Action Item:

- There are large areas with heavy fuel loads in Wasco County. Wildfires occurring in these areas have the potential to become large in size and difficult to control. Many of these areas are in close proximity to residential developments
- Reducing hazard fuels will reduce the potential for large and intense wildfires. The application of forest thinning, prescribed fires, and brush reduction will allow fire fighters to better attack wildfires as flame lengths will be lower.

Ideas for Implementation:

- Refer to 2018 Community Protection Against Wildfire (CPAW) recommendations and associated data as starting point for identifying priority fuel reduction projects.
- Seek grant funding from the National Fire Plan and other programs to assist landowners in accomplishing hazard fuel reduction work.
- Encourage landowners to undertake hazard fuel reduction work, even if grant funding is not available.
- Place information on the county web site which explains the need for hazard fuel reduction and measures which homeowners can take to accomplish it.
- Coordinate hazard fuel reduction projects on private lands with those on National Forest lands to increase the effectiveness of both.
- Consider the following communities as high priority for hazard fuel reduction: Zone 1 – Mosier/Seven Mile Hill, Mill Creek, Chenoweth, Rowena, Cherry Heights. Zone 2 – Celilo Village. Zone 3 - Pine Hollow/Wamic/Sportsman's Park, Pine Grove, Taylorville/Sportsman's Paradise, Tygh Valley.

Coordinating Organization:	Rural Fire Districts, The Dalles Public Works
Internal Partners:	**External Partners:**
Emergency Management, WC Public Works, Planning	Landowners, ODF, USFS, Oregon Fire Marshall's Office

Timeline:

x Short Term (0-3 years)
☐ Long Term (3+ years)

Form Submitted by:	CWPP Coordinator (2012), Updated by NHMP SC (2017)
Action Item Status:	**Institutionalized**

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
WH#4 – Explore ways to increase Fire District coverage throughout the County and seek funding for Fire Districts/Rangeland Associations	• *Facilitate Partnerships and Coordination* • *Emergency Services Enhancement*

Rationale for Proposed Action Item:

- Federal, state, and local fire protection districts do not cover the entire County.
- High fire risk to life and property exist in these areas.
- Of the 14 Rangeland Fire Protection Associations across Oregon, none are located in Wasco County.
- Mutual Aid agreements become safer and more effective when in cooperation with a qualified well equipped organization.
- Obtaining long term funding for future and existing fire districts ensures the stability of the district and increases the resiliency of mitigation and response efforts.

Ideas for Implementation:

- Begin discussion with existing organizations that could be encouraged or incentivized to increase coverage area
- Meet with Columbia Rural Fire District to explore options for enhancing coverage between Highway 197 and the Deschutes River north of Tygh Ridge
- Research Rangeland Fire Protection Associations and look at finding ways to establish them in southern or eastern unprotected areas of Wasco County
- Research funding sources for long term sustainability of fire districts

Coordinating Organization:	Emergency Management
Internal Partners:	**External Partners:**
Wildfire Coordinator, BOC, Fire Districts	Oregon's Fire Marshal's Office, ODF, USFS

Timeline:

☐ Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	NHMP SC (2017), Updated by Planning (2024)
Action Item Status:	**Institutionalized**

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
WH#5 – Continue to fund Wildfire Coordinator or local Natural Hazard Planner position	• *Facilitate Partnerships and Coordination* • *Education & Outreach & Inclusion, Diversity, Equity and Accessibility*

Rationale for Proposed Action Item:

- This position is identified in the Community Wildfire Protection Plan as necessary for ensuring plan goals are implemented effectively and plan is updated regularly
- Recent Community Planning Assistance for Wildfire work is generating several recommendations for decreasing fire risk in the WUI that will need to be managed and implemented.
- This position coordinates and assists with the implementation of the CWPP and other wildfire related action items and goals within the NHMP.

Ideas for Implementation:

- Coordinate various district's defensible space fuel treatment work
- Seek funding for work crews
- Coordinate outreach and education for homeowners
- Conduct Firewise style trainings
- Keep hazard maps updated
- Ensure hazard plans are up to date (Community Wildfire Protection Plan, Natural Hazard Mitigation Plan)
- Champion efforts to expand wildland fire protection areas
- Examine successes of Project Wildfire in Deschutes County for a model
- An all hazards planner could ensure timely implementation of other action items throughout this NHMP (for example if they area a Certified Floodplain Manager (CFM) they could focus on flood plain concerns as well, etc.)
- Position may be full time or part time
- Evaluate which department would be suitable for oversight. Position may be housed under EM, Planning, or as a standalone program.

Coordinating Organization:	Wasco County BOC
Internal Partners:	**External Partners:**
Emergency Management, Wildfire Coordinator	Rural Fire Departments, Oregon's Fire Marshal's Office, ODF, USFS

Timeline:

x Short Term (0-3 years)
☐ Long Term (3+ years)

Form Submitted by:	NHMP SC (2018), Updated by Planning (2024)
Action Item Status:	**Institutionalized**

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
WH#6 – Provide Parcel/Lot Identification Signage	• *Facilitate Partnerships and Coordination* • *Emergency Services Enhancement* • *Education & Outreach & Inclusion, Diversity, Equity and Accessibility*

Rationale for Proposed Action Item:

- Parcel/lot identification signage (Address Numbers) are not just convenient for finding addresses but necessary for emergency responders to locate those in need.
- Parcel/lot identification signage can help emergency responders identify areas within large tracts of land where structural development exists, particularly where dwellings and other habitable structures are located.

Ideas for Implementation:

- Require proposed development apply and obtain an address.
- Ensure addresses are tracked by the U.S. Postal Service, Wasco County Planning and GIS, and emergency responders.
- Continue to seek funding for signage for unincorporated county and urban jurisdictions.

Coordinating Organization:	Fire Districts
Internal Partners:	**External Partners:**
Planning, Emergency Management	Rural Fire Departments, Oregon's Fire Marshal's Office, ODF, USFS

Timeline:

x Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	NHMP SC (2018), Updated by Planning (2024)
Action Item Status:	**Deferred / Modified**

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
WH#7 – Increase Wildfire Prevention Awareness and Encourage WUI Areas to Conduct Firewise Workshops	• *Facilitate Partnerships and Coordination* • *Education & Outreach & Inclusion, Diversity, Equity and Accessibility* • *Climate Resilience*

Rationale for Proposed Action Item:

- Wildfire Prevention Awareness is crucial because it empowers people to understand the risks of wildfires, take proactive steps to prevent them from starting, and prepare for potential fire threats.
- Firewise Workshops are important because they educate communities on how to reduce their wildfire risk by teaching residents about proactive measures they can take to protect their homes and neighborhoods, including proper landscaping, building materials, and evacuation planning, essentially empowering communities to work together to mitigate wildfire damage before a fire occurs.
- Wildfire prevention techniques help combat climate change because large-scale wildfires release significant amounts of stored carbon dioxide from forests into the atmosphere, contributing to greenhouse gas emissions; by preventing these fires, we can maintain forests as carbon sinks and mitigate climate change further.

Ideas for Implementation:

- Targeted conversations with community leaders & stakeholders
- Determine most vulnerable private lands
- Targeted educational campaigns for vulnerable landowners & residents
- Work with school districts to utilize existing events for outreach
- Utilize public existing events to
- Pursue grants for Firewise and other Wildfire Prevention Awareness

Coordinating Organization:	Wildfire Coordinator, Fire Districts

Internal Partners:	External Partners:
Public Information Officer, Planning (Code Compliance), Emergency Management	Oregon's Fire Marshal's Office, ODF, USFS

Timeline:

x Short Term (0-3 years)
☐ Long Term (3+ years)

Form Submitted by:	NHMP SC (2018), Updated by Planning
Action Item Status:	**Deferred / Modified**

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
WH#8 – Map Fire Regimes and Condition Classes	• *Protection of Life & Property* • *Emergency Services Enhancement* • *Natural Resource Systems Protection* • *Climate Resilience*

Rationale for Proposed Action Item:

- Mapping fire regimes and condition classes is crucial because it provides a clear picture of how current vegetation and fire patterns deviate from historical "natural" conditions.
- Can better allow land managers to identify areas at high risk of uncharacteristic wildfires, prioritize restoration efforts, and design targeted fuel management strategies to maintain ecosystem health and reduce wildfire danger to communities.
- Helps identify areas with significantly altered fire regimes helps pinpoint locations where wildfires are more likely to occur with greater severity, allowing for proactive planning and mitigation strategies.
- Map Fire Regimes and Condition Classes are important for understanding and managing climate change because they provide a crucial tool to visualize and analyze how changing climatic conditions are impacting wildfire behavior and severity.

Ideas for Implementation:

- Develop Web App to map fire regimes and condition classes
- Modify Web App as necessary

Coordinating Organization:	Wasco County GIS
Internal Partners:	**External Partners:**
BOC	Rural Fire Districts, ODF, USFS, Oregon Fire Marshall's Office

Timeline:

x Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	NHMP SC (2018), Updated by Planning (2024)
Action Item Status:	**Deferred / Modified**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
WH#9 – Update the CWPP on a five year cycle or as needed.	• *Protection of Life & Property* • *Emergency Services Enhancement* • *Education & Outreach & Inclusion, Diversity, Equity and Accessibility* • *Facilitate Partnerships & Coordination*

Rationale for Proposed Action Item:

- Community Wildfire Protection Plans (CWPPs) are important because they allow communities at risk of wildfires to collaboratively identify local priorities, coordinate efforts with various agencies, and develop a strategic plan to reduce wildfire risk to people, property, and natural resources by addressing issues like fuel reduction, structure protection, and community preparedness, ultimately making them more resilient to wildfire threats.
- The process of developing a CWPP encourages diverse community members to participate, leading to better understanding of local risks and more effective solutions.
- Ensuring the CWPP is up-to-date ensures that high-risk areas and prioritized mitigation projects based on local needs are still relevant and that resources are being appropriated in the most efficient manner.

Ideas for Implementation:

- Develop Web App to map fire regimes and condition classes
- Modify Web App as necessary

Coordinating Organization:	Wildfire Coordinator, Planning

Internal Partners:	**External Partners:**
Emergency Management	Rural Fire Districts, ODF, USFS, Oregon Fire Marshall's Office

Timeline:

☐ Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	Planning (2024)
Action Item Status:	**NEW**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
WH#10 – Update County Fire Safety Standards.	• *Protection of Life & Property* • *Emergency Services Enhancement* • *Facilitate Partnerships & Coordination*

Rationale for Proposed Action Item:

- Fire safety standards for land use are important because they help minimize the risk of wildfires spreading through a community by strategically managing where development occurs.
- Guiding development away from highly flammable areas and promoting building designs that resist fire spread, land use planning can significantly decrease the likelihood of a wildfire causing widespread damage.
- By proactively managing land use with fire safety in mind, communities can build greater resilience to wildfire events, minimizing the impact of future fires.

Ideas for Implementation:

- Update County Fire Safety Standards (Chapter 10 of the Wasco County Land Use and Development Ordinance)
- Ensure that Fire Safety Standards adhere to state law

Coordinating Organization:	Wildfire Coordinator, Planning
Internal Partners:	**External Partners:**
Emergency Management, Building Codes Services	Rural Fire Districts, ODF, USFS, Oregon Fire Marshall's Office

Timeline:

☐ Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	Planning (2024)
Action Item Status:	**NEW**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
WH#11 – Adopt the WUI Code and Standards (Home hardening and defensible space) as required by state law, and/or encourage standards to mitigate loss of property and life where state law does not require	• *Protection of Life & Property* • *Emergency Services Enhancement* • *Facilitate Partnerships & Coordination*

Rationale for Proposed Action Item:

- WUI codes, or Wildland Urban Interface codes, are important because they establish regulations designed to minimize the risk of wildfire damage to lives and property in areas where human development borders wildlands.
- Their primary purpose is to prevent wildfires from spreading from vegetation to structures and vice versa by implementing building design features that resist ignition and ember penetration.
- Although increased standards can significantly increase the cost of development, the various strategies can do the following:
  - Building materials and design: WUI codes often mandate the use of fire-resistant building materials like non-combustible siding, roof coverings, and ember-resistant vents.
  - Defensible space: They typically require the creation of defensible space around structures, which means clearing flammable vegetation within a specific distance from the building.
  - Access for emergency vehicles: WUI codes can also include standards for road widths, turnarounds, and address signage to ensure easy access for fire fighting vehicles.

Ideas for Implementation:

- Adopt updated standards as required by state law
- Seek funding sources to assist vulnerable populations with site/property development to meet WUI Code home hardening and other wildfire safety standards

Coordinating Organization:	Building Codes Services, OSFM

Internal Partners:	**External Partners:**
Emergency Management, Planning, Wildfire Coordinator, BOC	Rural Fire Districts, ODF, USFS, Oregon Fire Marshall's Office

Timeline:

x Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	Planning (2024)
Action Item Status:	**NEW**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
WH#12 – Update the Wasco County risk assessment and include WUI identification map.	• *Protection of Life & Property* • *Emergency Services Enhancement* • *Facilitate Partnerships & Coordination*

Rationale for Proposed Action Item:

- County wildfire risk assessments are important because they provide crucial information about the likelihood and potential impacts of wildfires within a specific area.
- Allows local authorities to prioritize mitigation strategies, plan emergency responses, educate residents, and make informed land use decisions to minimize wildfire damage and protect lives and property in high-risk zones.

Ideas for Implementation:

- Adopt updated standards as required by state law
- Seek funding sources to assist vulnerable populations with site/property development to meet WUI Code home hardening and other wildfire safety standards

Coordinating Organization:	USFS, ODF, OSFM, BLM, NRCS, OSU Extension Office

Internal Partners:	**External Partners:**
Emergency Management, GIS, Planning	Rural Fire Districts, BOC

Timeline:

x Short Term (0-3 years)
☐ Long Term (3+ years)

Form Submitted by:	Planning (2024)
Action Item Status:	**NEW**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
WH#13 – Work with railroad to reduce maintenance work during fire season and improve ROW vegetative management.	• *Protection of Life & Property* • *Emergency Services Enhancement* • *Facilitate Partnerships & Coordination*

Rationale for Proposed Action Item:

- Working with railroads to reduce maintenance work during fire season and improve Right-of-Way (ROW) vegetative management is crucial because overgrown vegetation along railroad tracks presents a significant fire hazard, potentially causing disruptions to train operations, damage to infrastructure, and increased risk of wildfires spreading to nearby communities.
- Uncontrolled vegetation on railroad ROWs acts as readily available fuel for wildfires, especially during dry fire seasons, which can easily ignite from sparks from trains or other sources.
- By proactively managing vegetation through trimming, mowing, and selective herbicide application, railroads can minimize the need for emergency fire suppression efforts during peak fire season, saving time and resources.

Ideas for Implementation:

- Develop a working relationship with railroad to understand needs and constraints
- Determine if and how local and state resources can be utilized to help reduce maintenance work during fire season

Coordinating Organization:	Emergency Management

Internal Partners:	**External Partners:**
Fire Districts	ODF, USFS, Oregon Fire Marshall's Office

Timeline:

☐ Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	Planning (2024)
Action Item Status:	**NEW**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
WH#14 – Complete survey and evaluation of home sites for wildfire mitigation	• *Protection of Life & Property* • *Emergency Services Enhancement* • *Facilitate Partnerships & Coordination*

Rationale for Proposed Action Item:

- Completion of a survey and evaluation of home sites is crucial for wildfire mitigation because it helps identify potential risks and vulnerabilities, allowing for targeted prevention and preparedness measures.
- Identifying Risks Examples:
  - Fuel Load Assessment: Evaluating the amount of flammable vegetation around a home helps determine the potential intensity of a fire.
  - Slope and Topography: Steep slopes can increase fire spread, while topography can influence wind direction and intensity.
  - Distance to Wildland Areas: Proximity to forests or other natural areas can significantly impact fire risk.
  - Building Materials: The type of materials used in construction, especially for roofs and siding, can affect a home's fire resistance.

Ideas for Implementation:

- Develop a working relationship with landowners
- Develop communication and outreach plan
- Seek monetary assistance programs for site improvement
- Seek monetary assistance programs for structural protection (building materials)

Coordinating Organization:	Wildfire Coordinator, Emergency Management
Internal Partners:	**External Partners:**
Public Information Officer, Fire Districts	ODF, USFS, Oregon Fire Marshall's Office

Timeline:

☐ Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	Planning (2024)
Action Item Status:	**NEW**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
WH#15 – Assist Rural Fire Districts in upgrading their firefighting equipment, facilities and training as needed, and for operations and maintenance of equipment and facilities.	• *Protection of Life & Property* • *Emergency Services Enhancement* • *Facilitate Partnerships & Coordination*

Rationale for Proposed Action Item:

- Assisting rural fire districts in upgrading their firefighting equipment, facilities, and training is crucial because rural areas often face unique challenges like large geographic distances, limited resources, and smaller volunteer firefighter teams, making it essential to ensure they have the necessary tools and capabilities to effectively respond to emergencies and protect their communities.
- Rural Fire Districts are in many cases volunteers groups dealing with potentially large-scale fires or incidents where response time is critical; lack of training, facilities, or outdated equipment can pose safety risks to the firefighters and the public which adversely impacts hazard mitigation and response.
- By providing rural fire departments with the necessary tools, they can better protect residents and property from fires, especially in areas with limited access to professional firefighting services.

Ideas for Implementation:

- Seek funding opportunities for equipment, training, and facilities
- Work with funded fire protection districts to acquire newer used equipment
- Seek fund raising opportunities that can off-set and help acquire new equipment, provide training, or facilities.

Coordinating Organization:	Fire Districts
Internal Partners:	**External Partners:**
Public Information Officer, Emergency Management, BOC	ODF, USFS, Oregon Fire Marshall's Office, Wildfire Coordinator

Timeline:

☐ Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	Planning (2024)
Action Item Status:	**NEW**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
WH#16 – Increase interagency training and cooperative planning regarding air resources for fire suppression.	• *Protection of Life & Property* • *Emergency Services Enhancement* • *Facilitate Partnerships & Coordination*

Rationale for Proposed Action Item:

- Increasing interagency training and cooperative planning for air resources in fire suppression is crucial because it allows different agencies to work together more effectively during wildfire incidents, optimizing the use of aerial firefighting assets, enhancing coordination, and ultimately leading to faster and more efficient fire suppression efforts.
- By coordinating with other agencies, fire managers can access the most suitable aircraft for the specific fire situation, regardless of which agency owns them, maximizing the use of available air resources.
- Joint training sessions build common understanding and communication protocols between different agencies, ensuring clear and timely information exchange during fire operations.
- When multiple agencies are involved in a fire, sharing real-time data and aerial reconnaissance through coordinated planning allows for a better understanding of the fire's behavior and optimal response strategies.

Ideas for Implementation:

- Seek opportunities for joint training opportunities.
- Build partnerships with federal and state agencies that may control air assets.

Coordinating Organization:	Fire Districts
Internal Partners:	**External Partners:**
Public Information Officer, Emergency Management, BOC	ODF, USFS, Oregon Fire Marshall's Office, Wildfire Coordinator

Timeline:

☐ Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	Planning (2024)
Action Item Status:	**NEW**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
WH#17 – Reduce fire fuels along public access roads.	• *Protection of Life & Property* • *Emergency Services Enhancement* • *Facilitate Partnerships & Coordination*

Rationale for Proposed Action Item:

- Reducing fire fuels along roads is crucial because it creates "fuel breaks," which act as barriers to slow down the spread of wildfires, allowing firefighters easier access to contain a blaze and protect nearby communities, especially in areas where roads intersect with wildlands, by significantly reducing the amount of flammable vegetation readily available for a fire to consume; essentially making it easier to control and suppress a wildfire.
- Many county roads do not have regular County provided maintenance.
- By proactively managing vegetation through trimming, mowing, and selective herbicide application, the County can minimize the need for emergency fire suppression efforts during peak fire season, saving time and resources.

Ideas for Implementation:

- Utilize information obtained from Action Item MH# 1 and MH#13 to prioritize fire fuels reduction operations
- Seek partnerships with public and or private organizations and stakeholders to assist with fire fuel reduction operations
- Seek funding for fire fuel reduction operations

Coordinating Organization:	Public Works, WC-Soil & Water, Wildfire Coordinator

Internal Partners:	**External Partners:**
Fire Districts	ODF, USFS, Oregon Fire Marshall's Office, Wildfire Coordinator

Timeline:

☐ Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	Planning (2024)
Action Item Status:	**NEW**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
EHH#1 – Establish or construct accessible cooling centers like libraries, community centers, and public buildings.	• *Protection of Life & Property* • *Emergency Services Enhancement* • *Education & Outreach & Inclusion, Diversity, Equity and Accessibility* • *Facilitate Partnerships & Coordination*

Rationale for Proposed Action Item:

- Cooling Centers are crucial for communities to establish during extreme heat events because they provide a safe, air-conditioned space for people to escape dangerous temperatures, especially vulnerable populations like the elderly, young children, those without adequate cooling at home, and individuals experiencing homelessness, thus significantly reducing the risk of heat-related illnesses and fatalities.
- Cooling Centers can mitigate loss of life and reduce strain on emergency services
- Key reasons why Cooling Centers are important:
  - Protect vulnerable populations and reduce health risks: Cooling Centers can significantly decrease the incidence of heat-related illnesses like heat exhaustion and heat stroke.
  - Accessible refuge: For those without air conditioning at home or those experiencing homelessness, Cooling Centers offer a vital refuge during extreme heat events
  - Public health strategy: Establishing Cooling Centers can be a key component of a comprehensive heat adaptation plan, allowing communities to proactively address the dangers of extreme heat.

Ideas for Implementation:

- Conduct assessment of existing Cooling Centers within County
- Determine which facilities are best suited to being used as a Cooling Center:
  - Libraries, Schools, Senior centers, Recreation centers, Indoor community pools, Community centers, Town or County halls/centers/courthouses, Police department facilities, Fire departments facilities
- Determine if new Cooling Centers must be constructed
- Conduct Assessment of selected facilities to determine HVAC and other space requirements needed to establish the structure as a Cooling Center
- Seek funding for equipment and operations and maintenance of the Cooling Center

Coordinating Organization:	Administrative Services, Emergency Management

Internal Partners:	**External Partners:**
BOC, North Central Public Health, Building Codes Services	Planning, Red Cross, MCEDD

Timeline:

☐ Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	Planning (2024)
Action Item Status:	**NEW**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
EHH#2 – Develop a Heat Action Plan.	• *Protection of Life & Property* • *Emergency Services Enhancement* • *Education & Outreach & Inclusion, Diversity, Equity and Accessibility* • *Facilitate Partnerships & Coordination* • *Climate Resilience*

Rationale for Proposed Action Item:

- A Heat Action Plan is crucial because it provides a structured strategy to mitigate the health risks and potential dangers associated with extreme heat events, particularly for vulnerable populations like the elderly, young children, and those with pre-existing health conditions, by outlining proactive measures to inform, prepare, and protect residents during heatwaves, potentially saving lives and minimizing negative impacts on the community.
- Heat action plans contribute to climate resilience by proactively preparing communities to respond to extreme heat events, which are becoming more frequent and severe due to climate change, thus mitigating the negative impacts on health and wellbeing, and allowing for faster recovery in the face of heat waves.

Ideas for Implementation:

- Engage with community and establish Heat Action Plan committee
- Develop a heat action plan, the key steps include:
  - Conduct a vulnerability assessment, identify at-risk populations, establish a monitoring system, creating response strategies for different heat levels, engage stakeholders, develop communication plans, and regularly review and update the plan; focus on preparedness measures for vulnerable groups and incorporate strategies to reduce heat exposure during extreme heat events.

Coordinating Organization:	Planning, Emergency Management

Internal Partners:	**External Partners:**
North Central Public Health, Public Information Officer	MCEDD, Red Cross

Timeline:

☐ Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	Planning (2024)
Action Item Status:	**NEW**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
EHH#3 – Retrofit buildings to maximize energy efficiency	• *Protection of Life & Property* • *Natural Resource Systems Protection* • *Climate Resilience*

Rationale for Proposed Action Item:

- Building retrofitting is important because it can significantly improve energy efficiency, reduce environmental impact by lowering carbon emissions, enhance occupant health and well-being, increase property values, preserve heritage buildings, and improve resilience against natural disasters.
- Environmental benefits. Retrofitting can reduced the carbon footprint of older buildings. Energy-efficient upgrades like better insulation and lighting systems can drastically decrease energy consumption and associated greenhouse gas emissions.
- Improved air quality. Efficient building systems can contribute to cleaner indoor air quality.
- Economic benefits. Retrofitting can enhance cost savings, reducing energy bills for building owners and occupants resulting in long-term economic savings.
- Increased property value. Well-retrofitted buildings tend to have higher market value due to improved energy efficiency and sustainability features.
- Social benefits. Retrofitting can improve occupant health through better ventilation and temperature control.
- Community resilience. Retrofitting can make buildings more resistant to natural disasters like earthquakes and hurricanes, protecting lives and infrastructure.
- Preservation of heritage. Retrofitting buildings can help to restore and maintain historic buildings, preserving cultural heritage.

Ideas for Implementation:

- To start retrofitting old buildings within a community, a key first step is to assess existing buildings to identify potential retrofit projects.
- Engaging with stakeholders to develop a comprehensive plan with incentives and support mechanisms to encourage retrofits.
- Seek potential funding sources for retrofitting projects.
- Conduct education campaigns, and technical assistance programs to guide building owners through the process.

Coordinating Organization:	Administrative Services

Internal Partners:	**External Partners:**
BOC, Building Codes Services, Planning, Emergency Management, MCEDD, Public Information Officer	MCEDD, Red Cross

Timeline:

☐ Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	Planning (2024)
Action Item Status:	**NEW**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
DH#1 - Ensure Long-range Water Resources Development and Quality	• *Protection of Life & Property* • *Facilitate Partnerships and Coordination* • *Natural Resource Systems Protection*

Rationale for Proposed Action Item:

- Potential and projected growth within the County could place serious burden on water supply for domestic and agricultural use
- Certain areas of the County like the City of Mosier are already feeling the impact of growth and reduced water levels in aquifers
- Studying alternative sources may reveal under-utilized water resources and other information useful to water managers

Ideas for Implementation:

- In cooperation with OSU Extension Service and agricultural organizations prominent and respected within the farming and ranching community, build on existing outreach methods with the goal of providing water conservation/drought management training to farmers and ranchers
  - Establish a public advisory committee
  - Include public participation in drought planning
  - Organize drought information meetings for the public and the media
  - Implement water conservation awareness programs
  - Publish and distribute pamphlets on water conservation techniques / drought management
  - Organize workshops on special drought-related topics
  - Prepare sample ordinances on water conservation
  - Establish a drought information center
  - Set up a demonstration of on-site treatment technology at visitor center
  - Establish tuition assistance so farmers can enroll in farm management classes
  - Develop training materials in several languages
  - Provide education on different cultural perspectives of water resources
  - Employ public participation and public information

Coordinating Organization:	SWCD

Internal Partners:	**External Partners:**
BOC, Planning	Watermaster, OSU Extension, DEQ, ODFW, OECDD, DOGAMI, DLCD, City of The Dalles, ORWD, USFS, NCPHD

Timeline:

x Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	NHMP Coordinator (2012), Updated by NHMP SC (2017), Updated by NHMP (2024)
Action Item Status:	**Institutionalized**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
DH#2 - Support Local Agencies Training on Water Conservation Measures and Drought Management Practices	• *Education & Outreach & Inclusion, Diversity, Equity and Accessibility* • *Facilitate Partnerships and Coordination* • *Natural Resource Systems Protection*

Rationale for Proposed Action Item:

- Agricultural economy- crops and livestock- susceptible to drought
  - o Loss of income for farmers and ranchers during drought season
- Need for raised awareness of the impacts of drought
- Need for coordinated water conservation efforts
- Need for County-wide effort to reduce drought impact

Ideas for Implementation:

- In cooperation with OSU Extension Service and agricultural organizations prominent and respected within the farming and ranching community, build on existing outreach methods with the goal of providing water conservation/drought management training to farmers and ranchers
  - o Establish a public advisory committee
  - o Include public participation in drought planning
  - o Organize drought information meetings for the public and the media
  - o Implement water conservation awareness programs
  - o Publish and distribute pamphlets on water conservation techniques / drought management
  - o Organize workshops on special drought-related topics
  - o Prepare sample ordinances on water conservation
  - o Establish a drought information center
  - o Set up a demonstration of on-site treatment technology at visitor center
  - o Establish tuition assistance so farmers can enroll in farm management classes
  - o Develop training materials in several languages
  - o Provide education on different cultural perspectives of water resources
  - o Employ public participation and public information

Coordinating Organization:	SWCD
Internal Partners:	**External Partners:**
Planning	OSU Extension Service, Cherry Growers, Cattlemen's Association, NRCS, Wy'East RC&D

Timeline:

☐ Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	NHMP Coordinator (2012), Updated by NHMP SC (2017)
Action Item Status:	**Deferred**

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
SH#1 - Encourage Operators of Critical Facilities to Secure Emergency Power	• *Emergency Services Enhancement*

Rationale for Proposed Action Item:

- Severe storms have the ability to knock down power lines and disrupt the electrical grid
- Critical facilities are crucial to emergency response and all rely on electrical power to provide services; eliminating the possibility of a cut off power supply out of the equation makes those facilities more robust in the event of a hazard

Ideas for Implementation:

- Seek funding and capital improvements for emergency power supplies for all identified critical facilities.
- Identify critical facilities with a need for backup power
- Link to City of The Dalles goals

Coordinating Organization:	Emergency Management
Internal Partners:	**External Partners:**
Planning, Public Works	Cities, OEM, ODOE, DLCD, NWCPUD, Wasco Electric, Pacific Power

Timeline:

x Short Term (0-3 years)
☐ Long Term (3+ years)

Form Submitted by:	NHMP Coordinator (2012), Updated by NHMP SC (2017)
Action Item Status:	**Deferred / Modified**

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
SH#2 - Support/Encourage Electrical Utilities to Use Underground Construction Methods	• *Protection of Life & Property*

Rationale for Proposed Action Item:

- Underground construction of electrical utilities where possible through public incentives and partnerships helps to reduce power outages from severe storms
- There is potential for significant growth within the County within the next 50 years; adopting risk reducing building methods such as underground utilities in newly built areas now lessons the risk burden on future generations

Ideas for Implementation:

- Evaluate cost of doing underground vs overhead utilities.
- Support utility under-grounding program in newly developed areas to minimize future conflicts with utilities;
- Increase the use of underground utilities where possible in redevelopment areas;
- Coordinate with local utility companies and contractors to install underground utilities;
- Partner with utilities to investigate under-grounding utilities in sections of the county that are prone to hazards related to overhead utilities; and
- Identify underground utilities projects as a part of future Capital Improvement Projects (CIP).
- Coordinate a meeting between partner agencies to discuss how to accomplish the above
- Encourage off grid solutions
- Expand solar incentives
- Support Expedited Review process in the National Scenic Area

Coordinating Organization:	Planning
Internal Partners:	**External Partners:**
Emergency Management, GIS, Planning	Cities, Utilities, Building Contractors, Real Estate Agencies

Timeline:

x Short Term (0-3 years)
☐ Long Term (3+ years)

Form Submitted by:	NHMP Coordinator (2012), Updated by NHMP SC (2017)
Action Item Status:	**Deferred / Modified**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
SH#3 - Develop Partnership Programs to Reduce Vulnerability of Public Infrastructure from Severe Winter Storms	• *Emergency Services Enhancement* • *Protection of Life & Property*

Rationale for Proposed Action Item:

- Developing partnership programs to reduce the vulnerability of public infrastructure from severe winter storms is crucial because it allows for a combined effort from various stakeholders, including government agencies, private companies, and community organizations, to pool resources, expertise, and labor, leading to more comprehensive mitigation strategies, better preparedness, and faster recovery efforts in the face of extreme weather events.

Ideas for Implementation:

- Identify Key Stakeholders
- Establish Clear Communication Channels: Establish a communication and response plan
- Develop varied strategy and solutions: Advanced weather forecasts, develop funding solutions, and determine which infrastructure is most at risk
- Educate the public about the risks of severe winter storms and encourage them to take precautions.

Coordinating Organization:	Public Works
Internal Partners:	**External Partners:**
Emergency Management, Public Information Officer	Cities, Utilities

Timeline:

☐ Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	Planning 2024
Action Item Status:	**In Progress**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
SH#4 - Increase and Maintain Public Awareness of Severe Storms	• *Emergency Services Enhancement* • *Protection of Life & Property*

Rationale for Proposed Action Item:

- Early Warning: Timely alerts can provide individuals with crucial time to seek shelter or evacuate, significantly reducing the risk of injury or death.
- Informed Decision-Making: Knowledge about potential hazards, such as snow storms or flash floods, and empowers people to make informed decisions about their safety.
- Protection of Property: Helps provide awareness of impending storms can prompt people to take steps to protect their property, such as securing outdoor objects, boarding up windows, or moving valuables to higher ground. Early preparation and timely response can minimize property damage and economic loss.
- Efficient Emergency Response: Public awareness can expedite emergency response efforts as people are more likely to cooperate with authorities and follow evacuation orders. A well-informed public can help alleviate the burden on emergency services, allowing them to focus on critical tasks.
- Community Resilience: Preparedness: A knowledgeable community is more resilient in the face of severe weather events. Public awareness can foster a sense of community and encourage collaboration among neighbors to support one another during and after storms.

Ideas for Implementation:

- Identify Key Stakeholders
- Establish Clear Communication Channels
  - Take Advantage of a Variety of Media: Utilize traditional and social media to disseminate information about severe weather threats, safety tips, and emergency procedures.
  - Partner with Local Organizations: Collaborate with schools, businesses, and community groups to conduct educational campaigns and distribute informational materials.
  - Utilize Technology: Employ weather apps, emergency alert systems, and social media to provide real-time updates and warnings.
  - Conduct Community Outreach: Organize workshops, seminars, and drills to educate the public about severe weather preparedness.
  - Promote Emergency Preparedness Kits: Encourage individuals and families to create emergency kits containing essential supplies.

Coordinating Organization:	Public Information Officer, Public Works

Internal Partners:	**External Partners:**
Emergency Management	Cities, Utilities

Timeline:

☐ Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	Planning 2024
Action Item Status:	**In Progress**

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
FH#1 - Mitigate Flood Event Resulting from Naturally Induced Dam Failure	• *Protection of Life & Property*

Rationale for Proposed Action Item:

- Acquire or prepare detailed dam failure inundation maps:
  - o Identifying the hazard is necessary prior to identifying public notification areas and evacuation routes
- Improve understanding of vulnerability and risk to life and property from natural hazard induced dam failure:
  - o If we can understand the risk from dam failure , we can plan and use resources more appropriately to prepare against this hazard
- Rehabilitate identified vulnerable dams:
  - o Reduce or eliminate the risk to life, property and infrastructure
- Evaluate emergency response plan and identify areas of public notification and evacuation routes:
  - o Ensure the plan is adequate to cope with a hazard event

Ideas for Implementation:

- Prepare maps with FEMA 100 and 500-year flood inundation maps along with the dam failure inundation zone and a complete inventory of critical facilities.
- After the improvement of the hazard layers and the vulnerability inventory, the risk analysis should be reevaluated. Provide educational media to identified vulnerable communities.
- Provide support to assist in obtaining funding to perform rehabilitation of affected properties.
- Identify existing plans and revise notification and evacuation routes based on vulnerability inventory if needed.

Coordinating Organization:	SWCD
Internal Partners:	**External Partners:**
Public Works, GIS, Fire Department, Emergency Management, City of The Dalles	Army Corps of Engineers, BPA, DEQ, WRD,DSL, DLCD, Irrigation District, BLM

Timeline:

x Short Term (0-3 years)
☐ Long Term (3+ years)

Form Submitted by:	DOGAMI (2012), Updated by NHMP SC (2017)
Action Item Status:	**Deferred / Modified**

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
FH#2 – Protect Against Loss from Flooding	• *Education & Outreach & Inclusion, Diversity, Equity and Accessibility* • *Protection of Life & Property*

Rationale for Proposed Action Item:

- The State of Oregon's Natural Hazard Mitigation Plan indicates County's probability for a future flood event is high (that the county would be likely to have a major flooding event in the next 10-35 years) and the county's vulnerability to a future flood event is moderate. Improved collaboration with owners of at-risk properties can help the County to better identify ways to reduce its flood risk.
- One of the National Flood Insurance Program's primary objectives is to reduce the number of properties subject to repetitive loss. Table 2.12 in Section 2 demonstrates that Wasco County does not have any properties identified as repetitive loss as of January 2024.

Ideas for Implementation:

- Consult with property owners and explore mitigation actions for the interested homeowners with a high risk of flooding.
- Land transfer programs can help facilitate the movement of land ownership from one party within a high flood hazard area to a less hazardous area.
- Identify areas that are high flood hazards, or are completely inundated, and seek to acquire, establish and dedicate areas that are prone to flooding as no-build areas with a focus preserving natural resources and mitigating loss of property and life from flood hazards.
- For locations with a high risk of flooding and significant damages or road closures, determine and implement mitigation measures such as upsizing culverts or storm water drainage ditches
- Evaluate National Flood Insurance Program data every year. Address any repetitive loss with stringent mitigation measures against future issues.

Coordinating Organization:	Planning
Internal Partners:	**External Partners:**
BOC	Cities, DLCD, FEMA, OEM, OECDD

Timeline:

x Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	NHMP Coordinator (2012), Updated by NHMP SC (2017), Updated by NHMP SC (2024)
Action Item Status:	**Institutionalized**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
FH#3 - Removal of Fish Passage Barriers	• *Protection of Life & Property* • *Natural Resource Systems Protection*

Rationale for Proposed Action Item:

- These activities improve fish passage, minimize stream bank and roadbed erosion, facilitate natural sediment and wood movement, and—during flood events—eliminate or reduce excess sediment loading and dynamic changes in stream flow that cause stream bank erosion, undermining of roadbeds, and the washout of culverts.
- Proper road drainage upgrades, culvert replacements, etc., are likely to diminish the potential adverse effects of roads, including turbidity, sedimentation, and channel extension, by allowing the drainage design features to work properly and erosion to be minimized.

Ideas for Implementation:

- Culvert removal, where possible, and natural channel cross section reestablishment.
- Replacement of undersized culverts that present a barrier to fish movement with appropriately-sized culverts, bottomless arches or bridges.
- Replacement of perched culverts to meet the natural bed of the stream.
- Excavation and realignment of misaligned culverts.
- Modification of culverts replacement or lowering is not feasible.
- Redesign of stream crossings determined to be inappropriate for culvert installations to steel/concrete reinforced bridge installations or fords;
- Repair, upgrade or replacement of bridges and culverts, except that bridge replacements will be full-span, i.e., no bents, piers, or other support structures below bank-full elevation.

2018 UPDATE

- Removed three fish passage barriers/culverts from Fifteen Mile between 2012-2018
- Removed three from White River Watershed between 2015-2018

Coordinating Organization:	SWCD
Internal Partners:	**External Partners:**
Planning, Public Works	ODFW, DEQ

Timeline:

☐ Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	Wasco County SWCD (2012), Updated by NHMP SC (2017)
Action Item Status:	**In Progress**

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
FH#4 – Determine financial assets (structures, property value, etc.) at risk of damage or loss from flooding	• *Protection of Life & Property* • *Education & Outreach & Inclusion, Diversity, Equity and Accessibility*

Rationale for Proposed Action Item:

- Understanding assets in the floodplain and tracking increases or decreases gives the County a better understanding of what values are at risk which could lead to more efficient focus for flooding mitigation projects.

Ideas for Implementation:

- Create a "Summary of Impact on Exposed Assets" detailing information regarding # structures, # tax lots, total improved value at risk of flooding. The data should be based on properties within the 100 -year and 500 - year floodplains.
- Update this data every five years, or as necessary
- Ensure property owners are aware of financial risks through education and outreach.

Coordinating Organization:	Planning
Internal Partners:	**External Partners:**
GIS, Assessor	Property Owners, DLCD, FEMA, Insurance companies

Timeline:

☐ Short Term (0-3 years)
x Long Term (3+ years

Form Submitted by:	DLCD (2017), Updated by Planning (2024)
Action Item Status:	**In Progress**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
FH#5 – Update FIRM Maps	• *Protection of Life & Property* • *Education & Outreach & Inclusion, Diversity, Equity and Accessibility* • *Facilitate Partnerships & Coordination* • *Natural Resource Systems Protection*

Rationale for Proposed Action Item:

- FEMA FIRM update in final review, local oridnance and FIRM map adoption estimated to begin in 2026-2027.
- Wasco County 2040 COMPLAN Goal 7 Policy 7.1.1 Mitigate flood hazards through active management of water resources, soil and water conservation techniques, and flood plain identification.
  - Policy 7.1.1.c. The County shall continue to meet the minimum participation requirements for the National Flood Insurance Program (NFIP) in identified flood hazard areas.

Ideas for Implementation:

- Adopt FEMA's floodplain Maps
- Conduct Outreach and seek community involvement

Coordinating Organization:	Planning

Internal Partners:	**External Partners:**
GIS	Property Owners, DLCD, FEMA, Insurance companies

Timeline:

x Short Term (0-3 years)
☐ Long Term (3+ years

Form Submitted by:	Planning (2024)
Action Item Status:	**In Progress**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
FH#6 – Continue to Update County Flood Ordinances as Required	• *Protection of Life & Property* • *Education & Outreach & Inclusion, Diversity, Equity and Accessibility* • *Facilitate Partnerships & Coordination* • *Natural Resource Systems Protection*

Rationale for Proposed Action Item:

- FEMA FIRM update in final review, local oridnance and FIRM map adoption estimated to begin in 2026-2027.
- Wasco County 2040 COMPLAN Goal 7 Policy 7.1.1 Mitigate flood hazards through active management of water resources, soil and water conservation techniques, and flood plain identification.
  - Policy 7.1.1.c. The County shall continue to meet the minimum participation requirements for the National Flood Insurance Program (NFIP) in identified flood hazard areas.

Ideas for Implementation:

- Update Flood Overlay Zone Ordinance as needed
- Conduct Outreach and seek community involvement

Coordinating Organization:	Planning

Internal Partners:	**External Partners:**
GIS, Assessor	Property Owners, DLCD, FEMA, Insurance companies

Timeline:

x Short Term (0-3 years)
☐ Long Term (3+ years

Form Submitted by:	Planning (2024)
Action Item Status:	**In Progress**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
FH#7 – Obtain NFIP Community Rating System/CRS Rating System	• *Facilitate Partnerships & Coordination* • *Natural Resource Systems Protection*

Rationale for Proposed Action Item:

- The National Flood Insurance Program's (NFIP) Community Rating System (CRS) is a voluntary program that incentivizes communities to implement floodplain management strategies that exceed minimum NFIP requirements. By participating in the CRS, communities can earn a lower class rating, which translates to significant discounts on flood insurance premiums for residents and businesses within the community.
- Wasco County 2040 COMPLAN Goal 7 Policy 7.1.1 Mitigate flood hazards through active management of water resources, soil and water conservation techniques, and flood plain identification.
    - Policy 7.1.1.d. The County shall encourage communities within flood hazard areas to develop floodplain management strategies that exceed the minimum NFIP standards with the end goal of enhanced flood control, protection, and standing within the NFIP Community Rating System.

Ideas for Implementation:

- Determine if community is interested in participating
- Conduct Outreach and seek community involvement to promote being accepted into the CRS Rating System

Coordinating Organization:	Planning
Internal Partners:	**External Partners:**
Public Information Officer	Property Owners, DLCD, FEMA, Insurance companies

Timeline:

x Short Term (0-3 years)
☐ Long Term (3+ years

Form Submitted by:	Planning (2024)
Action Item Status:	**In Progress**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
FH#8 – Develop Flood Education & Outreach Programs	• *Facilitate Partnerships & Coordination*

Rationale for Proposed Action Item:

- Developing flood education and outreach programs is crucial because it can help save lives, reduce loss of property from hazards, and improve emergency services.
- Wasco County 2040 COMPLAN Goal 7 Policy 7.1.1 Mitigate flood hazards through active management of water resources, soil and water conservation techniques, and flood plain identification.

Ideas for Implementation:

- Develop outreach plan
- Seek funding for outreach assistance (materials, venue, etc…)
- Work with partners and media to provide education and outreach

Coordinating Organization:	Planning

Internal Partners:	**External Partners:**
Public Information Officer	Property Owners, DLCD, FEMA, Insurance companies

Timeline:

x Short Term (0-3 years)
x Long Term (3+ years

Form Submitted by:	Planning (2024)
Action Item Status:	**In Progress**

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
EH#1 - Rehabilitate Identified Vulnerable Schools, Emergency Facilities, Bridges and Public Buildings/Lifelines; Upgrade Critical Infrastructure and Facilities	• *Protection of Life & Property* • *Emergency Services Enhancement*

Rationale for Proposed Action Item:

- Performing the rehabilitation of vulnerable buildings is one of the final steps that actually reduces the risk (refer to Wasco County Emergency Management for updated list)
- In the event of a local earthquake, or the Cascadia Subduction Zone earthquake, many buildings could be damaged. Protecting structures that will house large populations or play critical roles in disaster response will be vital at that time

Ideas for Implementation:

- Provide scientific basis in effort to obtain local state, federal, and private funding
  Utilize DOGAMI's risk report that identifies buildings in geological hazard areas.
- Encourage schools apply for grants
- Prioritize critical facility/infrastructure (schools, stations, etc) from list developed for Section 2 of the NHMP
  - Identify funding sources for retrofit to reduce risk from earthquake effects
- Determine a new location for County secure servers and backups that removes them from the current location in an unsecure basement
- Post bridge weight limits on all bridges in the County
- Repave Washington Family Ranch airstrip to ensure access to remote population
- NHMP SC shall review critical facilities list every two years to ensure up to date information is collected

Coordinating Organization:	Facility Managers, WC Emergency Management
Internal Partners:	**External Partners:**
Emergency Management, BOC, Planning, GIS, Public Works	DOGAMI, OEM, DLCD, ODOT, Oregon Legislature

Timeline:

☐ Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	DOGAMI (2012), Updated by NHMP SC (2017)
Action Item Status:	**Deferred / Modified**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
EH#2 - Improve Knowledge of Earthquake Sources	• *Emergency Services Enhancement*

Rationale for Proposed Action Item:

- The source and location of an earthquake is a critical component of the expected damage to a particular site

Ideas for Implementation:

- Improve the existing crustal fault database by expanding LIDAR survey coverage and interpreting the results (See MH#11 – Update or Acquire Relevant Hazard Maps). After the potentially active faults are identified, trenching should be conducted to associated data such as recurrence intervals and maximum magnitude.
- Expand the seismic instrument network

Coordinating Organization:	Emergency Management
Internal Partners:	**External Partners:**
GIS, Public Works	DOGAMI, OEM, DLCD

Timeline:

☐ Short Term (0-2 years)
x Long Term (3+ years)

Form Submitted by:	DOGAMI (2012), Updated by NHMP SC (2017)
Action Item Status:	**Deferred / Modified**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
EH#3 - Improve Understanding of Vulnerability and Risk from earthquakes	• *Emergency Services Enhancement* • *Facilitate Partnerships & Coordination* • *Education & Outreach & Inclusion, Diversity, Equity and Accessibility*

Rationale for Proposed Action Item:

- Early Warning Systems: By understanding seismic activity and potential impact zones, early warning systems can be developed to alert populations in advance, allowing for timely evacuations and precautionary measures.
- Building Codes and Standards: Knowledge of seismic activity can inform the development of building codes and standards that ensure structures are designed to withstand earthquakes, minimizing the risk of collapse.
- Infrastructure Resilience: Identifying vulnerable infrastructure, such as bridges, dams, and power plants, allows for targeted mitigation measures to improve their seismic resilience.
- Insurance and Financial Planning: Understanding earthquake risk can guide insurance decisions and financial planning, helping individuals and businesses protect their assets.

Ideas for Implementation:

- Work with federal and state agencies (e.g., DOGAMI) to obtain up-to-date studies/surveys:
  - Seismological Studies: Conduct ongoing research to better understand fault lines, seismic activity, and earthquake patterns.
  - Geophysical Surveys: Utilize advanced techniques to map subsurface geological structures and identify potential seismic hazards.
- Early Warning Systems: Develop and refine early warning systems to provide timely alerts before an earthquake strikes.

Coordinating Organization:	Emergency Management
Internal Partners:	**External Partners:**
GIS, Public Works	DOGAMI, OEM, DLCD

Timeline:

☐ Short Term (0-2 years)
x Long Term (3+ years)

Form Submitted by:	Planning (2024)
Action Item Status:	**Deferred / Modified**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
EH#4 - Educate Those at Risk	• *Emergency Services Enhancement* • *Facilitate Partnerships & Coordination* • *Education & Outreach & Inclusion, Diversity, Equity and Accessibility*

Rationale for Proposed Action Item:

- Educating populations at risk can help mitigate loss of life an property from earthquake hazards.
- Encouraging populations at risk to invest in early warning systems, building standards, and better designed infrastructure can help reduce overall costs of repair and replacing lost structures and ensure emergency services operate at peak efficiency and effectiveness during an emergency.

Ideas for Implementation:

- Work with federal and state agencies (e.g., DOGAMI) to educate populations concerning earthquake risk.
- Develop communication strategy

Coordinating Organization:	Emergency Management, Public Information Officer

Internal Partners:	**External Partners:**
GIS, Public Works	DOGAMI, OEM, DLCD

Timeline:

☐ Short Term (0-2 years)
x Long Term (3+ years)

Form Submitted by:	Planning (2024)
Action Item Status:	**Deferred / Modified**

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
VH#1 - Use the research about plume models and prevailing winds from National Weather Service (NWS) to better determine the County's vulnerability to volcanic ash fallout	• *Protection of Life & Property* • *Natural Resources Systems Protection*

Rationale for Proposed Action Item:

- Wasco County was impacted by ash fall from the 1980 eruption of Mt St. Helens. Two volcanoes, Mt Hood and Mt Adams, are closer than Mt St Helens and all three are considered potentially active. An eruption of any of them with the right winds will deposit ash on Wasco County and could have wide ranging effects.

Ideas for Implementation:

- Create map
- Identify vulnerabilities
- Use product for public education

Coordinating Organization:	Emergency Management
Internal Partners:	**External Partners:**
GIS, Planning	NWS, USGS, DOGAMI

Timeline:

x Short Term (0-3 years)
☐ Long Term (3+ years)

Form Submitted by:	DLCD (2017)
Action Item Status:	**Deferred / Modified**

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
VH#2 - Improve Knowledge Base of Volcanic Risk and Vulnerability	• *Emergency Services Enhancement* • *Education & Outreach & Inclusion, Diversity, Equity and Accessibility*

Rationale for Proposed Action Item:

- Community understanding of volcanic risk and vulnerability is vital to protecting lives and mitigating property damage.
- Understanding risk from volcanic hazards can help drive development away from areas most at risk.
- Helps community land use planning and emergency response

Ideas for Implementation:

- Organize partners and stakeholder groups who have interest and knowledge in the subject
- Develop a communication strategy
- Encourage collaboration between geologists, geophysicists, volcanologists, and social scientists to gain a comprehensive understanding of volcanic processes and societal impacts.

Coordinating Organization:	Emergency Management, Public Information Officer
Internal Partners:	**External Partners:**
GIS, Planning	NWS, USGS, DOGAMI

Timeline:

x Short Term (0-3 years)
☐ Long Term (3+ years)

Form Submitted by:	DLCD (2017)
Action Item Status:	**Deferred / Modified**

DRAFT

Proposed Action Item:	Alignment with Plan Goals:
VH#3 - Evaluate Emergency Response Plan and Identify Areas of Public Notification and Evacuation Routes.	• *Emergency Services Enhancement* • *Education & Outreach & Inclusion, Diversity, Equity and Accessibility*

Rationale for Proposed Action Item:

- Evaluating emergency response plans and identifying public notification and evacuation routes is crucial because it can ensure a swift and coordinated response to emergencies and minimize loss of life.
- Identifying critical areas and evacuation routes helps optimize resource allocation and deployment.
- A clear plan can help prevent panic and confusion, leading to more orderly and efficient evacuations.
- Clear evacuation routes and signage can guide people to safety, reducing the risk of injuries or fatalities.
- Timely evacuations and protective measures can help minimize property damage and economic loss.

Ideas for Implementation:

- Organize partners and stakeholder groups who have interest and knowledge in the subject
- Develop a communication strategy
- Encourage collaboration between geologists, geophysicists, volcanologists, and social scientists to gain a comprehensive understanding of volcanic processes and societal impacts.

Coordinating Organization:	Emergency Management, Public Information Officer

Internal Partners:	External Partners:
GIS, Planning	NWS, USGS, DOGAMI

Timeline:

x Short Term (0-3 years)
☐ Long Term (3+ years)

Form Submitted by:	DLCD (2017)
Action Item Status:	**Deferred / Modified**

DRAFT

Proposed Action Item:	**Alignment with Plan Goals:**
LH#1 - Update County Landslide Ordinance	• *Protection of Life & Property*

Rationale for Proposed Action Item:

- The County currently uses Overlay Zone #2 – Geologic Hazard Overlay Zone – to regulate development in Landslide risk areas. These maps were developed with DEMs and would be more accurate with a more modern technology such as LiDAR.
- Wasco County 2040 COMPLAN Goal 7 Policy 7.1.2 Mitigate geologic hazards through active management of development and landform alterations in identified geologic hazard prone areas.
- Policy 7.1.2.a. All implementing ordinances applicable to the County shall be consistent with the Comprehensive Plan, and the Natural Hazards Mitigation Plan.

Ideas for Implementation:

- Track amount of development in the landslide hazard area.
- Use financial incentive and disincentives to promote development outside of identified risk Areas
- Oregon Technical Resource Guide (2002 document) has many examples of how other communities have drafted these types of ordinances
- In 2021, DOGAMI published NATURAL HAZARD RISK REPORT FOR WASCO COUNTY, OREGON which contained landslide loss data
- In 2023, DOGAMI published LANDSLIDE INVENTORY AND RISK REDUCTION OF THE NORTH AND CENTRAL PORTIONS OF WASCO COUNTY, OREGON, which provided updated maps of landslide hazards in north and central Wasco County
- Wasco County is in the process of updating its landslide hazard ordinance in 2025.

Coordinating Organization:	Planning
Internal Partners:	**External Partners:**
Planning Commission	OPDR, OEM, DOGAMI

Timeline:

x Short Term (0-3 years)
☐ Long Term (3+ years)

Form Submitted by:	NHMP Coordinator (2012), Updated by NHMP SC (2017), Updated by Planning (2024)
Action Item Status:	**Deferred/Modified**

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Proposed Action Item:	Alignment with Plan Goals:
LH#2 - Improve Understanding of Landslide Risk Inside Hazard Areas and Improve Warning Systems	• *Protection of Life & Property* • *Emergency Services Enhancement*

Rationale for Proposed Action Item:

- Better data provide for better decisions to minimize loss. Incorporating indirect economic loss better depicts the cost from natural hazard events.
- In 2002 DOGAMI had identified "further review areas" that the County could overlay with utility system and tax assessor information to identify potential risk. Modern methods involve the use of LiDAR to improve mapping and risk assessment.
- Debris flow landslides are rapidly moving and have caused the loss of life in Oregon. The current debris flow hazard maps are based mostly on computer modeling and could be improved through the incorporation of better topographic survey, geologic field data, and human impact data.
- The coordination of a warning alert to the local level is as important as the alert itself.

Ideas for Implementation:

- Complete inventory of critical facilities including: schools and emergency facilities, vulnerable public and commercial buildings, vulnerable residential buildings, and lifelines (including roads). Evaluate risk to life and property, including indirect economic loss. After the improvement of the hazard layers and the vulnerability inventory, the risk analysis reevaluation will be included in the 2018 DOGAMI Risk Report.
- Incorporation and interpretation of new base geologic maps including the Oregon Geologic Data Compilation. Use new slope maps including LIDAR-derived DEM and improvement through future mapping. Collect data related to human impact. Improve rainfall thresholds.
- Improvements to the instrumentation network (real time rainfall monitoring, active debris flow trip instruments, etc) should be installed and implemented. Follow-through improvements to the warning alert can be done through improvements in the chain of warning system down to the local level.

Coordinating Organization:	GIS
Internal Partners:	**External Partners:**
Planning, Emergency Management	DOGAMI, ODF, DLCD

Timeline:

☐ Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	DOGAMI (2012), Updated by NHMP SC (2017)
Action Item Status:	**Deferred / Modified**

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Proposed Action Item:	**Alignment with Plan Goals:**
LH#3 - Update County Landslide Maps	• *Protection of Life & Property*

Rationale for Proposed Action Item:

- Wasco County 2040 COMPLAN Goal 7 Policy 7.1.2 Mitigate geologic hazards through active management of development and landform alterations in identified geologic hazard prone areas.
- Policy 7.1.2.b.Updated mapping of identified geologic hazard areas based on data from federal, state, or local agencies shall be used to delineate areas within the County that fall within the Environmental Protection District Geologic Hazard Overlay zone (EPD-2)

Ideas for Implementation:

- Adopt updated landslide mapping as provided by DOGAMI's 2023 published LANDSLIDE INVENTORY AND RISK REDUCTION OF THE NORTH AND CENTRAL PORTIONS OF WASCO COUNTY, OREGON, which provided updated maps of landslide hazards in north and central Wasco County.
- Wasco County is in the process of updating its landslide hazard ordinance in 2025.

Coordinating Organization:	Planning

Internal Partners:	**External Partners:**
Planning Commission	OPDR, OEM, DOGAMI

Timeline:

x Short Term (0-3 years)
☐ Long Term (3+ years)

Form Submitted by:	NHMP Coordinator (2012), Updated by NHMP SC (2017), Updated by Planning (2024)
Action Item Status:	**Deferred/Modified**

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Proposed Action Item:	**Alignment with Plan Goals:**
LH#4 - Provide Education/Awareness for Those at Risk of a landslide hazard	• *Education & Outreach & Inclusion, Diversity, Equity and Accessibility*

Rationale for Proposed Action Item:

- Educating community members of landslide hazards can improve knowledge of early warning signs of a landslide, such as unusual noises, cracking sounds, or visible ground movement, can help them evacuate in time.
- Knowing how to react during a landslide, such as seeking higher ground or moving away from slopes, can save lives.
- Understanding landslide risks can lead to taking proactive measures to protect property, such as installing retaining walls, drainage systems, or vegetation.
- Educated individuals can take steps to minimize property damage by securing belongings and preparing for potential evacuation.

Ideas for Implementation:

- Organize partners and stakeholder groups who have interest and knowledge in the subject
- Develop a communication strategy.
- Encourage collaboration between geologists, and social scientists to gain a comprehensive understanding of landslides and societal impacts.

Coordinating Organization:	Emergency Management, Public Information Officer
Internal Partners:	**External Partners:**
Planning	OPDR, OEM, DOGAMI

Timeline:

☐ Short Term (0-3 years)
x Long Term (3+ years)

Form Submitted by:	NHMP Coordinator (2012), Updated by NHMP SC (2017), Updated by Planning (2024)
Action Item Status:	**Deferred/Modified**

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ACRONYMS	
BLM	Bureau of Land Management
BOC	Board of County Commissioners
BPA	Bonneville Power Administration
CERT	Community Emergency Response Team
COOP	Continuity of Operations
CWPP	Community Wildfire Protection Plan
DEM	Digital Elevation Model
DEQ	Department of Environmental Quality
DLCD	Department of Land Conservation and Development
DOGAMI	Oregon Department of Geology and Mineral industries
DSL	Department of State Lands
EDC	Economic Development Committee
EOC	Emergency Operations Center
FEMA	Federal Emergency Management Agency
GIS	Geographic Information Systems
HMGP	Hazard Mitigation Grant Program
HPP6	Hospital Preparedness Program Region 6
LiDAR	Light Detection and Ranging
MCCED	Mid-Columbia Council of Economic Development
NCPHD	North Central Public Health Department
NFIP	National Flood Insurance Program
NHMP SC	Natural Hazard Mitigation Plan Steering Committee
NRCS	National Resource Conservation Service
NWCPUD	North Wasco County People's Utility District
ODF	Oregon Department of Forestry
ODFW	Oregon Department of Fish and Wildlife
ODOE	Oregon Department of Energy
ODOT	Oregon Department of Transportation
OECDD	Oregon Economic and Community Development Department
OEM	Oregon Military Department, Office of Emergency Management
OHA	Oregon Health Authority
OPDR	Oregon Partnership for Disaster Resilience
ORWD	Oregon Water Department
OSU	Oregon State University
PIO	Public Information Officer
RC&D	Resource Conservation and Development
RST	Regional Solutions Team
SBA	Small Business Association
SWCD	Soil and Water Conservation District
USFS	United States Forest Service

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USGS	United States Geological Survey
WCSO	Wasco County Sheriff's Office
WRD	Water Replenishment District

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Appendix B: Planning and Public Process

Table of Contents

Public Outreach Strategy B-2

Steering Committee & Subcommittee Agenda, Minutes, and Slides

November 14, 2023, Plan Maintenance & 2024 Agenda and Roster B-12
December 12, 2023, Outreach Subcommittee Meeting Agenda and Roster B-17
December 19, 2023, Incorporated Communities Agenda and Roster B-21
December 20, 2023, Data Gathering Agenda and Roster B-24
January 23, 2024, Outreach Subcommittee Agenda and Roster B-26
January 24, 2024, Incorporated Communities Meeting Agenda and Roster B-29
February 06, 2024, Steering Committee Meeting Agenda and Roster B-32
February 21, 2024, Outreach Subcommittee Agenda and Roster B-37
March 06, 2024, Incorporated Communities Meeting Agenda and Roster B-40
April 15, 2024, Steering Committee Meeting Agenda, Roster and Slides B-43
April 23, 2024, Incorporated Communities Mosier Agenda and Slides B-97
List of additional meetings with Mosier B-114
April 25, 2024, Incorporated Communities Dufur Agenda and Slides B-115
List of additional meetings with Dufur B-131
April 30, 2024, Incorporated Communities Maupin Agenda and Slides B-132
List of additional meetings with Maupin B-154
May 29, 2024, Steering Committee Meeting Agenda and Roster B-155

Outreach Strategy, Website, and Media

NHMP Outreach Plan Strategy (Finalized February 2024) B-158
Wasco County NHMP Website (January, 2023 – November, 2024) B-164

DRAFT

Public Outreach Strategy

The Natural Hazards Mitigation Plan (NHMP) update process involved a wide variety of public outreach to ensure all agencies, citizens, and stakeholders had a chance to participate. The Wasco County NHMP Steering Committee held one Plan Maintenance meeting and four NHMP Update meetings in 2023-2024 (see list of meetings and related information below). The Steering Committee included three Wasco County leads, Daniel Dougherty, Planning Director, Sean Bailey, Senior Planner, and Stephanie Krell, Public Information Officer. , The Steering Committee determined that three subcommittees should be formed for the plan update, which included: (1) a Data Gathering and Research team; (2) an Outreach and Public Participation team; and (3) an Incorporated Communities team. The subcommittees conducted 10 meetings in 2023-2024. After each meeting, the agenda and minutes were posted to the NHMP website, which is housed on the Natural Hazard Mitigation Planning webpage at: (https://www.co.wasco.or.us/departments/planning/long_range/natural_hazards_mitigation_plan.phpphp). This webpage also provides information about the plan itself, status updates on the process, a link to the survey, points of contact, and relevant additional resources.

Public Outreach & Participation Efforts

The Outreach and Public Participation subcommittee (hereinafter "Committee") convened three meetings to plan, develop, and execute a comprehensive outreach and public participation strategy. The outreach strategy involved a variety of methods to accomplish the group's primary goal of increasing public involvement in the 2024 NHMP update. The Committee's members represent Wasco County and the cities of The Dalles, Maupin, Mosier, and Dufur.

A wide array of advertising channels and marketing mediums were utilized to inform and promote public participation in the NHMP update. However, the primary medium used to obtain public feedback was a survey. Lessons learned from the 2018 NHMP update and new technology drove the development of an online 13-question survey (seven hazard focused questions and six demographic focused questions). To increase participation, incentives added that included a $10.00 gift card for the first 75-respondants and a raffle for two wireless speaker systems. Additionally, to garner public participation, the Committee chose to host a movie marathon event (see description in next paragraph). The survey was active from February 8, to August 12, 2024, and obtained 639 respondents. This was markedly higher than the 2018 survey, which obtained only eight respondents. The survey results have been used to advise the Steering Committee, particularly for the risk assessment portion of the update and with the development of action items.

