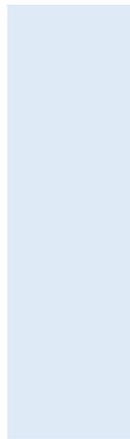
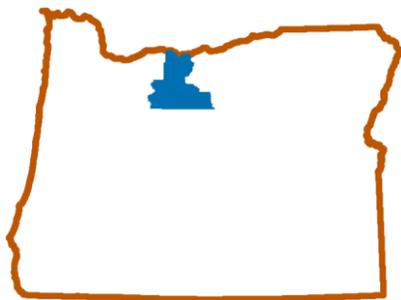


FINAL 5-17-2019



Wasco County

MULTI-JURISDICTION NATURAL HAZARDS MITIGATION PLAN



- Wasco County
- The Dalles



FEMA

Effective May 17, 2019 through May 17, 2024

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.

For further information and to provide comments, contact:

Lane Magill, Sheriff
Vacant, Emergency Manager
Wasco County Emergency Management
511 Washington St., Suite 102
The Dalles, OR 97058
V: (541) 506-2790
E: lanem@co.wasco.or.us

Will Smith, Senior Planner
Wasco County Planning Department
2705 East 2nd Street
The Dalles, OR 97058
V: (541) 506-2560
E: wills@co.wasco.or.us

Special Thanks & Acknowledgements

Wasco County developed this Multi-Jurisdictional Natural Hazards Mitigation Plan through a partnership funded by the Federal Emergency Management Agency's Pre-Disaster Mitigation Grant Program. In 2017, the Department of Land Conservation and Development (DLCD) received two Pre-Disaster Mitigation grants (PDMC-PL-10-OR-2016-003 and PDMC-PL-10-OR-2016-005) from FEMA through the Oregon Military Department, Office of Emergency Management (OEM) to assist Wasco County and seven other counties with their NHMPs.

Project Steering Committee:

- Will Smith, Wasco County Planning Department
- Juston Huffman, Wasco County Emergency Management
- Robert Palmer, Mid-Columbia Fire and Rescue
- Ryan Bessette, Wasco County Soil and Water Conservation District
- Frack Cochran, USDA Natural Resource Conservation Service
- Cindy Miller, North Wasco County School District #21
- Kristin Dodd, Oregon Department of Forestry
- Dave Anderson, The Dalles City Public Works
- Steve Kramer, Wasco County
- Tyler Stone, Wasco County
- Tycho Granville, Wasco County GIS
- Angie Brewer, Wasco County Planning
- Kelly Howsley-Glover, Wasco County Planning
- Arthur Smith, Wasco County Public Works

Project Managers:

- Will Smith, Wasco County Planning Department
- Juston Huffman, Wasco County Emergency Management

Department of Land Conservation and Development (DLCD) Staff:

- Tricia Sears, Natural Hazards Planner
- Christine Shirley, NFIP Coordinator (former)
- David Lentzner, Risk MAP Coordinator

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 2018 NHMP update.

This page left intentionally blank.

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
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

This page left intentionally blank.

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 and the City of The Dalles. Other jurisdictions were invited to participate and declines. 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.

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

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

Why Develop this Mitigation Plan?

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

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

Who Participated in Developing the Plan?

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

- 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
- Mid-Columbia Fire and Rescue
- USDA Natural Resource Conservation Service
- Oregon Department of Forestry
- Oregon Department of Land Conservation and Development

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

The 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 “Disasters and Donuts”.

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.

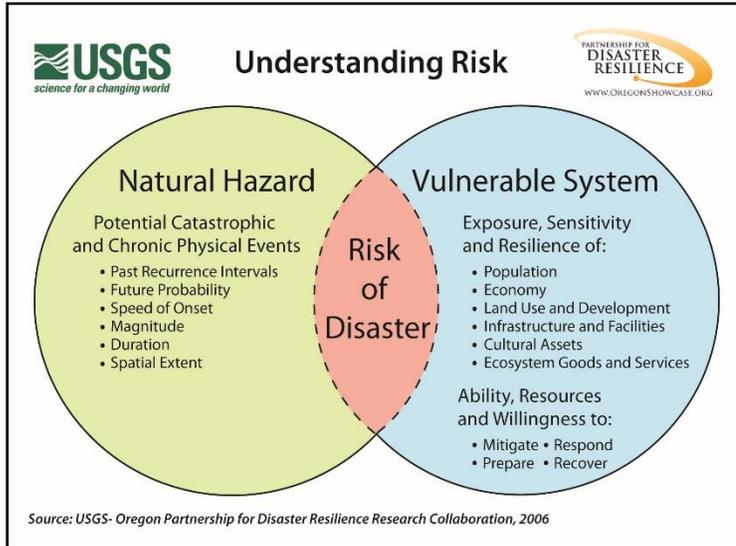
How Does this Mitigation Plan Reduce Risk?

This natural hazard mitigation plan is intended to assist the City of The Dalles and Wasco County generally to reduce the risk from natural hazards by identifying resources, information, and

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

strategies for risk reduction. It is also intended to guide and coordinate mitigation activities throughout the County. A risk assessment, included in 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 each hazard 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.

Table i.1: Risk Assessment Summary

Hazard	Initial Risk Score	Initial Risk Ranking	Revised Risk Ranking	Risk Level
Severe Weather	233	1	1	High
Drought	211	2	2	High
Wildfire	155	5	3	Medium
Flood	144	4	4	Medium
Earthquake	138	6	5	Medium
Volcano	166	3	6	Low
Landslide	58	7	7	Low

Source: Wasco County NHMP Steering Committee Meeting July 25, 2017 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.”

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

What are the Plan Goals?

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

- Protection of Life and Property
- Emergency Services Enhancement
- Education and Outreach
- Facilitate Partnerships and Coordination
- Natural Resource Systems Protection.

How are the Action Items Organized?

The mitigation action items are organized within an Action Item Matrix (located in Section 3 of the

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

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 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?

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.

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

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

Plan Adoption

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 Oregon Emergency Management. 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.

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] . . .

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.

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.

This page left intentionally blank.

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

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 applies to the following jurisdictions: Wasco County, and the City of The Dalles. Dufur has expressed interest in joining as well. 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 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 keypiece 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 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. 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



The first four stages of the NHMP update process had their own corresponding Steering Committee meeting, during which previous work could be reviewed and new content developed for each particular session. The community profile was completed in the Spring of 2017 by the Wasco County Planning Department’s Long Range Planner with assistance from staff. Content for the risk assessment was developed at the second Steering Committee meeting, and was reviewed and discussed before the Steering Committee reviewed the County’s mission, goals and action items. 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 2018 and circulated among County officials and interested public for review before submission 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, as well as through public outreach efforts throughout the process and a mitigation focused public meeting known as “Disasters and Donuts”. 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 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 listing of existing plans, policies, and programs, listing of community organizations, a summary of existing mitigation actions, and an overview of the hazards addressed in the plan. 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. 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:

- Drought;
- Earthquake;
- Flood;
- Wildland Fire;
- Landslides;
- Severe Local Weather; and
- Volcanoes

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, but the City of The Dalles was the only jurisdiction to provide an addendum 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 2012. This section also includes a review of other 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;
- 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 regional household preparedness survey prepared by the NHMP Steering Committee, based on the 2012 survey that was implemented by OPDR. The survey aimed to gauge household knowledge of mitigation tools and techniques to assist in reducing the risk and loss from natural hazards, as well as assessing household disaster preparedness.

APPENDIX E: GRANT PROGRAMS

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

APPENDIX F: MAPS

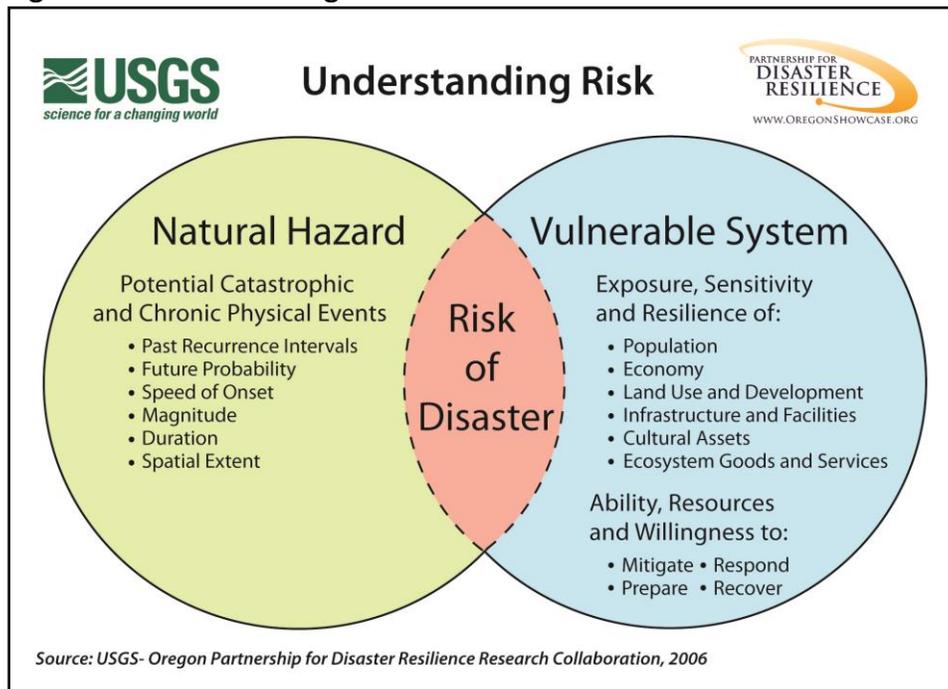
This appendix displays maps of current fire condition classes and historic fire regimes as compiled by the Oregon Department of Forestry (ODF) in 2017. It also displays maps from the 2018 Oregon Department of Geologic and Mineral Industries (DOGAMI) Risk Report. These maps display building distribution, population density, liquefaction, landslide susceptibility, and wildfire risk. This section concludes with maps of two County Environmental Protection Districts – EPD 1 Flood Hazard Overlay and EPD 2 Geologic Hazard Overlay. The Community Profile also uses maps to graphically represent a selection of County demographic information.

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 impact the jurisdiction. Included in the hazard assessment is an evaluation of potential hazard impacts – the type, location, and extent of all 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, will be used as the local level rationale for the risk reduction actions identified in Section 3 Mitigation Strategy. The risk assessment process is graphically depicted in Figure 2.1 below. Ultimately, the goal of hazard mitigation is to reduce the area, which is called Risk of Disaster, where hazards and vulnerable systems overlap.

Figure 2.1 Understanding Risk



Source: OPDR, Wasco County NHMP, August 2012

Hazard Identification

Wasco County is regularly impacted by several natural hazards due to its geography, climate, and topography. These hazards include flood, wildfire, severe weather, and to a slightly lesser extent drought. 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 is listed below in Table 2.1. This table differs slightly from the 2012 plan. The Steering Committee decided that since only one tornado has been witnessed in Wasco County, with no recorded damage, that “tornado” should not be a separate hazard category. Instead, it was moved into the Severe Weather category, which was renamed from Severe Local Storm to reflect its broader scope.

Table 2.1: Wasco County Hazard Overview

Hazard	General location
Severe Weather	Countywide. Now, includes tornado. Other hazards in this in this category include ice storm, snow storm or blizzard, and windstorm.
Drought	Countywide
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.
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.
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 Hood, but also would be impacted by Mt Adams or Mt St Helens 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 October 2017

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 two additional reports that relate to the Wasco County 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 8/3/18) 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 2.1 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> and the OCCRI Future Projections Report can be found on the left hand column under Additional Resources on our NHMP webpage at https://co.wasco.or.us/departments/planning/long_range/natural_hazards_mitigation_plan.php.

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.

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, 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 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 represented by low summer soil moisture and low summer runoff are projected to become more frequent in Hood River (Figure 2), Wasco, and Wheeler Counties, but may become less frequent in the other five counties by the 2050s compared to the historical baseline.”

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.

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 and power lines. This can cause power outages and can obstruct transportation routes. For example, repeated ice storms in the winter of 2016-2017 frequently closed I-84, restricting access to and from the County, impacting both businesses and residents. These storms also resulted in several building collapses throughout the County.

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. 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. 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

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 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.

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 $\frac{1}{4}$ to $\frac{3}{4}$ 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.

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 individuals (farm owners), on the 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. As growth places more pressure on limited local resources, and the climate changes, future impacts may be greater.

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

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.

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

Wildfire

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 (debris burning, land clearing, camping, etc.) which are or will be taking place. Table 2.2 demonstrates a breakdown of how many human and lightning cause fires occurred in nearby state and federal fire districts (this table includes some areas west of Wasco County as well), as reported by different agencies. The clear trend noted from these tables is that 70-90% of all fires locally are started by humans.

Table 2.2: Wasco County Wildfire Occurrence Overview

Year	Agency	Lightning	Human	Total	Lightning %	Human %
2013	ODF	7	13	20	35	65
2014	ODF	5	22	27	19	81
2015	ODF	4	17	21	19	81
2016	ODF	1	21	22	5	95
2017	ODF	0	15	15	0	100
Average					15	85

Year	Agency	Lightning	Human	Total	Lightning %	Human %
2013	FS - Mt Hood	27	50	77	35	65
2014	FS - Mt Hood	81	46	127	64	36
2015	FS - Mt Hood	14	82	96	15	85
2016	FS - Mt Hood	5	55	60	8	92
2017	FS - Mt Hood	8	62	70	11	89
Average					27	73

Year	Agency	Lightning	Human	Total	Lightning %	Human %
2013	FS - CRGNSA	3	22	25	12	88
2014	FS - CRGNSA	2	10	12	17	83
2015	FS - CRGNSA	4	20	24	17	83
2016	FS - CRGNSA	1	15	16	6	94
2017	FS - CRGNSA	0	11	11	0	100
Average					10	90

Source: Kristin Dodd, ODF Unit Forester; Scott MacDonald, USFS Assistant Fire Management Officer

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 forests 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”. Wildland fires can be referred to as brush fires, forest fires, or rangeland fires depending on the location. This document refers to them all inclusively as wildfire.

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 range lands 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 effect can impact the County for years. Table 2.3 below details the two Fire Management Assistance Declarations that have occurred since the previous plan update in 2012. In 2018 there were only six of these declared for the state of Oregon, two of which were in Wasco County.

Table 2.3: Recent FEMA Fire Management Assistance Declarations for Oregon – Wasco County

Declaration Number	Year	Name	Description
FM-5046	2013	Government Flats Complex	11,450 acres, conflagration declared, 4 homes lost, \$15 mil damage
FM-5073	2014	Rowena	3,680 acres, conflagration declared
FM-5255	2018	Substation Fire	78,425 acres, one fatality, conflagration declared, four homes and 48 other structures lost
FM-5265	2018	South Valley Fire	20,026 acres, conflagration declared, three homes and 12 other structures lost

Source: FEMA, Oregon Disaster History, Fire Management Assistance Declarations, as of 9/14/18

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.

Table 2.4: 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

Source: <https://www.oregon.gov/osp/SFM/docs/ConflagrationHistory.pdf>, accessed Sept. 14, 2018

Wasco County was selected as one of eight communities nationwide to participate in the Community Planning Assistance for Wildfire (CPAW) program which works with communities to reduce wildfire risks through improved land use planning. The CPAW team visited the County three times and in December 2018 they presented their Final Recommendations to the County Board of Commissioners. These recommendations, and 69 page report describing the state of wildfire in the County, as well as tips and implementation ideas for these recommendations moving forward can be found on the Wasco County Planning website under Long Range – Community Planning Assistance for Wildfire Program (https://co.wasco.or.us/departments/planning/long_range/community_planning_assistance_for_wildfire_program.php). Their input helped shape several of the NHMP action items found in this document.

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 Strike-Slip)¹. 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 origin²) and B faults (faults of unknown or minor seismicity) that are located in or near the County.

Table 2.5: 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	Hood River County, Oregon	69 km	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

Source: U.S. Geological Survey (USGS), Quaternary Fault and Fold Database (Accessed for 2012 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.

¹ NOAA. <http://oceanexplorer.noaa.gov/facts/plate-boundaries.html>, Accessed February 9, 2018

² Crone and Wheeler (2000)

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.

The most likely widespread and hazardous consequence of a future 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.

Ashfall 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 were clogged³. 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.

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 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.

³ Wasco County Steering Committee discussions, July 25, 2017

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.

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 December 2017, FEMA has approved a total of 33 federal disaster declarations (6 of which are major and are listed in Table 2.6), two emergency declarations, and 61 fire management assistance declarations in Oregon. Five new major disaster declarations and 12 new fire management assistance declarations since this plan's last update in 2012).⁴ 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 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.

⁴ FEMA. Declared Disasters by Year or State. <http://www.fema.gov/> Accessed December 11, 2017

There have only been two Emergency Declarations in Oregon, neither of which was in Wasco County. FEMA has no record of any Fire Suppression Authorizations. Fire Management Assistance Declarations are addressed above in Table 2.3. Table 2.6 summarizes the Major Disasters declared for Wasco County by FEMA since 1953. The table shows that all of the Major Disaster Declarations in Wasco County have been flood or weather related. There have been no major disaster declarations in Wasco County since the 2012 NHMP was created.

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.⁵ (See table 2.3 above for recent FEMA Fire Management Assistance Declarations for Wasco County.)⁶

Table 2.6: FEMA Major Disaster Declarations for Oregon – Wasco County

Declaration Number:	Declaration Date:	Incident(s):	Incident(s) Period:	Individual Assistance:	Public Assistance Categories:
DR-1683	22-Feb-07	Severe Winter Storm and Flooding	14-Dec-06 to 15-Dec-06	None	A, B, C, D, E, F, G
DR-1510	19-Feb-04	Severe Winter Storms	26-Dec-03 to 14-Jan-04	None	A, B, C, D, E, F, G
DR-1099	9-Feb-96	Severe Storms, Flooding	4-Feb-96 to 21-Feb-96	Yes	A, B, C, D, E, F, G
DR-1061	3-Aug-95	Flash Flooding	8-Jul-95 to 9-Jul-95	None	A, B, C, D, E, F, G
DR-413	25-Jan-74	Severe Storms, Snowmelt, Flooding	25-Jan-74	Yes	A, B, C, D, E, F, G
DR-184	24-Dec-64	Heavy Rain, Flooding	24-Dec-64	Yes	A, B, C, D, E, F, G

Source: FEMA, Oregon Disaster History, Major Disaster Declarations

⁵ Discussion, Steering Committee meeting, July 25, 2017

⁶ FEMA, Oregon Disaster History, accessed February 9, 2018

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 impact the community. However, communities can minimize losses from disaster events through deliberate planning and mitigation, as well as by identifying distinct vulnerabilities.⁷

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, members of the public may be on their own for at least three days, and might need to go for several days without utilities, and/or food and water sources. 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 are in vulnerable populations that 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 are 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.

⁷ Source: State of Oregon Emergency Management Plan, NHMP Region 5: Mid-Columbia, February 2012

NON-ENGLISH SPEAKING AND SPECIAL CULTURAL CHARACTERISTICS

According to 2016 census bureau estimates, approximately 17.4% of the Wasco County population is identified as Hispanic or Latino in origin. 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 also estimates that 15.4% of the Wasco County population over the age of five speaks a language other than English at home.⁸

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 would be uninformed unless they have assistance from friends or service providers who may provide them with instruction and information in English. 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.

ELDERLY

According to 2016 ACS 5-Year estimates, persons 60 and older made up 26.8% of the total Wasco County population. An increase is expected over the next few years, where this group is predicted to make up 27.5% of the County’s population by 2020.

TRANSIENT POPULATION

The transient population includes those who do not have a permanent residence in Wasco County. No formal survey is available but increases in this population have been observed over the last few years.

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 needed 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 would also not have their own supply of food, water, flashlights, radios, and other supplies that locals can use to take care of themselves in a disaster. And finally, visitors or travelers usually do not have a local support structure of family, friends, and neighbors that most of us rely on.

PHYSICALLY DISABLED

According to 2008-2010 census estimates 4,635, or 18.4%, of Wasco County’s non-institutionalized citizens are living with a disability.⁹ 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.

⁸ Source: US Census Bureau, 2012-2016 American Community Survey 5-Year Estimates

⁹ Source: US Census Bureau, 2012-2016 American Community Survey 5-Year Estimates

Table 2.7: Wasco County Disability Characteristics

Disability	Number of People	Percent of Non-institutionalized Population
Disability Status	4,635	18.4%
Hearing difficulty	1,899	7.5%
Vision difficulty	880	3.5%
Cognitive difficulty	1,831	7.8%
Ambulatory difficulty	2,296	9.7%
Self-care difficulty	797	3.4%
Independent living difficulty	1,255	6.5%
Total civilian non-institutionalized population	25,232	

Source: US Census Bureau, 2012-2016 American Community Survey 5-Year Estimates Developmentally Disabled

According to national prevalence formulas, approximately 1% of the Wasco County Population, or 258 residents (as of 2015), have a developmental disability. A “developmental disability” is defined in Oregon (OAR 411-320-0020) 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.

There is a wide variation in the vulnerability of the developmentally disabled population in Wasco County. Some developmentally disabled individuals may have strong support structures and a high level of care provided to them by friends, neighbors, and care providers, though others may not. Some individuals may be largely self-reliant, and some may have additional disabilities in addition to their developmental disabilities. Roughly 10% of the developmentally disabled population is wheelchair bound and approximately 2% of the County population, or 476 residents (as of 2000), suffer from a mental illness.

MENTALLY ILL

Disaster conditions can aggravate the symptoms of those who suffer from mental illness. The mentally ill tend to be very sensitive to changes in their environment. 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 (Source: 2012 NHMP).

LOW INCOME

Not having sufficient financial resources during and after a disaster can be a great disadvantage. Lower income people are more likely to live in mobile homes or other homes

that are less able to resist damage from flooding, windstorms, and severe weather. Low-income people also tend to have the greatest difficulty recovering from a disaster. According to 2016 American Community Survey estimates, approximately 14.5% of the total population in Wasco County has income below the national poverty level.

Economy¹⁰

Wasco County is highly susceptible to economic disturbance from natural hazards, as a great deal of funding for County services, and a substantial amount of the region's income come from agriculture, tourism, and other sensitive industries which can be severely disrupted by drought, flood, wildfire and severe weather, hazards that occur with a high likelihood of probability across the entire County.

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 need to ensure that land use and protection goals are being met to prevent future risks.¹¹

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.¹²

The 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 DOGAMI *Risk Report* (<http://www.oregongeology.org/pubs/index.htm>).

¹⁰ Source: Wasco County NHMP Community Profile, 2017

¹¹ Source: State of Oregon Emergency Management Plan, Region 5: Mid-Columbia Regional Profile, February 2012

¹² Source: Wasco County Comprehensive Land Use Plan

Table 2.8: DOGAMI Countywide Risk Assessment

Selected Countywide Results Total buildings: 18,481 Total estimated building value: \$3.9 billion	
500-year Probabilistic Magnitude 9.0 Earthquake Red-tagged buildings ^a : 819 Yellow-tagged buildings ^b : 413 Loss estimate: \$184 million	100-year Flood Scenario (NOT COMPLETED AT THE TIME OF PUBLICATION)
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, 2018

Environment

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.¹³ 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.” FEMA defines “Critical Infrastructure”¹⁴ 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

¹³ Source: Wasco County NHMP Community Profile, 2017

¹⁴ <https://www.oas.org/dsd/publications/Unit/oea66e/ch07.htm>

impact on security, national economic security, public health or safety, or any combination of those matters”.¹⁵

Due to the fundamental role that infrastructure plays both pre- and post-disaster; it deserves special attention in the context of creating more resilient communities.¹⁶ Specific and general County-wide critical facilities and infrastructure and services are listed in Figure 2.3 below. Additional information about critical facilities and infrastructure can be found in the *DOGAMI Risk Report*.

Figure 2.3: 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

Name	Type
Mid-Columbia Medical Center	Hospital
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

¹⁵ <https://www.fema.gov/pdf/emergency/nrf/nrf-support-cikr.pdf>

¹⁶ Source: State of Oregon Emergency Management Plan, Region 5: Mid-Columbia Regional Profile, February 2012

Dufur High School	School
Dufur PUD station	Utility
Dufur Reservoir	Water supply
Fort Dalles Readiness Center	Civic
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

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 Department	Fire Station
Union Pacific Railroad	Transportation
Wahtonka Campus	School
Wamic Rural Fire Department	Fire Station
Wasco County Emergency Management	EOC
Wasco County Central Dispatch	911 Center & Dispatch
Wasco County Courthouse	Courthouse
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: Wasco County Steering Committee, Disasters and Donuts Open House, Partner Agency Outreach

The 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.

Table 2.9 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 (\$)
<i>(all dollar amounts in thousands)</i>														
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

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. Table 2.10 shows that as of October 2017, there were a total of 101 National Flood Insurance Program (NFIP) policies in force with a total coverage value of nearly \$20 million. There have been a total of 12 NFIP claims including one in Dufur, three in The Dalles, and eight across Wasco County in unincorporated areas.

Table 2.10: NFIP Summary Table, Includes Repetitive and Severe Repetitive Loss

Jurisdiction	Effective FIRM and FIS	Initial FIRM Date	Total Policies	Pre-FIRM Policies	Policies by Building Type				Minus Rated A Zone	Minus Rated V Zone
					Single Family	2 to 4 Family	Other Residential	Non-Residential		
Wasco County	-	-	101	65	76	2	4	19	0	0
Unincorporated	9/24/1984	9/24/1984	68	41	53	1	1	13	0	0
Antelope	NP	NP								
Dufur	9/24/1984	9/24/1984	12	9	10	0	0	2	0	0
Maupin	9/24/1984	9/24/1984	3	0	1	0	0	2	0	0
Mosier	9/24/1984	9/24/1984	1	0	1	0	0	0	0	0
Shaniko	NP	NP							0	0
The Dalles	9/24/1984	9/24/1984	17	15	11	1	3	2	0	0
Jurisdiction	Insurance in Force	Total Paid Claims	Pre-FIRM Claims Paid	Substantial Damage Claims	Total Paid Amount	Repetitive Loss Structures	Severe Repetitive Loss Properties	CRS Class Rating	Last Community Assistance Visit	
Wasco County	\$ 19,643,700	12	10	2	\$ 279,936	0	0	-	-	
Unincorporated	\$11,069,100.00	8	7	2	\$240,950.40	0	0		8/3/2005	
Antelope	\$ -									
Dufur	\$1,686,800	1	0	0	\$ 3,139	0	0		--	
Maupin	1,407,900	0	0	0	\$ -	0	0		4/1/1985	
Mosier				0					--	
Shaniko										
The Dalles	\$5,479,900	3	3	0	\$35,846	0	0		--	

NP - Not Participating, No FIRM
 NA - Information not Available/ Not Applicable

Source: State NFIP Coordinator, Christine Shirley, DCLD, October 2017, FEMA CIS

Table 2.11 (below) highlights that as of February 2011, Wasco County and its incorporated cities have zero repetitive flood loss properties. 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.”¹⁸ 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.

¹⁸ Federal Emergency Management Agency, National Flood Insurance Program, Community Rating System, <http://www.fema.gov/business/nfip/crs.shtm>

Table 2.11: 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: State NFIP Coordinator, Christine Shirley, DCLD, October 2017, FEMA CIS

Hazard and Vulnerability: Definitions

Risk: an expression of the potential magnitude of a disaster’s impact. A natural hazards risk assessment involves characterizing natural hazards, assessing vulnerabilities, and describing risk, either quantitatively, qualitatively, or both.

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

Assessing Vulnerability: inventorying the existing or planned property and populations expose to a hazard, and then estimating how they will be affected by that hazard

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 whole¹⁹.

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

Probability: the likelihood of the hazard occurring and may be defined in terms of general descriptors (for example, unlikely, likely, highly likely), historical frequencies, statistical probabilities (for example: 1% chance of occurrence in any given year), and/or hazard probability maps

Impact: the consequence or effect of the hazard on the community and its assets. Assets are determined by the community and include, for example, people, structures, facilities, systems, capabilities, and/or activities that have value to the community. For example, impacts could be described by referencing historical disaster impacts and/or an estimate of potential future losses (such as percent damage of total exposure)

¹⁹ NHMP info sheet, DLCD, July 2017

Extent: the strength or magnitude of the hazard²⁰

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 2017 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
- Make informed judgments about potential risks.

Wasco County’s Hazard Analysis was last completed on February 15, 2012 with a slightly different methodology. This Hazard Analysis was completed by the NHMP Steering Committee on July 25, 2017 to update that analysis, and reorder the priorities if necessary.

²⁰ FEMA Local Mitigation Plan Review Guide (2011)

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

Table 2.12: Risk Assessment Process

HAZARD	HISTORY		VULNERABILITY		MAX THREAT		PROBABILITY		RISK SCORE
	2 x	WF = 2	5 x	WF = 5	10 x	WF = 10	7 x	WF = 7	
Drought	2 x	6	5 x	10	10 x	10	7 x	7	211
Earthquake	2 x	3	5 x	5	10 x	10	7 x	1	138
Flood	2 x	2	5 x	5	10 x	8	7 x	5	144
Wildfire	2 x	10	5 x	5	10 x	4	7 x	10	155
Landslide	2 x	3	5 x	1	10 x	4	7 x	1	58
Severe Weather	2 x	9	5 x	9	10 x	10	7 x	10	233
Volcano	2 x	1	5 x	10	10 x	10	7 x	2	166

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. At the August 31, 2017 Steering Committee meeting the Steering Committee used this assessment to inform their decision on the final ranking of hazards in Wasco County. It was determined there that the initial risk ranking of volcano as number 3 in Wasco County was too high and it was moved down the list. At the October 30, 2017 public open house, Disasters and Donuts, a dot exercise was conducted for evaluating hazard probability with the public. This exercise demonstrated that there is a high concern in the County for drought and wildfire in particular. Using this feedback, the Steering Committee decided to switch flood and fire, making fire slightly higher, but still leaving both in the “Medium” risk category. This information was taken into account in the final ranking of hazard risk (Table 2.13, Revised Risk Ranking).

Table 2.13: Revised Risk Ranking

Hazard	Initial Risk Score	Initial Risk Ranking	Revised Risk Ranking	Risk Level
Severe Weather	233	1	1	High
Drought	211	2	2	High
Wildfire	155	5	3	Medium
Flood	144	4	4	Medium
Earthquake	138	6	5	Medium
Volcano	166	3	6	Low
Landslide	58	7	7	Low

Source: NHMP Steering Committee Meetings, August 31, 2017 and November 14, 2017

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.” For this update, the Wasco County NHMP Steering Committee reviewed and reaffirmed the original NHMP mission at its August 31, 2017 meeting.

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.

Goal Review During Current NHMP Update Process

The 2017 Wasco County NHMP Steering Committee reviewed the plan goals during its August 31, 2017 meeting. It was determined that two of the goals, Disaster Resilient Economy and Acknowledge Responsibility, though important, were already captured within the other five goals and should be eliminated as stand-alone goals. The statements associated with those goals were reapportioned to more appropriate existing goals. These 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. These goals are listed in Table 3.1 and displayed in Figure 3.1.

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	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.
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.
	Provide support for agricultural and forest industries to help them prepare for hazardous events.

Source: Wasco County NHMP Steering Committee, August 31, 2017

Figure 3.1 Wasco County NHMP Goals



Source: Tricia Sears, DLCD, personal communication, October 10, 2017

Existing 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 lists 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 2007 – 2012 and 2012-2017.

The 2007 plan identified a broad range of 48 action items that the jurisdictions could take to mitigate the impact of natural hazards. The six that were fully completed by 2012 are listed in Table 3.2. 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 3.3 identifies action items that had concrete outcomes and provides a summary update of what mitigation actions Wasco County has accomplished since the 2012 plan.

Table 3.2: Wasco County Mitigation Activities, 2007-2012

Hazard	Program, Project, or Effort
Multi-Hazard (MH)	Developed Post-Disaster Recovery Plan as a Component of Update to the Wasco County Emergency Operations Plan
Multi-Hazard (MH)	Created Interoperable County-wide Emergency Communication System with Increased Radio Coverage
Flood Hazard (FH)	Updated County Flood Ordinances in 2008/2009
Severe Storm Hazard (SH)	Installed Emergency Power Generators to Several Critical Facilities
Wildfire Hazard (WH)	Cleaned Up Brownsfield Bark Piles in Maupin
Wildfire Hazard (WH)	Formed Tygh Valley and Wamic Fire Districts, Bringing more Unincorporated Lands Under Some Form of Wildfire Protection Coverage

Source: Wasco County NHMP Mitigation Strategy Steering Committee Meeting, May 23, 2012

Table 3.3: Wasco County Mitigation Activities, 2012-2017

Action Item	Title	Accomplishment
MH #5	Update County Comprehensive Plan	Comprehensive Plan update process (Wasco 2040) began in 2016 and is projected to be complete by 2020
FH #6	Removal of Passage Barriers along Fifteen Mile Subbasin	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 this AI on March 28, 2017

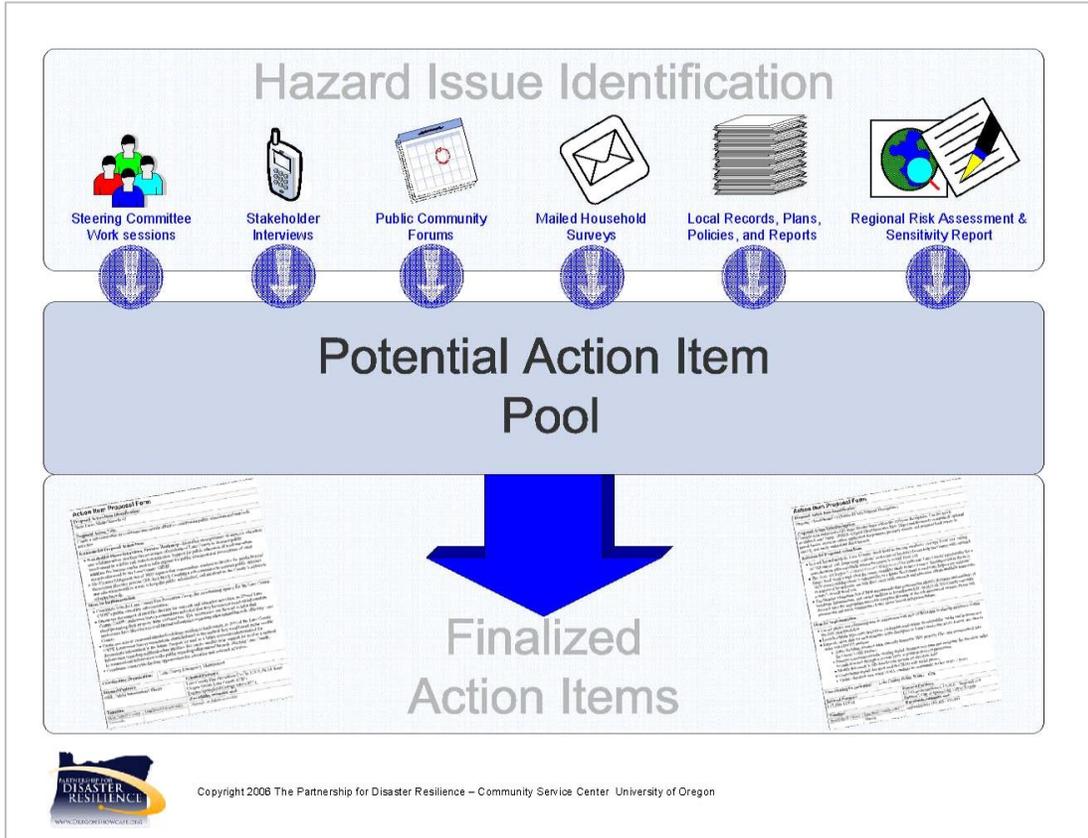
Source: Wasco County NHMP Steering Committee Meeting, November 14, 2017

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 could engage in to reduce risk. They address both

multi-hazard (MH) and hazard-specific issues. Action items can be developed through a number of sources. The figure below illustrates some of these sources. A description of how the plan’s mitigation actions were developed is provided below.

Figure 3.1 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 2017-2018 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 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.

Many 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 is in the process of updating their Comprehensive Plan and results from this NHMP will be linked to the Goal #7 portion of that document. Additionally, the Community Wildfire Protection Plan (CWPP) will be reviewed beginning at the end of 2018 and information gleaned from the NHMP update process will be incorporated into that effort. Likewise, any input relevant to the NHMP gathered in the outreach processes of those plan updates – the Comprehensive Plan and the CWPP - will be included in future 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.

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.

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

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):

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. The actions taken by the 2011/2012 Wasco County NHMP Steering Committee during their review of the plan’s action items, along with justifications for these decisions, can be found in Appendix B: Planning and Public Process.

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.