The Committee elected to host one large community event during the 2024 update. The event was an all-day movie marathon held at the Columbia Cinema in The Dalles. Wasco County Planning secured a private all-day event that was free to public, and on March 13, 2024, the "Disaster Movie Marathon" began at 11:00 a.m. and ran until the last movie ended at approximately 8:30 p.m.:

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AIRPLANE! | 1:55 & 4:00
APOLLO 13 | 11:00
ARMAGEDDON | 11:00 & 5:00
DANTE'S PEAK | 11:00 & 6:00
DEEP WATER HORIZION | 11:00 & 6:05
ONLY THE BRAVE | 1:15
THE BIRDS | 3:45
THE PERFECT STORM | 3:30
THE TOWERING INFERNO | 1:45
TWISTER | 1:15 & 6:00

The Wasco County Public Information Officer made available advertising for the survey and event at least a month in advance to the following news outlets:

- Bicoastal Media
- Columbia Community Connection News
- Gorge News
- Radio Tierra – KZAS
- Gorge Country Y102
- KODL Radio The Dalles
- Shaniko Recorder
- South Wasco Times
- Facebook and other applicable social media platforms

Committee members also made available advertising for the survey and marathon event to public offices, and when given permission, private buildings and businesses. The event brought in over 100 citizens from all over Wasco County. Free candy, hats, key-chain flashlights, and glow sticks were available and Columbia Cinema offered discounted refreshments. Steering Committee members were also on-site throughout the day to provide information and assist citizens in filling out the mitigation survey that was available on four touchscreen tablets (See below photographs).

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Figure 1: "Disaster Movie Marathon" Columbia Cinema

Source: Photo Credit: Natural Hazard Mitigation Plan Steering Committee.

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Figure 2: "Disaster Movie Marathon" Steering Committee Members and the Public

Source: Photo Credit: Natural Hazard Mitigation Plan Steering Committee.

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Figure 3: "Disaster Movie Marathon" Steering Committee Members and the Public

Source: Photo Credit: Natural Hazard Mitigation Plan Steering Committee.

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Figure 4: "Disaster Movie Marathon" Movies All Day

Source: Photo Credit: Natural Hazard Mitigation Plan Steering Committee.

Numerous public events were attended by Steering Committee members throughout 2024, where natural hazard mitigation was a topic of discussion:

- Bakeoven/Shaniko Rural Fire Protection District (RFPD) Annual Meeting on January 9, 2024
- Petersburg RFPD Annual Meeting on March 14, 2024
- Spring Wildfire Town Hall, at Mosier Grange on March 30, 2024
- Wasco County Fire Defense Board Management and Vendor Show, Juniper Flats Rural Fire Protection District Building on April 24, 2024
- Maupin Daze, City of Maupin on May 18, 2024
- Wasco County Fair, at Wasco County Fairgrounds on August 16, 2024
- Wasco County South County Preparedness at Wasco County Fairgrounds Event on October 19, 2024

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Incorporated Community Efforts for New Members

The Incorporated Communities subcommittee (hereinafter "Incorporated Committee") was created to encourage participation and help guide plan development for incorporated communities that joined the 2024 hazard mitigation effort. In late 2023, the City of Mosier decided to join Wasco County's hazard mitigation effort, and the cities of Maupin and Dufur joined the update soon after. All three cities lack a natural hazard mitigation plan as well as resources to develop one. It was apparent that a decisive element for success was to ensure participation and reinforce team effort towards the hazard mitigation plan process. The Incorporated Committee was formed to assist and guide the cities with their individual hazard addendum development. However, the most vital goal of the Incorporated Committee was to ensure participation and increase understanding of how their individual jurisdictions are directly linked with the County in improving hazard mitigation efforts in order to reduce loss of life and property by minimizing the impact of disasters.

Several Incorporated Committee meetings were convened throughout the plan's development. City workgroups were formed by volunteers who drove each jurisdiction's planning efforts. County staff, including Daniel Dougherty, Planning Director and Sean Bailey, Senior Planner worked closely with city workgroups with risk assessment, action item development, and city addendum development. Meeting minutes and slides are provided for reference.

The following agencies were part of the NHMP Partner Agency list.

Full NHMP Partner Agency List

Antelope (City of)	North Central Public Health District
4-H Extension Service District	North Wasco County Parks and Rec
Army Corps of Engineers	North Wasco County School District
BLM Prineville District	Northern Wasco County PUD
Blue Zones	NW Natural
BPA (Bonneville Power Admin)	Oregon Employment Department
Cattlemen's Association	Oregon Department of Fish and Wildlife
Chenowith People's Utilty District	Oregon Department of Forestry
Cherry Growers Association	Oregon Department of Transportation
The Dalles (City of)	Oregon Office of Emergency Management
Columbia Cascade Housing Corporation	Oregon State University
Columbia Gorge 4H	Orgon Department of Forestry
Columbia Gorge Community College	Pine Grove Water District
Columbia Gorge Real Estate	Port of The Dalles
Columbia Rural Fire Protection District	American Red Cross
Columbia Gorge Community College	School District 1
Confed. Tribes of Warm Springs	Shaniko (City of)
Confeder. Tribes of Umatilla	Soil and Water Conservation District

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Deparment of Geology and Mineral Industries	South Wasco Alliance
Department of Environmental Quality	South Wasco County School District #1
Department of Land Conservation and Development	South Wasco Park and Recreation District
Department of State Lands	The Dalles (City of)
Dufur (City of)	The Dalles Chamber of Commerce
Dufur Ambulance	The Dalles Public Works
Dufur Fire	Tooley Water District
Dufur Recreation District	Tygh Valley
Dufur School District #29	Tygh Valley Fire District
Fair Housing Council of Oregon	Tygh Valley Water District
Gorge Commission	US Forest Service - Columbia River Gorge National Scenic Area
Habitat for Humanity	US Forest Service - Mt Hood National Forest, Barlow Ranger District
Juniper Flat Fire District	Wamic (unincorporated community)
Maupin (City of)	Wamic Rural Fire Protection District
Maupin Ambulance	Wamic Water and Sanitary Authority
Maupin Public Works	Wasco County
MCCOG Area Agency on Aging	Wasco County Emergency Management
MCMC Health Foundation	Wasco County GIS
Mid Columbia Medical Center	Wasco County Planning
Mid Columbia Senior Center	Wasco County Public Works
Mid-Columbia Center for Living	Wasco County Soil & Water Conservation District
Mid-Columbia Council of Governments	Wasco Electric
Mid-Columbia Economic Development District	Washington Department of Transportation
Mid-Columbia Fire and Rescue	Washington Family Ranch
Mosier (City of)	WC Soil and Water Conservation District
Mosier Community School	White River Health District
Mosier Fire District	WRD (Water Resources Department)
National Guard (Salem)	Yakama Indian Nation
National Guard (The Dalles)	
Natural Resources Conservation Service	
Next Door	
Nez Perce Tribe	

Including broad local government participation in the NHMP update ensures a wide array of concerns and comments are captured to adequately mitigate the risk associated with natural hazards. Special Districts are part of the definition of local government in 44 CFR 201.2. A local government is any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments (regardless of whether the council of government is incorporated as a

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nonprofit under State law), regional or interstate government entity, or agency or instrumentality of a local government; any Indian tribe or authorized tribal organizations, or Alaska Native village or organization; and any rural community, unincorporated town or village, or other public entity. Oregon Revised Statute (ORS) Chapter 198, Special Districts Generally, defines *district* and identifies 27 specific types. Special Districts were included in the Wasco County NHMP update process; two were on the Steering Committee and were active participants.

Of those listed in the Full Partner Agency List, the following are Special Districts:

Chenowith PUD
Columbia Rural Fire Protection District
Dufur Fire
Dufur Recreation District
Juniper Flat Fire District
Maupin Ambulance
Mid-Columbia Council of Governments
Mid-Columbia Fire and Rescue
Mosier Fire District
North Central Public Health District
North Wasco County Parks and Rec
Northern Wasco County PUD
Pine Grove Water District
Port of The Dalles
Soil and Water Conservation District
South Wasco Park and Recreation District
Tooley Water District
Tygh Valley Fire District
Tygh Valley Water District
Wamic Rural Fire Protection District
Wamic Water and Sanitary Authority
Wasco County Soil & Water Conservation District
Wasco Electric
White River Health District

Of those listed in the Special Districts table above, the following were represented on the NHMP Steering Committee:

Mid-Columbia Fire and Rescue
Wasco County Soil & Water Conservation District

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Wasco County is home to the Confederated Tribes of the Warm Springs Reservation. They are a nation and have their own governing body as well as their own NHMP; they are not included in the County's update. The County is also home to Celilo Village, which sits on the Columbia River in the northeast corner of the County. This is a separate entity from the County on land held by the Bureau of Indian Affairs and originally established by the US Army Corps of Engineers to replace a village that was inundated by the creation of The Dalles Dam. This land is exempt from the County, as well as National Scenic Area jurisdiction and is not included in our NHMP. Celilo Village is not associated with any nearby reservations such as the Warm Springs or Yakama Reservations as it is not a specific tribe, but is composed of people from many tribes loosely part of a larger confederation known as the "Columbia River Tribe". Despite not being officially included in the NHMP, the input of tribal members was sought to assess any potential concerns they might have.

Below, see the list of NHMP plan maintenance and Steering Committee meetings, meeting agendas, sign-in sheets, flyers, screen shots, slide-decks, and other items from the Wasco County NHMP update process.

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November 14, 2023, NHMP Steering Committee Meeting

Wasco County Multi-Jurisdictional Natural Hazard Mitigation Plan Steering Committee Plan Meeting 2024 Update & Maintenance Minutes	14 November 2024, 10:00 AM – 12:00 PM Emergency Management Conference Room 425 East 7th Street, Annex C The Dalles, OR 97058
Type of Meeting: Steering Committee Meeting for NHMP Maintenance & 2024 Update	

Steering Committee Member Roll Call

In Person: Daniel Dougherty, Stephanie Krell, Kylee Ruby, Ryan Bessette, Simone Cordery-Cotter, Arthur Smith

Virtual: Alice Cannon, Eric Hansen, Janine Mayer, Kirk Fatland, Melissa Lee, Tycho Granville, Robert Palmer, Sean Bailey, Jayme Bennett, and Andrea Klaas

Absent: Sheridan McClellan, Jay Wood, Kristen Dodd, Steve Kramer, Dave Anderson, Kelly Howsley-Glover, Merle Keys, Kristin Dodd, Tyler Stone, Cindy Miller, and Carrie Pipinich

ITEMS

1. **Introductions**
   Daniel Dougherty (DD) led introductions around the room.

2. **(Maintenance) News & Action Item Updates**
   DD led a NHMP Steering Committee Toolkit Update/Rundown.
   a. Simone Cordery-Cotter (SCC) – Gave brief update on the Community Wildfire Defense Project.
   b. DD – Provided Wasco County Access Road Project Update, Landslide Hazards Update, and FEMA FIRM Update
   c. Bob Palmer (BP) – Discussed Fire Prevention Updates
   d. SCC – discussed community Fire Safe requirements
      i. Led to local road association possibilities conversation Arthur Smith (AS) with questions
   e. DD – Addressed signage for fire purposes and explained conditions of approval requiring addressing signs
      i. BP – Discussed concerns about private bridge weight rating signage
      ii. AS mentioned that bridge inspections are expensive, and that there are not many qualified inspectors in state.
      iii. AS – County Bridges are tested ($7,500 per bridge testing). Large constraint for private landowners to test private bridges.
      iv. Discussed possible grants for landowners.
      v. AS & SCC discussed the White River Crossing upgrade issues and hurdles.
   f. Tycho Granville (TG) – All GIS projects complete and need to be deleted.
   g. DD – went through more planning topics that are ongoing with no updates:

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i. Water Resources.
ii. Encouraging underground utilities
- Discussed that newly developed properties construct underground utilities.

h. Alice Cannon (AC) – discussed County updating community Wildfire Map in CWPP.
i. DD asked all agencies to updated their sections on the Spreadsheet to current

3. (NHMP Update Kick-off) Background

DD - NHMP Update Kick-Off quick background.

a. Asked who was a member of the 2019 NHMP update.
b. Discussed new people to committee and importance of public participation and following the public process for plan approval.

4. Objectives

DD – 2024 proposed Agenda (fluid agenda)

a. Discussed the Tasks necessary to achieve the plan update:
   Task 1: Determine the Planning Area & Resources
   Task 2: Build the Planning Team
   Task 3: Create an Outreach Strategy
   Task 4: Review Community Capabilities
   Task 5: Conduct Risk Assessment
   Task 6: Develop a Mitigation Strategy
   Task 7: Keep the Plan Current (E.g., Maintenance Meetings)
   Task 8: Review and Adopt the Plan
   Task 9: Create a Safe and Resilient Community
b. Discussed how the next four months will be concentrating on Tasks 1-4, and will be about gathering data (e.g., demographics and updated hazard data)
c. Discussed Update Requirements: Review Risk Assessment; Review Mitigation strategies; Review Plan Maintenance Process; Final Plan Preparation; Plan Implementation
d. Attack plan for update, possible Public Outreach and Urban Areas subcommittees
e. Stephanie Krell (SK) – mentioned she could lead Public Outreach
f. Kirk Fatland (KF) & Jayme Bennett (JB) can help with Mosier/Urban (plus the City of Mosier's potential new hirer), Melissa Lee (ML) volunteered for Maupin/Urban, and Eric Hansen for The Dalles
g. AS – asked about Dufur's cooperation and joining, and offered to help reach out to City of Dufur
h. DD – mentioned possible non-incorporated places subcommittee
i. AS – asked about The Dalles, SK will reach out to Amy El with City of The Dalles, & Eric Hansen (EH) will join for The Dalles/Urban
j. SCC will also assist as a liaison with the community and other agencies
k. Kylee Ruby (KR) was not sure, how building codes fully applies yet, but would be willing to assist in any way possible.

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l. DD – proposed a data gathering subcommittee, AC and TG can assist with Data gathering
m. SCC Response and Recovery subcommittee
    i. Not necessarily directly covered in NHMP, but should be included as it ultimately will be relevant in case of a major natural disaster.
    ii. Janine Mayer (JM) mentioned that this would not be required by FEMA, but a good idea
    iii. AS mentioned what is the scope of the overall questions, since recovery is a broad topic.
    iv. JM long term recovery for the displaced after a major disaster.
    v. Cleanup, DEQ, Insurance, process can be slow.
    vi. Sean Bailey (SB) mentioned of Planning Department requirements through state law that requires an application to be received within 365 days of the fire.
    vii. KR mentioned that things are being done at the state level to help stream line the building permit side along with planning, but locally adjustments to the ordinance would need to be adopted.
n. DD gave a rundown of the 2024 rough schedule and outline.
o. DD will be setting up the next meeting times, though switching to monthly meetings for those that can attend would be beneficial.
p. SK confirmed that the subcommittees would be meeting separately also.

Meeting was roughly 1 hour and 40 minutes long.

ACTION ITEMS (TO COMPLETE BEFORE THE NEXT MEETING)

Task #1 Organize and Facilitate December Subcommittee Meetings/Updates

- Incorporated Community Subcommittee (The Dalles, Maupin, and Mosier…potentially Dufur)
    - Volunteer Committee Members: Daniel Dougherty (Wasco County/Lead), Eric Hanson (The Dalles), Kirk Fatland & Jayme Bennett (Mosier), & Melissa Lee (Maupin)
        - Additional volunteers are welcome!
        - Subcommittee to ensure coordination, sharing of ideas & resources, & planning work. Will also coordinate with Data Gathering Subcommittee for updated data.

- Outreach Subcommittee
    - Volunteer Committee Members: Stephanie Krell (Wasco County/Lead), Daniel Dougherty, Sean Bailey, Simone Cordery-Cotter, and Kylee Ruby
        - Additional volunteers are welcome!
        - Subcommittee to coordinate public outreach programs & events for plan update

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- Data Gathering Subcommittee
  - Volunteer Committee Members: Alice Cannon (Wasco County/Lead), Tycho Granville, & Daniel Dougherty
  - Subcommittee to gather updated demographic and hazard data.

- Response and Recovery Subcommittee
  - Simone Cordery-Cotter (Office of State Fire Marshal/Lead), Daniel Dougherty, Sean Bailey, & Kylee Ruby
    - Subcommittee to look into how mitigation efforts can work to streamline recovery efforts. Not required in NHMP, but an addendum within the plan may help produce future policy/law that might streamline response, but especially recovery efforts.

Task #2 Coordinate January Steering Committee Meeting/Updates

Task #3 Open Planning File for the NHMP Update

Task #4 Share 2024 NHMP Agenda with Subcommittee

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Natural Hazard Mitigation Plan 2024 Update and November Maintenance Meeting
Steering Committee
2024 NHMP Update Meeting #1 – November 14, 2023

Attendance List

	NAME	ORGANIZATION	TITLE	EMAIL
1.	Stephanie Krell	Wasco Co	PIO	stephanie@co.wasco.or.us
2.	Kylee V. Ruby	Wasco. Co	Deputy B.O.	kyleer@co.wasco.or.us
3.	Ryan Bessette	Wasco Co. SWCD	Tech/Planner	ryan.bessette@or.nacdnet.net
4.	Simone Cordery-Cotter	OR State Fire Marshal	Wildfire Risk Reduction Specialist	simone.cordery-cotter@oofm.oregon.gov
5.	Arthur Smith	Wasco Co. PW	Director	arthurs@co.wasco.or.us
6.				
7.				
8.				
9.				
10				
11.				
12.				
13.				

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December 12, 2023, NHMP Outreach Subcommittee Meeting

Wasco County Multi-Jurisdictional Natural Hazard Mitigation Plan Outreach Subcommittee Meeting 2024 Update Minutes	12 December 2024, 1:00 PM – 2:00 PM Public Works Conference Room 2705 East 2nd Street The Dalles, OR 97058
Type of Meeting: Subcommittee Meeting for 2024 NHMP Update	

Subcommittee Members: Daniel Dougherty, Sean Bailey, Stephanie Krell, Kirk Fatland, Melissa Napoli, Simone Cordery-Cotter, Kylee Ruby, Eric Hanson

Subcommittee Member Roll Call

In Person: Daniel Dougherty

Virtual: Kirk Fatland, Melissa Napoli, Simone Cordery-Cotter

Absent: Eric Hanson

ITEMS

1. **Introductions**

   Started at 1pm

   Daniel Dougherty (DD), Sean Bailey (SB), Stephanie Krell (SK), Kylee Ruby (KR), Kirk Fatland (KF) with City Mosier, Melissa Lee (ML) with City of Maupin, Simone Cordery-Cotter (SC) Fire Marshall, introduced themselves for the record.

2. **Outreach planning strategies & time-lines**

   - DD gave a brief overview of outreach done in 2019 for previous update, no strategy written down.
   - SK asked about process, DD discussed tracking outreach is important, and one thing done for the 2019 Update, "Disaster and Donuts" event, and a public survey.
   - SK recommended renting the Drive-inn at Sunshine Mills
   - SK – Print and Social Media outreach locally, and what publications we could use, and new platform to help with survey.
   - ML asked if the events would be Wasco County events or Maupin or Mosier evens separately.
   - Red Band Pow Wow
   - SC the discovery center is good for hosting events that we could team up with.
   - ML asked about cutoff date for events and survey information gathering ect…May by the latest
   - Is grant funding available to host events, give incentives? DD to check

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3. **Key stakeholders/local organizations**

- SC mentioned the Next Door, SWCD
- ML mentioned South Wasco Alliance
- Chamber of Commerce
- Gorge Tourism Alliance
- Schools
- Library

4. **Wasco County and City events in 2024**

- Local events were discussed, Cherry Festival for The Dalles in April, Maupin Days in May. Disaster in Doughnuts in February.
- KF asked what the primary goal of the events were, DD answered primarily the surveys and getting feedback from the public while also informing them, but we are also required by law.
- Different locations for the Disaster and Doughnuts event Sunshine Mill for Drive-in, or the movie theatre for multiple movies in one night.

5. **Marketing mediums and frequency**

- ML mentioned Utility bills in Maupin for mailing opportunity
- SK Rural Life Mag
- Simone mentioned get our flyers or uniform mailer information made so we can hand out materials for events.

6. **Next steps**
   a. Next Subcommittee meetings?
   b. Other
      i. Grants
      ii. Contacts
      iii. Tasks

Additional Suggestions?
KF mentioned that he will be leaving his position and would no longer be involved with NHMP for Mosier moving forward.
Meeting concluded at 1:45pm

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ACTION ITEMS (TO COMPLETE BEFORE AND DURING THE NEXT MEETING)

- DRAFT OUTREACH STRATEGY
- FINALIZE OUTREACH STRATEGY
  - OUTREACH TIME-LINE
  - SURVEY QUESTIONS (REDUCE FROM 47 QUESTIONS)
  - OUTREACH MATERIALS & "SWAG"
  - ENSURE STAKEHOLDER GROUPS ARE UPDATED

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Natural Hazard Mitigation Plan 2024 Update
Outreach Subcommittee
Meeting #1 – December 12, 2023

Attendance List

NAME	ORGANIZATION	TITLE	CONTACT INFO
1. Daniel Doherty	Wasco Co. Planning	Senior Planner	541-506-2568
2. Stephanie Krai	Wasco Co.	PIO	541-993 8173
3. Sean Bailey	Wasco C.	Associate Planner	541-506-2544
4. Kylee V. Ruby	Wasco Co. BCS	Deputy Bldg Official	541-506 2050
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December 19, 2023, NHMP Incorporated Communities Subcommittee Meeting

Wasco County Multi-Jurisdictional Natural Hazard Mitigation Plan Incorporated Community Subcommittee Meeting 2024 Update Minutes	19 December 2024, 10:00 AM – 11:30 PM Public Works Conference Room 2705 East 2nd Street The Dalles, OR 97058
Type of Meeting: Subcommittee Meeting for 2024 NHMP Update	

Subcommittee Members: Daniel Dougherty, Eric Hanson, Jayme Bennett, Kirk Fatland, Melissa Napoli, Sean Bailey (Merle Keys as invitee)

Subcommittee Member Roll Call

In Person: Daniel Dougherty (DD)

Virtual: Melissa Napoli (MN), Sean Bailey (SB)

Absent: Eric Hanson, Jayme Bennett, Kirk Fatland

ITEMS

1. Introductions

- DD opened up introductions.

2. Incorporated Work Groups for Urban Jurisdictions & the Public Process. (Who's on board in your jurisdictions)
   - DD gave a brief overview of point of subcommittee and goal. Help Maupin, Mosier, and possibly Dufur join the County NHMP, using The Dalles as the current example.
   - MN provided that the following people are on the Maupin NHMP Workgroup:
     - MN (Community Liaison)
     - Nick Smith (Interim City Manager)
     - Gary Burnett (Public Works)
     - Tom Troutman (Maupin Fire Chief)

3. (Sharing Templates) Using The City of The Dalles' Addendum to the Wasco County NHMP as a template to write your own addendums.

4. Briefly discuss your Community Profile (Resources to find the following data):
   a. Geography and Climate;
   b. Population and Demographics;
   c. Employment and Economics;
   d. Housing; Land and Development;
   e. Transportation and Commuting Patterns;
   f. Critical Facilities and Infrastructure; and
   g. Historic and Cultural Resources.

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- DD explained what important information should you begin gathering, and the mportance of tracking how you gather that data.
- DD showed the existing The Dalles Addendum (2019), and walked through the table of contents. Then continued to run through the addendum, giving a rough overview of each section, and where applicable information can be found (2020 census data).
- DD mentioned that Alice Cannon, Wasco County Long Range Planner can help guide with data gathering.
- DD it is important to tie your action items to your goals and natural disasters. Toughest part is generally finding time to develop the plan, staying on task, and keeping your team focused.

5. Next steps
   a. Next Subcommittee meetings?

- Next Incorporated Community Subcommittee Meeting is scheduled for January 17, 2024.

ACTION ITEMS (TO COMPLETE BEFORE THE NEXT MEETING)

- **Help guide jurisdictions who missed the first meeting**
- **Ask the City of The Dalles for any pointers regarding writing city addendum**
- **Share Data Links & Citations for Community Profile & Hazard Annexes.**
- **Get a general update of progress made or planned work.**

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Natural Hazard Mitigation Plan 2024 Update
Incorporated Community Subcommittee
Meeting #1 – December 19, 2023

Attendance List

	NAME	ORGANIZATION	TITLE
1.	Daniel Dougherty	Wasco Co.	Service PLANNER
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December 20, 2023, NHMP Data Gathering Subcommittee Meeting

Wasco County Multi-Jurisdictional Natural Hazard Mitigation Plan Data Gathering Subcommittee Meeting 2024 Update Minutes	20 December 2024, 11:00 AM – 12:00 PM Virtual Only 2705 East 2nd Street The Dalles, OR 97058
Type of Meeting: Subcommittee Meeting for 2024 NHMP Update	

Subcommittee Members: Daniel Dougherty, Alice Cannon, Tycho Granville, Sean Bailey

Subcommittee Member Roll Call

In Person: N/A

Virtual: Daniel Dougherty (DD), Alice Cannon (AC), Tycho Granville (TG), Sean Bailey (SB)

Absent: N/A

ITEMS

1. Introductions

   - DD opened up introductions.
   - DD mentioned the previous survey was 47 questions which is too many, AC asked if there was funds for incentives to survey takers. DD explained he would look into it.

2. Community Profile
   - Check & update data links (illustrations, maps, citations). DD asked if AC would need any assistance in building the community profiles. AC said she could use feedback as questions come up since there is a lot of updated data with the recent census.
   - Is the data old/still relevant? DD mentioned some studies are from the 1990s, some possible older.
   - DD asked what the methodology was for using the data available. DD mentioned that previously they had someone at DLCD that was able to vet the information and give feedback.
   - DD said he provided links for census data locations.
     - Current demographic data is here: https://www.pdx.edu/population-research/population-forecasts, also (https://www.census.gov/) See also (https://www.cghealthycommunity.org). Also, https://data.census.gov/.
   - AC mentioned she thinks she should be fine at gathering and locating initial data, but may reach out for some assistance at future meetings.
   - DD stated we will have less direct assistance than 2019 update, as they had a grant at the time.

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- DD asked TG to primarily double check current info and links to verify they are current and correct, as there most likely is not too many changes.

3. Hazard Annexes
   - DD stated to TG that DD will take care of writing the annexes.
   - DD asked TG to primarily double check current info and links to verify they are current and correct, as there most likely is not too many changes.

4. Next steps

- DD stated that future meetings will primarily be check ins to get updates, and see if anyone needs assistance gathering any data.
- DD let AC know that primarily updating the Tables and information within the profiles, but DD and SB can handle most of the writing if that helps.
- DD mentioned he is unsure of how much assistance the newly added incorporated communities will need.

- Next Incorporated Community Subcommittee Meeting is tentatively scheduled for January 23, 2024.

ACTION ITEMS (TO COMPLETE BEFORE THE NEXT MEETING)

- **Continue gathering demographic data and updating**
- **Continue gathering hazard annex data (hazards since 2018)**
- **DD & SB begin updating 2024 NHMP template (data that can be updated without steering committee input).**

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January 23, 2024, NHMP Outreach Subcommittee Meeting

Wasco County Multi-Jurisdictional Natural Hazard Mitigation Plan Outreach Subcommittee Meeting 2024 Update Minutes	23 January 2024, 1:00 PM – 2:00 PM Public Works Conference Room 2705 East 2nd Street The Dalles, OR 97058
Type of Meeting: Subcommittee Meeting for 2024 NHMP Update	

Subcommittee Members: Daniel Dougherty, Sean Bailey, Stephanie Krell, Dan Meader, Melissa Napoli, Simone Cordery-Cotter, Kylee Ruby, Eric Hanson (Invited guests Kathy Bostick and Merle Keys)

Subcommittee Member Roll Call

In Person: Daniel Dougherty, Stephanie Krell

Virtual: Sean Bailey, Melissa Napoli, Eric Hansen, and Jayme Bennett

Absent: Simone Cordery-Cotter (SCC,sent notes)

ITEMS

1. **Introductions**

   Started at 1pm

   Daniel Dougherty (DD), Sean Bailey (SB), Stephanie Krell (SK), Jayme Bennett (JB) with City Mosier, Melissa Lee (ML) with City of Maupin, Eric Hansen (EH) with City of The Dalles, introduced themselves for the record.

2. **Survey Question**

   - DD – asked if everyone had an opportunity to review the previous survey and if there were thoughts. Too many Questions was the unanimous response. DD mentioned that SCC sent notes regarding old questions. SCC notes provided ideas that would place most demographic questions at the bottom of survey. The group agreed that the survey should contain location and hazard related questions at the front end and demographic questions at the tail end.
   - SK – noted the new survey firm Zen City and the assistance they will be providing, and gave an overview of the initial draft of the survey. The firm helps filter output non-relevant data. DD – mentioned that Alice Cannon with Wasco County had helped with a survey recently in the area that had over 800 responses.
   - ML asked if recovery will be part of the plan, and if so, should we ask what type of home do people live in, stick built, manufactured, RV, tent…Some might not be recognized as a home. DD – mentioned that mitigation is primary, but that response and recovery will be inherently ied in to questions.
   - SK – Wants to make the survey map interactive, users can drop pin of their location within the county.

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- SK – Then ran through possible survey questions and interactive ranking of disaster types for people.
- DD – We should have questions possibly asking what are citizens main concerns during an emergency? Travel, access to fuel, food, electricity, communications, medical facilities..
- DD – looks like the survey will be 15-18 questions. The group agreed with the number of questions.

3. **SWAG & Main Event (Disaster Movie Marathon) & Additional Meeting Spaces/Events**
   - SK – will be reaching out to the Movie Theatre (Columbia Cinema) for hosting of the Disaster Movie Marathon.
   - DD – The Planning Dept. has approximately $1,500.00 for "SWAG" and $1500.00 for a meeting/event room.
   - The idea of $10.00 Gift Cards was offered up and group agreed. Half of $1,500 could be for gift cards (75 gift cards).
   - SCC – can provide approx.. 150 Hats.
   - DD – asked if the events would be Wasco County events or Maupin or Mosier events separately.
     - Red Band Pow Wow
     - SK – The discovery center is good for hosting events that we could team up with.
   - EH – asked about cutoff date for events and survey information gathering ect…May by the latest
   - MN – Is grant funding available to host events, give incentives? DD to check

3. **Next steps**
   a. Next Subcommittee meeting: February 21, 2023 at 1:15-2:15pm.
   b. Finalize Survey Questions NLT February 7, 2023
   c. Finalize Disaster Movie Marathon Date & Movie Selection
      i. Finalize advertising for survey (private and public partners)
      ii. Update the Wasco County Website to reflect current NHMP update status & survey link)
   d. Finalize SWAG baskets available for survey participants

Meeting concluded at 1:55pm

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Natural Hazard Mitigation Plan 2024 Update
Outreach Subcommittee
Meeting #2 – January 23, 2024

Attendance List

	NAME	ORGANIZATION	TITLE	CONTACT INFO
1.	Daniel Dougherty	Wasco Co.	Senior Planner	danielD@co.wasco.or.us
2.	Stephanie Krell	" "	PIO	stephanieK@co.wasco.or.us
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January 24, 2024, NHMP Incorporated Communities Subcommittee Meeting

Wasco County Multi-Jurisdictional Natural Hazard Mitigation Plan Incorporated Community Subcommittee Meeting 2024 Update Minutes	24 January 2024, 11:00 AM – 11:30 PM Public Works Conference Room 2705 East 2nd Street The Dalles, OR 97058
Type of Meeting: Subcommittee Meeting for 2024 NHMP Update	

Subcommittee Members: Daniel Dougherty, Eric Hanson, Jayme Bennett, Melissa Napoli, Sean Bailey, Dan Meader (Kathy Bostick and Merle Keys as invitee)

Subcommittee Member Roll Call

In Person: Daniel Dougherty (DD)

Virtual: Eric Hanson (EH), Alice Cannon (AC), Sean Bailey (SB), Carrie Pipinich (CP).

Absent: Jayme Bennett, Melissa Napoli, Dan Meader

ITEMS

1. **Introductions**
   - DD – Opened up introductions.

2. **Incorporated Work Groups for Urban Jurisdictions & the Public Process.**
   - DD – Made not that representatives from Mosier and Maupin were not present, but that the meeting had been abruptly rescheduled due to weather.
   - CP – thanked for being included and stated she was willing to help anyway she can.
   - DD – stated that primarily helping keep the communities on task and assisting them.
   - DD – Brought up the work that Alice Cannon has been assisting with in updating the Community Profiles for the County with edits.
   - AC – provided that she is available to the communities for assistance with data gathering for their profile updates.
   - DD – The Dalles profile is a good template to start with and update. Mosier/Maupin/Dufur won't need to create their profiles from scratch.
   - AC – stated that with the new census data, most of the data needed to be updated from the last plan.
   - EH – stated that he will be putting a team together for The Dalles similar to last update, and they will start with updating their information from last time.
   - CP – asked with her being out and missing the initial meetings, how can she best support the incorporated communities, and what should she focus on?
   - DD – gave a quick rundown of the previous community profile for The Dalles, and explained that it is a good template, but will need to be reworked to focus on their communities.
   - CP – was worried about the lack of personnel and resources that these communities will have.

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- AC – offered to help update all tables for the communities since it will most likely save time, rather than explaining where/how to get the necessary data.
- DD – stated that he recognized the difficulties that these communities face in completing their profiles, but did not want this committee to be left with doing all of the work.
- DD – More discussion will be needed on what assistance will be needed for the incorporated communities creating their new profiles.

2. Next steps
   a. Next Subcommittee meetings? TBD after February 6, Steering Committee meeting.
   b. AC – to finish Maupin, Mosier, and potentially Dufur's Community Profile data tables
   c. DD & SB – to finish Maupin, Mosier, and potentially Dufur's Community Profile text after AC provides data tables.

Meeting concluded at 12:00pm

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Natural Hazard Mitigation Plan 2024 Update
Incorporated Community Subcommittee
Meeting #2 – January ~~17,~~ 24 2024

Attendance List

NAME	ORGANIZATION	TITLE
1. Daniel Dougherty	Wasco Co.	Senior PLANNER
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February 6, 2024, NHMP Steering Committee Meeting

Wasco County Multi-Jurisdictional Natural Hazard Mitigation Plan Steering Committee Meeting 2024 Update Minutes	6 February 2024, 2:00 PM – 3:40 PM Harding House Conference Room 200 East 4th Street The Dalles, OR 97058
Type of Meeting: Steering Committee Meeting for 2024 NHMP Update	

Steering Committee Member Roll Call

In Person: Daniel Dougherty (DD), Stephanie Krell (SK), Kylee Ruby (KR), Simone Cordery-Cotter (SCC), Arthur Smith (AS), Carrie Pippinich (CP), Sheridan McClellan (SM), Kristin Dodd (KD)

Virtual: Alice Cannon (AC), Sean Bailey (SB), Ryan, Bessette (RB), Jay Wood (JW), Melissa Napoli (MN), Eric Hansen (EH), Jayme Bennett (JB), Kathy Bostick (KB)

Absent: Steve Kramer, Dave Anderson, Kelly Howsley-Glover, Merle Keys, Tyler Stone, and Cindy Miller

ITEMS

1. **Introductions**

Started at 2pm

Subcommittee Updates
Incorporated Community Subcommittee

- DD began the meeting by giving quick updates. Asked AC to give an update on data gathering for the Community Profiles.
- AC stated that she completed updating all tables for all community Addendums, and completed her portion.
- DD explained that DD & SB would assist communities in completing the text of the Community Profile portion.
- DD explained that he would help facilitate
- AS asked for clarification if the towns of Shaniko were included, and DD confirmed that Shaniko and Antelope did not ask to be included.
- CP stated that she had been working with JB on getting Mosiers' information and team together.
- DD Asked MN if Maupin's team has any updates, and she said her team hasn't had a meeting yet due to winter storm delays, but will soon, and DD will be included.

- DD reiterated that he and SB will complete the text of the community profiles, but

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each community will need to have their own teams.

Data Gathering Subcommittee

- DD brought up if the updated DOGAMI landslide maps and FEMA FIRM maps are not yet made official Wasco County maps by the time the 2024 NHMP is complete, should they be included in the NHMP?
- KD asked if there was a reason to doubt the data woul be confirmed? She continued that there is a possible way to add a caveat allowing for the data to be used while awaiting final confirmation as done recently by the ODF.
- DD explained that the DOGAMI maps are published, but not set as Wasco County's Overlay Zone 2 (Landslides) yet, but there was little doubt they would be confirmed. The FIRM Maps; however, are in the appeal period. DD believes some Wasco County residents are appealing FEMA's findings for their land.
- SCC & KD explained that caveats can be made in the plan to address that the data is not finalized.

Outreach Subcommittee

- DD began with an update on outreach and planned events. DD asked SK to give an update.
- SK stated we have reserved Columbia Cinema in The Dalles, on Wednesday March 13, and have all four screens all day. We will show disaster movies and have prizes and swag for people that take the survey. The prizes include gift cards, hats, compasses, flashlights…Multiple disaster movies for all ages.
- AS asked if this level of event is required? And was curious of the process.
- DD responded that we are required to have public input, but last update only had 8 survey responses, and was not well attended.
- SK said that we have a flier with a QR code for people to take the survey.
- AS mentioned that post offices, especially Dufur still has a large amount of community foot traffic, or similar places like that in the rural communities. Other committee members stated interest in seeing more fliers posted and distributed.
- SK then showed what the steps are for the survey once you follow the QR code link. Website layout, and then took everyone through the survey.
- AS stated that it might be better to make it more obvious which questions are optional, particularly regarding the personal demographic information. SK stated that all questions are optional; you do not need to complete all questions to submit the survey.
- DD asked for the participating community seals, so that it was clear the NHMP update and events were multi-jurisdictional.
- SK Confirmed that she has all the relevant seals for all communities involved and they will be included in the report.
- DD - The extra SWAG gear from the event hosted in The Dalles can be utilized by the other communities during their event at a later date.

Hazard Classification and Analysis

- DD moved on to Hazard Classification and Analysis, and mentioned that in the last update Tornado was included in Severe weather, and asked the group if anyone wanted to submit new hazard recommendations.
- DD we have to talk about climate change in the update, but should we include how climate

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change might affect the existing hazards within the hazards and hazard annexes, or should discussion of climate change be included within its own appendix

- We also have to include Diversity Equity and Inclusion (DEI) sections in the updates. DD stated that similar to Climate Change, DEI could either be weaved through the vulnerable population section or have a separate appendix.
- SM and AS mentioned that it might be easier to make a separate appendix so we have officially covered it.
- SCC thought of actually weaving it throughout the plan to help implement it.
- DD agreed that weaving it into the hazards may be the right direction.
- DD - Back to hazards, does anyone have thoughts on which hazards should be included that have occurred since the last update? Federal and State declared only?
- DD The 2017 minutes and plan aren't exactly clear. It appears that only Fed & State declared emergencies were included.
- KD and AS provided comment that Fed & State declared emergencies would most likely be the primary hazards listed. AS did mention that local emergencies like the snow storm may also be included.
- DD we have mentioned air quality events, primarily due to wildfires. Should they be listed within Sever Weather, Wild Fire hazard, or should they be their own hazard?
- KD mentioned that Hood River is currently doing an update of their community response plan for smoke and might be helpful to look at their work.
- AS mentioned that there is probably mitigation information available we can use for the air quality alerts, his office already has to monitor for the road crews. SCC mentioned that Outdoor Workers, especially hispanic agricultural workers during harvest, seasonal working housing might not be a good place for them to be staying in an air quality emergency.
- DD - For updated hazard list, landslide info we have from DOGAMI, FEMA will be giving us the Flood information directly, AS will handle severe weather declaration, KD will provide updated declared fire emergencies, volcano obviously no update since 1980, and where the best place for fire information.
- DD started to share to the attendees the current list of hazards and definitions and what the updates looked like in 2019. SM noticed the critical infrastructure list and noticed some updates needed. DD reminded that the new community profiles will need to create lists of their critical infrastructure.
- SM provided that the following should be included in Wasco County's Critical Facilities list: Fresenius Kidney Care
  - Fair Grounds
  - Tygh Valley School/Community Center
  - Wamic Community Center
  - All Fire Stations/Hubs/Substations? Any Updates? Should check with districts.
  - Petersburg RFPA replaced Columbia Rural Fire since last update
- DD mentioned that The Dalles Fitness Center owner Tim Dahle reached out to possibly be considered a critical infrastructure facility incase of an emergency.
- SCC mentioned that she's aware of many communities including Extreme Heat as its own hazard and if we should also, as it does have its own definition. She thinks that this would be a good separate hazard, because there will most likely be a lot of grant opportunities upcoming for extreme heat.
- AS confirmed, his crews have strict guidelines based on heat.

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- SCC mentioned that Hood River County removed Natural from their NHMP, and now just refer to it as a Hazard Mitigation Plan (HMP) to allow for high hazard dam issues. She thought that SM should be in touch with HR County's representative.
- SM questioned the idea of making the Natural Hazard plan a "Hazard Plan" and explained that the plan accounted for the dam as a critical facility
- DD questioned weather DOD funds could be utilized if the plan became a "Hazard Plan"
- DD mentioned to KB what we will be needed from the City of Dufur before they can officially be included.
- DD mentioned that in regards to updating the economic resiliency to withstanding a natural disaster that AC had mentioned that Wasco County may no longer be considered a high-risk area, and that our economy is more diverse than it has been in the past.

Meeting concluded at 3:40pm

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Natural Hazard Mitigation Plan
Steering Committee Meeting #2
2024 NHMP Update
Meeting – February 6, 2024

	NAME	ORGANIZATION	TITLE
1.	Arthur Smith	WC Public Works	PW Director
2.	David Doughetty	WC PLANNING	Senior PLANNER
3.	Stephanie Krell	WC	PIO
4.	Kristin Dodd	ODF	Unit Forester
5.	Sheridan McClellan	WCSO	Emergency Manager
6.	Kylee V. Ruby	WCBCS	Deputy Building Official
7.	Corne Pipinich	MCDPD	Deputy Director
8.	Simone Cordery-Cotter	OSFM	Fire Risk Reduction Specialist
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February 21, 2024, NHMP Outreach Subcommittee Meeting

Wasco County Multi-Jurisdictional Natural Hazard Mitigation Plan Public Outreach Subcommittee Meeting 2024 Update Minutes	21 Febuary 2024, 1:15 PM – 1:45 PM Public Works Conference Room 2705 East 2nd Street The Dalles, OR 97058
Type of Meeting: Subcommittee Meeting for 2024 NHMP Update	

Subcommittee Member Roll Call

In Person: Daniel Dougherty (DD), Sean Bailey (SB), Kylee Ruby (KR), Stephanie Krell (SK)

Virtual: Melissa Napoli (MN), Simone Cordery- Cotter (SCC), Kathy Bostick (KB), Jayme Bennett (JB)

ITEMS

1. Introductions

• DD opened up introductions.

2. SK gave a brief overview of survey results, over 617 submissions so far, only 8 in 2019 update.

   - Pins and Location has been effective showing those that Identify outside of a city limits

   - Some the graph results can be confusing, and she has reached out how better to interpret the results, and see if there are didn't graph options.

   - Committee was surprised by what disasters appeared to be the public larger worry, Flood.

   - We will continue to push the survey, but initial number returns are way better than expected.

3. MN mentioned that Maupin is hosting an outdoor gardening event on March 9, and they are anticipating over 100-200 participants, and might be a good event.

4. KB asked that she be sent the QR code for the survey, and that she can post it on Dufur City Website. Also she will reach out to Dufur School.

5. SCC mentioned that Wamic Fire has a Spring Plant sale in May? And that might be a good event if not to late.

6. JB will reach out to Mosier School, and they are participating with an Oregon Business

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group that Mosier First Street Group is involved with that should help.

7. DD discussed tracking outreach is important, and one thing done for the 2019 Update, "Disaster and Donuts" event, and a public survey.

Meeting concluded at 1:45pm

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Natural Hazard Mitigation Plan 2024 Update
Outreach Subcommittee
Meeting #3 – February 21, 2024

Attendance List

	NAME	ORGANIZATION	TITLE	CONTACT INFO
1.	Daniel Dougherty	Wasco Co.	Senior Planner	541-506-2568
2.	Stephanie Krall	Wasco Co	PIO	541-993-8173
3.	Kylee V. Ruby	Wasco Co.	Deputy Bldg. Official	541-506-265
4.	Sean Bailey	Wasco Co	Plng.	541-506-2544
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March 6, 2024, NHMP Incorporated Communities Subcommittee Meeting

Wasco County Multi-Jurisdictional Natural Hazard Mitigation Plan Incorporated Communities SubCommittee Meeting 2024 Update Minutes	6 March 2024, 1:30 PM – 2:15 PM Public Works Conference Room 2705 East 2nd Street The Dalles, OR 97058
Type of Meeting: Subcommittee Meeting	

Committee Member Roll Call

In Person: Daniel Dougherty, Sean Bailey.

Virtual: Eric Hansen, Jill Hoyenga, Alice Cannon, Sheridan McClellan.

ITEMS

1. **Introductions**

Started at 2pm

Daniel Dougherty (DD), Sean Bailey (SB), Alice Cannon (AC), Eric Hansen (EH), and Jill Hoyenga (JH)introduced themselves for the record. Sheridan (SM) joined after initial introductions)

2.Subcommittee Updates

· DD asked if The Dalles team wanted to give a quick update on their progress.

EH mentioned that he didn't feel that The Dalles will be needing much Wasco County assistance for their Addendum update, as they are making good progress.

JH shared an updated table showing how TD is working through their update, and marking what sections are fine, and which ones needed updates. She will share this with DD & SB after the meeting. JH said the community profile is coming along well, and the team is doing a good job working through it.

There was a group discussion on the data from the 2020 US Censu, and the 2022 American Community Survey projections.

DD described how Wasco County was assisting Mosier/Maupin/Dufur with their Community profiles using The Dalles's profile as a template.

DD wrapped up the meeting but asked The Dalles team to reach out for any assistance if needed.

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Meeting concluded at 2:15pm

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Natural Hazard Mitigation Plan 2024 Update
Incorporated Community Subcommittee
Meeting #3 – March 6, 2024

Attendance List

	NAME	ORGANIZATION	TITLE
1.	Daniel Dougherty	Wasco Co.	Senior Planner.
2.	Sean Bailey	Wasco Co.	Associate Planner
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April 15, 2024, NHMP Steering Committee Meeting

Wasco County Multi-Jurisdictional Natural Hazard Mitigation Steering Committee Meeting 2024 Update Minutes	15 April 2024, 1:00 PM – 3:45 PM Public Works Conference Room 2705 East 2nd Street The Dalles, OR 97058
Type of Meeting: Committee Meeting	

Committee Member Roll Call

In Person: Daniel Dougherty, Sean Bailey, Arthur Smith, Stephanie Krell, Ryan Bessette, Jay Wood, Carrie Pippinich, Kristen Dodd.

Virtual: Kelly Howsley-Glover, Sheridan McClellan, Kathy Bostick, Alice Cannon

ITEMS

1. **Introductions**

Started at 2pm

Daniel Dougherty (DD), Sean Bailey (SB), Arthur Smith (AS), Stephanie Krell (SK), Ryan Bessette (RB), Jay Wood (JW), Kelly Howsley-Glover (KHG).

Alice Cannon (AC), Sheridan (SM), Kathy Bostick (KB), Carrie Pippinich (CP), and Kristen Dodd (KD) joined after initial introductions.

2. Natural Hazard Analysis and Prioritization

· DD gave a quick explanation of the Oregon Military's Emergency Management Hazard Analysis Matrix, and how it applies to this meetings exercise, and what Hazards we are discussing

· DD gave an overview of Wasco County's community profile based on the 2020 Census and 2022 ACS, for thinking of hazards at the macro level, and the communities at the micro level.

· DD used Wildfire as an example of how the voting process will work, and different aspects to consider.

-Wildfire Discussion and voting. Committee discussed how the "average" wildfire event is difficult to consider, so the entirety of an average wildfire season was used. Wasco County's updated wildfire protection map along with new ODF maps were used. Smoke events included in discussion.

-Earthquake Discussion and voting.

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-Flood Discussion and voting. AS reminded the committee that Wasco County had three “100 year flood” events in the 1990s alone.

-Landslide Discussion and voting. More of a centralized event, and may occur more with increased wildfire, or occurs after flooding also.

-Volcano Discussion and voting. Mt. St Helens in 1980 only comparable event. Wasco County most likely affected from Mt. St. Helens eruption over Mt Hood. Ash biggest issue, cut off from services from Portland, or accepting in displaced people.

-Drought Discussion and voting. Periods of drought seem to be more frequent and for longer periods.

-Extreme Heat Discussion and voting. New hazard, separated from severe storms due to increased frequency from last update, and larger focus on issue from the federal government, more funding.

-Severe Storms Discussion and voting.

-After voting concluded, the group discussed Wildfire, Extreme Heat, and Drought, the top 3, and voted to adjust Wildfire since it went first in voting, to reflect the groups adjustments throughout the voting process.

HAZARD ANALYSIS MATRIX[2]
WORKSHEET

JURISDICTION: Wasco County

Hazards		History WF = 2	Vulnerability WF = 5	Maximum Threat WF = 10	Probability WF = 7	Total Score
Wildland-Wildfire	WF X SR	2 X 10	5 X 9	10 X 10	7 X 10	225 (1)
	Subscore	= 20	= 45	= 100	= 70	
Earthquake	WF X SR	2 X 3	5 X 4	10 X 10	7 X 4	154
	Subscore	= 6	= 20	= 100	= 28	
Flood	WF X SR	2 X 8	5 X 4	10 X 9	7 X 8	182
	Subscore	= 16	= 20	= 90	= 56	
Landslide	WF X SR	2 X 2	5 X 8	10 X 7	7 X 4	112
	Subscore	= 4	= 40	= 70	= 28	
Extreme Heat	WF X SR	2 X 10	5 X 8	10 X 10	7 X 10	230 (2)
	Subscore	= 20	= 40	= 100	= 70	
Volcano	WF X SR	2 X 1	5 X 8	10 X 10	7 X 1	143
	Subscore	= 2	= 40	= 100	= 7	
Drought	WF X SR	2 X 10	5 X 9	10 X 9	7 X 10	225 (3)
	Subscore	= 20	= 45	= 90	= 70	
Severe Local Storm	WF X SR	2 X 10	5 X 6	10 X 9	7 X 10	210
	Subscore	= 20	= 30	= 90	= 70	
	WF X SR	2 X ___	5 X ___	10 X ___	7 X ___	
	Subscore	=	=	=	=	
	WF X SR	2 X ___	5 X ___	10 X ___	7 X ___	
	Subscore	=	=	=	=	

DATE: 4/15/24

WF = weight factor
SR = severity rating

DD wrapped up the meeting and thanked everyone for participating and joining.

Meeting concluded at 3:45pm

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Natural Hazard Mitigation Plan
Steering Committee Meeting #3
2024 NHMP Update
Meeting – April 15, 2024

	NAME	ORGANIZATION	TITLE
1.	Daniel Dougherty	Wasco Co. PLANNING	Senior Planner
2.	Stephanie Krell	Wasco Co.	PIO
3.	Jay Wood	Mid-Columbia Fire	Div. Chief
4.	Arthur Smith	WC Public Works	G.O.A.T.
5.	Sean Bailey	WC Planning	Asso. Planner
6.	Ryan Bessette	Wasco County SWCD	Technician / Planner
7.	Carrie Pipinich	MCEDD	Deputy Director
8.			
9.			
10			
11.			
12.			
13.			
14.			

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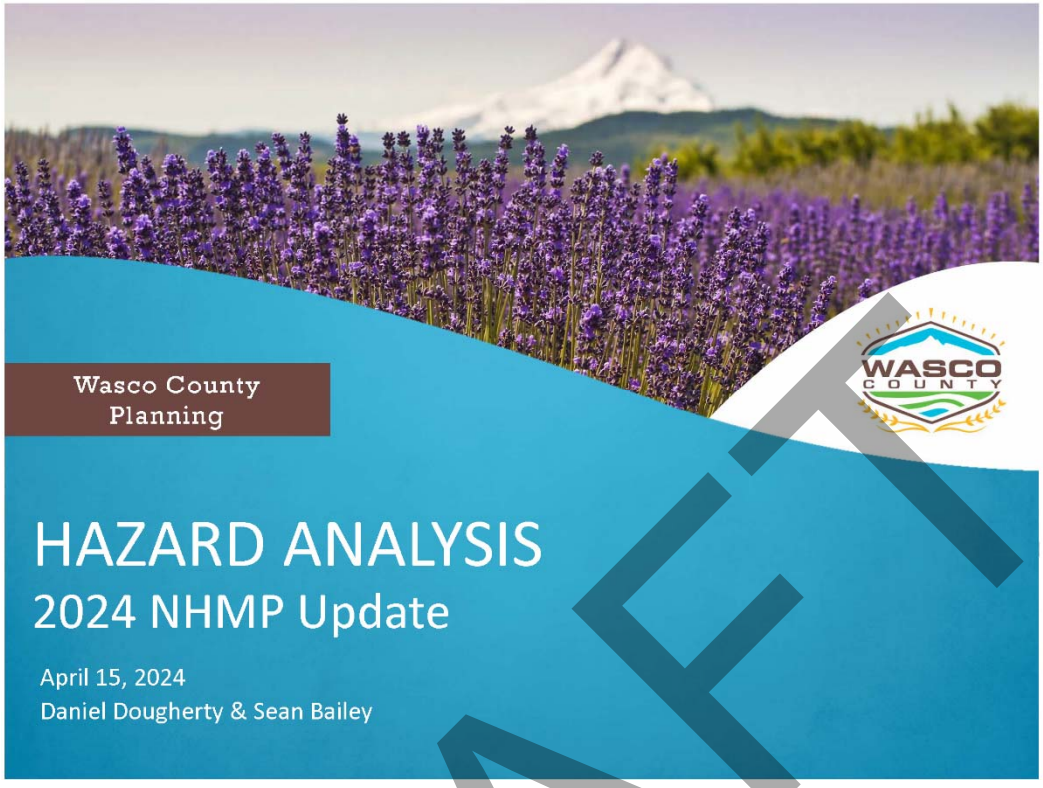

HAZARD ANALYSIS METHODOLOGY

(See Oregon Military Department & Office of Emergency Management (OEM) Hazard Methodology Worksheet)

HAZARD ANALYSIS MATRIX[2]
WORKSHEET

JURISDICTION:

Hazards		History WF = 2	Vulnerability WF = 5	Maximum Threat WF = 10	Probability WF = 7	Total Score
	WF X SR Subscore	2 X ____ =	5 X ___ =	10 X ___ =	7 X ___ =	

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HAZARD ANALYSIS METHODOLOGY

(See Oregon Military Department & Office of Emergency Management (OEM) Hazard Methodology Worksheet)

HISTORY (weight factor for category = 2)

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

- The EOC or alternate EOC was activated;
- Three or more 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 – score at 1 to 3 points based on…	0 - 1 event past 100 years
MEDIUM – score at 4 to 7 points based on…	2 - 3 events past100 years
HIGH – score at 8 to 10 points based on…	4 + events past100 years

PROBABILITY (weight factor for category = 7)

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

LOW – score at 1 to 3 points based on…	one incident likely within 75 to 100 years
MEDIUM – score at 4 to 7 points based on…	one incident likely within 35 to 75 years
HIGH – score at 8 to 10 points based on…	one incident likely within 10 to 35 years

HAZARD ANALYSIS METHODOLOGY

(See Oregon Military Department & Office of Emergency Management (OEM) Hazard Methodology Worksheet)

VULNERABILITY (weight factor for category = 5)

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

LOW – score at 1 to 3 points based on…	< 1% affected
MEDIUM – score at 4 to 7 points based on…	1 - 10% affected
HIGH – score at 8 to 10 points based on…	> 10% affected

MAXIMUM THREAT (weight factor for category = 10)

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

LOW – score at 1 to 3 points based on…	< 5% affected
MEDIUM – score at 4 to 7 points based on…	5 - 25% affected
HIGH – score at 8 to 10 points based on…	> 25% affected

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HAZARD ANALYSIS METHODOLOGY

(See Oregon Military Department & Office of Emergency Management (OEM) Hazard Methodology Worksheet)

- How our Team will Assign Scores

Step 1: Discuss History & Probability and Vulnerability & Max Threat (average & worst case)

Step 2: Tally majority vote on the Severity Rating & Severity Score

i. (e.g., We vote History: Low & Probability Low); then

ii. (e.g., We vote History: 2 & Probability 3)

Step 3: Multiply each Category's Severity Rating by Weight Factor to obtain Total Score

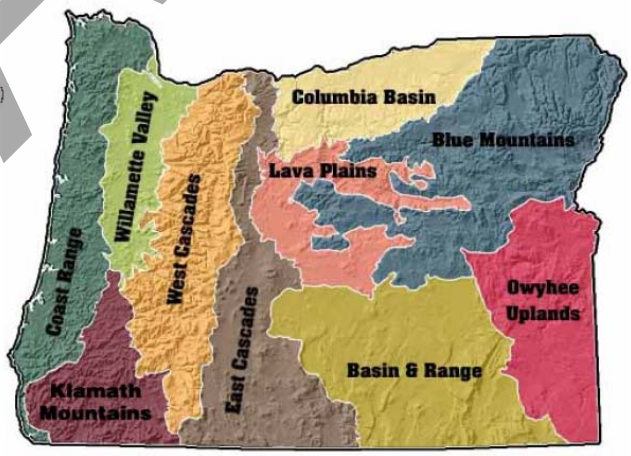
Step 4: Move to next hazard: wash, rinse, repeat

Questions?

COMMUNITY PROFILE

Geography & Climate

- Wasco County: 2,387 Sq. Miles (1,527,680 Acres)
- Primarily within Columbia Basin
  - East & West Cascades, Blue Mountains
  - Surrounded on all sides by Mountains
  - North Border Columbia River
- High Desert, Rolling Plains, Hill Country
- Three Major Drainage Basins
  - Deschutes, John Day, & Hood River Basins
- Climate Summary
  - Temperate and semi--arid
  - Low annual precipitation
  - Low winter temperatures, and high summer temperatures



Month	Average Max. Temp (deg F)	Average Min. Temp (deg F)	Average Precipitation (inches)	Average Snow Depth (inches)	Average Snowfall (inches)
Annual	**65.3**	**42.8**	**14.02**	**0**	**19.8**

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COMMUNITY PROFILE

Structures & Critical Facilities & Infrastructure

Natural Hazard Risk Report for Wasco Count (DOGAMI, 2021)

Table 2-1. Wasco County building inventory.

Community	Total Number of Buildings	Percentage of Buildings of Wasco County	Total Estimated Building Value ($)	Percentage of Building Value of Wasco County
Unincorporated County (rural)	7,727	42%	1,362,428,000	35%
Chenoweth	917	5.0%	143,595,000	3.7%
Pine Hollow	909	4.9%	95,521,000	2.4%
Tygh Valley	273	1.5%	37,496,000	1.0%
Warm Springs Reservation	238	1.3%	27,243,000	0.7%
Total Unincorporated County*	10,064	55%	1,666,283,000	43%
Antelope	78	0.4%	9,525,000	0.2%
Dufur	463	2.5%	92,824,000	2.4%
Maupin	466	2.5%	88,581,000	2.3%
Mosier	292	1.6%	28,875,000	0.7%
Shaniko	91	0.5%	15,581,000	0.4%
The Dalles	7,027	38%	2,007,625,000	51%
Total Wasco County	18,481	100%	3,909,294,000	100%

*Total includes portion of Warm Springs Reservation in Wasco County.

HAZARD ANALYSIS METHODOLOGY

(See Oregon Military Department & Office of Emergency Management (OEM) Hazard Methodology Worksheet)

HAZARD ANALYSIS MATRIX[2]
WORKSHEET

JURISDICTION: Wasco County

Hazards		History WF = 2	Vulnerability WF = 5	Maximum Threat WF = 10	Probability WF = 7	Total Score
Wildland-Wildfire	WF X SR Subscore	2 X ____ =	5 X ___ =	10 X ___ =	7 X ___ =	

SEVERITY RATING

LOW = choose the most appropriate number between 1 to 3 points
MEDIUM = choose the most appropriate number between 4 to 7 points
HIGH = choose the most appropriate number between 8 to 10 points

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HAZARD ANALYSIS METHODOLOGY

(See Oregon Military Department & Office of Emergency Management (OEM) Hazard Methodology Worksheet)

HAZARD ANALYSIS MATRIX[2]
WORKSHEET

JURISDICTION: Wasco County

Hazards	Weight Factor	History WF = 2	Vulnerability WF = 5	Maximum Threat WF = 10	Probability WF = 7	Total Score
Wildland-Wildfire	WF X SR Subscore	2 X 10 (High) =	5 X 3 (Low) =	10 X 4 (Med) =	7 X 6 (Med) =	

HAZARD ANALYSIS METHODOLOGY

(See Oregon Military Department & Office of Emergency Management (OEM) Hazard Methodology Worksheet)

HAZARD ANALYSIS MATRIX[2]
WORKSHEET

JURISDICTION: Wasco County

Hazards		History WF = 2	Vulnerability WF = 5	Maximum Threat WF = 10	Probability WF = 7	Total Score
Wildland-Wildfire	WF X SR Subscore	2 X 10 (High) = 20	5 X 3 (Low) = 15	10 X 4 = 40	7 X 6 = 42	117

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Agenda

1. Hazard Analysis Methodology Explainer
2. Community Profile Overview
3. Hazard Analysis (Discussion)
   - Wildland-Wildfire
   - Earthquake
   - Flood
   - Landslide
   - Volcano
   - Drought
   - Extreme Heat
   - Severe Local Storm (Windstorm, Snow Storm, Rainstorm)

Pioneering pathways to prosperity.

HAZARD ANALYSIS METHODOLOGY

(See Oregon Military Department & Office of Emergency Management (OEM) Hazard Methodology Worksheet)

- Explaining the Hazard Analysis Matrix (See Pages 5-6 of worksheet)

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COMMUNITY PROFILE

Structures & Critical Facilities & Infrastructure

Name	Type
Antelope Community Center	Civic
Antelope Fire Department	Fire Station
Ashwood Radio Site	Public Safety Radio
Backup Public Safety Answer Point	PSAP
Bakeoven Radio Site	Public Safety Radio
Big Eddy Substation	Utility
Celilo Converter Station	Utility
Chenowith Elementary School	School
Chenowith Water PUD	Utility
City waste water treatment plant	Waste Water Treatment
Clear Lake Radio Site	Public Safety Radio
Colonel Wright Elementary School	School
Dallesport Airport	Airport
Dry Hollow Elementary School	School
Dufur City Hall	Fire Station/Civic
Dufur High School	School
Dufur PUD station	Utility
Dufur Reservoir	Water supply
Fort Dalles Readiness Center	Gov Facility
Fresenius Kidney Center	Medical Facility
Fuel Site 1	Fuel Site
Fuel Site 2	Fuel Site
Fuel Site 3	Fuel Site
Fuel Site 4	Fuel Site
Fuel Site 5	Fuel Site
Highway 197	Transportation
I-84	Transportation
Juniper Flat Fire Department	Fire Station
Maupin City Hall	Civic
Maupin Fire Department	Fire Station
Maupin Grade School	School
Maupin Sewer Plant	Waste Water Treatment
Mid Columbia Fire and Rescue Station 1	Fire Station
Mid Columbia Fire and Rescue Station 2	Fire Station
Mid-Columbia Medical Center	Hospital

Name	Type
Mosier City Hall	Civic
Mosier Community School	School
Mosier Fire Department	Fire Station
NORCOR	Jail
North Central Public Health District	Public Health
Port of The Dalles	Port
Seufert Hill Radio Site	Public Safety Radio
Shaniko Fire Department	Fire Station
Shaniko Historic City Hall	Civic
Sorosis Hill Radio Site	Public Safety Radio
South Wasco County Ambulance Service	Ambulance
South Wasco County High School	School
Stacker Radio Site	Public Safety Radio
The Dalles Bridge	Transportation
The Dalles City Hall	City Hall
The Dalles Dam	Dam
The Dalles High School	School
The Dalles Middle School	School
The Dalles Police Department	Police Station
The Dalles Public Works	Civic/Utility
Tygh Valley Fire Departmnet	Fire Station
Tygh Valley School/Community Center	School
Union Pacific Railroad	Transportation
Wahtonka Campus	School
Wamic Community Center	Civic
Wamic Rural Fire Department	Fire Station
Wasco Count Emergency Management	EOC
Wasco County Courthouse	Courthouse
Wasco County Central Dispatch	911 Center & Dispatch
Wasco County Fairgrounds	Civic
Wasco County Public Works	Public Works (Roads)
Wasco County Sheriff's Office	Police Station
Washington Family Ranch Airstrip	Airstrip
Washington Family Ranch Fire Station	Fire Station
Wicks Water Treatment Plant	Utility

Locatiion	Total
Wasco County	70
The Dalles	25
Dufur	4
Maupin	6
Mosier	3
Antelope	2
Shaniko	2

COMMUNITY PROFILE

Population

- Slow Growing Population
  - 1980 (21,732 approx.) / 2020 (26,670)
  - 23% Increase in 40 Years
- Median Age – 40.4 years (2022)
- 60+ Years population trending upwards
- Higher proportion of disabled

Table C.3: Wasco Cour

Jurisdiction	
Antelope	
Dufur	
Maupin	
Mosier	
Shaniko	
The Dalles	1
Unincorporated	1
Wasco County	2

Source, PSU Population Resear
Combined Forecast Summary

Population Forecast

Population Research Center

Disability

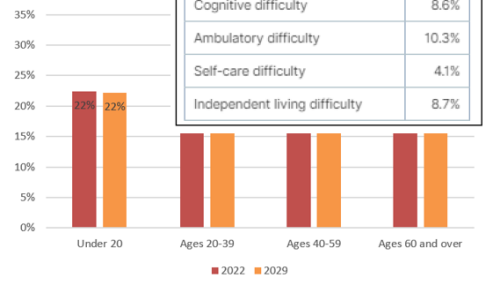
18.5% ± 1.8%
Disabled Population in Wasco County, Oregon

15.8% ± 0.3%
Disabled Population in Oregon

Types of Disabilities
in Wasco County, Oregon
S1810

Measure	Value
Hearing difficulty	7.2%
Vision difficulty	3.1%
Cognitive difficulty	8.6%
Ambulatory difficulty	10.3%
Self-care difficulty	4.1%
Independent living difficulty	8.7%

Figure C.3: Wasco County P



Source: PSU Population Research Center, 2022 Annual Oregon Population Report Tables; PSU Population Report Center, Wasco County Population Forecast Summary, 2022-2026 cycle.