Committee members had been individually brainstorming and gathering new suggestions for important actions that the County could take to mitigate natural hazard risk and vulnerability over the next five years. At the November 14, 2017 Steering Committee meeting these suggestions were examined and discussed, resulting in 5 new action items to pursue over the coming years. Several deferred action items were combined or modified, and in some cases removed, resulting in a total of 11 multi-hazard, two severe weather, two drought, three wildfire, four flood, two earthquake, one volcano, and two landslide specific Action Items for a total of 27 Action Items. Of these 27 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 3.4: Wasco County 2017 Action Item Matrix

Action Item	Action Title	Coordinating Organization	Timeline	Status
LT = Long Term, ST = Short Term D = Deferred, I = Institutionalized, IP = In Progress, M = Modified, N = New				
MULTI-HAZARD				
MH 1	Pursue regional funding for mitigation actions and coordination of efforts	MCCED, CERT	LT	I
MH 2	Develop Public Outreach / Educational Programs for all Hazards	Emergency Management	ST,LT	I
MH 3	Annual Review and Update of the County Emergency Operations Plan , Regular Updates of other relevant plans such as Community Wildfire Protection Plan, and Natural Hazards Mitigation Plan; Re-Adoption is required on a regular basis	NHMP SC	ST,LT	I
MH 4	Create Systems to Support and Maintain at-risk Populations	Emergency Management	ST	D/M
MH 5	Update County Comprehensive Plan	Planning	LT	IP
MH 6	Create Emergency Disaster Fund	BOC	LT	D/M
MH 7	Develop Small Business Awareness & Continuity Planning Campaign	Emergency Management, BOC	LT	D/M
MH 8	Maintain & Develop Partnership Programs to Reduce Vulnerability of Public Infrastructure/Facilities from hazard risks	Emergency Management	LT	I
MH 9	Pursue Agency Staff Training	NHMP SC	ST	N
MH 10	Fortify County Communication Networks	WCSO	ST	N
MH 11	Update or Acquire Relevant Hazard Maps	Planning	ST, LT	N/I

SEVERE WEATHER				
SH1	Encourage Operators of Critical Facilities to Secure Emergency Power	Emergency Management	ST	D/M
SH2	Support/Encourage Electrical Utilities to Use Underground Construction Methods	Planning	ST	D/M
DROUGHT				
DH 1	Ensure Long-range Water Resources Development and Quality	Planning	ST, LT	I
DH 2	Support Local Agencies Training on Water Conservation Measures and Drought Management Practices	SWCD	LT	D/M
WILDFIRE				
WH 1	Assessment of Non-County Roads for Response to Wildfire Hazards	Wasco County Public Works	ST	D/M
WH 2	Accomplish Defensible Space Around Structures	Rural Fire Districts, Planning	ST	I
WH 3	Treat Hazard Fuels in the Wildland Urban Interface Including in The Dalles Municipal Watershed	Rural Fire Districts, The Dalles Public Works	ST	I
WH 4	Explore ways to increase Fire District coverage throughout the County	Emergency Management	LT	N
WH 5	Establish a Wildfire Coordinator or local Natural Hazard Planner position	Planning, Emergency Management	ST	N
FLOOD				
FH 1	Mitigate Flood Event Resulting from Naturally Induced Dam Failure	SWCD	ST	D/M
FH 2	Protect Against Loss from Flooding	Planning	ST, LT	I
FH 3	Removal of Fish Passage Barriers	SWCD	LT	IP
FH 4	Determine financial assets (structures, property value, etc.) at risk of damage or loss from flooding	Planning	LT	N

EARTHQUAKE				
EH 1	Rehabilitate Identified Vulnerable Schools, Emergency Facilities, Bridges and Public Buildings/Lifelines; Upgrade Critical Infrastructure and Facilities	Facility Managers, Emergency Management	LT	D/M
EH 2	Improve Knowledge of Earthquake Sources	Emergency Management	LT	D/M
VOLCANO				
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	Emergency Management	ST	N
LANDSLIDE				
LH 1	Update County Landslide Ordinance	Planning	LT	D/M
LH 2	Improve Understanding of Landslide Risk Inside Hazard Areas and Improve Warning Systems	GIS	LT	D/M

Source: 2017-2018 NHMP, Appendix A: Action Items

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 Department 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 Department 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

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;

Lane Magill, Sheriff
Vacant, Emergency Manager
Wasco County Emergency Management
511 Washington St., Suite 102
The Dalles, OR 97058
V: (541) 506-2790
E: lanem@co.wasco.or.us

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.

Will Smith, Senior Planner
Wasco County Planning Department
2705 East 2nd Street
The Dalles, OR 97058
V: (541) 506-2560
E: wills@co.wasco.or.us

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;
- 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
Will Smith	Senior Planner	Wasco County
Juston Huffman	Emergency Manager	Wasco County
Robert Palmer	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
Cindy Miller	Executive Assistant	North Wasco County School District #21
Kristin Dodd	Unit Forester	Oregon Department of Forestry
Dave Anderson	Public Works Director	The Dalles City
Steve Kramer	County Commissioner	Wasco County
Tyler Stone	Administrative Officer	Wasco County
Tycho Granville	GIS Coordinator	Wasco County
Angie Brewer	Planning Director	Wasco County
Kelly Howsley-Glover	Long Range Planner	Wasco County
Arthur Smith	Public Works Director	Wasco County
Tricia Sears	Natural Hazards Planner	Department of Land Conservation and Development

Source: Wasco County NHMP SC meetings

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 NHMP was updated with the assistance of Natural Hazard Planners from the Department of Land Conservation and Development (DLCD). DLCD staff will continue to assist Wasco County with maintenance and implementation efforts after it FEMA approval. 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;
- 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:

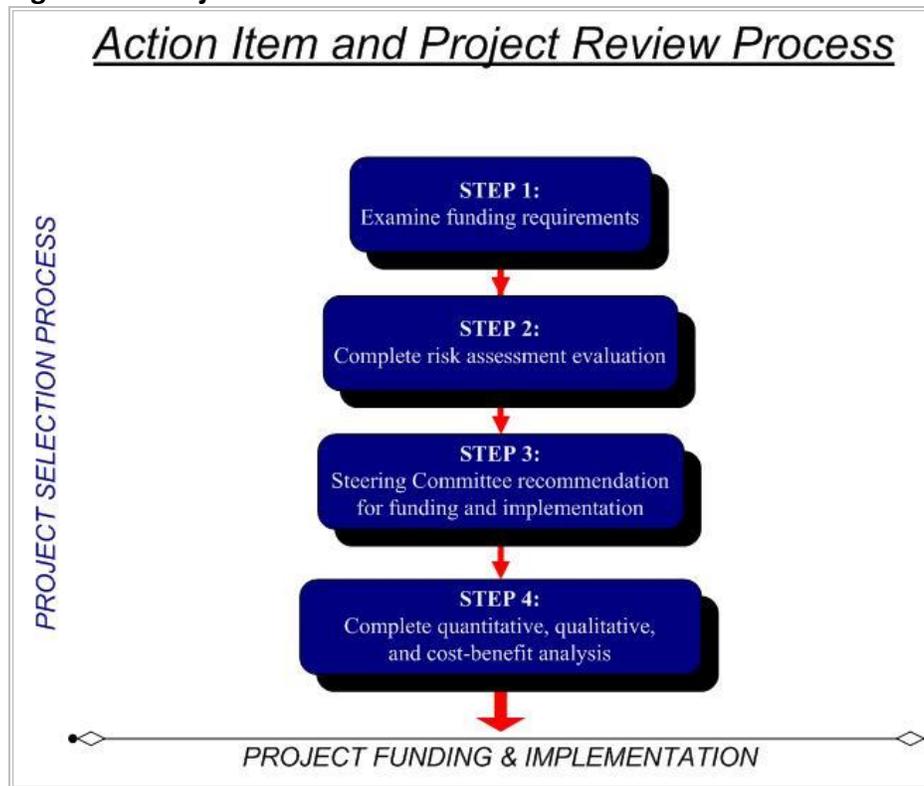
- Review existing and new risk assessment data;
- Discuss methods for continued public involvement; and
- Document successes and lessons learned during the year.

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



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.

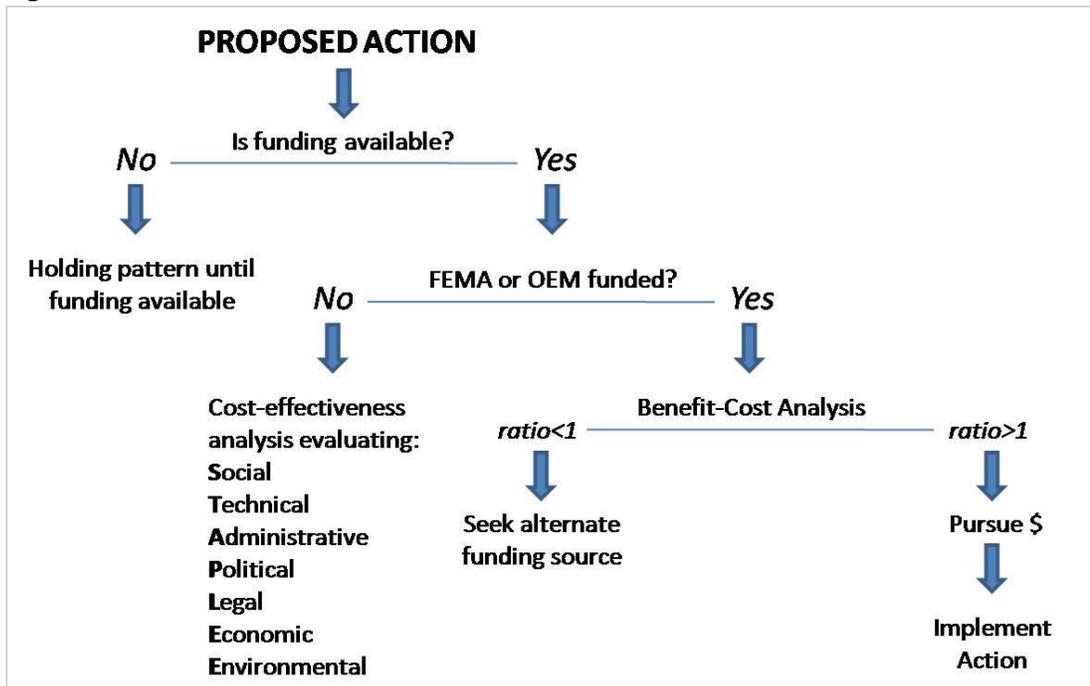
STEP 3: COMMITTEE RECOMMENDATION

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.

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

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 2023. 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.

Table 4.1: Natural Hazards Mitigation Plan Update Toolkit

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

Source: Oregon Partnership for Disaster Resilience (2010).

Volume II: Hazard Annexes

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 seven previously identified natural hazards, which were ranked with a risk level.

Hazard	Initial Risk Score	Initial Risk Ranking	Revised Risk Ranking	Risk Level
Severe Weather	233	1	1	High
Drought	211	2	2	High
Wildfire	144	5	3	Medium
Flood	155	4	4	Medium
Earthquake	138	6	5	Medium
Volcano	166	3	6	Low
Landslide	58	7	7	Low

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 lessened and appropriate mitigation actions are difficult to establish. Mitigation actions for Wasco County and the City of The Dalles are in Section 3 Mitigation Strategy, Table 3.4.

While reading these Hazard Annexes, note that there are two 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) (draft dated 8/3/18) and
- the *Future Climate Projections Wasco County* report prepared by the Oregon Climate Change Research Institute (OCCRI) in August 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 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.

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 to be 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.

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

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
2001-2003	State drought declaration for 18 counties
2005	State drought declaration for 13 Counties
2014-2016	State drought

Source: (2012 Wasco County NHMP; 2015 Oregon State NHMP; 2017 NHMP Steering Committee; and Burns et al. 2011a).

Hazard Identification

Nearly all areas of the county may be vulnerable to drought.

Vulnerability Analysis

The agriculture industry has been impacted by every drought, especially non-irrigated areas. The negative effects caused by sustained drought have seriously impacted 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**. The entire population of Wasco County is vulnerable to the effects of drought. Transportation and communications infrastructure would be minimally impacted, if at all. As growth places more pressure on limited local resources, future impacts may 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. OARS 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.

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.
- 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-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	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.
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: (2012 Wasco County NHMP; 2015 Oregon State NHMP; 2017 NHMP Steering Committee; and Burns et al. 2011a).

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.

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 2018 probabilistic method earthquake scenario ran by Oregon's Department of Geology and Mineral Industries (DOGAMI), utilized the United States Geological Survey's (USGS) 500-year probabilistic map and the Federal Emergency Management Agency's Hazus-MH model to produce a 9.0 magnitude earthquake in Wasco County.

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 9.0 magnitude earthquake in Wasco County is as follows:

Wasco Countywide DOGAMI 500-year probabilistic M9.0 earthquake results:

- Number of red-tagged buildings: 819
- Number of yellow-tagged buildings: 413
- Loss estimate: \$183,847,000
- Loss ratio: 4.7%
- Non-functioning critical facilities: 4
- Potentially displaced population: 1,297 results indicate the following

The above information is from the Oregon Department of Geology and Mineral Industries (DOGAMI) (2018) publication entitled *Natural Hazard Risk Report for Wasco County, Oregon*. The final version will be on DOGAMI's website. The draft version is currently located here:

https://www.co.wasco.or.us/docs/Natural%20Hazards%20Mitigation%20Plan/Wasco%20County%20Natural%20Hazard%20Risk%20Report_workingDraft%208-27-18.docx.

The results of DOGAMI's earthquake scenario estimates that overall damage in Wasco County would be minor and range from minimal to moderate loss of life and destruction of property. 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 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 9.0 earthquake simulation, DOGAMI upgraded all non-seismic code buildings to "moderate" code level. The simulation estimated that overall building loss would drop from 4.7 percent to 3.4 percent; however, the study also found that the benefits to moderately seismic coded buildings were minimal in landslide and liquefaction areas. The County's three most landslide vulnerable areas are estimated to be Tygh Valley, The Dalles, and Mosier.

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.

- a. Examination, evaluation, and enforcement of effective building and zoning codes.
- b. Geologically hazardous areas should be identified and land use policies adopted to lessen risk.
- c. Public information on what to do before, during, and after an earthquake should be provided to citizens.
- d. Local and state governments should develop and maintain response procedures and keep mitigation programs ongoing.

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-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

HA-3: Significant Historic Flood Events (cont.)

Occurrence	Description
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
March 1932	Winter Storms/Flooding

(* - Federal Disaster Declaration)

Source: (2012 Wasco County NHMP; 2015 Oregon State NHMP; 2017 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.

Vulnerability Analysis

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.

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 insure that these developments are 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 flood water.

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 one, 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: 1,999
- Loss estimate: \$25,831,000
- Loss ratio: 0.9%
- Damaged critical facilities: 5
- Potentially displaced population: 2,115

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.

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.

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.

WILDLAND FIRE

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:

HA-4: Significant Historic Wildland Fire 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

(* - Federal Fire Management Assistance Declaration - <https://www.fema.gov/disasters>)

Source: (2012 Wasco County NHMP; 2015 Oregon State NHMP; 2017 NHMP Steering Committee; and Burns et al. 2011a).

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.

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 2017 Wasco County was selected as one of eight communities nationwide to receive assistance from Community Planning Assistance for Wildfire (CPAW). CPAW works with communities to reduce wildfire risks through improved land use planning. CPAW is a grant-funded program providing communities with professional assistance from foresters, planners, economists and wildfire risk modelers to integrate wildfire mitigation into the development planning process. All services and recommendations are site-specific and come at no cost to the community. The final recommendations are expected in December 2018. For more information see <https://planningforwildfire.org/>.

Recently, DOGAMI 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 appears that the instance of wildfire is increasing through the region. Additionally, the existence of open range lands and large forested areas, increasing population and recreational activities, and the uncertain impact of climate change suggest a **high probability of occurrence**. The destruction of large tracts of forest land would have immediate economic impact to the community through lost jobs, reduced taxes, and increased public support while collateral economic and social effect could impact the County for years, suggesting **moderate vulnerability**. Accordingly, a **moderate risk rating** is assigned.

For more information on 2017 Vegetation Condition Class and Historic Fire Regimes 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. 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.
 8. Some wildland fires are allowed to burn in limited areas as part of forest management.

LANDSLIDE

Hazard Definition

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 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-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
237 total identified landslides in Wasco Co (Source Burns et al. (2011a))	

Source: (2012 Wasco County NHMP; 2015 Oregon State NHMP; 2017 NHMP Steering Committee; and Burns et al. 2011a).

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 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 Chenoweth, 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) (2018) 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 risk to 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.

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.

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 3 day period and again in 1909 more than 14 inches fell over 5 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

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. When this excessively hot weather remains in the area for an extended period of time it is called a heat wave. Multiple heat waves hit Wasco County in the summer of 2018, exposing vulnerable populations to increased risk as well as creating hazardous conditions for wildfire or drought potential.

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 impact 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 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-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 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

HA-6: Significant Historic Severe Weather Events (cont.)	
Occurrence	Description
11/22 - 11/23/1970	Freezing rain, 0.5 inch ice accumulations damaged trees
1/25/1974*	Storms/Flooding/Snow Melt
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
Apr-04	Wind storm, \$1000 damage
Dec-04	Wind storm, \$3,333 damage across Sherman, Wasco, Jefferson Counties
Mar-05	Wind storm, \$2,500 damage across Sherman, Wasco, Jefferson Counties
Jan-07	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, Interstate-84 closed due to snow and ice
Nov-12	Wind storm, \$120,000 damage across Gilliam, Sherman, Morrow, Wasco, Umatilla, Wallowa, Union, Jefferson Counties
Dec-16 - Feb-17	Emergency Declaration requested, multiple highway closures, snow on the ground in The Dalles for 3 months

(* - Federal Disaster Declaration)

Source: (2012 Wasco County NHMP; 2015 Oregon State NHMP; 2017 NHMP Steering Committee; and Burns et al. 2011a).

Hazard Identification

The hazards described above impact communities in similar ways. 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. There is an additional hazard in 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 causes 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. The long-term challenge for severe weather is in debris removal. Hundreds of tons of debris can pile up in residential and commercial areas.

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 powerlines, causing power lines to break.

Snowstorms primarily impact the transportation system and the availability or timing of public safety services. Heavy snow accumulations can also cause roofs to 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.

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 one thing that will do the most 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 done 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 is to quickly and efficiently 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.

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.

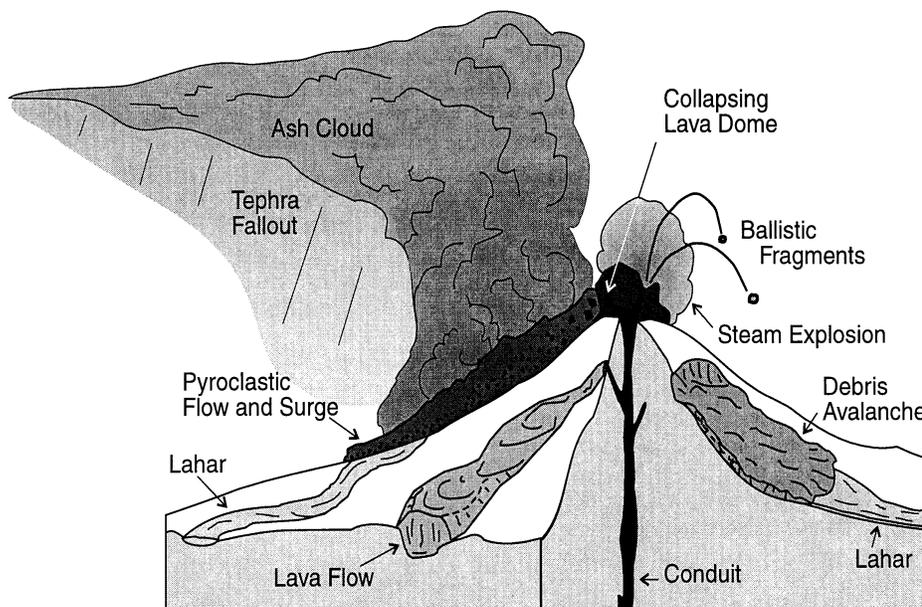


Figure A - Types of volcanic hazards¹

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 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 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: (2012 Wasco County NHMP; 2015 Oregon State NHMP; 2017 NHMP Steering Committee; 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 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 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 River a 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.

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. But 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 powerline 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.

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.

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.

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 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 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.

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.

Volume III: City/Special District Addendum

Table of Contents

- Volume III: 1
- City/Special District Addendum 1
- Table of Contents 2
 - Purpose 4
 - How was the 2019 Plan Update Developed?..... 4
 - How Were the Action Items Developed? 5
- City of The Dalles 2019 Mitigation Action Items..... 5
 - The Dalles Addendum Update 6
 - How Will the Plan be Implemented? 7
 - Implementation through Existing Programs..... 7
 - Continued Public Participation 8
 - Plan Maintenance 8
- The Dalles Community Profile..... 9
 - Geography and Climate 9
 - Population and Demographics..... 10
 - Employment and Economics..... 12
 - Housing 12
 - Land and Development..... 14
 - Transportation and Commuting Patterns..... 14
 - Critical Facilities and Infrastructure..... 14
 - Historic and Cultural Resources..... 15
- Hazard Analysis and Issue Identification 16
 - Initial Work Session Overview 16
 - City Participants 16

Analysis & Identification Process	16
Natural Hazard Risk Level Ranking Table	18
Severe Weather Event	18
Drought	19
Earthquake	19
Flood	21
Wildfire	22
Landslide	24
Volcanic Event.....	26
Goals and Action Items	26
What are the Plan Goals?	26
Existing Mitigation Activities.....	28
Action Items	29
What are the Plan Action Items?	29
Rationale or Key Issues Addressed	29
Coordinating Organization.....	29
Internal Partners	29
External Partners.....	29
Plan Goals Addressed.....	30
Timeline.....	30
City of The Dalles NHMP Mitigation Action Items Matrix	32
City of The Dalles Mitigation Action Items Summary Matrix.....	33
Mitigation Action Items Proposal Forms	42

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 2018. 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 2019 Plan Update Developed?

In 2017, a multijurisdictional group was convened to update the 2017 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 (Dave Anderson) 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 The Dalles received input from a number of staff members to help develop the City's Addendum, including the following:
 - a. Assistant to the City Manager;
 - b. Planning Director;
 - c. Police Chief;
 - d. Water Distribution Manager; and

e. Wastewater Collection 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 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 information was included in the rationale of the appropriate action item as well as in the County's Risk Assessment.
5. City staff updated the City Addendum.
6. The City sent the draft addendum and attachments to the working group to review and provide comment. The County assisted the City 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 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.

City of The Dalles 2019 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 Special Needs Populations Disaster Education/Outreach & Response
- 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
- 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)
- Unbury section of Mill Creek (that is currently underground) between Thompson Park and the Columbia River, where the creek terminates
- Implement E. Scenic Drive Stabilization Project
- Partner with the County to Implement the Community Wildfire Protection Plan (CWPP)
- Forest Management in The Dalles Municipal Watershed

The Dalles Addendum Update

As the Wasco County NHMP update process began to unfold in 2017, plans were made to update the City of Dalles' city addendum on a complimentary timeframe. The Dalles Public Works Director, Dave Anderson, served on the Wasco County NHMP Update Steering Committee, and convened a number of meetings with relevant City staff to update The Dalles' City Addendum. Consulted through the process were the City's Assistant to the City Manager, Matthew Klebes, City Planning Director, Steve Harris, the City of The Dalles Police Chief, Pat Ashmore, City Water Distribution Manager, Ray Johnson, and City Wastewater Collection Manager, Steve Byers. Following those meetings, City Regulatory Compliance Manager Jill Hoyenga revised the City's addendum, with particular focus on the plan's action items.

The current version of the Addendum reflects changes decided upon during the 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 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. The City's staff will re-convene 2 ½ years after re-adoption of The Dalles 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 Public Works Department 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 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 six planning documents that directly relate to natural hazard mitigation:

- The Dalles Comprehensive Land Use Plan, last revised in May 23, 2011, 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 July 2012, outlines which permits are required to develop in areas deemed to have unstable land.

- City of The Dalles Geologic Hazards Study, created in March 2011¹.
- The Dalles Scenic Drive Embankment Failure Report, created in August 2011².
- Steel Tank Seismic Evaluation, created in December 2014³.

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 the City's annual Northwest Cherry Festival. 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?

¹ Mark Yinger, R.G. (2011) *City of the Dalles Geologic Hazards Study*. Sister, OR: Mark Yinger Associates

² Shannon & Wilson, Inc. (2011). *Scenic Drive Embankment Failure The Dalles, OR*. Lake Oswego, OR: Shannon & Wilson, Inc.

³ Berg, P.A. (2014). *Steel Tank Seismic Evaluation*. Corvallis, OR: CH2M HILL

- 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.

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 400⁴ 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

⁴ Fujitani Hilts & Associates. (1991). *Landslide Hazard Study South Slope Area The Dalles, Oregon*. Portland, OR: Fujitani Hilts & Associates.

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 and 85 degrees. During the winter, the temperature ranges from an average low of 30^o F and high of 44^o 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 1.1: 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
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.⁵ 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-

⁵ City of Dalles Oregon (2018) website, accessed 2/21/2018

Columbia area shipping agricultural crops and wood products. The Dalles provides easy access to recreational opportunities, cultural and historical sites.⁶

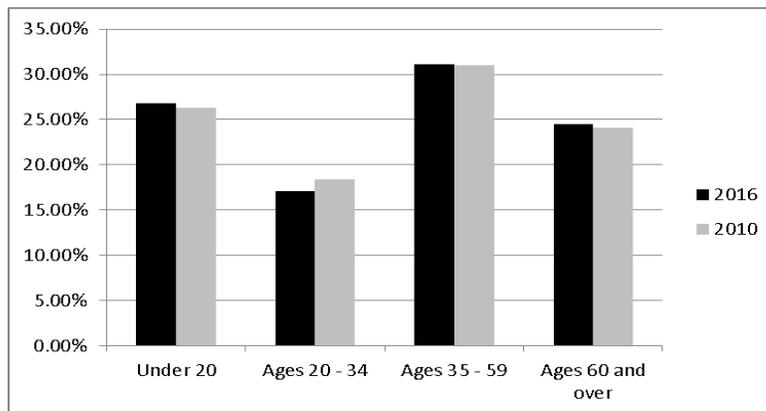
The estimated population of The Dalles, according to the US Census 2016 American Community Survey was 15,276. There are 6,317 total housing units in the City, and 6,029 housing units are occupied. The average household size is 2.44. The highest proportion of people in the City is those aged 35 - 59 (31%), followed by people under age 20 (27%). The median age of The Dalles citizens continues to slowly increase. The median age in 2016 was 40 years old, compared to 39.7 years old in 2010. Tables 1.2 and 1.3 illustrate population and demographics of The Dalles.

Table 1.2: Total Population, The Dalles, Wasco County, Oregon, 2016

Jurisdiction	Population (2016)	Population (2010)	Population (2000)	Population Change (2000 - 2016)	Percent Change (2000 - 2016)	Average Annual Growth Rate
The Dalles	15,276	13,620	12,156	3,120	26%	1.6%
Wasco County	25,657	25,213	23,791	1,866	8%	0.5%
Oregon	3,982,267	3,821,074	3,421,399	560,868	16%	1.0%

Source: U.S. Census Bureau, 2000 Census, 2010 Census; 2016 American Community Survey 5-Year Estimate

Figure 1.3: The Dalles Population Distribution by Age, 2016



Source: U.S. Census Bureau, 2010 Census; 2016 American Community Survey 5-Year Estimate

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.

In 2016, the City of The Dalles had a vast majority (89.7%) of people who self-identify as white, while 17.7% of the City’s population identifies as either Hispanic or Latino. According to the 2016 American Community Survey, 15.3% of residents speak a language other than English.

⁶ Historic The Dalles website, Wasco County Pioneer Association, accessed 2/21/2018

Of the total population of the City, 7.7% of households are estimated to have had an income below the Federal poverty level in 2016.⁷

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 area is known as the sweet cherry capital of the world – having cherry orchards that produce over \$30 million dollars annually. Tourism and recreation are primary industry sectors by virtue of the number of jobs it provides and due to the City’s location along the Columbia River Gorge.⁸ Table 1.4 shows the range of industry in The Dalles.

Table 1.4: Industries, The Dalles, 2016

Industry	Percent of Employment
Educational services, and health care and social assistance	27.20%
Retail trade	16.00%
Arts, entertainment, and recreation, and accommodation and food services	9.50%
Professional, scientific, and management, and administrative and waste management services	8.90%
Manufacturing	6.80%
Construction	5.70%
Agriculture, forestry, fishing and hunting, and mining	5.20%
Wholesale trade	3.80%
Finance and insurance, and real estate and rental and leasing	3.70%
Other services, except public administration	3.70%
Public administration	3.70%
Transportation and warehousing, and utilities	3.40%
Information	2.40%

Source: US Census, 2012-2016 American Community Survey 5-Year Estimates

The household median income is not rising faster than the rate of inflation. In 2016, the median household income was \$45,856. The median household income was \$42,317 in 2010 (\$47,149 in 2016 dollars). The median household income per capita in 2005 was \$34,430 (\$43,589 in 2016 dollars⁹).

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.

⁷ US Census Bureau, 2016 American Community Survey 5-year Estimates S0802

⁸ 2017-2022 Columbia Gorge Economic Development Strategy, Mid-Columbia Economic Development District

⁹ U.S. Bureau of Labor Statistics CPI Inflation Calculator accessed 2/1/2018

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 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 6,317 housing units in The Dalles (Table 1.4). Of these housing units there are 3,712 owner occupied homes. The median value of owner occupied housing in 2010 was \$181,200 and in 2016 was \$177,500. Most of the housing units were built in the 1950s and 1970s (Table 1.5) and are heated by electricity (76.3%). Gas is the next most common heating fuel (16.1%) but the percentage of homes heated with gas has decreased since 2010.

Table 1.5: Housing Type Summary, The Dalles, 2012-2016

Housing Type	Number	Percent
1 unit	4,364	69.10%
2 to 9 units	688	10.90%
10 to 19 units	295	4.70%
20 or more units	408	6.50%
Mobile Home	548	8.70%
Boat, RV, Van, etc.	14	0.20%
Total	6,317	

Source: U.S. Census Bureau, American Community Survey, 5 year Estimates, 2012-2016

Table 1.6: Housing Stock by Age, The Dalles, 2016

Year Structure Built	Number	Percent
Built 2014 or later	14	0.20%
Built 2010 to 2013	111	1.80%
Built 2000 to 2009	438	6.90%
Built 1990 to 1999	724	11.50%
Built 1980 to 1989	352	5.60%
Built 1970 to 1979	964	15.30%
Built 1960 to 1969	677	10.70%
Built 1950 to 1959	1,283	20.30%
Built 1940 to 1949	573	9.10%
Built 1939 or earlier	1,181	18.70%
Total housing units	6,317	

Source: U.S. Census, American Community Survey, 5 Year Estimates, 2006-2010; B25034

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). The Dalles has experienced moderate growth over the past three decades, and though there was only a 1.86% change in population in the City between 1980 and 1990 (and negative growth in Wasco County overall during the same period), the City has sustained a moderate 1.6% growth rate over the past twenty five years. Total population in 2016 was 15,276.¹⁰

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.

The majority of the inhabitants in the City commute to work by automobile (78.2% in 2016, down from 88.5% in 2010). 12% 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. Nearly five percent work from home.¹¹

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 The Dalles are listed in Table 1.7.

¹⁰ US Census Bureau, 2000 and 2010, 2016 American Community Survey 5- year Estimate

¹¹ US Census Bureau, 2016 American Community Survey 5-year Estimates

Table 1.7: Critical Infrastructure and Facilities, The Dalles, 2016

Infrastructure/Facility	Number
Airport	1
Civic	6
Communications	2
Dam	2
Electric Utility	2
EOC	1
Fire Station	2
Fuel Station	1
Medical	2
Hospital	1
Police	2
School	6
Water Supply	6
Wastewater	9

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 is located downtown. Trevitt’s Addition Historic District is adjacent to the commercial district, encompassing about 24.5 acres. Trevitt’s Addition is roughly bounded by Liberty Street on the east, West Second Street and the south bank of Mill Creek on the north, the Mill Creek Bridge over 6th Street on the west, and West Third Place and West Fourth Street on the south.¹² The National Register of Historic Places lists many historic buildings and landmarks in The Dalles.

Table 1.8: Registered Historic Sites, The Dalles 2017

National Registry Status	Number of Properties
Listed Within a National Historic District	153
Listed Individually	15
Both	7

Source: Oregon Historic Sites Database, accessed 2/21/2018

¹² Historic The Dalles website, Wasco County Pioneer Association, accessed 2/21/2018

Hazard Analysis and Issue Identification

Initial Work Session 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. Those action items were included in the updated City's addendum to the Wasco County Natural Hazards Mitigation Plan.

City Participants

The following individuals participated in the meetings:

- Matthew Klebes, Assistant to the City Manager
- Steve Harris, Planning Department
- Pat Ashmore, Police Department
- Dave Anderson, Public Works Department
- Ray Johnson, Public Works Department, Water Distribution
- Steve Byers, Public Works Department, Wastewater Collection.

Analysis & Identification Process

During the meetings, participants reviewed and updated 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 revised the NHMP Hazard Analysis and Issue Identification section. Changes were made where appropriate to reflect changes in perception to the City of The Dalles' risk to natural hazards. Furthermore, since there have been no identified tornados in Wasco County, tornados were removed as a stand-alone hazard and included with Severe Weather. The following is a summary of input from the original City Addendum working group, along with revisions and additions from the 2017 updates.

There are two additional reports that relate to the 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 8/3/18) 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 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 The Dalles, 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 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.

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 The Dalles Revised Risk Level Ranking

Hazard	Wasco Co. Rating	City Rating	Detail
Severe Weather	High	High	Ice storm, snow storm or blizzard, and windstorm, including tornado
Drought	High	High	The Dalles Municipal Watershed is at the greatest risk
Earthquake	Medium	High	Crustal quake events are most likely near The Dalles where identified faults exist
Flood	Medium	High	The Columbia River historically floods annually in The Dalles at Union Street
Wildfire	Medium	Medium	The Dalles wildland urban interface (WUI) zones is at the greatest risk
Landslide	Low	Medium	The Dalles has an identified slide area within the City limits that is actively mitigated
Volcano	Low	Low	The Dalles 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 The Dalles Working Group

Severe Weather Event

The County’s plan adequately addresses the severe storm risks that the City faces, except for winter storms. 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.

One extreme event occurred on June 2, 1998¹³. A thunderstorm moved through The Dalles dumped up to 0.67 inches of rain in 20 minutes. The wind blew trees and tree limbs onto power lines causing power outages to much of the east side of town. Heavy rain caused minor street

¹³ 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

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.

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, WA¹⁴. But there is no recorded instance of a tornado causing damage in The Dalles or Wasco County. Hence, the Wasco County NHMP Steering Committee and The Dalles 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 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.

Drought

The working group determined that the City's risk to drought 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 The Dalles. 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. The Dalles, being a regional hub for shipping and receiving agricultural products, may be particularly impacted by droughts in the region. Additionally, during drought years, Mid-Columbia Fire and Rescue (The Dalles fire prevention and response public service) must draw water from greater distances to fight fires, resulting in slower response times.

Earthquake

The working group determined that the City's risk to earthquake is high, which is higher than the County's risk. There's no past "recent" history of earthquakes in Wasco County or The Dalles.

¹⁴ Source: The Columbian, *Thursday's storm brought tornado to Vancouver neighborhood*, October 13, 2017. Accessed 4/30/2018

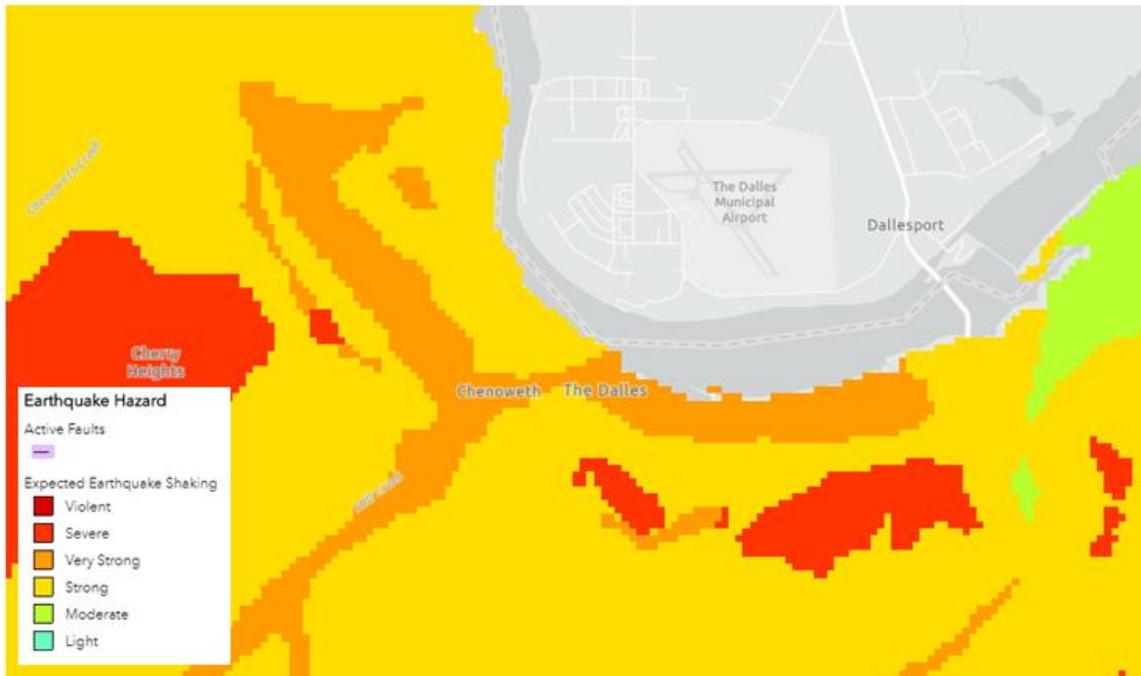
However, the County's NHMP indicated that, "It is difficult to identify a part of the community that is not vulnerable to an earthquake. People, buildings, emergency services, hospitals, transportation lifelines, and water and wastewater utilities are susceptible to the effects of an earthquake." In 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. Although The Dalles 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 four years), the current wooden pipeline may be damaged.