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COMMUNITY PROFILE

Vulnerable Populations

- 22% of Total Pop is 60+ Years
  - 5,861 ppl.
- 2,726 Households with one or more under 18
- 3,880 Households with one or more 65+
- 1,573 Households 65+ living alone
- Poverty increase by 2% since 2017
- Decrease in poverty for children since 2017
  - Increase in Income-eligible for federal nutrition program

Table C.4: Wasco County High Risk Populations

Location	Total Households	Percent Households with one or more under 18	Percent Households with one or more over 65	Percent Householder 65 and over, living alone
Wasco County	10,488	25.9%	36.9%	15.0%
Dufur	351	23.9%	40.7%	15.7%
Maupin	163	14.7%	53.4%	27.6%
Mosier	266	35%	29.3%	11.7%
The Dalles	6,341	27.2%	34.2%	15.3%

Source: U.S. Census Bureau, American Community Survey 2022.

Table C.8: Individuals Living Below Poverty Level

	2022 Percent Poverty All	2017 Percent Poverty All	2022 Percent Poverty Under 18	2017 Percent Poverty Under 18
Wasco County	16.0%	13.8%	16.3%	20.8%
Oregon	12.0%	13.2%	13.6%	16.5%
United States	12.6%	13.4%	16.7%	18.4%

Source: U.S. Census Bureau, Small Area Estimates Branch, 2022 and 2017.

Table C.9: Wasco County Children Income-Eligible for Federal Nutrition Programs

	2017	2018	2019	2020	2021
Percent children income-eligible for federal nutrition programs.	69%	69%	83%	83%	87%

Source: Feeding America, Map the Meal Gap 2017-2021.

COMMUNITY PROFILE

Vulnerable Populations

Table DP03 Selected Economic Characteristics for Wasco County (2022 ACS 5-Year Estimates)

INDUSTRY			
Civilian employed population 16 years and over	11,870	±473	11,870
Agriculture, forestry, fishing and hunting, and mining	1,109	±338	9.3%
Construction	768	±177	6.5%
Manufacturing	999	±202	8.4%
Wholesale trade	240	±114	2.0%
Retail trade	1,384	±239	11.7%
Transportation and warehousing, and utilities	486	±128	4.1%
Information	158	±63	1.3%
Finance and insurance, and real estate and rental and leasing	322	±117	2.7%
Professional, scientific, and management, and administrative an...	853	±209	7.2%
Educational services, and health care and social assistance	2,814	±357	23.7%
Arts, entertainment, and recreation, and accommodation and foo...	1,270	±198	10.7%
Other services, except public administration	572	±150	4.8%
Public administration	899	±260	7.6%

Migrant and Seasonal Farmworker (MSFW) County Estimates, 2012

County	MSFW Estimates Total	Migrant Workers	Seasonal Workers
Wasco*	22,337	7,483	14,854

*2012 Census of Agriculture migrant labor estimates, these values include migrant labor in livestock production

- High Number of Outdoor Dependent Laborers
- Outdoor Workforce Susceptible to Weather Extremes & Air Quality

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COMMUNITY PROFILE

Vulnerable Populations

Table C.19: Commute Shed (Where workers are employed who live In Wasco County), 2021

Location	Number	Percent
Wasco County, OR	5,771	47.5%
Hood River County, OR	1,447	11.9%
Multnomah County, OR	987	8.1%
Clackamas County, OR	531	4.4%
Klickitat County, WA	413	3.4%
Deschutes County, OR	328	2.7%
Jefferson County, OR	286	2.4%
Marion County, OR	277	2.3%
Washington County, OR	271	2.2%
Umatilla County, OR	217	1.8%
All Other Locations	1,629	13.4
Total	12,157	

Source: U.S. Census Bureau, OnTheMap, Wasco County Profile Analysis in 2021 by All Jobs

Table C.20: Labor Shed (Where workers live who are employed in Wasco County), 2021

Location	Number	Percent
Wasco County, OR	5,771	56.3%
Hood River County, OR	812	7.9%
Klickitat County, WA	511	5.0%
Multnomah County, OR	368	3.6%
Clackamas County, OR	252	2.5%
Washington County, OR	232	2.3%
Deschutes County, OR	182	1.8%
Cowlitz County, WA	172	1.7%
Marion County, OR	147	1.4%
Clark County, WA	137	1.3%
All Other Locations	1,663	16.2%
Total	10,247	

Source: U.S. Census Bureau, OnTheMap, Wasco County Area Profile Analysis in 2021 by All Jobs

- 87.1% (Car, Truck, or Van) Automobile Dependent Workforce*
- 78% Drive Alone*
- 7.1% Work from Home*
- Road Infrastructure Decisive

* (2022 U.S. Census ACS 5-Year Estimate: Table S0801 Commuting Characteristics by Sex)

COMMUNITY PROFILE

Vulnerable Populations Takeaways

- Age & Disabled (Elderly & Infirm)
- Poverty (Fixed Incomes, Seasonal Employment, Children)
- Outdoor Labor Susceptibility
- Commuter Workforce

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HAZARD ANALYSIS

Wildland-Wildfire (2017 NHMP Ranked 3rd Medium Risk Hazard)

Important Definitions

Any instance of uncontrolled burning within a forested area is a wildland fire, whereas uncontrolled burning in grassland, brush, or woodlands is classified as a wildfire. (2019 Wasco County NHMP, p. HA-15)

OAR 629-044-1005

(l) "Wildfire Risk" means the wildfire impacts to values based on scientifically modeled wildfire frequency and wildfire intensity.

(m) "Wildland-Urban Interface" means a geographical area where structures and other human development meets or intermingles with wildland or vegetative fuels.

HAZARD ANALYSIS

History-Probability: Wildland-Wildfire

Significant Wildland-Wildfire Events

- 33 Events since 1967
- Six Fed. Declarations since 2013
- Five Events 2013-2017
- 16 Events since 2018

HA-4: Significant Historic Wildland Fire Events	
Occurrence	**Description**
1902	Yacolt Burn, 170,000+ acres, About a million acres burned around the region
1967	School Marm Springs Fire, approximately 8000 acres, demonstrated that wildfire within The Dalles Watershed poses a tremendous risk to City-owned water-control infrastructure and public health
1977	Unnamed, unknown size
1979	Pine Grove
1985	Maupin
1988	Warm Springs
1994	Warm Springs
1998	Rowena, 2,208 acres
2000	Antelope
2002	Sheldon Ridge, 12,261 acres
2002	White River
2009	Microwave, 1,225 acres, conflagration declared
2011	High Cascade Complex, 101,292 acres
2013*	Government Flats Complex, 11,450 acres, conflagration declared, 4 homes lost, $15 mil damage
2014*	Rowena, 3,680 acres, conflagration declared
2016	Wassen Pond, 300 acres, structures threatened, conflagration declared
2016	Mosier Train Derailment
2017	Nena Springs, 39,500 acres
2018*	Substation, 80,000 acres, one fatality, conflagration declared, 52 structures (4 dwellings) destroyed
2018	Long Hollow, 40,000 acres
2018*	South Valley, 25,000 acres, conflagration declared, 15 structures (3 dwellings) destroyed
2018	Memaloose II, conflagration declared, 175+/- acres, structures threatened
2020*	Mosier Creek Fire, 985 acres, 5 structures destroyed
2020	September 7-13, Oregon experienced record poor air quality from wildfire smoke across the state. Oregon Air Quality Monitoring Annual Report: 2020, provides that The Dalles experienced 4 days of "Hazardous" and 3 days of "Very Unhealty" air quality.
2020*	White River Fire, 17,442 acres, over 100 dwellings ordered to evacuate
2021	Wrentham Market Fire, 7,222 acres, 2 structures destoryed (agricultural structures)
2021	S-503 Fire; 6822 acres (Warm Springs Reservation)
2021	Sunset Valley Road Fire, 987+/- acres, several outbuildings (agricultural structures), some cars and part of a cherry orchard.
2022*	Miller Road Fire, 10,847 acres, one structure destroyed
2023	Boulder Fire, 233 acres, no structures lost
2023	Antelope Creek Fire, 490 acres, no structures lost
2023	Milepost 87 Fire, 150 acres, 1 dwelling lost
2023	Simnaho Fire; 1249 acres (Warm Springs Reservation)
2023	Winslow Rd Fire, 837 acres

(* - Federal Fire Management Assistance Declaration,

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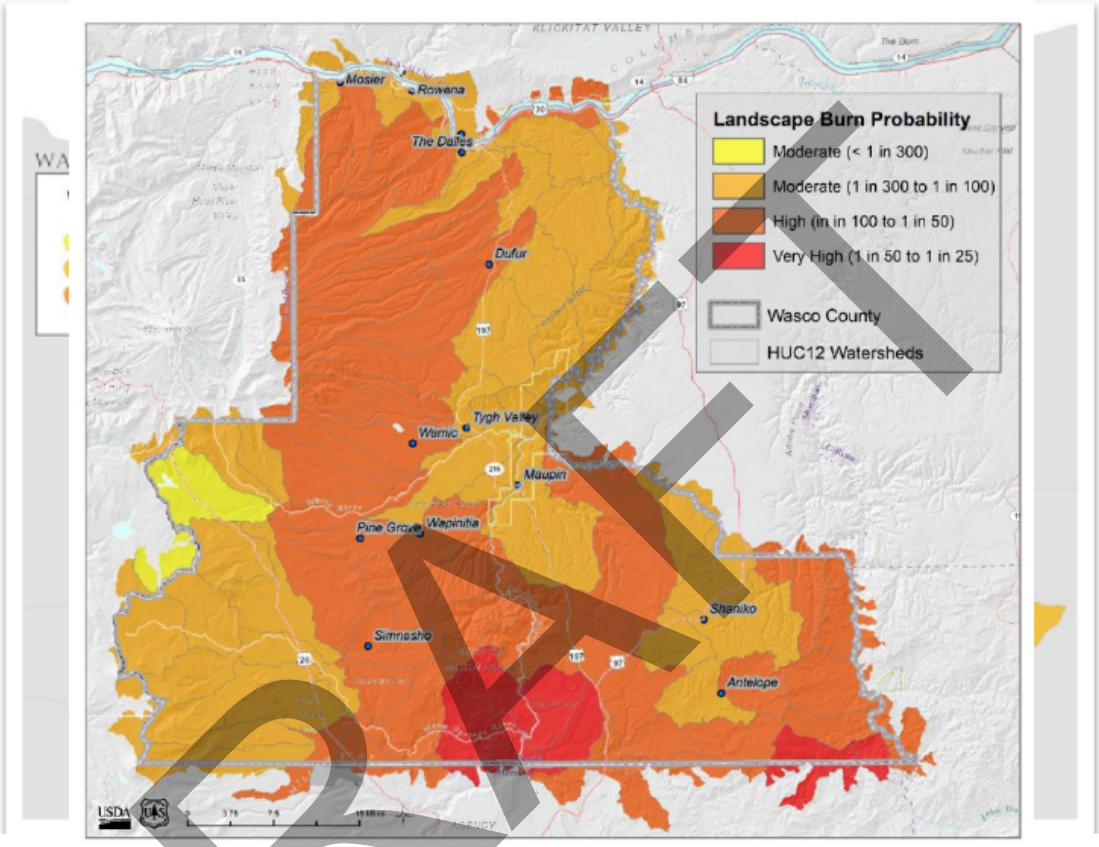
Figure 7 **Figure 9. Relative Likelihood of Wildfire in Wasco County, Source: 2018 CPAW**



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HAZARD ANALYSIS

Vulnerability/Max Threat: Wildland-Wildfire

Wasco County

Population: 26,670 (2020)
Housing Units: 11,996
Critical Infrastructure: 70

Unincorporated Communities/Subdivisions

Pine Hollow (531 pop)
Housing Units: 516

Sportsman's Paradise
Lots: 120 / 17 Address

Tygh Valley (236 pop)
Housing Units: 128

Wamic (123 pop)
Housing Units: 63

Sportsman's Park (76)
Housing Units: 156

Pine Grove (142)
Housing Units: 96

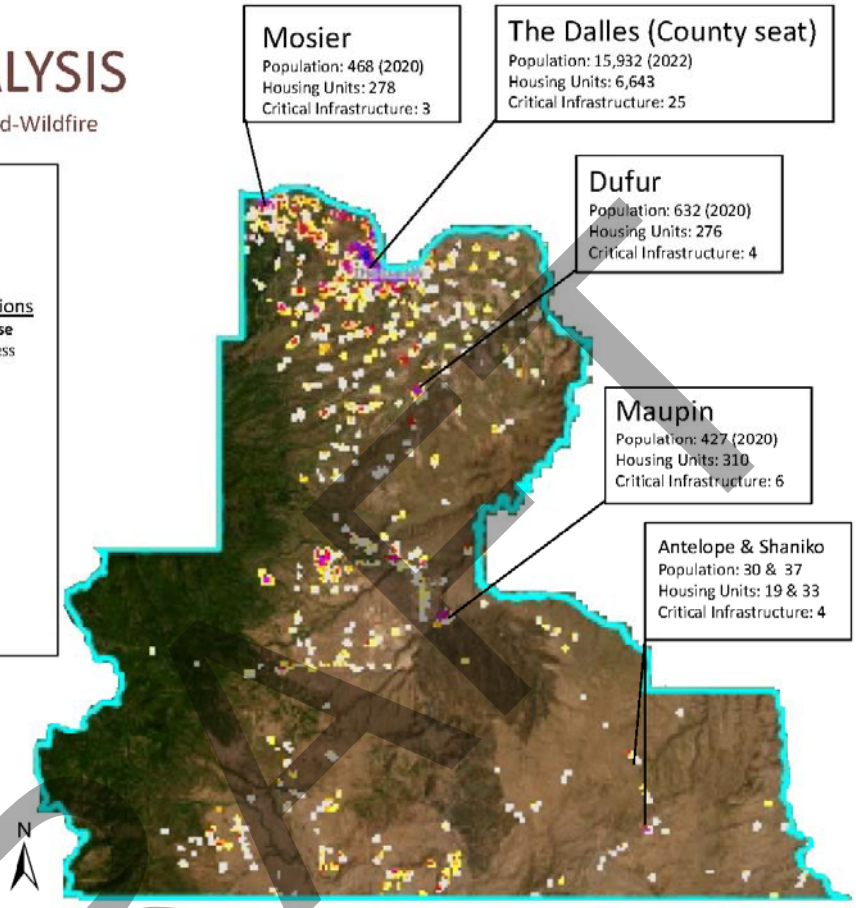
Chenoweth
Lots: 270 / 200+ Address **(Murray's Addition)**
1,975 pop (greater area) / Housing Units: 777

Celilo Village (85)
Housing Units: 19

Rowena (192)
Housing Units: 98

Housing Density

Category	Acres
<1 house per 40 acres	20,913
1 per 40 acres to 1 per 20 acres	13,134
1 per 20 acres to 1 per 10 acres	8,113
1 per 10 acres to 1 per 5 acres	5,535
1 per 5 acres to 1 per 2 acres	3,313
1 per 2 acres to 3 per acres	3,493
> 3 per acres	832



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HAZARD ANALYSIS

Vulnerability/Max Threat: Wildland-Wildfire

Wasco County

Population: 26,670 (2020)
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Unincorporated Communities/Subdivisions

Pine Hollow (531 pop)
Housing Units: 516

Sportsman's Paradise
Lots: 120 / 17 Address

Tygh Valley (236 pop)
Housing Units: 128

Wamic (123 pop)
Housing Units: 63

Sportsman's Park (76)
Housing Units: 156

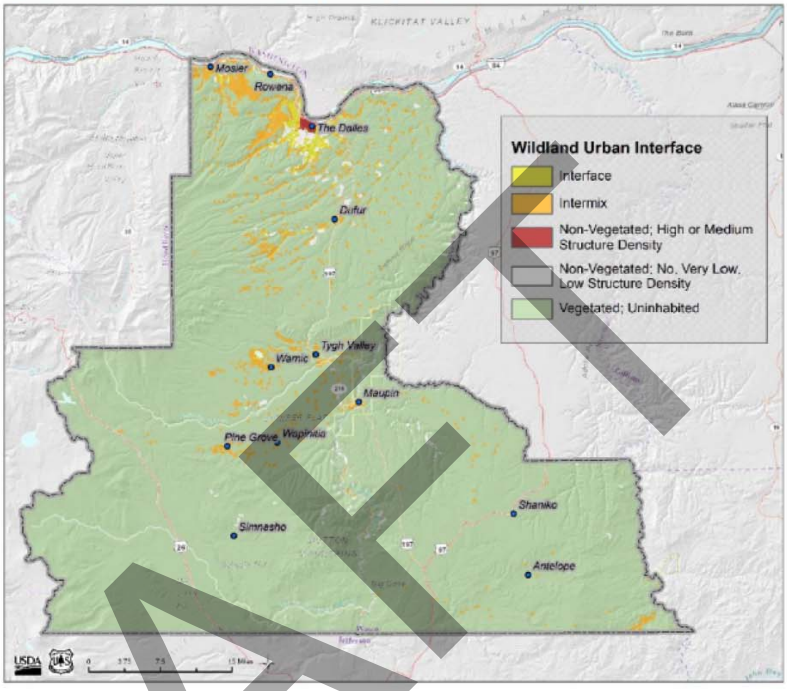
Pine Grove (142)
Housing Units: 96

Chenoweth
Lots: 270 / 200+ Address **(Murray's Addition)**
1,975 pop (greater area) / Housing Units: 777

Celilo Village (85)
Housing Units: 19

Rowena (192)
Housing Units: 98

Figure 5. The Wildland Urban-Interface (WUI) in Wasco County (Source 2018 CPAW)



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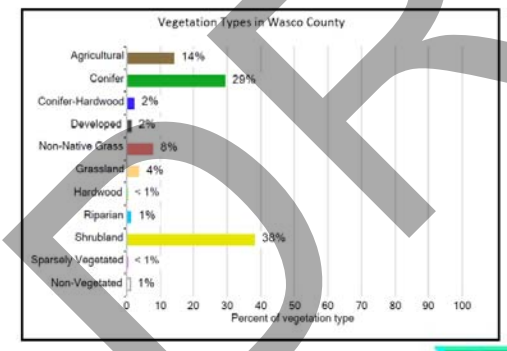
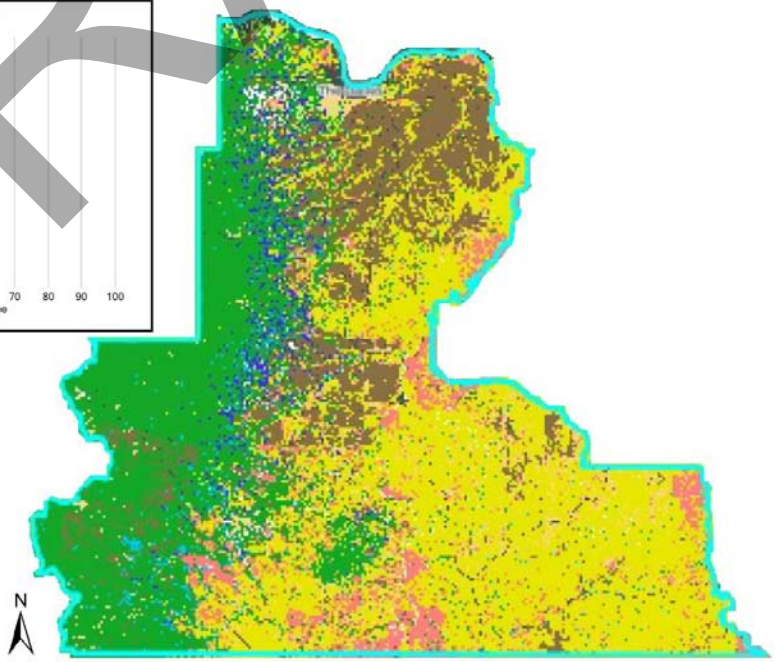
HAZARD ANALYSIS

Vulnerability/Max Threat: Wildland-Wildfire





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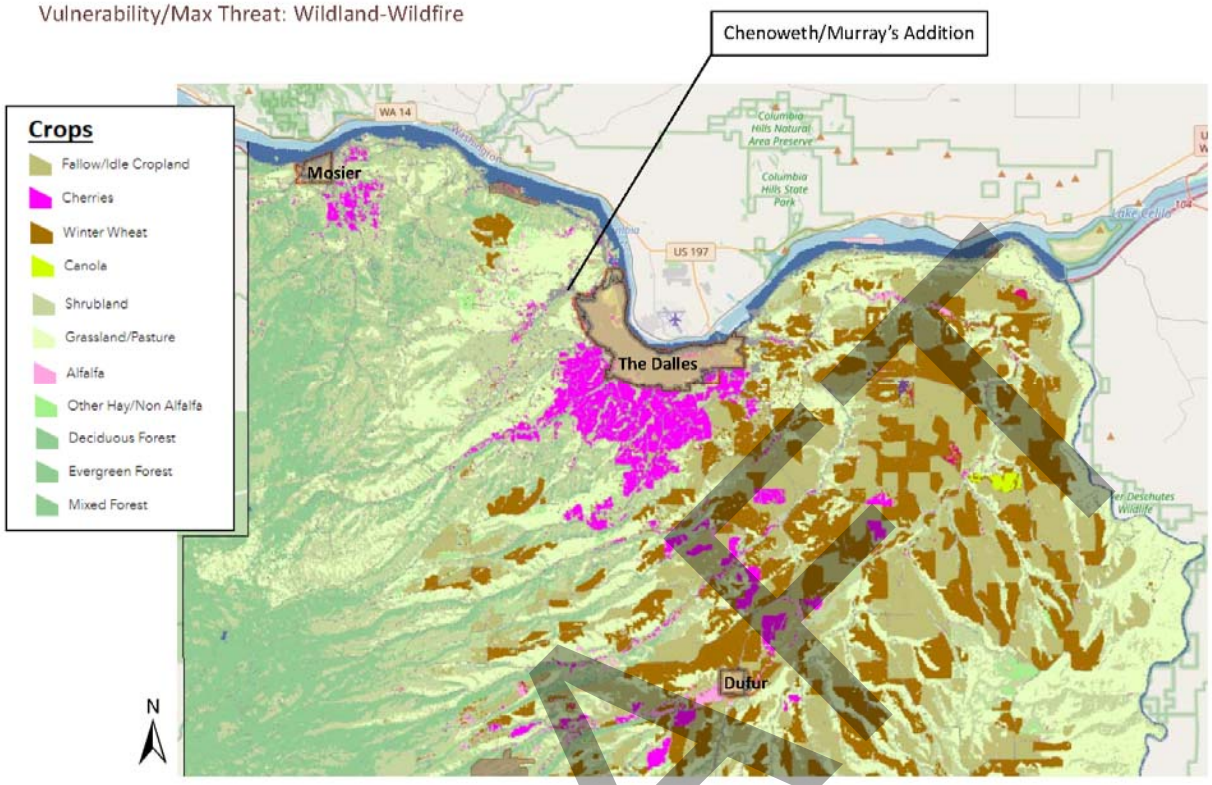
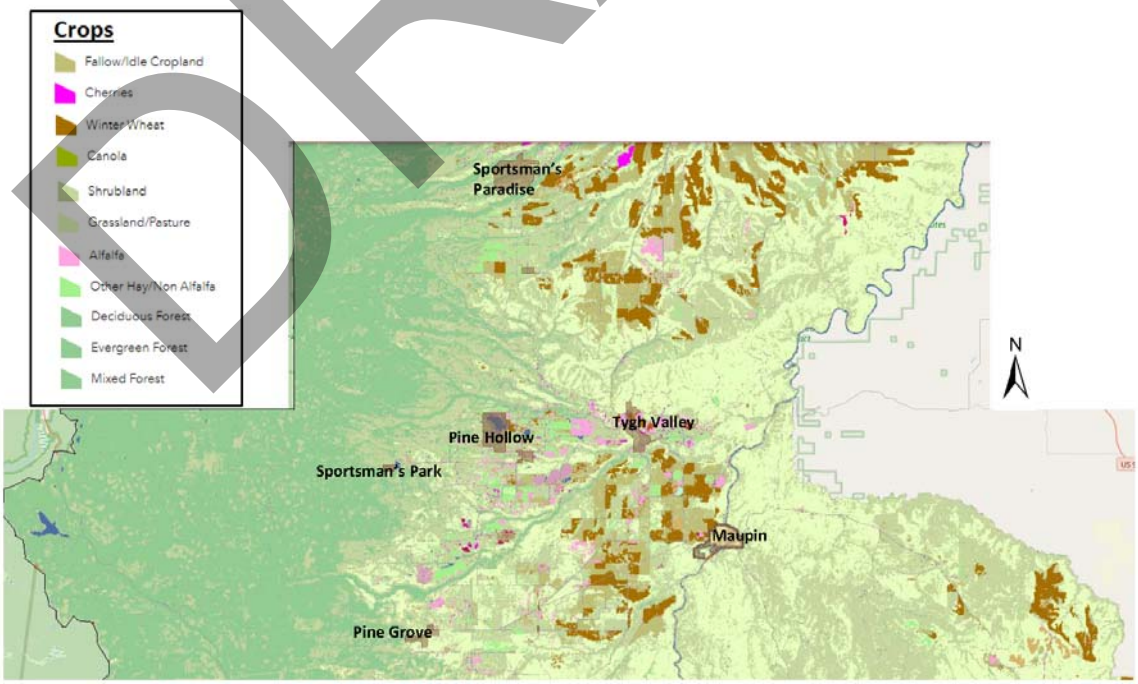
HAZARD ANALYSIS

Vulnerability/Max Threat: Wildland-Wildfire



HAZARD ANALYSIS

Vulnerability/Max Threat: Wildland-Wildfire



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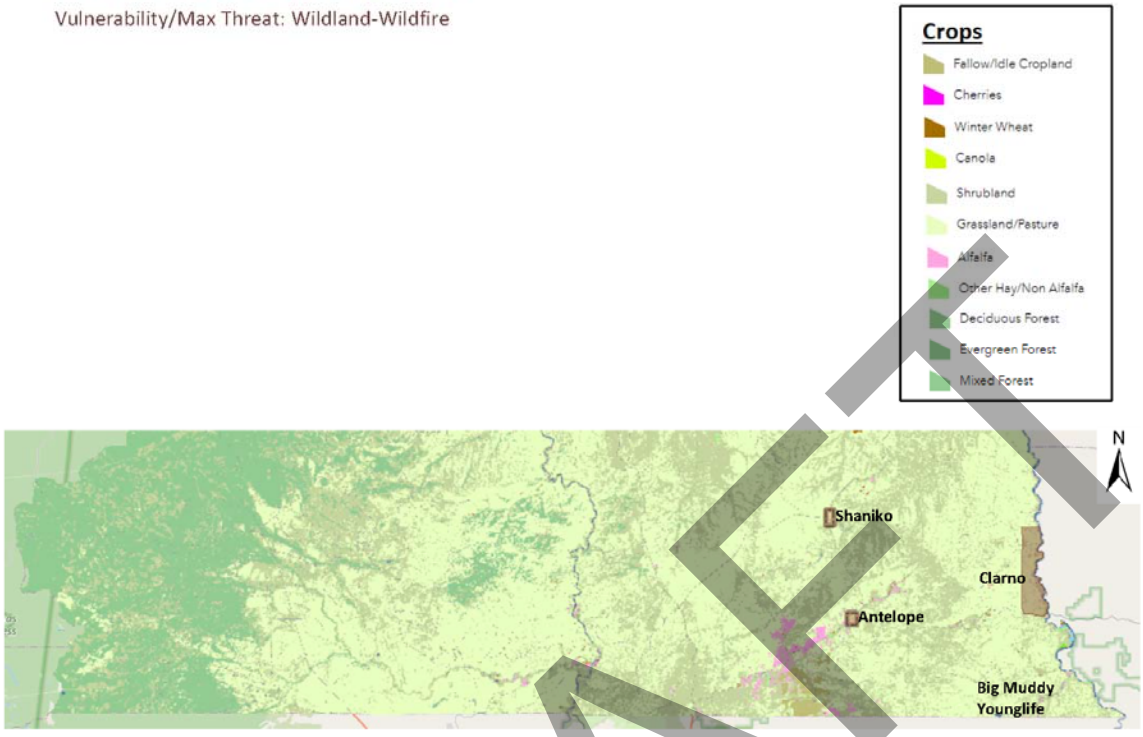
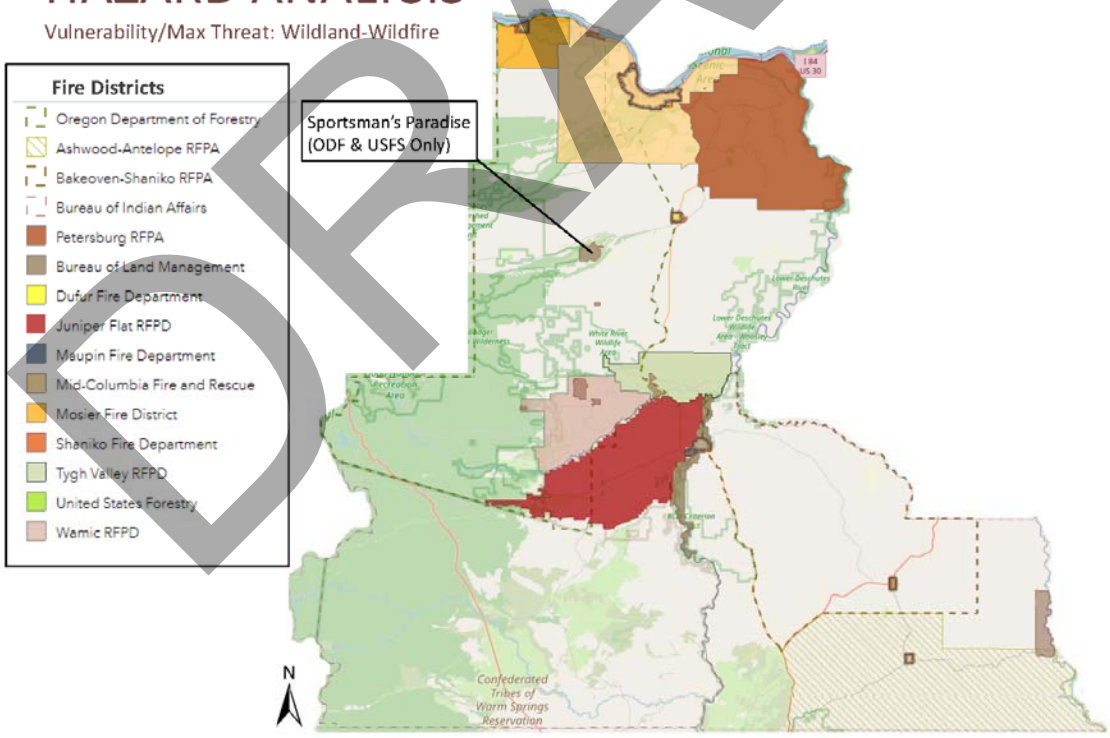
HAZARD ANALYSIS

Vulnerability/Max Threat: Wildland-Wildfire



HAZARD ANALYSIS

Vulnerability/Max Threat: Wildland-Wildfire



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HAZARD ANALYSIS

Vulnerability/Max Threat: Wildland-Wildfire

Natural Hazard Risk Report for Wasco Count (DOGAMI, 2021)

Wasco Countywide DOGAMI Modeled Wildfire Exposure (High risk):

- Number of buildings: 4,057
- Exposure value: $693,559,000
- Percentage of exposure value: 18%
- Critical facilities exposed: 10
- Potentially displaced population: 5,125

Wasco County Communities at the Highest Risk of Wildfire

- Pine Hollow
- Mosier (30 square miles between Mosier and Chenoweth high wildfire risk)
- Chenoweth (30 square miles between Mosier and Chenoweth high wildfire risk)
- Maupin (Homes within the WUI)

HAZARD ANALYSIS

Wildland-Wildfire

HISTORY (weight factor for category = 2)

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

< The EOC or alternate EOC was activated;
< Three or more 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 – score at 1 to 3 points based on…	0 - 1 event past 100 years
MEDIUM – score at 4 to 7 points based on…	2 - 3 events past100 years
HIGH – score at 8 to 10 points based on…	4 + events past100 years

---

Vote: Severity Rating:

- All those in favor of: **Low**
- All those in favor of: **Medium**
- All those in favor of: **High**

Vote: Severity Rating Score:
1-3 (Low)
4-7 (Medium)
8-10 (High)

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HAZARD ANALYSIS

Wildland-Wildfire

PROBABILITY (weight factor for category = 7)

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

LOW – score at 1 to 3 points based on…	one incident likely within 75 to 100 years
MEDIUM – score at 4 to 7 points based on…	one incident likely within 35 to 75 years
HIGH – score at 8 to 10 points based on…	one incident likely within 10 to 35 years

---

Vote: Severity Rating:

- All those in favor of: **Low**
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- All those in favor of: **High**

Vote: Severity Rating Score:
1-3 (Low)
4-7 (Medium)
8-10 (High)

HAZARD ANALYSIS

Wildland-Wildfire

VULNERABILITY (weight factor for category = 5)

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

LOW – score at 1 to 3 points based on…	< 1% affected
MEDIUM – score at 4 to 7 points based on…	1 - 10% affected
HIGH – score at 8 to 10 points based on…	> 10% affected

Vote: Severity Rating:

- All those in favor of: **Low**
- All those in favor of: **Medium**
- All those in favor of: **High**

Vote: Severity Rating Score:
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HAZARD ANALYSIS

Wildland-Wildfire

MAXIMUM THREAT (weight factor for category = 10)

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

LOW – score at 1 to 3 points based on…	< 5% affected
MEDIUM – score at 4 to 7 points based on…	5 - 25% affected
HIGH – score at 8 to 10 points based on…	> 25% affected

Vote: Severity Rating:

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- All those in favor of: **High**

Vote: Severity Rating Score:
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- Maupin (Homes within the WUI)

HAZARD ANALYSIS

Earthquake (2017 NHMP Ranked 5th Medium Risk Hazard)

Important Definitions

An earthquake is the shaking of the ground caused by an abrupt shift of rock along a fracture in the earth, called a fault. There are three categories of earthquakes and each type may affect Wasco County.

- **First Category:** Shallow or crustal earthquake. Depth of 5 to 10 miles beneath the earth's surface. Associated with fault movement within a surface plate.
- **Second Category:** Intraplate, or "deep" earthquake. Occur when an earthquake on a geologic plate affects another plate. Occur in Pacific Northwest when the Juan de Fuca plate breaks up underneath the continental plate, approximately 30 miles beneath the earth's surface.
- **Third Category:** Subduction zone earthquake. Pacific Northwest this is the Cascadia Subduction Zone (CSZ) earthquake. Occur when two converging plates become stuck along their interface. Movements between the plates build up energy across the locked surface until plates abruptly slip along the interface when the strain is released.

*Earthquake-induced hazards are **liquefaction and landslides.** Liquefaction occurs when saturated soils substantially lose bearing capacity due to ground shaking, causing the soil to behave like a liquid. Landslides are mass movement of rock, debris, or soil induced by ground shaking

(2019 Wasco County NHMP, p. HA-6)

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HAZARD ANALYSIS

History-Probability: Earthquake

Significant Earthquake Events

- Nine quakes since 1936 have impacted Wasco County
- Approximately two thousand earthquakes since 1980
  - 99% of them registering a magnitude less than 3.0
- Largest earthquake in PNW in 1872 in North Cascades
  - Estimated 7.4 magnitude (many aftershocks)
- No clear method to fully assess the future risk
- Research estimates 10% chance of a local subduction zone earthquake within 200 years.

HA-2: Significant Historic Earthquake Events

Occurrence	Description
1400 BCE	Approximate Cascadian Subduction Zone (CSZ) event
1050 BCE	Approximate CSZ
600 BCE	Approximate CSZ
400	Approximate CSZ
750	Approximate CSZ
900	Approximate CSZ
1/27/1700	CSZ
11/23/1873	Oregon/California border, near Brookings, 6.8, Felt as far away as Portland and San Francisco; may have been an intraplate event because of lack of aftershocks.
7/15/1936	Milton-Freewater, 6.4, two foreshocks and many aftershocks felt; $100,000 damage (in 1936 dollars).
4/13/1949	Olympia, Washington, 7.1, Eight deaths and $25 million damage (in 1949 dollars); cracked plaster, other minor damage in northwest Oregon.
11/5/1962	Portland/Vancouver, 5.5, Shaking lasted up to 30 seconds; chimneys cracked, windows broke, furniture moved.
May-July 1968	Adel Swarm, largest 5.1 Swarm, lasted May through July, decreasing in intensity; increased flow at a hot spring was reported.
4/12/1976	Near Maupin, 4.8, Sounds described as distant thunder, sonic booms, and strong wind.
4/25/1992	Cape Mendocino, California,7.0, Subduction earthquake at the triple junction of the Cascadia subduction zone and the San Andreas and Mendocino faults.
3/25/1993	Scotts Mills, 5.6, On Mount Angel-Gales Creek fault; $30 million damage, including Molalla High School and Mount Angel church.
9/20/1993	Klamath Falls, 5.9 and 6.0, Two deaths, $10 million damage, including county courthouse; rockfalls induced by ground motion.

HAZARD ANALYSIS

History-Probability-Vulnerability: Earthquake

Natural Hazard Risk Report for Wasco Count (DOGAMI, 2021)

- Utilized a probabilistic scenario using U.S. Geological Survey (USGS) National Seismic Hazard Maps
- Probabilistic map based on highest level of shaking expected to occur once every 2,475 years
- For practical purposes it can be considered a worst-case event (Magnitude of 7.0)

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HAZARD ANALYSIS

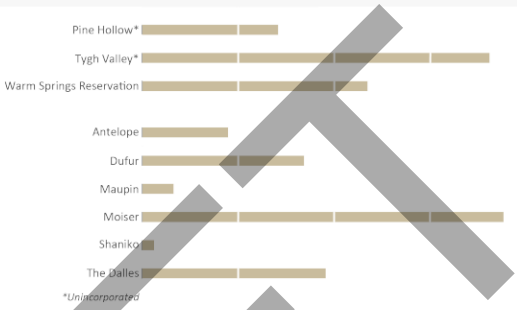
History-Probability-Vulnerability: Earthquake

- ≥ 25% Total Loss
  - Tygh Valley, Warm Springs, & Mosier
- Red Tagged = Uninhabitable
- Yellow Tagged = Limited Habitability
- 18 of 42 critical facilities estimated to be nonfunctioning
- 3,222: 18,481 Buildings Red/Yellow Tagged

Natural Hazard Risk Report for Wasco Count (DOGAMI, 2021)

Wasco countywide 2,500-year probabilistic Mw 7.0 earthquake results:

- Number of red-tagged buildings: 1,104
- Number of yellow-tagged buildings: 2,118
- Loss estimate: $870,172,000
- Loss ratio: 22%
- Non-functioning critical facilities: 18
- Potentially displaced population: 1,888



HAZARD ANALYSIS

Earthquake

HISTORY (weight factor for category = 2)

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

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< Three or more 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 – score at 1 to 3 points based on…	0 - 1 event past 100 years
MEDIUM – score at 4 to 7 points based on…	2 - 3 events past100 years
HIGH – score at 8 to 10 points based on…	4 + events past100 years

Vote: Severity Rating:

- All those in favor of: **Low**
- All those in favor of: **Medium**
- All those in favor of: **High**

Nine quakes since 1936

Vote: Severity Rating Score:

1-3 (Low)
4-7 (Medium)
8-10 (High)

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HAZARD ANALYSIS

Earthquake

PROBABILITY (weight factor for category = 7)

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

LOW – score at 1 to 3 points based on…	one incident likely within 75 to 100 years
MEDIUM – score at 4 to 7 points based on…	one incident likely within 35 to 75 years
HIGH – score at 8 to 10 points based on…	one incident likely within 10 to 35 years

Vote: Severity Rating:

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- All those in favor of: **High**

Vote: Severity Rating Score:
1-3 (Low)
4-7 (Medium)
8-10 (High)

Nine quakes since 1936

HAZARD ANALYSIS

Earthquake

VULNERABILITY (weight factor for category = 5)

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

LOW – score at 1 to 3 points based on…	< 1% affected
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HIGH – score at 8 to 10 points based on…	> 10% affected

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- Loss ratio: 22%
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HAZARD ANALYSIS

Earthquake

MAXIMUM THREAT (weight factor for category = 10)

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

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- Loss ratio: 22%
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- Potentially displaced population: 1,888

HAZARD ANALYSIS

Flood (2017 NHMP Ranked 4th Medium Risk Hazard)

Important Definitions

FEMA: A general and temporary condition of partial or complete inundation of 2 or more acres of normally dry land area. (National Flood Insurance Program Requirements, 59.1 – Definition)

In Wasco County, flooding events primarily caused by extensive wet conditions that follow a period of mid and high elevation ice and snow pack development.

Flood Types in Wasco County:

- **Riverine floods:** Amount of water flowing through a river channel exceeds the capacity of that channel. (Most common type of flooding)
- **Flash flooding:** Sudden rainstorms produce a large amount of rain in a very short period of time.

These types of floods occur in steeply sloping valleys and in small waterways.

- **Stormwater, or urban flooding:** Runoff from rainfall concentrates in developed areas, drainage, and low lying areas.

Poor drainage, elevated groundwater levels, and ponding are all symptoms of storm water flooding.

(2019 Wasco County NHMP, p. HA-11)

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HAZARD ANALYSIS

History-Probability: Flood

Significant Flood Events

- Four federal disasters in 32 years
- 13 significant floods in 100 years
- *Mild flooding every few years: White River, Deschutes & Columbia Rivers
- Climate change may increase heavy rain-storms increasing flash flooding

HA-3: Significant Historic Flood Events	
Occurrence	**Description**
January 1923	Record flood levels on the Deschutes River
May 1928	Columbia River flooding occurred
March 1932	Flooding occurred on the John Day and Grande Ronde Rivers
5/30/1948	Columbia River crested at 34.4 ft. Flood stage at that time was 15 ft. This is the flood that destroyed the City of Vanport. Fifteen people died in the flood.
March 1952	Flooding occurred on the John Day and Grande Ronde Rivers, highest flood stages on these rivers in over 40 years
July 1956	Flash flooding occurred in Central Oregon
December 1964*	Region wide flooding occurred (Dec 24, 1964)
1/25/1974*	Storms/Flooding/Snow Melt
July 1995*	Fifteen Mile Creek Flash Food. This flood was caused by a summer thunderstorm
1/1996 - 2/1996*	This widespread flood in the Pacific Northwest was the result of heavy rain and warming on heavy mid elevation snowpack, and was similar to regional flooding in December 1964. The Columbia River crested at 27.1 ft. on February 9. This flood occurred because of the confluence of several factors. The winter of 1995/96 was extremely rainy. Prior to the flooding period, the region experienced a cold snap with low elevation freezing, ice, and snow. As a result, Mill Creek flooded downtown The Dalles where heavy damage was caused. The last 850 ft. of Mill Creek before it enters the Columbia River was in a tunnel. Heavy debris flows and log jams at the tunnel inlet coupled with reduced discharge head caused by Columbia River levels backed water up and into the downtown business area. Losses were in millions of dollars.
12/1996-2/1997	Region wide flooding occurred
12/14 - 12/16/2006	Winter Storms/Flooding
August 2019	A powerful upper storm system combined with modest low and mid-level moisture to yield scattered strong to severe storms and flash flooding.
(* - Federal Disaster Declaration)	

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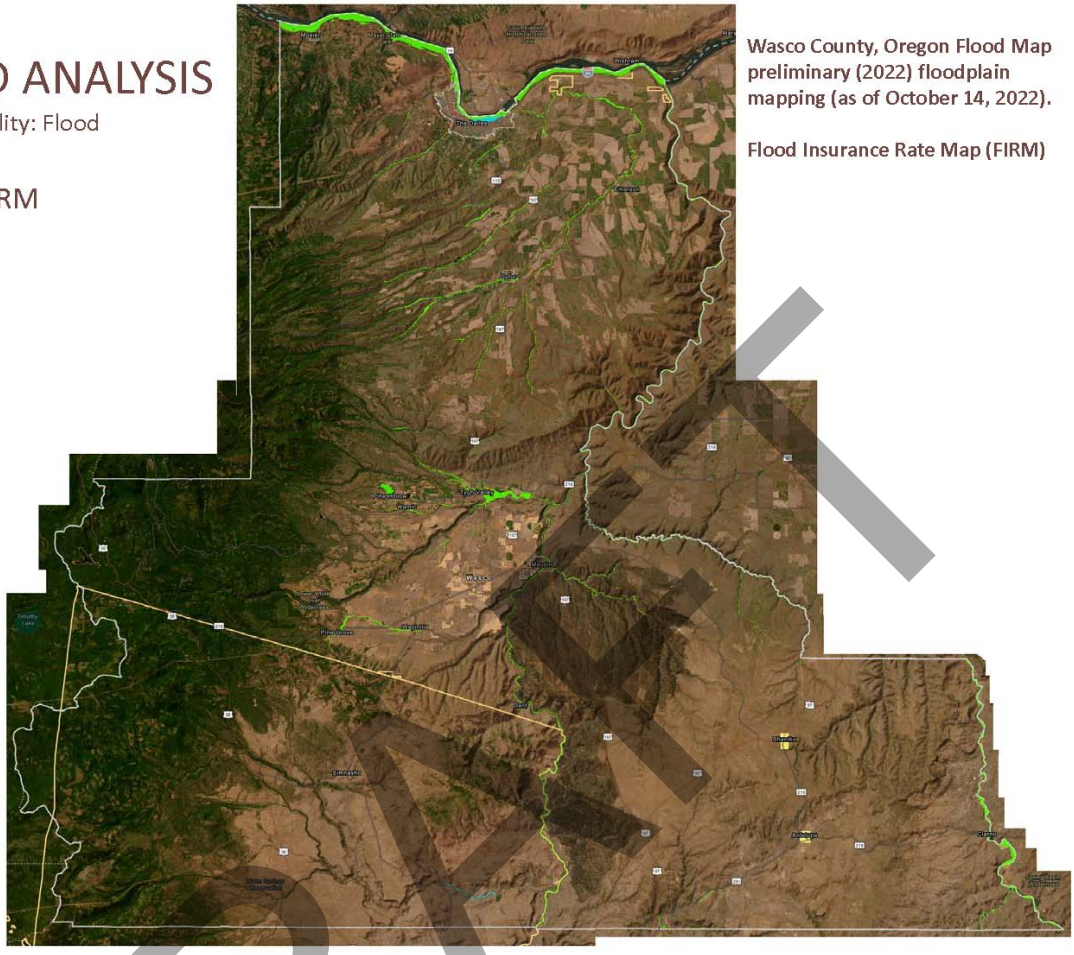
HAZARD ANALYSIS

History-Probability: Flood

- Updated FIRM



Wasco County, Oregon Flood Map preliminary (2022) floodplain mapping (as of October 14, 2022).

Flood Insurance Rate Map (FIRM)

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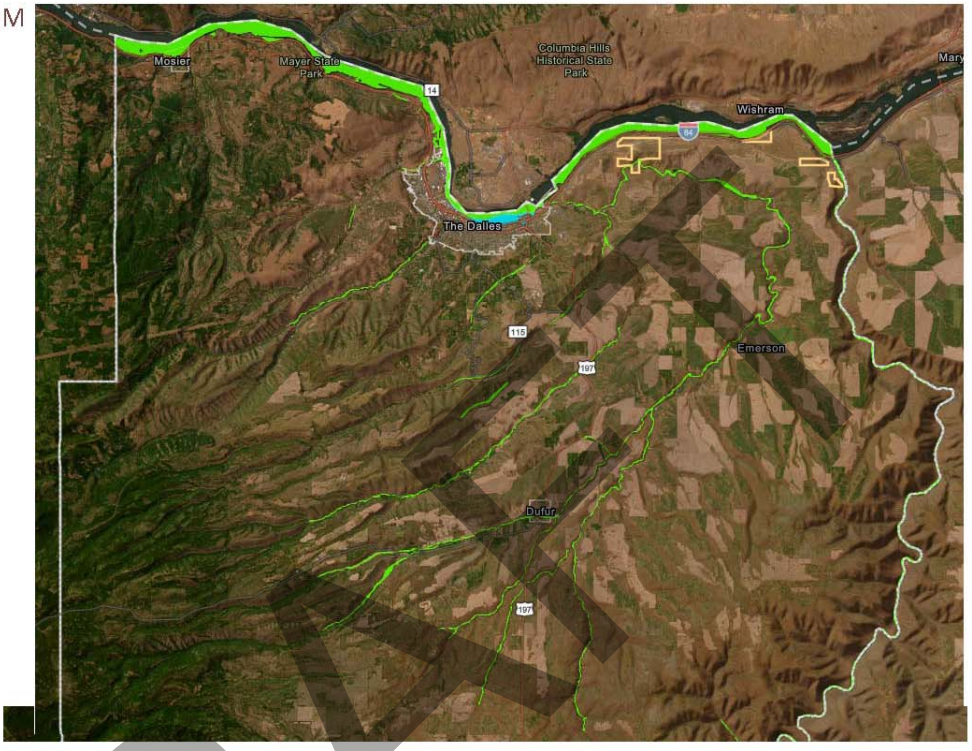
HAZARD ANALYSIS

Vulnerability/Max Threat: Flood

- 39 Parcels Out of FIRM



HAZARD ANALYSIS

Vulnerability/Max Threat: Flood

- 39 Parcels Out of FIRM

- 289 Parcels Into FIRM

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HAZARD ANALYSIS

Vulnerability/Max Threat: Flood

Wasco County Flood Insurance Rate Map

- 39 Tax Lots Out of FIRM
- 289 Tax Lots Into FIRM
- 559 Tax Lots Remain in FIRM

Total: 848 Tax Lots within FIRM

HAZARD ANALYSIS

Vulnerability/Max Threat: Flood

Natural Hazard Risk Report for Wasco Count (DOGAMI, 2021)

- Identified probability of flooding and the impacts of flooding
  - Annual probabilities calculated for flood hazard used 1% (100-year scenario)
- Significant Rivers: Columbia, Deschutes, John Day, Warm Springs, & White River
  - Significant Streams: Fifteenmile, Grub Hollow, Mosier, Mill, Rock, Threemile
- Building loss estimates are determined in Hazus-MH by overlaying building data on a depth grid
  - Used building information: first-floor height & basement to calculate loss ratio from a particular depth of flood

100-year Flood Scenario Results

Wasco countywide 100-year flood loss:

- Number of buildings damaged: 560
- Loss estimate: $19,867,000
- Loss ratio: 0.5%
- Damaged critical facilities: 1
- Potentially displaced population: 540

- 560: 18,481 Buildings Damaged
  - 3% Total Buildings
- Hardest hit communities (Chenoweth, Tygh Valley, The Dalles, and Dufur)

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HAZARD ANALYSIS

Flood

HISTORY (weight factor for category = 2)

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

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Vote: Severity Rating:

- All those in favor of: **Low**
- All those in favor of: **Medium**
- All those in favor of: **High**

13 significant floods in 100 years

Vote: Severity Rating Score:
1-3 (Low)
4-7 (Medium)
8-10 (High)

HAZARD ANALYSIS

Flood

PROBABILITY (weight factor for category = 7)

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

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13 significant floods in 100 years

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HAZARD ANALYSIS

Flood

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HAZARD ANALYSIS

Flood

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- Potentially displaced population: 540

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HAZARD ANALYSIS

Landslide (2017 NHMP Ranked 7th Low Risk Hazard)

Important Definitions

Landslides are the sliding movement of masses of loosened rock and soil down a hillside or slope. Include a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows.

Most common landslides occur on water saturated slopes when the base of the slope can no longer support the weight of the soil above it.

- Commonly associated with heavy rain and flooding conditions
- Associated with earthquakes
- Associated with volcanic activity

(2019 Wasco County NHMP, p. HA-19)

HAZARD ANALYSIS

History-Probability: Landslide

Significant Landslide Events

- Few significant landslides causing widespread damage or injury
- Landslide maps indicate multiple communities have some exposure to landslide hazard

HA-5: Significant Historic Landslide Events	
Occurrence	**Description**
1980s	Kelly Avenue Landslide – slow moving landslide being mitigated to this day
12/1996- 2/1997	This period saw a few landslides following periods of heavy rains
5/7/2017	Rockfall by Rowena crest, damaged Hwy 30, temporary closure
A total of 2,819 landslide areas (2,693 within 2023 DOGAMI study area) & 126 deposits outside of study area	

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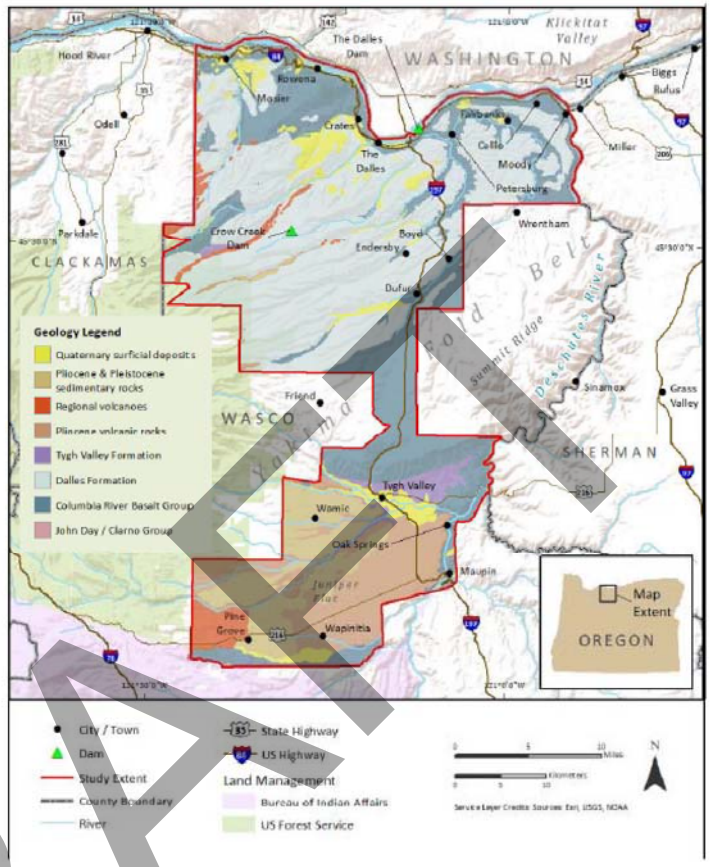
HAZARD ANALYSIS

Vulnerability/Max Threat: Landslide

New Landslide Areas Identified

- Updated Geologic Study
- Inventoried 2,693 new landslide areas
  - 536 are deep landslides (north portion)
  - 214 are rockfall deposits (Creeks & Rivers)
  - 1,653 are debris flow deposits (Tygh Valley)
  - Remaining shallow or unclassified

Landslide Inventory & Risk Reduction of the North & Central Portions of Wasco County Oregon (DOGAMI, 2023)



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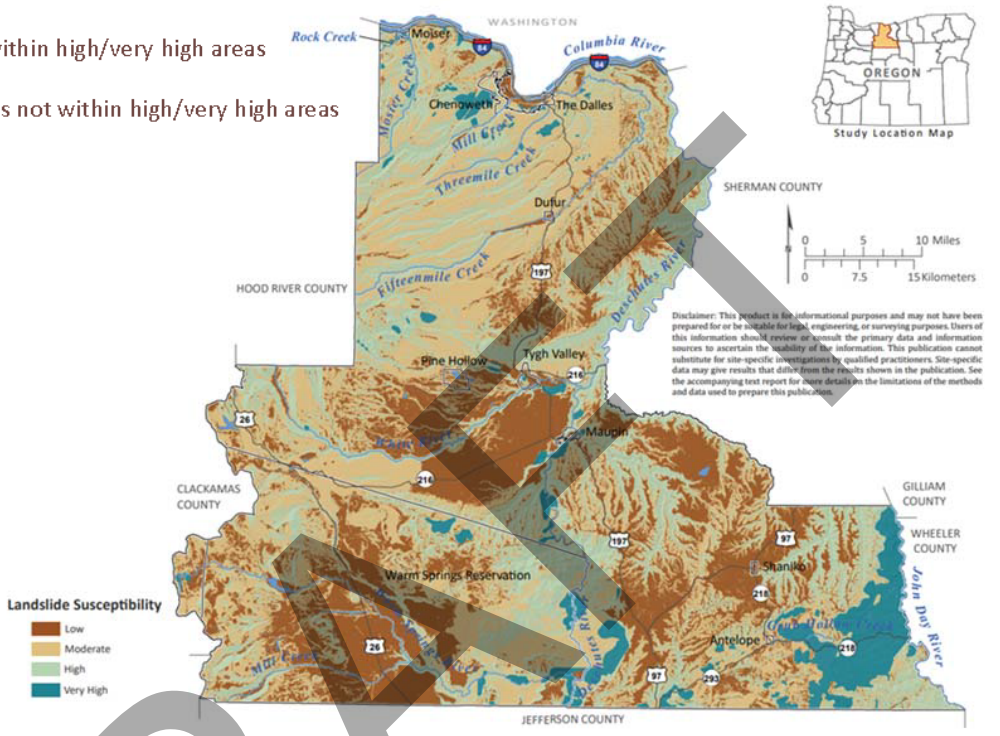
HAZARD ANALYSIS

Vulnerability/Max Threat: Landslide

Susceptible Communities

- Mosier, Tygh Valley & Warm Springs
- 13% building value within high/very high areas
- Most populated areas not within high/very high areas

Natural Hazard Risk Report for Wasco Count (DOGAMI, 2021)



HAZARD ANALYSIS

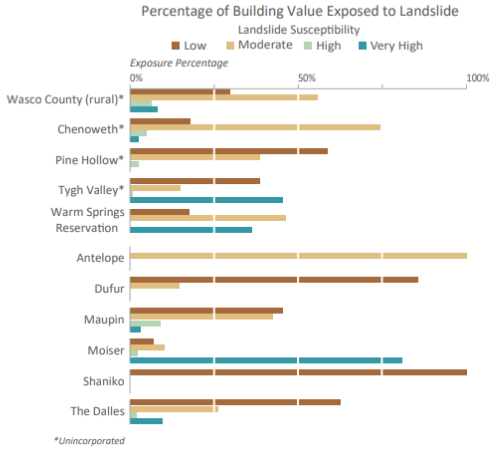
Vulnerability/Max Threat: Landslide

- No clear prediction model
- Difficult to predict
  - rainstorm or excavator
- Secondary hazard:
  - Earthquake or volcano
  - Lack of vegetation (wildland-wildfire)

Natural Hazard Risk Report for Wasco Count (DOGAMI, 2021)

Wasco countywide landslide exposure (High and Very High susceptibility):

- Number of buildings: 3,013
- Value of exposed buildings: $498,607,000
- Percentage of exposure value: 13%
- Critical facilities exposed: 4
- Potentially displaced population: 4,338



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HAZARD ANALYSIS

Landslide

HISTORY (weight factor for category = 2)

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

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---

Vote: Severity Rating:

- All those in favor of: **Low**
- All those in favor of: **Medium**
- All those in favor of: **High**

Few significant landslides causing widespread damage or injury

Vote: Severity Rating Score:
1-3 (Low)
4-7 (Medium)
8-10 (High)

HAZARD ANALYSIS

Landslide

PROBABILITY (weight factor for category = 7)

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

LOW – score at 1 to 3 points based on…	one incident likely within 75 to 100 years
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HAZARD ANALYSIS

Landslide

VULNERABILITY (weight factor for category = 5)

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

LOW – score at 1 to 3 points based on…	< 1% affected
MEDIUM – score at 4 to 7 points based on…	1 - 10% affected
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- Potentially displaced population: 4,338

HAZARD ANALYSIS

Landslide

MAXIMUM THREAT (weight factor for category = 10)

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

LOW – score at 1 to 3 points based on…	< 5% affected
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HAZARD ANALYSIS

Volcano (2017 NHMP Ranked 6th Low Risk Hazard)

Important Definitions

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. Volcanoes are a deadly hazard. 1980 to 1995 volcanoes killed approximately 29,000 people, forced the evacuation of 830,000 people, and caused economic losses in excess of $3 billion.

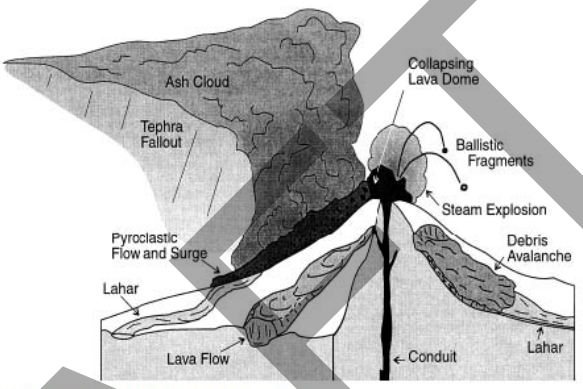

Figure A - Types of volcanic hazards[1]

(2019 Wasco County NHMP, p. HA-27)

HAZARD ANALYSIS

Volcano

Important Definitions

Numerous hazards related to volcanoes and volcano eruption:

- **Pyroclastic Flows and Surges:** Avalanches of hot (300-800°C), dry, volcanic rock fragments and gases that descend a volcano's flanks at speeds ranging from 20 to more than 200 miles per hour. Originate from the explosion related to an eruption. (Extremely Lethal)
- **Lava Flows:** Normally, the least hazardous threat posed by volcanoes. Silica content of lava determines the speed and viscosity of a lava flow. High silica content, the more viscous (thick) the lava. Low silica flow moves 10 to 30 mph.
- **Tephra:** The ash and volcanic projectiles that erupt from a volcano into the atmosphere. Largest fragments (bombs, >64mm) fall back to the ground near the vents, from a few meters, but as far as 10 km (6 mi.). The smallest rock fragments (ash) are composed of rock, minerals, and glass that are less than two millimeters in diameter.
- **Lahars**: Rapidly flowing mixtures of water and rock debris. Commonly associated with eruptions, heavy rains, debris accumulation, and even earthquakes may also trigger them. They may also be debris or mud flows. Can travel 50 miles downstream, reaching speeds between 20 and 40 mph. (Highest recorded: 1980 Mt. St. Helens eruption was 88 mph).

(2019 Wasco County NHMP, p. HA-27)

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HAZARD ANALYSIS

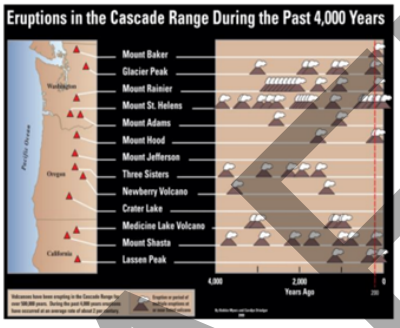
History-Probability: Volcano

Significant Landslide Events

- Few significant volcano events causing widespread damage or injury in recent history
- Volcano hazard can cause many secondary hazards (earthquake & landslide)

HA-8: Significant Historic Volcano Events	
Occurrence	**Description**
5/1/1980	Mt. St. Helens, ashfall in Wasco County
Various	At least five eruptions in the Cascade Rangehave occurred during the past 150 years.