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.¹⁵

¹⁵ Department of Geology and Mineral Industries. 1999. Interpretive Map Series 7 – Relative Earthquake Hazard Maps

Figure 1.1: The Dalles Earthquake Hazard Map



Source: Oregon HazVu: Statewide Geohazards Viewer, Oregon Department of Geology and Mineral Industries, accessed 2/21/2018

Flood

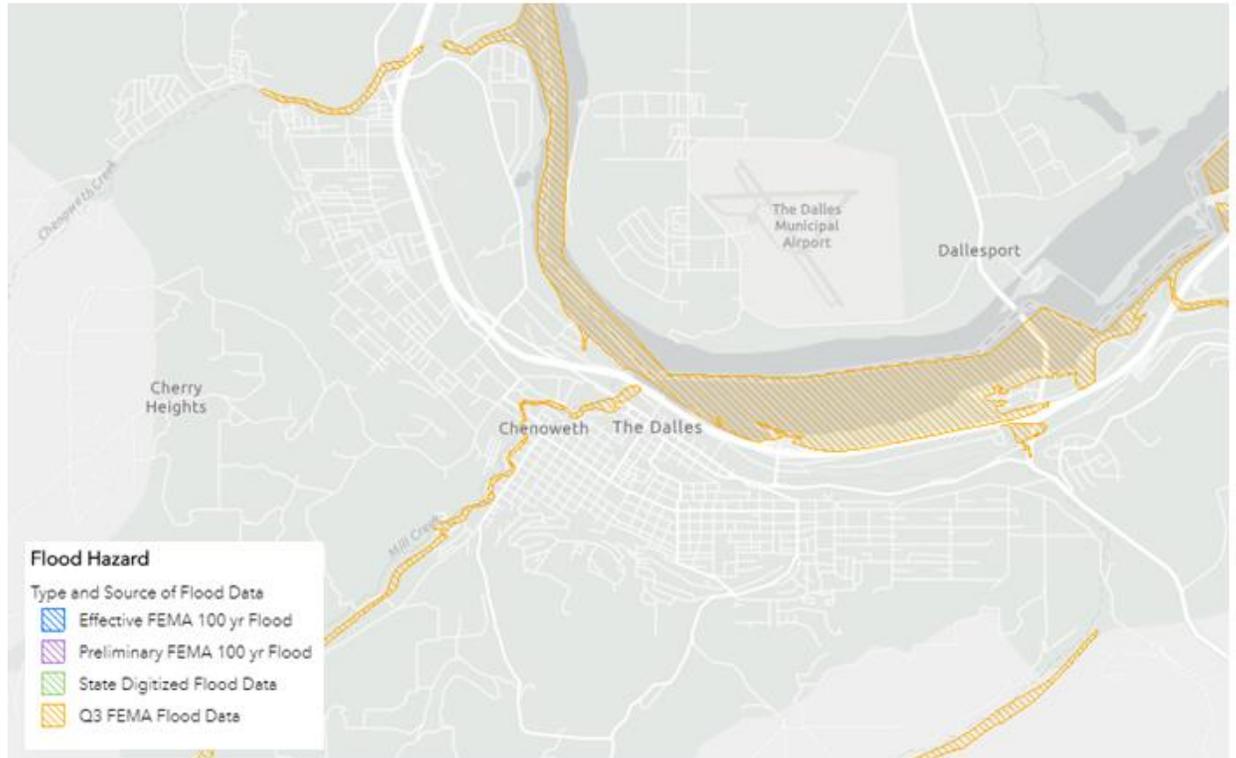
The working group determined that the City's risk to flood is high, which is higher than the County's risk. In addition to information found in the County's NHMP, the working group noted that The Dalles, as an urban center, has a higher density of high value properties. Flooding has the potential to significantly impact economically valuable commercial and industrial properties. The Dalles also has a more 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 1998, tries to mitigate the impact flooding may have on the City. The City is currently considering 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. 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 properties with losses valued at \$35,846. In addition, the City of The Dalles has 23 flood policies in affect valued at \$5,479,900.¹⁶

Figure 1.2: The Dalles Flood Hazard Map



Source: Oregon HazVu: Statewide Geohazards Viewer, Oregon Department of Geology and Mineral Industries, accessed 2/21/2018

Wildfire

The working group determined that the City's risk to wildfire is medium (except for The Dalles Municipal Watershed), 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 The Dalles. The City's greatest risk of fire 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.

- Wasco County is divided into five zones for the purpose of evaluating the threat of wildfire. The Dalles is in Zone 1, which, although small, has very complex wildfire hazards. Additionally, The high risk of fire starts in the Chenowith and Cherry Heights

¹⁶ Source: State NFIP Coordinator, Christine Shirley, DCLD, October 2017, FEMA CIS

areas are mitigated with fast response time from the Mid-Columbia Fire and Rescue and the Oregon Department of Forestry¹⁷.

- The lightning caused Sheldon Ridge wildfire of 2002 near The Dalles burned 12,681 acres and threatened over 250 homes in The Dalles and a major power line. Eight structures were burned. The fire was designated as an OSFM Conflagration Act (CA) incident, a FEMA Fire and the Oregon Department of Forestry Incident Management Team was deployed¹⁸. FEMA disbursements to the State of Oregon totaled \$3,581,723 in public assistance grants and \$59,611 in emergency work funds¹⁹.
- The lightning caused Blackburn Fire, the largest of the Government Flats Complex Fires in 2013, burned 11,775 acres²⁰ 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 years²¹.
- 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 supplies water to the City. The risk of 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 was moderate with a response time of more than 10 minutes.²²

For example, 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.²³ In addition, Columbia Gorge winds create extreme fire behavior in this area (Sheldon Ridge Fire, 2002; Blackburn Fire, 2013; smaller fire in 2017). From Wasco County Community Wildfire Protection Plan: "Apply for a grant to do hazard fuel treatment on City-owned

¹⁷ Hulbert, J.H. (2005). *Wasco County, Oregon Wildfire Protection Plan*. The Dalles, OR: Wasco County

¹⁸ State of Oregon Natural Hazard Mitigation Plan, February 2012, Fire Chapter Appendix F-3: History of Wildfires in Oregon, accessed online 2/21/2018

¹⁹ FEMA Disaster search engine webpage, Oregon Sheldon Ridge Fire (FM-2452), Financial Assistance, accessed 2/21/2018

²⁰ Denson, B. (2013, August 24). Blackburn Fire Has burned through nearly 12,000 acres at The Dalles. Portland, OR: The Oregonian

²¹ Anderson, D. (2018, June22). City of The Dalles Public Works Director. (J.Hoyenga, Interviewer)

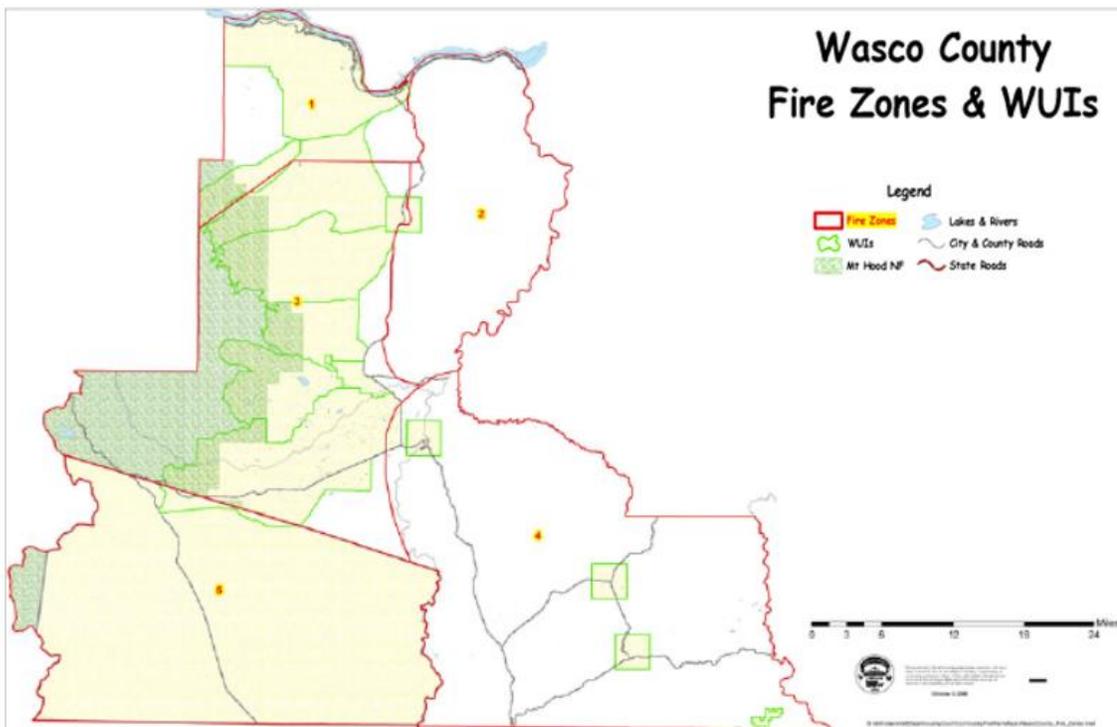
²² Hulbert, J.H. (2005). *Wasco County, Oregon Wildfire Protection Plan*. The Dalles, OR: Wasco County

²³ 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

lands in The Dalles Municipal Watershed. Priority-High." This project ranked 22nd in 2006 for recommended funding (ID# 2006-119)²⁴ The City received the grant and performed the work.²⁵

- The railroad tie plant in The Dalles is a potential source of fire because of the large number of railroad ties onsite presents a large amount of highly combustible fuel for a fire that may encroach upon the area.

Figure 1.3: Wasco County Fire Zones and WUIs



Source: Wasco County GIS, 2011

Landslide

The working group determined that the City's risk to landslide is medium, which is higher than the County's risk. While in general the risk of landslide in The Dalles is moderate, there are areas in the City where the risk is high (See Proposed Action Item Landslide Hazard #1 for more detailed information). 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 values²⁶. Documented landslides in the City, which damaged homes, also likely contributed to decreases in property values. Two very important community businesses, The

²⁴ 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

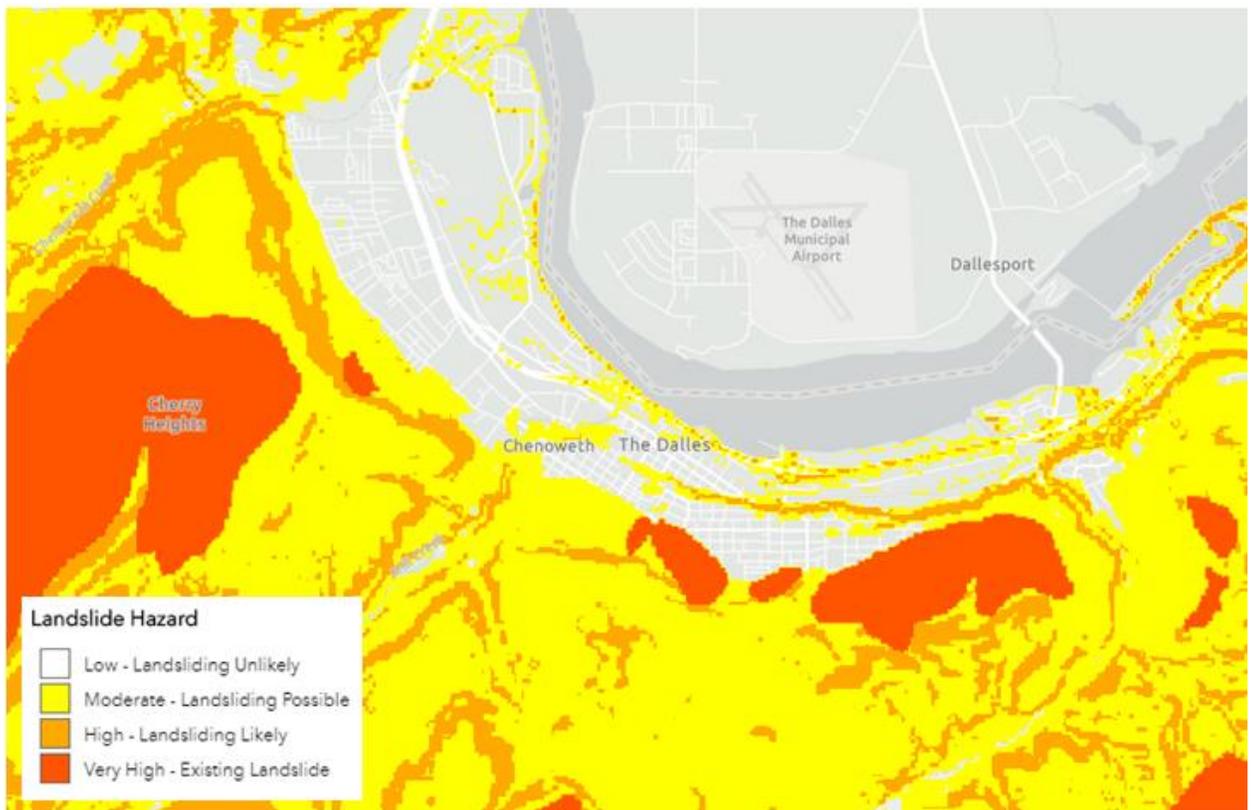
²⁵ City of The Dalles Finance Department. (2012). *Comprehensive Annual Financial Report*. The Dalles, OR: City of The Dalles

²⁶ Fujitani Hilts & Associates. (1991). *Landslide Hazard Study South Slope Area The Dalles, Oregon*. Portland, OR: Fujitani Hilts & Associates.

Columbia Gorge Community College and the Mid-Columbia Medical Center, are located in a portion of The Dalles that is susceptible to landslides.

According to a Department of Geology and Mineral Industries (DOGAMI) study conducted in 1977²⁷, “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. 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 the Mid-Columbia Medical Center, 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.”²⁸

Figure 1.4: The Dalles Landslide Hazard Map



²⁷ 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.

²⁸ Shannon & Wilson, Inc. (2011). *Scenic Drive Embankment Failure The Dalles, OR*. Lake Oswego, OR: Shannon & Wilson, Inc.

Source: Oregon HazVu: Statewide Geohazards Viewer, Oregon Department of Geology and Mineral Industries, accessed 2/21/2018

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 The Dalles. The Dalles 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 The Dalles municipal watershed is also directly at risk.

Figure 1.5: The Dalles Volcanic Event Map



Source: Oregon HazVu: Statewide Geohazards Viewer, Oregon Department of Geology and Mineral Industries, accessed 2/21/2018

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 1.10. 2017 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	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.
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.
	Provide support for agricultural and forest industries to help them prepare for hazardous events.

Source: Wasco County NHMP Steering Committee, August 31, 2017

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 1.10 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. 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.). Table 1.10 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 1.11: City of The Dalles Mitigation Activities, 2012-2017

Action Item	Title	Accomplishment
MH #1	Evaluate and Prioritize Critical Infrastructure for Hazard Resilience	Completed <i>Steel Tank Seismic Evaluation</i> in 2014
		Completed seismic upgrades to the Columbia View Reservoir
		Contracted for seismic upgrades to the Sorosis Reservoir
MH #6	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
MH #7	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.
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.
WH #1	Partner with the County to Implement the Community Wildfire Prevention Plan	A salvage timber sale was conducted in The Dalles Municipal Watershed following the 2013 Government Flats Complex Fire.
LH #1	Seek Implementation Funding for E Scenic Drive Stabilization Project	The design and construction for the E Scenic Drive Stabilization Project Phase 1 was completed using ODOT State Transportation Plan funds.

Source: 2012 NHMP, 2018 The Dalles NHMP Review team meetings

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 12 multi-hazard mitigation actions, 1 drought, 2 earthquake, 5 flood, 1 landslide, 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 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.

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:			
<ul style="list-style-type: none"> Rationale should be based on studies and data analysis, may or may not be associated with a plan 			
Ideas for Implementation:			
<ul style="list-style-type: none"> 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	<input type="checkbox"/> Short Term (0-2 years) <input type="checkbox"/> 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		

City of The Dalles NHMP Mitigation Action Items Matrix

Table 1.12: City of The Dalles 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 Weather	Storm hazards include ice, snow and windstorms; Tornadoes are a violent subset of severe storms caused by the intersection of a strong cross wind with a strong warm updraft.	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.	WH

City of The Dalles Mitigation Action Items Summary Matrix

This page intentionally blank

Table 1.13. 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	Facilitate Partnerships & Coordination	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	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				
MH#3	M	Partner with the County for the Coordination of Special Needs Populations Disaster Education/Outreach & Response	County BOC	City Council, Oregon Department of Health and Human Services, Red Cross, Mid-Columbia Medical Center	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			

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	Facilitate Partnerships & Coordination	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	LT			X		
MH#8	M	Small Business Awareness and Continuity Planning	Chamber of Commerce	Planning, Oregon Continuity Planner Association, Wasco County, 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 (new)	M	Enter Into Supply Contracts and Mutual Aid Agreements	City Council	Public Works, Wasco County Emergency Management, ORWARN, National Guard, Private Sector	ST				X	

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	Facilitate Partnerships & Coordination	Natural Resource Systems Protection
Multi-Hazard (MH)										
MH#11 (new)	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	
MH#12 (new)	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; Mid-Columbia COG (The Link)	LT				X	
Drought Hazard (DH)										
DH#1 (previously MH #6)	H	Develop Long-range Water Resources Plan to Accommodate Current/Project Growth and Mitigate Drought Impact	City Council	Public Works, Fire, Chenoweth Water PUD, Watermaster, DEQ, OHA, OWRD	LT					X

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	Facilitate Partnerships & Coordination	Natural Resource Systems Protection
Earthquake Hazard (FH)										
EH #1	H	Complete Seismic Upgrades Planned for Municipally-owned Potable Water Steel Reservoirs	Public Works			X	X			
EH #2	H	Complete a Seismic Analysis of the City's Water System	Public Works	Oregon Health Authority		X	X			
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		
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, DLCDC, OEM, FEMA	LT	X				X

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	Facilitate Partnerships & Coordination	Natural Resource Systems Protection
Flood Hazard (FH)										
FH#3	M	Update Flood Insurance Rate Maps (FIRMs)	Planning	City Council, Wasco County Emergency Management, DLCDC, OEM, FEMA	ST	X				
FH#4	M	Ensure continued compliance with the National Flood Insurance Program	Planning	City Council, Wasco County Emergency Management, DLCDC, OEM, FEMA		X		X		
FH#5	L	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, DLCDC, FEMA	LT	X				X
Landslide Hazard (LH)										
LH #1	M	Implement E. Scenic Drive Stabilization Project	Public Works	City Council, Engineering Firm, OEM, FEMA	LT	X				

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	Facilitate Partnerships & Coordination	Natural Resource Systems Protection
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	
WH#2 (new)	M	Forest Management in The Dalles Municipal Watershed	Public Works	City Council, Wasco County Emergency Management, Landowners, USFS, Oregon Office of State Fire Marshal	LT	X	X			X

Source: 2018 The Dalles NHMP Review Team meetings

This page intentionally blank

Mitigation Action Items Proposal Forms

This page intentionally blank

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:			
<ul style="list-style-type: none"> • The City’s 2011 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 2011 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 • 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. • During a flooding event in 1996, Mill Creek caused flood damage in the City’s downtown, impacting critical infrastructure. Assessing flood risks to critical infrastructure will assist in identifying potential mitigation strategies that will reduce future flood damages. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • As of 2017 the critical energy dependent and other critical facilities entries 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. • 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. 			
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			<input checked="" type="checkbox"/> Short Term (0-2 years) <input type="checkbox"/> Long Term (2-4+ years)
Form Submitted by:	Dave Anderson		
Action Item Status:	Submitted July 2006 – Revised 2012 – Revised 2018		

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:			
<ul style="list-style-type: none"> • 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:			
<ul style="list-style-type: none"> • 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			<input type="checkbox"/> Short Term (0-2 years) <input checked="" type="checkbox"/> Long Term (2-4+ years)
Form Submitted by:	Public Works		
Action Item Status:	Submitted July 2006 – Revised 2012 – Revised 2018		

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	
Alignment with Existing Plans/Policies:			
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • 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 several special needs 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:			
<ul style="list-style-type: none"> • 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 the following populations: Elderly, Low income, Non-English speakers, Mobile Homes, 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		Oregon Department of Health and Human Services, Red Cross, Mid-Columbia Medical Center	
Potential Funding Sources:		Estimated cost:	Timeline:
			<input checked="" type="checkbox"/> Short Term (0-2 years) <input type="checkbox"/> Long Term (2-4+ years)
Form Submitted by:	Public Works Department		
Action Item Status:	Submitted July 2006 – Revised 2012 – Revised 2018		

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:			
<ul style="list-style-type: none"> • 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:			
<ul style="list-style-type: none"> • 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			<input type="checkbox"/> Short Term (0-2 years) <input checked="" type="checkbox"/> Long Term (2-4+ years)
Form Submitted by:			
Action Item Status:		Submitted July 2006 – Revised 2012 – Reviewed 2018	

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:			
<ul style="list-style-type: none"> • 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:			
<ul style="list-style-type: none"> • 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:
			<input checked="" type="checkbox"/> Short Term (0-2 years) <input type="checkbox"/> Long Term (2-4+ years)
Form Submitted by:	Public Works		
Action Item Status:	Submitted July 2006 – Revised 2012 – Revised 2018		

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:			
<ul style="list-style-type: none"> 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. Critical facilities typically require emergency back-up power to be able to function during and after a disaster. 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. The working group identified the lack of emergency backup power at critical facilities 			
Ideas for Implementation:			
<ul style="list-style-type: none"> 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			<input type="checkbox"/> Short Term (0-2 years) <input checked="" type="checkbox"/> Long Term (2-4+ years)
Form Submitted by:			
Action Item Status:		Submitted July 2006 – Revised 2012 – Revised 2018	

Proposed Action Item:		Alignment with Plan Goals:	
MH#7 - Partner with the County to Implement Education/Outreach/Awareness Activities		Education & Outreach	
Alignment with Existing Plans/Policies:			
Wasco County Natural Hazards Mitigation Plan			
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> 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. 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:			
<ul style="list-style-type: none"> 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		Private Sector, Non-Profit Sector, State & Local Government, OEM, FEMA	
Potential Funding Sources:		Estimated cost:	Timeline:
Planning, Fire, Public Health, Public Works			<input type="checkbox"/> Short Term (0-2 years) <input checked="" type="checkbox"/> Long Term (2-4+ years)
Form Submitted by:			
Action Item Status:		Submitted July 2006 – Revised 2012 – Revised 2018	

Proposed Action Item:		Alignment with Plan Goals:	
MH#8 - Small Business Awareness and Continuity Planning		Education & Outreach	
Alignment with Existing Plans/Policies:			
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • 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 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:			
<ul style="list-style-type: none"> • 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		Oregon Continuity Planner Association, Wasco County, The Dalles Main Street Program	
Potential Funding Sources:		Estimated cost:	Timeline:
			<input type="checkbox"/> Short Term (0-2 years) <input checked="" type="checkbox"/> Long Term (2-4+ years)
Form Submitted by:	Public Works		
Action Item Status:	Submitted July 2006 – Revised 2012 – Revised 2018		

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 & Public Notice COTD Wastewater System Emergency Response Plan & Public Notice			
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • 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:			
<ul style="list-style-type: none"> • 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		Wasco County Emergency Management	
Potential Funding Sources:		Estimated cost:	Timeline:
			<input type="checkbox"/> Short Term (0-2 years) <input checked="" type="checkbox"/> Long Term (2-4+ years)
Form Submitted by:	Public Works		
Action Item Status:	Submitted 2006 – Revised 2018		

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:			
<ul style="list-style-type: none"> • 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:			
<ul style="list-style-type: none"> • 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 of 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:			
<ul style="list-style-type: none"> • 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, National Guard, Private Sector	
Potential Funding Sources:		Estimated cost:	Timeline:
			<input checked="" type="checkbox"/> Short Term (0-2 years) <input type="checkbox"/> Long Term (2-4+ years)
Form Submitted by:		Public Works	
Action Item Status:		Submitted 2018	

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:			
<ul style="list-style-type: none"> • The Dalles Public Works 3-Year ICS Training Cycle Plan • City of the Dalles Continuity of Operations Plan 			
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • 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:			
<ul style="list-style-type: none"> • Conduct initial ICS training for those identified • 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 five 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:
			<input type="checkbox"/> Short Term (0-2 years) <input checked="" type="checkbox"/> Long Term (2-4+ years)
Form Submitted by:	Public Works		
Action Item Status:	Submitted 2018		

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 Snow Response Plan COTD Transportation System Plan			
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> 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:			
<ul style="list-style-type: none"> 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 Council of Governments (The Link)	
Potential Funding Sources:		Estimated cost:	Timeline:
			<input type="checkbox"/> Short Term (0-2 years) <input checked="" type="checkbox"/> Long Term (2-4+ years)
Form Submitted by:	Public Works		
Action Item Status:	Submitted 2018		

Proposed Action Item:		Alignment with Plan Goals:	
DH#1- Develop Long-range Water Resources Plan to Accommodate Current/Project Growth and Mitigate Drought Impact		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:			
<ul style="list-style-type: none"> • 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. • The Fire Department also indicated the need for access to water for fire suppression efforts related to the wildfire hazard, especially along the wildland/urban interface. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Identify funding to complete the study (is this study/plan complete and available?) • Complete the study/plan • Develop a work plan to address infrastructure needs (e.g. aquifer storage and recovery) • Identify and seek project funding • Begin project implementation 			
Coordinating Organization:		City Council	
Internal Partners:		External Partners:	
Public Works, Fire, Chenoweth Water PUD		Watermaster, DEQ, OHA, OWRD	
Potential Funding Sources:		Estimated cost:	Timeline:
State and Federal Grants, City Funds			<input type="checkbox"/> Short Term (0-2 years) <input checked="" type="checkbox"/> Long Term (2-4+ years)
Form Submitted by:			
Action Item Status:		Submitted July 2006 – Revised 2012 – Revised 2018	

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			
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> 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. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> Complete identified in-tank seismic upgrades for Sorosis and Garrison Reservoirs integral with planned reservoir repainting projects. 			
Coordinating Organization:		Public Works	
Internal Partners:		External Partners:	
City Council, Public Works			
Potential Funding Sources:		Estimated cost:	Timeline:
Water utility rate revenues			<input checked="" type="checkbox"/> Short Term (0-2 years) <input type="checkbox"/> Long Term (2-4+ years)
Form Submitted by:		Public Works	
Action Item Status:		Submitted 2018	

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)			
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • Conducting a seismic risk assessment and developing a mitigation plan is required by state regulations for water systems located within certain seismic hazard zones. • 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:			
<ul style="list-style-type: none"> • 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 planned for FY 2019/20. 			
Coordinating Organization:		Public Works	
Internal Partners:		External Partners:	
City Council, Public Works			
Potential Funding Sources:		Estimated cost:	Timeline:
Water utility rate revenues, Water system development charges			<input checked="" type="checkbox"/> Short Term (0-2 years) <input type="checkbox"/> Long Term (2-4+ years)
Form Submitted by:	Public Works		
Action Item Status:	Submitted 2018		

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	
Alignment with Existing Plans/Policies:			
The Dalles Comprehensive Land Use Plan (due for update in 2019)			
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> 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:			
<ul style="list-style-type: none"> 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:		Planning	
Internal Partners:		External Partners:	
City Council, Public Works		Wasco County Emergency Management	
Potential Funding Sources:		Estimated cost:	Timeline:
FEMA, State and Federal Grants			<input checked="" type="checkbox"/> Short Term (0-2 years) <input type="checkbox"/> Long Term (2-4+ years)
Form Submitted by:	Public Works		
Action Item Status:	Submitted July 2007 – Revised 2012 – Revised 2018		

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:			
Blue Zones Project – The Dalles Northern Wasco County Park & Recreation District Master Plan The Dalles Comprehensive Land Use Plan (due for update 2019) Urban Renewal Plan Section 600.9. Mill Creek Greenway Property Development			
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> 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:			
<ul style="list-style-type: none"> Identify potential opportunities to acquire lands in the floodplain for use as parks, trail, or open space. Align Blue Zones Project pedestrian and bicycle trail building plans with this action item to facilitate a grant writing partnership. 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	
Potential Funding Sources:		Estimated cost:	Timeline:
FEMA, State and Federal Grants/Loans, Urban Renewal Agency, Private Sector			<input type="checkbox"/> Short Term (0-2 years) <input checked="" type="checkbox"/> Long Term (2-4+ years)
Form Submitted by:	Public Works		
Action Item Status:	Submitted July 2007 – Revised 2018		

Proposed Action Item:		Alignment with Plan Goals:	
FH#3 - Update Flood Insurance Rate Maps (FIRMs)		Protection of Life & Property	
Alignment with Existing Plans/Policies:			
The Dalles Comprehensive Land Use Plan (due for update 2019)			
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> 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:			
<ul style="list-style-type: none"> 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			<input checked="" type="checkbox"/> Short Term (0-2 years) <input type="checkbox"/> Long Term (2-4+ years)
Form Submitted by:		Public Works	
Action Item Status:		Submitted July 2007 – Revised 2012 – Revised 2018	

Proposed Action Item:		Alignment with Plan Goals:	
FH#4 - Ensure continued compliance with the National Flood Insurance Program		Protection of Life & Property Education & Outreach	
Alignment with Existing Plans/Policies:			
The Dalles Comprehensive Land Use Plan (due for update 2019)			
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • 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:			
<ul style="list-style-type: none"> • Partner with Wasco County on continuing compliance activities. • Explore opportunities to update floodplain ordinances based on new hazard knowledge provided by new FIRM. • 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:
			<input type="checkbox"/> Short Term (0-2 years) <input checked="" type="checkbox"/> Long Term (2-4+ years)
Form Submitted by:		Public Works	
Action Item Status:		Submitted July 2007 – Revised 2018	

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 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:			
<ul style="list-style-type: none"> • 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 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Get the project listed on Capital Improvement Plans for the Oregon Department of Transportation and Union Pacific Railroad • Work to include NHMP action items in the 2018 Northern Wasco County Park & Recreation District Master Plan • Explore funding opportunities. 			
Coordinating Organization:		Public Works	
Internal Partners:		External Partners:	
City Council, Planning		ODOT, Union Pacific, OEM, DLCD, FEMA	
Potential Funding Sources:		Estimated cost:	Timeline:
FEMA, State and Federal Grants/Loans, City Funds			<input type="checkbox"/> Short Term (0-2 years) <input checked="" type="checkbox"/> Long Term (2-4+ years)
Form Submitted by:	The Dalles Planning Department		
Action Item Status:	Submitted July 2007 – Revised 2012 – Revised January 2018		

Proposed Action Item:		Alignment with Plan Goals:	
LH #1 – Implement E. Scenic Drive Stabilization Project		Protection of Life & Property	
Alignment with Existing Plans/Policies:			
The Dalles Scenic Drive Embankment Failure Report (2011) City of The Dalles Geologic Hazards Study (2011)			
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • 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 City has identified the potential for catastrophic failure of portions of E. Scenic Drive that pose a risk to life, property, and City infrastructure. • Phase I of this action item was completed during the previous planning period. More work needs to be done to complete the stabilization project. • Design for Phase II is complete and scheduled to be completed during the next planning period. • Action Item LH#1 will be complete after Phase II constructed. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Evaluate funding opportunities • Write grant application for funding • Issue construction contract for Phase II 			
Coordinating Organization:		Public Works	
Internal Partners:		External Partners:	
City Council		Engineering Firm, OEM, FEMA	
Potential Funding Sources:		Estimated cost:	Timeline:
FEMA, State and Federal Grants/Loans, ODOT STP Funds, City Funds			<input type="checkbox"/> Short Term (0-2 years) <input checked="" type="checkbox"/> Long Term (2-4+ years)
Form Submitted by:	The Dalles Public Works		
Action Item Status:	Submitted 2012 – Revised 2018		

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			
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • 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:			
<ul style="list-style-type: none"> • 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			<input type="checkbox"/> Short Term (0-2 years) <input checked="" type="checkbox"/> Long Term (2-4+ years)
Form Submitted by:			
Action Item Status:		Submitted July 2006 – Revised 2012 – Reviewed January 2018	

Proposed Action Item:		Alignment with Plan Goals:	
WH#2 – Forest Management in The Dalles Municipal Watershed		Protection of Life & Property Emergency Services Enhancement 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:			
<ul style="list-style-type: none"> • 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:			
<ul style="list-style-type: none"> • Seek stable, ongoing funding to reduce the fuel load and manage forestland in The Dalles Municipal watershed. • 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			<input type="checkbox"/> Short Term (0-2 years) <input checked="" type="checkbox"/> Long Term (2-4+ years)
Form Submitted by:	Public Works		
Action Item Status:	Submitted 2018		



CITY OF THE DALLES
Department of Public Works
1215 West First Street
The Dalles, Oregon 97058

MEMORANDUM

DATE: December 14, 2018

TO: Dave Anderson, Public Works Director

FROM: Jill Hoyenga, Regulatory Compliance Manager

SUBJECT: Natural Hazard Mitigation Plan (NHMP) Update

The purpose of this memo is to advise you of my ongoing updates to the Wasco County Natural Hazard Mitigation Plan (NHMP) City Addendum. I am thankful for the opportunity to make this submittal better each time we make updates following County review. In this documentation I am only capturing changes made based on comments and updates made since the October 31, 2018 submittal. In addition to the changes listed, numbering of tables and figures was corrected. Other minor editorial changes were made. This memo is a cover statement for two updated submittals. One file shows track changes. The second file has all changes accepted.

Section: How Were the Action Items Developed? (Page TDA-5)

Change: Dave Anderson updated the text to reflect the working group that updated the NHMP rather than the Oregon Natural Hazards Working Group that that facilitated development of the 2012 NHMP.

Section: Analysis & Identification Process (Page TDA-16)

Change: Dave Anderson updated the text to include a link to the Wasco County posting of the OCCRI Future Projections Report

Section: Earthquake (Page TDA-20)

Change: The County reviewer commented that though the risk of earthquake was listed as high for The Dalles, no mitigation actions were listed. In previous NHMP addenda the earthquake mitigation actions were included in the multi-hazard actions section. Two earthquake hazard mitigation actions have been added in this version of the addendum.

Section: Wildfire (Page TDA-22)

Comment: The County reviewer asked if The Dalles is involved in the Community Planning Assistance for Wildfire. Public Works Department is not aware of City involvement in that effort.

Section: Landslide (Page TDA-24)

Comment: The County reviewer remarked that properties in landslide areas often have high value due to the viewshed. However, according to the 1991 report cited in the addendum, the consultants identified a decrease in property values resulting from active landslide activity which was severely

damaging homes at the time. The landslide has since been stabilized through continual dewatering actions by the City.

New Section: Existing Mitigation Activities (Page TDA-28)

Change: This section is entirely new at the suggestion of the County. A table was added to summarize the City of The Dalles mitigation activities during the previous planning period.

Section: What are the Plan Action Items? (Page TDA-30)

Change: The count of mitigation actions was updated to reflect the addition of two earthquake mitigation actions.

Section: City of The Dalles NHMP Mitigation Action Items Matrix (Page TDA-33 to TDA-41)

Change: The key on the title page was changed to a table with appropriate numbering. The table was updated by adding the two earthquake mitigation actions. Notations were added to make clear which action items were carried over from the previous planning period and which action items were new. The priority designation column was filled out completely. The designations were checked so that they are more aligned with the natural hazard risk level rankings stated on page TDA-18.