Eruptions in the Cascade Range During the Past 4,000 Years



Source: Myers and Driedger (2008)

HAZARD ANALYSIS

Vulnerability/Max Threat: Volcano

Larry G. Mastin, Ph.D. USGS (Email to Sheridan January 9, 2020)

- Wasco County (The Dalles), Mount St. Helens is a bigger threat than Mount Hood
  - MSH erupts more frequently, and produces bigger eruptions
  - Only MH eruptions in 10,000 years have been lava domes & ash clouds from domes
- Ran 1,000 simulations of a MSH eruption of the size during the May 18, 1980 eruption
  - Random sampling from wind fields in the historical record
  - The maximum ash thickness at the Dalles is about 5 cm (compacted)

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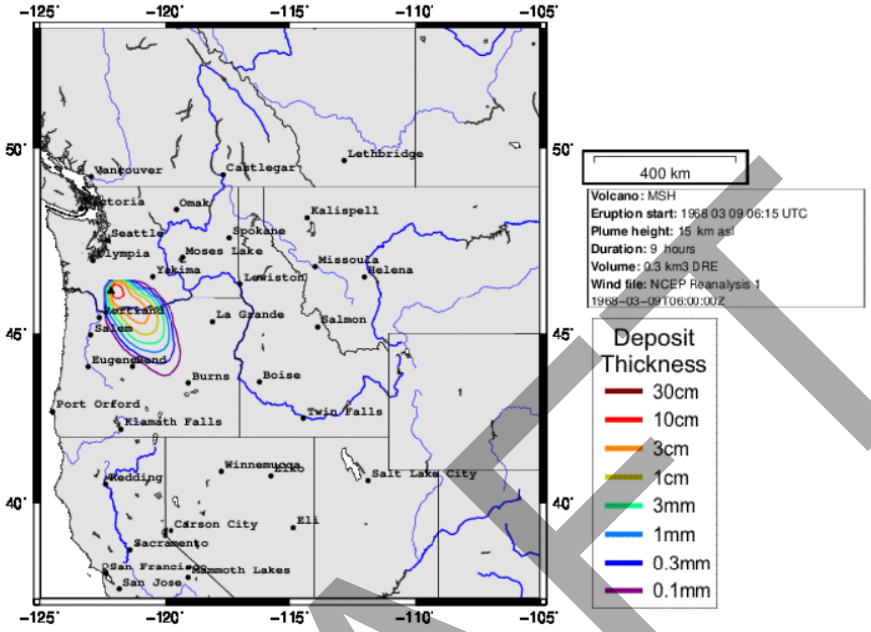
HAZARD ANALYSIS

Vulnerability/Max Threat: Volcano



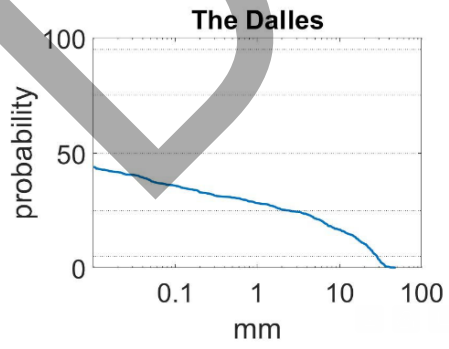
HAZARD ANALYSIS

Vulnerability/Max Threat: Volcano

Larry G. Mastin, Ph.D. USGS (Email to Sheridan January 9, 2020)

- Ash cloud arrived at The Dalles about 1.05 hours after eruption
- Ash started falling at ground level 2.75 hours after, and fell for >13 hours
  - New-fallen ash is fluffier than compacted ash, and might be 10-15 cm or more thick
- 1,000 simulations, 60% no-ash due to wind conditions

Plot of probability versus ash thickness



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HAZARD ANALYSIS

Vulnerability/Max Threat: Volcano

Considerations

- Volcano eruption can be predicted
- Cause multiple secondary hazards with or without eruption (earthquakes & landslides)
- Disrupt transportation and communication networks
- Impact some municipal water supplies
- Displace large numbers of people
- Ash fall reduces air quality and can destroy agriculture

HAZARD ANALYSIS

Volcano

HISTORY (weight factor for category = 2)

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Vote: Severity Rating Score:
1-3 (Low)
4-7 (Medium)
8-10 (High)

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HAZARD ANALYSIS

Volcano

PROBABILITY (weight factor for category = 7)

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

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HAZARD ANALYSIS

Volcano

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Can impact entire county
Property Damage (agriculture)

Total and Per Farm Overview, 2022 and change since 2017

	2022	% change since 2017
Number of farms	458	-23
Land in farms (acres)	978,577	-30
Average size of farm (acres)	2,137	-8
Total	($)	
Market value of products sold	137,967,000	+47
Government payments	9,903,000	+36
Farm-related income	8,962,000	+46
Total farm production expenses	126,257,000	+24
Net cash farm income	30,575,000	+484
Per farm average	($)	
Market value of products sold	301,237	+91
Government payments *	51,312	+86
Farm-related income *	50,064	+103
Total farm production expenses	275,670	+61
Net cash farm income	66,757	+658

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HAZARD ANALYSIS

Volcano

MAXIMUM THREAT (weight factor for category = 10)

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

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HAZARD ANALYSIS

Drought (2017 NHMP Ranked 2nd High Risk Hazard)

Important Definitions

Drought is a condition of climatic dryness severe enough to reduce soil moisture and water below the minimum necessary for sustaining plant, animal, and human life systems.

Drought is typically measured in terms of water availability in a defined geographical area.

The Oregon Drought Severity Index is the most commonly used drought measurement in the state. It categorizes droughts as mild, moderate, severe, and extreme.

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HAZARD ANALYSIS

History-Probability: Drought

Significant Drought Events

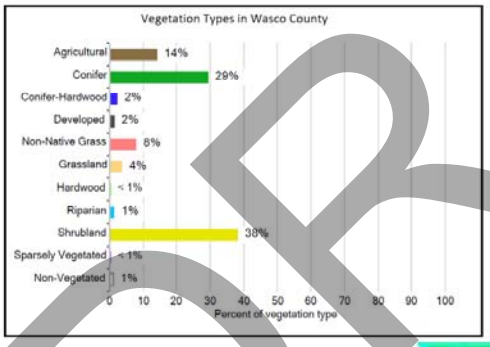
- 20: 73 Years of Drought 1904-1977
  - 27% in drought
- 16: 45 Years of Drought 1904-1949
  - 35.5% in drought
- 9: 45 Years of Drought 1978-2023
  - 20% in drought
- Drought in Wasco County since 2020

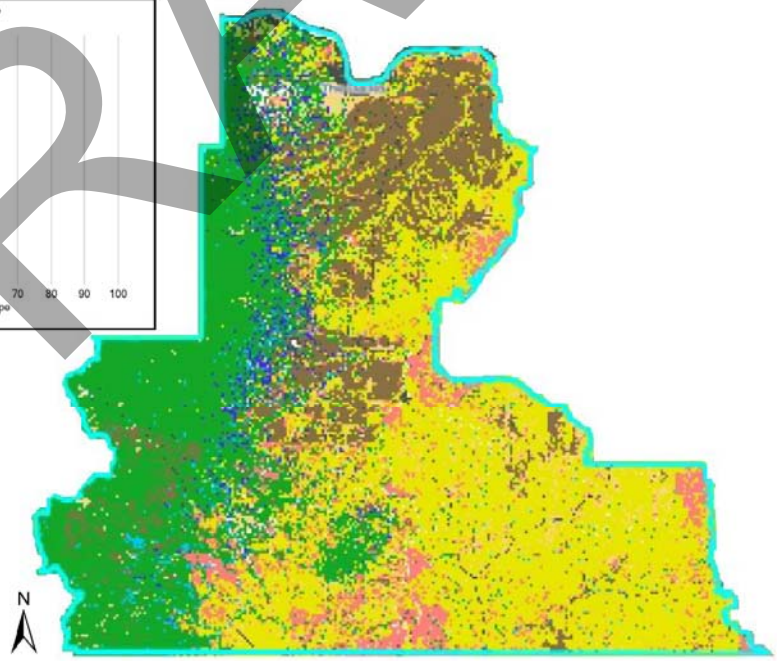
HA-1: Significant Historic Drought Events

Occurrence	Description
1904-1905	Drought period of about 18 months
1917-1931	Very dry period punctuated by brief wet spells (1920, 1927)
1939-1941	Three-year intense drought
1965-1968	Three-year drought following the big regional floods of 1964-65
1976-1977	Brief very intense statewide drought
1985-1994	Generally dry period, capped by statewide droughts in 1992 and 1994
2001-2002	State drought declaration for majority of state including Wasco County
2005	State drought declaration for Wasco County and 12 Counties
2014	State drought for 10 Counties
2015-2016	State drought for majority of state including Wasco County
2018	State drought declaration for 11 Counties
2020	State drought declaration for Wasco County and 14 other Counties
2021	State drought declaration for Wasco County and 25 other Counties
2022	State drought declaration for Wasco County and 16 other Counties
2023	State drought declaration for Wasco County and 12 other Counties

HAZARD ANALYSIS

Vulnerability/Max Threat: Drought





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2022 CENSUS OF AGRICULTURE *County Profile*

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2 Percent of state agriculture sales

Share of Sales by Type (%)

Crops	91
Livestock, poultry, and products	9

Land in Farms by Use (acres)

Cropland	217,603
Pastureland	621,906
Woodland	100,724
Other	38,344

Acres irrigated: 23,082
2% of land in farms

Land Use Practices (% of farms)

No till	15
Reduced till	5
Intensive till	10
Cover crop	6

Farms by Value of Sales

	Number	Percent of Total [b]
Less than $2,500	154	34
$2,500 to $4,999	40	9
$5,000 to $9,999	31	7
$10,000 to $24,999	41	9
$25,000 to $49,999	26	6
$50,000 to $99,999	42	9
$100,000 or more	124	27

Farms by Size

	Number	Percent of Total [b]
1 to 9 acres	36	8
10 to 49 acres	116	25
50 to 179 acres	88	19
180 to 499 acres	82	18
500 to 999 acres	31	7
1,000+ acres	105	23

HAZARD ANALYSIS
Vulnerability/Max Threat: Drought

Drought & Water Resource Information & Concerns

- Water Quantity – Aquifer Overdraft & Depletion
  - Concern posed by NRCS Wasco County Long Range Strategy 2023-2027
- Mosier Deep Well #1 (Permit No. 921-19-000185-PLNG)
  - Oregon Water Resources & Wasco County Soil & Water Conservation District
  - 2020 permitted well into the Grand Ronde Aquifer relieving 350 gallons per minute from Pamona Aquifer
- Mosier Backup Well No. 5 (Permit No. 921-22-000009-PLNG)
  - Provided a back up well for City of Mosier
- Increases propensity for wildland-wildfire
- Significant impact on agriculture industry
- Low stream flows create higher water temperatures, oxygen depletion, disease for fish

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HAZARD ANALYSIS

Drought

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HAZARD ANALYSIS

Drought

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HAZARD ANALYSIS

Drought

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HAZARD ANALYSIS

Extreme Heat (Added to Oregon State NHMP in 2020)

Important Definitions

Extreme heat events occur as a result of natural variability. Conditions that drive extreme heat events in the Pacific Northwest include, upper-level ridges, or large areas of high atmospheric pressure, and strong offshore flow.

- One method to measure extreme heat is to count the number of days with temperatures above a certain threshold, such as days with temperatures above 90°F.
- The National Weather Service issues heat warnings when the heat index exceeds given local thresholds. Heat index is a measure of how hot it feels combining temperature and relative humidity. As relative humidity increases, a temperature can feel even hotter.

NOAA's National Weather Service

Heat Index

Temperature (°F)

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution | Extreme Caution | Danger | Extreme Danger

Source: https://www.weather.gov/phi/heat

(Oregon Natural Hazards Mitigation Plan, September 2020, pp. 237-238)

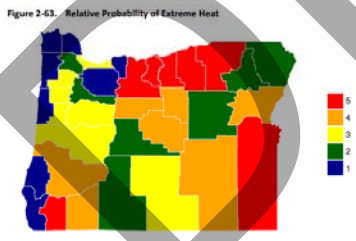
HAZARD ANALYSIS

History-Probability: Extreme Heat

Significant Extreme Heat Events

- Significant heat waves in 2021 and 2022
- Oregon 2020 NHMP ranks Wasco County as "Very High" (5: 6 Counties in Region 5)
  - Based on historic and projected future frequency of days with heat index above 90°F

Figure 2-63. Relative Probability of Extreme Heat



Note: 5 = "Very High"; 4 = "High"; 3 = "Moderate"; 2 = "Low"; 1 = "Very Low"
Source: Oregon Climate Change Research Institute

HA-7: Significant Historic Extreme Heat Events

Occurrence	Description
June 28-30, 2008	An upper level ridge and thermal trough across the Pacific Northwest produced temperatures above 100 degrees for two consecutive days breaking records in many locations.
August 15-17, 2008	Excessive Heat Event: An upper level ridge and dry air brought excessive heat into eastern Oregon. Many locations experienced multiple days of at least 100 degree temperatures.
July 12-16, 2018	Major heatwave, with 5 triple digit days: 102, 101, 101, 105, 103
June-August, 2021	Major heatwave (heatdome), governor declared emergency for Wasco County and 22 other counties. 5 triple digit days breaking records: 102, 110, 115, 118, 107 in June recorded in The Dalles. 15-days of triple digit tempretures recorded in The Dalles from July-August.
July-August, 2022	Heatwave, not as significant as the 2020 heatdome, but Wasco County experienced 20 days of triple digit temperatures.

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HAZARD ANALYSIS

Vulnerability/Max Threat: Extreme Heat

- Is associated with more fatalities than any other severe weather event in the United States*

Table 2-40. Percentage of Homes with Cooling Equipment

	Single Family Homes	Manufactured Homes
Cooling Zone 1 (All of Regions 1 and 3 plus Columbia, Washington, Hood River, Jefferson, Wheeler, Crook, Deschutes, Lake, Wallowa, Baker, Harney Counties)	57.7%	59.5%
Cooling Zone 2 (Multnomah, Clackamas, Douglas, Sherman, Gilliam, Morrow, Klamath, Union, Grant Counties)	55.4%	66.8%
Cooling Zone 3 (Josephine, Jackson, Malheur, Wasco, and Umatilla Counties)	90.7%	76.9%
All Cooling Zones (Oregon)	67.9%	67.7%

Source: https://neea.org/img/uploads/Residential-Building-Stock-Assessment-II-Single-Family-Homes-Report-2016-2017.pdf, p. 41

- Days with average temperatures at or below 65 degrees are not cooling degree days
  - Cooling Zone 1 is defined as having fewer than 300 cooling degree-days annually
  - Cooling Zone 2 is defined as having 300 to 600 cooling degree-days annually
  - Cooling Zone 3 is defined as having more than 600 cooling degree-days annually

HAZARD ANALYSIS

Vulnerability/Max Threat: Extreme Heat

- Is associated with more fatalities than any other severe weather event in the United States*

Most Threatened Population Groups*

- Elderly, children, infants
- Disabled/infirm
- Outdoor workers
- Homeless

- Increased energy and water demand

- Increased stress on plants & animals

Table 2-41. Adaptive Capacity Rankings

Quantile Range	Adaptive Capacity	Rank	Vulnerability
0.0–0.2	Very Low	5	Very High
0.2–0.4	Low	4	High
0.4–0.6	Moderate	3	Moderate
0.6–0.8	High	2	Low
0.8–1.0	Very High	1	Very Low

Table 2-42. Relative Vulnerability Rankings for Oregon Counties and Regions

County	Sensitivity	Adaptive Capacity	Vulnerability
Region 5	**3**	**2**	**3**
Gilliam	1	3	2
Hood River	3	3	3
Morrow	5	3	4
Sherman	1	3	2
Umatilla	5	1	3
Wasco	5	1	3

The relative vulnerability of Oregon counties to extreme heat was determined by adding the rankings for sensitivity (social vulnerability) and adaptive capacity (air conditioning)*

(Oregon Natural Hazards Mitigation Plan, September 2020, pp. 247-251

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HAZARD ANALYSIS

Extreme Heat

HISTORY (weight factor for category = 2)

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

- The EOC or alternate EOC was activated;
- Three or more 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 – score at 1 to 3 points based on…	0 - 1 event past 100 years
MEDIUM – score at 4 to 7 points based on…	2 - 3 events past100 years
HIGH – score at 8 to 10 points based on…	4 + events past100 years

---

Vote: Severity Rating:

- All those in favor of: **Low**
- All those in favor of: **Medium**
- All those in favor of: **High**

Vote: Severity Rating Score:
1-3 (Low)
4-7 (Medium)
8-10 (High)

HAZARD ANALYSIS

Extreme Heat

PROBABILITY (weight factor for category = 7)

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

LOW – score at 1 to 3 points based on…	one incident likely within 75 to 100 years
MEDIUM – score at 4 to 7 points based on…	one incident likely within 35 to 75 years
HIGH – score at 8 to 10 points based on…	one incident likely within 10 to 35 years

---

Vote: Severity Rating:

- All those in favor of: **Low**
- All those in favor of: **Medium**
- All those in favor of: **High**

Vote: Severity Rating Score:
1-3 (Low)
4-7 (Medium)
8-10 (High)

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HAZARD ANALYSIS

Extreme Heat

VULNERABILITY (weight factor for category = 5)

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

LOW – score at 1 to 3 points based on…	< 1% affected
MEDIUM – score at 4 to 7 points based on…	1 - 10% affected
HIGH – score at 8 to 10 points based on…	> 10% affected

Vote: Severity Rating:

- All those in favor of: **Low**
- All those in favor of: **Medium**
- All those in favor of: **High**

Vote: Severity Rating Score:

1-3 (Low)
4-7 (Medium)
8-10 (High)

Can impact entire county

Property Damage (agriculture)

Total and Per Farm Overview, 2022 and change since 2017

	2022	% change since 2017
Number of farms	458	-23
Land in farms (acres)	978,577	-30
Average size of farm (acres)	2,137	-8
Total	($)	
Market value of products sold	137,967,000	+47
Government payments	9,903,000	+36
Farm-related income	8,962,000	+46
Total farm production expenses	126,257,000	+24
Net cash farm income	30,575,000	+484
Per farm average	($)	
Market value of products sold	301,237	+91
Government payments *	51,312	+86
Farm-related income *	50,064	+103
Total farm production expenses	275,670	+61
Net cash farm income	66,757	+658

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HAZARD ANALYSIS

Extreme Heat

MAXIMUM THREAT (weight factor for category = 10)

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

LOW – score at 1 to 3 points based on…	< 5% affected
MEDIUM – score at 4 to 7 points based on…	5 - 25% affected
HIGH – score at 8 to 10 points based on…	> 25% affected

Vote: Severity Rating:

- All those in favor of: **Low**
- All those in favor of: **Medium**
- All those in favor of: **High**

Vote: Severity Rating Score:

1-3 (Low)
4-7 (Medium)
8-10 (High)

Can impact entire county

Property Damage (agriculture)

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HAZARD ANALYSIS

Severe Local Storm (2017 NHMP Ranked 1st High Risk Hazard)

Important Definitions

Communities throughout Wasco County are vulnerable to a variety of severe storm hazards:

Ice Storms or Freezing Rain (black ice): Occur when rain falls from warm moist upper layers of the atmosphere into a cold, dry layer near the ground. The rain freezes on contact with the cold ground and accumulates on exposed surfaces.

Snow Storm or Blizzard: National Weather Service defines a blizzard as a storm which contains large amounts of snow OR blowing snow, with winds in excess of 35 mph and visibilities of less than 1/4 mile for an extended period of time (at least 3 hours). Accumulations average between 4 – 5 inches in the City of the Dalles each year.

Windstorm: Wind that is strong enough to cause at least light damage to trees and buildings and may or may not be accompanied by precipitation. Peak wind gusts have gone above 100 miles per hour. The strongest winds that impact Wasco County come from either east or west.

Tornado: Tornadoes characterized by funnel clouds of varying sizes that generate winds as fast as 500 miles per hour. They can affect an area of ¼ to ¾ of a mile and seldom more than 16 miles long.

HAZARD ANALYSIS

History-Probability: Severe Local Storm (Ice Storms, Snow Storm, Windstorm & Tornado)

HA-6: Significant Historic Severe Weather Events

Occurrence	Description
12/16 - 12/18/1884	Heavy snow in the Columbia River Basin from Portland to The Dalles and along the Cascades foothills in the Willamette Valley; 1-day snow totals: Albany, 16.0 inches; The Dalles, 29.5 inches; Portland, 12.4 inches.
Dec 1885	Most snow recorded (6-10 feet), trains had difficulty reaching Portland
12/20/1892-12/23/1892	The record snowfall in the region occurred December 20-23, 1892. In Southwest Washington and Northwest Oregon, 15 to 30 inches fell. Portland had 27.5 inches of snow.
1/30 - 2/3/1916	Snow and ice storm along the northern Oregon border
12/5 - 12/7/1950	Severe ice storm over the columbia basin east of the Cascades
1/18/1956	Freezing rain/snow produced dangerous highway conditions
10/12/1962	The Columbus Day Storm on October 12, 1962 was the worst windstorm to occur in the Northwest since records have been kept. Thirty-eight people died and monetary losses were estimated somewhere between $175 and $200 million. The Portland Airport reported a peak gust of 88 miles per hour. At the Morrison Bridge in Downtown Portland there was a peak gust of 114 mph.
1/17 - 1/19/1970	Freezing temps for a week caused severe ice build up, damaged trees/utilities
April 1970	Tornado observed, no damage
11/22 - 11/23/1970	Freezing rain, 0.5 inch ice accumulations damaged trees
1/25/1974	Storms/Flooding/Snow Melt
July 1995	Fifteen Mile Creek Flash Food, This flood was caused by a summer thunderstorm
11/13/1981-11/15/1981	The strongest windstorm since the Columbus Day Storm occurred November 13-15, 1981. This storm was nearly as strong as the Columbus Day Storm but it tracked farther west. This was actually two strong windstorms, the stronger first storm arriving November 13 and early November 14 and the second storm hit on November 15.
2/14 - 2/16/1990	Two feet of snow in the Gorge
1/16 - 1/18/1996	Freezing rain with heavy accumulations of ice in the Gorge
2/2 - 2/4/1996	Ice storm
12/26 - 12/30/1996	Ice storm, 4-5 inches of ice in the Gorge, I-84 closed for 4 days, downed trees

Significant Local Storm Events

- Since 2010, seven severe weather events
  - $120,000+ damages, closures (highways & business)
- 1962 Windstorm caused $175-$200 million in loss
- Can be difficult to predict extent of storm & damages

12/26/2003 - 1/14/2004	Winter Storms, federal disaster declared for 30/36 Counties
April 2004	Wind storm, $1000 damage
December 2004	Wind storm, $3,333 damage across Sherman, Wasco, Jefferson Counties
March 2005	Wind storm, $2,500 damage across Sherman, Wasco, Jefferson Counties
January 2007	Wind storm, $5000 damage across Gilliam, Sherman, Morrow, Wasco, Umatilla, Jefferson Counties
11/29 - 11/20/2010	4-5 inches of snow, 1/2 inch ice
1/12 - 1/18/2010	4.5 inches of snow, I84 closed due to snow and ice
November 2012	Wind storm, $120,000 damage across Gilliam, Sherman, Morrow, Wasco, Umatilla, Wallowa, Union, Jefferson Counties
December 2016 - February2017	Emergency Declaration requested, multiple highway closures, snow on the ground in The Dalles for 3 months
February 22-26, 2019	Stream of mid-level moisture resulting in a long duration snow event Wasco, Sherman, Gilliam, Morrow, and Umatilla, Counties (Eastern Columbia River Gorge)
2022	Severe ice storm, closure of I-84 several days. Severe wind storms resulted in the death of one person.
2023-2024	December & January severe winter weather storm (12-days in January) brought significant snow (1-2 feet), extreme cold arctic air (-2°F), and closed portions of I-84.

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HAZARD ANALYSIS

History-Probability-Vulnerability: Severe Local Storm (Ice Storms, Snow Storm, Windstorm & Tornado)

Considerations

- Moderate storms can cause widespread hazards
  - Difficult to predict when or if a moderate storm will turn into a severe storm

- Entire County is vulnerable to the effects of a storm
  - Bring down power lines, trees, and tree limbs
  - Disrupt transportation & communication networks
  - Can disrupt and destroy agriculture produce
  - Heavy toll on local resources

- Seldom causes death and injury and rarely results in severe property damage*

*(2019 Wasco County NHMP, p. HA-26)

HAZARD ANALYSIS

Severe Local Storm (Ice Storms, Snow Storm, Windstorm & Tornado)

HISTORY (weight factor for category = 2)

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HAZARD ANALYSIS

Severe Local Storm (Ice Storms, Snow Storm, Windstorm & Tornado)

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HAZARD ANALYSIS

Severe Local Storm (Ice Storms, Snow Storm, Windstorm & Tornado)

VULNERABILITY (weight factor for category = 5)

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Can impact entire county
Property Damage (agriculture)
Worst case:$175-$200 million loss

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HAZARD ANALYSIS

Severe Local Storm (Ice Storms, Snow Storm, Windstorm & Tornado)

MAXIMUM THREAT (weight factor for category = 10)

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Can impact entire county
Property Damage (agriculture)
Worst case:$175-$200 million loss

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April 23, 2024, NHMP Incorporated Communities Subcommittee Meeting "Mosier" Hazard Ranking

April 23, 2024

Mosier NHMP Workgroup Meeting #1

Ron Wright (RW), Mosier City Council Member
Todd Reeves (TR), Mosier Fire President
Daun King (DK), Mosier School, Operations facility, procurement, and nutrition
Jayme Bennet (JB), City Manager
Carrie Pipinich (CP), Executive Director MCCED
Daniel Dougherty (DD), Senior Planner, Wasco County Planning

Introductions: 5 Minutes

Meeting Agenda:

Community Demographics

CP: Discussed Mosier's Community Demographics and highlighted the fact that the community is growing: increased by 9% between 2010-2022.

- Low poverty rate

- Higher age dependency ratio than Oregon state (as a whole, more children)

- 10% disabled

- 80% drive alone for their commute

Hazards Review & Discussion

CP: Discussed Hazards

Discussed Wildfire threat, and Extreme heat.

Jayme explained that Mosier has no public cooling facilities for community members

Discussed Severe Local Storm.

Jayme explained that severe storm affects Mosier proportionately more than Wasco County alone.

Todd Reeves explained that severe storm, particularly winter storms impact Mosier

Discussed Flood

Jayme explained that the wastewater treatment plant being recently mapped into FIRM

- No ability to handle storm water (no storm water system in Mosier)
- Commented that heavy rain can cause some significant basement flooding
- Fire hydrant draining can cause storm water flooding

Todd Reeves commented that houses near the wastewater plant have flooded in the past (90s flood)
Daun King provided that some groundwater flooding has caused mold in the school basement

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Discussed Earthquake hazard
Jayme discussed DOGAMI's landslide study
DK: Mentioned that the School, being a critical facility could be severely impacted by earthquake/landslide
JB: Well near the school, and HWY 30 is decisive regarding transportation

Discussed volcano

Group Voted on list and how it reflects priorities in Mosier.

TR: Discussed that drought impacts the city less than in the County and should be moved down

TR & DW: explained that Severe Storm should be moved higher due to the city specific impacts (utilities, transportation)

DK: Discussed how winter weather impacts children getting to school and the only grocery store

TR: Asked about drought and how it should be addressed. Drought was moved higher on the list based on discussion of water supply/water shed.

DD: Discussed Wasco County's drought discussion on April 15, 2024.

Group conducted final vote on Hazard Analysis List.

CP moved into Mosier's Critical Infrastructure/Facilities

Mosier City Hall

Mosier Community School

Mosier Fire dDeepartment

Mosier Waste Water Treatment Plan

Mosier Water System Assets-Reservoir, Wells

I-84, Hwy 30, State Road evac Routes

RW: Senior Center

DK: Grange Hall

JB: Gravel Pit (ODOT owned)

JB: Brenna's Market, MoCo, Fruit Co. (water/pwr provision), Power Infrastructure & Internet/Telecommunications

DK: discussed HAM Radio operators (RAGS) training

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Action Item Development Brainstorm

RW: discussed wildfire hazard home hardening funding & defensible space

DK: School seismic upgrades & back up power

DK: Increase water access outside of City limits to fight wildfire more quickly

RW: Backup power supply for the city

DK: Backup power for school (largest public facility in Mosier)

DD: Asked if Mosier had a landslide overlay zone, and added that it could be included

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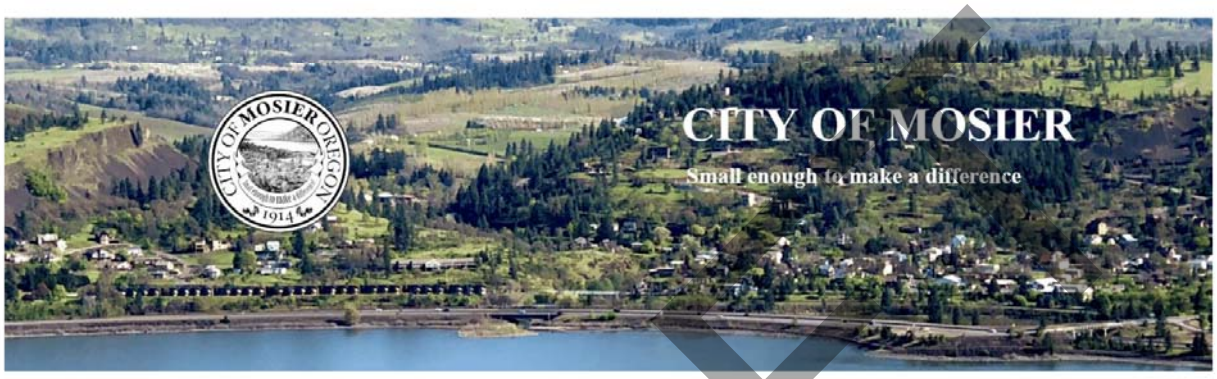
Natural Hazard Mitigation Plan Meeting



Agenda

- Community Profile
- Hazard Discussion, Prioritization
- Critical Facilities List
- Action Plan Development

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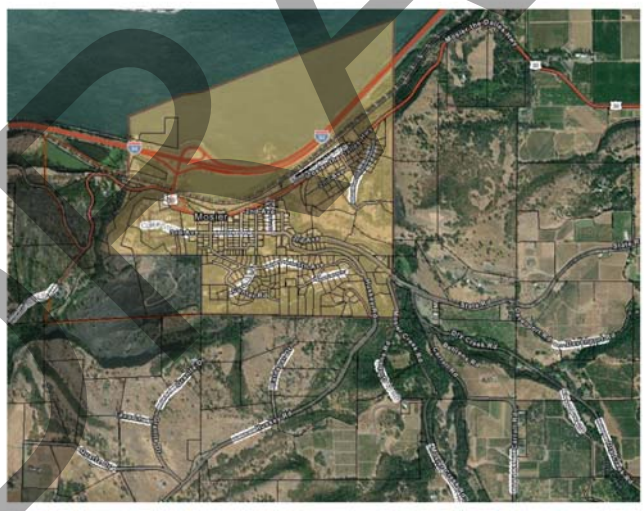
Community Demographics

- Growing-increased by 9% between 2010 and 2022
- Higher age dependency ratio than OR as a whole–more children but about the same elderly
- Higher median household income than Wasco County, very low poverty rate in the City
- 80% drive alone for their commute
- 10% disabled
- Almost 30% identify as Hispanic/Latino

Link:
https://data.census.gov/profile/Mosier_city,_Oregon?g=160XX00US4150050#populations-and-people

Hazards Review and Discussion



DOGAMI HazVu Maps

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Hazards Analysis Methodology

HAZARD ANALYSIS MATRIX[2]
WORKSHEET

JURISDICTION:

Hazards		History WF = 2	Vulnerability WF = 5	Maximum Threat WF = 10	Probability WF = 7	Total Score
	WF X SR Subscore	2 X ____ =	5 X ___ =	10 X ___ =	7 X ___ =	

(See Oregon Military Department & Office of Emergency Management (OEM) Hazard Methodology Worksheet)

Wild Fire

Important Definitions

Any instance of uncontrolled burning within a forested area is a wildland fire, whereas uncontrolled burning in grassland, brush, or woodlands is classified as a wildfire. (2019 Wasco County NHMP, p. HA-15)

OAR 629-044-1005

(l) "Wildfire Risk" means the wildfire impacts to values based on scientifically modeled wildfire frequency and wildfire intensity.

(m) "Wildland-Urban Interface" means a geographical area where structures and other human development meets or intermingles with wildland or vegetative fuels.

Source: CPAW

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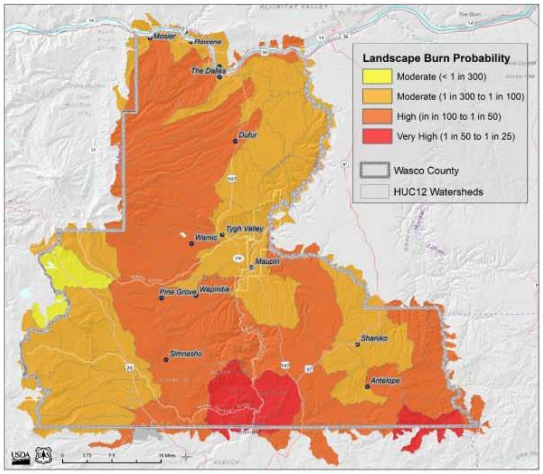
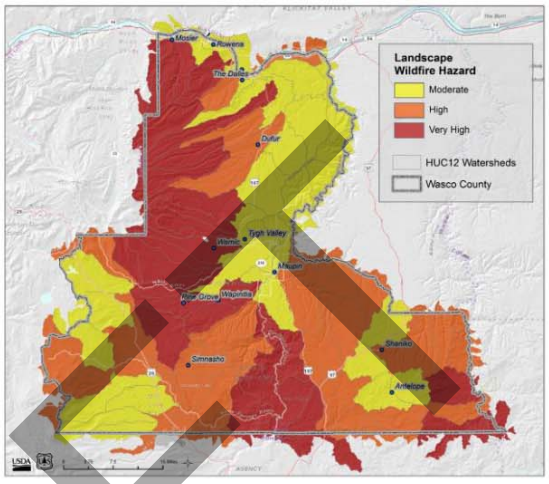
Wild Fire





Source: CPAW

Wild Fire

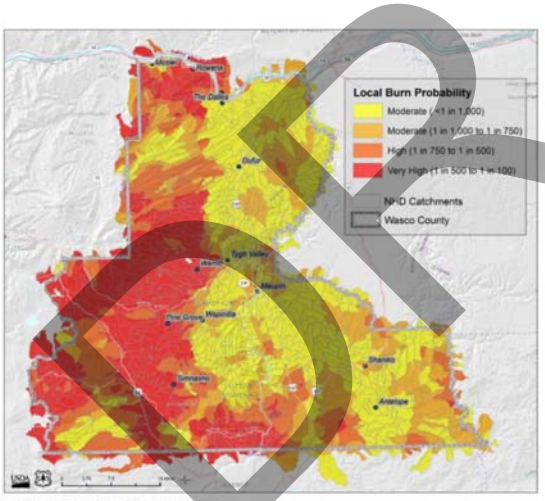


Figure A7 Local Burn Probability for Wasco County

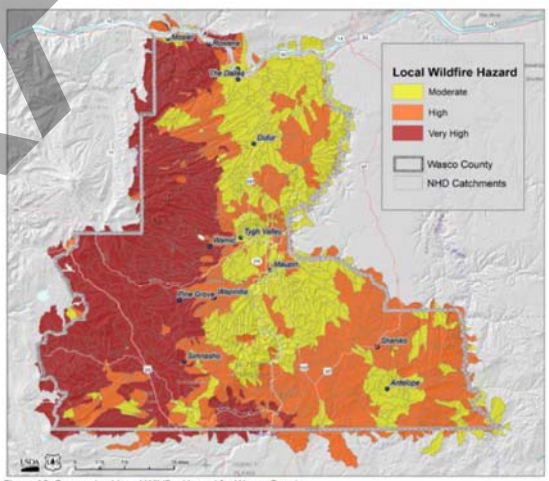


Figure A9. Summarized Local Wildfire Hazard for Wasco County

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Extreme Heat

Important Definitions

Extreme heat events occur as a result of natural variability. Conditions that drive extreme heat events in the Pacific Northwest include, upper-level ridges, or large areas of high atmospheric pressure, and strong offshore flow.

•One method to measure extreme heat is to count the number of days with temperatures above a certain threshold, such as days with temperatures above 90°F.

•The National Weather Service issues heat warnings when the heat index exceeds given local thresholds. Heat index is a measure of how hot it feels combining temperature and relative humidity. As relative humidity increases, a temperature can feel even hotter.

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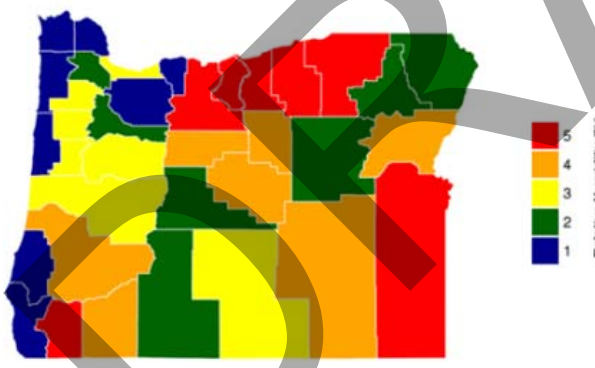
Extreme Heat

Figure 2-63. Relative Probability of Extreme Heat



Note: 5 = "Very High"; 4 = "High"; 3 = "Moderate"; 2 = "Low"; 1 = "Very Low"

Source: Oregon Climate Change Research Institute

NOAA's National Weather Service

Heat Index

Temperature (°F)

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution | Extreme Caution | Danger | Extreme Danger

Source: https://www.weather.gov/ohi/heat

Drought

Important Definitions

Drought is a condition of climatic dryness severe enough to reduce soil moisture and water below the minimum necessary for sustaining plant, animal, and human life systems. Drought is typically measured in terms of water availability in a defined geographical area. The Oregon Drought Severity Index is the most commonly used drought measurement in the state. It categorizes droughts as mild, moderate, severe, and extreme.

Severe Local Storm

Important Definitions

Communities throughout Wasco County are vulnerable to a variety of severe storm hazards:

Ice Storms or Freezing Rain (black ice): Occur when rain falls from warm moist upper layers of the atmosphere into a cold, dry layer near the ground. The rain freezes on contact with the cold ground and accumulates on exposed surfaces.

Snow Storm or Blizzard: National Weather Service defines a blizzard as a storm which contains large amounts of snow OR blowing snow, with winds in excess of 35 mph and visibilities of less than 1/4 mile for an extended period of time (at least 3 hours). Accumulations average between 4 – 5 inches in the City of the Dalles each year.

Windstorm: Wind that is strong enough to cause at least light damage to trees and buildings and may or may not be accompanied by precipitation. Peak wind gusts have gone above 100 miles per hour. The strongest winds that impact Wasco County come from either east or west.

Tornado: Tornadoes characterized by funnel clouds of varying sizes that generate winds as fast as 500 miles per hour. They can affect an area of ¼ to ¾ of a mile and seldom more than 16 miles long.

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Flood

Important Definitions

FEMA: A general and temporary condition of partial or complete inundation of 2 or more acre of normally dry land area. (National Flood Insurance Program Requirements, 59.1 – Definition)

In Wasco County, flooding events primarily caused by extensive wet conditions that follow a period of mid and high elevation ice and snow pack development.

Flood Types in Wasco County:

•**Riverine floods:** Amount of water flowing through a river channel exceeds the capacity of that channel. (Most common type of flooding)

•

•**Flash flooding:** Sudden rainstorms produce a large amount of rain in a very short period of time. These types of floods occur in steeply sloping valleys and in small waterways.

•**Stormwater, or urban flooding:** Runoff from rainfall concentrates in developed areas, drainage, and low lying areas. Poor drainage, elevated groundwater levels, and ponding are all symptoms of storm water flooding.

(2019 Wasco County NHMP, p. HA-11)

Flood

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Earthquake

Important Definitions

An earthquake is the shaking of the ground caused by an abrupt shift of rock along a fracture in the earth, called a fault. There are three categories of earthquakes and each type may affec Wasco County.

•**First Category:** Shallow or crustal earthquake. Depth of 5 to 10 miles beneath the earth's surface. Associated with fault movement within a surface plate.

•**Second Category:** Intraplate, or "deep" earthquake. Occur when an earthquake on a geologic plate affects another plate. Occur in Pacific Northwest when the Juan de Fuca plate breaks up underneath the continental plate, approximately 30 miles beneath the earth's surface.

•**Third Category:** Subduction zone earthquake. Pacific Northwest this is the Cascadia Subduction Zone (CSZ) earthquake. Occur when two converging plates become stuck along their interface. Movements between the plates build up energy across the locked surface until plates abruptly slip along the interface when the strain is released.

*Earthquake-induced hazards are **liquefaction and landslides.** Liquefaction occurs when saturated soils substantially lose bearing capacity du to ground shaking, causing the soil to behave like a liquid. Landslides are mass movement of rock, debris, or soil induced by ground shaking

Earthquake-Cascadia

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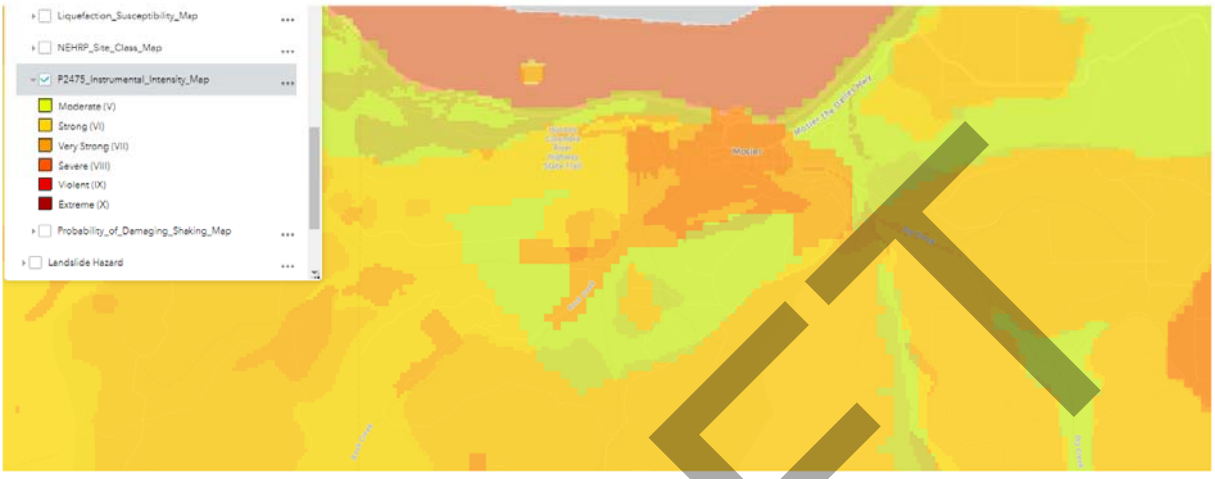
Earthquake-General



Landslide

Important Definitions

Landslides are the sliding movement of masses of loosened rock and soil down a hillside or slope. Include a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows.

Most common landslides occur on water saturated slopes when the base of the slope can no longer support the weight of the soil above it.

- Commonly associated with heavy rain and flooding conditions
-
- Associated with earthquakes
- Associated with volcanic activity

(2019 Wasco County NHMP, p. HA-19)

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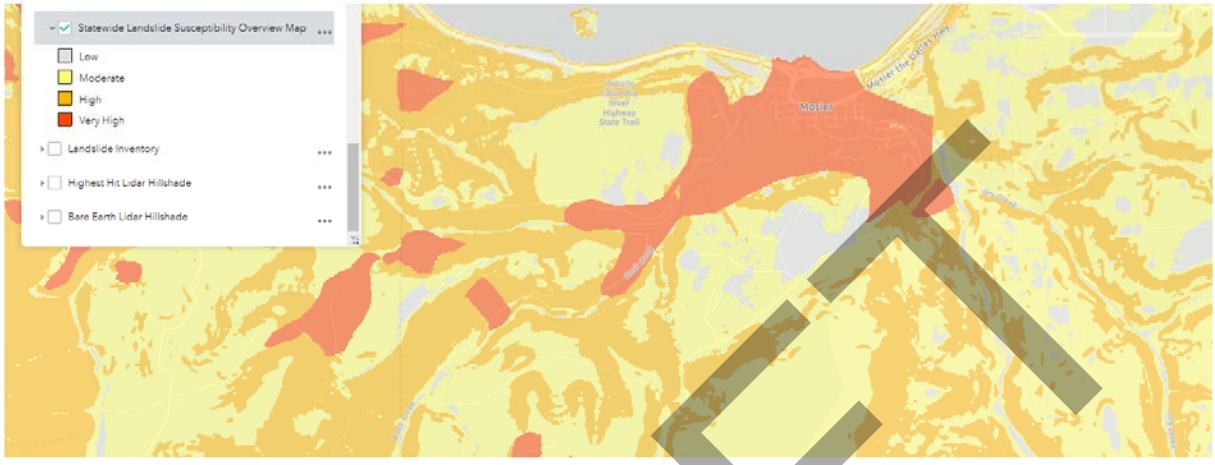
Landslide



Additional Hazards?

Volcano

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Countywide Hazards Ranking

HAZARD ANALYSIS MATRIX[2]
WORKSHEET

JURISDICTION: Wasco County

Hazards		History WF = 2	Vulnerability WF = 5	Maximum Threat WF = 10	Probability WF = 7	Total Score	
Wildland-Wildfire	WF X SR Subscore	2 X 10 = 20	5 X 9 = 45	10 X 10 = 100	7 X 10 = 70	235	1
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DATE: 4/15/24

WF = weight factor
SR = severity rating

1. Wildland-Wildfire
2. Extreme Heat
3. Drought
4. Severe Storm/Winter Weather
5. Flood
6. Earthquake
7. Volcano
8. Landslide

Mosier-Hazards Ranking

1. Wildland-Wildfire
2. Severe Storm/Winter Weather
3. Extreme Heat
4. Drought
5. Flood
6. Landslide
7. Earthquake
8. Volcano

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Critical Facilities

"Critical facilities" are defined as those structures from which essential services and functions for victim survival, continuation of public safety actions, and disaster recovery are performed or provided.

Examples: Shelters, emergency operation centers; public health, public drinking water, sewer and wastewater facilities

Current Critical Facilities Listed in the County NHMP

- Mosier City Hall
- Mosier Community School
- Mosier Fire Department

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Proposed Critical Facilities-Brainstorm!

- Mosier City Hall
- Mosier Community School
- Mosier Fire Department (including repeater)
- Mosier Waste Water Treatment Plant
- Mosier Water System Assets–Reservoir, Wells
- I-84, Hwy 30, State Road–evac routes
- Senior Center
- Grange Hall
- Gravel Pit
- Brenna's Market *
- MoCo *
- Fruit Co (water/pwr provision) *
- Power Infrastructure
- Internet/Telecommunications
- (Rags) Ham Radio Antennas*
- County Yard–county fuel site-State Rd/Seven Mile site just outside of town

Action Item Development

Proposed Action Item:		**Alignment with Plan Goals:**
Type of Hazard #1 – Mitigation Proposal Title		Must align with a Wasco County Goal
Alignment with Existing Plans/Policies:		
List agency and plan that supports the mitigation proposal		
Rationale for Proposed Action Item:		
• Rationale should be based on studies and data analysis, may or may not be associated with a plan		
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• Ideas from plan development working groups and public input sessions		
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Internal Partners:	**External Partners:**	
City Departments	Other public and private sector organizations	
Potential Funding Sources:	**Estimated cost:**	**Timeline: (check one)**
As identified during plan development	**If available**	☐ Short Term (0-2 years) ☐ Long Term (2-4+ years)
Form Submitted by:	**Author or Department**	
Action Item Status:	Track from original submittal year. Example: Submitted July 2006 – Revised 2012 – Revised 2018	

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Action Item Development-Brainstorm

- Evaluate and Prioritize Critical Infrastructure and facilities for Hazard Resilience
- Seek implementation funding for hazard resilience to critical infrastructure and facilities.
- Encourage Critical Facilities to secure emergency power
- Annual review of plan action progress and update at year 5.
- Rags Training/Table Top Exercise?
- Seek backup power options (funding and implementation $$s) for school to enhance role as emergency shelter in the community
- Improve school infrastructure to increase resilience
- Seismic retrofits for the school building
- Fire hardening/defensible space outreach program or funding to address deficiencies
- Increase water access outside of City limits to fight wildfire more quickly
- Secondary power supply to the City-redundant grid or backup system
- Landslide overlay for City planning in coordination with County process?

Next Steps

Compile into draft!

Additional ideas? Send to Jayme!

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Wasco County convened additional meetings to assist the city of Mosier with the development of their Addendum on the following dates:

August 5, 2024

August 9, 2024

September 12, 2024

September 13, 2024

September 16, 2024

September 19, 2024

September 20, 2024

October 16, 2024

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April 25, 2024, NHMP Incorporated Communities Subcommittee Meeting "Dufur" Hazard Ranking

Wasco County Multi-Jurisdictional Natural Hazard Mitigation Plan Dufur Community Meeting 2024 Update Minutes	25 April 2024, 5:30 PM – 6:30 PM Dufur City Hall 175 NE 3rd St Dufur, OR 97021
Type of Meeting: Community Meeting	

Committee Member Roll Call

In Person: Kathy Bostick (KB), Carrie Pippinich (CP), Merle Keys (MK), Jon Keyser (JK), and Tom Richman (TR).

Virtual: Sean Bailey (SB), Josiah Dean (JD).

ITEMS

1. **Agenda:**
   - Community Profile
   - Hazard Discussion
   - Critical Facilities List
   - Action plan

2.Community Profile. CP gave a quick overview of Wasco County's Profile, and then a more specific rundown of Dufur.

3.Hazard Discussion. CP gave a quick overview of Wasco County's 4/15/24 Steering Committee Meeting and voting, showing how the County Committee decided.

CP then asked if their group wanted more information on the hazards for discussion.

JD had questions on Drought, and how it is trackable for a period, or what can be done to mitigate.

SB mentioned the points from the WC voting, and to think of the long term effects drought has on a community for water uses and damages to crops and other property.

After discussion of the hazards, and the differences from Wasco County to the City of Dufur, the following list was decided:

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1. Wildland-Wildfire
2. Flood
3. Extreme Heat
4. Severe Storm/Winter Weather
5. Drought
6. Earthquake
7. Volcano
8. Landslide

4. Critical Facilities current list: Dufur High School, Dufur PUD Station, Dufur Reservoir, and Dufur City Hall.

After brainstorming, updated city list was completed:

- Dufur School
- Dufur PUD Substation
- Dufur Reservoir
- City Wells 1, 2 and 3 (City and South Basin)
- Dufur City Hall
- Dufur Fire Station
- Dufur City Park
- South Basin Reservoir
- Gas Station
- Dufur Valley Rd/USFS Road-44 + 197
- Wasco County Shop (fuel)
- Dufur Christian Church and Dufur Catholic Parish Hall

5. Action Plan. CP and KB lead the group in a discussion about possible mitigation action plans based on the identified hazards and their effects on critical facilities. Initial list below:

- Backup power for critical facilities-priorities-wells, City offices, School
- Expand South Basin Reservoir to help address meeting fire needs
- Seismic assessment and improvements for reservoirs (City and South Basin)
- Emergency Preparedness Table at Threshing Bee
  - Seek Implementation Funding for Hazard Resilient Modifications to Critical Infrastructure
- Purchase equipment to address impacts from hazards (ex gravel truck, haul downed trees, etc)
- Explore acquisition and management strategies to preserve parks, trails, and open space in the floodplain
- HVAC + Window Updates to address smoke, extreme heat conditions aat critical facilities-School in particular? City Hall for heating system?
- Updating equipment for Fire District–(note coming with specifics)

Meeting concluded at 6:30 pm

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Dufur Natural Hazard Mitigation Plan Meeting

DUFUR
ORE|USA

Agenda

- Community Profile
- Hazard Discussion, Prioritization
- Critical Facilities List
- Action Plan Development

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Community Demographics

- Population fairly steady since 2010 according to Decennial Census/PSU (table below) –ACS data shows growth to 857

Table 1.2: Total Population, City of Dufur, Wasco County, Oregon, 2010-2022

Jurisdiction	Population (2022)	Population (2020)	Population (2010)	Population Change (2010 - 2022)	Percent Change (2010 - 2022)
Dufur	611	632	604	7	1.1%
Wasco County	26,794	26,670	25,213	1,581	5.9%
Oregon	4,281,851	4,237,256	3,831,074	450,777	10.5%

Community Demographics

- Higher age dependency ratio than Wasco County as a whole–more children and slightly lower elderly population
- Higher median household income than Wasco County ($74,321 vs $61,316)
- Very low poverty rate in the City but higher in the student population
- 74% drive alone for their commute
- 19.1% disabled
- School Population more diverse than City population due to larger geographic area

Link: https://data.census.gov/profile/Dufur_city,_Oregon?g=160XX00US4120900#populations-and-people

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Hazards Review and Discussion

DOGAMI HazVu Maps

Countywide Hazards Ranking

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WORKSHEET

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DATE: 4/15/24

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Wild Fire

Important Definitions

Any instance of uncontrolled burning within a forested area is a wildland fire, whereas uncontrolled burning in grassland, brush, or woodlands is classified as a wildfire. (2019 Wasco County NHMP, p. HA-15)

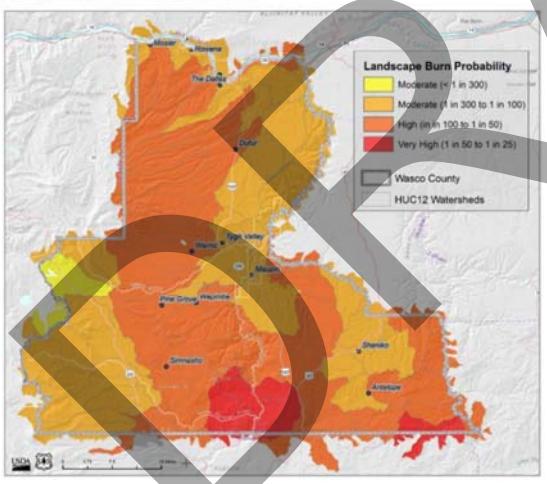
OAR 629-044-1005

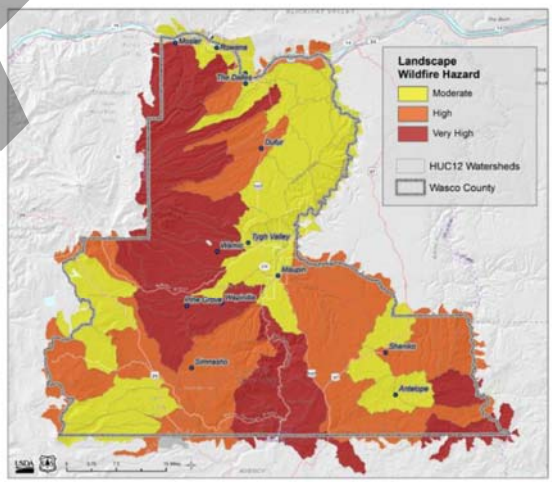
(l) "Wildfire Risk" means the wildfire impacts to values based on scientifically modeled wildfire frequency and wildfire intensity.

(m) "Wildland-Urban Interface" means a geographical area where structures and other human development meets or intermingles with wildland or vegetative fuels.

Source: CPAW

Wild Fire





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Wild Fire

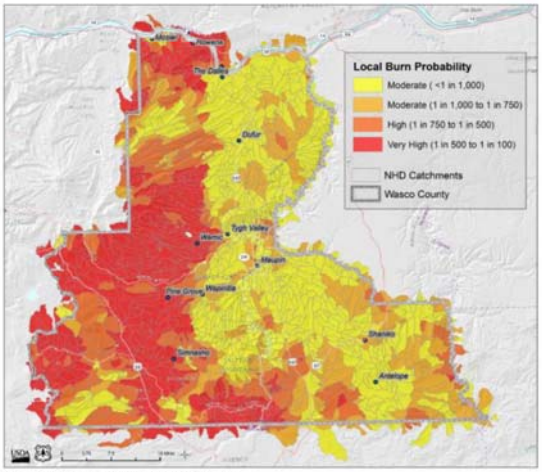

Figure A7 Local Burn Probability for Wasco County

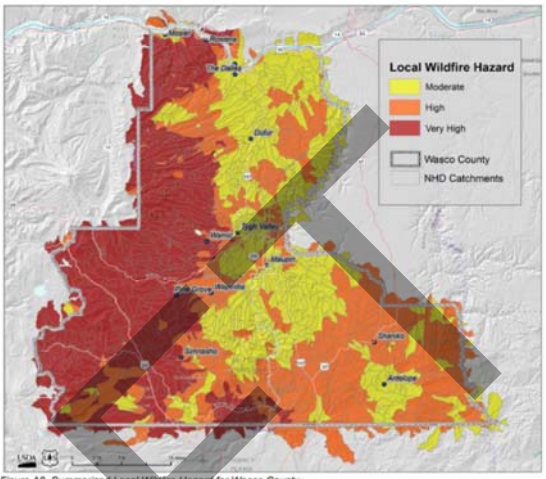

Figure A9. Summarized Local Wildfire Hazard for Wasco County

Extreme Heat

Important Definitions

Extreme heat events occur as a result of natural variability. Conditions that drive extreme heat events in the Pacific Northwest include, upper-level ridges, or large areas of high atmospheric pressure, and strong offshore flow.

•One method to measure extreme heat is to count the number of days with temperatures above a certain threshold, such as days with temperatures above 90°F.

•The National Weather Service issues heat warnings when the heat index exceeds given local thresholds. Heat index is a measure of how hot it feels combining temperature and relative humidity. As relative humidity increases, a temperature can feel even hotter.

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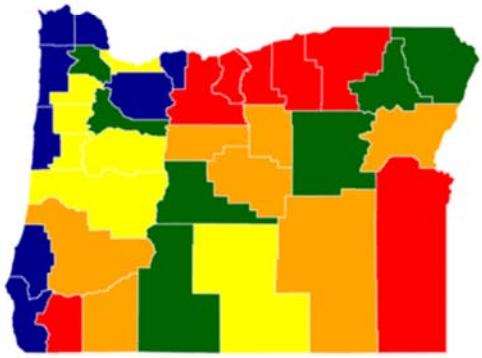
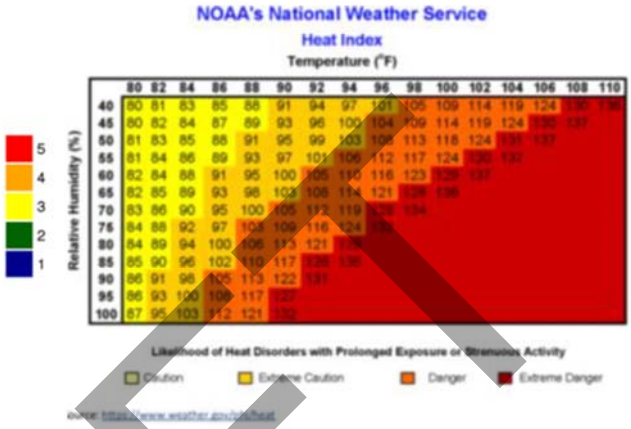
Extreme Heat

Figure 2-63. Relative Probability of Extreme Heat



Note: 5 = "Very High"; 4 = "High"; 3 = "Moderate"; 2 = "Low"; 1 = "Very Low"
Source: Oregon Climate Change Research Institute



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(2019 Wasco County NHMP, p. HA-11)

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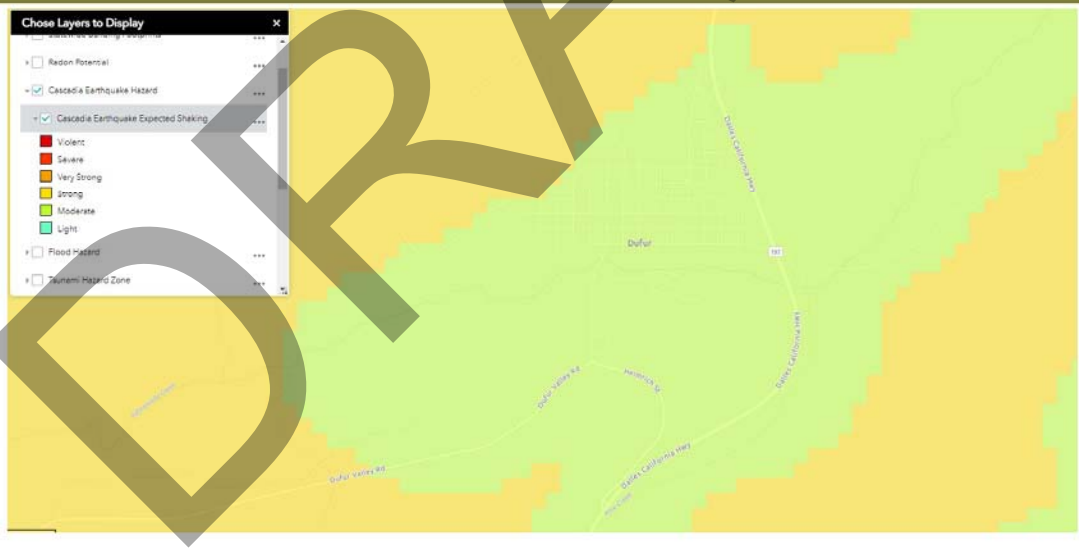
Flood

Earthquake: Cascadia



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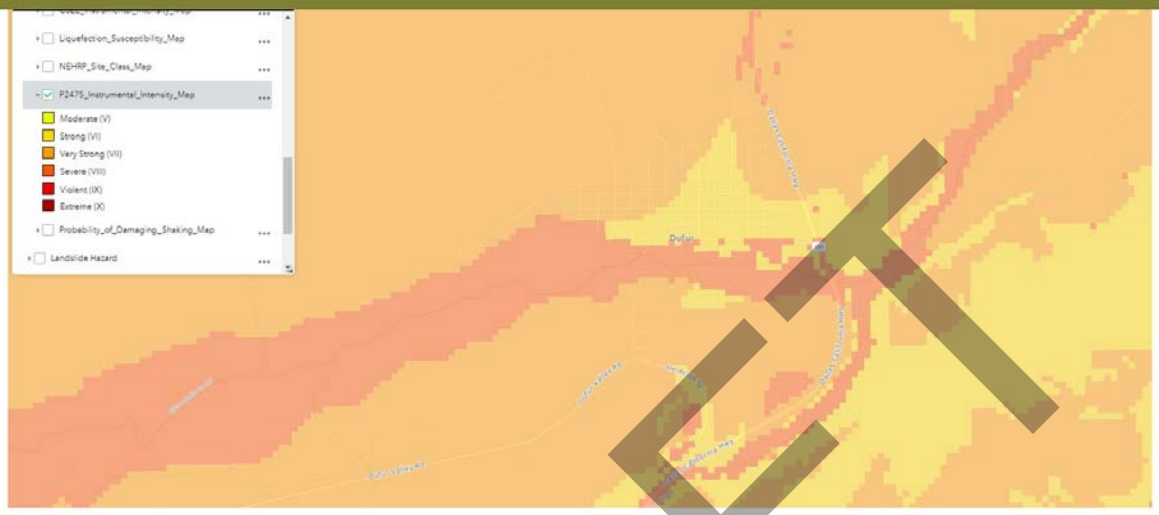
Earthquake: General



Landslide

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Volcano

Important Definitions

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.