Section: Mitigation Action Items Proposal Forms (Pages TDA-47 to TDA-67)

Changes:

- The timeline check box was updated on MH #1 Evaluate and Prioritize Critical Infrastructure for Hazard Resilience (e.g. Seismic Retrofit, Wildfire Protections) Page TDA-45
- The County had a question regarding MH #3 TDA-47 Partner with the County for the Coordination of Special Needs Populations Disaster Education/Outreach & Response. Public Works Department is not aware of City involvement in such an effort. The local State Office of Aging & People with Disabilities may have more information.
- The County had a question regarding MH #4 TDA-48 Identification and Pursuit of Implementation Funding for Mitigation Actions. Public Works Department is not aware of City involvement in a specific plan. However, in practice, opportunities for funding mitigation projects are pursued by the City in the course of normal business.
- At the suggestion of the County reviewer, text was added to MH #5 TDA-49 regarding Emergency Management Performance Grant funding requirements.
- The County had a question regarding MH #7 TDA-51 Partner with the County to Implement Education/Outreach/Awareness Activities. Public Works Department is not aware of City involvement in such an effort. However, updated text suggests a path toward action on this proposal.
- The County had a question regarding policies supporting MH #10 TDA-54 Enter Into Supply Contracts and Mutual Aid Agreements. Two agreements are now listed in the policy section in lieu of plans.
- The County had a question regarding ICS in emergency operations plans supporting MH #11 TDA-55 Ensure Critical Staff Are Identified and Trained in the NIMS-FEMA Compliant Incident Command System (ICS). The City Continuity of Operations Plan is now listed in the plans/policies section.
- Two earthquake hazard mitigation proposed action item form have been inserted at EH #1 TDA-58 Complete Seismic Upgrades Planned for Municipally-owned Potable Water Steel Reservoirs and EH #2 TDA-59 Complete a Seismic Analysis of the City's Water System. EH #1 remains listed in MH #1 as in previous versions of this submittal.

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 yearsⁱ.

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. 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. 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^{ii iii iv}. 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^v. According to Oregon 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.^{vi}

Hazard vulnerability

Antelope is Wasco County's southern and eastern most city. Most of the land in the area is rangeland used for cattle grazing with many dry creek beds, draw, and hollows forming a topographic complex 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.

NHMP Participation

As part of the public outreach effort, the mayor of Antelope was emailed on November 20, 2017 to inquire if they were interested in participating. Response from the city recorder, Tim Richardson, by email on November 20, 2017 indicated that they were not. Per their wishes, Antelope is not included in this multi-jurisdictional Natural Hazards Mitigation Plan.



Figure 1 Oregon Route 2018 entering Antelope from the Northwest. Photo credit: Ian Poellet.

Dufur

Description

Dufur is an agricultural community lying 13 miles south of The Dalles and was incorporated in 1893. It is a community of around 600 people^{vii}. The Population Research Center, in 2016, estimated the population of Dufur to be 211 with a projected increase to 618 by 2035^{viii}. The main crops are wheat, cherries, and grapes^{ix}. Dufur attracts bicyclists and motorcyclists in the tourist season, who come for its expansive wheat fields and orchards. Since 1971, the 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. Dufur counts within its inventory the Dufur Historical Society, in addition to the Scenic Balch Hotel. The Balch was recently restored and operates as a hotel as well as seasonal wedding and event venue^{x xi xii xiii}. According to Oregon DHS office of Forecasting, Research, and Analysis; Dufur was also identified as a poverty hotspot.
^{xiv}

Hazard vulnerability

Dufur is surrounded by wheat fields, with scattered orchards to the east. These farm uses are vulnerable to extended drought. The town water supply comes from 15 Mile Creek out of the Mt Hood

National Forest, which runs through town and has associated FEMA identified floodplains across the southern portion of the city, with fingers reaching to the north along Heisler Street, Williams Street, and Alkin Street. Potential wildfire impacts in the forest to the watershed could negatively affect this water source. The adjacent wheat fields, meadows, and oak woodlands are also highly susceptible to wildfire. As tourist attention increases, emergency medical services will be stretched thin.

NHMP Participation

Dufur’s Mayor Merle Keys attended the Mitigation Open House, Disasters and Donuts, on October 30, 2017. He contributed feedback on what critical facilities and infrastructure exist in his city, which was incorporated into this Natural Hazards Mitigation Plan (for a complete list, see Section 2 – Risk Assessment). On 6/22/18, a series of emails was sent out to city leadership of Dufur, Shaniko, Maupin, and Mosier inquiring if they were interested in taking the next step and adopting the plan as well, increasing the number of cities included in the multi-jurisdictional plan. There was no response to these emails. On 7/12/18, each of them was given a follow up phone call. All of these went to voicemail and messages were left. Merle was included on the 6/22/18 email and the 7/12/18 followup phone calls. During a 7/13/18 conversation, he indicated that Dufur would be interested in adopting the NHMP for their city as well. However during the review process, the Oregon Military Department, Office of Emergency Management (OEM) determined that they did not participate to the necessary level and so were not eligible.



Figure 2 View of Mount Hood from Dufur. Photo credit: US Forest Service.

Maupin

Description

Maupin is Wasco County's second largest city. It lies at the intersection of 197 and the Deschutes River. In 2016, the Population Research Center estimated Maupin's population at 428 with an expected growth to 452 by 2035. River tourism, including fishing and white water rafting, plays a major role here^{xv xvi}. It sees significant increase in the summer months due to tourism from rafters on the Lower Deschutes River as well as hikers, geocachers, rock hounds, birdwatchers, cyclists, and hunters. Community campgrounds fill up with RVs and tents. Boaters camp where they can along the river and many of the homes in town are seasonal vacation homes standing empty for long periods of time in the winter. To serve this large influx of summer tourists, the worker population also increases dramatically in the summer time. In 2015, DHS named Maupin as a poverty hotspot.^{xvii}

Hazard Vulnerability

Often seasonal campers and boaters live in temporary shelters such as RVs or tents in the flood plain throughout the summer. With large summer populations of temporary seasonal workers and tourists, notification of emergencies is challenging, and emergency services are stretched thin. Large, fast moving wildfires are common in the sage, juniper, and grasslands of the surrounding area. In June of 2018, the 100,000 acre Boxcar Fire started near the city and was stopped within city limits before spreading miles to the south. Those grassy hinterlands are also used for ranching and cattle grazing. Any farm use in the region is vulnerable to extended drought. With low precipitation levels, severe winter weather is uncommon, but with steep roads in and out of the river canyon, any snow or ice accumulations on these transportation lines will have a negative impact.

NHMP Participation

Maupin was contacted as part of the Partner Agency mailing list (for the complete list see Appendix B – Public Process). The mayor, Lynn Ewing, intended to attend the Mitigation Open House, Disasters and Donuts, on October 30, 2017 but was unable to. They have not had any feedback for the NHMP Steering Committee throughout this process.



Figure 3 Maupin Bridge. Photo Credit: Wasco County.

Mosier

Description

Mosier lies along the Columbia River, near the western border of Wasco County, just five miles from the City of Hood River. Based on the Population Research Center estimates, the population increased to 456 by 2016, and will increase to 561 by 2035^{xviii}

Mosier is known for its proximity to hiking on the Rowena Plateau amid basalt cliffs, balsamroot flowers, and cherry orchards, as well as cycling through the Mosier Twin Tunnels Trail, wine tasting, and windsurfing^{xix xx}. Mosier has a heavy tourist presence, but is also home to many full time residents working in nearby communities or orchards. There is a senior center on the east side of town.

Hazard Vulnerability

Orchard land to the south is vulnerable to extended drought. In 2016, an oil train derailed in town and sparked a wildfire inside city limits. Other wildfires have come close as well, burning in the pine and oak woodlands and scattered grasslands common in the area. Ice storms along the Columbia River frequently result in I-84 closing from Troutdale to Hood River, negatively impacting businesses and commuters who rely on this transportation line daily. With steep slopes to the south of town, large swaths of Mosier are located in geologic hazard zones. A portion of the northern edge is inside the Columbia River's floodplain, as well as along Mosier creek which bisects the city in a steep ravine.

NHMP Participation

During the NHMP process, Mosier went through a City Manager transition from Kathy Fitzpatrick to Colleen Coleman. Both engaged with the NHMP Steering Committee at different points during the update. They provided the Steering Committee with information about ongoing grant applications resulting from their efforts to recover from the 2016 oil train derailment, as well as a list of critical facilities and infrastructure (for the full list see Section 2 – Risk Assessment).



Figure 4 Mosier Oregon Third Avenue. Photo Credit Ian Poellet.

Shaniko

Description

Shaniko was once the southern terminus of a Union Pacific rail line and known as the “Wool Capital of the World”^{xxi}. As of the 2010 census, it had a population of 36^{xxii}. The Population Research Center estimates the population will stay at 36 for the next fifty years^{xxiii}. Shaniko lies in the south of Wasco County, about 8 miles north of Antelope. Its elevation is 3343 feet from sea level, and Shaniko Plateau’s vegetation consists mainly of sage, juniper, and bunchgrass^{xxiv}. 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^{xxv}. According to DHS in May 2015, Shaniko is a poverty hotspot.^{xxvi}

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 wind storms as strong winds are common across the ridges in this area.

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, 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 interest in rebuilding their fire department as a potential mitigation action item, which was then added to the action item list.



Figure 5 Downtown Shaniko, winter 2017. Photo Credit: Wasco County.

NOTE: All small cities have been kept updated and offered a chance to participate as part of the Partner Agency email list since the beginning of the update process. They have received regular updates on the NHMP Steering Committee’s progress and have consistently had the opportunity to provide feedback.

References:

1. [Two farmer brothers named their new home on the arid plains of Central Oregon after themselves and Dufur was born.](#) *Travel Oregon*. Retrieved 6-1-2018.
2. [Dufur.](#) *The Oregon Encyclopedia*. Retrieved 6-1-2018.
3. [Oregon Ghost Towns: Boyd, Dufur, and Friend.](#) *Travel Oregon*. Retrieved 6-1-2018.
4. [Historic Balch Hotel.](#) *Balch Hotel*. Retrieved 6-1-2018.
5. [Antelope, Oregon: The town we like to call Rajneesh.](#) *Noosphere Geologic Blog*. Retrieved 6-1-2018.
6. [City of Antelope and Muddy Ranch.](#) *Oregon Encyclopedia*. Retrieved 6-1-2018.
7. [United States Census of 2010.](#) Retrieved 6-1-2018.
8. [Oregon's Early Rural Schools Exhibit.](#) *Oregon Blue Book*. Retrieved 6-1-2018.
9. [Top 10 things to do in Dufur.](#) *Balch Hotel*. Retrieved 6-1-2018.
10. [Adventure and Relaxation await you in Sunny Maupin, Oregon.](#) *Maupin Oregon*. Retrieved 6-1-2018.
11. [City of Maupin Visitor Info.](#) *City of Maupin*. Retrieved 6-1-2018.
12. [Road Trip: Mosier.](#) *Travel Oregon*. Retrieved 6-1-2018.
13. [Connecting with the Gorge: Mosier Plateau Trail.](#) *Travel Oregon*. Retrieved 6-1-2018.
14. [Mosier, Oregon, USA.](#) *Mosier Community*. Retrieved 6-1-2018.
15. [This ghost town is home to a secret abandoned car museum.](#) *Roadtrippers*. Retrieved 6-1-2018.
16. [The Shaniko Story.](#) *Shaniko, where the west still lives*. Retrieved 6-1-2018.
17. [Some Antelope Oregon History.](#) *City Of Antelope*. Retrieved 6-1-18.
18. [Young Life Christian Camp.](#) *Washington Family Ranch, a YoungLife Camp*. Retrieved 6-1-18.
19. [Hiking near Maupin.](#) *Maupin, Oregon*. Retrieved 6-1-18.

Figure 1 Oregon Route 218 entering Antelope from the Northwest. Photo credit: Ian Poellet. *Wikimedia Commons*. Retrieved 6-22-2018.

Figure 2 View of Mt Hood from Dufur. Photo credit: U.S. Forest Service- Pacific Northwest Region. Retrieved 6-22-2018.

Figure 3: Maupin Bridge. Photo credit: Wasco County.

Figure 4 View along Third Avenue in Mosier, Oregon. Photo Credit: Ian Poellet. *Wikimedia Commons*. Retrieved 6-22-2018.

Figure 5 Downtown Shaniko, winter 2017. Photo Credit: Wasco County.

-
- ⁱ Coordinated Population Forecast: 2016 through 2066, Wasco County. June 30, 2016. Population Research Center (Portland State University).
- ⁱⁱ [Some Antelope Oregon History](#). *City Of Antelope*. Retrieved 6-1-18.
- ⁱⁱⁱ [Antelope, Oregon: The town we like to call Rajneesh](#). *Noosphere Geologic Blog*. Retrieved 6-1-2018.
- ^{iv} [City of Antelope and Muddy Ranch](#). *Oregon Encyclopedia*. Retrieved 6-1-2018.
- ^v [Young Life Christian Camp](#). *Washington Family Ranch, a YoungLife Camp*. Retrieved 6-1-18.
- ^{vi} High Poverty Hotspots- Wasco County. *Oregon DHS Office of Forecasting, Research and Analysis*, May 2015
- ^{vii} [United States Census of 2010](#). Retrieved 6-1-2018.
- ^{viii} Coordinated Population Forecast: 2016 through 2066, Wasco County. June 30, 2016. Population Research Center (Portland State University).
- ^{ix} [Two farmer brothers named their new home on the arid plains of Central Oregon after themselves and Dufur was born](#). *Travel Oregon*. Retrieved 6-1-2018.
- ^x [Two farmer brothers named their new home on the arid plains of Central Oregon after themselves and Dufur was born](#). *Travel Oregon*. Retrieved 6-1-2018.
- ^{xi} [Dufur](#). *The Oregon Encyclopedia*. Retrieved 6-1-2018.
- ^{xii} [Oregon Ghost Towns: Boyd, Dufur, and Friend](#). *Travel Oregon*. Retrieved 6-1-2018.
- ^{xiii} [Historic Balch Hotel](#). *Balch Hotel*. Retrieved 6-1-2018.
- ^{xiv} High Poverty Hotspots- Wasco County. *Oregon DHS Office of Forecasting, Research and Analysis*, May 2015
- ^{xv} [Adventure and Relaxation await you in Sunny Maupin, Oregon](#). *Maupin Oregon*. Retrieved 6-1-2018.
- ^{xvi} [City of Maupin Visitor Info](#). *City of Maupin*. Retrieved 6-1-2018.
- ^{xvii} High Poverty Hotspots- Wasco County. *Oregon DHS Office of Forecasting, Research and Analysis*, May 2015
- ^{xviii} Coordinated Population Forecast: 2016 through 2066, Wasco County. June 30, 2016. Population Research Center (Portland State University).
- ^{xix} [Road Trip: Mosier](#). *Travel Oregon*. Retrieved 6-1-2018.
- ^{xx} [Connecting with the Gorge: Mosier Plateau Trail](#). *Travel Oregon*. Retrieved 6-1-2018.
- ^{xxi} [The Shaniko Story](#). *Shaniko, where the west still lives*. Retrieved 6-1-2018.
- ^{xxii} [United States Census of 2010](#). Retrieved 6-1-2018.
- ^{xxiii} Coordinated Population Forecast: 2016 through 2066, Wasco County. June 30, 2016. Population Research Center (Portland State University).
- ^{xxiv} [The Shaniko Story](#). *Shaniko, where the west still lives*. Retrieved 6-1-2018.
- ^{xxv} [This ghost town is home to a secret abandoned car museum](#). *Roadtrippers*. Retrieved 6-1-2018.
- ^{xxvi} High Poverty Hotspots- Wasco County. *Oregon DHS Office of Forecasting, Research and Analysis*, May 2015

Appendix A: Action Items

Proposed Action Item:		Alignment with Plan Goals:	
MH #1 - Pursue regional funding for mitigation actions and coordination of efforts		<ul style="list-style-type: none"> Facilitate Partnerships and Coordination Emergency Services Enhancement 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> 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 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 <ul style="list-style-type: none"> 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:			
<ul style="list-style-type: none"> 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 through 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:			
<input type="checkbox"/> Short Term (0-3 years) <input checked="" type="checkbox"/> Long Term (3+ years)			
Form Submitted by:		NHMP Steering Committee (2012), Updated NHMP SC (2017)	
Action Item Status:		Institutionalized	

Proposed Action Item:	Alignment with Plan Goals:
MH#2 - Develop Public Outreach / Educational Programs for all Hazards	<ul style="list-style-type: none"> • <i>Education and Outreach</i> • <i>Facilitate Partnerships and Coordination</i>
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • 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 volcanic hazards closer to reality, we can plan and use resources more appropriately to prepare against this hazard 	
Ideas for Implementation:	
<p style="text-align: center;">ALL HAZARD</p> <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> 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). <p style="text-align: center;">SEVERE WEATHER</p> <ul style="list-style-type: none"> • 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

- 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 SC (2017)
Action Item Status:	Institutionalized

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, and Natural Hazards Mitigation Plan; Re-Adoption is required on a regular basis		<ul style="list-style-type: none"> Facilitate Partnerships and Coordination 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> FEMA requires NHMP update every 5 years to maintain HMGP funding eligibility CWPP was created in 2005 and has never been updated. Update planned to begin in Fall 2018 Comprehensive Plan was created in 1983. Currently in year one of three year update process known as Wasco 2040. Annual review/update ensures operability of plans, increases awareness & implementation and makes 5 year update easier 			
Ideas for Implementation:			
<ul style="list-style-type: none"> 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 (2017)	
Internal Partners:		External Partners:	
Planning, BOC, Emergency Management, Public Works		OEM, OPDR, DLCD	
Timeline:			
<input checked="" type="checkbox"/> Short Term (0-3 years) <input type="checkbox"/> Long Term (3+ years)			
Form Submitted by:		NHMP Coordinator (2012)	
Action Item Status:		Institutionalized	

Proposed Action Item:		Alignment with Plan Goals:	
MH#4 - Create Systems to Support and Maintain at-risk Populations		<ul style="list-style-type: none"> • <i>Facilitate Partnerships and Coordination</i> • <i>Emergency Services Enhancement</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • Special needs populations (elderly, disabled, low income, non-English speaking) are at greatest risk during a hazard event. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • 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) 			
Coordinating Organization:		Emergency Management	
Internal Partners:		External Partners:	
Planning, Records and Assessment		Red Cross, Hospitals, OR Senior Advisory Council, HPP6, OHA, NCPHD	
Timeline:			
<input checked="" type="checkbox"/> Short Term (0-3 years) <input type="checkbox"/> Long Term (3+ years)			
Form Submitted by:		NHMP Coordinator (2012)	
Action Item Status:		Deferred / Modified	

Proposed Action Item:		Alignment with Plan Goals:	
MH#5 - Update County Comprehensive Plan		<ul style="list-style-type: none"> • <i>Protection of Life & Property</i> • <i>Natural Resource Systems Protection</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • Comprehensive Plan was created in 1983. Currently in year one of three year update process known as Wasco 2040. • Goal 7 of the Wasco County Comprehensive Plan is out of date. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Use updated hazard information for county ordinances and regulations that govern site specific land use decisions • Create maps that show hazard areas corresponding to a list of parcels in the hazard area • Track data about level in hazard areas on a yearly basis 			
Coordinating Organization:		Planning	
Internal Partners:		External Partners:	
BOC		DLCD, DOGAMI	
Timeline:			
<input type="checkbox"/> Short Term (0-3 years) <input checked="" type="checkbox"/> Long Term (3+ years)			
Form Submitted by:		NHMP Coordinator (2012)	
Action Item Status:		In Progress	

Proposed Action Item:		Alignment with Plan Goals:	
MH#6 - Create Emergency Disaster Fund		<ul style="list-style-type: none"> Facilitate Partnerships and Coordination 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> 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:			
<ul style="list-style-type: none"> 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, DLCDC	
Timeline:			
<input type="checkbox"/> Short Term (0-3 years) <input checked="" type="checkbox"/> Long Term (3+ years)			
Form Submitted by:		NHMP Coordinator (2012)	
Action Item Status:		Deferred / Modified	

Proposed Action Item:		Alignment with Plan Goals:	
MH#7 – Develop Small Business Awareness & Continuity Planning Campaign		<ul style="list-style-type: none"> • <i>Education and Outreach</i> • <i>Facilitate Partnerships and Coordination</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • 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:			
<ul style="list-style-type: none"> • 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:			
<input type="checkbox"/> Short Term (0-3 years) <input checked="" type="checkbox"/> Long Term (3+ years)			
Form Submitted by:		OPDR (2012)	
Action Item Status:		Deferred / Modified	

Proposed Action Item:		Alignment with Plan Goals:	
MH#8 – Maintain & Develop Partnership Programs to Reduce Vulnerability of Public Infrastructure/Facilities from hazard risks		<ul style="list-style-type: none"> • <i>Protection of Life & Property</i> • <i>Facilitate Partnerships and Coordination</i> • <i>Emergency Services Enhancement</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • 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:			
<ul style="list-style-type: none"> • 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 every year. • Rebuild Shaniko Fire station. 			
Coordinating Organization:		Emergency Management	
Internal Partners:		External Partners:	
Planning, Public Works		Cities, Utilities, Law Enforcement, DOT, ODOE, OEM, DLCD	
Timeline:			
<input type="checkbox"/> Short Term (0-3 years) <input checked="" type="checkbox"/> Long Term (3+ years)			
Form Submitted by:		NHMP Coordinator (2012), Updated by NHMP SC (2017)	
Action Item Status:		Institutionalized	

Proposed Action Item:		Alignment with Plan Goals:	
MH#9 Pursue Agency Staff Training		<ul style="list-style-type: none"> • <i>Education & Outreach</i> • <i>Facilitate Partnerships & Coordination</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • 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:			
<ul style="list-style-type: none"> • 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:			
<input checked="" type="checkbox"/> Short Term (0-3 years) <input type="checkbox"/> Long Term (3+ years)			
Form Submitted by:		Planning (2017)	
Action Item Status:		NEW	

Proposed Action Item:		Alignment with Plan Goals:	
MH #10 Fortify County Communication Networks		<ul style="list-style-type: none"> • <i>Emergency Services Enhancement</i> • <i>Protection of Life & Property</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • 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:			
<ul style="list-style-type: none"> • 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:			
<input checked="" type="checkbox"/> Short Term (0-3 years) <input type="checkbox"/> Long Term (3+ years)			
Form Submitted by:		WCSO, MCEDD (2017)	
Action Item Status:		NEW	

Proposed Action Item:	Alignment with Plan Goals:
MH#11 – Update or Acquire Relevant Hazard Maps	<ul style="list-style-type: none"> • <i>Protection of Life & Property</i> • <i>Natural Resource Systems Protection</i>
Rationale for Proposed Action Item:	
<p style="text-align: center;">FIRE</p> <ul style="list-style-type: none"> • 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. <p style="text-align: center;">FLOOD</p> <ul style="list-style-type: none"> • 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 2023. • Flood ordinances out of date • Required for NFIP & CRS programs <p style="text-align: center;">EARTHQUAKE</p> <ul style="list-style-type: none"> • Wasco County has access to regularly updated DOGAMI earthquake hazard and fault line maps. <p style="text-align: center;">VOLCANO</p> <ul style="list-style-type: none"> • 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. <p style="text-align: center;">LANDSLIDE</p> <ul style="list-style-type: none"> • 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. This will improve land use planning and provide for more efficient and cost effective development. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • 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. 	

<ul style="list-style-type: none"> • 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:	
<input checked="" type="checkbox"/> Short Term (0-3 years) <input checked="" type="checkbox"/> Long Term (3+ years)	
Form Submitted by:	NHMP SC (2017)
Action Item Status:	NEW/ Institutionalized

Proposed Action Item:		Alignment with Plan Goals:	
SH#1 - Encourage Operators of Critical Facilities to Secure Emergency Power		<ul style="list-style-type: none"> Emergency Services Enhancement 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> 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:			
<ul style="list-style-type: none"> 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:			
<input checked="" type="checkbox"/> Short Term (0-3 years) <input type="checkbox"/> Long Term (3+ years)			
Form Submitted by:		NHMP Coordinator (2012), Updated by NHMP SC (2017)	
Action Item Status:		Deferred / Modified	

Proposed Action Item:		Alignment with Plan Goals:	
SH#2 - Support/Encourage Electrical Utilities to Use Underground Construction Methods		<ul style="list-style-type: none"> • <i>Protection of Life & Property</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • 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 lessens the risk burden on future generations 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • 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:			
<input checked="" type="checkbox"/> Short Term (0-3 years) <input type="checkbox"/> Long Term (3+ years)			
Form Submitted by:		NHMP Coordinator (2012), Updated by NHMP SC (2017)	
Action Item Status:		Deferred / Modified	

Proposed Action Item:		Alignment with Plan Goals:	
DH#1 - Ensure Long-range Water Resources Development and Quality		<ul style="list-style-type: none"> • <i>Protection of Life & Property</i> • <i>Facilitate Partnerships and Coordination</i> • <i>Natural Resource Systems Protection</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • 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:			
<ul style="list-style-type: none"> • Assist in the determination of which alternative water sources in or near Wasco County would benefit by detailed studies and also assist in the determination of how these studies can be funded • Develop water related strategies – Comprehensive Plan, Storm Water Management Plan, etc. • County Adoption of Stricter Water Conservation Policies <ul style="list-style-type: none"> o Establish stronger economic incentives for private investment in water conservation o Encourage voluntary water conservation o Improve water use and conveyance efficiencies o Implement water metering and leak detection programs o Imposing excess-use charges during times of water shortage o Imposing mandatory water-use restrictions during times of water shortage o Conduct water-conservation education of the public and of school children, including special emphasis during times of water shortage 			
Coordinating Organization:		Planning	
Internal Partners:		External Partners:	
BOC		Watermaster, SWCD, OSU Extension, DEQ, ODFW, OECD, 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)	
Action Item Status:		Institutionalized	

Proposed Action Item:		Alignment with Plan Goals:	
DH#2 - Support Local Agencies Training on Water Conservation Measures and Drought Management Practices		<ul style="list-style-type: none"> • <i>Education & Outreach</i> • <i>Facilitate Partnerships and Coordination</i> • <i>Natural Resource Systems Protection</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • Agricultural economy- crops and livestock- susceptible to drought <ul style="list-style-type: none"> 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:			
<ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> 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:			
<input type="checkbox"/> Short Term (0-3 years) <input checked="" type="checkbox"/> Long Term (3+ years)			
Form Submitted by:		NHMP Coordinator (2012), Updated by NHMP SC (2017)	
Action Item Status:		Deferred	

Proposed Action Item:		Alignment with Plan Goals:	
WH#1 - Assessment of Non-County Roads for Response to Wildfire Hazards		<ul style="list-style-type: none"> • <i>Protection of Life & Property</i> • <i>Emergency Services Enhancement</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • 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. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Complete an inventory showing the condition of roads serving the wildland urban interface. Identify roads which need improvement to allow safe and efficient access for fire fighting vehicles. • 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:			
<input checked="" type="checkbox"/> Short Term (0-3 years) <input type="checkbox"/> Long Term (3+ years)			
Form Submitted by:		Unknown (2012), Updated by NHMP SC (2017)	
Action Item Status:		Deferred / Modified	

Proposed Action Item:		Alignment with Plan Goals:	
WH#2 - Accomplish Defensible Space Around Structures		<ul style="list-style-type: none"> • <i>Protection of Life & Property</i> • <i>Emergency Services Enhancement</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • 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:			
<ul style="list-style-type: none"> • Seek grant funding from the National Fire Plan and other programs to assist landowners in accomplishing defensible space work. • Encourage landowners to undertake defensible space 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:			
<input checked="" type="checkbox"/> Short Term (0-3 years) <input type="checkbox"/> Long Term (3+ years)			
Form Submitted by:		CWPP Coordinator (2012), Updated by NHMP SC (2017)	
Action Item Status:		Institutionalized	

Proposed Action Item:		Alignment with Plan Goals:	
WH#3 - Treat Hazard Fuels in the Wildland Urban Interface Including in The Dalles Municipal Watershed		<ul style="list-style-type: none"> • <i>Protection of Life & Property</i> • <i>Natural Resource Systems Protection</i> • <i>Emergency Services Enhancement</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • 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:			
<ul style="list-style-type: none"> • 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:			
<input checked="" type="checkbox"/> Short Term (0-3 years) <input type="checkbox"/> Long Term (3+ years)			
Form Submitted by:		CWPP Coordinator (2012), Updated by NHMP SC (2017)	
Action Item Status:		Institutionalized	

Proposed Action Item:		Alignment with Plan Goals:	
WH#4 – Explore ways to increase Fire District coverage throughout the County		<ul style="list-style-type: none"> • <i>Facilitate Partnerships and Coordination</i> • <i>Emergency Services Enhancement</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • 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 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • 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 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 			
Coordinating Organization:		Emergency Management	
Internal Partners:		External Partners:	
		Fire Districts, Oregon’s Fire Marshal’s Office, ODF, USFS	
Timeline:			
<input type="checkbox"/> Short Term (0-3 years) <input checked="" type="checkbox"/> Long Term (3+ years)			
Form Submitted by:		NHMP SC (2017)	
Action Item Status:		New	

Proposed Action Item:		Alignment with Plan Goals:	
WH#5 – Establish a Wildfire Coordinator or local Natural Hazard Planner position		<ul style="list-style-type: none"> • <i>Facilitate Partnerships and Coordination</i> • <i>Education and Outreach</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • 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 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • 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:	
Planning, Emergency Management		Rural Fire Departments, Oregon’s Fire Marshal’s Office, ODF, USFS	
Timeline:			
<input checked="" type="checkbox"/> Short Term (0-3 years) <input type="checkbox"/> Long Term (3+ years)			
Form Submitted by:		NHMP SC (2018)	
Action Item Status:		NEW	

Proposed Action Item:		Alignment with Plan Goals:	
FH#1 - Mitigate Flood Event Resulting from Naturally Induced Dam Failure		<ul style="list-style-type: none"> • <i>Protection of Life & Property</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • Acquire or prepare detailed dam failure inundation maps: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> o Reduce or eliminate the risk to life, property and infrastructure • Evaluate emergency response plan and identify areas of public notification and evacuation routes: <ul style="list-style-type: none"> o Ensure the plan is adequate to cope with a hazard event 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • 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:			
<input checked="" type="checkbox"/> Short Term (0-3 years) <input type="checkbox"/> Long Term (3+ years)			
Form Submitted by:		DOGAMI (2012), Updated by NHMP SC (2017)	
Action Item Status:		Deferred / Modified	

Proposed Action Item:		Alignment with Plan Goals:	
FH#2 – Protect Against Loss from Flooding		<ul style="list-style-type: none"> • <i>Education and Outreach</i> • <i>Protection of Life & Property</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • 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 2.7 in Section 2 demonstrates that Wasco County does not have any properties identified as repetitive loss as of October 2017, but 12 properties have been impacted by flooding to such an extent a claim was filed. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Consult with property owners and explore mitigation actions for the interested homeowners with a high risk of flooding. • 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)	
Action Item Status:		Institutionalized	

Proposed Action Item:		Alignment with Plan Goals:	
FH#3 - Removal of Fish Passage Barriers		<ul style="list-style-type: none"> • <i>Protection of Life & Property</i> • <i>Natural Resource Systems Protection</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • 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:			
<ul style="list-style-type: none"> • 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. <p>2018 UPDATE</p> <ul style="list-style-type: none"> - 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:			
<input type="checkbox"/> Short Term (0-3 years) <input checked="" type="checkbox"/> Long Term (3+ years)			
Form Submitted by:		Wasco County SWCD (2012), Updated by NHMP SC (2017)	
Action Item Status:		In Progress	

Proposed Action Item:		Alignment with Plan Goals:	
FH#4 – Determine financial assets (structures, property value, etc.) at risk of damage or loss from flooding		<ul style="list-style-type: none"> • <i>Protection of Life & Property</i> • <i>Education & Outreach</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • 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:			
<ul style="list-style-type: none"> • 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 year • 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:			
<input type="checkbox"/> Short Term (0-3 years) <input checked="" type="checkbox"/> Long Term (3+ years)			
Form Submitted by:		DLCD (2017)	
Action Item Status:		NEW	

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		<ul style="list-style-type: none"> • <i>Protection of Life & Property</i> • <i>Emergency Services Enhancement</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • 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:			
<ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> ○ 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:			
<input type="checkbox"/> Short Term (0-3 years) <input checked="" type="checkbox"/> Long Term (3+ years)			
Form Submitted by:		DOGAMI (2012), Updated by NHMP SC (2017)	
Action Item Status:		Deferred / Modified	

Proposed Action Item:		Alignment with Plan Goals:	
EH#2 - Improve Knowledge of Earthquake Sources		<ul style="list-style-type: none"> Emergency Services Enhancement 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> The source and location of an earthquake is a critical component of the expected damage to a particular site 			
Ideas for Implementation:			
<ul style="list-style-type: none"> 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:			
<input type="checkbox"/> Short Term (0-2 years) <input checked="" type="checkbox"/> Long Term (3+ years)			
Form Submitted by:		DOGAMI (2012), Updated by NHMP SC (2017)	
Action Item Status:		Deferred / Modified	

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		<ul style="list-style-type: none"> • <i>Protection of Life & Property</i> • <i>Natural Resources Systems Protection</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • 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:			
<ul style="list-style-type: none"> • Create map • Identify vulnerabilities • Use product for public education 			
Coordinating Organization:		Emergency Management	
Internal Partners:		External Partners:	
GIS, Planning		NWS, USGS, DOGAMI	
Timeline:			
<input checked="" type="checkbox"/> Short Term (0-3 years) <input type="checkbox"/> Long Term (3+ years)			
Form Submitted by:		DLCD (2017)	
Action Item Status:		NEW	

Proposed Action Item:		Alignment with Plan Goals:	
LH#1 - Update County Landslide Ordinance		<ul style="list-style-type: none"> • <i>Protection of Life & Property</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • The County currently uses Environmental Protection District #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. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • 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 • New/forthcoming landslide guide from DLCD & Dogami by end of 2018 			
Coordinating Organization:		Planning	
Internal Partners:		External Partners:	
Planning Commission		OPDR, OEM, DOGAMI	
Timeline:			
<input type="checkbox"/> Short Term (0-3 years) <input checked="" type="checkbox"/> Long Term (3+ years)			
Form Submitted by:		NHMP Coordinator (2012), Updated by NHMP SC (2017)	
Action Item Status:		Deferred/Modified	

Proposed Action Item:		Alignment with Plan Goals:	
LH#2 - Improve Understanding of Landslide Risk Inside Hazard Areas and Improve Warning Systems		<ul style="list-style-type: none"> • <i>Protection of Life & Property</i> • <i>Emergency Services Enhancement</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • 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:			
<ul style="list-style-type: none"> • 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:			
<input type="checkbox"/> Short Term (0-3 years) <input checked="" type="checkbox"/> Long Term (3+ years)			
Form Submitted by:		DOGAMI (2012), Updated by NHMP SC (2017)	
Action Item Status:		Deferred / Modified	

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
OECD	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
USGS	United States Geological Survey
WCSO	Wasco County Sheriff's Office
WRD	Water Replenishment District

Appendix B: Planning and Public Process

Table of Contents

Public Outreach Strategy	B-2
February 1, 2017 Plan Maintenance Meeting Agenda and Roster	B-8
March 23, 2017 Plan Maintenance Meeting Agenda and Roster	B-10
July 25, 2017 Plan Update Meeting Agenda and Roster	B-12
October 12, 2017 Plan Update Meeting Agenda and Roster	B-16
November 14, 2017 Plan Update Meeting Agenda and Roster.....	B-16
December 20, 2017 Plan Update Meeting Agenda and Roster	B-18
September 5, 2018 Plan Update Meeting Agenda and Roster	B-22
October 30, 2017 Disasters and Donuts Critical Facility Suggestions	B-24
October 30, 2017 Disasters and Donuts Sign-in Sheet.....	B-25
October 10, 2017 Lions Club Presentation Sign-in Sheet	B-26
October 30, 2017 Disasters and Donuts Flyer (Spanish)	B-27
October 30, 2017 Disasters and Donuts Flyer (English)	B-28
October 30, 2017 Disasters and Donuts Trivia Questions	B-29
October 26, 2017 Disasters and Donuts Radio Interview	B-31
<i>Website Updates and Social Media Screenshots</i>	
July 27, 2017 NHMP Website	B-32
July 27, 2017 Emergency Management Website with NHMP Link	B-34
August 3, 2017 NHMP Website	B-35
September 12, 2017 NHMP Website	B-36
September 21, 2017 Preparedness Website with NHMP Link	B-37
October 3, 2017 NHMP Website with Public Meeting Information	B-38
October 24, 2017 Wasco2040 Website with NHMP Information	B-39
December 5, 2017 NHMP Website	B-40
February 27, 2018 NHMP Website	B-41
July 13, 2018 NHMP Website	B-42
July 17, 2018 County Homepage Banner Featuring NHMP	B-43
August 2, 2018 Wasco County Facebook Page Featuring NHMP Event	B-44
September 12, 2018 NHMP Website	B-45

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 two Plan Maintenance meetings and five NHMP Update meetings in 2017 – 2018 (see list of meetings and related information below). The Steering Committee included the two Wasco County leads, Will Smith, Senior Planner, and Juston Huffman, Emergency Manager, and Tricia Sears, Natural Hazards Planner at the Oregon Department of Land Conservation and Development. After each of these, the agenda and minutes were posted to the NHMP website, which is housed on the Planning Department's Long Range Planning webpage (<https://co.wasco.or.us/departments/planning/index.php>). This webpage also provides information about the plan itself, status updates on the process, points of contact, and relevant additional resources.