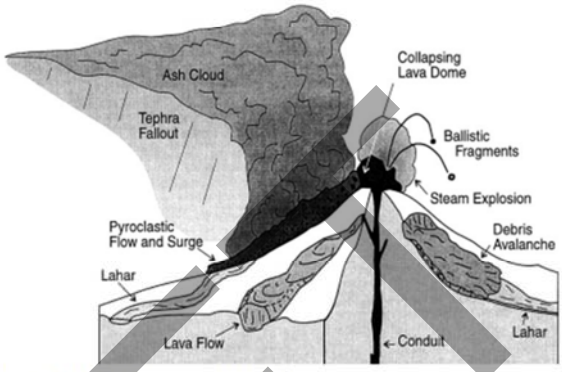
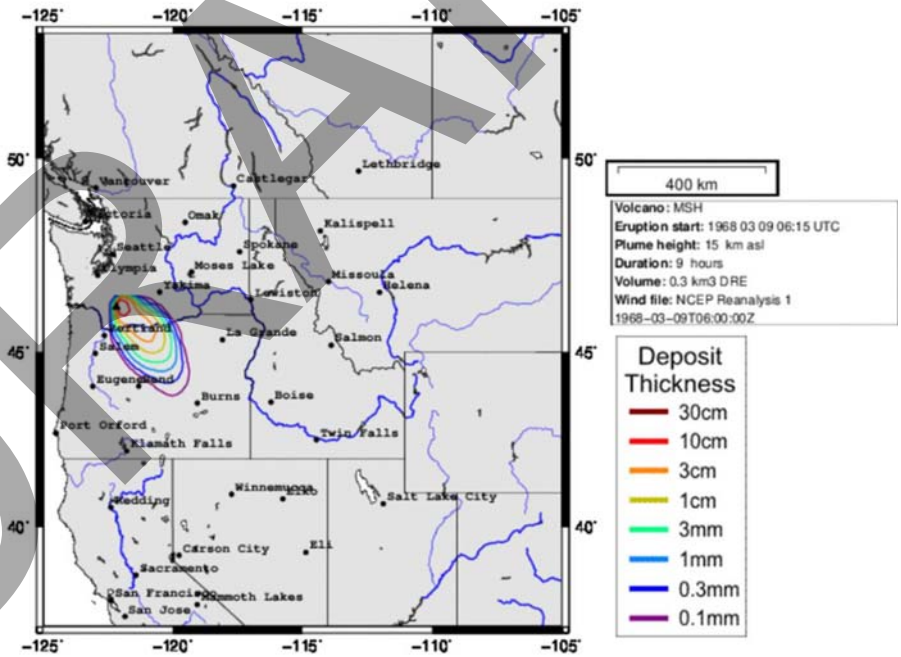


Figure A - Types of volcanic hazards

Volcano



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Dufur-Hazards Ranking

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DRAFT

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- Dufur Reservoir
- Dufur City Hall

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Potential Critical Facilities-Brainstorm!

- Dufur School
- Dufur PUD Substation
- Dufur Reservoir
- City Wells 1, 2 and 3 (City and South Basin)
- Dufur City Hall
- Dufur Fire Station
- Dufur City Park
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- Gas Station
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- Wasco County Shop (fuel)
- Dufur Christian Church and Dufur Catholic Parish Hall
- ???

Action Item Development

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Form Submitted by:	**Author or Department**		
Action Item Status:	Track from original submittal year. Example: Submitted July 2006 – Revised 2012 – Revised 2018		

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Action Items-Brainstorm!

- Backup power for critical facilities-priorities-wells, City offices, School
- Expand South Basin Reservoir to help address meeting fire needs
- Seismic assessment and improvements for reservoirs (City and South Basin)
- Emergency Preparedness Table at Threshing Bee
  - Seek Implementation Funding for Hazard Resilient Modifications to Critical Infrastructure
- Purchase equipment to address impacts from hazards (ex gravel truck, haul downed trees, etc)
- Explore acquisition and management strategies to preserve parks, trails, and open space in the floodplain
- HVAC + Window Updates to address smoke, extreme heat conditions aat critical facilities-School in particular? City Hall for heating system?
- Updating equipment for Fire District–(note coming with specifics)

DRAFT

Wasco County convened additional meetings to assist the city of Dufur with the development of their Addendum on the following dates:

July 31, 2024

August 6, 2024

September 13, 2024

September 16, 2024

September 23, 2024

October 1, 2024

October 16, 2024

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April 30, 2024, NHMP Incorporated Communities Subcommittee Meeting "Maupin" Hazard Ranking

Natural Hazard Mitigation Plan- Hazard Identification Planning Meeting
4/30/2024
12:00 p.m.
Present:
Daniel Dougherty- Wasco County Planner
Nick Smith- City Manager, City of Maupin
Tom Troutman- City Councilor, Fire Chief, City of Maupin
Melissa Napoli- Community Liaison, City of Maupin

Daniel summarized ranking of hazards, community profile and gives instruction on action items.

Community Profile

Community profile suggests high commuter workforce, lower income, older population, 20.5% disabled.

Daniel asks if there's any particular group that would be more impacted by a natural hazard. Melissa states that retail and outdoor recreation would be important to list as they'd be greatly impacted by disaster and would impact our economy.

Daniel reviews county hazard ranking.

Wildfire #1: Nick asks if we know how many homes are located in the WUI. DOGAMI may have that information.

Extreme Heat: County ranked as #2 because of impacts. Daniel asks if we have vulnerable populations in town. Melissa and Nick both list the older population and older homes that may not have A/C. Tom states air conditioning is not necessary because of the cooling effects of the river.

Oregon NHMP ranks region 5, including Wasco Co, as "very high".

Melissa suggests thinking about the city's end goals and considering that when making action items.

Nick mentions that a fire last year did impact Maupin because tourists were canceling reservations. Tom mentions that extreme heat has a similar effect because people don't want to come over to Maupin when it's that hot and there isn't enough shade on the river.

Drought: Daniel reviews statistics of drought in Wasco Co since 1904. Mentions that Mosier's aquafer's run dry in drought.

Nick states Maupin runs off of springs that have never gone dry. Tom states that the water table increases and decreases throughout the year. Melissa asks if there's ever been a time when historically, Maupin's water was low enough to cause a problem. Tom says no.

Daniels mentions that population increase can create issues when more people are using water.

Tom states that water is no concern for Maupin. Nick mentions that drought could impact retail if our farmers were impacted, however after discussion, only 4.7% of Maupin's industry is ag.

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Severe local storm: Nick says minor impact because people wait it out, perhaps missing a few days of work but otherwise not impacted. Tom states that he could see impact if deliveries to the store or the gas station were interrupted. Nick mentions summer rain storms and states they don't have much impact. Tom mentions that occasionally wind storms do happen.

Daniel suggests talking through a worst case scenario in a winter storm. Melissa says worst case scenario may be if 197 was blocked in both directions and deliveries of supplies could not get through. Tom said that a major arterial outside of Maupin would have to be blocked and these issues wouldn't happen in Maupin proper.

Tom states that Maupin is well protected because it's in the shadow of Mt. Hood and storms go around us.

Flood: Daniel mentions that the survey results list flood as 2 or 3 in ranking. Daniel discusses stormwater/urban flooding. Tom says a storm in '64 washed out white river bridge and bakeoven bridge, but the '96 floods didn't impact Maupin much. Tom said after '64, the county came in and modified Bakeoven creek banks to provide more protection. T says the 94 flood backed up the Deschutes River and the area where the current city park is located was completely underwater. Daniel summarizes this information and discusses probability and impact. Tom states he doesn't think we'll see another flood like the one we saw in '96. He thinks we're more likely to see problems with the railroad than anything.

Daniel discusses FIRM. The majority of Maupin's population falls outside of the FIRM map. The largest impact seems to be on the railroad. Tom states that when they built the city streets, they raised up portions of the area across from Maupin City Park to prevent water from gathering/flooding in that area.

Tom states that Bakeoven flood happened in July- during peak tourist season. Nick states that it's usually due to snowpack melting combined with warm weather/rain. Daniel asks if an event like this would have a catastrophic impact on the town's tourism.

Daniel recommends looking at how many tax lots are in the flood overlay zone and determining how many properties are in this zone. How many people does this impact.

Tom says our infrastructure would be impacted most because the sewer on the east side would be underwater.

Nick says in that event, they'd turn those pumps off. Tom says that's what they did in '96 when it flooded. States the water was up to the windows in the community building.

Earthquakes: Daniel states very few earthquakes have occurred in Wasco County. Tom states that our infrastructure would be impacted if it changes our water table. Nick says it could take out our water line on the west side. Daniel reviews Cascadia Subduction Zone map of which parts of Maupin would be impacted.

Tom states that there's a portion of east Maupin that could be susceptible to landslide in an earthquake.

Nick states that Bakeoven road being closed due to landslide would not be that much of an issue because of alternate routes. Tom agrees.

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Daniel mentions the bridge and considering that when we are thinking about impact during an earthquake.

Nick asks how DOGAMI determines the mapping area. Daniel states they use LIDAR, historical data, etc to determine these areas. Daniel suggests we keep in mind that our infrastructure is old, we have an aging population, we have high commuter workforce, etc.

Melissa asks if a landslide would impact the sewer pump near city park. Nick and Tom state that there are not major slopes around city park and it would likely not be an issue unless creek backed up.

Volcano: Daniel introduces this hazard with definitions.

Ranking:

Nick and Melissa mentioned that they agreed that wildfire should be first on the list. Nick stated that Tom had him rethinking that extreme heat should be #2 on the list. Tom reiterated that it's not an issue and had a small impact on tourism in 2020 during the heat dome. Nick states that he feels the impact on tourism may get worse as more people learn how miserable it is to be on the river when it's that hot. Nick states drought should move down on the list. Tom says severe storms/weather should be #3. Nick states flood should be above drought on the list. Melissa suggests flipping #2 and #3 and placing severe weather above extreme heat on the list. Tom and Nick agreed. Melissa asks what the group thinks about moving flooding up to #3 and moving extreme heat down to #4 because of the large impact on our infrastructure. Nick and Tom agree.

Tom again states that extreme heat is typical here in the summer.

Melissa asks about moving drought down and putting earthquake in #5 because of the impact it could have on infrastructure if flooding occurs. Tom and Nick agreed. Landslide moves to #6. Tom and Nick feel drought should be 7 and Tom states volcano should be last on the list.

Critical Facilities and Infrastructure: Melissa provided her list of CF&I. Daniel added her items to his list. Added BNSF and Richmond's Service Station. Maupin Market was added. Nick mentions the pumpline that goes down the hill from the reservoir as a critical piece of infrastructure and it's added to the list. Melissa asks about the internet facility at the PW yard. Nick agrees that that should be added to the list. Nick mentions the springs pumphouse and the lower reservoir pumphouse, as well as the spring itself. Dufur Springs and spring boxes are added to the list.

Action Item Development: Daniel introduces the action item development sheet.

The team adds the following on the subject of wildfire mitigation:

- Air burner
- Outreach and education and
- Vegetation removal in the WUI

Daniel advises that we will meet again later in May to identify our action items and implementation plan for each.

Team adjourns. 2:04pm

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Maupin Natural Hazard Mitigation Plan Meeting

Agenda

- Community Profile
- Hazard Discussion, Prioritization
- Critical Facilities List
- Action Plan Development

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Community Demographics

- Population fairly steady since 2010 according to Decennial Census/PSU (table below) – ACS data shows growth to 431

Table 1.2: Total Population, City of Maupin, Wasco County, Oregon, 2010-2022

Jurisdiction	Population (2022)	Population (2020)	Population (2010)	Population Change (2010 - 2022)	Percent Change (2010 - 2022)
Maupin	431	427	418	13	3.0%
Wasco County	26,794	26,670	25,213	1,581	5.9%
Oregon	4,281,851	4,237,256	3,831,074	450,777	10.5%

Source: Portland State University Population Center, *Populations for Oregon and Its Counties and Incorporated Cities and Towns: 2000-2022.*

Community Demographics

- Older Population: Median age of Maupin citizens continues to slowly increase
- Lower median household income than Wasco County ($44,583 vs $61,316)
- 9% poverty rate in the City, lower than Wasco County at 11.7% and State at 12%
- 85% drive automobiles to work/high commuter workforce (12% from The Dalles)
- 57% of Housing Stock is over 50-years old
- 20.5% disabled (2022 ACS Estimate)

Link: https://data.census.gov/profile/Maupin_city,_Oregon?g=160XX00US4146500

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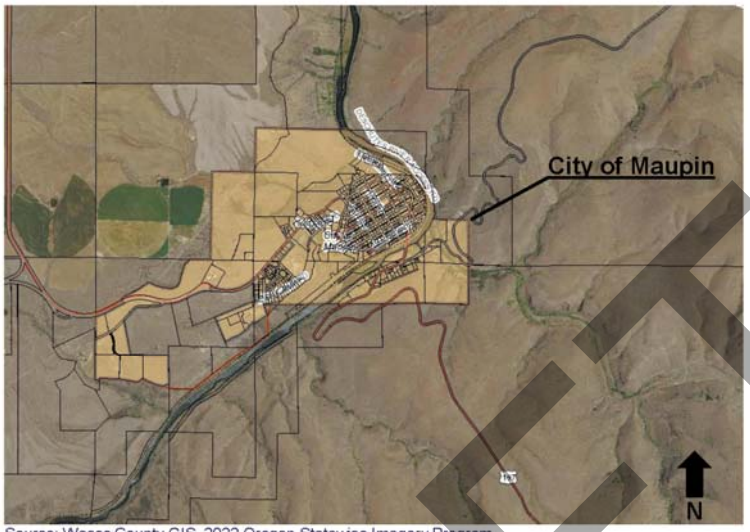
Hazards Review and Discussion



Source: Wasco County GIS, 2022 Oregon Statewise Imagery Program

Countywide Hazards Ranking

HAZARD ANALYSIS MATRIX[2]
WORKSHEET

JURISDICTION: Wasco County

Hazards		History WF = 2	Vulnerability WF = 5	Maximum Threat WF = 10	Probability WF = 7	Total Score	
Wildland-Wildfire	WF X SR	2 X 10	5 X 9	10 X 10	7 X 10	225	1
	Subscore	= 20	= 45	= 100	= 70		
Earthquake	WF X SR	2 X 3	5 X 4	10 X 10	7 X 4	154	
	Subscore	= 6	= 20	= 100	= 28		
Flood	WF X SR	2 X 8	5 X 4	10 X 9	7 X 8	182	
	Subscore	= 16	= 20	= 90	= 56		
Landslide	WF X SR	2 X 2	5 X 2	10 X 7	7 X 4	112	
	Subscore	= 4	= 10	= 70	= 28		
Extreme Heat	WF X SR	2 X 10	5 X 8	10 X 10	7 X 10	230	2
	Subscore	= 20	= 40	= 100	= 70		
Volcano	WF X SR	2 X 1	5 X 8	10 X 10	7 X 1	143	
	Subscore	= 2	= 40	= 100	= 7		
Drought	WF X SR	2 X 10	5 X 9	10 X 9	7 X 10	225	3
	Subscore	= 20	= 45	= 90	= 70		
Severe Local Storm	WF X SR	2 X 10	5 X 6	10 X 9	7 X 10	210	
	Subscore	= 20	= 30	= 90	= 70		
	WF X SR	2 X___	5 X___	10 X___	7 X___		
	Subscore	=	=	=	=		
	WF X SR	2 X___	5 X___	10 X___	7 X___		
	Subscore	=	=	=	=		

DATE: 4/15/24

WF = weight factor
SR = severity rating

1. Wildland-Wildfire
2. Extreme Heat
3. Drought
4. Severe Storm/Winter Weather
5. Flood
6. Earthquake
7. Volcano
8. Landslide

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Wild Fire

Important Definitions

Any instance of uncontrolled burning within a forested area is a wildland fire, whereas uncontrolled burning in grassland, brush, or woodlands is classified as a wildfire. (2019 Wasco County NHMP, p. HA-15)

OAR 629-044-1005

(l) "Wildfire Risk" means the wildfire impacts to values based on scientifically modeled wildfire frequency and wildfire intensity.

(m) "Wildland-Urban Interface" means a geographical area where structures and other human development meets or intermingles with wildland or vegetative fuels.

Source: CPAW

Wild Fire

HAZARD ANALYSIS

History-Probability: Wildland-Wildfire

Significant Wildland-Wildfire Events

- 33 Events since 1967
- Six Fed. Declarations since 2013
- Five Events 2013-2017
- 16 Events since 2018

HA-4: Significant Historic Wildland Fire Events

Occurrence	Description
1902	Yacolt Burn, 170,000+ acres, about a million acres burned around the region
1967	School Marm Springs Fire, approximately 8000 acres, demonstrated that wildfire within The Dalles Watershed poses a tremendous risk to City-owned water-control infrastructure and public health
1977	Unnamed, unknown size
1979	Pine Grove
1985	Maupin
1988	Warm Springs
1994	Warm Springs
1998	Rowena, 2,208 acres
2000	Antelope
2002	Sheldon Ridge, 12,261 acres
2002	White River
2009	Microwave, 1,225 acres, conflagration declared
2011	High Cascade Complex, 101,292 acres
2013*	Government Flats Complex, 11,450 acres, conflagration declared, 4 homes lost, $13 mil damage
2014*	Rowena, 3,680 acres, conflagration declared
2016	Wassen Pond, 300 acres, structures threatened, conflagration declared
2016	Mosier Train Derailment
2017	Nena Springs, 39,500 acres
2018*	Substation, 80,000 acres, one fatality, conflagration declared, 52 structures (4 dwellings) destroyed
2018	Long Hollow, 40,000 acres
2018*	South Valley, 25,000 acres, conflagration declared, 15 structures (3 dwellings) destroyed
2018	Memaloose II, conflagration declared, 175+/- acres, structures threatened
2020*	Mosier Creek Fire, 985 acres, 5 structures destroyed
2020	September 7-13, Oregon experienced record poor air quality from wildfire smoke across the state. Oregon Air Quality Monitoring Annual Report: 2020, provides that The Dalles experienced 4 days of "Hazardous" and 3 days of "Very Unhealty" air quality.
2020*	White River Fire, 17,442 acres, over 100 dwellings ordered to evacuate
2021	Wrentham Market Fire, 7,222 acres, 2 structures destoryed (agricultural structures)
2021	S-503 Fire; 6822 acres (Warm Springs Reservation)
2021	Sunset Valley Road Fire, 987+/- acres, several outbuildings (agricultural structures), some cars and part of a cherry orchard.
2022*	Miller Road Fire, 10,847 acres, one structure destroyed
2023	Boulder Fire, 233 acres, no structures lost
2023	Antelope Creek Fire, 490 acres, no structures lost
2023	Milepost 87 Fire, 150 acres, 1 dwelling lost
2023	Simnaho Fire; 1249 acres (Warm Springs Reservation)
2023	Winslow Rd Fire, 837 acres

(* - Federal Fire Management Assistance Declaration,

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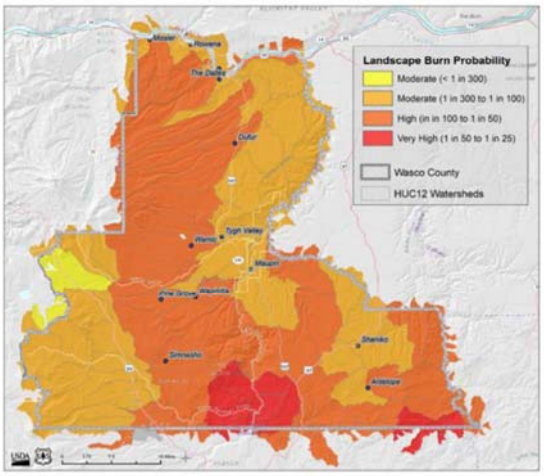
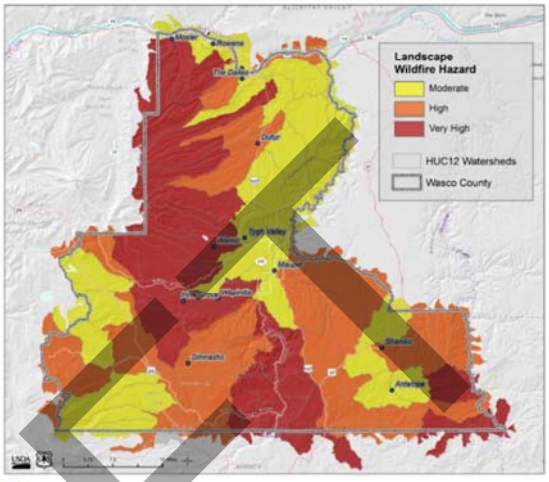
Wild Fire





Source: Wasco County 2024 CWPP & CPAW 2018

Wild Fire

Wasco County Communities at the Highest Risk of Wildfire

- Pine Hollow
- Mosier (30 square miles between Mosier and Chenoweth high wildfire risk)
- Chenoweth (30 square miles between Mosier and Chenoweth high wildfire risk)
- Maupin (Homes within the WUI)

Source: Natural Hazard Risk Report for Wasco Count (DOGAMI, 2021)

HAZARD ANALYSIS

Vulnerability/Max Threat: Wildland-Wildfire

Wasco County
Population: 26,670 (2020)
Housing Units: 11,996
Critical Infrastructure: 70

Unincorporated Communities/Subdivisions

Pine Hollow (531 pop)
Housing Units: 516

Sportsman's Paradise
Lots: 120 / 17 Address

Tygh Valley (236 pop)
Housing Units: 128

Wamic (123 pop)
Housing Units: 63

Sportsman's Park (76)
Housing Units: 156

Pine Grove (142)
Housing Units: 96

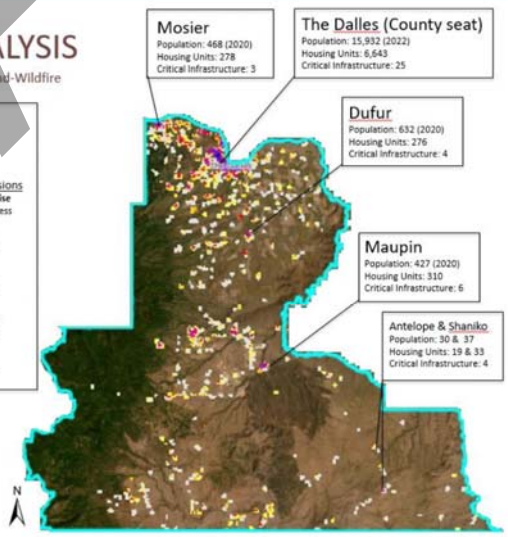
Chenoweth
Lots: 370 / 200+ Address **(Murray's Addition)**
1,875 pop (greater area) / Housing Units: 777

Celilo Village (85)
Housing Units: 19

Rowena (192)
Housing Units: 98

Housing Density

Category	Acres
<1 house per 40 acres	20,913
1 per 40 acres to 1 per 20 acres	13,134
1 per 20 acres to 1 per 10 acres	8,113
1 per 10 acres to 1 per 5 acres	5,535
1 per 5 acres to 1 per 2 acres	3,313
1 per 2 acres to 3 per acres	3,493
> 3 per acres	832



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Extreme Heat

Important Definitions

Extreme heat events occur as a result of natural variability. Conditions that drive extreme heat events in the Pacific Northwest include, upper-level ridges, or large areas of high atmospheric pressure, and strong offshore flow.

•One method to measure extreme heat is to count the number of days with temperatures above a certain threshold, such as days with temperatures above 90°F.

•The National Weather Service issues heat warnings when the heat index exceeds given local thresholds. Heat index is a measure of how hot it feels combining temperature and relative humidity. As relative humidity increases, a temperature can feel even hotter.

Extreme Heat

Significant Extreme Heat Events

- Significant heat waves in 2021 and 2022
- Oregon 2020 NHMP ranks Wasco County as "Very High" (5: 6 Counties in Region 5)
  - Based on historic and projected future frequency of days with heat index above 90°F

HA-7: Significant Historic Extreme Heat Events	
Occurrence	**Description**
June 28-30, 2008	An upper level ridge and thermal trough across the Pacific Northwest produced temperatures above 100 degrees for two consecutive days breaking records in many locations.
August 15-17, 2008	Excessive Heat Event: An upper level ridge and dry air brought excessive heat into eastern Oregon. Many locations experienced multiple days of at least 100 degree temperatures.
July 12-16, 2018	Major heatwave, with 5 triple digit days: 102, 101, 101, 105, 103
June-August, 2021	Major heatwave (heatdome), governor declared emergency for Wasco County and 22 other counties. 5 triple digit days breaking records: 102, 110, 115, 118, 107 in June recorded in The Dalles. 15-days of triple digit tempretures recorded in The Dalles from July-August.
July-August, 2022	Heatwave, not as significant as the 2020 heatdome, but Wasco County experienced 20 days of triple digit temperatures.

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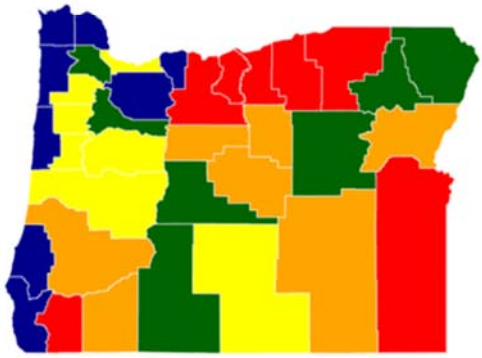
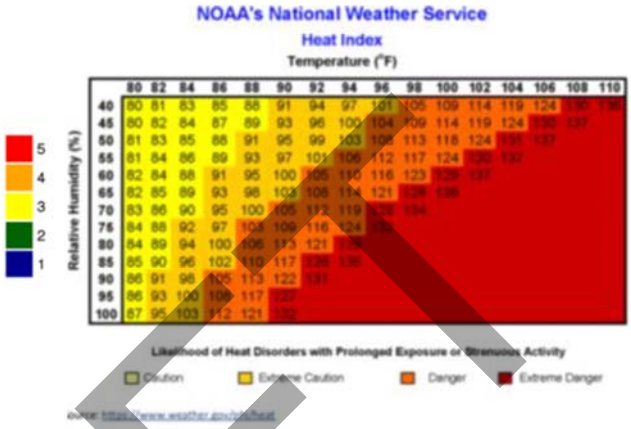
Extreme Heat

Figure 2-63. Relative Probability of Extreme Heat



Note: 5 = "Very High"; 4 = "High"; 3 = "Moderate"; 2 = "Low"; 1 = "Very Low"
Source: Oregon Climate Change Research Institute



Extreme Heat

How does it impact your population (vulnerable)?
How does it impact your economy?
How does it impact critical facilities/infrastructure?
Are there public cooling facilities?

Month	Average Max. Temperature (degree F)	Average Min. Temperature (degree F)
January	42	28
February	46	28
March	54	33
April	61	37
May	67	43
June	75	50
July	84	56
August	85	55
September	76	47
October	64	39
November	49	31
December	40	26
Annual	**62**	**39**

Source: USClimateData.com, Average Temperatures

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Drought

Important Definitions

Drought is a condition of climatic dryness severe enough to reduce soil moisture and water below the minimum necessary for sustaining plant, animal, and human life systems. Drought is typically measured in terms of water availability in a defined geographical area. The Oregon Drought Severity Index is the most commonly used drought measurement in the state. It categorizes droughts as mild, moderate, severe, and extreme.

Drought

Significant Drought Events

- 20: 73 Years of Drought 1904-1977
  - 27% in drought
- 16: 45 Years of Drought 1904-1949
  - 35.5% in drought
- 9: 45 Years of Drought 1978-2023
  - 20% in drought
- Drought in Wasco County since 2020

HA-1: Significant Historic Drought Events

Occurrence	Description
1904-1905	Drought period of about 18 months
1917-1931	Very dry period punctuated by brief wet spells (1920, 1927)
1939-1941	Three-year intense drought
1965-1968	Three-year drought following the big regional floods of 1964-65
1976-1977	Brief very intense statewide drought
1985-1994	Generally dry period, capped by statewide droughts in 1992 and 1994
2001-2002	State drought declaration for majority of state including Wasco County
2005	State drought declaration for Wasco County and 12 Counties
2014	State drought for 10 Counties
2015-2016	State drought for majority of state including Wasco County
2018	State drought declaration for 11 Counties
2020	State drought declaration for Wasco County and 14 other Counties
2021	State drought declaration for Wasco County and 25 other Counties
2022	State drought declaration for Wasco County and 16 other Counties
2023	State drought declaration for Wasco County and 12 other Counties

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Severe Local Storm

Important Definitions

Communities throughout Wasco County are vulnerable to a variety of severe storm hazards:

Ice Storms or Freezing Rain (black ice): Occur when rain falls from warm moist upper layers of the atmosphere into a cold, dry layer near the ground. The rain freezes on contact with the cold ground and accumulates on exposed surfaces.

Snow Storm or Blizzard: National Weather Service defines a blizzard as a storm which contains large amounts of snow OR blowing snow, with winds in excess of 35 mph and visibilities of less than 1/4 mile for an extended period of time (at least 3 hours). Accumulations average between 4 – 5 inches in the City of the Dalles each year.

Windstorm: Wind that is strong enough to cause at least light damage to trees and buildings and may or may not be accompanied by precipitation. Peak wind gusts have gone above 100 miles per hour. The strongest winds that impact Wasco County come from either east or west.

Tornado: Tornadoes characterized by funnel clouds of varying sizes that generate winds as fast as 500 miles per hour. They can affect an area of ¼ to ¾ of a mile and seldom more than 16 miles long.

Severe Local Storm

HA-6: Significant Historic Severe Weather Events

Occurrence	Description
12/16 - 12/18/1884	Heavy snow in the Columbia River Basin from Portland to The Dalles and along the Cascades foothills in the Willamette Valley; 1-day snow totals: Albany, 16.0 inches; The Dalles, 29.5 inches; Portland, 12.4 inches.
Dec 1885	Most snow recorded (6-10 feet), trains had difficulty reaching Portland
12/20/1892-12/23/1892	The record snowfall in the region occurred December 20-23, 1892. In Southwest Washington and Northwest Oregon, 15 to 30 inches fell. Portland had 27.5 inches of snow.
1/30 - 2/3/1916	Snow and ice storm along the northern Oregon border
12/5 - 12/7/1950	Severe ice storm over the columbia basin east of the Cascades
1/18/1956	Freezing rain/snow produced dangerous highway conditions
10/12/1962	The Columbus Day Storm on October 12, 1962 was the worst windstorm to occur in the Northwest since records have been kept. Thirty-eight people died and monetary losses were estimated somewhere between $175 and $200 million. The Portland Airport reported a peak gust of 88 miles per hour. At the Morrison Bridge in Downtown Portland there was a peak gust of 114 mph.
1/17 - 1/19/1970	Freezing temps for a week caused severe ice build up, damaged trees/utilities
April 1970	Tornado observed, no damage
11/22 - 11/23/1970	Freezing rain, 0.5 inch ice accumulations damaged trees
1/25/1974	Storms/Flooding/Snow Melt
July 1995	Fifteen Mile Creek Flash Food, This flood was caused by a summer thunderstorm
11/13/1981-11/15/1981	The strongest windstorm since the Columbus Day Storm occurred November 13-15, 1981. This storm was nearly as strong as the Columbus Day Storm but it tracked farther west. This was actually two strong windstorms, the stronger first storm arriving November 13 and early November 14 and the second storm hit on November 15.
2/14 - 2/16/1990	Two feet of snow in the Gorge
1/16 - 1/18/1996	Freezing rain with heavy accumulations of ice in the Gorge
2/2 - 2/4/1996	Ice storm
12/26 - 12/30/1996	Ice storm, 4-5 inches of ice in the Gorge, I-84 closed for 4 days, downed trees

Significant Local Storm Events

- Since 2010, seven severe weather events
  - $120,000+ damages, closures (highways & business)
- 1962 Windstorm caused $175-$200 million in loss
- Can be difficult to predict extent of storm & damages

12/26/2003 - 1/14/2004	Winter Storms, federal disaster declared for 30/36 Counties
April 2004	Wind storm, $1000 damage
December 2004	Wind storm, $3,333 damage across Sherman, Wasco, Jefferson Counties
March 2005	Wind storm, $2,500 damage across Sherman, Wasco, Jefferson Counties
January 2007	Wind storm, $5000 damage across Gilliam, Sherman, Morrow, Wasco, Umatilla, Jefferson Counties
11/29 - 11/20/2010	4-5 inches of snow, 1/2 inch ice
1/12 - 1/18/2010	4.5 inches of snow, I84 closed due to snow and ice
November 2012	Wind storm, $120,000 damage across Gilliam, Sherman, Morrow, Wasco, Umatilla, Wallowa, Union, Jefferson Counties
December 2016 - February2017	Emergency Declaration requested, multiple highway closures, snow on the ground in The Dalles for 3 months
February 22-26, 2019	Stream of mid-level moisture resulting in a long duration snow event Wasco, Sherman, Gilliam, Morrow, and Umatilla, Counties (Eastern Columbia River Gorge)
2022	Severe ice storm, closure of I-84 several days. Severe wind storms resulted in the death of one person.
2023-2024	December & January severe winter weather storm (12-days in January) brought significant snow (1-2 feet), extreme cold arctic air (-2°F), and closed portions of I-84.

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Flood

Important Definitions

FEMA: A general and temporary condition of partial or complete inundation of 2 or more acre of normally dry land area. (National Flood Insurance Program Requirements, 59.1 – Definition)

In Wasco County, flooding events primarily caused by extensive wet conditions that follow a period of mid and high elevation ice and snow pack development.

Flood Types in Wasco County:

•**Riverine floods:** Amount of water flowing through a river channel exceeds the capacity of that channel. (Most common type of flooding)

•

•**Flash flooding:** Sudden rainstorms produce a large amount of rain in a very short period of time. These types of floods occur in steeply sloping valleys and in small waterways.

•**Stormwater, or urban flooding:** Runoff from rainfall concentrates in developed areas, drainage, and low lying areas. Poor drainage, elevated groundwater levels, and ponding are all symptoms of storm water flooding.

(2019 Wasco County NHMP, p. HA-11)

Flood

Significant Flood Events

- Four federal disasters in 32 years
- 13 significant floods in 100 years
- *Mild flooding every few years: White River, Deschutes & Columbia Rivers
- Climate change may increase heavy rain-storms increasing flash flooding

HA-3: Significant Historic Flood Events

Occurrence	Description
January 1923	Record flood levels on the Deschutes River
May 1928	Columbia River flooding occurred
March 1932	Flooding occurred on the John Day and Grande Ronde Rivers
5/30/1948	Columbia River crested at 34.4 ft. Flood stage at that time was 15 ft. This is the flood that destroyed the City of Vanport. Fifteen people died in the flood.
March 1952	Flooding occurred on the John Day and Grande Ronde Rivers, highest flood stages on these rivers in over 40 years
July 1956	Flash flooding occurred in Central Oregon
December 1964*	Region wide flooding occurred (Dec 24, 1964)
1/25/1974*	Storms/Flooding/Snow Melt
July 1995*	Fifteen Mile Creek Flash Food, This flood was caused by a summer thunderstorm
1/1996 - 2/1996*	This widespread flood in the Pacific Northwest was the result of heavy rain and warming on heavy mid elevation snowpack, and was similar to regional flooding in December 1964. The Columbia River crested at 27.1 ft. on February 9. This flood occurred because of the confluence of several factors. The winter of 1995/96 was extremely rainy. Prior to the flooding period, the region experienced a cold snap with low elevation freezing, ice, and snow. As a result, Mill Creek flooded downtown The Dalles where heavy damage was caused. The last 850 ft. of Mill Creek before it enters the Columbia River was in a tunnel. Heavy debris flows and log jams at the tunnel inlet coupled with reduced discharge head caused by Columbia River levels backed water up and into the downtown business area. Losses were in millions of dollars.
12/1996-2/1997	Region wide flooding occurred
12/14 - 12/16/2006	Winter Storms/Flooding
August 2019	A powerful upper storm system combined with modest low and mid-level moisture to yield scattered strong to severe storms and flash flooding.

(* - Federal Disaster Declaration)

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Flood

The 1-percent annual chance flood is also referred to as the base flood or 100-year flood.

Special Flood Hazard Areas (SFHAs) are labeled as Zone A, Zone AO, Zone AH, Zones A1-A30, Zone AE, Zone A99, Zone AR, Zone AR/AE, Zone AR/AO, Zone AR/A1-A30, Zone AR/A, Zone V, Zone VE, and Zones V1-V30.

Moderate flood hazard areas, labeled Zone B or Zone X (shaded) are also shown on the FIRM, and are the areas between the limits of the base flood and the 0.2-percent-annual-chance (or 500-year) flood.

The areas of minimal flood hazard, which are the areas outside the SFHA and higher than the elevation of the 0.2-percent-annual-chance flood, are labeled Zone C or Zone X (unshaded).

Sources:
https://fema.maps.arcgis.com/apps/StorytellingSwipe/index.html?appid=e656a35ec9124a0b948fbfad03eb1c36

https://www.fema.gov/glossary/flood-zones#:~:text=SFHAs%20are%20labeled%20as%20Zone,%2C%20and%20Zones%20V1%2DV30.

Flood

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Flood

Flood

How many tax lots in FIRM?
How does it impact your population (vulnerable)?
How does it impact your economy?
How does it impact critical facilities/infrastructure?

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Earthquake

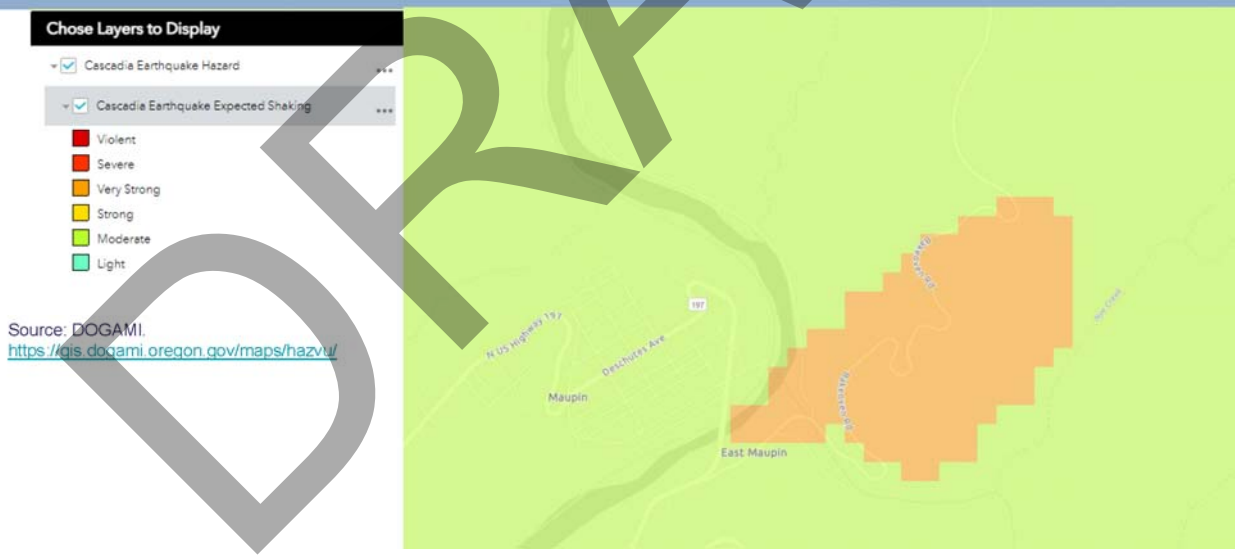
Significant Earthquake Events

- Nine quakes since 1936 have impacted Wasco County
- Approximately two thousand earthquakes since 1980
  - 99% of them registering a magnitude less than 3.0
- Largest earthquake in PNW in 1872 in North Cascades
  - Estimated 7.4 magnitude (many aftershocks)
- No clear method to fully assess the future risk
- Research estimates 10% chance of a local subduction zone earthquake within 200 years.

HA-2: Significant Historic Earthquake Events

Occurrence	Description
1400 BCE	Approximate Cascadian Subduction Zone (CSZ) event
1050 BCE	Approximate CSZ
600 BCE	Approximate CSZ
400	Approximate CSZ
750	Approximate CSZ
900	Approximate CSZ
1/27/1700	CSZ
11/23/1873	Oregon/California border, near Brookings, 6.8, Felt as far away as Portland and San Francisco; may have been an intraplate event because of lack of aftershocks.
7/15/1936	Milton-Freewater, 6.4, two foreshocks and many aftershocks felt; $100,000 damage (in 1936 dollars).
4/13/1949	Olympia, Washington, 7.1, Eight deaths and $25 million damage (in 1949 dollars); cracked plaster, other minor damage in northwest Oregon.
11/5/1962	Portland/Vancouver, 5.5, Shaking lasted up to 30 seconds; chimneys cracked, windows broke, furniture moved.
May-July 1968	Adel Swarm, largest 5.1 Swarm, lasted May through July, decreasing in intensity; increased flow at a hot spring was reported.
4/12/1976	Near Maupin, 4.8, Sounds described as distant thunder, sonic booms, and strong wind.
4/25/1992	Cape Mendocino, California, 7.0, Subduction earthquake at the triple junction of the Cascadia subduction zone and the San Andreas and Mendocino faults.
3/25/1993	Scotts Mills, 5.6, On Mount Angel-Gales Creek fault; $40 million damage, including Molalla High School and Mount Angel church.
9/20/1993	Klamath Falls, 5.9 and 6.0, Two deaths, $10 million damage, including county courthouse; rockfalls induced by ground motion.

Earthquake: Cascadia



Source: DOGAMI.
https://gis.dogami.oregon.gov/maps/hazvul/

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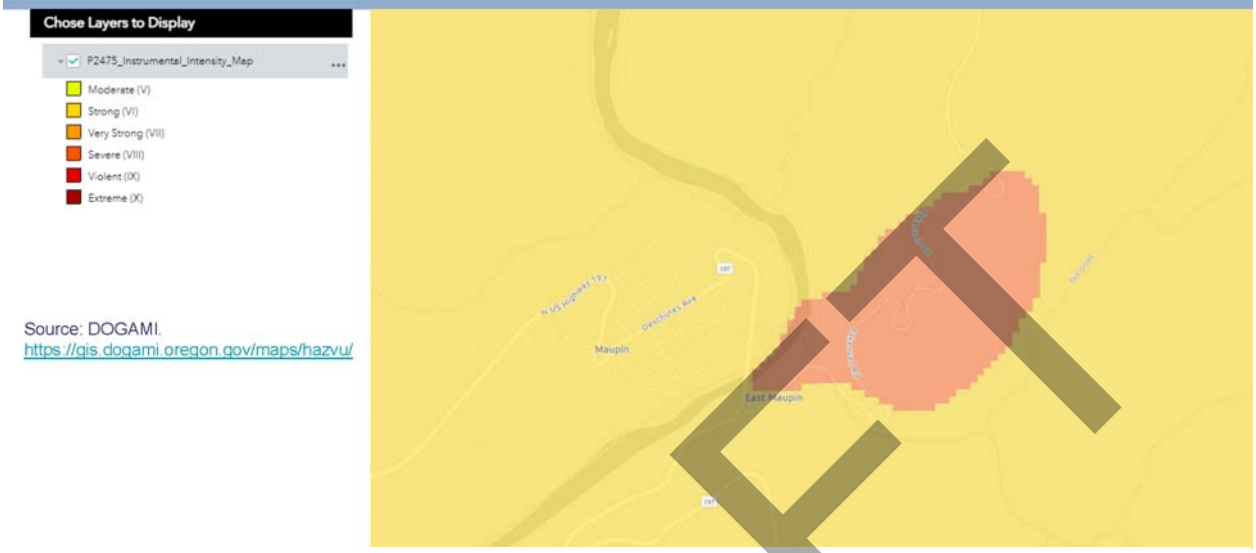
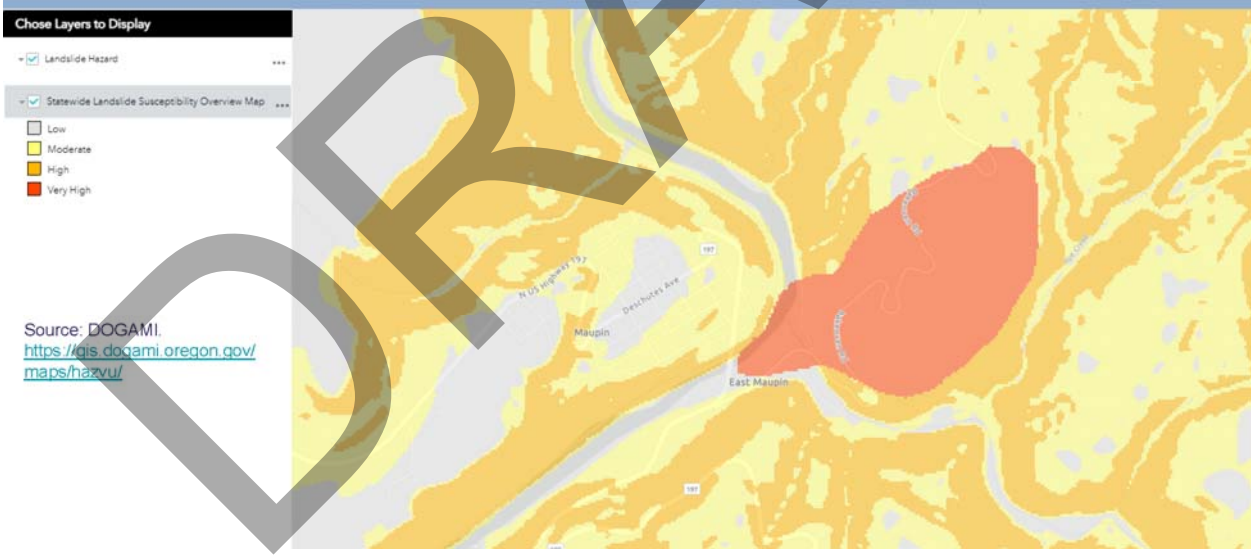
Earthquake: General



Source: DOGAMI.
https://gis.dogami.oregon.gov/maps/hazvu/

Landslide



Source: DOGAMI.
https://gis.dogami.oregon.gov/maps/hazvu/

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Volcano

Important Definitions

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.

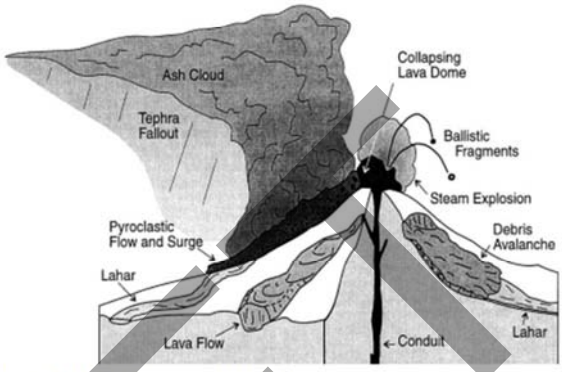
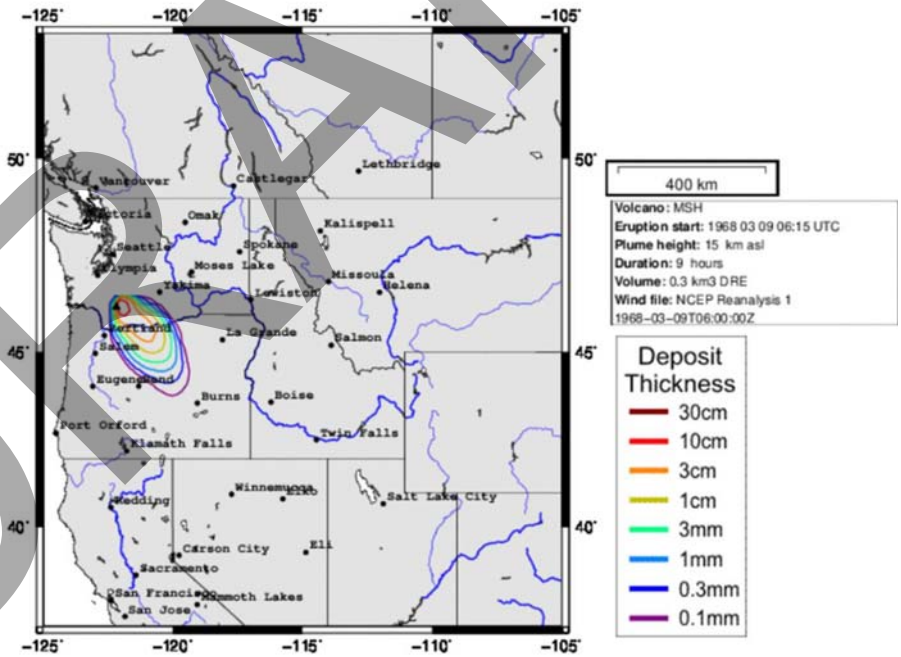


Figure A - Types of volcanic hazards[1]

Volcano



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Countywide Hazards Ranking

HAZARD ANALYSIS MATRIX[2]
WORKSHEET

JURISDICTION: Wasco County

Hazards		History WF = 2	Vulnerability WF = 5	Maximum Threat WF = 10	Probability WF = 7	Total Score	
Wildland-Wildfire	WF X SR	2 X 10	5 X 9	10 X 10	7 X 10	225	1
	Subscore	= 20	= 45	= 100	= 70		
Earthquake	WF X SR	2 X 3	5 X 4	10 X 10	7 X 4	154	
	Subscore	= 6	= 20	= 100	= 28		
Flood	WF X SR	2 X 8	5 X 4	10 X 9	7 X 8	182	
	Subscore	= 16	= 20	= 90	= 56		
Landslide	WF X SR	2 X 2	5 X 8	10 X 7	7 X 4	112	
	Subscore	= 4	= 40	= 70	= 28		
Extreme Heat	WF X SR	2 X 10	5 X 8	10 X 10	7 X 10	230	2
	Subscore	= 20	= 40	= 100	= 70		
Volcano	WF X SR	2 X 1	5 X 8	10 X 10	7 X 1	143	
	Subscore	= 2	= 40	= 100	= 7		
Drought	WF X SR	2 X 10	5 X 9	10 X 9	7 X 10	225	3
	Subscore	= 20	= 45	= 90	= 70		
Severe local Storm	WF X SR	2 X 10	5 X 6	10 X 9	7 X 10	210	
	Subscore	= 20	= 30	= 90	= 70		
	WF X SR	2 X ___	5 X ___	10 X ___	7 X ___		
	Subscore	=	=	=	=		
	WF X SR	2 X ___	5 X ___	10 X ___	7 X ___		
	Subscore	=	=	=	=		

DATE: 4/15/24

WF = weight factor
SR = severity rating

1. Wildland-Wildfire
2. Extreme Heat
3. Drought
4. Severe Storm/Winter Weather
5. Flood
6. Earthquake
7. Volcano
8. Landslide

Maupin-Hazards Ranking

1. Wildland-Wildfire
2. Severe Storm/Winter Weather
3. Flood
4. Extreme Heat
5. Earthquake
6. Landslide
7. Drought
8. Volcano

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Critical Facilities

"Critical facilities" are defined as those structures from which essential services and functions for victim survival, continuation of public safety actions, and disaster recovery are performed or provided.

Examples: Shelters, emergency operation centers; public health, public drinking water, sewer and wastewater facilities

Current Critical Facilities in Maupin

- Highway 197 (Transportation)
- Maupin City Hall (Civic)
- Maupin Fire Department (Fire Station)
- Maupin Public Works Facility
- Maupin Grade School (School)
- Maupin Sewer Plant (Waste Water Treatment)
- Canyon Rim Assisted Living
- ODOT Shop/Yard
- Imperial River Company (Private)
- Section Foreman's House
- South Wasco Co. Ambulance Service
- Water Tank (upper reservoir)
- Water Tank (lower reservoir)
- Bridge (Deschutes River Bridge)
- Deschutes Rim Health Clinic
- City Park & Boat Ramp
- Maupin Market
- Richmond's Services (Gas Station)
- City Drinking Water Pipeline & Pump (Above Ground)
- Fiber Optic Line/Phone (POP)
- Springs Pump House
- Lower Reservoir Pump House
- Dufur Springs & Spring Boxes

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Action Item Development

Proposed Action Item:		Alignment with Plan Goals:
Type of Hazard #1 – Mitigation Proposal Title		Must align with a Wasco County Goal
Alignment with Existing Plans/Policies:		
List agency and plan that supports the mitigation proposal		
Rationale for Proposed Action Item:		
• Rationale should be based on studies and data analysis, may or may not be associated with a plan		
Ideas for Implementation:		
• Ideas from plan development working groups and public input sessions		
Coordinating Organization:	City Department that will lead the mitigation effort	
Internal Partners:	**External Partners:**	
City Departments	Other public and private sector organizations	
Potential Funding Sources:	**Estimated cost:**	**Timeline: (check one)**
As identified during plan development	**If available**	☐ Short Term (0-2 years) ☐ Long Term (2-4+ years)
Form Submitted by:	**Author or Department**	
Action Item Status:	Track from original submittal year. Example: Submitted July 2006 – Revised 2012 – Revised 2018	

Action Items-Brainstorm!

These are some of Dufur's Ideas (Use these to think about Maupin Action Items

- Backup power for critical facilities-priorities-wells, City offices, School
- Expand South Basin Reservoir to help address meeting fire needs
- Seismic assessment and improvements for reservoirs (City and South Basin)
- Emergency Preparedness Table at Threshing Bee
- Seek Implementation Funding for Hazard Resilient Modifications to Critical Infrastructure
- Purchase equipment to address impacts from hazards (ex gravel truck, haul downed trees, etc)
- Explore acquisition and management strategies to preserve parks, trails, and open space in the floodplain
- HVAC + Window Updates to address smoke, extreme heat conditions aat critical facilities-School in particular? City Hall for heating system?
- Updating equipment for Fire District–(note coming with specifics)

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Action Items-Brainstorm!

These are some of Dufur's Ideas (Use these to think about Maupin Action Items

- Air Burner used for community yard debris (WF mitigation)
- Outreach & Education (Especially for folks in WUI)
- Vegetation removal on properties within WUI

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Wasco County convened additional meetings to assist the city of Maupin with the development of their Addendum on the following dates:

July 10, 2024

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May 29, 2024, NHMP Steering Committee Meeting

Wasco County Multi-Jurisdictional Natural Hazard Mitigation Steering Committee Meeting 2024 Update Minutes	May 29, 2024, 10:00 AM – 11:45 AM Public Works Conference Room 2705 East 2nd Street The Dalles, OR 97058
Type of Meeting: Committee Meeting	

Committee Member Roll Call

In Person: Daniel Dougherty, Arthur Smith, Ryan Bessette, Jay Wood, Kristen Dodd.

Virtual: Sean Bailey, Eric Hansen, Jill Hoyenga, Andrea Clause, Melissa Napoli.

ITEMS

1. **Introductions**

Started at 10am

Daniel Dougherty (DD), Sean Bailey (SB), Kylee Ruby (KR) Arthur Smith (AS), Ryan Bessette (RB), Jay Wood (JW), Kristen Dodd (KD), Eric Hansen (EH), Jill Hoyenga (JH)

Melissa Napoli (MN). Joined after initial introductions.

2. Update

· DD gave a quick update on where the NHMP Update was in the process. SB and DD are working through the language, and are hoping to have a draft end of June.

· DD reminded the group that we voted on the updated hazards last meeting, and the Incorporated Communities then did their voting after.

· JH gave an update for The Dalles gave an update on their portion.

-AS asked for clarification on the process deadlines, and when drafts and the final draft are expected to be finalized. DD responded that end of June, initial draft, final board approval, November.

-JH described how The Dalles has put together two potential Matrix formats, one that was consistent with the current County's format, or move towards a new format that might better reflect current direction of FEMA updates, but group decided to stay consistent at this point. But would adopt some updates.

DD asked JH to walk the group through how The Dalles went about their update to their action items, and how they considered the additions of DEI and Climate Change, along with new hazards. (DD shared the Proposed Action Item Sheet for The Dalles).

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JH described the table and how to interpret the layout. The Dalles utilized the acronym IDEA (Inclusion, Diversity, Equity, & Accessibility). JH recommended a few new columns to our Action Item Sheets to align more with FEMA/OEM, and the group agreed.

-This discussion led to discussion on the existing 2019 action items, and if any new 2024 action item recommendations or thoughts. DD stated that this won't be the only meeting talking about these, so we can circle back with them next meeting. DD talked about new items added by planning, primarily how to expedite permit approval after a disaster in the Scenic Area, such as in Murray's Addition. SR has historical/cultural issues that can't be skipped. Full reviews are expensive and slow. Group thought at least addressing this issue would be a good idea, whether or not was currently realistic, but to show that we would like to make this happen in the future with assistance and approval of relevant agencies.

-JW, KD, MN all gave examples of communities that have taken years to get funding to trickle down to the actual effected communities. AS & RB mentioned how quickly response was after 1996 flood, but would take much longer now.

-KR mentioned the possibility of pre-approved dwellings, that if customers chose one of the options, it could speed up the permitting process. Group liked the idea, but discussed the possible limitations.

-DD encouraged members to look over the existing Action Items, proposed Items, and think about new item for next meeting. People can add to the list on their own. Group liked what was there but agreed to add ideas soon.

DD wrapped up the meeting and thanked everyone for participating and joining.

Meeting concluded at 11:45am

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Steering Committee Meeting #~~3~~ 4
2024 NHMP Update
Meeting – May 29, 2024

NAME	ORGANIZATION	TITLE
1. Daniel Dougherty	Wasco Co.	Senior PLANNER
2. Ryan Bessette	Wasco Co. SWCD	Tech/Planner
3. Kristin Dodd	ODF	Unit Forester
4. Arthur Smith	WC Public Works	Public Works Director
5. Jay Wood	MCFR	Division CHIEF
6. Kylee V. Ruby	WC Buildng Codes	Deputy Building Official
7.		
8.		
9.		
10		
11.		
12.		
13.		
14.		

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Wasco County NHMP Outreach Plan Strategy (Finalized February 2024)

2024 NHMP Update Public Outreach Strategy

The 2024 Natural Hazard Mitigation Plan (NHMP) update "Outreach Subcommittee" (hereinafter, committee) has developed an outreach strategy that involves multiple different methods to accomplish the group's primary goal of public involvement in the NHMP update. The committee's members represent the county and the incorporated communities of The Dalles, Maupin, and Mosier.

A wide array of advertising channels and marketing mediums will be utilized to inform, and ultimately promote public participation in the NHMP update. The committee has also decided to utilize a public mitigation survey as the primary medium to obtain public opinion. The survey results will be used to advise the NHMP's update.

Amongst many public participation events, the committee has elected to host at least one major NHMP update event. During the 2018 NHMP update, a "Disasters and Donuts" public gathering was hosted, where disaster movies were played and community feedback solicited. The committee believed this event idea had great potential to solicit public participation again. The committee is currently seeking forums that might host such an event (The Dalles Movie Theatre, Sunshine Mill Drive-In Theatre). Smaller hosted events for the Incorporated Communities may also be provided.

Advertising & Marketing Mediums

One Directional Advertising (Marketing) Mediums

- Print & Digital News Focused Media
  - Columbia Gorge News (Digital and Print, Digital in English & Spanish)
  - Columbia Community Connection News (Digital Only, English and Spanish)
  - South Wasco Times Newspaper (Once per Month Paper Only Newspaper)
  - Ruralite Magazine?
  - (Other local publications)?
- Radio
  - GorgeRadio (One stop shop for multiple stations)
    - (92.7 FM (KMSW), 98.3 FM/1340 AM (KIHR), 96.9 FM (KCGB), 103.9 FM/1300 AM (KCI), and 93.5 FM (KACI)

Two Directional Advertising (Marketing) Mediums & Survey Locations

- Public Events in 2024 (Outreach Opportunities)
  - ODF Happy Hour Social - Oregon Food Bank Fundraiser - February 21, 2024
  - Get Ready - The Dalles (Likely in September)
  - Farmers Market (Held June-October)
  - Cherry Fest (April)
  - Wasco County Fair (August 2023, Handouts were provided by WC-Staff Daniel Dougherty)
  - Wasco County Fair 2024 (August)
  - Maupin Madness (Likely in June)
  - Maupin Daze (May)
  - Health fair? North Central Public Health District? Kids Day? (2024 dates unknown)
  - Redsides Powwow (Maupin) (Likely in April)

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- Columbia Gorge Discovery Center "Wildfire Event" (Likely in June, but includes regional ppl)

- Established Public Meetings (Where we can provide a quick blurb about the update)
  - Wasco County Board of Commissioners Meetings
  - Maupin, Mosier, and The Dalles City Council Meetings
  - Other Community Board (on the record public) Meetings??

- Engagement Platforms (Social Media and Webpage)
  - Webpage Platform
    - Wasco County NHMP Website (Also Linked to our Zencity Link)
      - Daniel D. shall update NHMP website (with meeting minutes, updates, & links)
    - Incorporated Jurisdictions
    - Zencity for information & survey participation (This will seriously assist with surveys)
  - Social Media platforms (Facebook, Instagram, Others)
    - Wasco County Facebook & Instagram pages
    - Incorporated Jurisdictions social media pages

Outreach Events & Materials Monies (Resources within the Grant)

Within the current Wasco County NHMP Grant, very little money was allocated for public outreach materials (e.g., Outreach Items such as cups, t-shirts, or incentive items such as gift certificates). This is a constraint that can be overcome, but will require outside-the-box thinking.

Current Resources for Wasco County as Provided in Amended SF-424A (Grant Budget)*

Meeting Space Rental	Five Events (could be one)	$250.00/event	$1,250.00
Printed materials for meetings and handouts	400 Units	$0.25/unit cost	$100.00
Website and social media graphics (Canva Pro subscription)	$120.00	One Subscription	$120.00
Survey Tool	$120.00	One Subscription/Tool	$120.00

*The SF-424A Budget is currently undergoing amendment to include Mosier's budget. Staff has altered public event space to include one pubic event at $850.00 (Disaster Movie Marathon at the Columbia Cinema).

Lessons Learned for Next NHMP Update: Ask for additional Outreach Materials dollars.

Outreach Materials

- Update older NHMP Flyers (Easy and Fast)
- Develop new NHMP Flyers (Slower, but creates opportunities for new graphics and information)
  - Ensure that the message covers The Dalles, Mosier, and Maupin to save resources
- Develop advertising blurb for NHMP update, where to conduct survey, and for events
  - Ensure that the message covers The Dalles, Mosier, and Maupin to save resources
- Decide on at least two outreach "swag" materials (t-shirts, cups, coasters, ect…)

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- Determine number, cost estimate, and time for delivery of materials

Would like volunteer(s). To be completed no later than January 22, 2024.

Public Survey

The survey used for the 2018 NHMP update used a multiple-choice format and contained 22-questions. Question 12 contained five additional multiple-choice questions. Question 21 contained eight additional multiple-choice questions. Question 22 contained 12 additional multiple-choice questions. (A total of 47 questions). The 2019 NHMP provides that "[o]nly *eight citizens* took the survey…". *Emphasis added.* Page B-2 (Pdf page 218 of the 2019 NHMP).

The first six questions were used to obtain demographics (e.g., education, income, ethnicity, gender, time lived in Oregon, owner or renter). The remaining questions focused on hazard identification and knowledge, incentives and community preparation opinions, and household hazard preparedness.

The committee believes that citizens may be reluctant to spend much time answering multiple question surveys. Additionally, citizens may choose to avoid surveys that seek information that is deemed private, such as demographic information. The committee is determined to produce a shorter survey that can obtain the most vital information that is necessary to produce end-result actions items that address the public's need.

Another important issue is to ensure that the survey reaches vulnerable populations, and to ensure the survey has questions that can accurately document if individuals are vulnerable.

A final survey has been produced. It contains a location questions at the beginning and then proceeds into hazard related questions, and ends with demographic questions. The survey is Questions. The finalized survey was produced on February 6, 2024.

The survey will be in both paper and digital format, and will be available online on all applicable county and urban jurisdiction websites, and also available via Zencity link.

Outreach Event & Advertising Time-Line for 2024

The Wasco County Public Information Officer Stephanie Krell has volunteered to produce the Outreach Time-Line. This time-line will organize those events and meetings that the committee selects to participate in throughout 2024. It will also be utilized to book advertising blurbs concerning the NHMP update and the "Disaster Movie Marathon" pubic meeting event to be held March 13, 2024.

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Partner/Stakeholder List

The following agencies were part of the 2019 NHMP Partner Agency list. These agencies shall be solicited for the 2024 update. Emails shall be sent giving updates and to solicit feedback during the 2024 update process.