For the Wasco County 2012 NHMP, Oregon Partnership for Disaster Resilience (OPDR) conducted an eight county mitigation survey. Wasco County was part of the survey. For the 2017 update, Wasco County did not have access to that resource, and no new widespread survey was planned. The NHMP SC created their own Wasco County specific survey based on the 2012 one. This survey was posted on the NHMP website, a link to which was included in the signature line of County planners' emails throughout the update process period. Additionally, at public events, flyers were distributed with the website information and hard copies of the survey were available. At the NHMP Open House, described below, the survey was available for visitors. At the end of this year long period, the results were not robust. Only eight citizens took the survey, the results of which are included below.

Members of the NHMP SC staffed booths at preparedness events throughout 2017. Juston Huffman and Will Smith attended the Emergency Management show at the Dalles Readiness Center on April 19, 2017 and Juston staffed one at the Preparedness Fair at the Mid-Columbia Fire and Rescue station on September 16, 2017. Will Smith staffed a booth at the April 12 and November 15, 2017 Fire Defense Board Meetings and spoke about the update process for ten minutes at each meeting to the gathered fire chiefs, soliciting comments and questions. Informational flyers, including the survey website info, were distributed at each. Will Smith gave a presentation on August 10, 2017 to Government Affairs, a weekly gathering of local citizens that convenes at 7 A.M. every Thursday morning. He spoke for a half hour, took questions and distributed information. Will was also the featured speaker at a Lions Club lunch on October 10, 2017 speaking for about half an hour, taking questions and distributing information. At each event, notes were taken about suggestions for action items and mitigation strategies all of which were incorporated into the final plan.

On October 30, 2017, the NHMP SC hosted a mitigation specific Open House known as Disasters and Donuts. Flyers were made in English and Spanish, distributed at events and posted around town. It was held from noon until 7 p.m. at the Wasco County Planning Department Conference Room. The room was set up with a variety of interactive information boards gathering input on suggested critical facilities, prioritizing hazards, and identifying concerns. Throughout the Open House, popular and cheesy disaster movies were playing on the screen to help set the mood and provide discussion points. The Planning Department is open until 4 p.m. so several people came in who were coming to ask

planning questions, and several other people attended who had heard about the Open House through word of mouth and advertising. Turnout was low at approximately 15 total people throughout the day, but some valuable information was recorded and incorporated into the final plan.

At the Oregon Land Conservation and Development Commission (LCDC) meeting on March 15, 2018, Will Smith joined DLCD Natural Hazards Planners Tricia Sears and Marian Lahav in the “Natural Hazards Mitigation Planning” presentation. The “seven-member Land Conservation and Development Commission (LCDC), assisted by DLCD, adopts state land-use goals and implements rules, assures local plan compliance with the goals, coordinates state and local planning, and manages the coastal zone program” (<https://www.oregon.gov/LCD/pages/lcdc.aspx>). After the Steering Committee examined the plan in 2017 (SC meetings ended in December 2017 but additional interactive discussion occurred in 2018), the two leads, Will and Juston updated the plan with their proposed edits. Working alongside Tricia Sears, Natural Hazards Planner for the Oregon Department of Land Conservation and Development, the edits were finalized and additional addenda and appendices created by May 2018. These documents were sent to the Steering Committee for comment and review on June 7, 2018 with a request for feedback by June 26. All feedback received was then incorporated and the documents were then distributed more widely to the Partner Agency list which includes all email addresses gathered from various events throughout the year of interested citizens and stakeholders as well as the Planning Commission and the Board of County Commissioners. This email was sent on July 13, 2018 with a request for feedback by August 3; this information was also posted online. On September 5, 2018 a NHMP Steering Committee meeting was held to discuss the feedback received on the draft documents and to further discuss the mitigation actions.

In September, 2017, Will Smith and Dan Hammel, Division Chief for Mid-Columbia Fire and Rescue, applied to the Community Planning Assistance for Wildfire (CPAW) program (<https://planningforwildfire.org/>) on behalf of Wasco County. Later that year the County was selected as one of eight communities through that nationwide competitive process to receive professional assistance from foresters, planners, economists and wildfire risk modelers to integrate wildfire mitigation into the development planning process.

The CPAW program consists of a conference, and three site visits from the CPAW team. The first site visit was March 20-21, 2018. The team was given a tour of the County on the first day, and on the second day they hosted three workshops – one for local subject matter experts in wildland fire reviewing the CPAW Risk Assessment data and process, and the other two open to the public giving an introduction to the program and then working in small groups to extract information about fire in Wasco County from residents for the team to assess. The second site visit was on July 23-24, 2018. This visit consisted of a follow-up workshop for the SME firefighter group, a Planning Commission presentation, a workshop for planners about the basics of wildfire and some tools available for them, and a review of the team’s draft recommendation. The final site visit will be on December 11-12, 2018.

The following agencies were part of the NHMP Partner Agency list, which grew throughout the process as more people became aware of the project and requested information. Emails giving updates and soliciting feedback were distributed to this list intermittently throughout the process.

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
Chenoweth People's Utility 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	Oregon 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
Columiba Gorge Community College	School District 1
Confed. Tribes of Warm Springs	Shaniko (City of)
Confeder. Tribes of Umatilla	Soil and Water Conservation District
Department 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 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:

Chenoweth 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

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 tribe specific 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 our NHMP, the input of tribal members was sought to assess any potential concerns they might have. Tribal representatives from the Nez Perce, Yakama Indian Nation, Confederated Tribes of Warm Springs, and the Confederated Tribes of Umatilla were included in our Partner Agency contact and distribution list for updates and feedback.

Additional outreach efforts were made to the small cities and unincorporated urban areas in Wasco County. These efforts are described in the Small Cities Addendum in Volume III of this document.

Below, see the list of NHMP plan maintenance and Steering Committee meetings, meeting agendas, sign-in sheets, flyers, screen shots, and photos from the Wasco County NHMP update process.

Natural Hazard Mitigation Plan
Steering Committee
2017 PLAN MAINTENANCE Meeting #1 – February 1

➤ **INTRODUCTIONS**

➤ **BACKGROUND**

- a. Natural hazard mitigation planning purpose
- b. Previous plans

➤ **OBJECTIVES**

- a. Describe timeline/tasks to be completed during the update
 - i. Meetings
 - ii. Update requirements
 - 1. Review risk assessment
 - 2. Review mitigation strategies
 - 3. Review plan maintenance process
 - 4. Final plan preparation
 - 5. Plan implementation
- b. Identify roles and responsibilities of the committee
 - i. Subcommittees
 - ii. Action Item review/updates
 - iii. Other goals (any long term outcomes each agency wants to achieve?)
- c. Discuss public involvement strategies
 - i. Road show
 - ii. Website
 - iii. Public meeting (summer?)
 - iv. Survey
 - v. Measure 56 notice
- d. Discuss community stakeholders/jurisdictions that should be involved
 - i. Suggestions? (Government agencies, non-profits, citizen groups, tribes, etc.)
 - 1. Steering Committee vs. Planning participant
 - ii. Resource needs
 - 1. Grants? Personnel?
- e. Overview of previous plan maintenance meetings that have occurred

➤ **NEXT STEPS**

- a. Next Steering Committee meeting (Late Spring), Sub-Committee meetings

Natural Hazard Mitigation Plan UPDATE
Steering Committee
Meeting #1 – February 1, 2017

	<u>NAME</u>	<u>ORGANIZATION</u>	<u>TITLE</u>
1.	Will Smith	W.C. Planning	Associate Planner
2.	Cindy Miller	North Wasco Co. School District	Exec. Asst.
3.	JUSTON HUFFMAN	WCSO	EM
4.	Ryan Bessette	Wasco Co. SWCD	Technician/Planner
5.	Kristin Dodd	OR Dept. of Forestry	Unit Forester
6.	STEVE KRAMER	WASCO CO	COMMISSIONER
7.	ARTHUR SMITH	Wasco Co Public Works	Director
8.	DUSTIN NILSEN	WASCO PLNG.	SR. PLNR
9.	Kelly Howsley Glover	" "	Long Range Planner
10.	Angie Brewer	" "	Planning Director
11.	Steven Harris	City - The Dalles	Plan Director
12.			
13.			
14.			

Natural Hazard Mitigation Plan
Steering Committee
Plan Maintenance
Meeting – March 23, 2017

1. Introductions
2. Funding – is it too late? Any options?
If not, the next update may need it
3. Partner Agencies POC list
 - a. Google doc. Update, discuss, add groups if necessary
4. Risk Assessment Stage – Disaster Mitigation Act 2000 requirements
 - a. Description of type – no update needed?
 - b. Description of location and extent, including previous occurrences
 - i. Need to update last 5 years of occurrences
 1. Lead needed
 - c. Vulnerability
 - i. Existing, future buildings
 1. Planning, GIS, Assessor?
 - ii. Infrastructure
 1. Public works, utilities
 - iii. Facilities
 1. All
 - d. NFIP insured structures repeatedly damaged
 - e. Jurisdictional specific differences
 - i. The Dalles, Other cities
 - f. County participation in NFIP and continued compliance
5. Review of Section 2 of NHMP.
 - a. Note what needs updating.
6. Community Profile update.
 - a. Lead needed
7. Public Outreach meeting planning

Natural Hazard Mitigation Plan
 Steering Committee
 Plan Maintenance
 Meeting – March 23, 2017

	<u>NAME</u>	<u>ORGANIZATION</u>	<u>TITLE</u>
1.	Will Smith	Wasco Co. Planning	Assoc Planner
2.	JUSTIN HUFFMAN	WASCO Co. EM/EOC	EMERGENCY MNGR
3.	FRANK COCHRAN	NATURAL RESOURCES CONSERVATION SERVICE	DISTRICT CONSERVATIONIST
4.	Steven Harris	City - The Dalles	Plan Director
5.	SEVE KEAMER	WASCO Co	Commissioner
6.	Kristin Dodd	ODF	Unit Forester
7.	Cindy Miller	NWCSD 21	Exec. ASST.
8.	TYLER STONE	WASCO	A.O.
9.	Robert Palmer	Mid-Columbia Fire + Rescue	Fire Chief
10.	Angie Brewer	wasco. Co. Planning	Director
11.	Kelly Howsley Glover	WASCO Co. Planning	Long Range Planner
12.			
13.			
14.			

Natural Hazard Mitigation Plan
Steering Committee
Plan Maintenance Meeting – July 25, 2017

- | | |
|---|--------|
| 1. Introductions | 5 min |
| 2. Updates | 10 min |
| a. June FEMA Disaster Mitigation training (Will/Tricia) | |
| b. Community Profile (Kelly) | |
| c. PDM Grant (Tricia) | |
| 3. Hazard Analysis activity – OEM methodology (Tricia) | 90 min |
| a. Review Significant Historic Hazard Events Tables | |
| b. Complete Hazard Analysis Worksheet | |
| c. Outcome: Risk levels designated, Hazards ranked | |
| 4. Next Steps | 15 min |
| a. Timelines | |
| b. Action Item suggestions table | |
| c. Public outreach | |

Meeting Materials:

Agenda
Significant Historic Hazard Events Table
Hazard Analysis Worksheet
Potential Action Items Table
Timeline Chart

Attendance List

	<u>NAME</u>	<u>ORGANIZATION</u>	<u>TITLE</u>
1.	Will Smith	WC Planning	Asso. Planner
2.	Tricia Sears	PLCD	Natural Hazards Planner
3.	JUSTON HUFFMAN	WC SO EM	Emergency management
4.	DAVE ANDERSON	City of The Dalles	Public Works Director
5.	Ryan Bessette	Wasco County SWCD	District Tech/NRCS Planner
6.	FRANK COCHRAN	USDA-NRCS	DISTRICT CONSERVATIONIST
7.	TYCIND GRANVILLE	WC GIS	GIS COORDINATOR
8.	Cindy Miller	North Wasco Co. School Distr.	Exec. Assst.
9.	ARTHUR SMITH	Wasco County Public Works	Public Works Director
10.	Kelly Housley Cloven	Wasco County Planning	Long Range Planner
11.	DUSTIN NILSEN	WASCO CO. PLANNING	SR. PLANNER
12.			
13.			
14.			

Wasco County
Natural Hazard Mitigation Plan
Steering Committee Meeting – Aug. 31, 2017

1. Introductions 5 min
2. Updates 15 min
 - a. Public Outreach meeting status (Will)
 - b. Community Profile complete (Kelly)
 - c. Cost Share forms (Tricia)
3. Hazard Vulnerability Assessment - review 15 min
 - a. Review last meeting's outcomes, update as needed
4. Mitigation Strategy Editing 70 min
 - a. Review 2012 Goals
 - b. Review status of previous action items
 - c. Brainstorm new action items (if time allows)
5. Next Steps 15 min
 - a. Finalize Action Items
 - b. Public outreach
 - c. Early Oct meeting

Meeting Materials:

Aug 31, 2017 SC meeting agenda

2012 NHMP Section 3: Mitigation Strategy

2012 Goals list

FEMA handbook Task 6: Develop a Mitigation Strategy

OPDR handbook Stage 3: Reviewing the Mitigation Strategy

Updated Community Profile

Hazard Vulnerability Assessment outcomes

Wasco County
 Natural Hazard Mitigation Plan
 Steering Committee
 NHMP SC Meeting – August 31, 2017

	Attendance List		
	<u>NAME</u>	<u>ORGANIZATION</u>	<u>TITLE</u>
1.	Will Smith	WC Planning	Assoc. Planner
2.	Tricia Sears	Oregon DCD	Natural Hazards Planner
3.	JUSTON HUFFMAN	WCSO	EMERGENCY MANAGER
4.	FRANK COCHRAN	NRCS	DISTRICT CONSERVATIONIST
5.	TYCHO GRANVILLE	WASCO COUNTY	GIS COORDINATOR
6.	ARONNE SMITH	WC PW	Director
7.	Kelly Howley Glover	Planning	Long Range
8.	Dave Anderson	City of The Dalles	Public Works Dir.
9.	Robert Palmer	Mid-Co. Fire + Rescue	Fire Chief
10.			
11.			
12.			
13.			
14.			

Wasco County
Natural Hazard Mitigation Plan
Steering Committee Meeting – Oct. 12, 2017

1. Introductions 5 min
2. Updates 15 min
 - a. Public Outreach meeting status (Will)
 - b. 2017 Updated goals language (Will)
 - c. Emails about upcoming opportunities (Will)
 - d. Cost Share Forms Q&A (Tricia)
3. 2012 Action Items - review 45 min
 - a. Review last plan's Action Items, discuss status
4. 2017 Action Items - brainstorm 45 min
 - a. Review suggested new Action Items, discuss, prioritize
5. Next Steps 15 min
 - a. Edits
 - b. Public outreach meeting
 - c. Nov meeting

Meeting Materials:

2017 Mitigation Strategy Goals

2012 Action Items

2017 Action Item suggestions

The Dalles City Action Items

HMA application email

Seismic rehab grant email

Cost Share Forms

Disasters and Donuts flyers

Attendance List

<u>NAME</u>	<u>ORGANIZATION</u>	<u>TITLE</u>
1. Will Smith	WC Planning	Senior Planner
2. Tricia Sears	DLCD	Natural Hazards Planner
3. Ryan Bessette	Wasco County SWCD	Technician/NRCS Planner
4. Clinton Whitten	NRCS	Acting District Conservationist
5. DAVID LUTZNER	DLCD	Oregon Risk MAP Coordinator
6. JUSTON HUFFMAN	WRSO	EMERGENCY MANAGER
7. TYCHO GRANVILLE	WC GIS	GIS COORDINATOR
8. Kelly Howsley Oliver	Planning	Long Range/Sp. Projects
9. DAVE ANDERSON	City of The Dalles	Public Works Director
10. Cindy Miller	North Wasco Co. SD	EXEC. ASST.
11.		
12.		
13.		
14.		

1. Introductions 5 min
2. Updates 15 min
 - a. Public Outreach meeting results (Will)
 - b. Critical Facilities list (Will)
3. 2012 Action Items – review WF Als 15 min
 - a. Review last plan’s WF Action Items, discuss status
4. 2017 Action Items - brainstorm 45 min
 - a. Review suggested new Action Items, discuss, prioritize
5. Next Steps 15 min
 - a. Edits
 - b. Dec meeting?

Meeting Materials:

2012 Action Items

2017 Action Item suggestions

WC NHMP Section 4: Plan Implementation and Maintenance

OPDR handbook – Stage 4: Reviewing the Plan Maintenance Process

Critical Facilities list

Attendance List

	<u>NAME</u>	<u>ORGANIZATION</u>	<u>TITLE</u>
1.	Will Smith	WC Planning	Senior Planner
2.	Tricia Sears	BLAD	Nat. Haz Planner
3.	Cindy Miller	NWCSDAI	Exec. Asst.
4.	DAVE Anderson	City of The Dalles	Public Works Director
5.	Ryan Bessette	Wasco SWCD	District Technician / NRCS Planner
6.	Kelly Howsley Clover	Wasco Co.	Long Range Planner
7.	Bob Palmer	MCFR	Fire Chief
8.	JUSTIN HUFFMAN	WCSO EM	EMERGENCY MANAGER
9.			
10.			
11.			
12.			
13.			
14.			

- | | |
|---|--------|
| 1. Introductions | 5 min |
| 2. Updates | 15 min |
| a. Small City Outreach (Will) | |
| 3. Section 4: Plan Implementation and Maintenance Edits | 60 min |
| a. Review, comment, update | |
| 4. Next Steps | 15 min |
| a. Editing process | |
| b. Approvals needed – Boards, Councils | |

Meeting Materials:

WC NHMP Section 4: Plan Implementation and Maintenance

OPDR handbook – Stage 4: Reviewing the Plan Maintenance Process

Attendance List

	<u>NAME</u>	<u>ORGANIZATION</u>	<u>TITLE</u>
1.	Will Smith	WC Planning	Senior Planner
2.	Ryan Bessette	Wasco SWCD	Technician/Planner
3.	JUSTON HUFFMAN	WASCO SHERIFF'S OFFICE	EMERGENCY MANAGER
4.	Kristin Dadd	OR Dept. of Forestry	Unit Forester
5.	Tricia R. Sears	DCD	Nat Haz Planner
6.	Kelly Howsley Alver	WC Planning	Long Range Planner
7.	Angie Brewer	WC Planning	Director
8.	Cindy Miller	NWCSA 21	Exec. Asst.
9.			
10.			
11.			
12.			
13.			
14.			

Wasco County
Natural Hazard Mitigation Plan
Steering Committee Meeting – Sept. 5, 2018

- | | |
|---|--------|
| 1. Introductions | 5 min |
| 2. Updates (Will) | 15 min |
| a. Editing Process in 2018, comments received | |
| b. Small City Section and Communication | |
| 3. Climate Change Report | 20 min |
| 4. DOGAMI Risk Report | 20 min |
| a. Critical Facility list update | |
| 5. Plan Update toolkit review | 20 min |
| 6. Next Steps | 15 min |
| a. Approvals needed – FEMA, OEM, Boards, Councils | |

Meeting Materials:

Section 2: Risk Assessment – Tricia edits with CC and Risk report additions
OPDR handbook – Stage 4: Reviewing the Plan Maintenance Process
OCCRI Climate Change Future Projection Report
DOGAMI Natural Hazard Risk Report
Plan Update Toolkit
NHMP public comment record
NHMP Cover Page

Attendance List

	<u>NAME</u>	<u>ORGANIZATION</u>	<u>TITLE</u>
1.	Will Smith	WC Planning	Senior Planner
2.	Kristin Dodd	ODF	Unit Forester
3.	Tricia Sears	DLCD	Natural Hazards Planner
4.	JUSTON HUFFMAN	WC EMERGENCY Mngt.	Emergency manager
5.	Cindy Miller	NWBSDQI	Exec. Assst.
6.	Dave Anderson	City of Tree Dalls	Public Works Dir
7.	Kelly Housley Glover	Wasco Co Planning	Long Range / Special Projects Planner
8.	Bob Palmer	MCFR	Fire Chief
9.			
10.			
11.			
12.			
13.			
14.			

Highway 26
Highway 216
Big Eddy Substation
Celilo Converter Station
The Dalles Bridge
The Dalles Dam
Union Pacific Railroad
Washington Family Ranch Fire Station
Washington Family Ranch Airstrip
Dallesport Airport
One Community Health
Fort Dalles Roadlayers Center
Dofur PUD Station
Dofur Reservoir

← Attendance

Wasco County Natural Hazards Mitigation Plan Update 2017

Disasters and Donuts
Community Open House
Monday, October 30, 2017

NAME	EMAIL
Rod Ruyter	
Shere Kramer	
LORIE HULL	loriemae.hull@gmail.com
SCOTT RAKER	SCOTT@NWPREST.ORE
TAYLOR WEAVER	
Merle	

Wasco County Natural Hazards Mitigation Plan Update 2017

Lions Club Weekly Meeting
 Tuesday, October 10, 2017

NAME	EMAIL	PHONE (optional)
Jim Wilcox	jwilcox51@gmail.com	
Carolyn Layson	carolyn@copperwest.com	
Miche Kilkeny	MKilkeny@gorge.net	
Chris Mumford	OutsideTheWire.us@gmail	
Jeff Strieg	jeffstrieg@charion.net	
Rick Wolf	Richard.Wolf@A&M.com	
Kristen Harmon	Kristenaharmon@us12.salvationarmy.org	

"DESASTRES Y DONAS"

CASA ABIERTA COMUNITARIA

30 DE OCTUBRE DEL 2017 | 12 P.M. A 7 P.M.

VISITE A CUALQUIER HORA

DEPARTAMENTO DE PLANIFICACION DEL CONDADO DE WASCO
2705 EAST SECOND ST.
THE DALLES, OR 97058



¡El Condado de Wasco está actualizando su Plan de Mitigación de Riesgos Naturales y necesitamos su ayuda!

La mitigación es el esfuerzo para reducir la pérdida de vidas y bienes al disminuir el impacto de los desastres. (FEMA)

Venga a nuestra Casa Abierta para dar su opinión sobre cómo los Peligros Naturales afectan a usted o a su organización, y darnos sugerencias sobre lo que podríamos hacer para mitigar sus impactos - todo mientras disfruta de donas, bebidas y proyecciones de sus películas favoritas de desastres!

Para más información o para proporcionar comentarios, por favor contacte:

*Will Smith, Planificador Asociado
Planificación del condado de Wasco
Telefono: 541-506-2560
E-mail: wills@co.wasco.or.us*

DESASTRES NATURALES DEL CONDADO DE WASCO

- Clima Severo
- Sequía
- Fuegos Salvajes
- Inundación
- Terremoto
- Volcán
- Delizamiento de Tierra



"DISASTERS AND DONUTS" COMMUNITY OPEN HOUSE

OCTOBER 30, 2017 | NOON - 7 P.M.

STOP BY ANY TIME!

**WASCO COUNTY PLANNING DEPARTMENT
2705 EAST SECOND ST.
THE DALLES, OR 97058**



Wasco County is updating our Natural Hazard Mitigation Plan and we need your help!

Mitigation is the effort to reduce loss of life and property by lessening the impact of disasters. (FEMA)

Come to our Open House to provide feedback about how Natural Hazards affect you or your organization, and give us suggestions on what we could do to mitigate their impacts – all while enjoying complimentary donuts, beverages, and screenings of your favorite disaster movies!

For more information or to provide comments please contact:

*Will Smith, Associate Planner
Wasco County Planning
Phone: 541-506-2560
Email: wills@co.wasco.or.us*

WASCO COUNTY'S NATURAL DISASTERS

- Severe Weather
- Drought
- Wildfire
- Flood
- Earthquake
- Volcano
- Landslide



Trivia questions

1. Name two large rivers that form borders for Wasco County (1 point each).

2. Name four wildland fires in Wasco County that have been declared a Conflagration in the last five years (1 point each)?

3. Wasco County has had 5 FEMA Disaster Declarations for flooding in the past century. In what years did these major floods hit (1 point each)?

4. How many tornados have been officially observed in Wasco County?

5. Last winter how many consecutive days was there snow on the ground in The Dalles?

6. What was the previous record (Bonus point: What year)?

7. When was the last Cascadia Subduction Zone earthquake?

8. What was it's estimated magnitude?

9. What was the date of the most recent major eruption of Mt. St. Helens (1 point each for year, month, day)?

10. When was the last significant eruption of Mt Hood (within a decade)?

1. Name two large rivers that form borders for Wasco County. (John Day, Deschutes)

2. Name four wildland fires in Wasco County that have been declared a Conflagration in the last five years? (Rowena, Government Flats Complex, Wassen Pond, Mosier Train derailment)

3. Wasco County has had 5 FEMA Disaster Declarations for flooding in the past century. In what years did these major floods hit? (1964, 1974, 1995, 1996, 2005-06)

4. How many tornados have been officially observed in Wasco County? (One)

5. Last winter how many consecutive days was there snow on the ground in The Dalles? (78?)

6. What was the previous record (Bonus Point – what year)? (29 in 1979)

7. When was the last Cascadia Subduction Zone earthquake? (Jan 26, 1700)

8. What was it's estimated magnitude? (Estimated 8.7-9.2)

9. What was the date of the most recent eruption of Mt. St. Helens? (May 18, 1980)

10. When was the last significant eruption of Mt Hood? (roughly 1790)

Gorge Radio - Bicoas...
4,798 likes

Like Page Share



Gorge Radio - Bicoastal
Media
21 hours ago

We're ready at our TD studio for all of the little trick-or-treaters!



- [Home](#)
- [News](#)
- [Events](#)
- [Listen Live](#)
- [Local & On-Demand](#)
- [Contact Us](#)
- [Holiday Shopping Spree](#)



Hood River Valley Eagles State Playoff Soccer
Live On Gorgeradio.com



« [Blasting To Delay I-84 Traffic Monday Afternoon](#)
[CGCC Forum Attendees Want New President To Be Active In Community](#) »

Wasco County Updating Natural Hazard Mitigation Plan

Published October 26, 2017

The Wasco County Planning Department is in the process of updating its Natural Hazard Mitigation Plan. The plan for Wasco County focuses on seven natural hazards: severe weather, drought, wildfire, flood, earthquake, volcano, and landslide. County Senior Planner Will Smith says they have been working on a number of action items since 2012, adding the committee working on the update said severe weather has become a top priority. Floods and droughts were the next two, along with wildfire. There will be an open house on the mitigation plan update called "Disasters and Donuts" this Monday from noon to 7 p.m. at the Wasco County Planning Department on 2705 East 2nd in The Dalles. People can provide feedback and give suggestions on natural hazard mitigation, along with enjoying donuts and screenings of disaster movies.



Copyright ©2017. All Rights Reserved.

July 27, 2017 NHMP Website (top)

The screenshot shows the top portion of the Wasco County website. At the top left, there is a language selector for 'ENG' and a search bar with the placeholder text 'TYPE TO BEGIN SEARCHING...'. The Wasco County logo is on the left, and a navigation menu with items like 'Home', 'How Do I? (FAQ)', 'Services', 'Departments', 'Businesses', and 'Visitors' is on the right. The main header features a large landscape image with the title 'Natural Hazards Mitigation Plan' in white text. Below the title is a breadcrumb trail: 'Home > Departments > Planning > Long Range > Notice Sent To All Property Owners In Wasco County > Natural Hazards Mitigation Plan'. On the right side, there is a vertical social media sharing bar with icons for Facebook, Twitter, Print, Email, Pinterest, and a plus sign for more options. The main content area is divided into two columns. The left column has a green box with 'Planning Home' and 'Wasco County 2040', and a dark brown box with 'Current Plans' listing 'Natural Hazards Mitigation Plan (2012)' and 'Community Wildfire Protection Plan (2005)', followed by 'Additional Resources' and 'FEMA Local Mitigation Handbook'. The right column contains two paragraphs of text explaining the mitigation planning process and the 2017 update, along with contact information for Will Smith, Associate Planner in the Planning Department.

VISIT THIS PAGE IN: **ENG** ▾

TYPE TO BEGIN SEARCHING... 🔍

WASCO COUNTY

Home How Do I? (FAQ) ▾ Services ▾ Departments ▾ Businesses ▾ Visitors ▾

Natural Hazards Mitigation Plan

Home > Departments > Planning > Long Range > Notice Sent To All Property Owners In Wasco County > Natural Hazards Mitigation Plan

Planning Home
Wasco County 2040

Current Plans

Natural Hazards Mitigation Plan (2012)
Community Wildfire Protection Plan (2005)

Additional Resources
FEMA Local Mitigation Handbook

The natural hazard mitigation planning process helps communities identify local policies and actions that can be implemented over the long term to reduce the impact of future losses from hazards. This is a joint effort to assess risks and form mitigation strategies for Wasco County, led by Emergency Management and Planning. Other partners include School Districts, Fire Districts, Public Works, the Soil and Water Conservation District, The Dalles, MCCOG, Oregon Department of Forestry, and more.

The 2017 Natural Hazard Mitigation Plan Update Steering Committee will meet several times this year and will have the updated plan complete by the beginning of 2018. Hazards being reviewed include droughts, earthquakes, flooding, wildland fires, landslides, severe local storms, tornadoes, and volcanoes. For more information, or if you would like to participate, please contact:

Will Smith, Associate Planner
Planning Department

July 27, 2017 NHMP Website (bottom)

[FEMA Local Mitigation Handbook](#)
[Oregon Pre-Disaster Mitigation Program Plan Update Training Manual](#)

Agenda and Minutes

Steering Committee
[February 1, 2017 Agenda](#)
[February 1, 2017 Minutes](#)
[March 23, 2017 Agenda](#)
[March 23, 2017 Minutes](#)

Take Our Survey

Help us better prepare for the future.
[Click here to take our survey](#)

Planning Department
wills@co.wasco.or.us
 541-506-2560 | Fax 541-506-2561
 2705 East Second Street | The Dalles, OR 97058

Juston Huffman, Emergency Manager
 Wasco County Sheriff's Office- [Emergency Management](#)
justonh@co.wasco.or.us
 541-506-2790 | Fax 541-506-2791
 511 Washington Street, Suite 102 | The Dalles, OR 97058

Help us better plan for the future. [Take our survey](#)

Wasco County Natural Hazards Mitigation Plan

What is it?
 The Wasco County Natural Hazards Mitigation Plan is a multi-jurisdiction plan that identifies policies and actions to help prepare for and mitigate natural hazards like fire, flood, and storms.

What's changing?
 The Steering Committee is working on updating many of the references, community details, and also formatting of material in the existing report. Many of the action items from the 2012 will also be updated to reflect progress, or shifting priorities.

Why update?



July 27, 2017 Emergency Management Website with NHMP Link

VISIT THIS PAGE IN: **ENG**

TYPE TO BEGIN SEARCHING...

WASCO COUNTY

Home How Do I? (FAQ) Services Departments Businesses Visitors

Emergency Management

Home > Departments > Emergency Management

- Emergency Info
- Community Preparedness
- Wildfire Planning
- Natural Hazards Mitigation Plan

Contact Us

Emergency Manager: Juston Huffman
541-506-2790

Wasco County's Emergency Management system requires coordination of activities to mitigate, prepare for, respond to and recover from natural or man-made 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.

August 3, 2017 NHMP Website

Current Plans

[Natural Hazards Mitigation Plan \(2012\)](#)
[Community Wildfire Protection Plan \(2005\)](#)

Additional Resources

[FEMA Local Mitigation Handbook](#)
[Oregon Pre-Disaster Mitigation Program Plan Update Training Manual](#)

Agenda and Minutes

Steering Committee
[February 1, 2017 Agenda](#)
[February 1, 2017 Minutes](#)
[March 23, 2017 Agenda](#)
[March 23, 2017 Minutes](#)
[July 25, 2017 Agenda](#)
[July 25, 2017 Minutes](#)

Take Our Survey

The 2017 Natural Hazard Mitigation Plan Update Steering Committee will meet several times this year and will have the updated plan complete by the beginning of 2018. Hazards being reviewed include droughts, earthquakes, flooding, wildland fires, landslides, severe local storms, tornadoes, and volcanoes. For more information, or if you would like to participate, please contact:

Will Smith, Associate Planner
Planning Department
wills@co.wasco.or.us
541-506-2560 | Fax 541-506-2561
2705 East Second Street | The Dalles, OR 97058

Juston Huffman, Emergency Manager
Wasco County Sheriff's Office- [Emergency Management](#)
justonh@co.wasco.or.us
541-506-2790 | Fax 541-506-2791
511 Washington Street, Suite 102 | The Dalles, OR 97058

Help us better plan for the future. [Take our survey](#)

Wasco County Natural Hazards Mitigation Plan

NATURAL HAZARDS MITIGATION PLAN TIMELINE



What is it?

The Wasco County Natural Hazards Mitigation Plan is a multi-jurisdiction plan that identifies policies and actions to help prepare for and mitigate natural hazards like fire, flood, and storms.



September 12, 2017 NHMP Website

Current Plans

Natural Hazards Mitigation Plan (2012)
Community Wildfire Protection Plan (2005)

Additional Resources

FEMA Local Mitigation Handbook
Oregon Pre-Disaster Mitigation Program Plan Update Training Manual

Conservation District, The Dalles, MCCOG, Oregon Department of Forestry, and more.

The 2017 Natural Hazard Mitigation Plan Update Steering Committee will meet several times this year and will have the updated plan complete by the beginning of 2018. Hazards being reviewed include droughts, earthquakes, flooding, wildland fires, landslides, severe local storms, tornadoes, and volcanoes.

For more information, or if you would like to participate, please contact:

Will Smith, Associate Planner
Planning Department
wills@co.wasco.or.us
541-506-2560 | Fax 541-506-2561
2705 East Second Street | The Dalles, OR 97058

Juston Huffman, Emergency Manager
Wasco County Sheriff's Office- [Emergency Management](#)
justonh@co.wasco.or.us
541-506-2790 | Fax 541-506-2791
511 Washington Street, Suite 102 | The Dalles, OR 97058

Help us better plan for the future. [Take our survey](#)

Agenda and Minutes

Steering Committee
February 1, 2017 Agenda
February 1, 2017 Minutes
March 23, 2017 Agenda
March 23, 2017 Minutes
July 25, 2017 Agenda
July 25, 2017 Minutes
August 31, 2017 Agenda
August 31, 2017 Minutes

Wasco County Natural Hazards Mitigation Plan

NATURAL HAZARDS MITIGATION PLAN TIMELINE



What is it?

The Wasco County Natural Hazards Mitigation Plan is a multi-jurisdiction plan that identifies policies and actions to help prepare for and mitigate natural hazards like fire, flood, and storms.

September 21, 2017 Preparedness Website with NHMP Link

VISIT THIS PAGE IN: **ENG** | TYPE TO BEGIN SEARCHING... | **f**

WASCO COUNTY | Home | How Do I? (FAQ) | Services | Departments | Businesses | Visitors

Community Preparedness

- Emergency Info
- Community Preparedness
- Wildfire Planning
- Natural Hazards Mitigation Plan

Related Links and Forms

- Earthquake
- Flood
- Wildfire

Home > Departments > Emergency Management > Community Preparedness

Natural Hazards Mitigation Plan

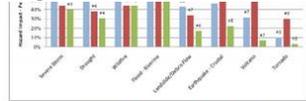
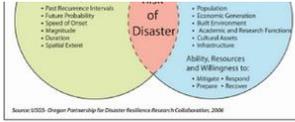
The Wasco County Planning Department and Wasco County Emergency Management would like Wasco County residents to assist with the update to our Natural Hazards Mitigation Plan. Please click [here](#) to answer a few questions concerning your family's level of preparedness.

Preparing for Disaster

The Wasco County Sheriff's Office Emergency Management Division uses an all-hazard, county-wide approach to minimize the impact of natural and human-caused emergency incidents or disasters.

Emergency Management identifies hazards, develops emergency response, recovery and mitigation plans and coordinates emergency and disaster response activities. Emergency Management coordinates with cities, special districts, community organizations and regional partners to promote emergency

October 3, 2017 NHMP Website with Public Meeting Information



Steering Committee Partners



**“DISASTERS AND DONUTS”
COMMUNITY OPEN HOUSE**
OCTOBER 30, 2017 | NOON - 7 P.M.
STOP BY ANY TIME!
WASCO COUNTY PLANNING DEPARTMENT
3701 EAST SECOND ST.
THE DALLES, OR 97108

**“DESASTRES Y DONAS”
CASA ABIERTA COMUNITARIA**
30 DE OCTUBRE DEL 2017 | 12 P.M. A 7 P.M.
VISITE A CUALQUIER HORA
DEPARTAMENTO DE PLANEACION DEL CONDADO DE WASCO
3701 EAST SECOND ST.
THE DALLES, OR 97108

Wasco County is updating one Natural Hazard Mitigation Plan and we need your help!

Mitigation is the effort to reduce loss of life and property by lessening the impact of disasters. (FEMA)

Come to our Open House to provide feedback about how Natural Hazards affect you or your organization, and give us suggestions on what we could do to mitigate these impacts – all while enjoying complimentary donuts, beverages, and refreshments of your favorite disaster movie!