Full Partner Agency list:

Antelope (City of)	North Central Public Health District
4-H Extension Service District	North Wasco County Parks and Rec
Army Corps of Engineers	North Wasco County School District
BLM Prineville District	Northern Wasco County PUD
Blue Zones	NW Natural
BPA (Bonneville Power Admin)	Oregon Employment Department
Cattlemen's Association	Oregon Department of Fish and Wildlife
Chenowith People's Utilty District	Oregon Department of Forestry
Cherry Growers Association	Oregon Department of Transportation
The Dalles (City of)	Oregon Office of Emergency Management
Columbia Cascade Housing Corporation	Oregon State University
Columbia Gorge 4H	Orgon Department of Forestry
Columbia Gorge Community College	Pine Grove Water District
Columbia Gorge Real Estate	Port of The Dalles
Columbia Rural Fire Protection District	Red Cross
Columiba Gorge Community College	School District 1
Confed. Tribes of Warm Springs	Shaniko (City of)
Confeder. Tribes of Umatilla	Soil and Water Conservation District
Deparment of Geology and Mineral Industries	South Wasco Alliance
Department of Environmental Quality	South Wasco County School District #1
Department of Land Conservation and Development	South Wasco Park and Recreation District
Department of State Lands	The Dalles (City of)
Dufur (City of)	The Dalles Chamber of Commerce
Dufur Ambulance	The Dalles Public Works
Dufur Fire	Tooley Water District
Dufur Recreation District	Tygh Valley
Dufur School District #29	Tygh Valley Fire District
Fair Housing Council of Oregon	Tygh Valley Water District
Gorge Commission	US Forest Service - Columbia River Gorge National Scenic Area

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Habitat for Humanity	US Forest Service - Mt Hood National Forest, Barlow Ranger District
Juniper Flat Fire District	Wamic
Maupin (City of)	Wamic Rural Fire Protection District
Maupin Ambulance	Wamic Water and Sanitary Authority
Maupin Public Works	Wasco County
MCCOG Area Agency on Aging	Wasco County Emergency Management
MCMC Health Foundation	Wasco County GIS
Mid Columbia Medical Center	Wasco County Planning
Mid Columbia Senior Center	Wasco County Public Works
Mid-Columbia Center for Living	Wasco County Soil & Water Conservation District
Mid-Columbia Council of Governments	Wasco Electric
Mid-Columbia Economic Development District	Washington Department of Transportation
Mid-Columbia Fire and Rescue	Washington Family Ranch
Mosier (City of)	WC Soil and Water Conservation District
Mosier Community School	White River Health District
Mosier Fire District	WRD (Water Resources Department)
National Guard (Salem)	Yakama Indian Nation
National Guard (The Dalles)	
Natural Resources Conservation Service	
Next Door	
Nez Perce Tribe	

Of those, the following are Special Districts:

Chenowith PUD
Columbia Rural Fire Protection District
Dufur Fire
Dufur Recreation District
Juniper Flat Fire District
Maupin Ambulance
Mid-Columbia Council of Governments
Mid-Columbia Fire and Rescue
Mosier Fire District
North Central Public Health District
North Wasco County Parks and Rec
Northern Wasco County PUD
Pine Grove Water District

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Port of The Dalles
Soil and Water Conservation District
South Wasco Park and Recreation District
Tooley Water District
Tygh Valley Fire District
Tygh Valley Water District
Wamic Rural Fire Protection District
Wamic Water and Sanitary Authority
Wasco County Soil & Water Conservation District
Wasco Electric
WC Soil and Water Conservation District
White River Health District

Of those, the following were represented on the NHMP Steering Committee:

Mid-Columbia Fire and Rescue
Wasco County Soil & Water Conservation District

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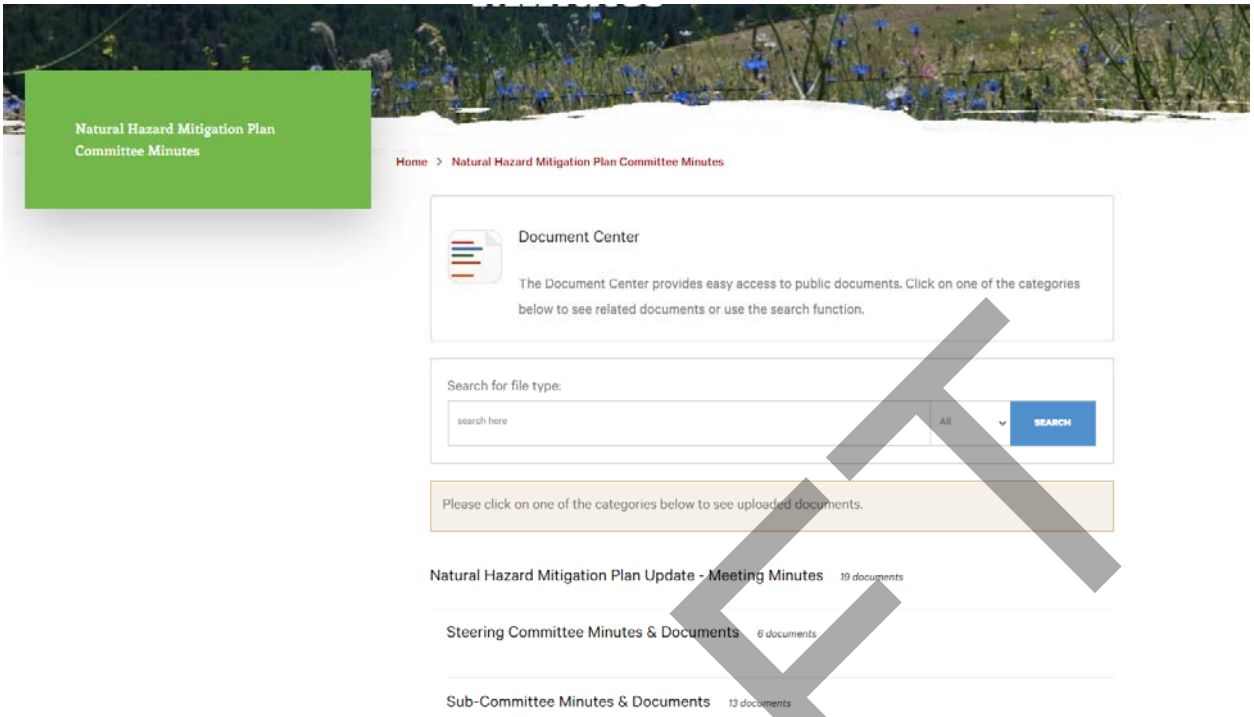
Wasco County NHMP Website (January, 2023 – November, 2024)


Natural Hazard Mitigation Plan Committee Minutes
Home > Natural Hazard Mitigation Plan Committee Minutes
Document Center
The Document Center provides easy access to public documents. Click on one of the categories below to see related documents or use the search function.
Search for file type:
search here
All
SEARCH
Please click on one of the categories below to see uploaded documents.
Natural Hazard Mitigation Plan Update - Meeting Minutes 19 documents
Steering Committee Minutes & Documents 6 documents
Sub-Committee Minutes & Documents 13 documents

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Natural Hazard Mitigation Plan Update - Meeting Minutes *19 documents*

Steering Committee Minutes & Documents *6 documents*

- Steering Committee Meeting - November 14, 2023
- Steering Committee Meeting - February 6, 2024
- Steering Committee Meeting - April 15, 2024
- Hazard Analysis Ranking & Presentation - April 15, 2024
- Hazard Analysis Ranking Ranking Matrix - April 15, 2024
- Steering Committee Meeting - May 29, 2024

Sub-Committee Minutes & Documents *13 documents*

- Incorporated Communities Meeting - December 19, 2023
- Incorporated Communities Meeting - January 24, 2024
- Incorporated Communities Meeting - March 6, 2024
- Mosier Subcommittee Meeting - Planning Document
- Mosier Subcommittee Meeting - April 23, 2024
- Dufur Subcommittee Meeting - April 25, 2024
- Dufur Subcommittee Meeting - Planning Document
- Maupin Subcommittee Meeting - Planning Document
- Public Outreach Subcommittee Meeting - December 12, 2024
- Public Outreach Subcommittee Strategy
- Public Outreach Subcommittee Meeting - January 23, 2024
- Public Outreach Subcommittee Meeting - February 21, 2024
- Public Outreach Subcommittee Meeting - Survey Results

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Appendix C: Community Profile

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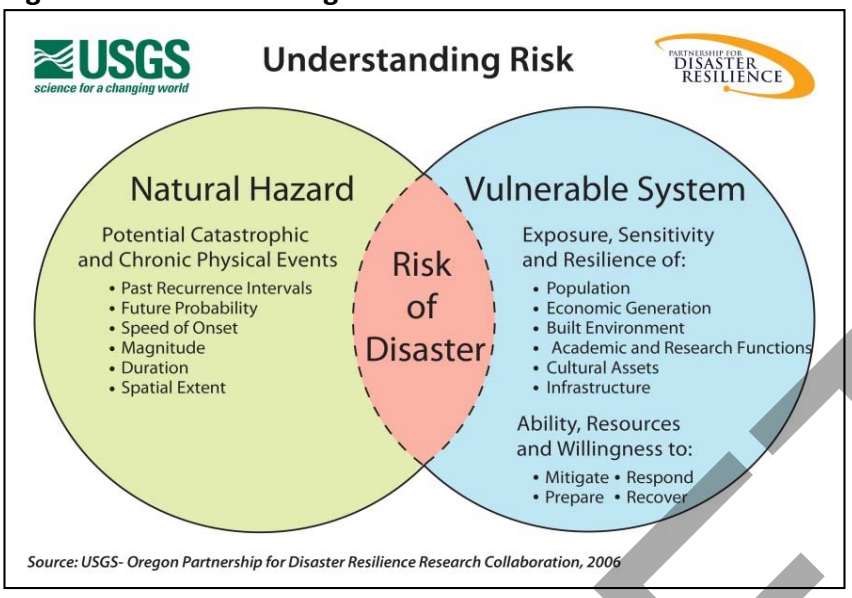
The community profile describes Wasco County from a number of perspectives in order to help define and understand its sensitivity and resilience to natural hazards. The information in this section provides a snapshot in time of the sensitivity and resilience indicators that are identified through the examination of community capitals which include natural environment, socio-demographic capacity, regional economy, physical infrastructure, community connectivity and political capital. The most fundamental definition of capital is a resource or asset that can be used, invested, or exchanged to create new resources. The concept of community capitals provides a useful framework for identifying the diverse resources and activities that make up a local economy.[1]

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

The information in this section represents a snapshot in time of the sensitivity and resilience factors in the county during the plan's most recent update. The information documented below, along with the hazard assessments located in *Section 2: Risk Assessment*, should be used as the local level rationale for the risk reduction action items identified in *Appendix A*. The identification of actions that reduce Wasco County's sensitivity, increase its resilience, and assist in reducing overall risk, are represented by the overlap in Figure C.1 below.

[1] Cornelia Flora, Jan Flora, Susan Fey and Mary Emery, "Community Capitals Framework," English Language Learners Symposium.

Figure C.1 Understanding Risk



Source: OPDR, Wasco County NHMP, August 2012

Why Plan for Natural Hazards in Wasco County?

Natural hazards impact citizens, property, the environment and the economy of affected communities. Wasco County residents and businesses could be exposed to incredible financial and emotional costs in the event of a natural disaster, whether from droughts, earthquakes, flooding, landslides, volcanoes, wildfires, or seasonal storms. The risk associated with natural hazards increases as more people move to areas that are subject to a higher rate of natural hazard incidence or probability. The inevitability of natural hazards and activity within the county create an urgent need to develop strategies, coordinate resources and increase public awareness to reduce risk and prevent loss from future natural hazard events. Identifying risks posed by natural hazards and developing strategies to reduce the impact of a hazard event can assist in protecting life and property of citizens and communities. Local residents and businesses should therefore work together with the county to keep the natural hazards mitigation plan updated. The Natural Hazards Mitigation Plan addresses the potential impacts of hazard events and allows the county to apply for certain funding from FEMA for pre and post disaster mitigation projects that would otherwise not be available if the county did not have an up to date Natural Hazards Mitigation Plan.

Natural Environment Capacity

Geography

The County of Wasco was organized by the territorial legislature in 1854. This 250,000 square mile county, the largest ever established in the United States, has since been pared to its current size of 2,387 square miles. The county lies east of the Cascade Range along the Columbia River, and is bounded on the west by the forests of Mt. Hood National

DRAFT

Forest, on the north by the Columbia River, and on the east by the Deschutes and John Day Rivers.

Oregon, like most of the Western States, is largely owned by the federal government with a vast majority of federal lands administered by the Bureau of Land Management (BLM) and the U.S. Forest Service.[2] In Wasco County approximately 62% of the land is privately owned (952,465 acres), whereas 37.8% of the land is owned by the Federal Government (579,548 acres, including tribal land), 2.8% by the State of Oregon (roughly 43,518 acres) and 0.4% by local government (roughly 6,055 acres).[3] Most of the land owned by BLM is adjacent to the Deschutes and John Day rivers, while US Forest Service land is located within the boundaries of the Mt Hood National Forest.

A majority (approximately 98% of the located outside the Columbia Gorge National Scenic Area) of the private land in the county is either agricultural land, forest, or an agriculture/forest mix. A large portion of the southern half of the county is comprised of the Warm Springs Indian Reservation, and the entire county is classified as rural except for land within the City of The Dalles.[4]

Steep rolling hills and sharp cliffs and canyons are characteristic landforms of Wasco County. Elevations vary from 5,700 feet at Flag Point in the western part of the county to 150 feet on the Columbia River. From the higher elevations of the Cascade Range, a general slope occurs to the north and east. Tributary streams dissect steep canyons as they make their way to the Columbia, Deschutes and John Day Rivers.

The soils in Wasco County have formed in a variety of parent materials. In the northeastern part of the county, soils have developed from loess deposits. These deposits range from a few inches to more than fifteen feet in thickness. In a southerly direction, the deposits become finer textured and thinner. Where a thin deposit of loess occurs, the soils developed from a mixture of loess and basalt. In the western part of the county, soils have developed from volcanic ash deposited over sediments, whereas soils in the southern part of the county have developed in fine textured sediments. These soils are predominantly fine textured with high percentages of coarse fragments. Water deposited soils formed in recent alluvium occur along the major drainages in the county, and small amounts of volcanic ash occur throughout the county.

Columbia Basin

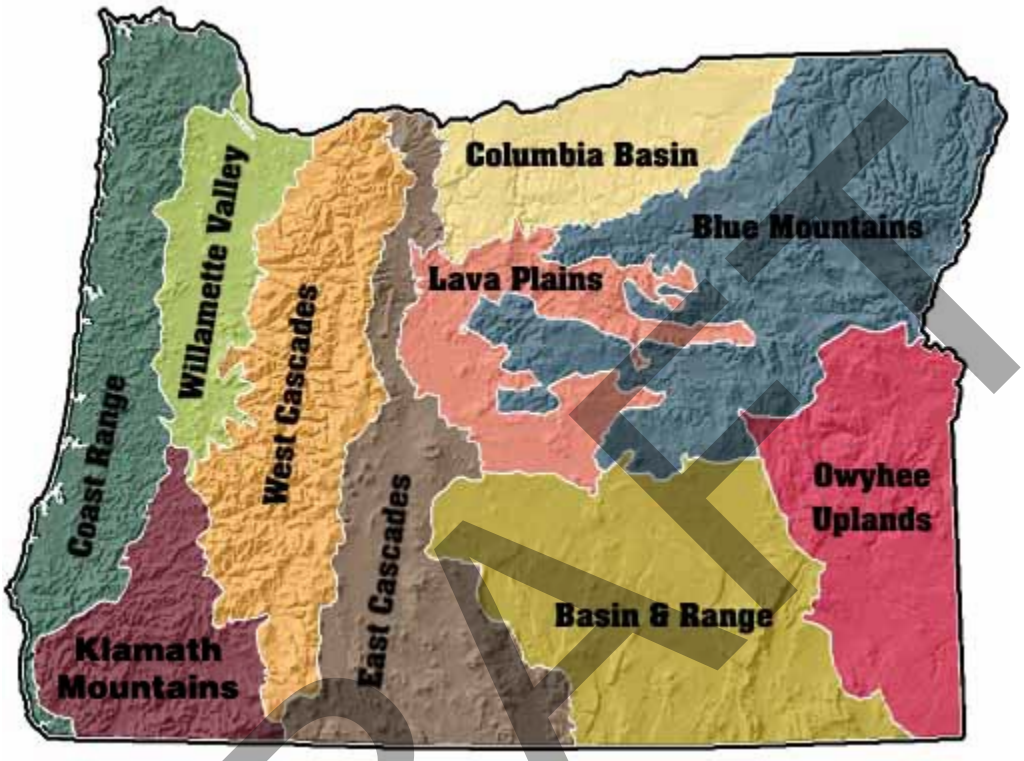
As can be seen in Figure C.2 below, Wasco County is mainly within the Columbia Basin physiographic province, though it is bordered on its eastern boundary by the East and West Cascades, as well as the Blue Mountains to the South. Also commonly referred to as the Deschutes-Columbia Plateau, the Columbia Basin is predominantly a volcanic province covering approximately 63,000 square miles in Oregon, Washington and Idaho.[5] The basin is surrounded on all sides by mountains, the Okanogan Highlands to the north, the Cascade Range to the west, the Blue Mountains to the south and the Clearwater Mountains to the east. Almost 200 miles long and 100 miles wide, the Columbia Basin merges with the

[2] Allan, Stuart et al. (2001). *Atlas of Oregon*. Pg. 83.
[3] Wasco County Assessor Data, August 2017.
[4] Census Bureau, 2010 Census, Oregon's 68 Urban Areas; Census Bureau, 2020 Census Urban Areas Facts, New Urban Areas for 2020. https://www.census.gov/programs-surveys/geography/guidance/geo-areas/urban-rural/2020-ua-facts.html.
[5] Western Oregon University. *Overview of Oregon Geography Oregon Physiographic Provinces "Deschutes---Columbia Plateau"*. 1999. http://www.wou.edu/las/physci/taylor/eisi/orr_orr2.PDF.

DRAFT

Deschutes Basin lying between the High Cascades and Ochoco Mountains. The province slopes gently northward toward the Columbia River with elevations up to 3,000 feet along the south and west margins down to a few hundred feet along the river.

Figure C.2: Physiographic Provinces of Oregon



Physiographic Provinces, Oregon Habitat Joint Venture --- http://www.ohjv.org/projects.html

Level Four Ecoregions

"Ecoregions denote areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources; they are designed to serve as a spatial framework for the research, assessment management, and monitoring of ecosystem components. By recognizing the spatial differences in the capacities and potentials of ecosystems, ecoregions stratify the environment by its probable response to disturbance."[6] There are seven level four ecoregions within the Columbia Basin and East Cascades that are located in Wasco County; the Pleistocene Lake Basin, the Deschutes/John Day Canyons, the Umatilla Plateau, the Oak/Conifer Foothills, Grand Fir Mixed Forest, Cascade Crest Montane Forest, and the John Day/Clarno Uplands.

PLEISTOCENE LAKE BASINS: the Pleistocene Lake Basins once contained vast temporary lakes that were created by flood waters from glacial lakes Missoula and Columbia. In Oregon, the flood waters accumulated from the eastern entrance of the Columbia River Gorge upstream to the Wallula Gap to form ancient Lake Condon. Today, the region is the driest and warmest part of the Columbia Basin with mean annual precipitation varying from seven to ten inches. Native vegetation consists of bunchgrass and sagebrush. Major irrigation projects provide

[6] Ibid.

DRAFT

Columbia River water to this region, allowing the conversion of large areas into agriculture.[7]

UMATILLA PLATEAU: the nearly level to rolling, treeless Umatilla Plateau ecoregion is underlain by basalt and veneered with loess deposits. Areas with thick loess deposits are farmed for dry land winter wheat, or irrigated alfalfa and barley. In contrast, rangeland dominates more rugged areas where loess deposits are thinner or nonexistent. Mean annual precipitation is nine to 15 inches and increases with increasing elevation. In uncultivated areas, moisture levels are generally high enough to support grasslands of bluebunch wheatgrass and Idaho fescue without associated sagebrush.[8]

DESCHUTES/JOHN DAY CANYONS: deeply cut into basalt, the Deschutes/John Day Canyons fragment a lightly populated portion of the Umatilla Basin. Canyon depths up to 2,000 feet create drier conditions than on the plateau above. In the canyons, bunchgrasses, Wyoming big sagebrush, and cheatgrass grow on rocky, colluvial soil. Riparian vegetation in narrow reaches is often limited to a band of white alder at the water line; broader floodplains and gravel bars are dominated by introduced species, such as reed canarygrass, sweetclover, and teasel. The rivers support Chinook salmon and steelhead runs.[9]

OAK/CONIFER FOOTHILLS: this ecoregion is much more diverse than other parts of the East Cascades. Marine weather enters the ecoregion via the Columbia River Gorge, moderating its otherwise continental climate. As a result, soil, climate, and vegetation share characteristics of both eastern and western Oregon. Grasslands, oak woodlands, and forests dominated by ponderosa pine, and Douglas---fir occur. The ecoregion is lower and drier than the nearby Grand Fir Mixed Forest ecoregion.[10]

GRAND FIR MIXED FOREST: this ecoregion is mostly outside the limit of maritime climatic influence. It is characterized by high, glaciated plateaus and mountains, frigid soils, and a snow---dominated, continental climate. Grand fir, Douglas---fir, ponderosa pine, and larch occur. The ecoregion is higher and moister than the Oak/Conifer Foothills, but the boundary between them is not sharp.[11]

CASCADE CREST MONTANE FOREST: this ecoregion consists of an undulating plateau punctuated by volcanic mountains and lava flows. Volcanism in the Pliocene epoch overtopped the existing Miocene Volcanics of the Western Cascades Montane Highlands. Later Pleistocene glaciations left numerous naturally---fishless lakes. Today the ecoregion contains forests dominated by mountain hemlock and Pacific silver fir. It has a shorter summer drought and fewer intermittent streams than the High Southern Cascades Montane Forest.[12]

JOHN DAY/CLARNO UPLANDS: this semiarid ecoregion forms a ring of dry foothills surrounding the western perimeter of the Blue Mountains. Highly dissected hills, palisades, and colorful ash beds flank the valleys of the John Day and Crooked Rivers. The ecoregion has a continental climate moderated somewhat by marine influence. Juniper woodland has expanded markedly into the sagebrush---grassland during the 20th Century due to a combination of climatic factors, fire

[7] Environmental Protection Agency. "Ecoregions of Oregon." https://oregonbirding.org/wp-content/uploads/2018/09/EcoregionsOregonLevelIVEPA.pdf.
[8] Ibid.
[9] Ibid.
[10] Ibid.
[11] Ibid.
[12] Ibid.

DRAFT

suppression, and grazing pressure.[13]

Rivers

Wasco County lies within three major drainage basins, the Hood River, Deschutes River and John Day River Basins. The major rivers which drain these areas include the Columbia, Deschutes and John Day Rivers. Stream flows are rapid during the spring and early summer months due to increased stream flow from snow melt, but also during the early winter rain-storms, before the heavy snowfall and freezing conditions prevail. The high water months normally are March, April, May, and June. The Deschutes and John Day Rivers, as with most streams that drain arid basins, are subject to extreme flow variations. These seasonal variations are quite pronounced, and the John Day River has had periods when no flow was recorded.

Columbia River Basin

The Columbia River Basin is North America's fourth largest, draining a 259,000 square mile basin that includes territory in seven states (Oregon, Washington, Idaho, Montana, Nevada, Wyoming and Utah) and one Canadian province (British Columbia). The river flows for more than 1,200 miles, from the base of the Canadian Rockies in southeastern British Columbia to the Pacific Ocean at Astoria, Oregon, and Ilwaco, Washington. The Columbia River Basin includes a diverse ecology that ranges from temperate rain forests to semi-arid plateaus, with precipitation levels from six inches to 110 inches per year. Furthermore, the Columbia is a snow-charged river that seasonally fluctuates in volume. Its annual average discharge is 160 million acre-feet of water with the highest volumes between April and September and the lowest from December to February. From its source at 2,650 feet above sea level, the river drops an average of more than two feet per mile, but in some sections it falls nearly five feet per mile.[14]

The Columbia River Basin is the most hydroelectrically developed river system in the world.[15] The Federal Columbia River Power System (FCRPS) encompasses the operations of 14 major dams and reservoirs on the Columbia and Snake rivers, operated as a coordinated system. In addition, the U.S. Army Corps of Engineers operates nine of 10 major federal projects on the Columbia and Snake rivers. These federal projects are a major source of power in the region, and provide flood control, navigation, recreation, fish and wildlife, municipal and industrial water supply, and irrigation benefits.[16]

John Day River

The John Day River basin drains nearly 8,100 square miles of central and northeast Oregon. It is one of the nation's longest free-flowing river systems. Elevations range from 265 feet at the confluence with the Columbia River to over 9,000 feet at the headwaters in the Strawberry Mountain Range. The river has no dams to control water flow; therefore, flow levels fluctuate widely in relation to snow pack and rainfall. The John Day River system is under designation of two important river preservation programs: the National Wild and Scenic

[13] Ibid.
[14] North Central Education Service District Lesson 1: The Columbia River, a River of Power. Written by: Bill Lang Professor of History Portland State University, Former Director, Center for Columbia River History. https://www.ncesd.org/wp-content/uploads/2017/03/River-of-Power-Lesson-1-final-2013.pdf.
[15] Ibid.
[16] United States Army Corps of Engineers. Columbia River Basin Dams. (n.d.) https://www.nwd.usace.army.mil/CRWM/CR-Dams/

DRAFT

Rivers Act and the Oregon Scenic Waterways Act.[17] Together, these two acts, one a federal program and one a state program, provide protection for the natural, scenic, and recreational values of river environments. The Bureau of Land Management (BLM), in partnership with The Confederated Tribes of the Warm Springs, Oregon Department of State Lands, Oregon Parks and Recreation Department, Oregon Department of Fish and Wildlife and the John Day Coalition of Counties (making up the John Day River Interagency Planning Team) has responsibility for managing the 147-mile John Day Wild and Scenic River from Service Creek in Wheeler County to Tumwater Falls.[18]

Deschutes River

The Deschutes River flows approximately 245 miles through central Oregon and is a major tributary to the Columbia River. The Deschutes Basin encompasses roughly 10,700 square miles, making it the second largest river basin in the state.[19] The Deschutes begins in Little Lava Lake in the Cascade Mountains, flows through two reservoirs and the City of Bend, then flows north through a deep gorge. Groundwater provides the largest input of flow to the lower Deschutes River, adjacent to Wasco County, and any changes in water resource use in the upper Deschutes Basin have the potential to affect stream flow in the lower Deschutes River.[20] Oregon water law permits landowners and irrigators to own water rights from the Deschutes River, and the Oregon Water Resources Department (OWRD) manages groundwater use through mitigation banks. These virtual banks are cooperative, non-profit brokerages that coordinate members' policies and plans regarding water use. The cooperatives organize water sellers, or organizations that own water rights, and match them with prospective buyers. It is believed that the established rules for temporary or permanent water reallocation help ensure the validity and continuity of water rights, oversee quality control, ensure a reliable and transparent market with stable prices, and guarantee an orderly transition between users. The hope is that this system will reduce depletion of the Deschutes River, especially during summer months.[21]

Climate

Temperature, Precipitation and Topography

Wasco County lies in a transitional zone between western and eastern Oregon climates. Maritime air patterns are characteristic of western Oregon, while the drier continental air patterns dominate eastern Oregon. The Cascade Mountain Range forms a barrier which creates the climatic difference. The transition between these two major climates can be evidenced within the county.

Overall, the climate in Wasco County is temperate and semi-arid. Low annual precipitation, low winter temperatures, and high summer temperatures are typical. Seasonal differences in temperature are greater than daily changes. Extremes of temperature most often occur

[17] U.S. Department of Interior. Bureau of Land Management. "John Day River". https://www.blm.gov/programs/recreation/permits-and-passes/lotteries-and-permit-systems/oregon-washington/john-day-river.
[18] Public Announcement. John Day River Update, May 2010. https://www.blm.gov/or/districts/prineville/files/2010-08-11_JDRS_EA_PressRelease.pdf.
[19] Oregon Environmental Council. (2007). *Cleaner Rivers for Oregon Why Our Rivers Need Help.* https://oeconline.org/wp-content/uploads/2014/10/cleaner-rivers-report.pdf.
[20] Oregon Explorer Natural Resources Digital Library. (Accessed 2014) *Water Quantity and Quality. Deschutes Basin Development and Groundwater.*
[21] Ibid.

DRAFT

when a continental air mass dominates the area with an east wind. Strong marine influences also reflect the occurrence of precipitation, more than half of which falls from November through February. Table C.1 highlights the average temperature, precipitation and snowfall in the City of the Dalles. From 1907 to 2015, the average annual precipitation in Wasco County equaled 11.70inches per year. Snowfall amounts for the same period averaged 15.1 inches per year with the highest amounts occurring in between November and February.[22] Table C.1., provides the average temperature, precipitation, and snowfall for the City of The Dalles from 1948 to 2005.

Table C.1: Period of Record Monthly Climate Summary, The Dalles, OR

Month	Average Max. Temp (deg F)	Average Min. Temp (deg F)	Average Precipitation (inches)	Average Snow Depth (inches)	Average Snowfall (inches)
January	42.3	29.4	2.66	8.4	1
February	48.9	32	1.87	2	0
March	57.4	36.3	1.34	0.9	0
April	65.6	41.9	0.75	0	0
May	73.5	48.7	0.58	0	0
June	80.4	55.1	0.44	0	0
July	87.9	59.6	0.14	0	0
August	87.6	58.9	0.33	0	0
September	81.5	51.4	0.45	0	0
October	67.9	42.4	1.07	0	0
November	52	36	2.13	1.2	0
December	43.5	31.5	2.62	2.9	0
Annual	**65.7**	**43.6**	**14.38**	**15.4**	**0**

Source: Western Regional Climate Center, Western US Climate Historical Summaries, https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?orthed (Period of Record: 1948-2005)

The county's rolling topography creates local differences in wind patterns, and highly unstable climatic conditions are found in the Columbia Gorge and nearby areas as a result. The contact between continental and maritime air masses produces strong wind patterns. Prevailing winds are north-westerly in summer and northeasterly in winter. Winds are less dominant away from the Columbia Gorge, and western Wasco County is generally protected from winds by the Cascade Mountains to the west.

The topography of the county forms microclimates. The higher portions of rolling hills have higher soil temperatures because they are exposed to the sun and drying winds, while the creek bottoms and canyons have lower soil temperatures and retain a greater amount of moisture. Differences in microclimates can be seen in the changes of vegetation, as trees and bushes are found in the canyons, while bunchgrass dominates the tops of rolling hills.

Minerals and Soils

The soils in Wasco County have formed in a variety of parent materials. In the northeastern part of the county, soils have developed from loess deposits. These deposits range from a few inches to more than fifteen feet in thickness. In a southerly direction, the deposits become finer textured and thinner. Where a thin deposit of loess occurs, the soils developed

[22] Western Regional Climate Center. (n.d.). *WASCO, OREGON (359068) Period of Record Monthly Climate Summary Period of Record : 09/01/1907 to 03/31/2015*. https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?or9068.

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from a mixture of loess and basalt. In the western part of the area, soils have developed from volcanic ash deposited over sediments. Soils in the southern part of the area have developed in fine textured sediments, and are predominantly fine textured with high percentages of coarse fragments. Water deposited soils formed in recent alluvium also occur along the area's major drainages, and small amounts of volcanic ash occur throughout the county.

Hazard Severity

There are many potential hazards that can occur within Wasco County, however several warrant more concern due to Wasco County's geography. For example the high desert and rolling plains of Wasco County make it particularly susceptible to drought. During dry years, drought is fairly common around the county, especially during a succession of dry years. Of particular concern with regard to drought potential are areas in the county (the City of Mosier for example) that rely upon wells and have seen a reduction in groundwater supply.

Historically, flooding has occurred along one or more of the county's waterways every few years. These include the White River, the Deschutes River and the Columbia River. Flooding on these rivers usually occurs during spring and early summer. Long periods of heavy rainfall and mild temperatures coupled with snowmelt contribute to flooding conditions, however riverine and flash floods may both occur in Wasco County. Riverine floods happen when the amount of water flowing through a river channel exceeds the capacity of that channel.

Because of its wet climate and considerable topographic relief, the Pacific Northwest is one of the more prolific portions of the nation for slope failures. Wasco County has several areas where landslides have taken place and many areas that are susceptible to landslides. The slopes above the Columbia River are particularly susceptible. Slides in Wasco County generally range in size from thin masses of soil of a few yards wide to deep-seated bedrock slides. Landslides typically occur in Wasco County during or after periods of heavy rain and flooding. Wasco County is large and contains a diverse set of wildfire hazard and risk situations.

There are several climatic and topographic conditions found in Wasco County that are conducive for large wildfires: hot and dry conditions during the fire season throughout the county; frequent high winds along the Columbia River Gorge which can contribute to fast moving fires that are difficult to control; and moderate to steep slopes in places like Mosier which add to the rate of wildfire spread and suppression difficulty.

Synthesis

Natural capital is essential in sustaining all forms of life including human life, and plays an often under-represented role in natural hazard community resiliency planning. With four distinct mild seasons, a diverse terrain and its proximity to the Columbia Gorge, Wasco County historically has had to deal with habitual drought, flooding, wildfires and the occasional landslide. By identifying potential hazards, temperature and precipitation patterns, along with natural capitals such as key river systems, Wasco County can focus on key areas to better prepare, mitigate, and increase the resiliency of local communities.

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Socio Demographic Capacity

Population

The Population Research Center estimates the population of Wasco County in 2022 equaled 26,794. Table C.2 illustrates that that Oregon's population increased by 0.5% from 2020 to 2022. Wasco County is primarily rural and is the twenty-second most populated of thirty-six counties in the State of Oregon. The population of the county is slightly larger than neighboring Hood River and Jefferson Counties, and significantly larger than neighboring Sherman, Gilliam and Wheeler Counties. Table C.2 describes the population change for these communities between 2020 and 2022.

Table C.2: Regional Change in County Populations:

County	Population (2022)	Population (2020)	Population Change (2020-2022)	Percent Change (2020-2022)
Wasco	**26,794**	**26,670**	**124**	**0.2%**
Clackamas	430,421	421,401	9,020	0.9%
Gilliam	2,071	1,995	76	1.7%
Hood River	23,894	23,977	-83	-0.2%
Jefferson	25,404	24,502	902	1.6%
Sherman	1,938	1,870	68	1.6%
Wheeler	1,436	1,451	-15	-0.5%
Oregon	4,281,851	4,237,256	44,595	0.5%

Source: Portland State University Population Research Center, Certified Population Estimates 2022. U.S. Census Bureau Population, 2020.

The largest populated area in Wasco County is The Dalles, where over half of County residents reside. Table C.3 describes the population change since 2010 within the cities and unincorporated areas of Wasco County compared to the county as a whole. The Dalles and Mosier, both located along the Columbia River and Interstate 84, had the largest rise in population. The rest of the county's population is dispersed between smaller towns, unincorporated communities and on farms and ranches.

It is worth noting that many of the small jurisdictions have limited resources with respect to fire, police and emergency medical. In most cases, the residential populations are served by volunteer fire fighters and emergency medical technicians. This fact, combined with an aging population, poses significant future problems in providing volunteer emergency response resources. In areas with a positive population growth, it will be important to continue to promote volunteer service that will be responsible as first responders in the event of a natural hazard.

DRAFT

Table C.3: Wasco County 2010 and 2020 Populations, and 2040 Population Forecast

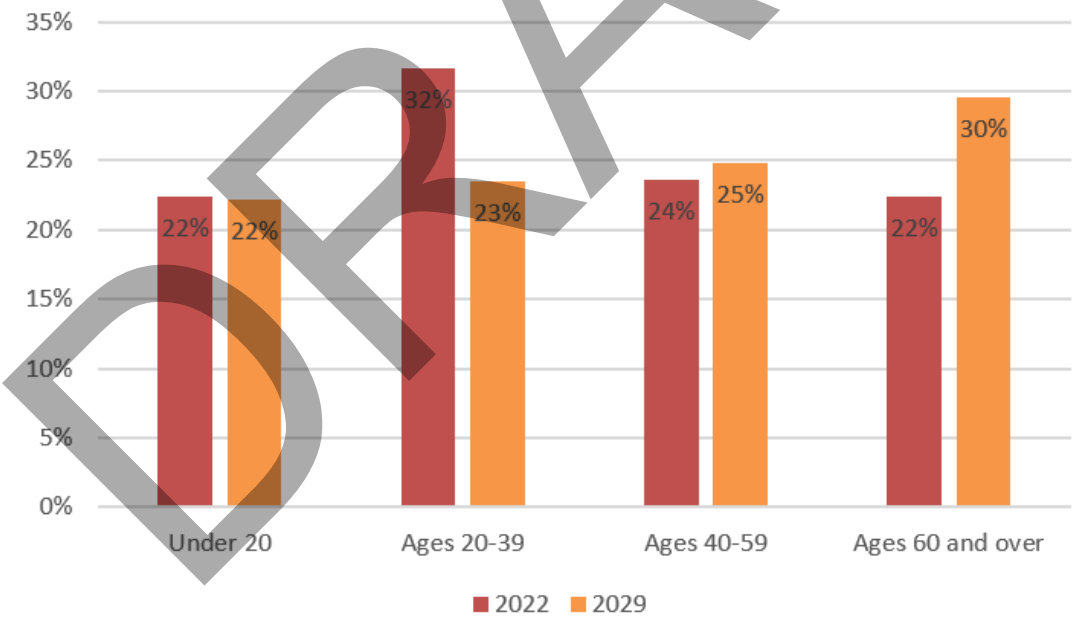
Jurisdiction	2010	2020	2040
Antelope	46	37	40
Dufur	604	632	637
Maupin	418	427	439
Mosier	433	468	553
Shaniko	36	30	34
The Dalles	13,620	16,010	18,243
Unincorporated	10,056	9,066	9,152
Wasco County	25,213	26,670	29,097

Source, PSU Population Research Center Annual Population Report Tables, 2022. PSU Population Research Center Combined Forecast Summary for All Areas, 2022-2026.

Age

The age profile of an area has a direct impact both on what actions are prioritized for mitigation and how response to hazard incidents is carried out. Figure C.3 illustrates the current and projected percentage of population by age groups within the county. As of 2022, approximately 22% of the population in the county was over the age of 60. That percentage is projected to grow to 30% by 2029. The County's younger population (under 20 years old) will remain consistent between 2022 and 2029.

Figure C.3: Wasco County Population by Age, 2022 and 2029



Source: PSU Population Research Center, 2022 Annual Oregon Population Report Tables; PSU Population Report Center, Wasco County Population Forecast Summary, 2022-2026 cycle.

Figure C.4 illustrates the percentage of population by various age groups in the incorporated communities of Wasco County. The cities of Dufur and Shaniko have the highest percentage of residents under the age of 20. A larger youth population in an area increases the importance of outreach to parents and schools on effective ways to teach children about fire safety, earthquake response, and evacuation plans. Children are also more vulnerable to the

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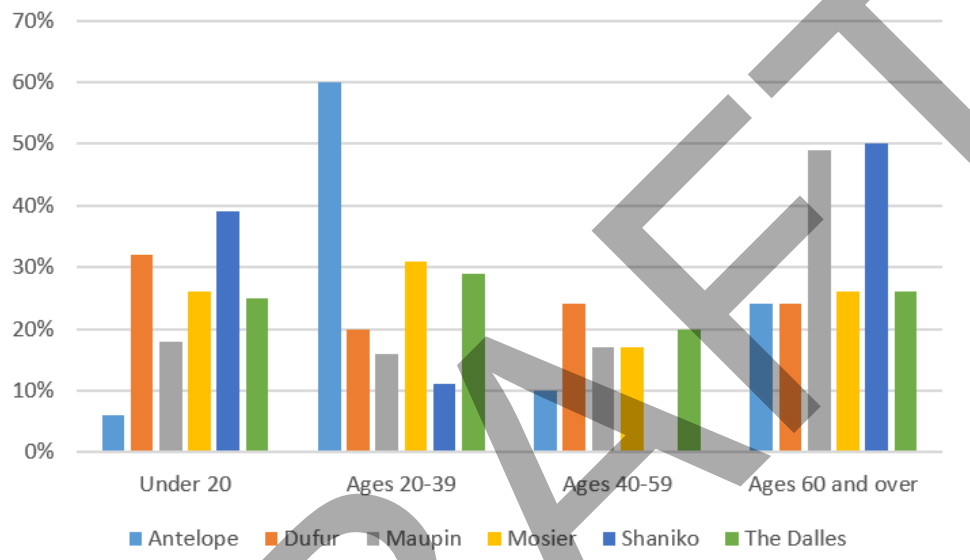
extreme heat and cold, have few transportation options and require assistance to access medical facilities.[23]

Maupin and Shaniko have the highest percentage of residents over the age of 60. Older populations are another group that is likely to have special needs prior to, during and after a natural disaster. Older populations may require assistance in an evacuation due to limited mobility or health issues, and are more vulnerable to the extreme heat and cold. Additionally, older populations may require special medical equipment or medications and can lack the social and economic resources needed for post-disaster recovery.[24]

Figure C.4: Wasco County City Population Distribution by Age, 2022



Source: PSU Population Research Center, 2022 Annual Oregon Population Report Tables; PSU Population Report Center, Wasco County Population Forecast Summary, 2022-2026 cycle.

Other important considerations for high-risk populations are the number of households where persons over the age of 65 live alone as well as households with children under 18. Table C.4 describes the high-risk populations in each jurisdiction within the county for which data is available. Over 36% of the 10,488 households in the county have individuals living in them who are 65 or older, and nearly half of those are householders that live alone. Additionally, children under the age of 18 occupy over 25% of the households in the county.[25] These households are more vulnerable because they are occupied by individuals who may lack the necessary knowledge, skills, social support structures, or the mental and physical abilities necessary to take care of themselves. Historically, vulnerable populations present a special challenge to emergency managers and response agencies and they are more likely to be victims of a disaster.[26]

DRAFT

[23] National Center for Environmental Health, *Planning for an Emergency: Strategies for Identifying and Engaging At-Risk Groups,* 2015.
[24] Ibid.
[25] U.S. Census Bureau, American Community Survey, 2022
[26] Wasco County HIVA, July 2008.

Table C.4: Wasco County High Risk Populations

Location	Total Households	Percent Households with one or more under	Percent Households with one or more over 65	Percent Householder 65 and over, living alone
Wasco County	10,488	25.9%	36.9%	15.0%
Dufur	351	23.9%	40.7%	15.7%
Maupin	163	14.7%	53.4%	27.6%
Mosier	266	35.0%	29.3%	11.7%
The Dalles	6,341	27.2%	34.2%	15.3%

Source: U.S. Census Bureau, American Community Survey 2022.

Minority Status/Language (comprising race, ethnicity, and English language proficiency variables)

The impact following a disaster in terms of losses and the ability of the community to recover may also vary among minority population groups based on race, ethnicity, and language. Studies have shown that racial and ethnic minority groups can be more vulnerable to natural disaster events due to historic circumstance that may have been the catalyst for living in areas prone to natural disaster.[27] Historic circumstance of some minority groups may also be linked to an increased likelihood for the group to live in impoverished areas where buildings do not or cannot meet updated building code requirements and/or lack emergency services from lack of community funding.[28] Minorities are more likely to be isolated in communities, are less likely to have the savings to rebuild after a disaster, and less likely to have access to transportation and medical care. Additionally, minorities and the poor are more likely to rent than own homes, and in the event of a natural disaster, where homeowners would gain homeowner insurance, renters often do not have rental insurance.[29] Table C.5 describes the population in Wasco County by race, while Table C.6 highlights the county population that identifies as Hispanic or Latino. According to the 2020 Decennial Census, approximately 18.8% of the Wasco County population is identified as Hispanic or Latino in origin, which is 1.4% higher than was reported in 2016.[30] It should be noted that "Hispanic Origin" is considered an ethnicity, not a race, as Hispanics may be of any race. The US Census Bureau 2022 American Community Survey (ACS) 5-Year Estimates provides that 17.2% of the Wasco County population over the age of five speaks a language other than English at home.[31]

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[27] Flanagan, Barry E.; Gregory, Edward W.; Hallisey, Elaine J.; Heitgerd, Janet L.; and Lewis, Brian (2011) "A Social Vulnerability Index for Disaster Management," Journal of Homeland Security and Emergency Management: Vol. 8: Iss. 1, Article 3.
[28] Ibid.
[29] State of Oregon 2015 Natural Hazards Mitigation Plan, Region 5 Mid---Columbia Regional Profile.
[30] U.S. Census Bureau, Table P1: Race, 2020 Decennial Census.
[31] U.S. Census Bureau, Table S1601: Language Spoken at Home, 2022 American Community Survey 5-Year Estimates.

Table C.5: Wasco County Racial Composition

Race	Count	Percent
Total Population	26,639	
One Race	23,535	88.30%
White	21,820	81.90%
Black or African American	82	0.30%
American Indian or Alaska Native	703	2.60%
Asian	179	0.70%
Native Hawaiian and other Pacific Islander	33	0.10%
Other race	718	2.70%
Two or more races	3,104	11.70%

Source: U.S. Census Bureau, American Community Survey, 2022.

Table C.6: Wasco County Hispanic Ethnicity

Hispanic or Latino Origin	Count	Percent
Total Population	26,639	
Hispanic or Latino (of any race)	5,309	19.90%
Not Hispanic or Latino	21,330	80.10%

Source: U.S. Census Bureau, American Community Survey, 2022.

The U.S. Census reports that over 18% of the Wasco County population identifies with a non-white race. Similarly, nearly 20% of the population is of Hispanic or Latino origin. Culturally appropriate and effective outreach includes both methods and messaging targeted to all audiences in the County. Connecting to historically disenfranchised populations through trusted organizations and institutions or providing preparedness handouts and presentations in the languages spoken by the County's diverse population will increase community resilience.

Education

Educational attainment of community residents influences the capacity of a population to be resilient during a natural disaster. Tables C.7 describes educational attainment throughout the county and state. Compared to the state, Wasco County has a lower percentage of high school graduates and a much lower percentage of college graduates with a Bachelor's degree or higher. This number has risen 3.3 percentage points in the county since the 2011-2015 period.

Table C.7: Wasco County Educational Attainment

Educational Attainment	Wasco County	Oregon
Population 25 and over		
High school graduate or higher	86.4%	91.6%
Bachelor's degree or higher	22.0%	35.5%

Source: U.S. Census Bureau, American Community Survey, 2018-2022.

Educational attainment often reflects higher income and therefore higher self-reliance. Widespread educational attainment is also beneficial for the regional economy and employment sectors as there are potential employees for professional, service and manual labor workforces. Oversaturation of either highly educated residents or low educational

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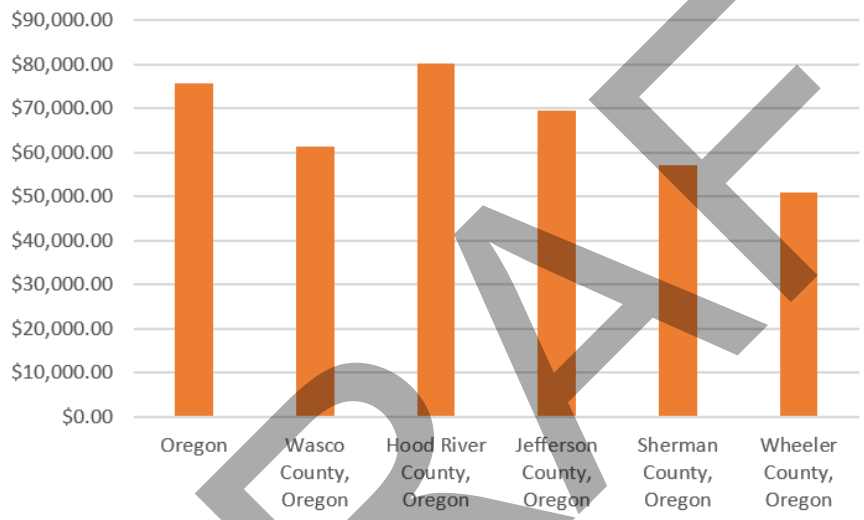
attainment can have negative effects on the resiliency of the community.

Income

Household income and poverty status levels are indicators of socio demographic capacity and the stability of the local economy. Household income can be used to compare economic areas as a whole, but does not reflect how the income is divided among the residents in the area.[32] Figure C.5 illustrates highlights the median household income in 2022 for Oregon, Wasco County and surrounding Counties. In 2022, the median household income across Wasco County equaled over $61,000 roughly $14,500 lower than Oregon as a whole with a median household income of nearly 75,000. All area counties in the figure lagged behind Oregon's 2022 median household income, except Hood River County with a median household income of just over $80,000.

Figure C.5: Median Household Income, 2022



Source: U.S. Census Bureau, American Community Survey, 2022.

Income is a resiliency indicator as higher incomes are often associated with increased self-reliance and ability to prepare oneself if an emergency does occur. Table C.8 identifies both the number and the percentage of individuals living below the poverty level. In 2022, the national poverty guideline for a family of four was at or below $27,750.[33]

The Census Bureau estimated in 2022 that 16% of the total population and 16.3% of children live below the poverty level across the county. Among the highlights in Table C.8, poverty levels of all ages increased by 2.2% between 2017 and 2022. Poverty can limit the ability of households to engage in mitigation activities and require more community assistance in the event of a disaster in the form of sheltering, medical assistance and transportation. The poverty estimates as a percentage are higher in Wasco County compared to state and national averages, with the exception of the 2022 poverty estimate among those under 18 years of age.

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[32] State of Oregon 2015 Natural Hazards Mitigation Plan, Region 5 Mid---Columbia Regional Profile.
[33] Heathcare.gov, Federal Poverty Level (FPL), 2024.

Table C.8: Individuals Living Below Poverty Level

	2022 Percent Poverty All Ages	2017 Percent Poverty All	2022 Percent Poverty Under 18	2017 Percent Poverty Under 18
Wasco County	16.0%	13.8%	16.3%	20.8%
Oregon	12.0%	13.2%	13.6%	16.5%
United States	12.6%	13.4%	16.7%	18.4%

Source: U.S. Census Bureau, Small Area Estimates Branch, 2022 and 2017.

Additionally, Table C.9 shows the number of children whose families are income-eligible for federal nutrition programs. The percentage has steadily increased between 2017 and 2021, increasing 18% in that time period. This is a dramatic increase, signaling the vulnerability of families with children in the County; however, it could be reflective of the COVID-19 Pandemic.

Table C.9: Wasco County Children Income-Eligible for Federal Nutrition Programs

	2017	2018	2019	2020	2021
Percent children income-eligible for federal nutrition programs.	69%	69%	83%	83%	87%

Source: Feeding America, Map the Meal Gap 2017-2021.

Health and Safety

Individual and community health play an integral role in community resiliency. Those who lack health insurance have higher vulnerability to hazards and will likely require additional community support and resources. Table C.10 identifies health insurance coverage across Wasco County. In 2017, the Census Bureau estimated that the number of uninsured residents in Wasco County under the age of 65 equaled 2,286 (approximately 11.0%); however, in 2021, the number of uninsured residents under the age of 65 equaled. It is important to note that the uninsured rate for persons under the age of 65 has been consistently higher in the county compared to the state over the past five years.

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Table C.10: Wasco County Health Insurance Coverage

		Percent Uninsured Under Age 65	Percent Uninsured Under 19
2017	Wasco County	11.00%	5.10%
	Oregon	8.20%	3.70%
2018	Wasco County	10.40%	4.30%
	Oregon	8.40%	3.40%
2019	Wasco County	11.60%	5.50%
	Oregon	8.60%	4.00%
2020	Wasco County	11.40%	5.30%
	Oregon	8.00%	3.50%
2021	Wasco County	9.80%	4.70%
	Oregon	7.40%	3.60%
2022	Wasco County	12.80%	6.00%
	Oregon	8.80%	3.30%

Source: U.S. Census Bureau, Small Area Health Insurance Estimates, 2017-2022.

The availability of law enforcement officials and professional medical care providers can serve to strengthen the resilience of a community and lessen the immediate impacts during and following a major disaster. As of 2024, 25 full time sworn officers serve the City of The Dalles Police Department including administration, and the Wasco County Sheriff's Office has 18 sworn deputies. As shown in Table C.11 below, the rate of sworn police officers per 1,000 people in Wasco County is almost the same as the rate throughout the entire state. Similarly, the Oregon Medical Board identifies that there are over three physicians in patient care per 1,000 people, about 0.5% less than the state as a whole.

Table C.11: Wasco County Physicians and Sworn Police Officers

		Wasco County	Oregon
2024	Number of Sworn Police Officers	43	6,303
	Rate per 1,000 population	1.6	1.5
2023	Number of Physicians	104	18,624
	Rate per 1,000 population	3.88	4.35

Source: Federal Bureau of Investigation, Crime Data Explorer, 2022; Oregon Medical Board Annual Report 2022; Oregon State Sheriff's Association 2024; The City of The Dalles, Oregon 2024.

Synthesis

Socio demographic capacity is a significant indicator of community hazard resiliency. The characteristics and qualities of the community population such as age, race, education, income, health and safety are significant factors that can influence the community's ability to cope, adapt to and recover from natural disasters. The status of socio demographic capacity

DRAFT

indicators can have long-term impacts on the economy and general stability of a community, ultimately affecting an area's overall level of resilience.

Regional Economic Capacity

Economic resilience to natural disasters is far more complex than merely restoring employment or income to 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 any existing economic picture. Once inherent strengths or systematic vulnerabilities become apparent, both the public and private sectors can take action to increase the resilience of the local economy.

Regional Affordability

The evaluation of regional affordability supplements the identification of socio-demographic capacity indicators, i.e. median income, and is a critical analysis tool to understanding the economic status of a community. This information can capture the likelihood of individuals' ability to prepare for hazards, through retrofitting homes or purchasing insurance. Regional affordability is a mechanism for generalizing the abilities of community residents to get back on their feet without Federal, State or local assistance.

Median Income

Median income can be used as an indicator for the strength of a region's economic stability. Table C.12 shows that between 2015 and 2022 the median household income in Wasco County has risen at a slower rate than both the state and nation as a whole. The median household income, in addition, is lower than both state and national medians.

Table C.12: Median Household Income, 2015 and 2022

	2015	2022	Change
Wasco County	$43,422	$61,316	$17,894
Oregon	$51,243	$76,632	$25,389
United States	$53,889	$75,149	$21,260

Source: U.S. Census Bureau: State and County Quick Facts 2017-2022;
U.S. Census Bureau: American Community Survey 2011-2015

Economic Diversity

Economic diversity is a general indicator of an area's fitness for weathering difficult financial times. One method for measuring economic diversity is through use of the Hachman Index, a formula that compares the composition of county and regional economies with those of states or the nation as a whole. Table C.13 provides Hachman Index results. Using the Hachman Index, a diversity ranking of 1 indicates the Oregon County with the most diverse economic activity compared to the state as a whole, while a ranking of 36 corresponds with the least diverse county economy. Wasco County and neighboring Hood River County sit between the two most highly ranked counties in the state in terms of economic diversity, as well as three of the lowest ranked counties, with Sherman County ranked lowest in the state overall. The Wasco County economic diversity ranking is 17, in the middle tier of Oregon's 36

DRAFT

counties.[34]

Table C.13: County Hachman Index Scores and Ranks

County	2021 Hachman Index Score	2021 State Rank	1999 State Rank
Wasco	0.388	17	20
Clackamas	0.836	3	2
Gilliam	0.04	36	35
Hood River	0.297	23	25
Jefferson	0.141	29	29
Sherman	0.046	35	36
Wheeler	0.133	30	31

Source: Oregon Employment Department, Quarterly Census of Employment and Wages, 2021

Employment and Wages

Data provided by the US Census in the 2017 and 2022 American Community Survey indicate that Wasco County's labor force (defined as the population of 16 and older which are in the labor force) increased between 12,037 in 2017 to 12,814 in 2022.[35]

Following regional, state and national trends after the COVID-pandemic (see Table C.14 and Figure C.6), Wasco County's unemployment rate rebounded, increasing only 0.2% between 2017 and 2022, after experiencing fluctuation during the pandemic in 2020 and 2021.[36] Many surrounding counties in the region have experienced the same trend (see Table C.14).

Table C.14: Regional Unemployment

	County 2017 Unemployment Rate	2022 Unemployment Rate	Percent Change from 2017
Wasco	**4.1**	**4.3**	**+0.2%**
Clackamas	3.7	3.8	+0.1%
Gilliam	4.2	4	-0.2%
Hood River	3.5	3.6	+0.1%
Jefferson	5.5	5.5	0%
Sherman	4.7	3.3	-1.4%
Wheeler	3.8	3.4	-0.4%
Oregon	4.1	4.2	+0.1%

Source: 2011 Oregon Employment Department, "Local Area Employment Statistics 2017-2022"

Employment data from the Oregon Employment Department demonstrate a cyclical employment pattern in the Wasco and Hood River County region, with a seasonal peak in the summer (July) in Wasco County and a seasonal peak in the fall (September/October) for Hood River County.[37] These peaks typically respond to the slowing of the primary tourist season along the Columbia River, as well as most agricultural operations, with the approach

[34] Oregon Employment Department – 2021 Hachman Index Scores by County
[35] American Community Survey Fact Finder 2017 and 2022
[36] Oregon Employment Department "Local Area Employment Statistics 2017-2022.".
[37] Oregon Employment Department, "Local Area Unemployment Statistics", 2022-2023.

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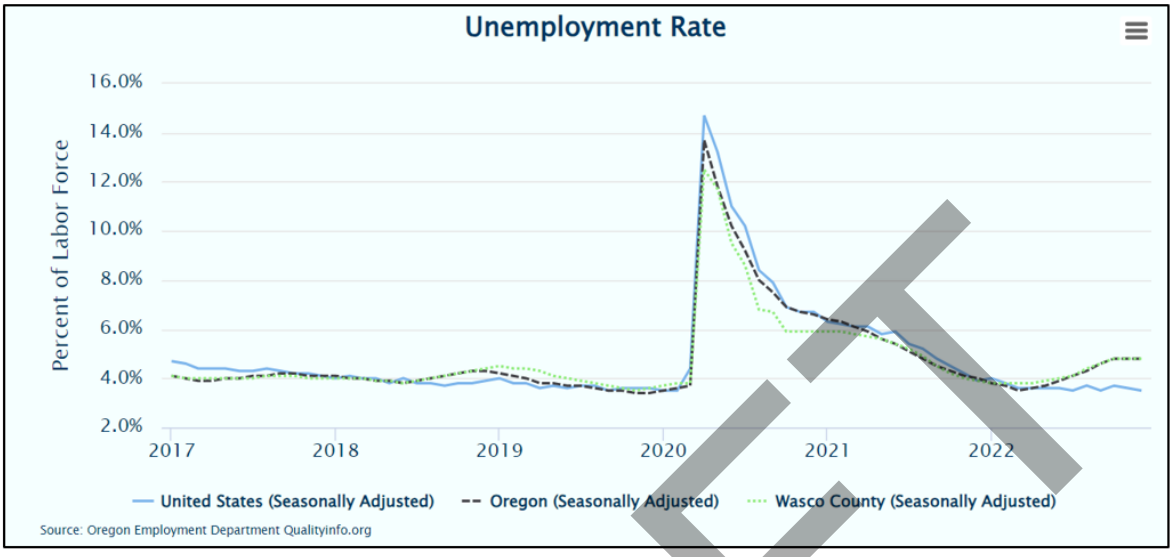
of fall and winter in the region.

Figure C.6: Seasonally Adjusted Unemployment Rates, 2017-2022



Source: Oregon Employment Department. Qualityinfo.org.

As opposed to measurements of the labor force and total employment, Covered Employment provides a quarterly count of all employees covered by Unemployment Insurance. Table C.15 displays the County Covered Employment and payroll figures for Wasco and surrounding Counties in 2016.

Table C.15: 2022 County Covered Employment and Payroll

County	Employees	Annual Payroll	Average Pay
Wasco	**11,351**	**$582,300,000**	**$51,301**
Hood River	13,802	$668,100,000	$48,404
Sherman	937	$53,500,000	$57,081
Gilliam	944	$55,400,000	$58,639
Wheeler	325	$11,800,000	$36,359
Oregon	1,947,970	$129,200,000,000	$66,342

Source: Oregon Employment Department, County Covered Employment and Wages, 2022.

In 2021, 704 employment establishments operated in Wasco County, and over 85% of those establishments had fewer than 20 employees.[38] The prevalence of small businesses in the county is a partial indication of sensitivity to natural hazards, because small businesses are typically more susceptible to financial uncertainty. If a business is financially unstable before a natural disaster occurs, financial losses (resulting from both damage caused and the recovery process) may have a bigger impact than they would for larger and more financially stable businesses.[39]

[38] U.S. Census Bureau – 2021 County Business Patterns.

[39] Federal Emergency Management Administration, "Stay in Business After a Disaster by Planning Ahead," October 13, 2018.

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Industry

Major Regional Industry

Key industries are those that represent major employers and are significant revenue generators. Different industries face distinct vulnerabilities to natural hazards, as illustrated by the industry specific discussions below. Identifying key industries in the region enables communities to target mitigation activities towards those industries' specific sensitivities. It is important to recognize that the impact that a natural hazard event has on one industry can reverberate throughout the regional economy.[40]

This is of specific concern when the businesses belong to the basic sector industry. Basic sector industries are those that are dependent on sales outside of the local community. The farm and ranch, information, and wholesale trade industries are all examples of basic industries. Non-basic sector industries are those that are dependent on local sales for their business, such as retail trade, construction, and health and social assistance.[41]

Employment by Industry

Economic resilience to natural disasters is particularly important for the major employment industries in the region. If these industries are negatively impacted by a natural hazard, such that employment is affected, the impact will be felt throughout the regional economy.[42] Thus, understanding and addressing the sensitivities of these industries is a strategic way to increase the resiliency of the entire regional economy.

The county's economy is based upon agriculture (orchards, wheat farming, livestock ranching), lumber, manufacturing, electric power, transportation, and tourism. The county made a large shift towards a service-oriented economy following the decline of regional aluminum production, once a major pillar of the local economy. Retail trade and services are concentrated in the City of the Dalles, and are anchored by small business, tourism and recreation.

The county's proximity to the Portland area, the Southern Pacific, Union Pacific and Burlington Northern railroad lines that run across the western edge of the region, and Interstate 84 provide good opportunities for the transportation of manufactured and agricultural goods. In addition, the region's proximity to the Columbia River, the Cascade Mountains and the high desert terrain provide year-round sporting and tourism activities. Looking towards the future, healthcare services, manufacturing, retail trade, tourism, agriculture and food products, construction, lumber and wood products will continue to grow and develop to provide goods, services and work opportunities for area residents.[43] Table C.16 identifies Covered employment in Wasco County by industry. The four industries with the most employees, as of 2016, are Education and Health Services (19.6%), government (16.7%), natural resources and mining (14.2%) and retail (13.1%). While Wasco County has considerable employment in some non-basic industries, such as health and social assistance as well as government, the county's third largest industry (natural resources and mining) is of the basic nature and thus dependent to a large degree on sales outside of the local community. Basic

[40] Ibid.
[41] Ibid.
[42] Ibid.
[43] State of Oregon 2020 Natural Hazards Mitigation Plan, Region 5 Mid---Columbia Regional Profile.

DRAFT

industries encourage growth in non-basic industries and bring wealth into communities from outside markets. However, a high dependence on basic industries can lead to severe difficulties when recovering from a natural disaster if vital infrastructure or primary resource concentrations have been damaged by a natural disaster.

Table C.16: 2022 Total Covered Employment by Industry

Industry	Number Employed	Percent of Employment
Education and Health Services	2,223	19.6%
Government	1,894	16.7%
Natural Resources and Mining	1,612	14.2%
Retail	1,483	13.1%
Leisure and Hospitality	1,294	11.4%
Manufacturing	570	5.0%
Professional and Business Services	501	4.4%
Other Services	430	3.8%
Construction	354	3.1%
Financial Activities	288	2.6%
Wholesale	267	2.4%
Transportation, Warehousing & Utilities	242	2.1%
Information	169	1.5%
Unclassified	13	0.1%
Total	**11,340**	

Source: Oregon Employment Department, Wasco County Covered Employment and Wages 2022.

The Oregon Employment Department estimated net employment growth between 2017 and 2022. This was a tumultuous time for employment statistics both statewide and nationally. Between the spring 2020 and through 2021, the COVID pandemic resulted in unstable employment for many sectors. By 2022, employment had stabilized, though several sectors had not yet recovered to pre-pandemic employment levels. Total nonfarm employment in Wasco County experienced a loss of 661 jobs or 5.5%.[44] These data matches state and national trends.

DRAFT

[44] Oregon Employment Department, Wasco County Covered Employment and Wages, 2017 and 2022.