For more information or to provide comment please contact:
Wendy Smith, Assistant Planner
Wasco County Planning
Phone: 541-356-2160
Email: wsmith@wasco.or.us

WASCO COUNTY'S NATURAL DISASTERS

- Severe Weather
- Drought
- Wildfire
- Flood
- Earthquake
- Volcano
- Landslide

For more information and to fill out our survey please visit:
http://www.co.wasco.or.us/departments/planning/long_range/natural_hazards_mitigation_plan.php

El Condado de Wasco está actualizando su Plan de Mitigación de Riesgos Naturales y necesitamos su ayuda!

La mitigación es el esfuerzo para reducir la pérdida de vidas y bienes al disminuir el impacto de los desastres. (FEMA)

Visite a nuestra Casa Abierta para dar sus opiniones sobre cómo los Peligros Naturales afectan a usted o a su organización, y dar sus sugerencias sobre lo que podríamos hacer para mitigar sus impactos. ¡Todo mientras disfrutamos de donuts, bebidas y refrescos de sus películas favoritas de desastres!

Para más información o para proporcionar comentarios, por favor contacte:
Wendy Smith, Planificadora Asistente
Departamento del Condado de Wasco
Teléfono: 541-356-2160
Correo electrónico: wsmith@wasco.or.us

DESASTRES NATURALES DEL CONDADO DE WASCO

- Clima Severo
- Sequía
- Fuegos Salvajes
- Inundación
- Terremoto
- Volcán
- Deslizamiento de Tierra

Para obtener más información y para completar nuestro cuestionario, visite http://www.co.wasco.or.us/departments/planning/long_range/natural_hazards_mitigation_plan.php



October 24, 2017 Wasco2040 Website with NHMP Information

DISASTERS AND DONUTS

OCT. 30 NOON-7PM 2705 E 2ND

Come to the Planning Office for Disasters and Donuts!

As part of the update to our Natural Hazards Mitigation Plan, Planning staff is hosting a community workshop on October 30th at the Planning Office from Noon until 7 PM. Come grab a donut, watch a disaster flick, and learn more about how we in Wasco County plan for Natural Hazards! Natural Hazards are a ...

<https://wasco2040.com/2017/10/24/come-to-the-planning-office-for-disasters-and-donuts/>

Upcoming Events

No events currently scheduled.

What is a Comprehensive Plan?

Wasco County Comp Plan Up...

What is a Resource Zone?

Oregon Resource Zones 101

December 5, 2017 NHMP Website

Community Wildfire Protection Plan
(2005)

Additional Resources

[FEMA Local Mitigation Handbook](#)
[Oregon Pre-Disaster Mitigation
Program Plan Update Training
Manual](#)

Agenda and Minutes

Steering Committee

[February 1, 2017 Agenda](#)

[February 1, 2017 Minutes](#)

[March 23, 2017 Agenda](#)

[March 23, 2017 Minutes](#)

[July 25, 2017 Agenda](#)

[July 25, 2017 Minutes](#)

[August 31, 2017 Agenda](#)

[August 31, 2017 Minutes](#)

[October 12, 2017 Agenda](#)

[October 12, 2017 Minutes](#)

[November 14, 2017 Agenda](#)

[November 14, 2017 Minutes](#)

and will have the updated plan complete by the beginning of 2018. Hazards being reviewed include droughts, earthquakes, flooding, wildland fires, landslides, severe local storms, tornadoes, and volcanoes. For more information, or if you would like to participate, please contact:

Will Smith, Associate Planner
Planning Department
wills@co.wasco.or.us
541-506-2560 | Fax 541-506-2561
2705 East Second Street | The Dalles, OR 97058

Juston Huffman, Emergency Manager
Wasco County Sheriff's Office- [Emergency Management](#)
justonh@co.wasco.or.us
541-506-2790 | Fax 541-506-2791
511 Washington Street, Suite 102 | The Dalles, OR 97058

Help us better plan for the future. [Take our survey](#)

Wasco County Natural Hazards Mitigation Plan

NATURAL HAZARDS MITIGATION PLAN TIMELINE



What is it?

The Wasco County Natural Hazards Mitigation Plan is a multi-jurisdiction plan that identifies policies and actions to help prepare for and mitigate natural hazards like fire, flood, and storms.

What's changing?



February 27, 2018 NHMP Website

Additional Resources

[FEMA Local Mitigation Handbook](#)
[Oregon Pre-Disaster Mitigation Program Plan Update Training Manual](#)

Agenda and Minutes

Steering Committee

[February 1, 2017 Agenda](#)

[February 1, 2017 Minutes](#)

[March 23, 2017 Agenda](#)

[March 23, 2017 Minutes](#)

[July 25, 2017 Agenda](#)

[July 25, 2017 Minutes](#)

[August 31, 2017 Agenda](#)

[August 31, 2017 Minutes](#)

[October 12, 2017 Agenda](#)

[October 12, 2017 Minutes](#)

[November 14, 2017 Agenda](#)

[November 14, 2017 Minutes](#)

[December 20, 2017 Agenda](#)

[December 20, 2017 Minutes](#)

Will Smith, Associate Planner

Planning Department

wills@co.wasco.or.us

541-506-2560 | Fax 541-506-2561

2705 East Second Street | The Dalles, OR 97058

Juston Huffman, Emergency Manager

Wasco County Sheriff's Office- [Emergency Management](#)

justonh@co.wasco.or.us

541-506-2790 | Fax 541-506-2791

511 Washington Street, Suite 102 | The Dalles, OR 97058

Help us better plan for the future. [Take our survey](#)

Wasco County Natural Hazards Mitigation Plan

NATURAL HAZARDS MITIGATION PLAN TIMELINE



What is it?

The Wasco County Natural Hazards Mitigation Plan is a multi-jurisdiction plan that identifies policies and actions to help prepare for and mitigate natural hazards like fire, flood, and storms.

What's changing?

The Steering Committee is working on updating many of the references, community details, and also formatting of material in the existing report. Many of the action items from the 2012 will also be



Current Plans

Natural Hazards Mitigation Plan (2012)

Community Wildfire Protection Plan (2005)

Additional Resources

FEMA Local Mitigation Handbook

Oregon Pre-Disaster Mitigation Program Plan Update Training Manual

Agenda and Minutes

Steering Committee

February 1, 2017 Agenda

February 1, 2017 Minutes

March 23, 2017 Agenda

March 23, 2017 Minutes

July 25, 2017 Agenda

July 25, 2017 Minutes

August 31, 2017 Agenda

August 31, 2017 Minutes

July 13, 2018 NHMP Website

can be implemented over the long term to reduce the impact of future losses from hazards. This is a joint effort to assess risks and form mitigation strategies for Wasco County, led by Emergency Management and Planning. Other partners include School Districts, Fire Districts, Public Works, the Soil and Water Conservation District, The Dalles, MCCOG, Oregon Department of Forestry, and more.

Final drafts of several sections are available for your review. Please send any comments to Will Smith at the email or address listed below.

- [Section 2: Risk Assessment](#)
- [Section 3: Mitigation Strategies](#)
- [Section 4: Plan Implementation and Maintenance](#)
- [Appendix A: Action Items](#)
- [Small Cities Addendum](#)
- [City/Special District Addendum](#)

Will Smith, Associate Planner
 Planning Department
wills@co.wasco.or.us
 541-506-2560 | Fax 541-506-2561
 2705 East Second Street | The Dalles, OR 97058

Juston Huffman, Emergency Manager
 Wasco County Sheriff's Office- [Emergency Management](#)
justonh@co.wasco.or.us
 541-506-2790 | Fax 541-506-2791
 511 Washington Street, Suite 102 | The Dalles, OR 97058



Wasco County Natural Hazards

July 17, 2018 County Homepage Banner Featuring NHMP

Secure | co.wasco.or.us/index.php

VISIT THIS PAGE IN: ENG

TYPE TO BEGIN SEARCHING...

WASCO COUNTY

Home How Do I? (FAQ) Services Departments Businesses Visitors

Concerned about natural hazards?

The Natural Hazards Mitigation Steering Committee has finalized a draft of the new five year plan. Staff is currently looking for any citizen feedback on the drafts. Click on the Learn More button to see the plan and provide a response.

LEARN MORE

August 2, 2018 Wasco County Facebook Page Featuring NHMP Event

Wasco Planners
Just now · 🌐

Wasco County Planning works to prevent or reduce impact from natural hazards, like fire, through a variety of techniques including fire protection standards and education. We are finalizing edits to the updated, multi-jurisdictional Wasco Natural Hazards Mitigation Plan and would love your input. For more check out:



CO.WASCO.OR.US
Natural Hazards Mitigation Plan
The natural hazard mitigation planning process helps communities identify local policies and actions that can be implemented over the long term to reduce the impact of future losses from

👍 Like 💬 Comment ➦ Share

September 12, 2018 NHMP Website (top)

Not secure | cms5.revize.com/revize/wascocounty/departments/planning/long_range/natural_hazards_mitigation_plan.php#contact_rz163

Natural Hazards Mitigation Plan

Community Planning Assistance for Wildfire Program

Current Plans

- Natural Hazards Mitigation Plan (2012)
- Community Wildfire Protection Plan (2005)
- Additional Resources
 - FEMA Local Mitigation Handbook
 - Oregon Pre-Disaster Mitigation Program Plan Update Training Manual
 - Climate Change Influence on Natural Hazards in Eight Oregon Counties (2018)
 - Wasco County Future Projections Report
 - Wasco County Natural Hazard Risk Report

The natural hazard mitigation planning process helps communities identify local policies and actions that can be implemented over the long term to reduce the impact of future losses from hazards. This is a joint effort to assess risks and form mitigation strategies for Wasco County, led by Emergency Management and Planning. Other partners include School Districts, Fire Districts, Public Works, the Soil and Water Conservation District, The Dalles, MCCOG, Oregon Department of Forestry, and more.

Final drafts of several sections are available for your review. Please send any comments to Will Smith at the email or address listed below.

- [Section 2: Risk Assessment](#)
- [Section 3: Mitigation Strategies](#)
- [Section 4: Plan Implementation and Maintenance](#)
- [Appendix A: Action Items](#)
- [Small Cities Addendum](#)
- [City/Special District Addendum](#)

Will Smith, Associate Planner
Planning Department
wills@co.wasco.or.us
541-506-2560 | Fax 541-506-2561
2705 East Second Street | The Dalles, OR 97058

Juston Huffman, Emergency Manager
Wasco County Sheriff's Office- [Emergency Management](#)
justonh@co.wasco.or.us
541-506-2790 | Fax 541-506-2791
511 Washington Street, Suite 102 | The Dalles, OR 97058



September 12, 2018 NHMP Website (bottom)

Not secure cms5.revize.com/revize/wascocounty/departments/planning/long_range/natural_hazards_mitigation_plan.php#contact_rz163

511 Washington Street, Suite 102 | The Dalles, OR 97058

Wasco County Natural Hazards Mitigation Plan

Agenda and Minutes

Steering Committee

[February 1, 2017 Agenda](#)

[February 1, 2017 Minutes](#)

[March 23, 2017 Agenda](#)

[March 23, 2017 Minutes](#)

[July 25, 2017 Agenda](#)

[July 25, 2017 Minutes](#)

[August 31, 2017 Agenda](#)

[August 31, 2017 Minutes](#)

[October 12, 2017 Agenda](#)

[October 12, 2017 Minutes](#)

[November 14, 2017 Agenda](#)

[November 14, 2017 Minutes](#)

[December 20, 2017 Agenda](#)

[December 20, 2017 Minutes](#)

[September 5, 2018 Agenda](#)

[September 5, 2018 Minutes](#)

NATURAL HAZARDS MITIGATION PLAN TIMELINE

What is it?

The Wasco County Natural Hazards Mitigation Plan is a multi-jurisdiction plan that identifies policies and actions to help prepare for and mitigate natural hazards like fire, flood, and storms.

What's changing?

The Steering Committee is working on updating many of the references, community details, and also formatting of material in the existing report. Many of the action items from the 2012 will also be updated to reflect progress, or shifting priorities.

Why update?

Wasco County is required by FEMA to update the Natural Hazards Mitigation Plan every five years.

Natural Hazard

Potential Catastrophic and Chronic Physical Events

- Past Recurrence Interval
- Future Probability
- Speed of Onset
- Magnitude
- Duration
- Spatial Extent

Vulnerable System

Exposure, Sensitivity and Resilience of:

- Population
- Economic Generation
- Built Environment
- Academic and Research Functions
- Cultural Assets
- Infrastructure

Risk of Disaster

Figure 2.6: Hazard Impact Rankings – Wasco County

Appendix C: Community Profile

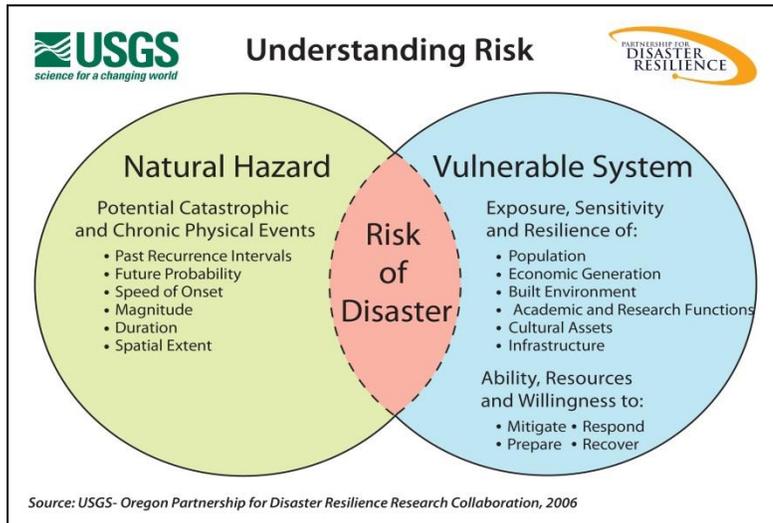
The following section describes Wasco County from a number of perspectives in order to help define and understand its sensitivity and resilience to natural hazards. Sensitivity and resilience indicators are identified through the examination of community capitals which include natural environment, socio-demographic 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 AB*. 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.

C.1 Understanding Risk



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

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 63% of the land is privately owned (roughly 966,634 acres), whereas 33.8% of the land is owned by the Federal Government (roughly 518,664 acres), 2.8% by the State of Oregon (roughly 43,382 acres) and .3% by local government (roughly 5,434 acres).³ Most of the land owned by BLM is adjacent to the Deschutes and John Day rivers, while US Forest Service land is limited to the Mt Hood National Forest. A majority (approximately 98% of non-scenic area lands) 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

² Allan, Stuart et al., *Atlas of Oregon*. Pg. 83.

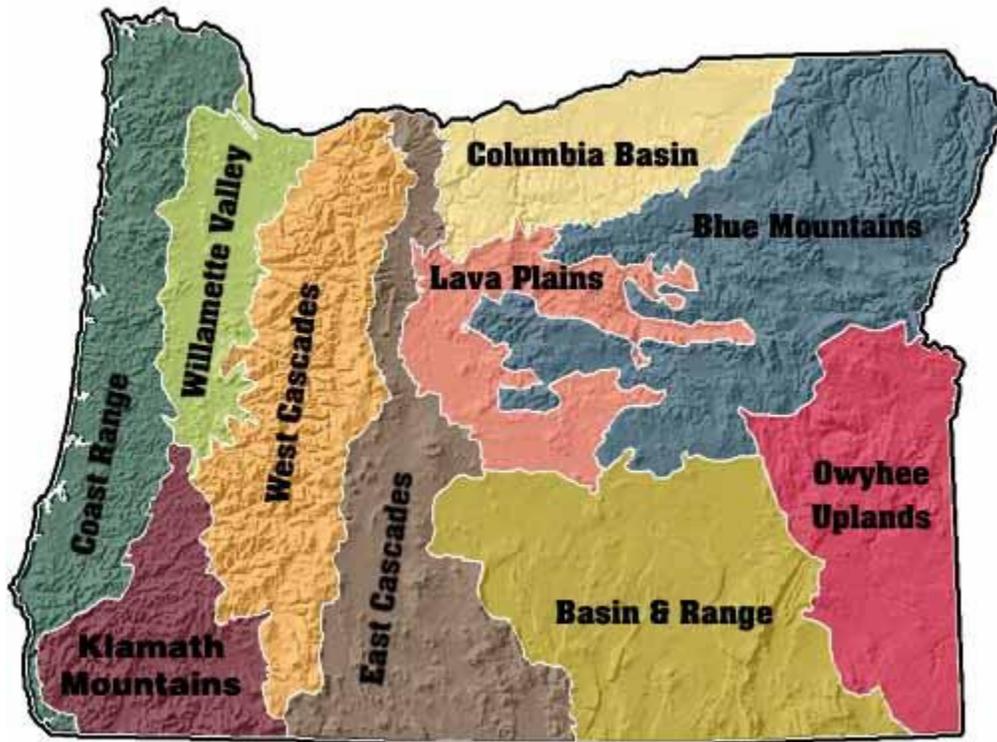
³ Wasco County Assessor Data, August 2017

⁴ Census Bureau, 2010 Census, Oregon's 68 Urban Areas

⁵ Western Oregon University. *Oregon Physiographic Provinces*. "Deschutes-Columbia Plateau". 1999. http://www.wou.edu/las/phisci/taylor/eisi/orr_orr2.PDF.

long and 100 miles wide, the Columbia Basin merges with the 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.³

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 BASINS⁷: 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

⁶ Ibid.

⁷ Environmental Protection Agency. “Ecoregions of Oregon.” ftp://ftp.epa.gov/wed/ecoregions/or/or_front.pdf.

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 Columbia River water to this region, allowing the conversion of large areas into agriculture.

UMATILLA PLATEAU⁸: 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.

DESCHUTES/JOHN DAY CANYONS⁹: 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.

OAK/CONIFER FOOTHILLS¹⁰: 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.

GRAND FIR MIXED FOREST¹¹: 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.

CASCADE CREST MONTANE FOREST¹²: 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.

JOHN DAY/CLARNO UPLANDS¹³: this semiarid ecoregion forms a ring of dry foothills surrounding the western perimeter of the Blue Mountains. Highly dissected hills, palisades, and colorful ash

⁸ Ibid.

⁹ Ibid.

¹⁰ Ibid.

¹¹ Ibid.

¹² Ibid.

¹³ Ibid.

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 suppression, and grazing pressure.

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

¹⁴ Center for Columbia River History. "Columbia River". Written by: Bill Lang Professor of History Portland State University, Former Director, Center for Columbia River History. <http://www.ccrh.org/river/history.htm>.

¹⁵ Ibid.

¹⁶ National Oceanic and Atmospheric Administration. Northwest Regional Office. "Columbia/Snake Basin". <http://www.nwr.noaa.gov/Salmon-Hydropower/Columbia-Snake-Basin/>.

two important river preservation programs: the National Wild and Scenic 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 90% of the stream 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 rights to more water than the rivers actually carry, causing parts of the Deschutes and many other rivers to nearly run dry during the 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 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,

¹⁷ U.S. Department of Interior. Bureau of Land Management. "John Day River". <http://www.blm.gov/or/resources/recreation/johnday/>.

¹⁸ Public Announcement. John Day River Update, May 2010. http://www.blm.gov/or/districts/prineville/plans/files/jdr_update_may2010.pdf.

¹⁹ Oregon Environmental Council. "Deschutes River." <http://www.oeconline.org/our-work/rivers/cleaner-rivers-for-oregon-report/deschutes-river>.

²⁰ Deschutes River Conservancy. "Lower Deschutes." http://www.deschutesriver.org/Our_Basin/Lower_Deschutes/default.aspx.

²¹ Oregon Environmental Council. "Deschutes River." <http://www.oeconline.org/our-work/rivers/cleaner-rivers-for-oregon-report/deschutes-river>.

precipitation and snowfall in the City of the Dalles. From 1981 to 2010, the average annual precipitation in The Dalles equaled 14.6 inches per year. Snowfall amounts averaged 19.8 inches per year with the highest amounts occurring in December and January; however these snowfall averages in the table below are from over a hundred years of observation, and thus may not be representative of current climate trends.

Table C.1: Period of Record General Climate Summary, The Dalles, OR

Month	Mean Maximum Temperature (deg F)	Mean Minimum Temperature (deg F)	Mean Temperature (deg F)	Mean Precipitation (inches)	Average Snowfall (inches)
January	43.4	29	36.2	2.6	9.6
February	49.3	29.5	39.4	1.8	2.9
March	58.3	34.4	46.3	1.2	0.7
April	65.4	39.2	52.3	0.8	0
May	73.4	46.3	59.8	0.7	0
June	80	52.5	66.3	0.5	0
July	88.2	57.8	73	0.2	0
August	88.5	56.7	72.6	0.3	0
September	81.3	48.7	65	0.4	0
October	67.6	39.3	53.4	0.9	0
November	51.9	33.4	42.6	2.1	2.1
December	42.1	28.7	35.4	3.1	4.5
Annual	65.8	41.4	53.6	14.6	19.8

Source: Western Regional Climate Center, Western US Climate Historical Summaries, <http://www.wrcc.dri.edu/CLIMATEDATA.html> – Temperature and precipitation data (1981-2010), snowfall data (1893-2011)

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 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 in size 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.

Socio Demographic Capacity

Population

The Population Research Center estimates the population of Wasco County in 2016 equaled 26,553. It is estimated that Oregon’s population increased by 1.13% from 2015 to 2016. Wasco County experienced an increase of 0.8% during the same time period. The county is primarily rural and as of 2010, the twenty-second most populated in the State of Oregon. The population of the county is slightly larger than neighboring Hood River County and Jefferson Counties, and significantly larger than neighboring Sherman, Gilliam and Wheeler counties. Table C.2 describes the population change for these communities between 2010 and 2016.

Table C.2: Regional Change in County Populations:

County	Population Estimates base, April 1, 2010 (V2016)	Population Estimates base, July 1, 2016 (V2016)	Population Change (2010-2016)	Percent Change April 1, 2010 to July 1, 2016	Annual Growth Rate
Wasco	25,211	26,553	1342	5.3%	0.8%
Clackamas	375,998	408,062	32064	8.5%	1.4%
Gilliam	1,873	1,854	-19	-1.0%	-0.17%
Hood River	22,346	23,232	886	4.0%	.67%
Jefferson	21,719	23,080	1361	6.3%	1.05%
Sherman	1,766	1,710	-56	-3.2%	-0.53%
Wheeler	1,439	1,344	-95	-6.6%	-1.1%
Oregon	3,831,072	4,093,465	262,392	6.8%	1.13%

Source: U.S. Census Bureau, 2010 Census, 2016 estimates, Wasco County estimates from PSU Population Research Forecast Report

The largest populated area in Wasco County is The Dalles, where just 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 county as a whole. The Dalles and Mosier, both located along the Columbia River and Interstate 84, had a larger 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. 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.

Table C.3: Change in Wasco County Population

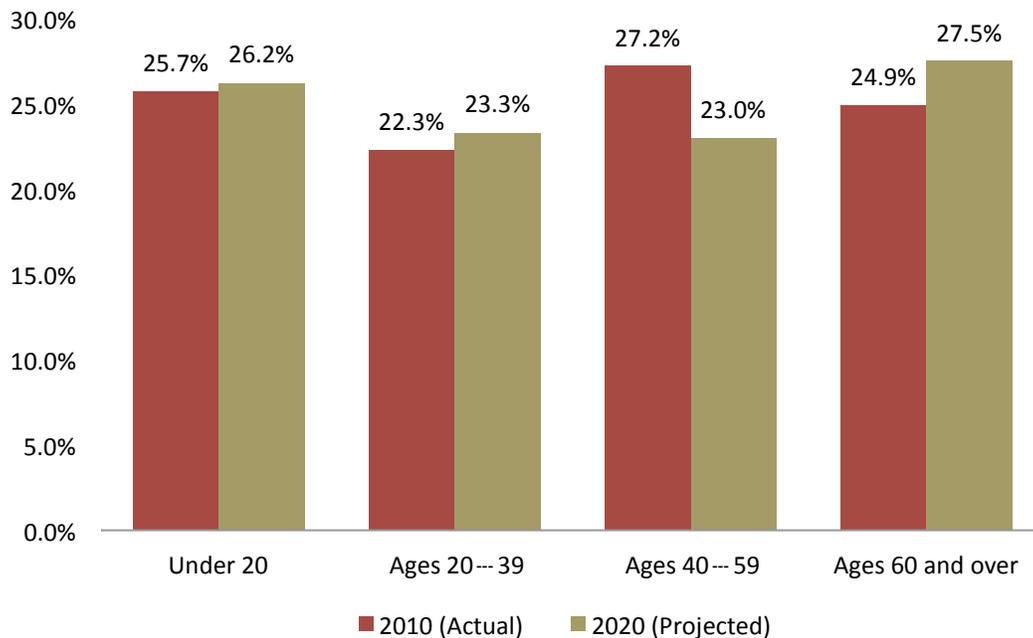
Jurisdiction	2010	2016	2035	Annual Growth Rate Forecast (2016-2035)
Antelope	46	51	51	0.0%
Dufur	610	611	618	0.1%
Maupin	421	428	452	0.3%
Mosier	441	456	561	1.1%
Shaniko	36	36	36	0.0%
The Dalles	15,792	16,823	20,208	1.0%
Unincorporated	7,867	8,147	9,000	0.5%
Wasco County	25,213	26,553	30,928	0.8%

Source: U.S. Census Bureau 2010 Census, Forecast by Population Research Center (PSU)

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 2010, nearly a quarter (24.9%) of the population in the county was over the age of 60, compared to 20.1% of the population for Oregon as a whole. In addition, the Office of Economic Analysis (OEA) projects that from 2010 to 2020 the percent of the county’s population under the age of 20 and over the age of 60 will increase and make up more than fifty percent of the population.

Figure C.3: Wasco County Population by Age, 2010 and 2020

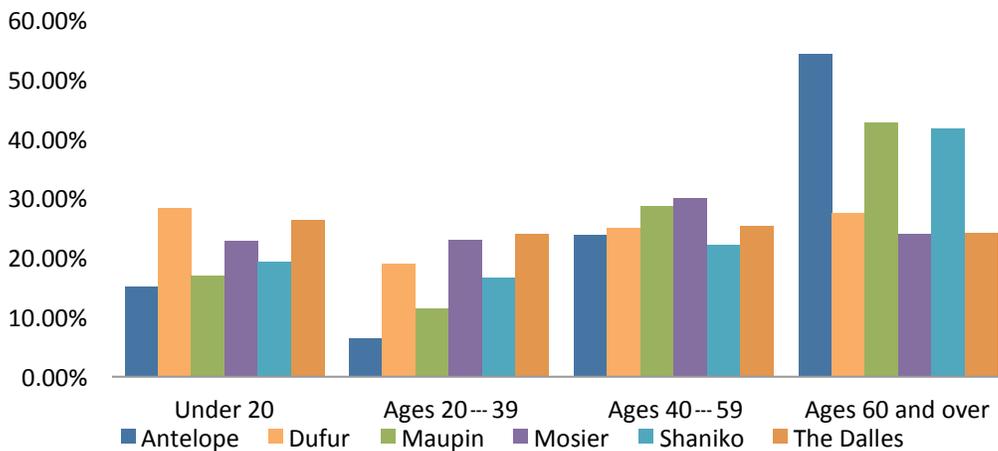


Source: 2010 (Actual), U.S. Census Bureau, 2010 Census, 2020 (Projected) Population Research Center

Figure C.4 illustrates the percentage of population by various age groups in the incorporated communities of Wasco County. The Dalles and Dufur have the highest percentage of residents under the age of 20 and lower percentages of residents over the age of 60 compared to the

county overall. A larger youth population in an area will increase the importance of outreach to schools and parents on effective ways to teach children about fire safety, earthquake response, and evacuation plans. Children are also more vulnerable to the heat and cold, have few transportation options and require assistance to access medical facilities.²² The City of Mosier has a very even age distribution, while the cities of Antelope, Maupin and Shaniko have significantly larger proportions of people age 60 and over in their populations. 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. Additionally, older populations may require special medical equipment or medications and can lack the social and economic resources needed for post-disaster recovery.²³

Figure C.4: Wasco County City Population Distribution by Age, 2010



Source: U.S. Census Bureau, 2010 Census

Table C.4: Wasco County High Risk Populations

High Risk Households	Wasco County	Percent	Dufur	Percent	Maupin	Percent
Total households	10,031		244		199	
Households with individuals under 18	2,937	29.3%	81	33.20%	39	19.6%
Single householder with own children under 18	889	8.9%	16	6.50%	8	4.0%
Households with individuals 65 years and over	3,094	30.8%	87	35.70%	87	43.7%
Householder 65 years and over living alone	1,249	12.5%	34	14%	42	21.1%

Source: U.S. Census Bureau, 2010 Census, American FactFinder, DP-1

²² State of Oregon Natural Hazards Mitigation Plan, Region 4 Southwest Oregon Regional Profile.

²³ Wood, Nathan. Variations in City Exposure and Sensitivity to Tsunami Hazards in Oregon. U.S. Geological Survey, Reston, VA, 2007.

Other important considerations for high risk populations are the number of households where persons over the age of 64 live alone as well as single parent households with children under 18. Tables C.4 and C.5 describe the high risk populations in each jurisdiction within the county for which data is available. Over 30% of the 10,031 households in the county have individuals living in them who are 65 or older, and nearly half of those are 65 or older householders that live alone. Additionally, 8.9% of the households in the county are occupied by single parents with children under the age of 18. These groups are 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.²⁴

Table C.5: Wasco County High Risk Populations

High Risk Households	Mosier	Percent	The Dalles	Percent
Total households	203		5,472	
Households with individuals under 18	49	24.1%	1,659	30.3%
Single householder with own children under 18	16	7.9%	545	10.0%
Households with individuals 65 years and over	54	26.6%	1,654	30.2%
Householder 65 years and over living alone	23	11.3%	770	14.1%

Source: U.S. Census Bureau, 2010 Census, American FactFinder, DP-1

Race

The impact following a disaster in terms of losses and the ability of the community to recover may also vary among minority population groups. Studies have shown that racial and ethnic minorities can be more vulnerable to natural disaster events. 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.²⁵ Table C.6 describes the population in Wasco County by race and ethnicity.

²⁴ Source: Wasco County HIVA, July 2008

²⁵ State of Oregon Natural Hazards Mitigation Plan, Region 5 Mid-Columbia Regional Profile.

Table C.6: Wasco County Racial Composition (based off of 2016 estimates)

Race	Count	Percent
Total Population	26,115	
One Race	25488	97.6%
White	23765	91.0%
Black or African American	183	0.7%
American Indian or Alaska Native	1149	4.4%
Asian	287	1.1%
Native Hawaiian and other Pacific	209	.8%
Other race	1,311	5.2%
Two or more races	640	2.4%

Source: U.S. Census Bureau, 2016 estimates, QuickFacts

Table C.7: Wasco County Hispanic Ethnicity

Hispanic or Latino Origin	Count	Percent
Total Population	26115	
Hispanic or Latino (of any race)	4544	17.4%
Not Hispanic or Latino	21,571	82.6%

Source: U.S. Census Bureau, 2016 estimates

The minority population in Wasco County is larger than several surrounding counties. The U.S. Census reports that over 9% of the Wasco County population identifies with a non-white race. Similarly, over 17% of the population is of Hispanic or Latino origin. Culturally appropriate and effective outreach includes both methods and messaging targeted to this diverse audience. For example, connecting to historically disenfranchised populations through trusted sources or providing preparedness handouts and presentations in the languages spoken by the population can increase community resilience.

Education

Educational attainment of community residents is also an influencing factor in socio demographic capacity. Tables C.8 and C.9 describe 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, roughly 12% less, a 5% decrease since 2010.

Table C.8: Wasco County Educational Attainment

Educational Attainment	Percent
Population 25 and over	
High school graduate or higher	84.8%
Bachelor's degree or higher	18.7%

Source: U.S. Census Bureau, 2011-2015, QuickFacts

Table C.9: Oregon Educational Attainment

Educational Attainment	Percent
Population 25 and over	
High school graduate or higher	89.8%
Bachelor's degree or higher	30.8%

Source: U.S. Census Bureau, 2011-2015, QuickFacts

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. An oversaturation of either highly educated residents or low educational attainment can both 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.²⁶ Figure C.5 illustrates changes in the median household income from 2005 to 2010 in Wasco and surrounding Counties. In 2010 the median household income across Wasco County equaled \$41,711, roughly \$5,000 lower than Oregon as a whole. However, the county's 9.5% growth in income between 2005 and 2010 is greater than the 8.1% growth indicated by the state over the same period of time.

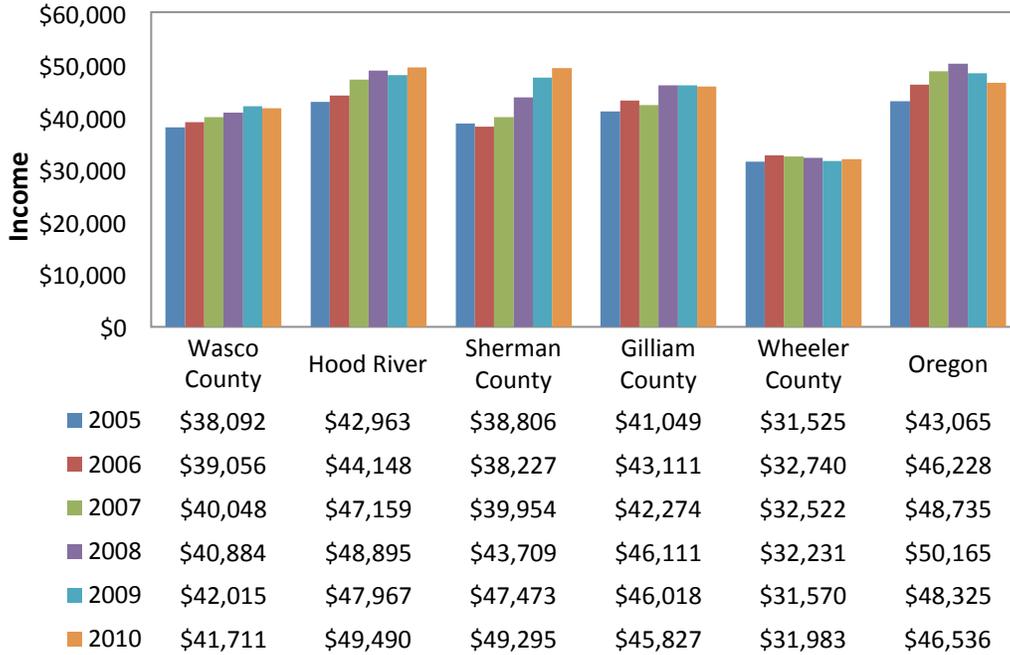
Estimates for 2011-2015 indicate an increasing gap between median household income in Wasco County and statewide; US Census estimates the median household income in 2015 for Wasco County at \$43,422 while for the state it was \$51,243, or a difference of \$7,821. By comparison, Hood River County's estimated median household income in 2015 was \$55,827.

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.10 identifies both the number and the percentage of individuals living below the poverty level. In 2010, the national poverty guideline for a family of four equaled income levels at or below \$22,050.²⁷

²⁶ State of Oregon Natural Hazards Mitigation Plan, Region 4 Southwest Oregon Regional Profile.

²⁷ U.S. Department of Health and Human Services. *Federal Register*, Vol. 75, No. 148, August 3, 2010, pp. 45628–45629

Figure C.5: Median Household Income, 2005-2010



Source: U.S. Census Bureau, Small Area Estimates Branch, 2005-2010

The Census Bureau estimated in 2010 that 15.7% of the total population and 23.5% of children live below the poverty level across the county. Poverty levels of all ages increased by .3% since between 2010 and 2015, according to the US Census. Poverty limits the ability of households to engage in household level mitigation activities. In addition, the higher the poverty rate, the more assistance the community will likely need in the event of a disaster in the form of sheltering, medical assistance and transportation. Notably, the poverty estimates as a percentage are consistently higher in Wasco County compared to state and national averages, with the exception of poverty among all ages in 2010.

Table C.10: Individuals Living Below Poverty Level

	2005 Percent Poverty All	2010 Percent Poverty All	2017 Percent Poverty All	2005 Percent Poverty Under 18	2010 Percent Poverty Under 18	2017 Percent Poverty Under 18
Wasco County	14.7%	15.7%	16.2%	23.8%	23.5%	22.6%
Oregon	14.1%	15.8%	15.8%	18.8%	21.7%	21.6%
United States	13.3%	15.3%	13.5%*	18.5%	21.6%	

Source: U.S. Census Bureau, Small Area Estimates Branch, 2005 Estimates, 2010 Estimates, State of Oregon DHS 2017 Data (<http://www.oregon.gov/DHS/ASSISTANCE/Branch%20District%20Data/June%202017.pdf>), *Estimate 2015 US Census

Additionally, the number of school children eligible to receive free or reduced lunch has fluctuated but increased by 3.6% from 2010 to 2016. As shown in Table C.11 below, more than half of the students in the county have qualified for the lunch program over the past five years, with 63% qualifying in 2016. As of June 2017, 19.6% of Wasco County residents were receiving

Supplemental Nutrition Assistance (SNAP). This figure represents a 2% decrease from August 2010 levels.