Table C.17: Total Wasco County Nonfarm Employment by Industry

Industry	2017	2022	Change 2017-2022	
			Number of Jobs	Percent
Natural Resources and Mining	1,709	1483	-226	-13.20%
Construction	351	430	79	2.30%
Manufacturing	722	501	-221	-3.10%
Wholesale	153	169	16	10.50%
Retail	1,739	1,612	-127	-7.30%
Transportation, Warehousing, and Utilities	169	288	119	7.00%
Information	187	267	80	4.30%
Financial Activities	247	242	-5	-2.00%
Professional and Business services	516	570	54	10.50%
Education and health Services	2,238	2,233	-5	0.20%
Leisure and Hospitality	1,358,100	1,294	-64	-4.70%
Other Services	500	354	-146	-29.20%
Government	2,117	1,894	-223	-10.50%
Unclassified	5	13	8	106%
Total Annual Average Nonfarm Employment	**12,011**	**11,350**	**-661**	**-5.50%**

Source: Oregon Covered Employment and Wages (QCEW) 2017 and 2022.

High Revenue Sectors

The two nonfarm sectors with the highest known revenue in 2007 were retail and wholesale. Table C.18 shows the revenue generated by each economic sector. All of the known sectors combined generated more than $1.5 billion in revenue for the county in 2017, the most recent year for which data is available (2022 data was not available for Wasco County at the time of this update in 2024).

DRAFT

Table C.18: Revenue of Nonfarm Sectors in Wasco County

Sectors	Sector Revenue (1000)
Retail	470,309
Wholesale	329,503
Health care and social assistance	323,615
Manufacturing	157,904
Accommodation and food services	71,268
Administrative and Support and Waste Management	61,475
Professional, scientific, and technical services	32,858
Transportation and warehousing	19,303
Other Services (except public administration)	18,993
Real Estate and Rental and Leasing	9,600
Arts, entertainment and recreation	6,287
Total Revenue ($1,000)	**$1,501,115**

Source: U.S. Census Bureau, Economic Census: Core Summary Statistics, 2017.

The retail trade sector of Wasco County brought in the most revenue during 2017, generating more than $470 million.[45] The sector is highly dependent on tourism and importing of goods for sale in commercial establishments, tying it directly to the conditions of the county's transportation infrastructure, particularly Interstate 84. Depending on the severity of a natural disaster and the pace of recovery, revenue generated from this sector could be greatly impacted during a natural hazard event.

In 2017, the *health care and social assistance* sector generated $329.5 million, making it the third largest earning sector in Wasco County for which data was available. The sector is a relatively stable revenue generator, and relies largely on the local presence of older residents and elderly facilities. It is likely that the populations that require such services on a daily basis will continue requiring assistance, such as those living in residential care facilities. However, in the event of a disaster medical needs may increase due to physical or stress induced injuries and trauma. The physical infrastructure of this sector will be essential for maintaining the capacity of service that it currently provides.

Accommodation and food services generated over $71 million in revenue during 2017. A large portion of the sector's revenue is generated through leisure and hospitality, serving regional residents with disposable income and tourists, and could be adversely affected by a disaster. The behavior of both demographics would be disrupted if tourists deter from visiting the impacted area, or local residents concentrate spending on essential items rather than luxury expenditures (e.g. dining out).

The majority of Wasco County's revenue generating sectors are highly dependent upon transportation networks in order to receive shipped goods (e.g. food supplies and products), export goods to outside markets, and maintain accessibility to traveling motorists. Therefore disruption of the transportation system could have severe consequences for all of the before

[45] U.S. Census Bureau, Economic Census: Core Summary Statistics, 2017. Table EC1700BASIC.

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mentioned sectors.

In the event that any of the county's primary sectors are impacted by a disaster, particularly the retail and health and care and social assistance sectors, Wasco County may experience a significant disruption of economic productivity and should therefore plan accordingly.

REGIONAL INDUSTRY EMPLOYMENT FORECAST

Sectors that are anticipated to be major employers in the future also warrant special attention in the hazard mitigation planning process. Between 2022 and 2023, the largest employment growth in the Columbia Gorge region (Gilliam, Hood River, Sherman, Wasco, and Wheeler counties) is expected in the education and health services sector, adding 600 new jobs by 2032. Leisure and hospitality will grow by 11% and add 430 new jobs. Another major growth sector is natural resources and mining, with a projected addition of approximately 400 jobs and 11% growth by 2032.[46]

Labor and Commute Shed

Most hazards can happen at any time during the day or night. It may be possible to give advance warning to residents and first responders who can take immediate preparedness and protection measures, but the variability of hazards is one part of why they can have such varied impact. A snow storm during the work day will have different impacts than one that comes during the night. During the day, a hazard has the potential to segregate the population by age or type of employment (e.g., school children at school or office workers in downtown areas). This may complicate some aspects of initial response such as transportation or the identification of wounded or missing. Conversely, a hazard at midnight may occur when most people are asleep and unable to receive an advance warning through typical communication channels. The following labor shed and commute shed analysis is intended to document where county residents work and where people who work in Wasco County reside.

As shown in Table C.19, overall the workforce is moderately mobile between Wasco, Hood River, Clackamas and Multnomah Counties. Over 52% of Wasco County's employed residents leave the County for work.[47] Over 24% of workers who live in Wasco County travel westward to Hood River, Clackamas, and Multnomah Counties for jobs. Interestingly, a significant number (19.7%) of county residents are employed further afield in Deschutes, Marion, Washington, and Umatilla counties. It is possible that these workers do not physically commute every day or on a regular basis and instead telecommute or otherwise have remote locations.

DRAFT

[46] Oregon Employment Department, Industry Employment Projections for the Columbia Gorge Region 2022-2032.
[47] US Census Bureau, OnTheMap, Wasco County Inflow/Outflow Analysis, 2021.

Table C.19: Commute Shed (Where workers are employed who live In Wasco County), 2021

Location	Number	Percent
Wasco County, OR	5,771	47.5%
Hood River County, OR	1,447	11.9%
Multnomah County, OR	987	8.1%
Clackamas County, OR	531	4.4%
Klickitat County, WA	413	3.4%
Deschutes County, OR	328	2.7%
Jefferson County, OR	286	2.4%
Marion County, OR CuontyCountyCounty Multnomah County	277	2.3%
Washington County, OR	271	2.2%
Umatilla County, OR	217	1.8%
All Other Locations	1,629	13.4%
Total	12,157	

Source: U.S. Census Bureau, OnTheMap, Wasco County Profile Analysis in 2021 by All Jobs

Table C.20 below tells the statistical story about where workers live who are employed in Wasco County. The majority of workers employed in the county are also residents (56.3%). The location outside of Wasco County where the highest numbers of workers come from is neighboring Hood River County. However, a substantial number of workers live farther west of Hood River in Multnomah, Clackamas and Washington Counties, while others live across the river in Klickitat and Cowlitz Counties.

DRAFT

Table C.20: Labor Shed (Where workers live & who are employed in Wasco County), 2021

Location	Number	Percent
Wasco County, OR	5,771	56.3%
Hood River County, OR	812	7.9%
Klickitat County, WA	511	5.0%
Multnomah County, OR	368	3.6%
Clackamas County, OR	252	2.5%
Washington County, OR	232	2.3%
Deschutes County, OR	182	1.8%
Cowlitz County, WA	172	1.7%
Marion County, OR	147	1.4%
Clark County, WA	137	1.3%
All Other Locations	1,663	16.2%
Total	**10,247**	

Source: U.S. Census Bureau, OnTheMap, Wasco County Area Profile Analysis in 2021 by All Jobs

The Labor Shed and Commute Shed analyses reveal that there is a great deal of commuting and worker exchange between communities in the region. While over 56% of Wasco County workers maintain employment outside of the county, 44% of Wasco County workers live elsewhere, west, east and south of the County in Oregon, as well as to the north across the Columbia River in various Washington Counties.

Synthesis

Regional economic capacity refers to the present financial resources and revenue generated in the community to achieve a higher quality of life. Forms of economic capital include income equality, housing affordability, economic diversification, employment, and industry. 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.

Considering its comparatively low unemployment rate, and the moderate diversity of its economy (though dependent on several basic industries for revenue generation), Wasco County may experience a less difficult time in recovering from a natural disaster than one with a less diverse economic base, or one already suffering from unemployment at levels significantly higher than the state and national averages. However it is important to consider what might happen to the county economy if the largest revenue generators and employers (the retail, wholesale, and health care and social assistance industries), were heavily

DRAFT

impacted by a disaster. To an extent, and to the benefit of Wasco County, these particular industries are a mix of basic and non-basic industries, dependent on both external markets and local residents.

It is imperative, however that Wasco County continues to recognize that economic diversification is a long-term issue. More immediate strategies and actions to reduce vulnerability from an economic perspective should focus on risk management for the county's dominant industries (e.g. business continuity planning) as well as the county's dependence on main transportation arteries.

Built Capacity

Housing Building Stock

Housing characteristics are an important factor in hazard mitigation planning, as some housing types tend to be less disaster resistant than others, and therefore warrant special attention.

Table C.21 identifies the type of housing most common throughout the county. Of particular interest are mobile homes and other non-permanent housing structures (including boats, RVs, vans, etc.), which account for approximately 19% of the housing in Wasco County. Mobile structures are particularly vulnerable to certain natural hazards, such as windstorms, and special attention should be given to securing the structures, as they are typically more prone to damage than wood-frame construction.[48] Furthermore, Table C.21 indicates that the majority of Wasco County's housing stock is single-family homes.

It is also important to consider multi-unit structures, as they are more vulnerable to the impacts from natural disasters due to the increased number of people living in close proximity. In short, a structural weakness in a multiunit structure will have an amplified impact on the population. According to the data presented in Table C.21, roughly 14% of housing in Wasco County is composed of multi-family dwellings (2 to 20 or more units).

Table C.21: Wasco County Housing Type Summary, 2022

Housing Type	Number	Percent
Total Housing Units	**12,038**	
1 unit (attached & detached)	7,731	66.80%
2 to 9 units	998	8.30%
10 to 19 units	247	2.10%
20 or more	422	3.50%
Mobile Home, Boat, RV, Van, etc.	2,335	19.40%

Source: U.S. Census, American Community Survey, 2022

Age of housing is another characteristic that influences a structure's vulnerability to hazards. Generally the older a home is, the greater the risk of damage from natural disasters. This is because stricter building codes have only been implemented in recent decades, following improved scientific understanding of plate tectonics and earthquake risk. In Oregon, many

[48] State of Oregon 2020 Natural Hazards Mitigation Plan, Region 4 Southwest Oregon Regional Profile.

DRAFT

structures built after the late 1960's began utilizing earthquake resistant designs and construction. Similarly, communities in the northwest began implementing flood elevation ordinances in the 1970's.[49]

In 1990, Oregon again upgraded to stricter seismic standards that included earthquake loading in the building design.[50] Table C.22 shows that 16% of the housing stock in Wasco County was built after 2000. All of these homes were built with the more stringent building codes, leaving over 80% with questionable seismic stability, and almost 40% with very questionable seismic stability (4,685 housing units built 1959 or earlier).[51] Knowing the age of the structure is helpful in targeting outreach regarding retrofitting and insurance for owners of older structures.

Table C.22: Wasco County Housing Stock by Age, 2022

Year Structure Built	Number	Percent
Total Housing Units	**12,038**	
Built 2020 or later	32	0.3%
Built 2000-2019	1,953	16.2%
Built 1980 to 1999	2,215	18.4%
Built 1970 to 1979	2,120	17.6%
Built 1940 to 1969	3,549	29.5%
Built 1939 or earlier	2,169	18.0%

Source: U.S. Census, American Community Survey, 2022

Mitigation and preparedness planning should also consider type of occupancy when developing outreach projects or educational campaigns. Homeowners are likely to take steps to reduce the impact of natural hazards through mitigation or insurance methods. Renters may be less invested in physical improvements to the unit, but outreach around personal preparedness or renter's insurance would benefit this population. As demonstrated in Table C.23, approximately 38% of the occupied housing units in Wasco County are renter-occupied.

Table C.23: Wasco County Housing Unit Occupancy Summary, 2022

Housing Units	Number	Percent
Owner---occupied	6,830	65.1%
Renter---occupied	3,658	34.9%
Total	**10,488**	

Source: U.S. Census, American Community Survey, 2022.

Physical Infrastructure

Physical infrastructure such as dams, roads, bridges, railways and airports support Wasco County communities and economies. Critical facilities are those that are critical to government response and recovery activities; however the term may also refer to facilities or infrastructure that could cause serious secondary impacts when disrupted. Many things can be counted as

[49] Ibid.
[50] Wang Yumei and Bill Burns. "Case History on the Oregon GO Bond Task Force: Promoting Earthquake Safety in Public Schools and Emergency Facilities." National Earthquake Conference. January 2006.
[51] U.S. Census Bureau, Table DP04 Selected Housing Characteristics, 2022 American Community Survey.

DRAFT

critical infrastructure and facilities depending on the social, environmental, economic, and physical makeup of the area under consideration. Some examples include: Agriculture and food systems; communications facilities; critical manufacturing; dams; emergency services; energy generation and transmission; government facilities; healthcare and public health; information technology; transportation systems; and water. Due to the fundamental role that physical infrastructure plays both in pre and post-disaster, they deserve special attention in the context of creating resilient communities.[52]

DAMS

Under normal loading conditions, dams are generally at very low risk of failure. Specific events are associated with most dam failures and include extreme flood that exceeds spillway capacity; extended high water levels in a dam; movement of the dam in an earthquake; and a large rapidly moving landslide affecting the dam or reservoir.[53] Oregon Water and Resources Department has inventoried all dams located in Oregon and Wasco County, managed by the State of Oregon. The largest dam in Wasco County is The Dalles Dam, and is managed by the US Army Corps of Engineers. The hazard potential for The Dalles Dam is high. The US Army Corps of Engineers inspects the dam regularly for structural safety, with the last inspection in April 2023.[54] The dam received a risk assessment of "low" in March 2019.[55] Table C.24 below includes all other Wasco County dams regulated and inspected by the State of Oregon:

Table C.24: Oregon Dam Inventory and Hazard Potential Summary for Wasco County

Hazard Potential	Number of Dams
High	7
Significant	0
Low	15

Source: Oregon water Resources Department, Dam Inventory, 2023. http://apps.wrd.state.or.us/apps/misc/dam_inventory/.

DRAFT

[52] State of Oregon 2020 Natural Hazards Mitigation Plan, Region 5 Mid-Columbia Regional Profile.
[53] Ibid.
[54] US Army Corps of Engineers, National Inventory of Dams, The Dalles Lock and Dam, data updated on 08/23/2024. https://www.nwd-wc.usace.army.mil/dd/nwdp/project_hourly/webexec/rep?r=tda&date=08%2F23%2F2024.
[55] State of Oregon 2020 Natural Hazards Mitigation Plan, Region 5 Mid-Columbia Regional Profile.

RAILWAYS

Railroads are major providers of regional and national cargo trade flows. The Burlington Northern Santa Fe (BNSF) Railway and the Union Pacific Railroad run through Wasco County.[56]

The Union Pacific Line in Wasco County is limited to the stretch of tracks that follow I-84 and the Columbia River on the northern border of the county. The BNSF Line crosses I-84 and the Columbia River around Wasco County's northeastern border, running north to south along the Deschutes River into Jefferson County.

Rails are sensitive to icing from winter storms that can occur in the Columbia Gorge region. For industries in the region that utilize rail transport, these disruptions in service can result in severe economic losses. The potential for rail accidents caused by natural hazards can also have serious implications for the local communities if hazardous materials are involved.[57]

AIRPORTS

Wasco County has no commercial service airports, though has a regional public airport in Dallesport, Washington directly across the Columbia River to the immediate north of The Dalles. The City of The Dalles and Klickitat County jointly operate the Columbia Gorge Regional Airport. Wildfire fighting air operations are located at the airport seasonally. This airport also serves as a regional base for Life Flight Network, a nonprofit patient transport service providing helicopter, airplane, and ground ambulance transportation throughout Oregon, Washington, Idaho, and Montana.[58] Two helipads are available at Mid-Columbia Medical Center and Mid-Columbia Fire and Rescue in The Dalles. The county has eleven privately operated airports near these Wasco County communities: Antelope, Dufur, Maupin, Shaniko, The Dalles, and Wamic.[59]

The Portland International Airport in Portland is the only major commercial service airport near Wasco and surrounding counties. Larger airports are also located in Yakima, WA to the northeast and in Redmond, OR to the south. Access to all airports faces the potential for closure from a number of natural hazards, including wind and winter storms common to the region.[60]

ROADS AND BRIDGES

The region's major expressway is Interstate 84. It runs east/west through Wasco County and is the main passage for automobiles, buses and trucks traveling along the Columbia River. Other major highways that service this region include:

- US Highway 197 connects The Dalles at I-84 with Dufur and Maupin to the South.
- US Highway 97 merges with US Highway 197, connecting Wasco County with Sherman County to the east and Jefferson County to the south.
- US Highway 26 provides an alternate route from Portland to Wasco County. The

[56] Oregon Department of Transportation, State of Oregon, Oregon Railways. http://www.oregon.gov/ODOT/TD/TDATA/gis/docs/statemaps/railroads.pdf?ga=t.
[57] State of Oregon 2020 Natural Hazards Mitigation Plan, Region 5 Mid-Columbia Regional Profile.
[58] Life Flight Network website, 2024, https://www.lifeflight.org/about-us/.
[59] Wasco County Public and Private Airports, Oregon, Wasco County airport directory. (n.d.). https://www.tollfreeairline.com/oregon/wasco.htm.
[60] State of Oregon 2020 Natural Hazards Mitigation Plan, Region 5 Mid-Columbia Regional Profile.

DRAFT

Highway wraps around the southern side of Mt. Hood before moving south to Warm Springs and then Madras.

- Highway 216 runs primarily east/west and connects Highways 197, 97 and 26 in the southern half of Wasco County.
- Highway 35 runs south from I-84 through Hood River before intersecting with US Highway 26 on the south side of Mt. Hood.

Daily transportation infrastructure capacity in the Columbia Gorge region is moderately stressed by maintenance, congestion, and oversized loads, however peak loads and congestion can materialize during holidays and major construction projects, but can also fluctuate by season. Natural hazards tend to further disrupt automobile traffic and create gridlock; this is of specific concern in periods of evacuation during an emergency.[61]

Wasco County maintains 650.48 road miles of county roads with 260.93 road miles of paved road and 389.55 road miles of gravel surface road.[62] There are also 175 publicly dedicated roads without county maintenance.[63]

The existing condition of bridges in the region is also a factor that affects risk from natural hazards. Bridge failure can have immediate and long-term implications for the response and recovery of a community. Incapacitated bridges can disrupt traffic and exacerbate economic losses due to the inability to transport products and services in and out of the area.[64] According to Table C.25, in 2022, of the 150 total bridges maintained by both the State and Wasco County, the Federal Highway Administration identified 12 bridges considered to be in poor condition. In the event of an earthquake, these bridges may be more vulnerable to failure.

Table C.25 Summary of Wasco County Bridges

Agency Responsible for Maintenance	Total Bridges	Good Condition	Fair Condition	Poor Condition
State of Oregon	27	11	13	3
Wasco County	123	39	75	9

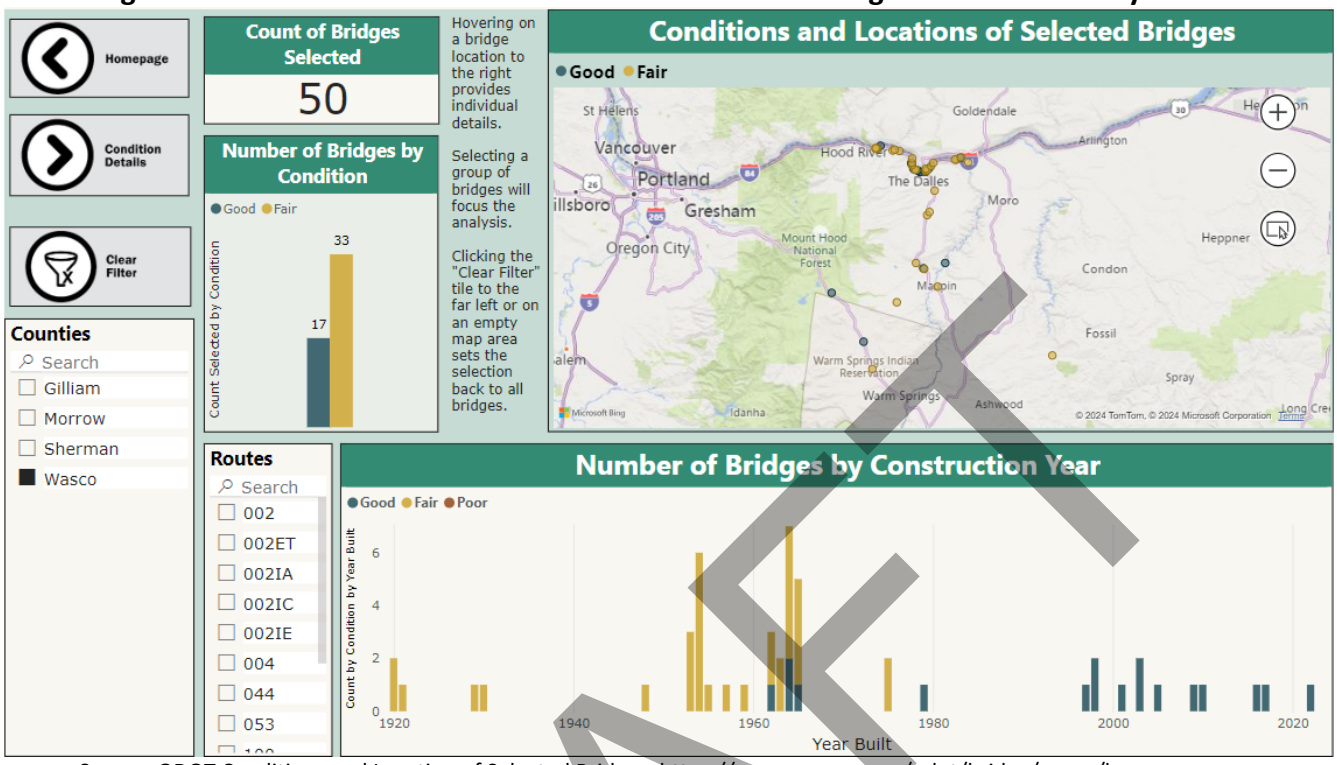
Source: Federal Highway Administration, Bridge Condition by County, June 15, 2022. https://www.fhwa.dot.gov/bridge/nbi/no10/county22c.cfm#or

The Oregon Department of Transportation provides additional information on Wasco County bridges as provided in Figure C.7, which details that 33 bridges are in "fair" condition and 17 in "good" condition with a majority of the 50 bridges being constructed before 1970.

DRAFT

[61] Ibid.
[62] Wasco County Public Works, Wasco County Roads by Name. https://cms5.revize.com/revize/wascocounty/document_center/Public%20Works/Wasco%20County%20Road%20List%20by%20Name%202023.pdf.
[63] Wasco County Road Hazards Assessment Project, 2024. Wasco County Public Access Road Inventory and Fire Risk Assessment. Grant No: HMGP-DR-4562-53-F-OR.
[64] State of Oregon 2020 Natural Hazards Mitigation Plan, Region 5 Mid-Columbia Regional Profile.

Figure C.6: ODOT Conditions and Location of Selected Bridges in Wasco County



Source: ODOT Conditions and Location of Selected Bridges. https://www.oregon.gov/odot/bridge/pages/bcr.aspx

Utility Lifelines

Utility lifelines are the resources that the public relies on daily, (i.e., electricity, fuel and communication lines). If these lines fail or are disrupted, the essential functions of the community can become severely impaired. Utility lifelines are closely related to physical infrastructure, (i.e., dams and power plants) as they transmit the power generated from these facilities.

The network of electricity transmission lines running through the Columbia Gorge region is operated by the Bonneville Power Administration, Pacific Power and Light, the Wasco Electric Cooperative, and the Northern Wasco PUD. These entities facilitate multi-state, regional, and local energy distribution.

Power Generation

The majority of electrical power in the region is generated through hydropower at Columbia River dams. The Dalles Dam is a major hydroelectric dam located east of The Dalles. Wasco County has also become an attractive location for non-hydropower energy facilities. Table C.26 is a compilation of renewable energy facilities under construction or approved by the State of Oregon in recent years.

DRAFT

Table C.26: Non-Hydropower Energy Facilities in Wasco County

Project Name	Status	Megawatt (MW)
Bakeoven Solar	Under Construction	60
Daybreak Solar	Under Construction	140
Sunset Solar	Approved	103

Source: Oregon Department of Energy, Energy Facility Siting. https://www.oregon.gov/energy/facilities-safety/facilities/Pages/default.aspx.

Additionally, Wasco County approved a county reviewed solar facility in 2018 (Wasco Solar). There have been further conversations with other projects that may lead to additional county or state reviewed renewable energy projects.

PACIFIC POWER

Pacific Power serves customers in Southern Washington, Oregon, and Northern California, Eastern Idaho, Utah and Wyoming, including Wasco County and other communities in the Columbia Gorge.

NORTHERN WASCO COUNTY PEOPLE'S UTILITY DISTRICT

Northern Wasco PUD is a non-profit, customer-owned utility company providing electricity to customers in Northern Wasco County. It distributes electricity to customers produced by The Dalles Dam and other sources. It has two hydroelectric power generation projects – one five-megawatt generator located in the fish attraction water on the north shore of The Dalles Dam, and co-owns a ten-megawatt unit at the McNary Dam with Klickitat Public Utility District.

WASCO ELECTRIC COOPERATIVE

The Wasco Electric Cooperative engages in energy transmission and distribution, providing electricity to rural customers in Wasco, Sherman, Jefferson, Gilliam and Wheeler Counties.

Gas Service

A gas distribution line crosses the Columbia River into Wasco County near The Dalles. The distribution line is fed by a larger natural gas transmission line called the Northwest Pipeline that borders the northern bank of the Columbia River in Washington. This line is controlled by Willlams, a natural gas transmission company. TC Energy controls another natural gas pipeline that crosses into the southeast corner of Wasco County from Sherman County before moving South to Jefferson County.[65] Most of the natural gas Oregon uses originates in British Columbia and Alberta, Canada. These lines may be vulnerable to severe, but infrequent natural hazards, such as earthquakes, which could disrupt service to natural gas consumers across the region.

NW Natural also distributes natural gas to communities in Oregon and southwest Washington. Natural gas is available only in the northern portion of the county, including The Dalles and Mosier. The company is headquartered in Portland, OR, though a service center is located in The Dalles.

Telecommunications

There are many telecommunication providers in Wasco County, including CenturyLink, Charter Communications, US Cellular, Verizon, T-Mobile, and others. Cable, fiber, mobile, and satellite

[65] TC Energy, Gas Transmission Northwest System Map, June 24, 2020.

DRAFT

internet are available in many locations throughout the County. Most major cellular phone services also operate in the County. Columbia Gorge Broadband Consortium is a collaborative partnership to increase broadband access in communities throughout the gorge. Organizations in Wasco, Hood River, Klickitat and Skamania counties are all involved, with the Mid-Columbia Economic Development District providing oversight.[66]

Water and Sewer

A mixture of public and private entities operate water and wastewater systems in the county. Incorporated cities such as Mosier, The Dalles, Dufur, and Maupin have municipal water and wastewater treatment systems. Wamic is the only unincorporated city to have a water and wastewater treatment system. The small, incorporated cities of Antelope and Shaniko offer municipal water to residents, but do not have wastewater treatment systems. Tygh Valley and Pine Hollow are two unincorporated communities that provide water service or irrigation districts, but do have wastewater treatment facilities. The Sportsmans Park subdivision has a community drainfield. All other land receives water and wastewater treatment from wells, water rights, and private septic systems.

Solid Waste and Landfill

The Northern Wasco County Sanitary Landfill is a privately owned facility and is the only sanitary landfill in the county. Various garbage services across the region dump solid waste at the landfill.

Critical Facilities

Critical facilities are those facilities that are essential to government response and recovery activities (e.g., hospitals, police, fire and rescue stations, school districts and higher education institutions). The interruption or destruction of any of these facilities would have a debilitating effect on incident management. Critical facilities in Wasco County are identified in Table C.27.

Table C.27: Wasco County Critical Facilities

	County Total
Hospitals (# of beds)	1 (49 beds)
Police / Sheriff's Offices	3
Fire & Rescue Stations	8
Dams	31
Bridges	150*
School Districts & Colleges	3 districts, 1 Community College
Public Airport	1
Private Airports	11
Medical Helipads	2

Source: Mid-Columbia Medical Center, Wasco County Sheriff's Office, Mid-Columbia Fire and Rescue, Oregon Water Resources Department, Wasco County Public Works Department, Oregon Department of Education, Oregon Department of Aviation Airport Directory, 2022. *This bridge total includes bridges maintained by ODOT.

[66] Columbia Gorge Broadband Consortium website, 2024. http://gorgebroadband.org/connect/wasco-county.php.

DRAFT

Wasco County is served by the Oregon State Police Department and the Wasco County Sheriff's Office. The Dalles City Police Department also provides services within its city limits. There are twelve fire response districts of various geographical extent and coverage operating in Wasco County. The districts are a mixture of Oregon and US Forest Service, county, municipal, and other various regionally affiliated entities.[67]

The County Courthouse, located in The Dalles, houses many of the administrative offices for Wasco County including the Sheriff as well as space for public hearings. The Courthouse also includes administrative offices for the State Courts. The Wasco County 911 Office is located at an undisclosed location nearby.

Dependent Facilities

In addition to the critical facilities mentioned in Table C.27, other facilities are also vital to the continued delivery of health services and may significantly influence the public's ability to recover from emergencies. Assisted living centers, nursing homes, residential mental health facilities, and psychiatric hospitals are important to identify within the community because of the dependent nature of the residents. Such facilities can also serve as secondary medical facilities during an emergency, as they are equipped with nurses, medical supplies and beds.

In Wasco County there are three assisted living centers, three registered nursing homes, and three residential care facilities. Most of these facilities are located in The Dalles, though there is an assisted living facility home in Maupin. There are also 14 live-in care facilities around the county that have a resident capacity of five or less, where seniors and people with disabilities live and have care provided for them.[68] Mid-Columbia Center for Living is a mental health service provider located in The Dalles, offering a variety of treatment options.

Correctional Facilities

Correctional facilities are incorporated into physical infrastructure as they play an important role in everyday society by maintaining a safe separation of the public from potentially dangerous elements. There is one correctional facility located in Wasco County, NORCOR, which is located in The Dalles and serves correctional needs for Wasco, Hood River, Sherman and Gilliam Counties. While correctional facilities are built to code to resist structural failure and typically have back up power to sustain regulation of inmates following the immediate event of an emergency, logistical planning becomes more challenging when the impacts of the event continue over a long duration.

Synthesis

Built capacity refers to the built environment and infrastructure that supports a community. The various forms of built capital mentioned throughout this section, play significant roles in the event of a disaster. Physical infrastructure, including utility and transportation lifelines, are critical to maintain during a disaster and are essential for proper functioning and response. Community resilience is directly affected by the quality and quantity of built capital. Poor or missing infrastructure can negatively affect a community's ability to cope,

[67] Wasco County Fire Districts Map, https://cms5.revize.com/revize/wascocounty/FireDistrictsMap.pdf.
[68] Oregon Department of Human Services Website, https://ltclicensing.oregon.gov/Facilities, 2024.

DRAFT

respond and recover from a natural disaster. Initially 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 immediate resources.

Around 19% of Wasco County's housing stock is made up of mobile homes and other non-permanent housing structures (including boats, RVs, vans, etc.), while roughly 18% is made up of multi-family dwellings, types of housing that may significantly amplify the human costs of natural hazards and disasters due to the density of occupants. Over 70% of the county's housing was built before 1990, when Oregon upgraded its seismic building standards to include seismic loading. These structures are more vulnerable to disaster.

In terms of infrastructure, eight of Wasco County's thirty dams are classified as high threat potentials, including The Dalles Dam, Wasco County's largest. Approximately 92% of the bridges in Wasco County are in fair and good condition, with 8% in poor condition. Most of the county's critical facilities and vital infrastructure are located in The Dalles; however there are a number of alternative highways and roads aside from I-84 that may provide service access to people outside of the city, or serve as evacuation routes away from The Dalles in case of an emergency.

Community Connectivity Capacity

Social Organizations

Social organizations can play an important role in promoting hazard mitigation and in aiding recovery efforts following a natural disaster. These organizations are uniquely suited to reach vulnerable populations, which have a tendency to be more at-risk in the event of a disaster. Social organizations take a number of forms, but are often community oriented programs that provide social and community-based services for the public. In promoting hazard awareness, Counties should work closely with such programs to help distribute information and educate the public as to proper hazard mitigation practices.

Below are a few methods that social organizations located throughout Wasco County can use to become involved in hazard mitigation.

- Education and Outreach – Organizations can partner with the community to educate the public or provide outreach assistance and materials on natural hazard preparedness and mitigation.
- Information Dissemination – Organizations can collaborate with the community to provide and distribute hazard-related information to target audiences.
- Plan/Project Implementation – Organizations may have plans and/or policies that may be used to implement mitigation activities or the organization can serve as the coordinating or partner organization to implement mitigation actions.

Civic Engagement

Civic engagement and involvement are important indicators of community connectivity. Whether it is engagement through volunteerism or through local, state, and national politics, you can gauge the connection people have to their community by their willingness to assist others in their community.

Residents who want to become involved in their community through volunteering have a number of opportunities available to them throughout the region. Service clubs like Rotary, Kiwanis, and

DRAFT

the Lions Club in The Dalles are oriented toward community volunteerism. Nonprofit organizations throughout Wasco County rely heavily on the ongoing involvement of volunteers. These programs, among many others, allow residents to give back to their community.

Those who are more invested in their community may also have a higher tendency to vote in political elections. Below, Table C.28 outlines voter participation and turnout percentages from the 2016 and 2020 elections. There was a higher percentage voter turnout in 2020 in Wasco County than in 2016. In both elections, Wasco County's voter turnout was approximately two to three percentage points lower than the state rate in both elections.

Table C.28: Voter Registration and Participation, 2020 and 2016

	2016		2020	
	Wasco County	State of Oregon	Wasco County	State of Oregon
Total -- Eligible Voters	15,613	2,553,806	18,169	2,944,588
Total -- Ballots Returned	12,273	2,051,448	14,358	2,413,890
Voter Turnout Percentage	78.6%	80.3%	79.0%	82.0%

Source: Oregon Secretary of State, 2020 and 2016 General Election Official Voter Registration Statistics.

Cultural Resources

Cultural resources provide residents with a sense of belonging. Current residents can use them to learn about the history and lives of past residents. Historic sites, museums, and libraries are just a few of the resources that give residents and visitors a sense of cultural connectivity to a place. These resources celebrate history and help define an area that people call *home.*

Historic Places

The National Register of Historic Places lists all types of facilities and infrastructure that help define a community. Whether it is the first schoolhouse in town or even just the home of a resident who played a vital role in the success of the community, the *Register* lists all types of historic features that characterize the area. Table C.29 categorizes the 34 different National Historic Places located throughout Wasco County by their type.

These places provide current residents, youth, and visitors with a sense of community. Because of the history behind these sites, and their role in defining a community, it is important to protect these historic places from the impacts natural disasters might have on them.

Table C.29: National Register of Historic Places in Wasco County

Type of Place	Number of Structures
Buildings	26
Districts	5
Sites	3
Total	34

Source: National Register of Historic Places Database, 2024.

Libraries and Museums

DRAFT

Libraries and Museums are other facilities which a community can use to stay connected. The Dalles-Wasco County Library is the main facility in the county; however Maupin, Mosier and Dufur each have their own public libraries. These facilities serve a critical function in maintaining a sense of community, however library buildings should also be considered as a common place for members of communities to gather during a disaster.

Museums can also function in maintaining a sense of community as they provide residents and visitors with the opportunity to explore the past and develop cultural capacity. There are many museums throughout Wasco County that provide information on the region's natural and human history, with the largest, the Columbia Gorge Discovery Center, situated in The Dalles. As with public libraries, it is important to consider museums in the mitigation process for community resilience. These structures should be protected in critical times to preserve cultural heritage, but may also serve as a place of refuge for community members during a disaster event.

The Confederated Tribes of Warm Springs

In 1855, the Confederated Tribes of Warm Springs entered into a treaty with the United States. With the treaty, "the Warm Springs and Wasco tribes relinquished approximately ten million acres of land, but reserved the Warm Springs Reservation for their exclusive use. The tribes also retained rights to harvest fish, game and other foods off the reservation in their usual and accustomed places."[69] Later, the Northern Paiute tribe joined the Confederated Tribes of Warm Springs.

The reservation lands are located in both Wasco County and Jefferson County, and governed by their own tribal government with a full portfolio of public services. Emergency Management is among the services provided by the tribal government. Warm Springs, the most populated community on the reservation, is located in Jefferson County. Warm Springs is the seat of most tribal services and administrative offices. The tribe's Indian Head Casino is located along Highway 26 in Warm Springs.

The northern portion of the reservation is within Wasco County and is home to Kah-Nee-Ta Resort and Spa and the community of Simnasho. The Simnasho and Hehe longhouses are both in Wasco County.[70] Longhouses are important locations for social and ceremonial gatherings. Some tribal families attend schools in the South Wasco County School District. The Red Sides Pow Wow is held each spring at South Wasco County High School in Maupin.

Wasco County maintains an intergovernmental relationship with the Warm Springs Tribal Council in an effort to coordinate services such as transportation and medical needs. Some Warm Springs residents regularly travel to The Dalles for shopping and medical appointments or hospital services. Communication and coordination is necessary during natural disaster events and will be an ongoing need into the future.

Community Stability

Residential Geographic Stability

Geographic stability often results in a feeling of connectedness to one's community and is a

[69] Confederated Tribes of Warm Springs website, https://warmsprings-nsn.gov/history/, 2024.
[70] Google Maps, 2024.

DRAFT

measure of one's rootedness. A person's place attachment refers to this sense of community and can often magnify efforts to help revitalize a community.[71] Regional residential stability is important to consider in the mitigation process as those who have been in one place for a long period of time are more likely to have a vested interest in the area and should be more likely to help with hazard mitigation efforts. Table C.32 estimates residential stability across the region. It is calculated by the number of people who have lived in the same house and/or county for more than a year, compared to the percentage of people who have not. According to the data, 91.1% of Wasco County residents lived in the same house or within county boundaries generally for more than a year as of 2022, within two percentage points of the state average.

Table C.30: Regional Residential Stability

County	Geographic Stability
Wasco	**91.1%**
Clackamas	92.8%
Gilliam	91.2%
Hood River	95.1%
Jefferson	90.0%
Sherman	96.3%
Wheeler	91.8%

Source: US Census Bureau, American Community Survey, 2022

Homeownership

Another measure of community stability and place attachment is homeownership. One does not seek to be a homeowner in a place they do not feel safe and secure. Residents who become homeowners search for a place in which they are happy, protected, and can afford. Homeownership is an indicator that residents will most likely return to a community post-disaster, as these people are economically and socially invested in the community. Similarly, homeowners are more likely to take necessary precautions in protecting their property. Table C.33 identifies the percentage of homeownership across the region, where the remaining households are renters. Wasco County's home ownership rate is lower than other counties in the region, though higher than the State percentage.

DRAFT

[71] Susan Cutter, Christopher Burton, and Christopher Emrich, "Disaster Resilience Indicators for Benchmarking Baseline Conditions," Journal of Homeland Security and Emergency Management 7, no. 1 (2010):9

Table C.31: Regional Homeownership

County	Home Owners
Wasco	**65.1%**
Clackamas	71.1%
Gilliam	74.6%
Hood River	68.3%
Jefferson	70.2%
Sherman	70.0%
Wheeler	69.1%
Oregon	62.8%

Source: US Census Bureau, American Community Survey, 2022

Synthesis

Community connectivity capacity places a strong emphasis on social structure, trust and norms, and the cultural resources within a community. In terms of community resilience, social and cultural capital will become essential to stabilize the recovery of the community. Social and cultural capitals are present in all communities; however, it is dramatically different from one town to the next as they reflect the specific needs and composition of the community residents. A community with low residential stability may hinder the full potential of social and cultural resources, adversely affecting the community's coping and response mechanisms in the event of a disaster.

Place attachment can be determined through a variety of outlets. Wasco County has a wide range of resources in the form of social organizations, civic engagement, and cultural capital that help retain a sense of community and add to regional stability. Wasco County is generally consistent with state levels for voter turnout, regional stability and regional homeownership, suggesting that the county should continue to invest time informing and supporting its residents to build more resilient and better-prepared communities. These residents are more likely to return in the event of a disaster. Likewise, it is important to consider the roles such services and facilities can and will provide to residents during a disaster event.

Political Capital

Government Structure

Wasco County's Mission is "to ensure the provision of essential public services, which allow the people of Wasco County to enhance the quality of their lives. These services will be delivered in an efficient, effective and respectful manner."

Wasco County is governed by a part-time, elected Board of Commissioners. The Board of Commissioners normally meets on the first and third Wednesdays of each month in the County Courthouse to conduct county business. The County Courthouse, located in downtown The Dalles, houses many of the administrative offices for Wasco County including the Sheriff as well as space for public hearings. The Courthouse also includes administrative offices for State Courts, and the Wasco County 911 Office is located at an undisclosed location nearby. The Board of Commissioners is the County's policy-making body,

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responsible for setting policy direction and making decisions that influence the fiscal outlook and service-delivery to County residents.

Beyond Emergency Management, all the departments within the county governance structure have some degree of responsibility in building overall community resilience. Each plays a role in ensuring that the county functions and normal operations resume after an emergency incident. A description of all County Departments with a role in hazard mitigation is included below:

- **Emergency Management:** Wasco County's Emergency Management system requires coordination of activities to mitigate, prepare for, respond to and recover from major emergencies or disasters. The Emergency Management program is administered by the Sheriff's Office with the Sheriff designated as the Director of Emergency Services. The program is coordinated by an Emergency Manager. The scope of the emergency management system includes cities, service districts, volunteer agencies, schools, and other organizations with emergency responsibilities.

- **Fairground Facilities:** The local fairground facilities serve as an entertainment venue but are also considered a staging site for incident response efforts. Mitigation could include specific actions to ensure the facilities can be used during an emergency response; such as extra power should it need to be used as a shelter. The county fairgrounds located south of The Dalles in Tygh Valley offers considerable space and full facilities for potentially staging operations for an emergency incident.

- **Health and Human Services:** The North Central Public Health District serves citizens of Wasco, Sherman and Gilliam Counties, and is responsible for enforcement and administration of public and environmental health laws of federal, state, and county government. The North Central Public Health District conducts activities necessary for the preservation of health, prevention of disease, and protection of the public by following the three core public health functions: *assessment, monitoring*, and *policy development***.** Furthermore, the Public Health Emergency Preparedness (PHEP) Program develops plans and procedures to better prepare the counties to respond, mitigate, and recover from all public health emergencies.[72]

- **Planning:** The Wasco County Planning Department strives to make the land use planning process understandable, convenient, and expeditious while treating residents in an equitable, professional and respectful manner. The Department is responsible for comprehensive land use planning and facilitating land use development permits in Wasco County. Among other functions and responsibilities, the department maintains Wasco County's Comprehensive Plan. This document establishes a single, coordinated set of policies to guide orderly development of Wasco County. These policies give a direction to staff and elected officials; establish priorities for action; serve as a basis for future decisions provide a standard by which progress can be measured and promote a sense of community. The policies also influence all levels of government and private enterprise toward a better understanding of the land use priorities in the county.[73]

- **Public Works:** Wasco County's Department of Public Works consists foremost of the County

[72] North Central Public Health District Website, 2024.
[73] Wasco County Planning Department Website, 2024.

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Road Division. The Department is responsible for the construction and maintenance of 697 miles of roadway (300 miles of which is paved), 123 bridges, hundreds of culverts, and a myriad of other related items, such as signs and guardrail. Road maintenance activities involve pavement maintenance, gravel road grading, ditch and culvert cleaning, brushing, snow and ice removal, bridge maintenance, and sign maintenance. The Public Works Department and its employees have important information about the resilience of the physical aspects of the community. The Department can help to prioritize projects for mitigation and should be a key partner in implementation as well.[74]

- **Sheriff's Office:** The Wasco County Sheriff's Office has 18 sworn deputies, with a mission to serve and protect persons and property and to maintain the peace and order within Wasco County. The Wasco County Sheriff's Office provides primary law enforcement services throughout Wasco County with the exception of the City of The Dalles. The Office oversees Patrol, Criminal Investigations, 911 Communications, Parole and Probation, and Emergency Management.[75]

Existing Plan & Policies

All local governments in Oregon have plans and policies that guide and influence land use, land development and population growth. Such plans and policies can include comprehensive plans, zoning ordinances and technical reports or studies. Plans and policies are vetted through a public process with an appointed citizen Planning Commission, and the Board of County Commissioners. Most land use, comprehensive, and strategic plans get updated regularly, and can adapt easily to changing conditions and needs.[76] The Wasco County Natural Hazards Mitigation Plan includes a range of recommended action items that, when implemented, will reduce the county's vulnerability to natural hazards. Many of these recommendations are consistent with the goals and objectives of the county's existing plans and policies. Linking existing plans and policies to the Natural Hazards Mitigation Plan helps identify what resources already exist that can be used to implement the action items identified in the Plan. The following list of County Plans coordinate closely with the Natural Hazard Mitigation Plan for implementation:

The following are a list of plans and policies already in place in Wasco County:

- Wasco County Comprehensive Plan Originally Adopted: August 1983, Last Updated: 2022.
- Wasco County Land Use and Development Ordinance Originally Adopted: June 1985, Last Updated: 2021 (Land Division and Procedural) Updates; 2022 (Farm and Forest Zone, Communication Facilities, and Military Airspace Overlay).
- Wasco County Emergency Operations Plan Original Release: 2006, Last Updated: December 2018.
- Columbia Gorge National Scenic Area Management Plan Originally Adopted October 1991, Last Updated: October 2020.
- Wasco County National Scenic Area Land Use and Development Ordinance Adopted: May 1994, Last Updated: November 3, 2021. Currently in the process of being updated in 2024-2025 (Mandatory Updates).
- Wasco County Transportation Systems Plan Adopted: July 2009.

[74] Wasco County Public Works Department Website, 2024.
[75] Wasco County Sheriff's Office Website, 2024.
[76] Burby, Raymond J., ed. 1998. Cooperating with Nature: Confronting Natural Hazards with Land-Use Planning for Sustainable Communities.

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- Community Wildfire Protection Plan Adopted: December 21, 2005, Last Updated: December 2024.
- Mt. Hood Coordination Plan Prepared: September 2005, Last Updated: June 2013.
- Wasco County Area Service Ambulance Plan: Adopted March 2012, Last Updated: August 2020.
- Wasco County Economic Development Strategy 2022-2027, Adopted March 2023.

Synthesis

Government organization and planning structures established to support them must be collaborative and nimble in response to natural hazard events. For the county to be resilient during a hazard event, it is essential for the political capital to encompass diverse government and non-government entities in collaboration; as disaster losses stem from a predictable result of interactions between the physical environment, social and demographic characteristics, and the built environment.[77]

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

Appendix D: Survey Results

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Wasco County Natural Hazard Mitigation Plan Outreach Survey

February 8 – August 12, 2024 |639 respondents

The responses to the question about mitigating natural disasters in the community are diverse and cover a wide range of measures. Some of the most frequently mentioned suggestions include:

Preparedness and Education:
- Develop and practice emergency plans.
- Conduct drills and training for the community.
- Educate residents about disaster risks and preparedness.
- Create awareness through public campaigns.

Infrastructure and Building Codes:
- Enforce and update building codes to withstand natural hazards.
- Strengthen existing infrastructure.
- Invest in early warning systems.

Land Use Planning and Environmental Protection:
- Implement zoning regulations to avoid high-risk areas.
- Protect and restore natural ecosystems.
- Promote sustainable land use practices.

Community Engagement and Collaboration:
- Foster collaboration between government agencies, organizations, and residents.
- Establish community networks for support and communication.

Other notable suggestions include:

Financial Preparedness:
- Obtain insurance coverage for natural disasters.
- Create disaster relief funds.

Specific Measures:
- Controlled burns to manage wildfire risk.
- Improved forest management.
- Water conservation efforts.
- Undergrounding power lines.

Overall, the responses emphasize the importance of a multi-faceted approach that addresses prevention, mitigation, preparedness, response, and recovery to effectively mitigate the impact of natural disasters in the community.

*Note: Actual data may vary. This survey was subject to over 900 bot submissions based on a variety of review factors, including duplicate IP addresses, response time and analysis of the open-ended questions.

After multiple rounds of filtering, it is believed that the survey accurately depicts the input of Wasco County residents.

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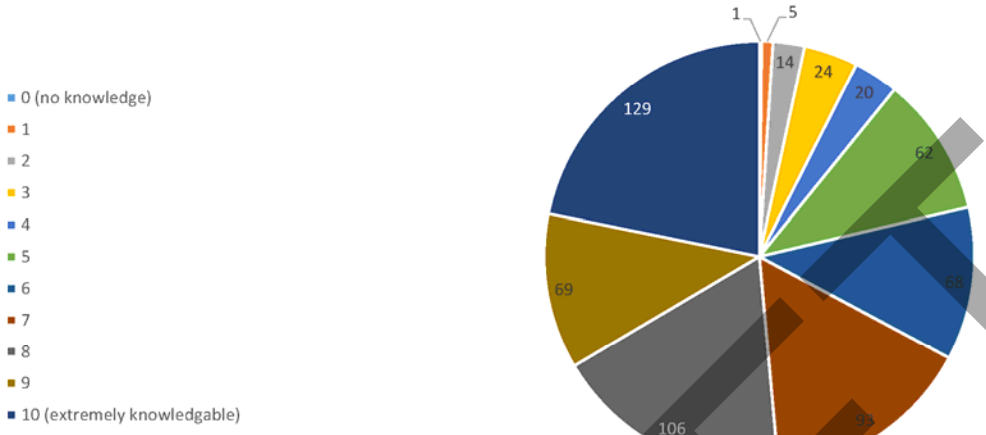
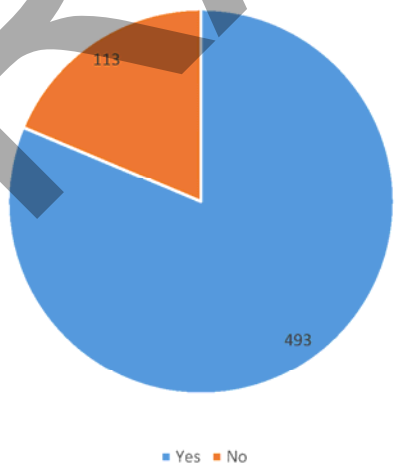
How would you rate your knowledge about the natural disasters common to Wasco County?



Do you have a disaster preparedness plan for your household?



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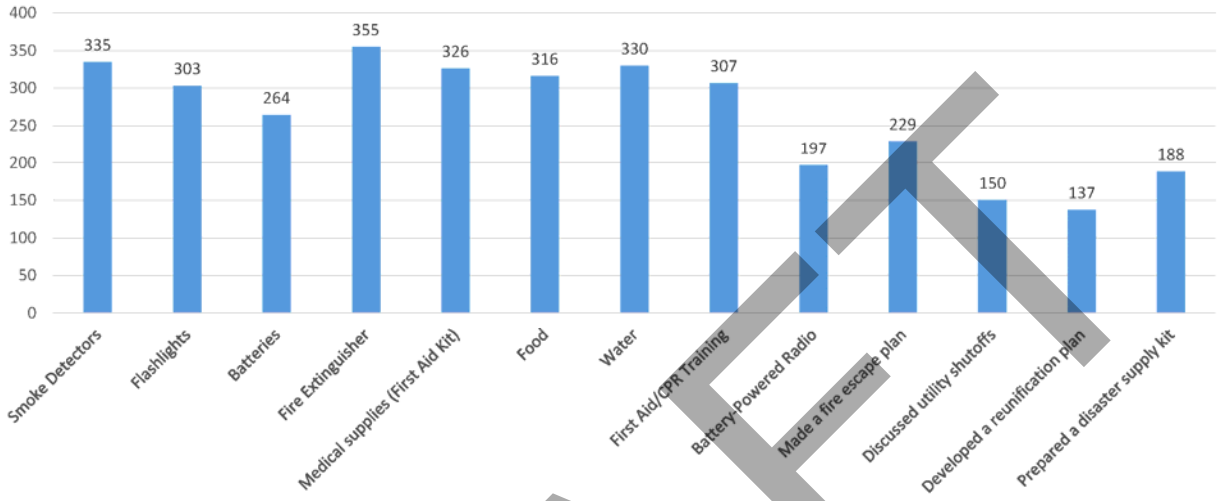
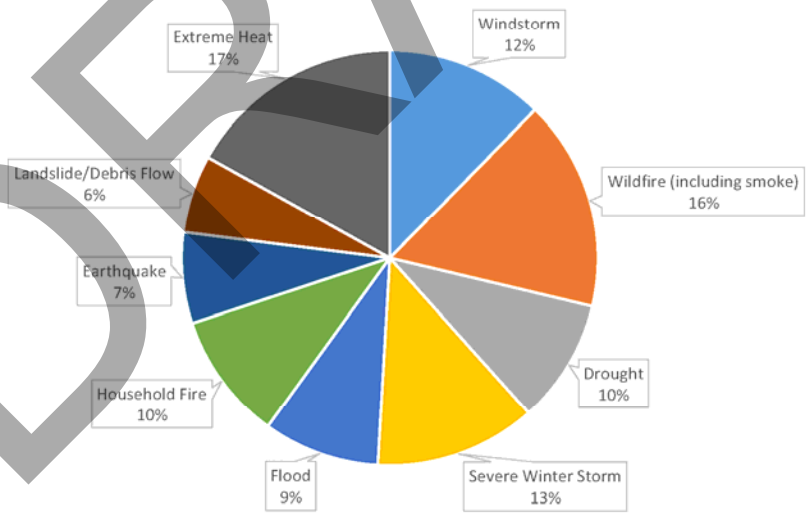
Please choose the preparedness steps your household has already taken. (Choose all that apply)



What disasters have you personally experienced in last five years? Select all that apply



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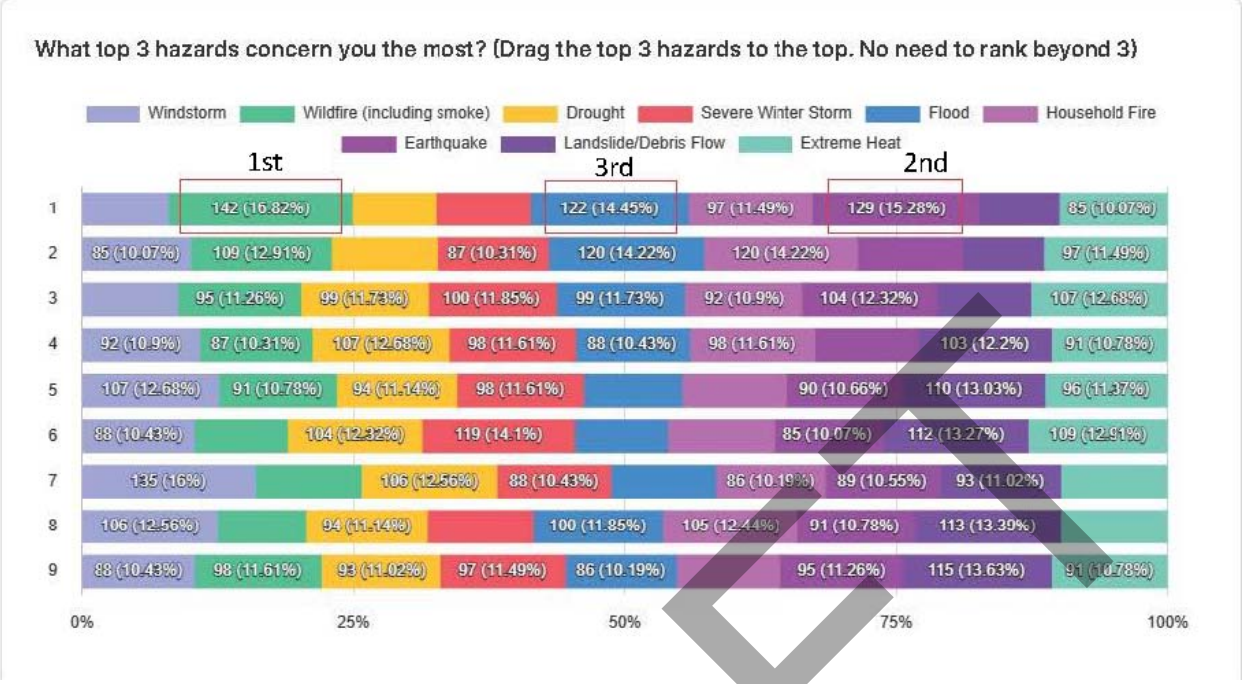
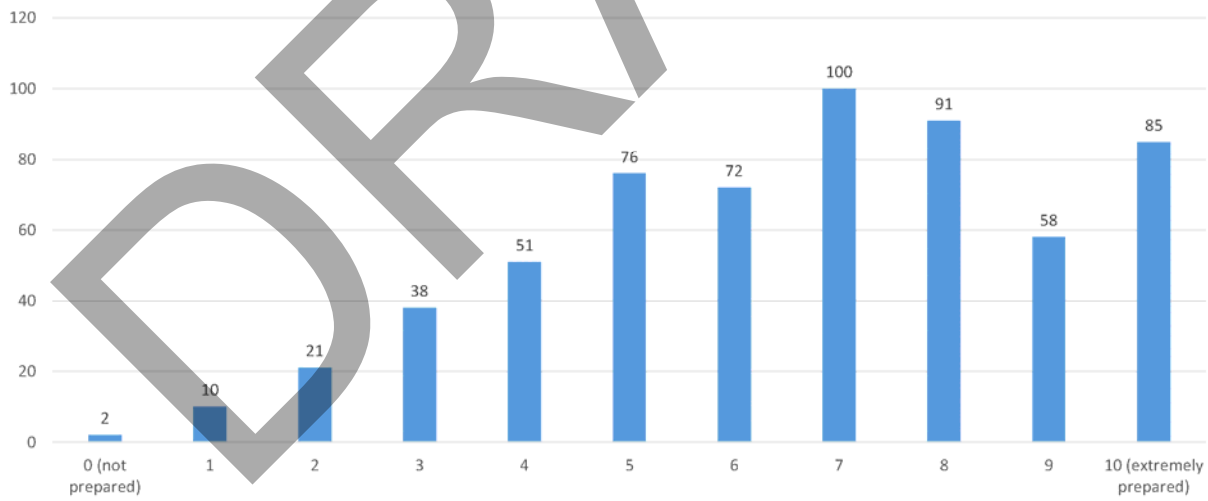


How prepared do you think your community is to handle a natural disaster?



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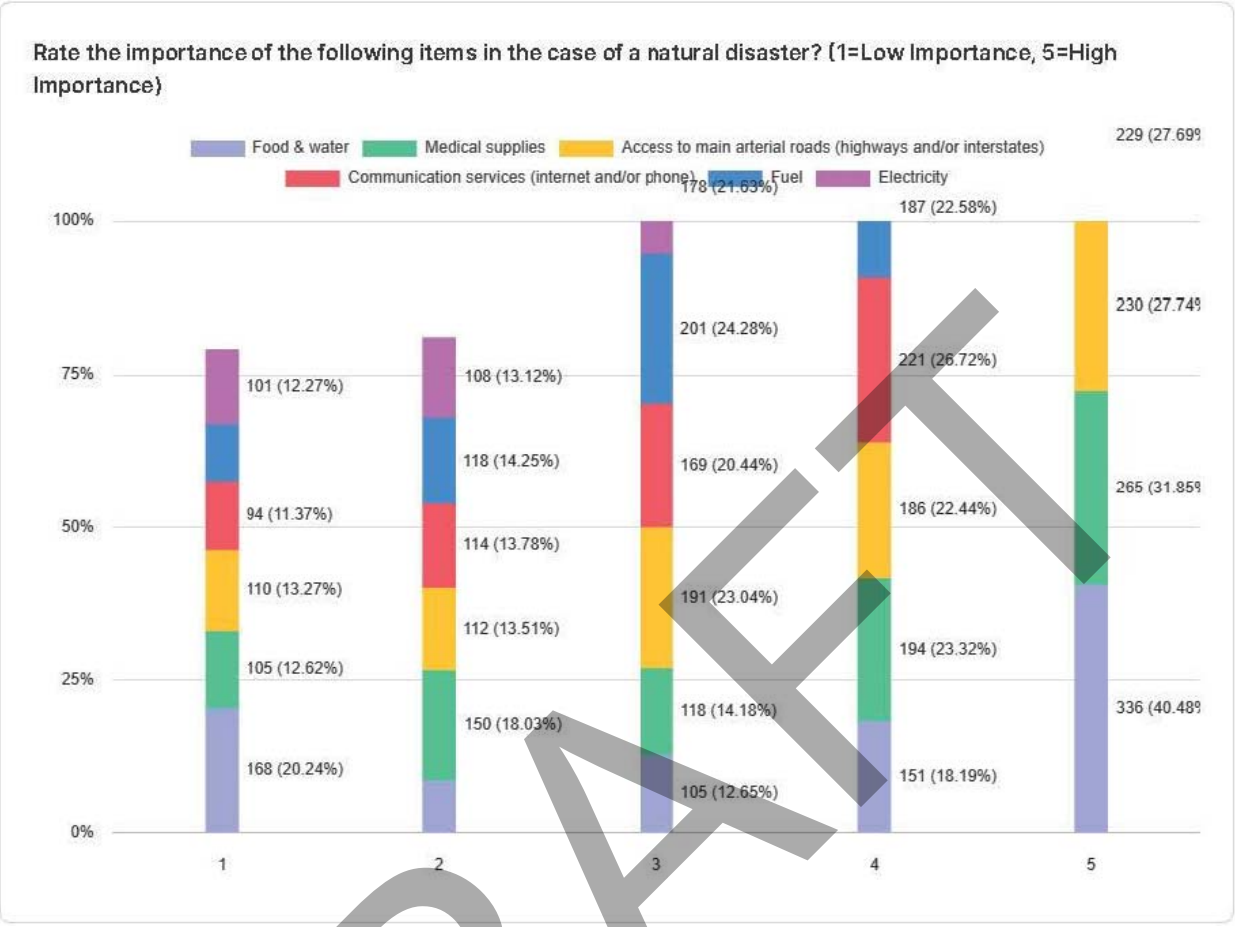
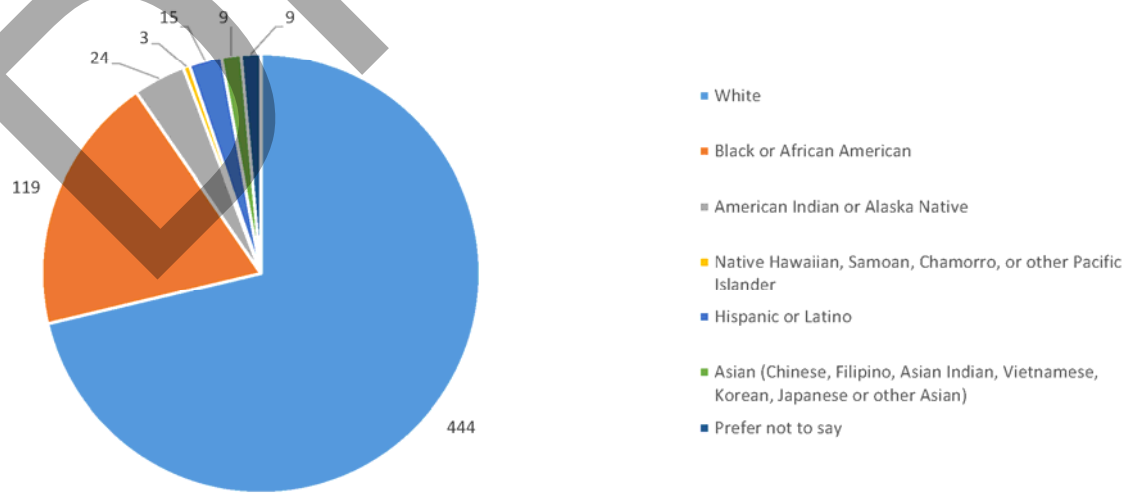


What is your race or origin? Select all that apply.