Table C.11: Wasco County Free or Reduced Price School Lunch Eligibility

	2005	2006	2007	2008	2009	2010	2016
Percent of children eligible to receive free/reduced lunch during the school year	58.0%	55.3%	51.5%	56.2%	55.6%	60.0%	63.6%

Source: Children First for Oregon, Status of Oregon's Children, 2005-2010, Oregon Department of Education 2016

Health and Safety

Individual and community health play an integral role in community resiliency. It is recognized that those who lack health insurance have higher vulnerability to hazards and will likely require additional community support and resources. Table C.12 identifies health insurance coverage across Wasco County. The Census Bureau estimates in 2009 that the number of uninsured residents in Wasco County under the age of 65 equaled 4,251, roughly 21.8%. 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. The rates of uninsured dropped between 2009 and 2015 as a result of the national Affordable Care Act and some state changes to the Oregon Health Plan for persons under the age of 19.

Table C.12: Wasco County Health Insurance Coverage

		Percent Uninsured --- Under Age 65	Margin of Error	Percent Uninsured --- Under Age 19
2005	Wasco County	19.9%	+/-2.8%	n/a
	Oregon	18.7%	+/-0.9%	n/a
2006	Wasco County	21.6%	+/-2.6%	16.1%
	Oregon	19.1%	+/-0.9%	12.9%
2007	Wasco County	22.3%	+/-2.5%	17.5%
	Oregon	18.8%	+/-0.9%	12.8%
2008	Wasco County	22.6%	+/-1.9%	17.4%
	Oregon	18.0%	+/-0.4%	12.3%
2009	Wasco County	21.8%	+/-1.7%	13.6%
	Oregon	19.4%	+/-0.4%	11.0%
2015	Wasco County	15.0%-10.0%	+/-5%	10.0%
	Oregon	8.0%	+/-2.0%	2.3%

Source: U.S. Census Bureau, Small Area Health Insurance Estimates, 2005-2009, 2014-2015, Oregon Health Authority 2015 (<http://www.oregon.gov/oha/HPA/ANALYTICS/InsuranceData/2015-Time-Trends-Fact-Sheet.pdf>)

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 immediately following a major disaster. There are a total of 22 full time sworn officers in the city of The Dalles Police Department including administration, and the Wasco County Sheriff's Office has 17 full time sworn officer positions. As shown in Table C.13 below, the rate of sworn police

officers per 1,000 people in Wasco County is essentially the same as the rate throughout the entire state. Similarly, the American Medical Association identifies that there are nearly two physicians in patient care per 1,000 people, about one fifth less than the state as a whole.

Table C.13: Wasco County Physicians and Sworn Police Officers

		Wasco County	Oregon
2010	Number of Sworn Police Officers	39	6,035
	Rate per 1,000 population	1.6	1.6
2009	Number of Physicians	50	9,609
	Rate per 1,000 population	2.0	2.5

Source: Wasco County Sheriff's Office; The City of The Dalles Police Department; Federal Bureau of Investigation, Uniform Crime Reports, Updated: November 17, 2010; American Medical Association, Physician Characteristics and Distribution in the US, Update: February 24, 2011.

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 current status of socio demographic capacity 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.14 shows that between 2009 and 2015 the median household income in Wasco County has risen at 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.14: Median Household Income, 2009 and 2015

	2009	2015	Change
Wasco County	\$42,015	\$43,422	\$1,407
Oregon	\$48,325	\$51,243	\$2,918
United States	\$50,221	\$66,011	\$15,790

Source: U.S. Census Bureau: State and County Quick Fact – 2010 Census; American FactFinder – 2015 ACS

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. 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 17³⁰, in the middle tier of Oregon’s 36 counties.

Table C.15: County Hachman Index Scores and Ranks

County	2016 Hachman Index Score	2016 State Rank	2012 State Rank
Wasco	0.375	17	16
Clackamas	0.858	1	1
Gilliam	0.050	35	32
Hood River	0.291	25	22
Jefferson	0.135	30	35
Sherman	0.035	36	36
Wheeler	0.149	29	29

Source: Oregon Employment Department, Quarterly Census of Employment and Wages, 2017

While illustrative, economic diversity is not a guarantor of economic vitality or resilience. For example as of 2017, though Sherman County is ranked number 36 in the state for economic diversity, it is listed as “non-distressed” by the Oregon Business Development Commission. Similarly, neighboring Hood River County, ranked 25 in terms of economic diversity, is also listed as non-distressed, while Wasco County ranked at 17 is identified as distressed. The economic distress measure is based on indicators of decreasing new jobs, average wages and income, and is associated with an increase of unemployment.

Employment and Wages

Data provided by the US Census in the 2010 American Community Survey indicate that Wasco County’s labor force (defined as the population of 16 and older which are in the labor force) decreased from 14,320 to 11,987 between 2010 and 2015.³²

Following regional, state and national trends post-recession (see Figure C.6), Wasco County’s unemployment rate dropped 3.1 percentage points between 2011 and 2015, according to the Oregon Employment Department.³³ Many surrounding Counties in the region have remained below the state average over the past four years. According to State local area unemployment statistics, the unemployment rate in Wasco County has continued to drop since 2015 to 4.4% in June 2017 (see Figure C.6).

Table C.16: Regional Unemployment

	2011 Unemployment Rate	2015 Unemployment Rate	Percent Change from 2011
Wasco	8.4	5.3	-36.9%
Clackamas	8.7	5.3	-39.0%
Gilliam	6.5	5.2	-20%
Hood River	7.7	3.5	-54.5%
Jefferson	13.1	8.0	-38.9%
Sherman	9	4.3	-52.2%
Wheeler	9.7	4.3	-55.7%
Oregon	9.5	5.8	-38.9%

Source: 2011 Oregon Employment Department, “Local Area Employment Statistics”.
<http://www.qualityinfo.org/olmisj/labforce.>, 2015 American FactFinder

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.³⁶ 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 of fall and winter in the region.

³⁰ Oregon Employment Department – 2016 Hachman Index Scores by County

³¹ Business Oregon – Oregon Economic Data “Distressed Communities List”

³² American Community Survey Fact Finder

³³ Ibid.

³⁴ Oregon Employment Department – “Current Employment Statistics”,

<http://www.qualityinfo.org/olmisj/CES>

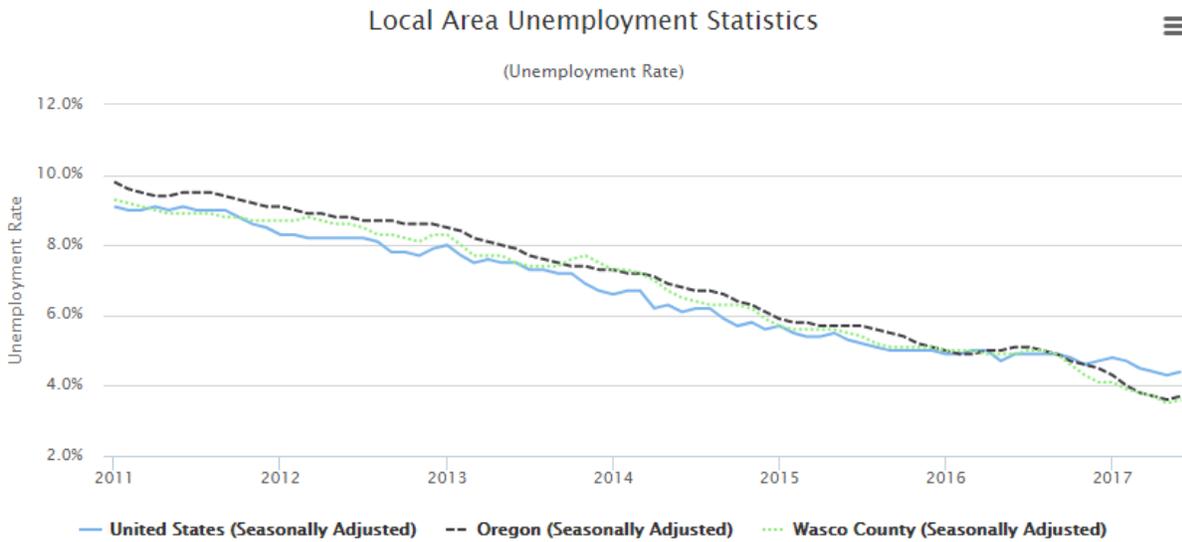
³⁵ Oregon Employment Department – “Local Area Employment Statistics”

<http://www.qualityinfo.org/olmisj/labforce>

³⁶ Oregon Employment Department, “Local Area Employment Statistics”,

<http://www.qualityinfo.org/olmisj/labforce>

Figure C.6: Seasonally Adjusted Unemployment Rates, 2011-2017



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.17 displays the County Covered Employment and payroll figures for Wasco and surrounding Counties in 2016.

Table C.17: 2016 County Covered Employment and Payroll

County	Employees	Annual Payroll	Average Pay
Wasco	11,912	\$452,945,117	\$38,024
Hood River	13,287	\$484,020,772	\$36,428
Sherman	845	\$38,341,478	\$45,374
Gilliam	778	\$30,632,810	\$39,373
Wheeler	287	\$8,460,577	\$29,479
Oregon	1,841,5433	\$91,095,669,122	\$49,467

Source: Oregon Employment Department, County Covered Employment and Wages.

In 2015, there were 692 employment establishments operating in Wasco County, and many of those establishments had fewer than 20 employees.³⁷ 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.³⁸

³⁷ U.S. Census Bureau – 2015 County Business Patterns

³⁸ State of Oregon Natural Hazards Mitigation Plan, Region 4 Southwest Oregon Regional Profile

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.³⁹

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.⁴⁰

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.⁴¹ 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.⁴²

³⁹ Ibid.

⁴⁰ Ibid.

⁴¹ Ibid.

⁴² OR-SNHRA: (Region 5) Mid-Columbia

Table C.18 identifies Covered employment in Wasco County by industry. The four industries with the most employees, as of 2016, are government (17.9%), education and health services (18.6%), natural resources and mining (14%) and retail (13.9%). 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 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 greatly damaged.

Table C.18: 2016 Total Covered Employment by Industry

Industry	Number Employed	Percent of Employment
Government	2,136	17.9%
Education and Health Services	2,223	18.6%
Natural Resources and Mining	1,674	14%
Retail	1,663	13.9%
Leisure and Hospitality	1,338	11.2%
Manufacturing	749	6.3%
Professional and Business Services	510	4.3%
Other Services	492	4.1%
Construction	311	2.6%
Financial Activities	269	2.2%
Wholesale	149	1.2%
Transportation, Warehousing & Utilities	172	1.4%
Information	225	1.8%
Private Non---Classified	1	--
Total	11,912	

Source: Oregon Employment Department, Wasco County 2016 Covered Employment and Wages.

The Oregon Employment Department estimates net employment growth between 2006 and 2016. In that time period, two of the county's four largest industries (not including agriculture), retail, along with education and health services, experienced employment growth (110 jobs and 730 jobs respectively). Four industries experienced net losses during the time period: government (80 jobs) information (70 jobs), wholesale (80 jobs), and manufacturing(20 jobs).⁴³ Notably, government jobs still made up nearly 25% of the county's nonfarm employment, primarily at the local level.

⁴³ Oregon Employment Department, Wasco County Covered Employment and Wages. 2016

Table C.19: Total Wasco County Nonfarm Employment by Industry, 2010 & 2016

Industry	2010	2016	Change 2010-2016	
			Number	Percent
Mining, logging and construction	390	370	-20	-5.12%
Manufacturing	560	750	190	33.93%
Wholesale	170	150	-20	---11.76%
Retail	1,550	1,670	120	7.74%
Transportation, Warehousing, and Utilities	200	210	10	5%
Information	110	220	110	100%
Financial activities	380	320	-60	-15.79%
Professional and business services	470	510	40	8.51%
Education and health services	1,780	2,230	450	25.28%
Leisure and hospitality	1,100	1,340	240	21.82%
Other Services	320	360	40	12.5%
Government	2,340	2,210	---130	---5.55%
Total Annual Average Nonfarm Employment	9,370	10,340	970	10.35%

Source: Oregon Labor Market Information System --- Current Employment Statistics

Overall, there was a 10.35% increase in Wasco County non-farm employment between 2010 and 2016, equating to an overall increase of 970 jobs during the ten year period, significantly more than the previous decade.

HIGH REVENUE SECTORS

The two nonfarm sectors with the highest known revenue in 2007 were retail and wholesale. Table C.20 shows the revenue generated by each economic sector. All of the known sectors combined generated more than \$980 million in revenue for the county in 2012, the most recent year for which data is available.

Table C.20: Revenue of Nonfarm Sectors in Wasco County

Sectors	Sector Revenue
	(\$1,000)
Manufacturing	93,565
Retail	389,437
Wholesale	213,589
Health care and social assistance	148,164
Accommodation and food services	66,708
Professional, scientific, and technical services	24,964
Other services (except public administration)	13,404
Real estate and rental and leasing	10,914
Arts, entertainment, and recreation	4,466
Administrative and Support and Waste	15,739
Educational Services*	NA
Total Revenue (\$1,000)	980,950

* Data incomplete, unavailable or withheld by U.S. Census Bureau

Source: U.S. Census Bureau, 2012 Economic Census. Economy-Wide Key Statistics

The *retail trade* sector of Wasco County brought in the most revenue during 2012, generating more than \$389 million.⁴⁴ 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 2012, the *health care and social assistance* sector generated \$148 million, making it the second 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 \$66 million in revenue during 2012. 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),

⁴⁴ U.S. Census Bureau, 2012 Economic Census. Table 1 Selected Statistics by Economic Sector.

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 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 2010 and 2020, the largest employment growth in the region is anticipated in educational and healthcare services, which are expected to grow by 26% and add 1000 new positions. The trade, transportation and utilities sector is expected to grow by 16% and add 670 new positions during the same time period, while leisure and hospitality are projected to create 630 new positions and grow by 20%. Professional and business services have the highest projected growth rate at 33%, and the sector is expected to create around 500 new jobs by 2020.⁴⁵ Considering these projected industries are relatively reflective of the highest revenue generating industries in Wasco County as of 2007, and all play a vital role in the resilience of the regional economy, the sensitivities of these industries should be incorporated into future hazard mitigation planning.

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.21, overall the workforce is moderately mobile between Wasco, Hood River, Clackamas and Multnomah Counties. Contrasted with 2012, the majority of Wasco County residents now work outside of the County to work. Over 23% of workers who live in Wasco County travel westward to Hood River, Clackamas, and Multnomah Counties for their job.

Interestingly, a significant number (19.7%) of county residents are employed further afield in locations including La Grande, Eugene, and in communities in Central Oregon such as Prineville, Redmond and Bend. 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.

⁴⁵ Oregon Employment Department, Regional Employment Projections by Industry and Occupation --- <http://www.qualityinfo.org/olmisj/PubReader?itemid=00003217>

Table C.21: Commute Shed (Where workers are employed who live In Wasco County), 2014

Location	Number	Percent
Wasco County	5,470	47.5%
The Dalles	4,396	38.2%
Maupin	97	.8%
Hood River County	1,087	9.4%
Hood River	642	5.6%
Jefferson County	209	1.8%
Warm Springs	135	1.2%
Multnomah County	937	8.1%
Portland	705	6.1%
Clackamas County	662	5.8%
Deschutes County	379	3.3%
Washington County	339	2.9%
Marion County	267	2.3%
Klickitat County, WA	274	2.4%
Umatilla County	194	1.7%
All Other Locations	1,691	14.7%
Total	11, 509	

Source: U.S. Census Bureau, OnTheMap, Area Profile Analysis in 2014 by All Jobs

Table C.22 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 (55.8%). 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 many others live across the river in Klickitat and Cowlitz Counties.

Table C.22: Labor Shed (Where workers live who are employed in Wasco County), 2014

Location	Number	Percent
Wasco County	5,470	55.8%
The Dalles	3,635	37.1%
Chenoweth CDP	312	3.2%
Dufur	78	0.8%
Hood River County	711	7.3%
Hood River	263	2.7%
Klickitat County, WA	555	5.7%
Multnomah County	295	3.0%
Portland	216	2.2%
Clackamas County	260	2.7%
Washington County	183	1.9%
Marion County	164	1.7%

Jefferson County	151	1.5%
Cowlitz County, WA	142	1.4%
Clark County, WA	133	1.4%
All Other Locations	1,734	17.7%
Total	9,798	

Source: U.S. Census Bureau, OnTheMap, Area Profile Analysis in 2014 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 45% of Wasco County workers maintain employment outside of the county, 44% of Wasco County workers live elsewhere, both east and south of The Dalles, 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 around or higher than the state and national averages.⁴⁶ However it is important to consider what might happen to the county economy if the largest revenue generators and employers (the natural resources,

health care and social assistance industries), were heavily 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.23 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 15% 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.⁴⁷ Table C.23 furthermore 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.23, roughly 15% of housing in Wasco County is made up of multi-family dwellings.

Table C.23: Wasco County Housing Type Summary, 2015

Housing Type	Number	Percent
1 unit	7,843	68.7%
2 to 10 units	958	8.4%
10 to 19 units	335	2.9%
20 or more units	502	4.4%
Mobile home	1,764	15.4%
Boat, RV, van, etc.	21	0.2%
Total	11,423	

U.S. Census Bureau, American Community Survey, 2015

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 structures built after the late 1960’s began utilizing earthquake resistant designs and

⁴⁷ State of Oregon Natural Hazards Mitigation Plan, Region 4 Southwest Oregon Regional Profile.

construction. Similarly, communities in the northwest began implementing flood elevation ordinances in the 1970's.⁴⁸ In 1990 Oregon again upgraded to stricter seismic standards that included earthquake loading in the building design.⁴⁹ Table C.24 shows that just over 20% of the housing stock in Wasco County was built after 1990 when the more stringent building codes were put in place, leaving about 80% with questionable seismic stability, and nearly 40% with very questionable seismic stability (percentage of homes built before 1960).⁵⁰ Thus knowing the age of the structure is helpful in targeting outreach regarding retrofitting and insurance for owners of older structures.⁵¹

Table C.24: Wasco County Housing Stock by Age, 2015

Year Structure Built	Number	Percent
Built 2014 or later	15	.1%
Built 2000 to 2013	1,473	12.9%
Built 1990 to 1999	1,644	14.4%
Built 1980 to 1989	1,096	9.6%
Built 1970 to 1979	2,034	17.8%
Built 1960 to 1969	945	8.3%
Built 1950 to 1959	1,744	15.3%
Built 1940 to 1949	730	6.4%
Built 1939 or earlier	1,742	15.2%
Total housing units	11,423	

Source: U.S. Census, American Community Survey, 2015

Mitigation and preparedness planning should also consider type of occupancy when developing outreach projects or educational campaigns. Residents who own their own home are more likely to want 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.25 below, approximately 35% of the occupied housing units in Wasco County are renter-occupied.

⁴⁸ State of Oregon Natural Hazards Mitigation Plan, Region 4 Southwest Oregon Regional Profile.

⁴⁹ 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.

⁵⁰ Source: U.S. Census Bureau, 2015 American Community Survey.

Table C.25: Wasco County Housing Unit Occupancy Summary, 2015

Housing Units	Number	Percent
Occupied housing	9,704	85%
Owner---occupied	6,263	64.5%
Renter---occupied	3,441	35.5%
Vacant housing	1,719	15%
Total	11,487	

Source: U.S. Census, American Community Survey, 2015;

Physical Infrastructure

Physical infrastructure such as dams, roads, bridges, railways and airports support Wasco County communities and economies. Critical facilities are facilities 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 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

Dam failures can occur at any time and are quite common. Fortunately most failures result in minor damage and pose little or no risk to life safety.⁵³ However, the potential for severe damage still exists. The Oregon Water and Resources Department has inventoried all dams located in Oregon and Wasco County. Of the County's high hazard dams, of special concern is The Dalles Dam, which is by far the largest, and was last inspected in 1988.

Table C.26: Wasco County Dam Inventory and Threat Summary

Threat Potential	Number of Dams
High	8
Significant	0
Low	18

Oregon water Resources Department, Dam Inventory, Query. http://apps.wrd.state.or.us/apps/misc/dam_inventory/

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.⁵⁴

⁵² State of Oregon Natural Hazards Mitigation Plan, Region 4 Southwest Oregon Regional Profile.

⁵³ Ibid.

⁵⁴ Oregon Department of Transportation, State of Oregon, Oregon Railways. <http://www.oregon.gov/ODOT/TD/TDATA/gis/docs/statemaps/railroads.pdf?ga=t>

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.⁵⁵

AIRPORTS

Wasco County has no commercial service airports, but has 10 private airports, including a helipad at the Mid-Columbia Medical Center and another at Mid-Columbia Fire and Rescue.⁵⁶ The Portland International Airport in Portland is the only major commercial service airport near Wasco and surrounding Counties. However a small regional airport, Columbia Gorge Regional Airport, is located in Dallesport, WA, just across the Columbia River from The Dalles. Larger airports are also located in Yakima, WA to the northeast and in Redmond, OR to the south. Access to these airports faces the potential for closure from a number of natural hazards, including wind and winter storms common to the region.⁵⁷

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:

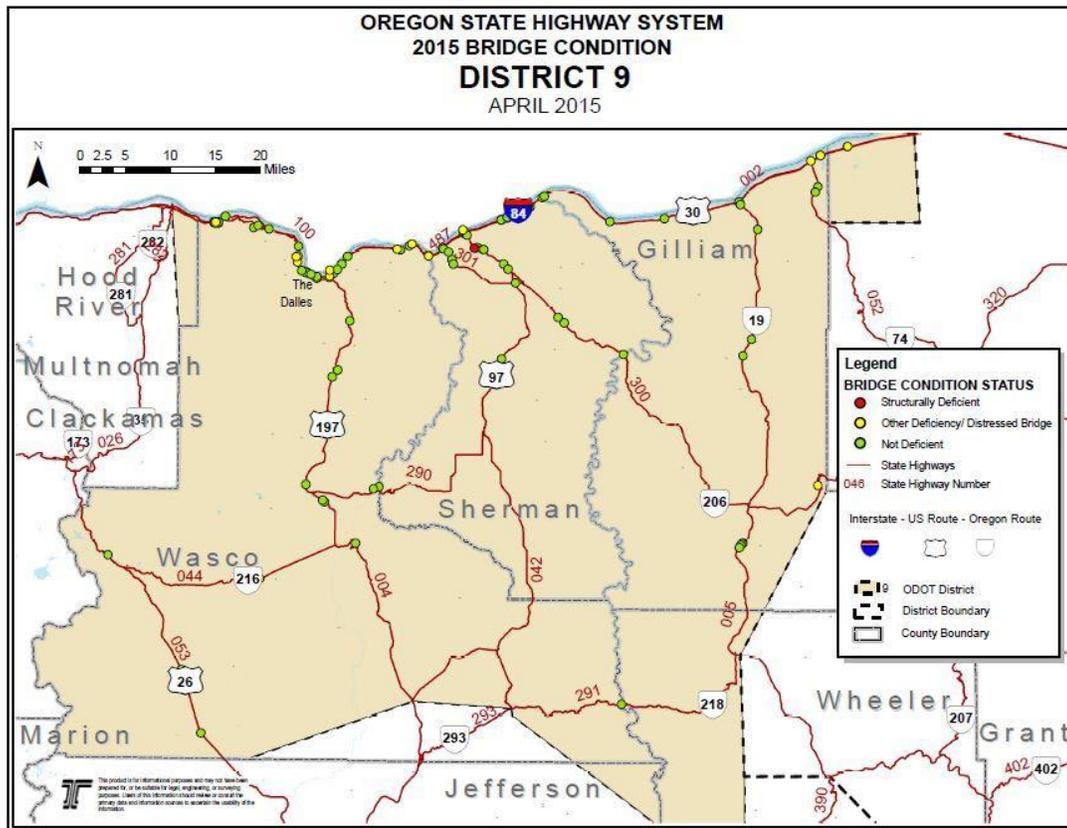
- US Highway 197 connects The Dalles at I-84 with Dufur and Maupin to the South.
- US Highway 97 merges with US Highway 197, connecting Wasco County with Sherman County to the east and Jefferson County to the south.
- US Highway 26 provides an alternate route from Portland to Wasco County. The Highway 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.

⁵⁵ State of Oregon Natural Hazards Mitigation Plan, Region 4 Southwest Oregon Regional Profile.

⁵⁶ FAA Airport Master Record. 2011. http://www.faa.gov/airports/airport_safety/airportdata_5010/

⁵⁷ State of Oregon Natural Hazards Mitigation Plan, Region 4 Southwest Oregon Regional Profile.

Figure C.7 Wasco County District 9, 2015 Bridge Inventory, ODOT



Source: 2015 Bridge Condition Report, Oregon Department of Transportation

Daily transportation infrastructure capacity in the Columbia Gorge region is only 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.⁵⁸

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.⁵⁹ The Wasco County Public Works Department is responsible for maintenance of 124 bridges around the county (includes 67 National Bridge Inventory (NBI) bridges (20' or longer), and 57 non-NBI bridges (less than 20')).⁶⁰ Table C.27 represents the condition of nearby NBI bridges, and highlights the number of distressed bridges in ODOT's Region 4, District 9. The region encompasses all of Wasco, Sherman and Gilliam Counties.

⁵⁸ Ibid.

⁵⁹ Ibid.

⁶⁰ Wasco County Public Works Department, http://www.co.wasco.or.us/departments/public_works/road_operations.phphttp://co.wasco.or.us/county/dept_works_roads.cfm

The NBI identifies 4 distressed bridges, and concludes that 20% of all the bridges in the region exhibit some form of structural or other deficiency. The classification of a distressed bridge does not imply the bridge is unsafe; however in the event of seismic activity these bridges are of higher vulnerability to failure.

Table C.27: ODOT Region 4, District 9 Bridge Condition and Deficiency Overview

Deficiency	Number	Percent
Structurally Deficient – Distressed Bridges	4	3.8%
Other Deficiency – Distressed Bridges	17	16.2%
Not Distressed	84	80.0%
Total	105	

Oregon Department of Transportation, 2015 Bridge Condition Report; Region 4, District 9

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 Pacific Power and Light, the Wasco Electric Cooperative, and the Northern Wasco PUD, the three entities that primarily facilitate local energy production and distribution in the area.

Power Generation

The majority of electrical power in the region is generated through hydropower; these dams are primarily situated on the Columbia River. There is one major hydroelectric dam in Wasco County, The Dalles Dam, which is located on the Columbia River just east of The Dalles. Wasco County has no power plants and there are no large wind power installations located within county limits, However the Summit Ridge Wind Project, with 72 wind turbines generating a peak capacity of a 200 194.4 MW facility, has been approved, and other projects are in various stages of development.⁶¹

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 not for profit customer owned utility company. 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 with Klickitat County PUD, a ten-megawatt unit at the McNary Dam.

Northern Wasco PUD, a not-for-profit customer-owned utility company, provides electricity to customers in Northern Wasco County, administering electricity produced by The Dalles Dam. Northern Wasco PUD also co-owns a ten megawatt unit at the McNary Dam in partnership with Klickitat County PUD.

WASCO ELECTRIC COOPERATIVE

The Wasco Electric Cooperative engages in energy transmission and distribution, providing electric service to customers in most of 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 that borders the northern bank of the Columbia River in Washington, which is controlled by Cascade Natural Gas Williams Northwest Pipeline. TransCanada GTN System controls another natural gas pipeline that crosses into the southeast corner of Wasco County from Sherman County before moving South to Jefferson County.⁶² Most of the natural gas Oregon uses originates in Alberta, Canada, and Williams Companies Inc. Avista Utilities owns the main natural gas transmission pipeline.⁶³ 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 Gas also distributes natural gas to communities in Oregon and southwest Washington. They are headquartered in Portland, OR, but Wasco County has access to NW Natural Gas through a service center in The Dalles.

Telecommunications

There are many telecommunication providers in Wasco County, including CenturyLink and Charter Communications, who are the third and fourth largest telecommunications companies in the United States. The largest internet and phone providers within the county. Comcast, gorge.net and most major cell phone service providers also operate throughout the region.

Water and Sewer

Wasco County is served by a mixture of private and municipal water and sewage systems. Incorporated towns such as Mosier, The Dalles, Dufur, and Maupin have municipal water and waste water treatment systems. Wamic is the only unincorporated city to have a water and waste water treatment system. Other unincorporated cities such as Tygh Valley, Pine Hollow, Shaniko and Antelope are served by municipal water, or irrigation districts, but do not have waste water treatment systems. All other land is served by wells, water rights, and private septic systems.

Sewage and Landfill

There are six community sewer systems in the county. The cities of Dufur, Maupin, Mosier, and The Dalles each have a community sewer system. The rural unincorporated community of Wamic also has a community sewer system, and the Sportsmen's Park subdivision has a community drainfield.

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 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).⁶⁴ 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.28 below.

Table C.28: Wasco County Critical Facilities

County Total	
Hospitals (# of beds)	1 (49)
Police / Sheriff's Offices	3
Fire & Rescue Stations	7
Dams	31
Bridges	124
School Districts & Colleges	3 districts, 1 Community College
Airports	10
Public Airport	0
Private Airport	8
Private Helipad	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, FAA Airport Master Record

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 the 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.⁶⁵

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.

⁶² TransCanda, GTN System Map ---

http://www.gastransmissionnw.com/downloads/documents/system_map.pdf

⁶³ Loy, W. G., ed. 2001. Atlas of Oregon, 2nd Edition. Eugene, OR: University of Oregon Press.

⁶⁴ State of Oregon Natural Hazards Mitigation Plan, Region 4 Southwest Oregon Regional Profile.

⁶⁵ Wasco County Fire Districts Map --- http://co.wasco.or.us/county/documents/public_works/fire_districts.pdf

Dependent Facilities

In addition to the critical facilities mentioned in Table C.28, there are other facilities that are vital to the continued delivery of health services and may significantly impact the public's ability to recover from emergencies. Assisted living centers, nursing homes, 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 four assisted living centers, three registered nursing homes, and one residential mental health facility. Most of these facilities are located in The Dalles, though there is an assisted living facility in Maupin. There are also seven 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.⁶⁶ There is one psychiatric hospital in Wasco County, Wasco County Mental Health, which is located in The Dalles.

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 of a challenge when the impacts of the event continue over a long duration.

⁶⁶ Seniors and People with Disabilities Service – Wasco County Office

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 and lack of or poor condition of infrastructure can negatively affect a community's ability to cope, 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 15% 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. Likewise over 80% of the county's housing was built before 1990, the year Oregon upgraded its seismic building standards to include seismic loading. 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. Over 80% of bridges in the region are not distressed, but four are structurally deficient, and seventeen exhibit some other form of deficiency. 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 partner 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 help out.

Residents who want to become involved in their community through volunteering have a number of opportunities available to them throughout the region. Through Gorge Search67 and other programs, residents can search online through a variety of volunteer opportunities around the region and choose one that fits their skills, interests and schedule. 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.29 outlines voter participation and turnout percentages from the 2012 and 2016 elections. There was a higher percentage voter turnout in 2016 in Wasco County, which was 2% points lower than the state rate.

Table C.29: Wasco County Election Results, 2012 and 2016

	2016		2012	
	Wasco County	Oregon	Wasco County	Oregon
Total -- Registered Voters	15,540	2,538,573	13,555	199,360
Total -- Ballots Cast	12,167	2,033,914	11,112	1,820,507
Voter Turnout Percentage	78.3%	80.12%	73.9%	82.8%

Source: Wasco County Clerk: Wasco County Final Election Results; Oregon Blue Book Election Result, <http://sos.oregon.gov/elections/Pages/electionhistory.aspx>

Cultural Resources

Cultural resources provide residents with a sense of belonging and can be used to teach current residents about the histories 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.30 categorizes the 32 different National Historic Sites located throughout Wasco County by their distinction and function.

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 sites* from the impacts natural disasters might have on them.

Table C.30: National Register of Historic Sites in Wasco County

Type of Structure	Number of Structures
Bridges and Locks	---
Cabins, Estates, Farms, Houses, Huts, Lodges, Log Cabins	15
Mills	---
Historic Campsites, Complexes and Scenic Stretches	3
Hotels	2
Churches	2
Schools	---
Historic Districts	3
Buildings, Halls, City Structures	7
Total	32

Source: National Register of Historic Places -- <http://nrhp.focus.nps.gov/natregadvancedsearch.do>

Libraries and Museums

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.⁷⁰ 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.

⁷⁰ Historic The Dalles Oregon -- http://www.historicthedalles.org/the_dalles-museums.htm

The Confederated Tribes of Warm Springs

“Reservation lands extend from the summit of Oregon's Cascade Mountains and snowcapped Mt. Jefferson at 10,497 feet, east to the Deschutes River's elevation at 1,000 feet, with the Metolius River and Lake Billy Chinook forming the southern boundary.

Showcasing most of the Pacific Northwest's natural wonders, the Warm Springs Reservation includes Alpine lakes, pristine rivers, deep canyons and vistas of high desert and volcanic peaks. Over half the reservation is forested, with the remainder primarily range land.

Home of the Warm Springs, Wasco, and Paiute tribes, the Warm Springs Reservation is inhabited by nearly 4,000 tribal members, most of whom live in or around the town of Warm Springs.

Within the community, the Tribal government provides a variety of services, including education, public safety, utilities, health, resource management, business development and recreation. Many services not offered by the Tribal government are provided by locally-owned private businesses.

The tribal economy is based primarily on natural resources, including hydropower, forest products and ranching. Tourism and recreation also make important contributions.”⁷¹

Community Stability

RESIDENTIAL GEOGRAPHIC STABILITY

Geographic stability often results in a feeling of connectedness to one's community and is a 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.⁷² Regional residential stability is important to consider in the mitigation process as those who have been in one place for awhile are more likely to have a vested interest in the area and should be more likely to help with hazard mitigation efforts. Table C.31 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. Wasco County is estimated to have 91.8% of its residents live in the same house or within county boundaries generally for more than a year as of 2010, very near the state average. Aside from Hood River and Jefferson Counties, the figures of community stability below are relatively consistent across the region as well as compared to the State average.

In analyzing 2015 US Census Estimates, it appears Wasco County maintained a low percentage of individuals moving housing within less than one year. The most significant percentage of movers had been in place for fifteen to six years, while households moving between five to one years also made up about 27% of the population. With the small, but steady, increase in overall population forecasted for the next several decades, it is likely Wasco County will continue to see new residents.

⁷¹ Warm Springs, <http://www.warmsprings.com/>

⁷² 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 Residential Stability

County	Geographic Stability
Wasco	91.8%
Clackamas	92.8%
Gilliam	91.2%
Hood River	94.8%
Jefferson	88.3%
Sherman	91.9%
Wheeler	90.9%
Oregon	92.5%

Source: US Census Bureau, American Community Survey, 2006-2010; B07003

HOMEOWNERSHIP

Another measure of community stability and place attachment is homeownership. One does not seek to be a homeowner in a place they don’t 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.32 identifies the percentage of homeownership across the region, where the remaining households are renters. Wasco County’s home ownership rate is close to other counties in the region and notably higher than the state average.

Table C.32: Regional Homeownership

County	Home Owners
Wasco	64.5%
Clackamas	68.2%
Gilliam	60.7%
Hood River	64.9%
Jefferson	66.8%
Sherman	64.5%
Wheeler	71.8%
Oregon	61.3%

Source: US Census Bureau, FactFinder, 2015 Estimates

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, these emerging elements of social and cultural capital will be drawn upon to stabilize the recovery of the community. Social and cultural capitals are present in all communities; however, it 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 residents match state levels of 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, as they 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 Board of Commissioners consisting of three part-time County Commissioners, all of which are elected positions. 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. Although the County Board of Commissioners shares the actual administration of county affairs with elective department heads, it is, nevertheless, the focal point for decisions that must be made locally with respect to county affairs.⁷³

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 incident, and the needs of the population are met. Some divisions and departments of Wasco County government that have a role in hazard mitigation include:

- **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.

⁷³ Wasco County Website, Departments, Board of County Commissioners ---

- **Fairground Facilities:** The local fairground facilities serve as an entertainment venue but should be considered as a staging site for 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. A small fairground with limited space and facilities is located within the City of Dalles, while the county fairgrounds located south of The Dalles in Tygh Valley offers considerably more space and full facilities.
- **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.⁷⁴
- **Planning:** The Wasco County Planning Department strives to make the planning process understandable, convenient, and expeditious while treating everyone 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 to establish a single, coordinated set of policies which act to provide for orderly development of Wasco County. These policies give a direction to planning, 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 for an improved quality of life. It also helps all levels of government and private enterprise to understand the wants and needs of all Wasco County citizens.⁷⁵
- **Public Works:** Wasco County's Department of Public Works consists foremost of the County Road Division. The Department is responsible for the construction and maintenance of 697 miles of roadway (300 miles of which is paved), 124 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

⁷⁴ North Central Public Health District Website --- <http://www.wshd.org/wshd/default.htm>

⁷⁵ Wasco County Planning Department Website --- <http://co.wasco.or.us/planning/planhome.html>

of the community. The Department can help to prioritize projects for mitigation and should be a key partner in implementation as well.⁷⁶

- **Sheriff Office:** The Sheriff's Office currently has seventeen sworn positions, 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.⁷⁷

Existing Plan & Policies

Communities often have existing plans and policies that guide and influence land use, land development and population growth. Such existing plans and policies can include comprehensive plans, zoning ordinances and technical reports or studies. Plans and policies already in existence have support from local residents, businesses and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, and can adapt easily to changing conditions and needs.⁷⁸ 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. Implementing the natural hazards mitigation plan's action items through existing plans and policies increases their likelihood of being supported and getting updated, and maximizes the county's resources.