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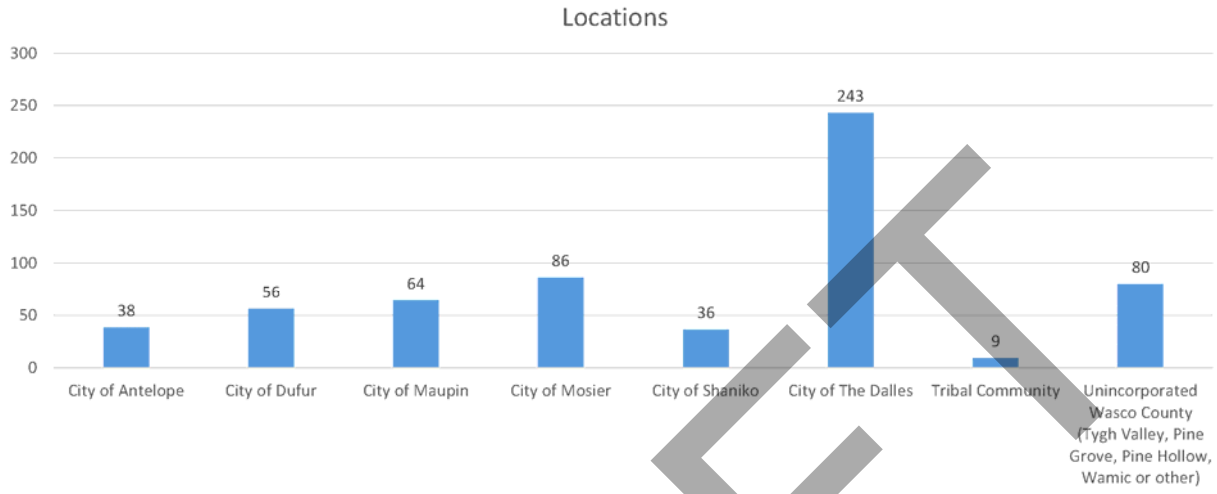
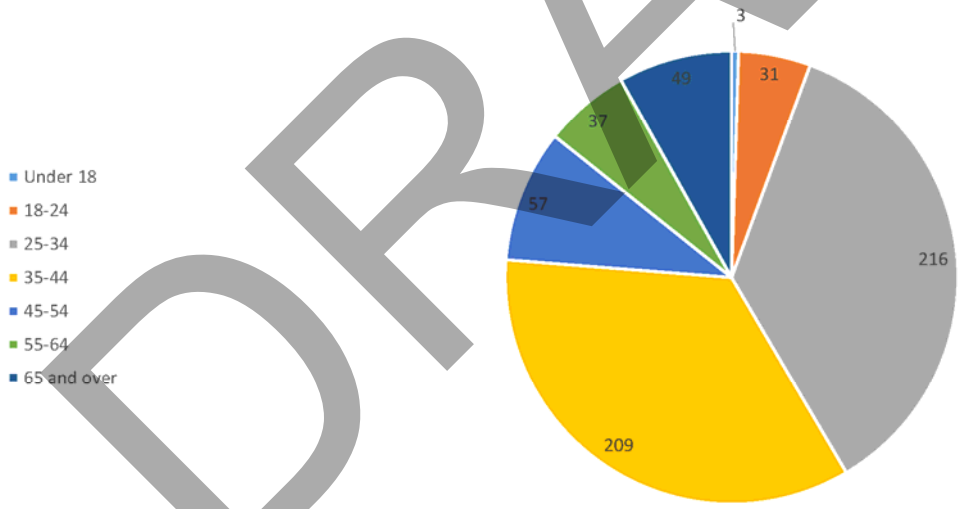
Where do you live?



What is your age?



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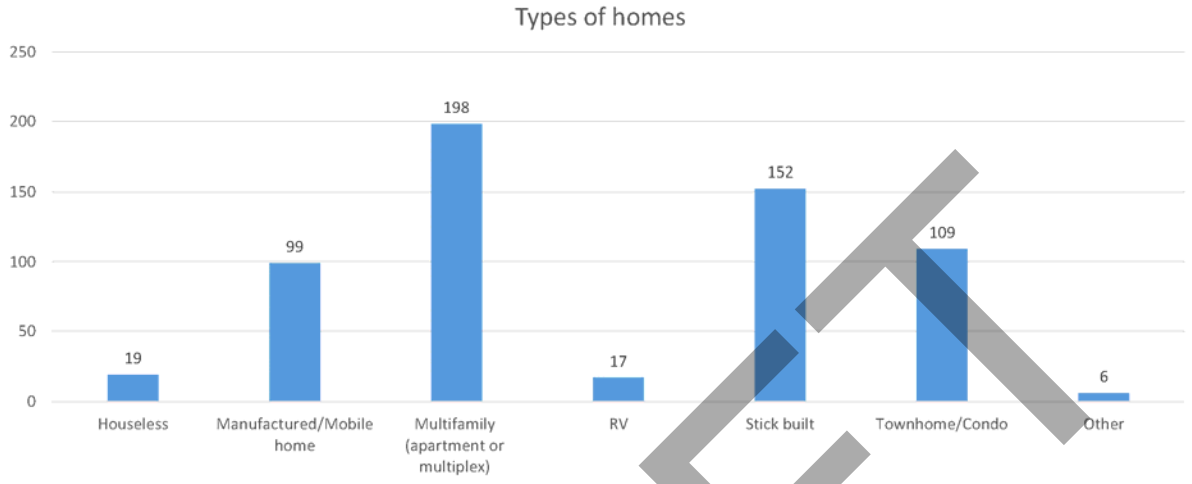
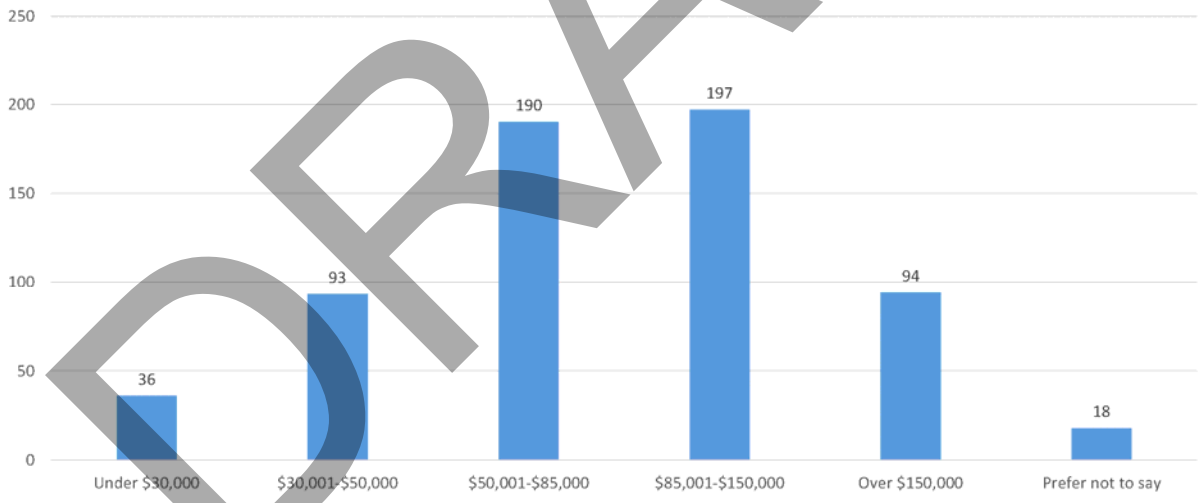
Is your home:



Which category represents the total combined income of all members of your family annually?



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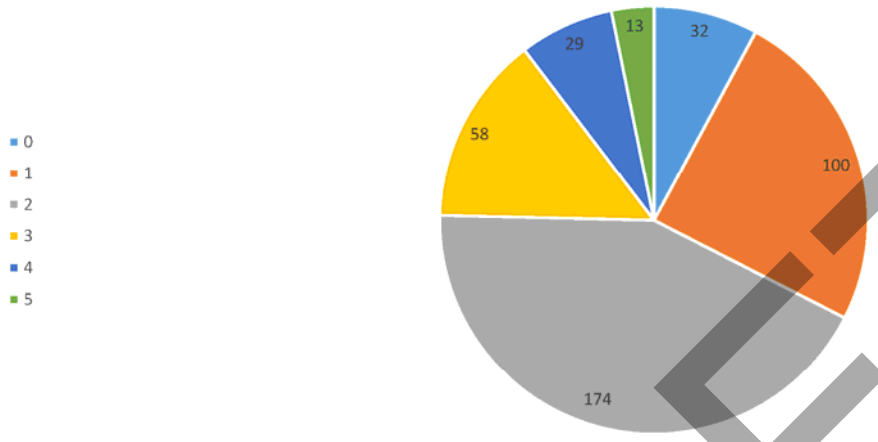
How many children live in your household at least half of the time?



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Appendix E: Grant Programs and Other Resources

Post-Disaster Federal Programs

Hazard Mitigation Grant Program

- The Hazard Mitigation Grant Program (HMGP) provides grants to States and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. The HMGP is authorized under Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act.
  http://www.fema.gov/hazard-mitigation-grant-program

Physical Disaster Loan Program

- When physical disaster loans are made to homeowners and businesses following disaster declarations by the U.S. Small Business Administration (SBA), up to 20% of the loan amount can go towards specific measures taken to protect against recurring damage in similar future disasters.
  http://www.sba.gov/category/navigation-structure/loans-grants/small-business-loans/disaster-loans

Pre-Disaster Federal Programs

Pre-Disaster Mitigation Grant Program

- The Pre-Disaster Mitigation (PDM) program provides funds to states, territories, Indian tribal governments, communities, and universities for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. Funding these plans and projects reduces overall risks to the population and structures, while also reducing reliance on funding from actual disaster declarations. PDM grants are to be awarded on a competitive basis and without reference to state allocations, quotas, or other formula-based allocation of funds.
  http://www.fema.gov/pre-disaster-mitigation-grant-program

Flood Mitigation Assistance Program

- The overall goal of the Flood Mitigation Assistance (FMA) Program is to fund cost-effective measures that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other National Flood Insurance Program (NFIP) insurable structures. This specifically includes:
  - Reducing the number of repetitively or substantially damaged structures and the associated flood insurance claims;

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- Encouraging long-term, comprehensive hazard mitigation planning;
- Responding to the needs of communities participating in the NFIP to expand their mitigation activities beyond floodplain development activities; and
- Complementing other federal and state mitigation programs with similar, long-term mitigation goals.
  http://www.fema.gov/flood-mitigation-assistance-program

Detailed program and application information for federal post-disaster and pre-disaster programs can be found at: https://www.fema.gov/multimedia-library

For Oregon Military Department, Office of Emergency Management grant guidance on Federal Hazard Mitigation Assistance, visit:
http://www.oregon.gov/OMD/OEM/pages/all_grants.aspx - Hazard_Mitigation_Grants

OEM contact: Krail Daniel, Deputy State Hazard Mitigation Officer

Email: kail.daniel@oem.oregon.gov

State Programs

Community Development Block Grant Program

- Promotes viable communities by providing: 1) decent housing; 2) quality living environments; and 3) economic opportunities, especially for low and moderate income persons. Eligible Activities Most Relevant to Hazard Mitigation include: acquisition of property for public purposes; construction/reconstruction of public infrastructure; community planning activities. Under special circumstances, CDBG funds also can be used to meet urgent community development needs arising in the last 18 months which pose immediate threats to health and welfare.
  https://www.hud.gov/program_offices/comm_planning/cdbg

Oregon Watershed Enhancement Board

- While OWEB's primary responsibilities are implementing projects addressing coastal salmon restoration and improving water quality statewide, these projects can sometimes also benefit efforts to reduce flood and landslide hazards. In addition, OWEB conducts watershed workshops for landowners, watershed councils, educators, and others, and conducts a biennial conference highlighting watershed efforts statewide. Funding for OWEB programs comes from the general fund, state lottery, timber tax revenues, license plate revenues, angling license fees, and other sources. OWEB awards approximately $20 million in funding annually.
  http://www.oregon.gov/OWEB/Pages/index.aspx

Federal Mitigation Programs, Activities & Initiatives

Basic & Applied Research/Development

- National Earthquake Hazard Reduction Program (NEHRP), National Science Foundation. Through broad based participation, the NEHRP attempts to mitigate the effects of earthquakes. Member agencies in NEHRP are the US Geological Survey (USGS), the National Science Foundation (NSF), the Federal Emergency Management Agency (FEMA), and the National Institute for Standards and Technology (NIST). The agencies focus on research and

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development in areas such as the science of earthquakes, earthquake performance of buildings and other structures, societal impacts, and emergency response and recovery. http://www.nehrp.gov/

- Decision, Risk, and Management Science Program, National Science Foundation. Supports scientific research directed at increasing the understanding and effectiveness of decision making by individuals, groups, organizations, and society. Disciplinary and interdisciplinary research, doctoral dissertation research, and workshops are funded in the areas of judgment and decision making; decision analysis and decision aids; risk analysis, perception, and communication; societal and public policy decision making; management science and organizational design. The program also supports small grants for exploratory research of a time-critical or high-risk, potentially transformative nature. http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5423

Hazard ID and Mapping

- National Flood Insurance Program: Flood Mapping; FEMA. Flood insurance rate maps and flood plain management maps for all NFIP communities. http://www.fema.gov/national-flood-insurance-program-flood-hazard-mapping
- National Digital Orthophoto Program, DOI – USGS. Develops topographic quadrangles for use in mapping of flood and other hazards. https://www.usgs.gov/publications/national-digital-orthophoto-program
- Mapping Standards Support, DOI-USGS. Expertise in mapping and digital data standards to support the National Flood Insurance Program. http://ncgmp.usgs.gov/standards.html
- Soil Survey, USDA-NRCS. Maintains soil surveys of counties or other areas to assist with farming, conservation, mitigation or related purposes. http://soils.usda.gov/survey/printed_surveys/

Project Support

- Coastal Zone Management Program, NOAA. Provides grants for planning and implementation of non-structural coastal flood and hurricane hazard mitigation projects and coastal wetlands restoration. https://coast.noaa.gov/czm/
- Community Development Block Grant Entitlement Communities Program, HUD. Provides grants to entitled cities and urban counties to develop viable communities (e.g., decent housing, a suitable living environment, expanded economic opportunities), principally for low- and moderate- in come persons. https://www.hud.gov/program_offices/comm_planning/cdbg
- National Fire Plan (DOI – USDA) Provides technical, financial, and resource guidance and support for wildland fire management across the United States. Addresses five key points: firefighting, rehabilitation, hazardous fuels reduction, community assistance, and accountability. http://www.forestsandrangelands.gov/
- Assistance to Firefighters Grant Program, FEMA. Grants are awarded to fire departments to enhance their ability to protect the public and fire service personnel from fire and related hazards. Three types of grants are available: Assistance to Firefighters Grant (AFG), Fire Prevention and Safety (FP&S), and Staffing for Adequate Fire and Emergency Response (SAFER). http://www.fema.gov/welcome-assistance-firefighters-grant-program

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- Emergency Watershed Protection Program, USDA-NRCS. Provides technical and financial assistance for relief from imminent hazards in small watersheds, and to reduce vulnerability of life and property in small watershed areas damaged by severe natural hazard events. http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/ewpp
- Rural Development Assistance – Utilities, USDA. Direct and guaranteed rural economic loans and business enterprise grants to address utility issues and development needs. https://www.rd.usda.gov/programs-services/all-programs
- Rural Development Assistance – Housing, USDA. Grants, loans, and technical assistance in addressing rehabilitation, health and safety needs in primarily low-income rural areas. Declaration of major disaster necessary.

  https://www.rd.usda.gov/programs-services/all-programs/multi-family-housing-programs
- Public Assistance Grant Program, FEMA. The objective of the Federal Emergency Management Agency's (FEMA) Public Assistance (PA) Grant Program is to provide assistance to State, Tribal and local governments, and certain types of Private Nonprofit organizations so that communities can quickly respond to and recover from major disasters or emergencies declared by the President. http://www.fema.gov/public-assistance-local-state-tribal-and-non-profit
- National Flood Insurance Program, FEMA. Makes available flood insurance to residents of communities that adopt and enforce minimum floodplain management requirements. http://www.fema.gov/national-flood-insurance-program
- HOME Investments Partnerships Program, HUD. Grants to states, local government and consortia for permanent and transitional housing (including support for property acquisition and rehabilitation) for low-income persons. https://www.hud.gov/program_offices/comm_planning/home
- Disaster Recovery Initiative, HUD. Grants to fund gaps in available recovery assistance after disasters (including mitigation). https://www.hud.gov/disaster_resources/disaster_recovery_for_individuals_and_families/disaster_recovery_funds
- Emergency Management Performance Grants, FEMA. Helps state and local governments to sustain and enhance their all-hazards emergency management programs. https://www.fema.gov/grants/preparedness/emergency-management-performance
- Partners for Fish and Wildlife, DOI – FWS. Financial and technical assistance to private landowners interested in pursuing restoration projects affecting wetlands and riparian habitats. http://www.fws.gov/partners/
- North American Wetland Conservation Fund, DOI-FWS. Cost-share grants to stimulate public/private partnerships for the protection, restoration, and management of wetland habitats. https://www.fws.gov/program/north-american-wetlands-conservation
- Federal Land Transfer / Federal Land to Parks Program, DOI-NPS. Identifies, assesses, and transfers available Federal real property for acquisition for State and local parks and recreation, such as open space. http://www.nps.gov/ncrc/programs/flp/index.htm
- Wetlands Reserve program, USDA-NCRS. Financial and technical assistance to protect and restore wetlands through easements and restoration agreements.

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https://www.fsa.usda.gov/sites/default/files/documents/wetland-reserve-program-final-programmatic-environmental-assessment-january-2009.pdf

- Secure Rural Schools and Community Self-Determination Act of 2000, US Forest Service. Reauthorized for FY2012, it was originally enacted in 2000 to provide five years of transitional assistance to rural counties affected by the decline in revenue from timber harvests on federal lands. Funds have been used for improvements to public schools, roads, and stewardship projects. Money is also available for maintaining infrastructure, improving the health of watersheds and ecosystems, protecting communities, and strengthening local economies. https://www.fs.usda.gov/working-with-us/secure-rural-schools/act

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Appendix F: Maps

Table of Contents

Wasco County Community Wildfire Protection Plan (CWPP) (2024)

Landscape Wildfire Hazard F-3

Potential Flame Length for a Typical Fire Day in Wasco County F-4

Oregon Explorer: Oregon CWPP Planning Tool Maps (2024)

Fuel Model Groups F-5

Overall Wildfire Risk - Watershed F-6

DOGAMI Risk Report Maps (2021)

Building Distribution Map of Wasco County F-7

Population Density of Wasco County F-8

Liquefaction Map of Wasco County F-9

Landslide Susceptibility Map of Wasco County F-10

Wildfire Risk Map of Wasco County F-11

DOGAMI Landslide Inventory and Risk Reduction (2022)

2022 Landslide Inventory Map of Wasco County F-12

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Wasco County Environmental Protection Districts 1 and 2

Environmental Zone 1 – Flood Hazard Overlay F-13

Environmental Protection District 2 – Geologic Hazard Overlay F-14

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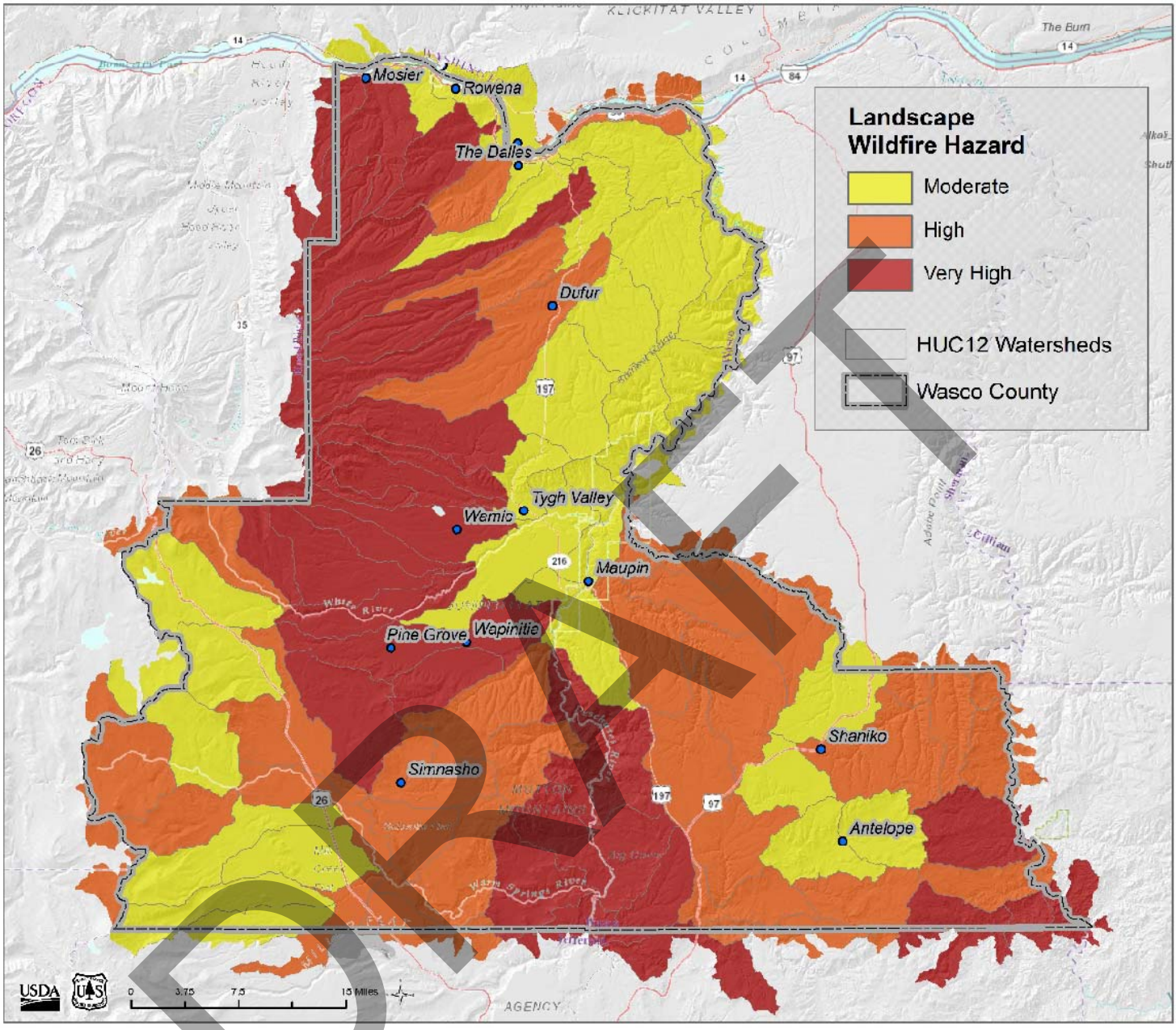

Source: Wasco County 2024 Community Wildfire Protection Plan. (Provided through 2018 Community Assistance Planning for Wildfire).

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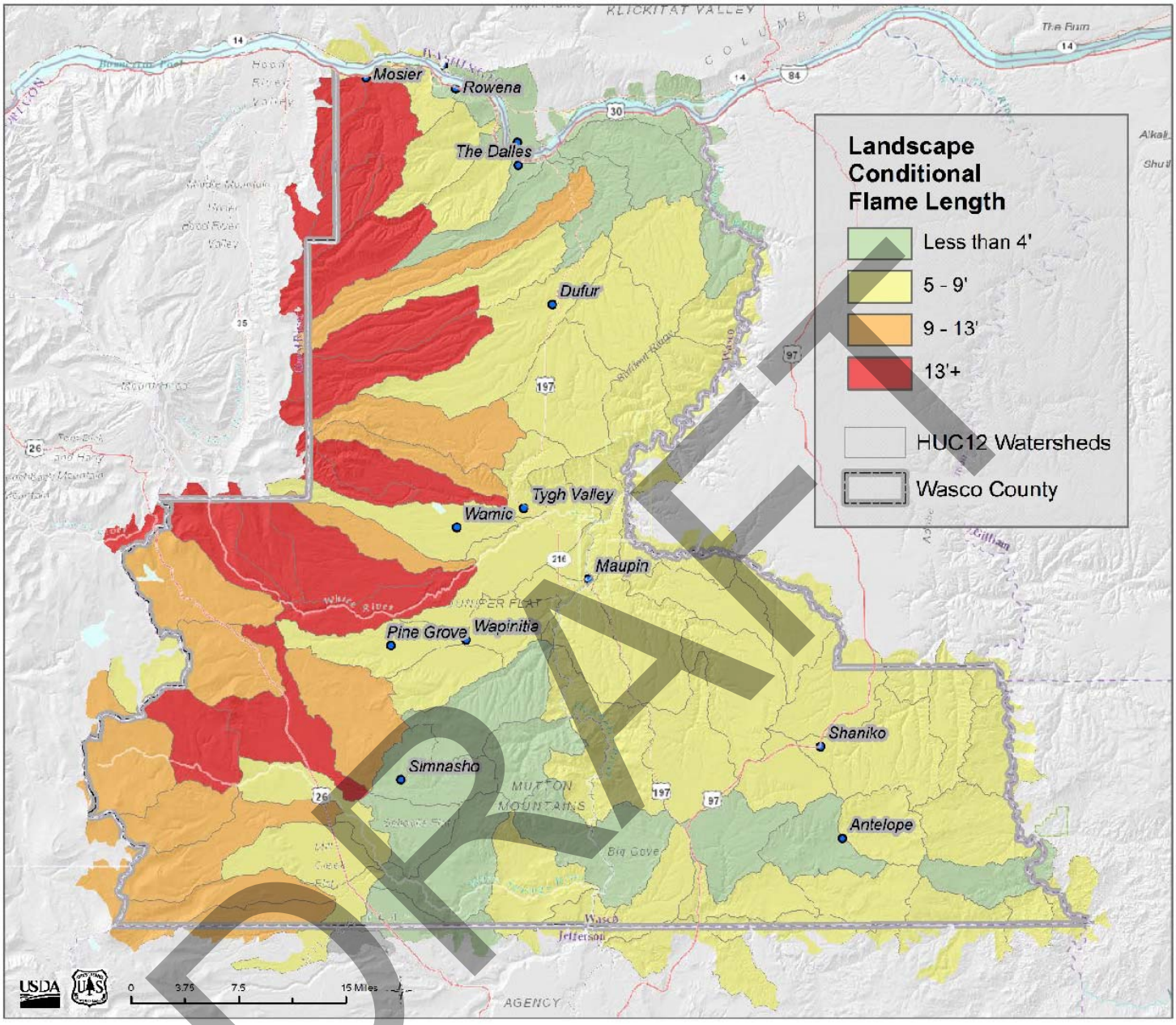

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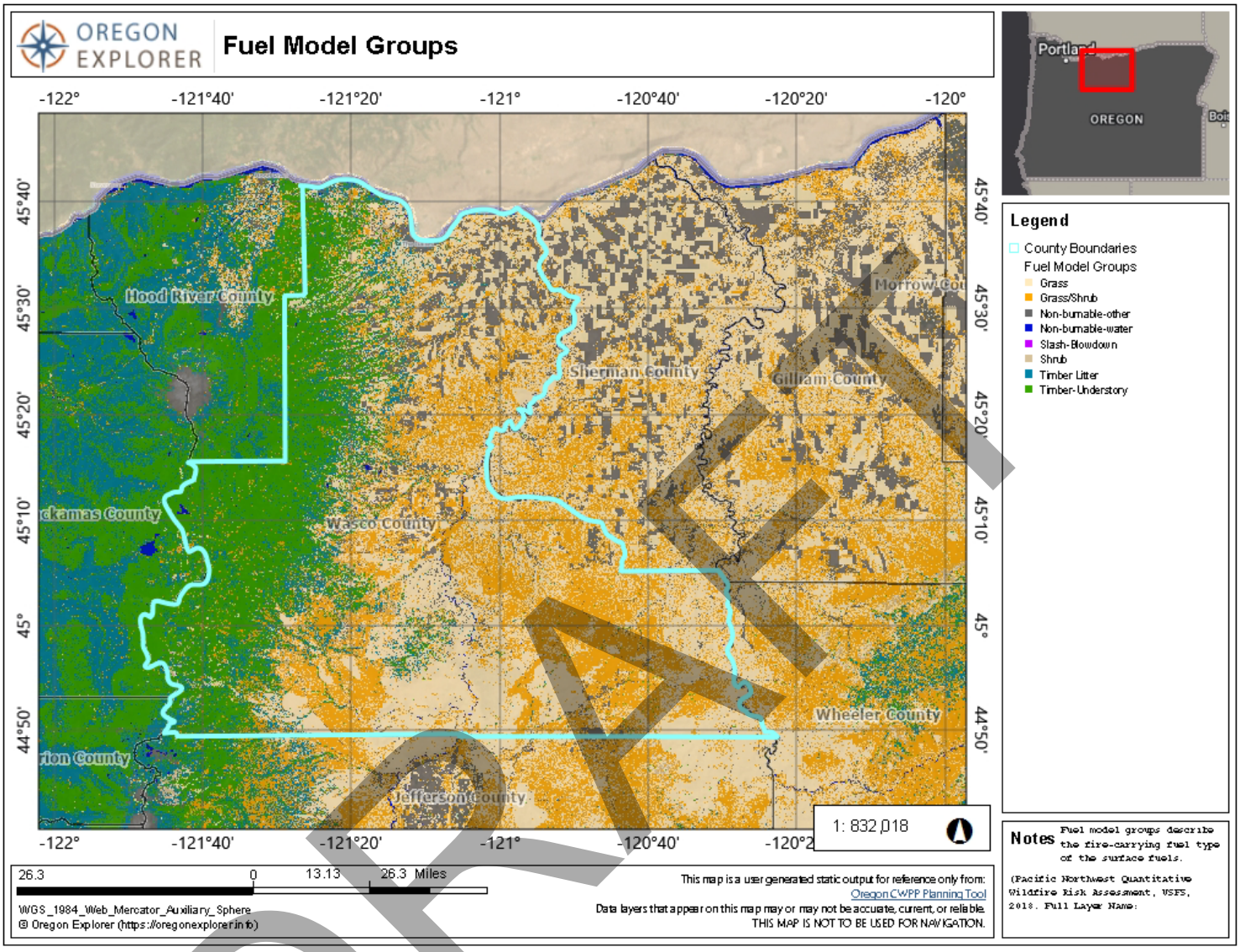

Source: Oregon Explorer: Oregon CWPP Planning Tool, Pacific Northwest Quantitative Wildfire Risk Assessment, USFS, 2018.

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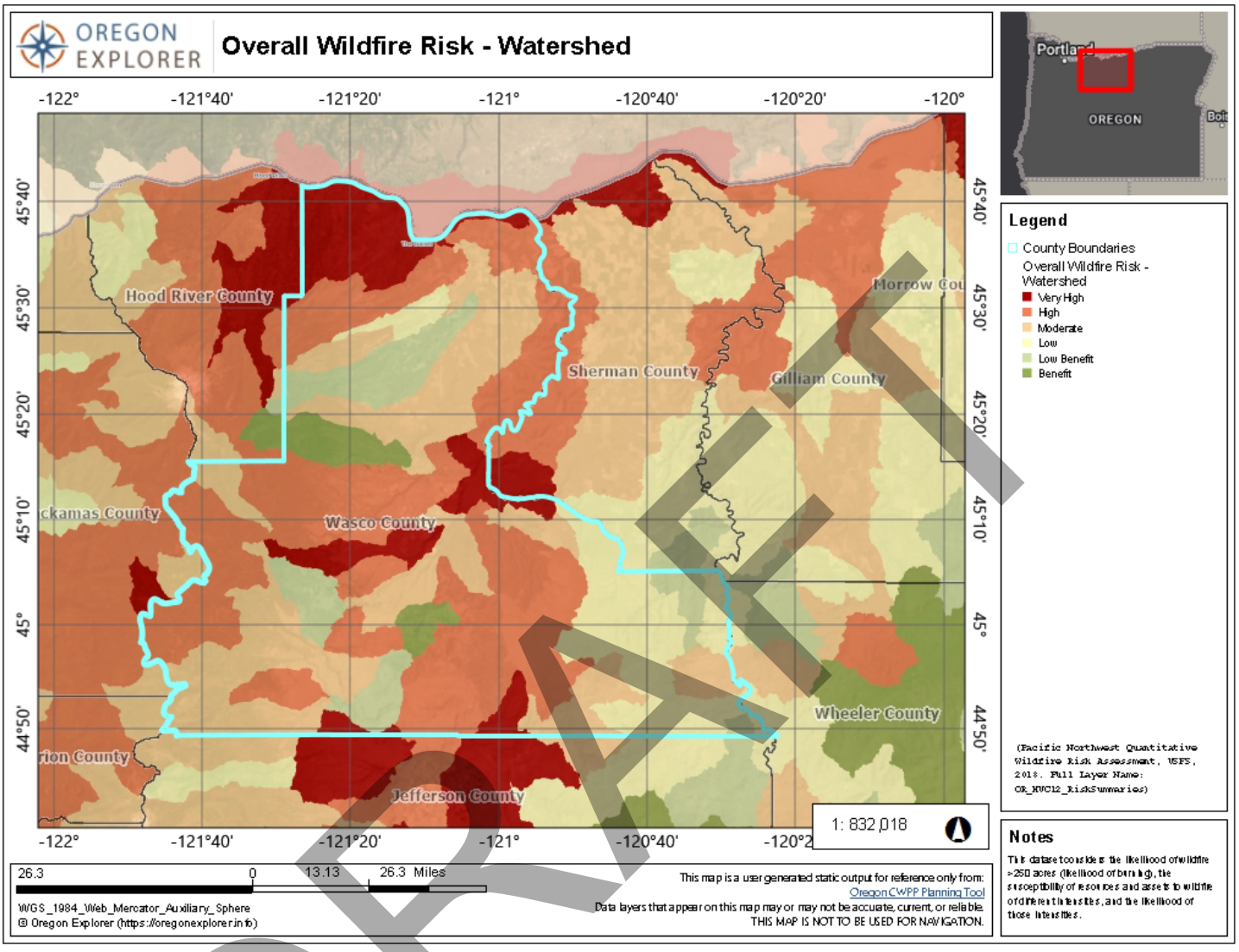

Source: Oregon Explorer: Oregon CWPP Planning Tool, Pacific Northwest Quantitative Wildfire Risk Assessment, USFS, 2018.

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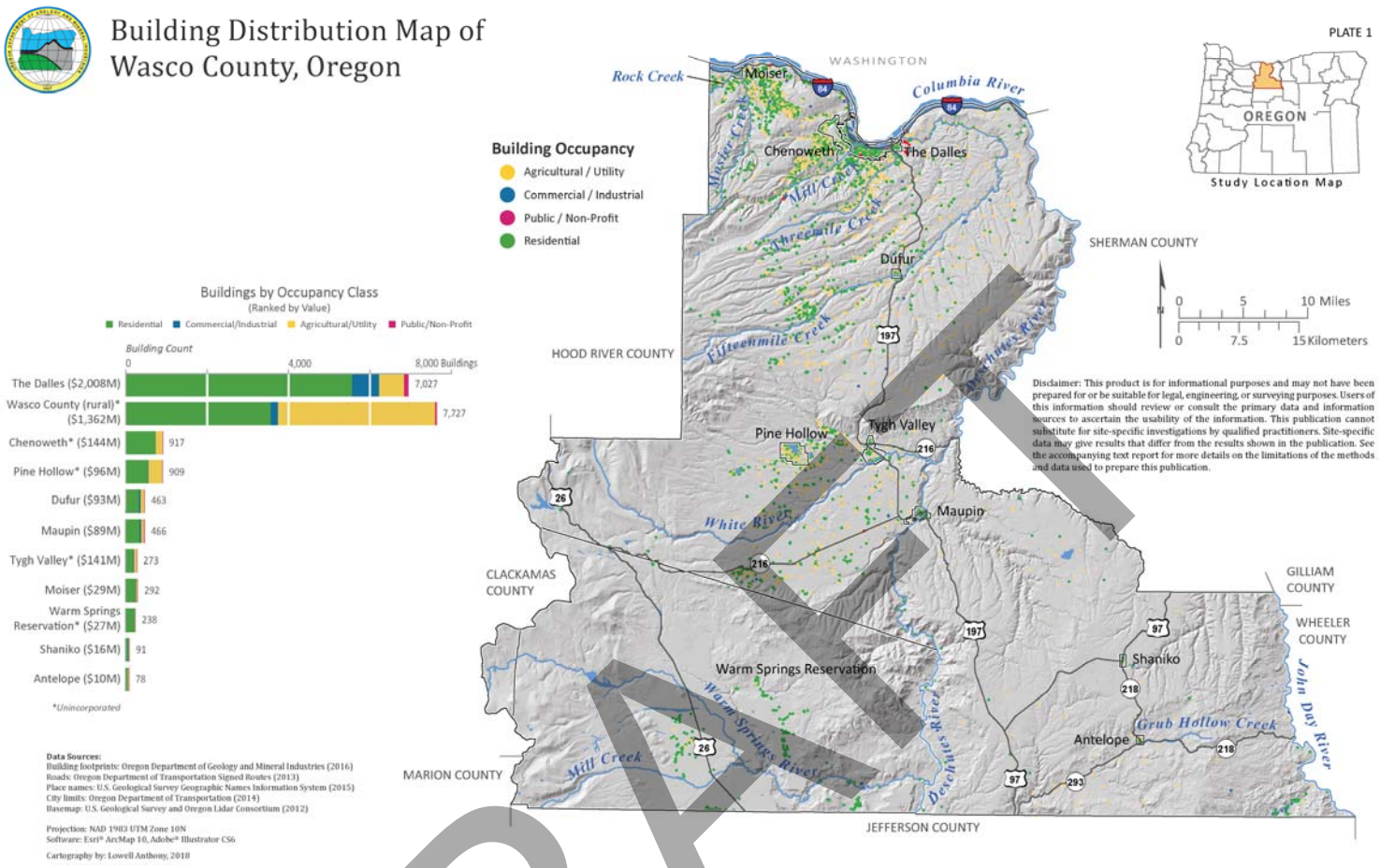

Source: Natural Hazard Risk Report for Wasco County, Oregon, DOGAMI, 2021

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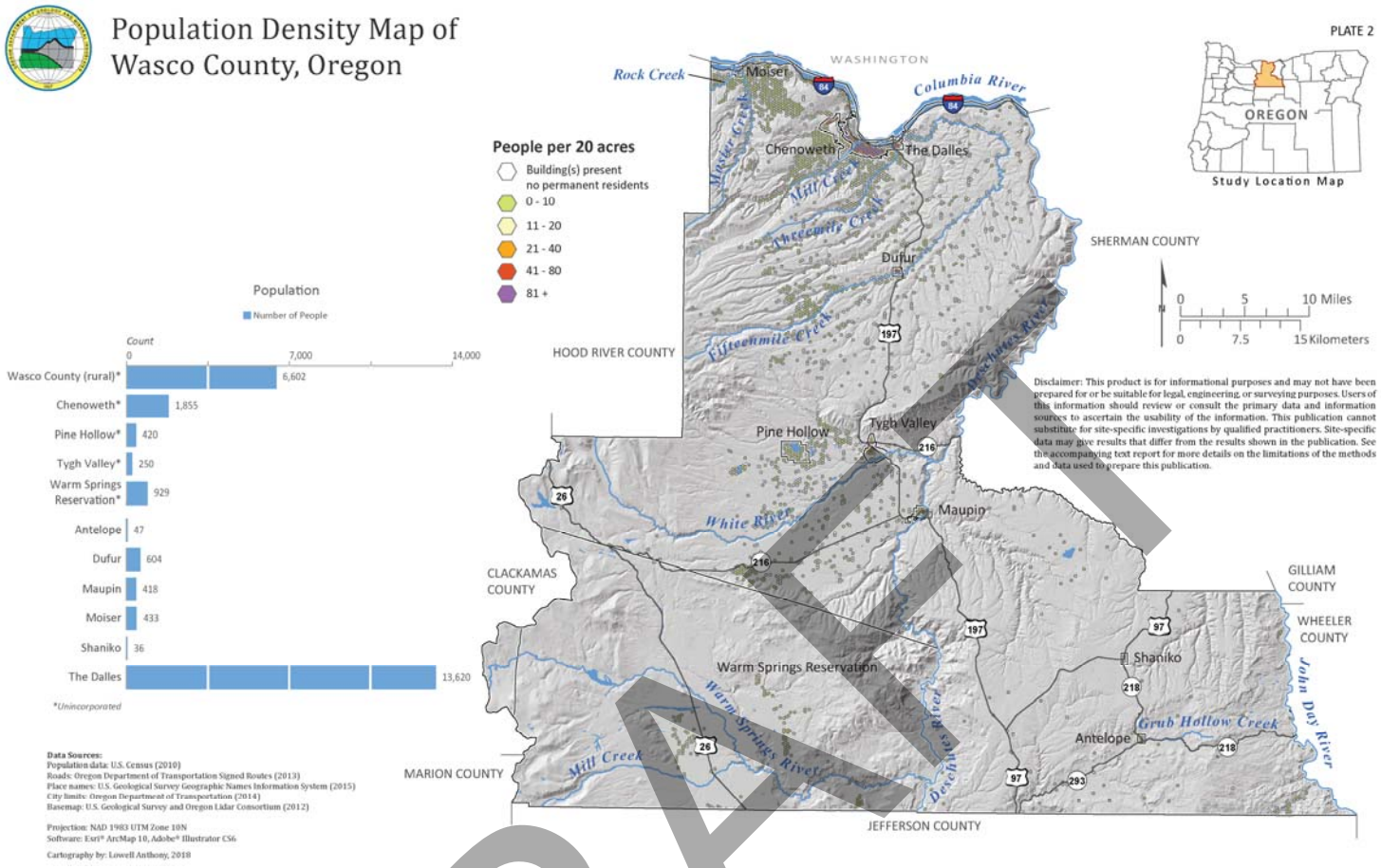

Source: Natural Hazard Risk Report for Wasco County, Oregon, DOGAMI, 2021

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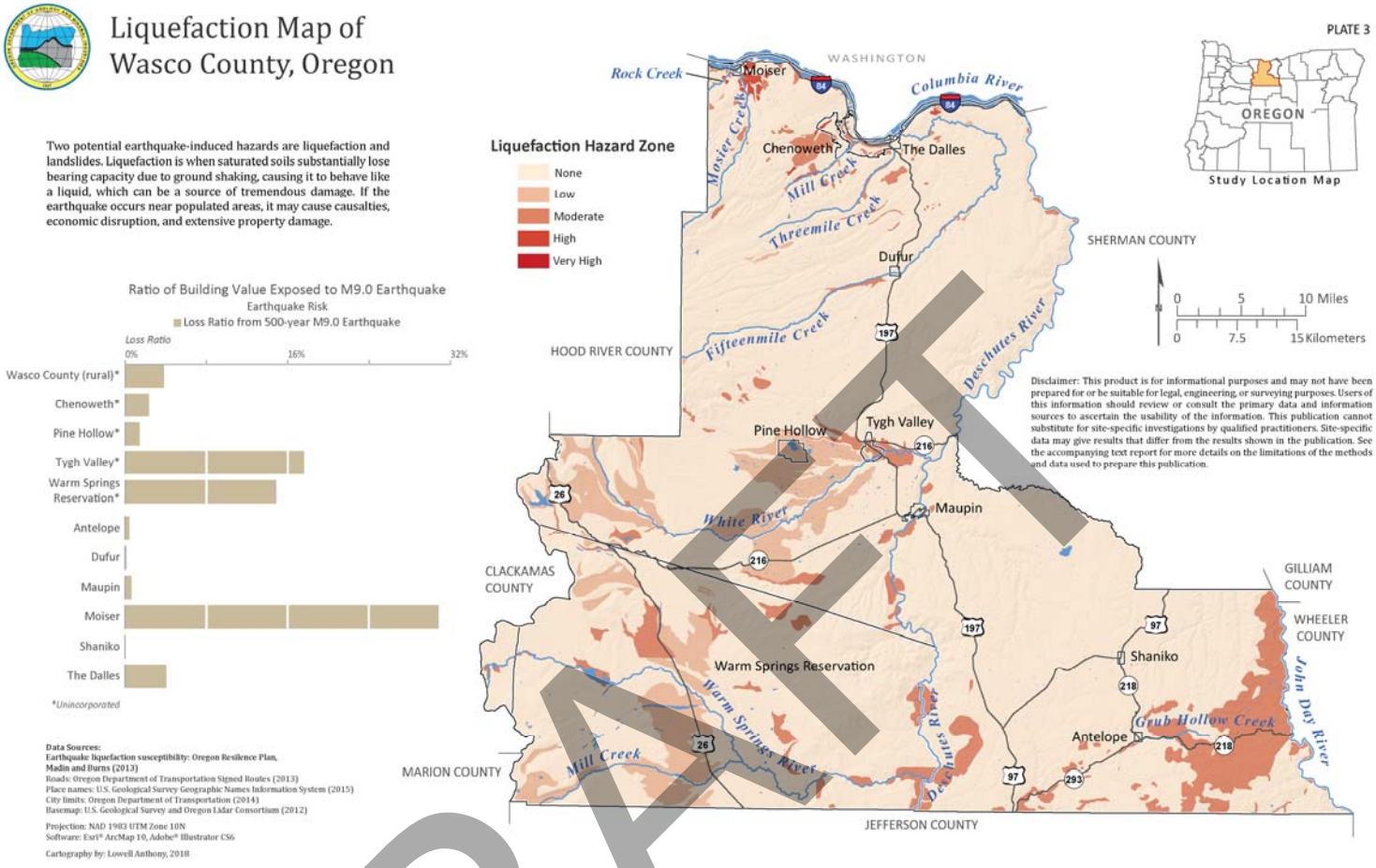

Source: Natural Hazard Risk Report for Wasco County, Oregon, DOGAMI, 2021

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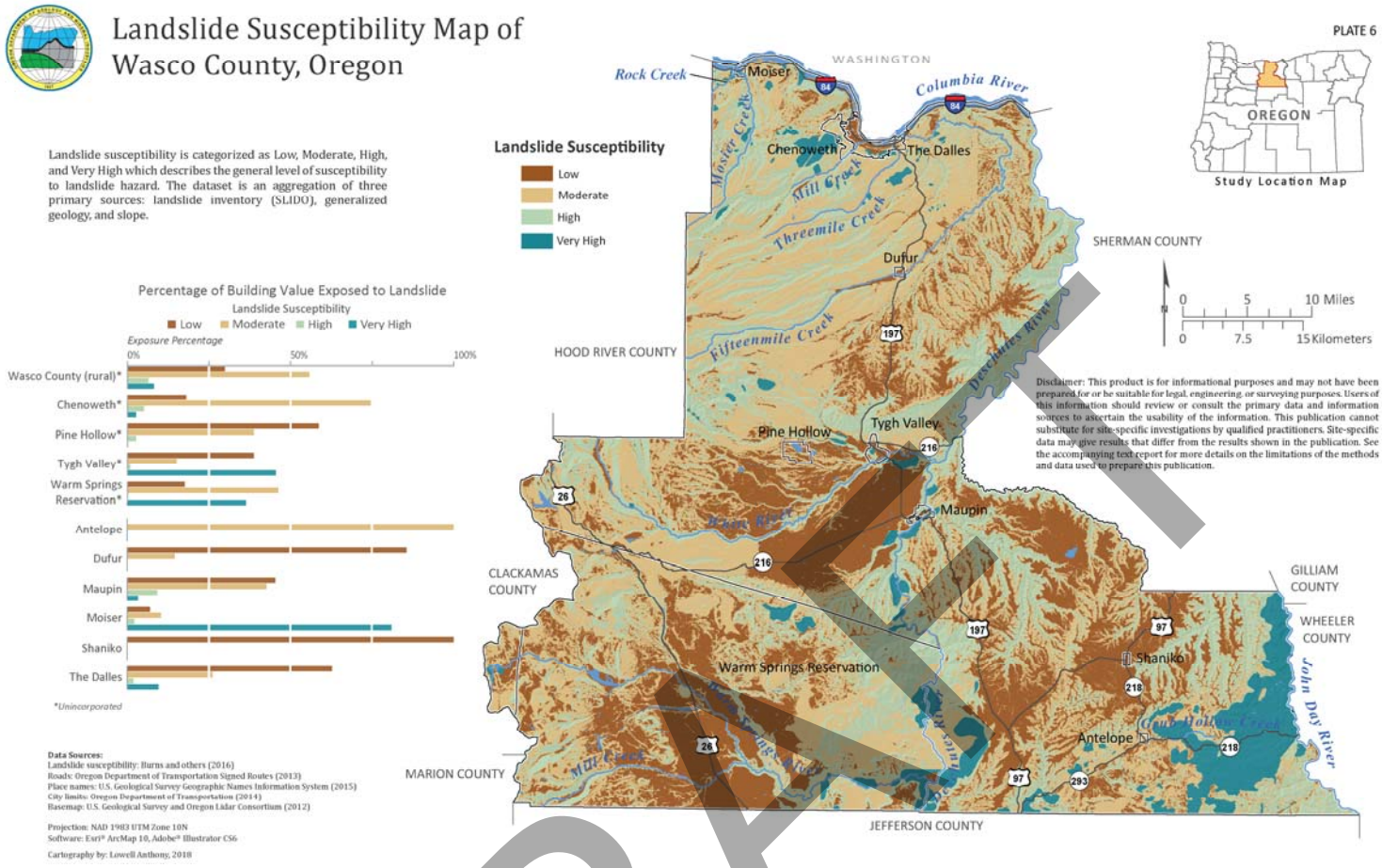

Source: Natural Hazard Risk Report for Wasco County, Oregon, DOGAMI, 2021

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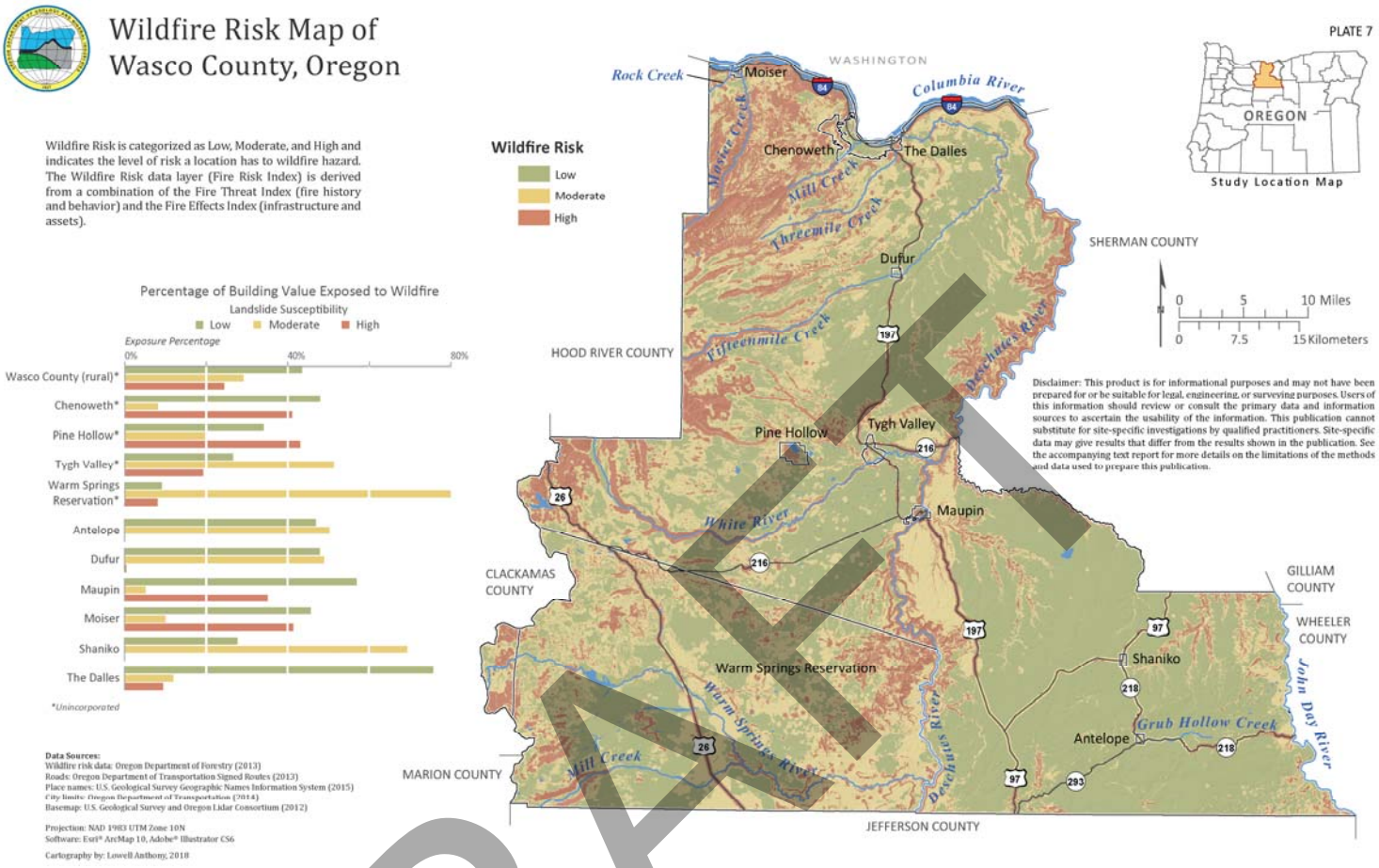

Source: Natural Hazard Risk Report for Wasco County, Oregon, DOGAMI, 2021

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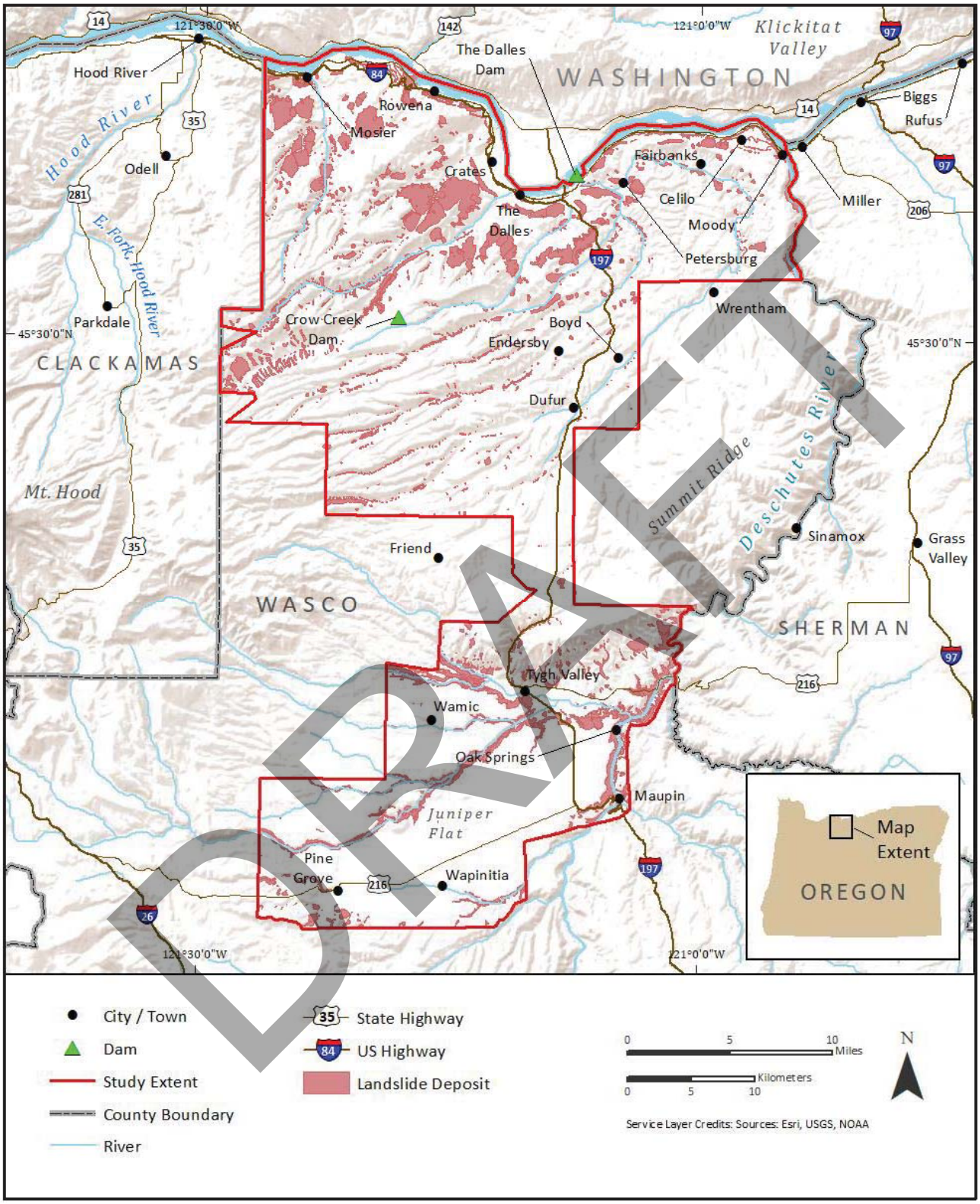

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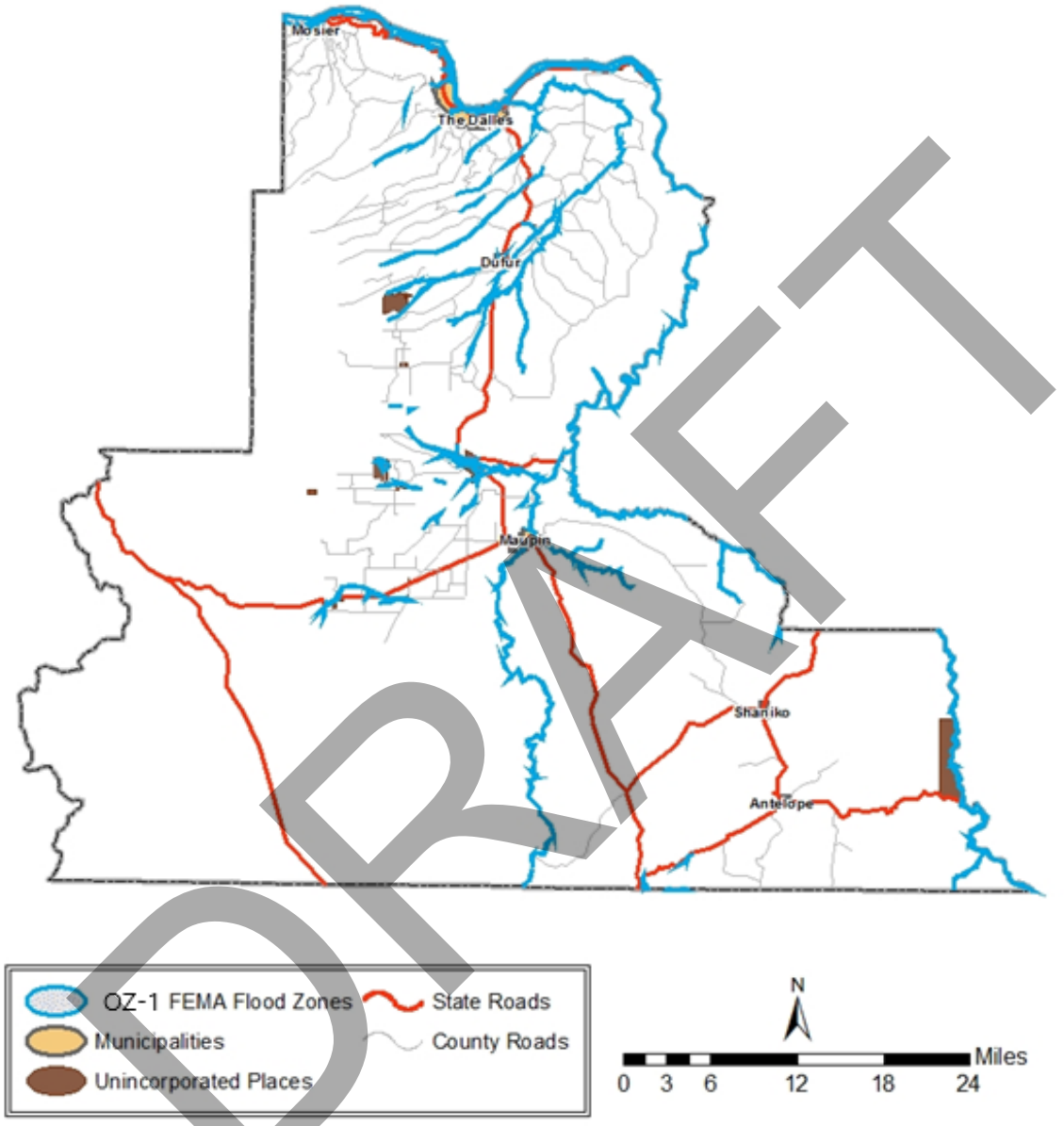
Source: Landslide Inventory and Risk Reduction of the North and Central Portions of Wasco County, Oregon O-23-02 report, DOGAMI, 2022

Overlay Zone (OZ-1) FEMA Flood Zone



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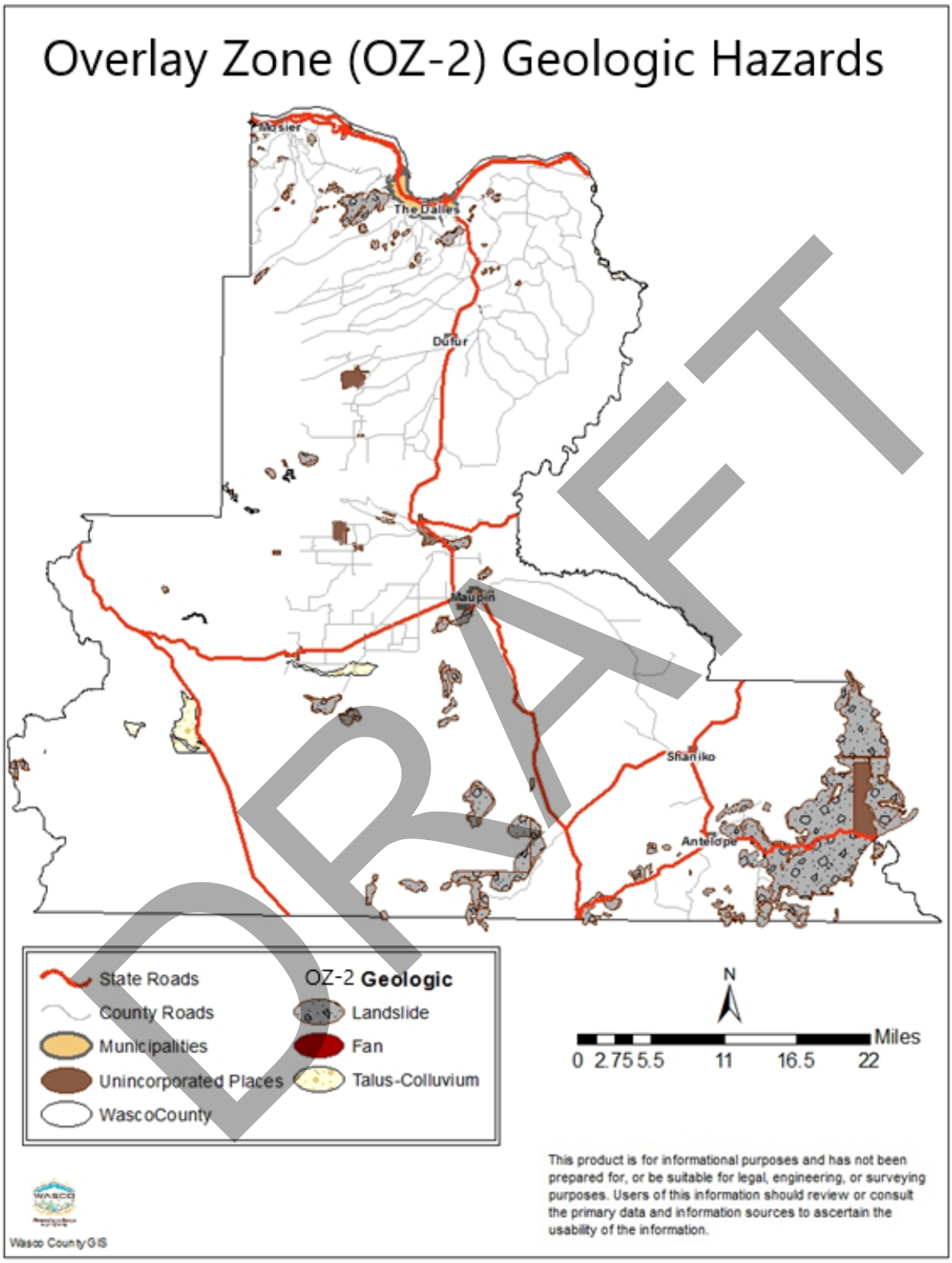
Overlay Zone (OZ-2) Geologic Hazards
Mosier
The Dalles
Dufur
Maupin
Shaniko
Antelope
State Roads
County Roads
Municipalities
Unincorporated Places
WascoCounty
OZ-2 Geologic
Landslide
Fan
Talus-Colluvium
N
Miles
0 2.75 5.5 11 16.5 22
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