The following are a list of plans and policies already in place in Wasco County:

- Wasco County Comprehensive Plan Originally Adopted: August 1983
- Wasco County Land Use and Development Ordinance Originally Adopted: June 1985
- Wasco County Emergency Operations Plan Original Release: 2006, Updated: January 2012
- Columbia Gorge National Scenic Area Management Plan Originally Adopted October 1991, Amended: June 2007
- Wasco County National Scenic Area Land Use and Development Ordinance Adopted: May 1994, Revised: August 19, 2010
- Wasco County Transportation Systems Plan Adopted: July 2009
- Community Wildfire Protection Plan Adopted: December 21, 2005
- Mt. Hood Coordination Plan Prepared: September 2005
- Wasco County Area Service Ambulance Plan Adopted: March 2012
- Wasco County Economic Development Strategic Action Plan 2017/2018

⁷⁶ Wasco County Website, Departments, Public Works ---
http://co.wasco.or.us/county/dept_works_info.cfm

⁷⁷ Wasco County Website, Departments, Sherriff Office ---
http://co.wasco.or.us/county/dept_sheriff_info.cfm

⁷⁸ Burby, Raymond J., ed. 1998. Cooperating with Nature: Confronting Natural Hazards with Land-Use Planning for Sustainable Communities

Synthesis

Political capital is recognized as the government and planning structures established within the community. In terms of hazard resilience, it is essential for political capital to encompass diverse government and non-government entities in collaboration; as disaster losses stem from a predictable result of interactions between the physical environment, social and demographic characteristics and the built environment.⁷⁹

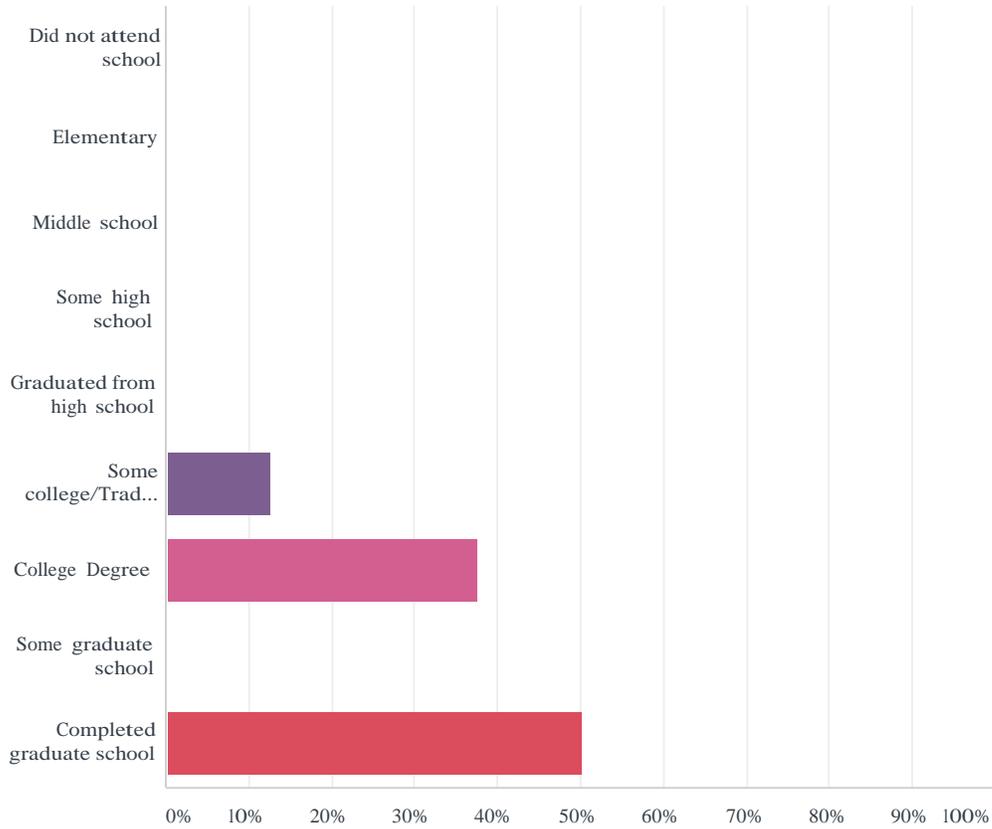
⁷⁹ Mileti, D. 1999. *Disaster by Design: a Reassessment of Natural Hazards in the United States*. Washington D.C.: Joseph Henry Press.

Appendix D: Survey Results

Household Natural Hazards Preparedness Survey

Q1 What is the highest level of education you have completed?

Answered: 8 Skipped: 0

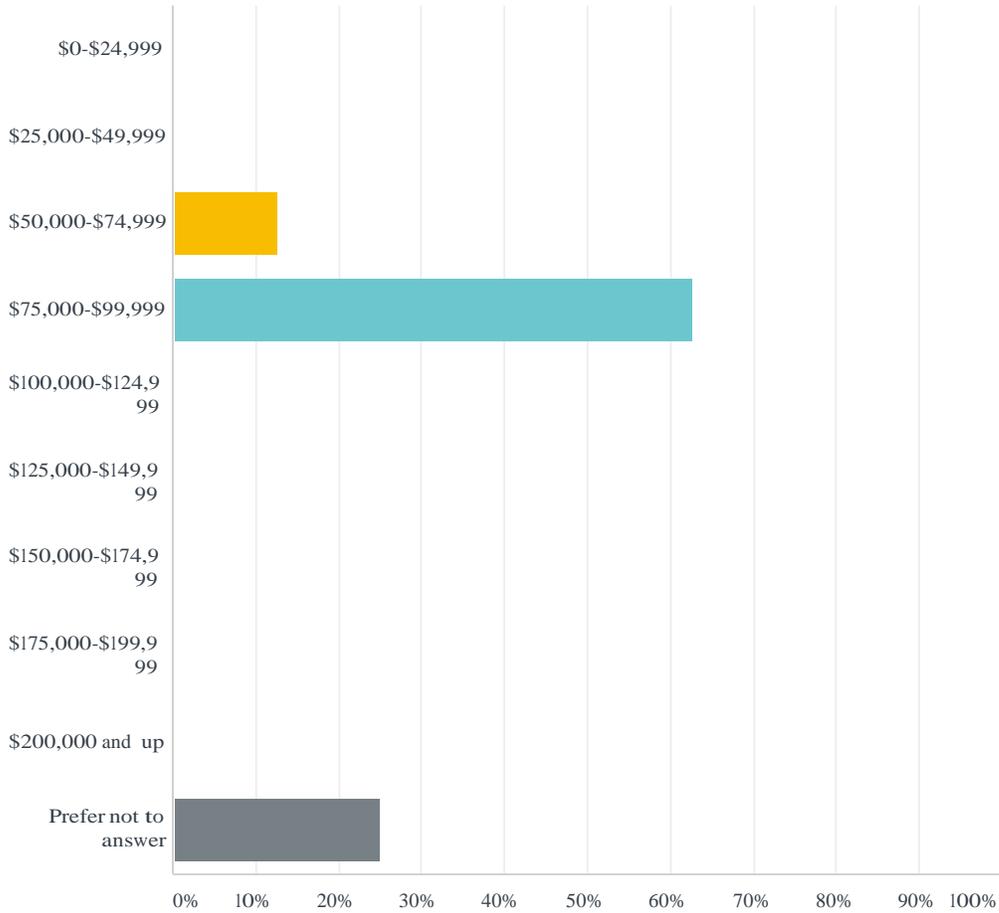


ANSWER CHOICES	RESPONSES	
Did not attend school	0.00%	0
Elementary	0.00%	0
Middle school	0.00%	0
Some high school	0.00%	0
Graduated from high school	0.00%	0
Some college/Trade school	12.50%	1
College Degree	37.50%	3
Some graduate school	0.00%	0
Completed graduate school	50.00%	4
TOTAL		8

Household Natural Hazards Preparedness Survey

Q2 What is your approximate average household income?

Answered: 8 Skipped: 0

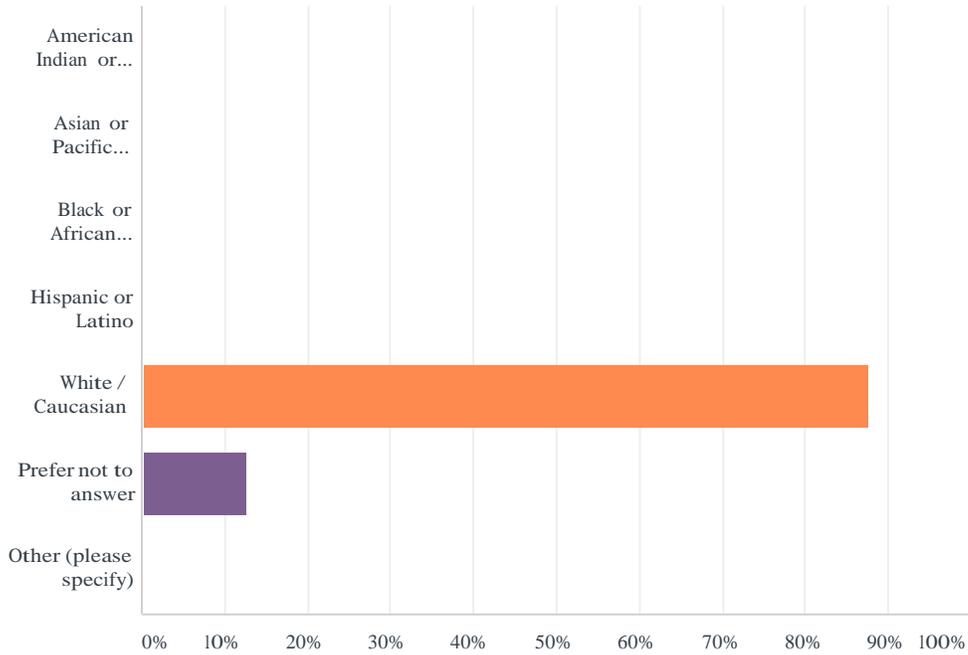


ANSWER CHOICES	RESPONSES
\$0-\$24,999	0.00% 0
\$25,000-\$49,999	0.00% 0
\$50,000-\$74,999	12.50% 1
\$75,000-\$99,999	62.50% 5
\$100,000-\$124,999	0.00% 0
\$125,000-\$149,999	0.00% 0
\$150,000-\$174,999	0.00% 0
\$175,000-\$199,999	0.00% 0
\$200,000 and up	0.00% 0
Prefer not to answer	25.00% 2
TOTAL	8

Household Natural Hazards Preparedness Survey

Q3 What is your ethnicity? (Please select all that apply.)

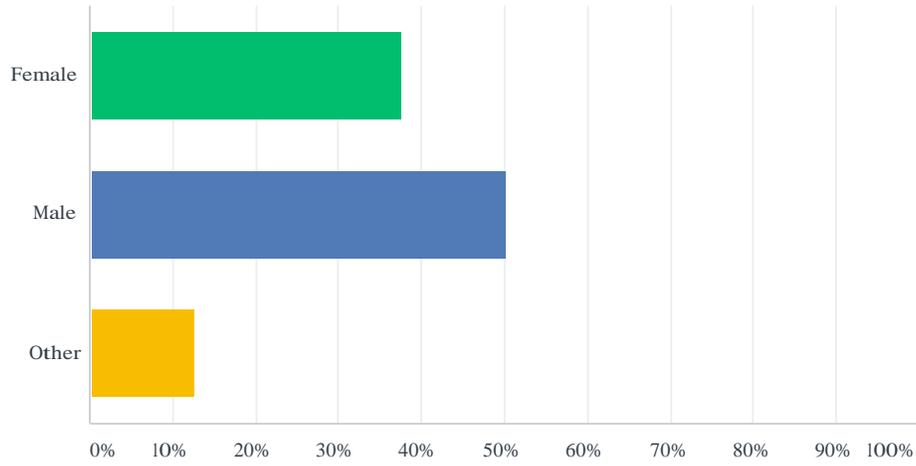
Answered: 8 Skipped: 0



ANSWER CHOICES	RESPONSES
American Indian or Alaskan Native	0.00% 0
Asian or Pacific Islander	0.00% 0
Black or African American	0.00% 0
Hispanic or Latino	0.00% 0
White / Caucasian	87.50% 7
Prefer not to answer	12.50% 1
Other (please specify)	0.00% 0
Total Respondents: 8	

Q4 What is your gender?

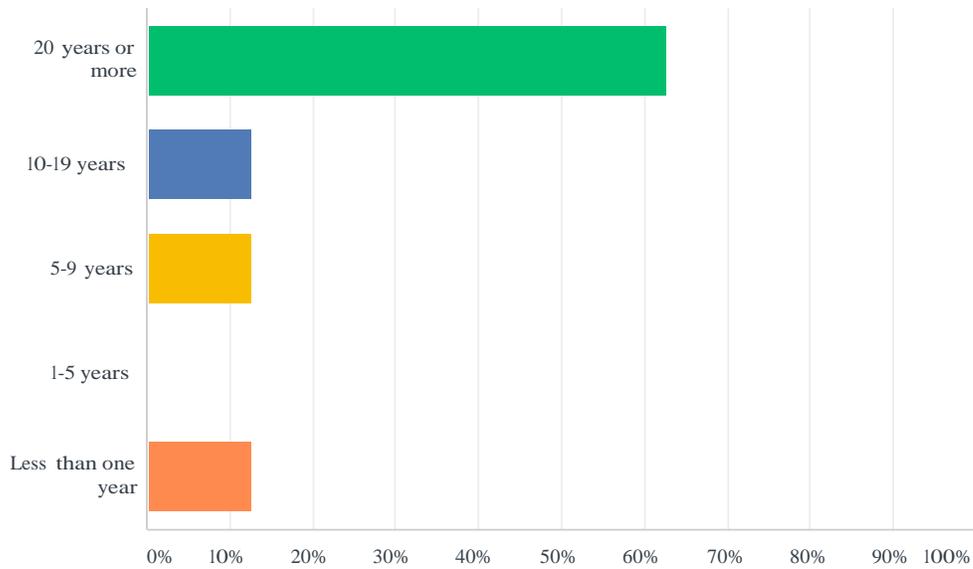
Answered: 8 Skipped: 0



ANSWER CHOICES	RESPONSES	
Female	37.50%	3
Male	50.00%	4
Other	12.50%	1
TOTAL		8

Q5 Length of time you have lived in Oregon?

Answered: 8 Skipped: 0

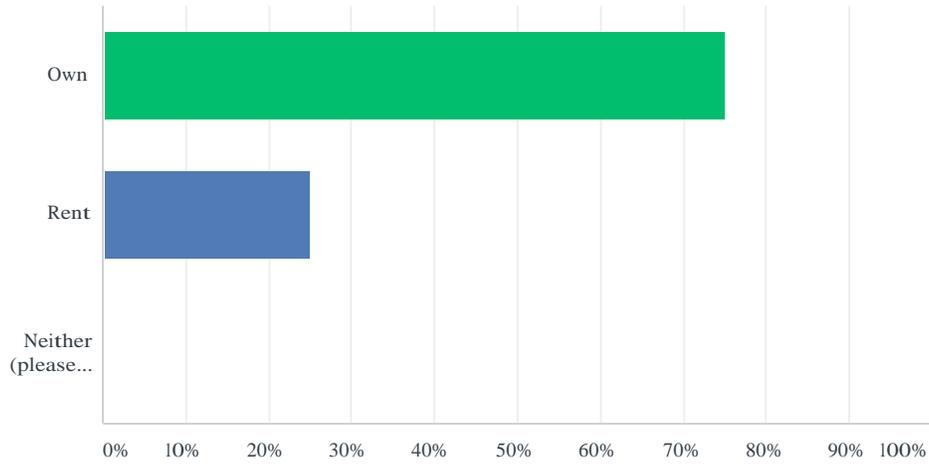


ANSWER CHOICES	RESPONSES	
20 years or more	62.50%	5
10-19 years	12.50%	1
5-9 years	12.50%	1
1-5 years	0.00%	0
Less than one year	12.50%	1
TOTAL		8

Household Natural Hazards Preparedness Survey

Q6 Do you rent or own the place where you live?

Answered: 8 Skipped: 0

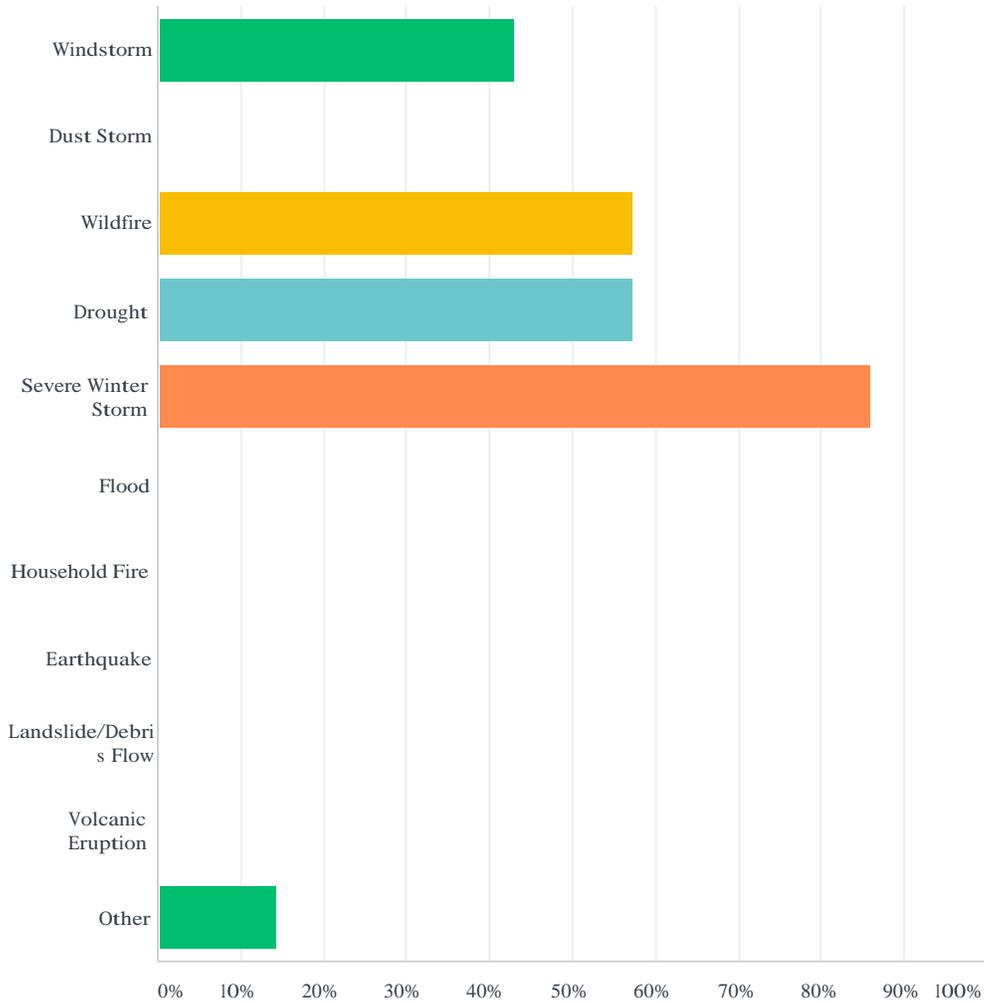


ANSWER CHOICES	RESPONSES	
Own	75.00%	6
Rent	25.00%	2
Neither (please specify)	0.00%	0
TOTAL		8

Household Natural Hazards Preparedness Survey

Q7 What disasters have you personally experienced in the last five years? (Choose all that apply)

Answered: 7 Skipped: 1



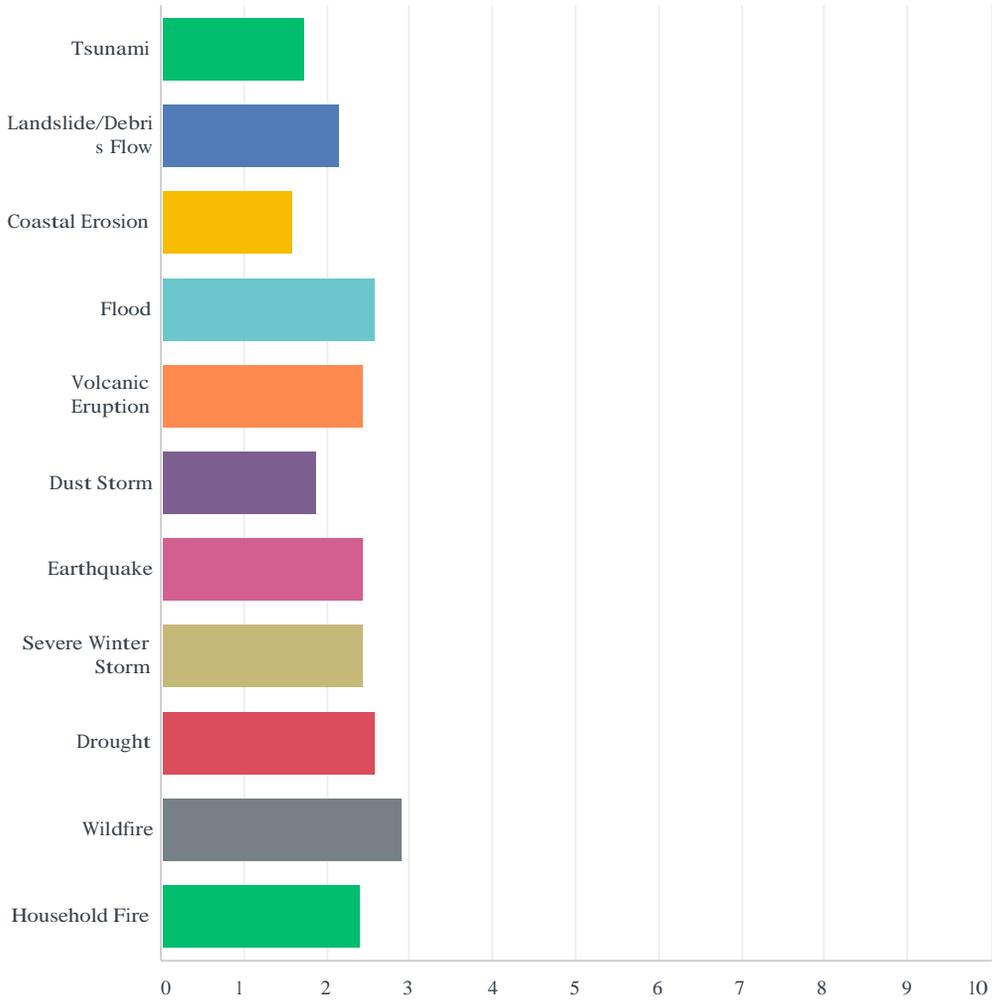
ANSWER CHOICES	RESPONSES	
Windstorm	42.86%	3
Dust Storm	0.00%	0
Wildfire	57.14%	4
Drought	57.14%	4
Severe Winter Storm	85.71%	6
Flood	0.00%	0
Household Fire	0.00%	0
Earthquake	0.00%	0
Landslide/Debris Flow	0.00%	0
Volcanic Eruption	0.00%	0
Other	14.29%	

Total Respondents: 7

Household Natural Hazards Preparedness Survey

Q8 What is your general level of concern about natural hazards in the Mid-Columbia Region?

Answered: 8 Skipped: 0



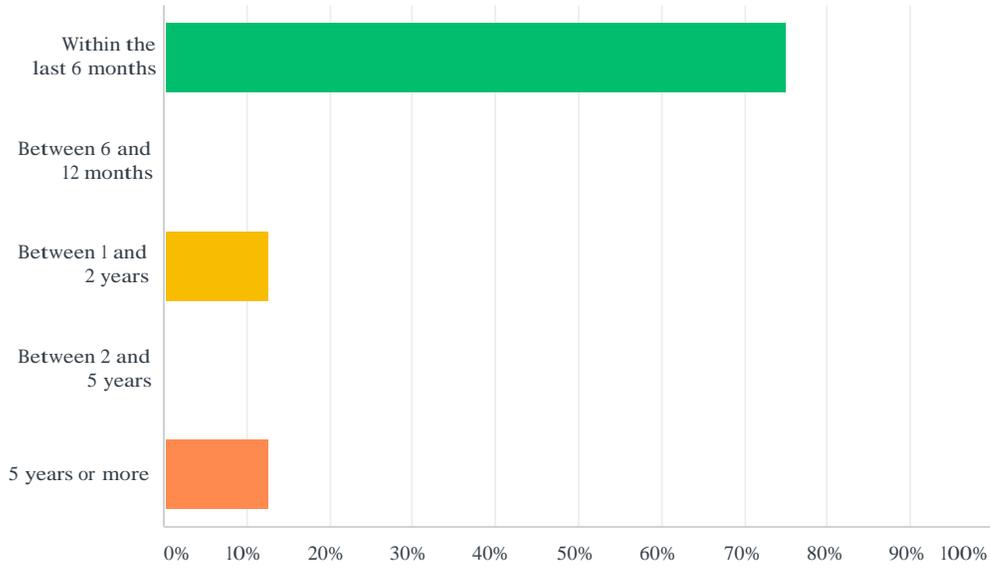
	NOT CONCERNED	SOMEWHAT CONCERNED	NEUTRAL	CONCERNED	EXTREMELY CONCERNED	TOTAL	WEIGHTED AVERAGE
Tsunami	42.86% 3	28.57% 2	14.29% 1	14.29% 1	0.00% 0	7	1.71
Landslide/Debris Flow	0.00% 0	57.14% 4	0.00% 0	28.57% 2	14.29% 1	7	2.14
Coastal Erosion	57.14% 4	28.57% 2	14.29% 1	0.00% 0	0.00% 0	7	1.57
Flood	0.00% 0	0.00% 0	57.14% 4	42.86% 3	0.00% 0	7	2.57
Volcanic Eruption	14.29% 1	14.29% 1	42.86% 3	14.29% 1	14.29% 1	7	2.43
Dust Storm	42.86% 3	14.29% 1	28.57% 2	14.29% 1	0.00% 0	7	1.86

Household Natural Hazards Preparedness Survey

Earthquake	0.00% 0	14.29% 1	14.29% 1	42.86% 3	28.57% 2	7	2.43
Severe Winter Storm	0.00% 0	0.00% 0	0.00% 0	57.14% 4	42.86% 3	7	2.43
Drought	0.00% 0	14.29% 1	0.00% 0	28.57% 2	57.14% 4	7	2.57
Wildfire	0.00% 0	0.00% 0	0.00% 0	12.50% 1	87.50% 7	8	2.88
Household Fire	12.50% 1	12.50% 1	25.00% 2	25.00% 2	25.00% 2	8	2.38

Q9 When was the last time your household received information on family and home safety?

Answered: 8 Skipped: 0

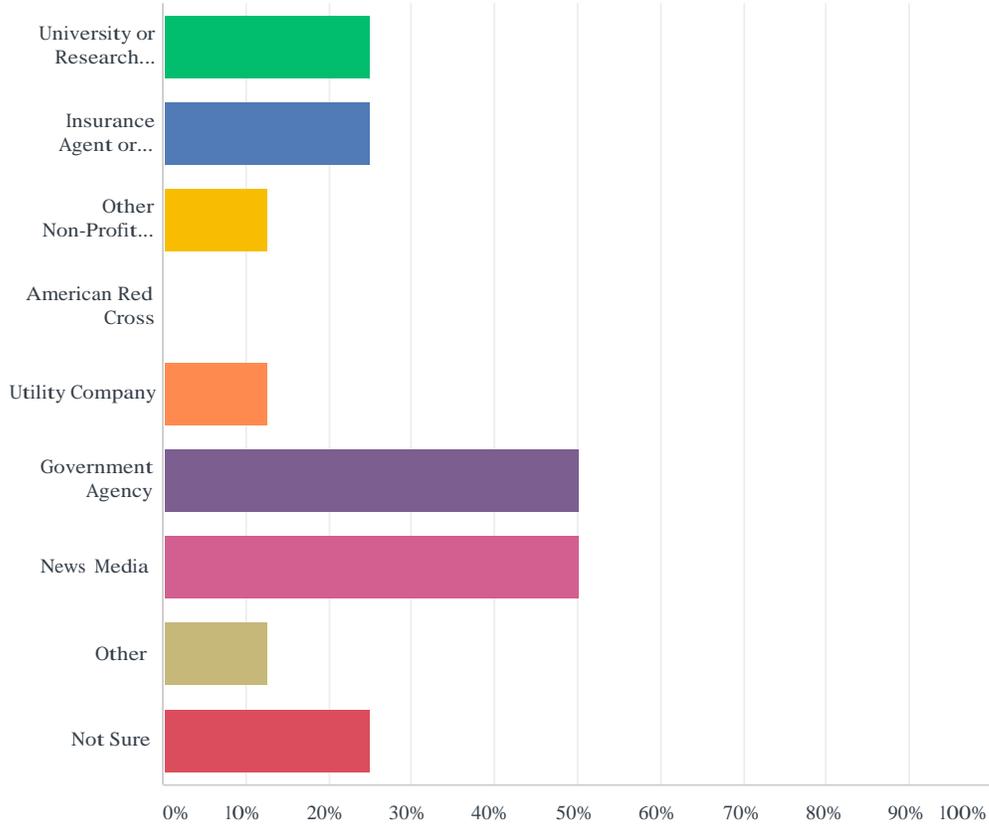


ANSWER CHOICES	RESPONSES	
Within the last 6 months	75.00%	6
Between 6 and 12 months	0.00%	0
Between 1 and 2 years	12.50%	1
Between 2 and 5 years	0.00%	0
5 years or more	12.50%	1
TOTAL		8

Household Natural Hazards Preparedness Survey

Q10 From which of the following did you receive your family and household information. (Choose all that apply)

Answered: 8 Skipped: 0

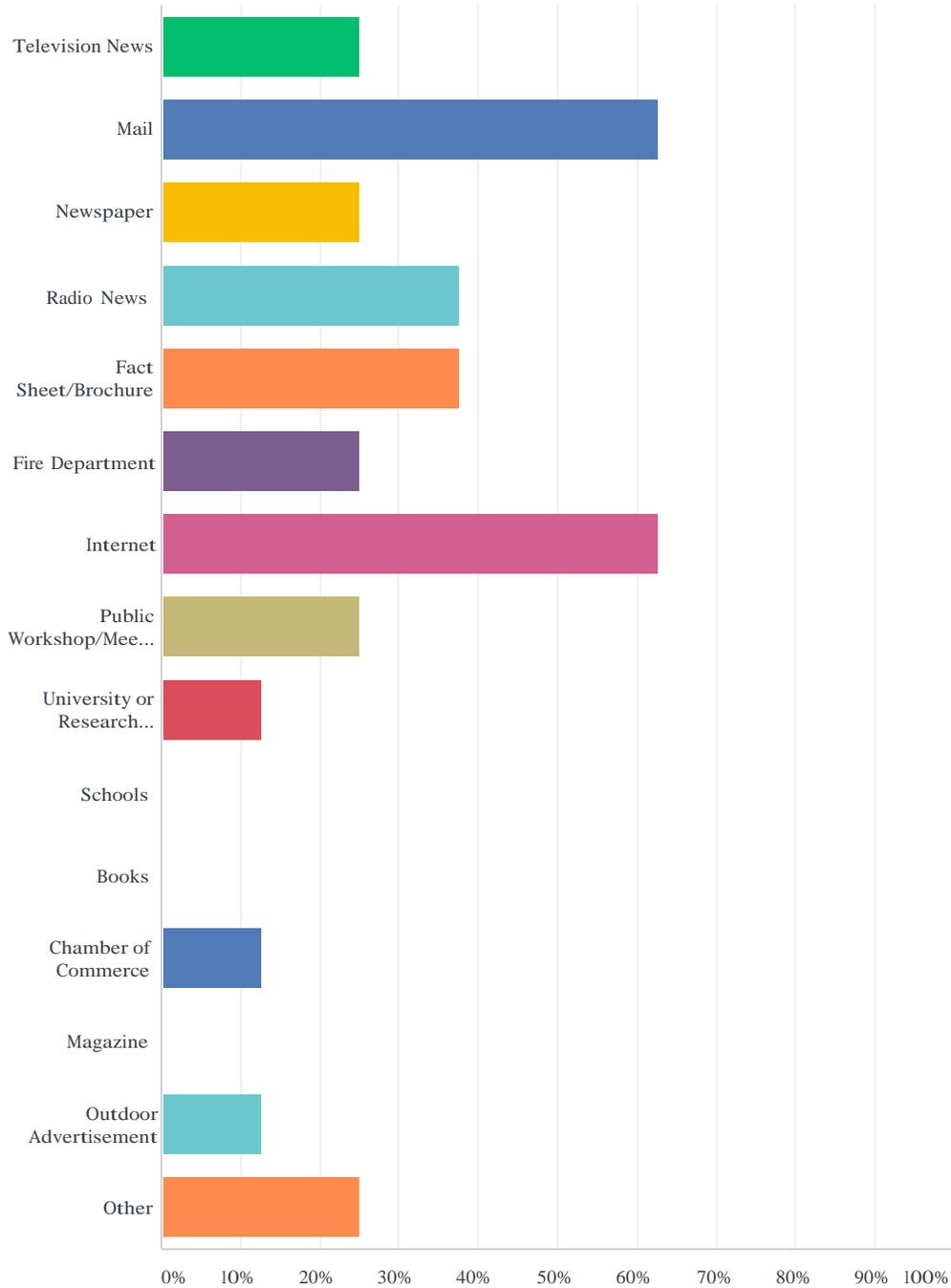


ANSWER CHOICES	RESPONSES	
University or Research Institution	25.00%	2
Insurance Agent or Company	25.00%	2
Other Non-Profit Organization	12.50%	1
American Red Cross	0.00%	0
Utility Company	12.50%	1
Government Agency	50.00%	4
News Media	50.00%	4
Other	12.50%	1
Not Sure	25.00%	2
Total Respondents: 8		

Household Natural Hazards Preparedness Survey

Q11 What is the most effective way to reach your household with household preparedness information? (Choose all that apply)

Answered: 8 Skipped: 0



ANSWER CHOICES	RESPONSES
Television News	25.00% 2
Mail	62.50% 5

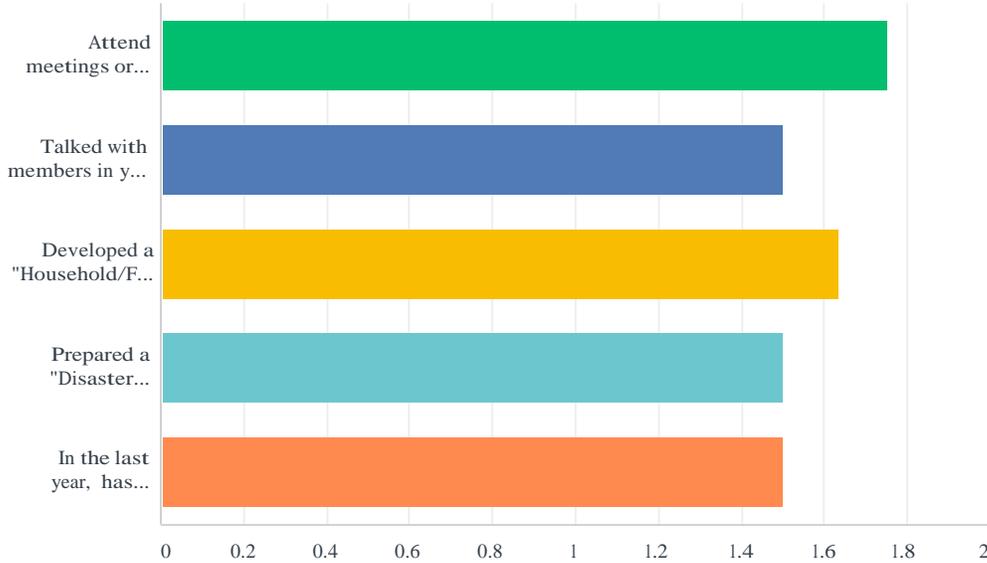
Household Natural Hazards Preparedness Survey

Newspaper	25.00%	2
Radio News	37.50%	3
Fact Sheet/Brochure	37.50%	3
Fire Department	25.00%	2
Internet	62.50%	5
Public Workshop/Meeting	25.00%	2
University or Research Institution	12.50%	1
Schools	0.00%	0
Books	0.00%	0
Chamber of Commerce	12.50%	1
Magazine	0.00%	0
Outdoor Advertisement	12.50%	1
Other	25.00%	2
Total Respondents: 8		

Household Natural Hazards Preparedness Survey

Q12 How does your household prepare for an emergency/natural disaster?

Answered: 8 Skipped: 0

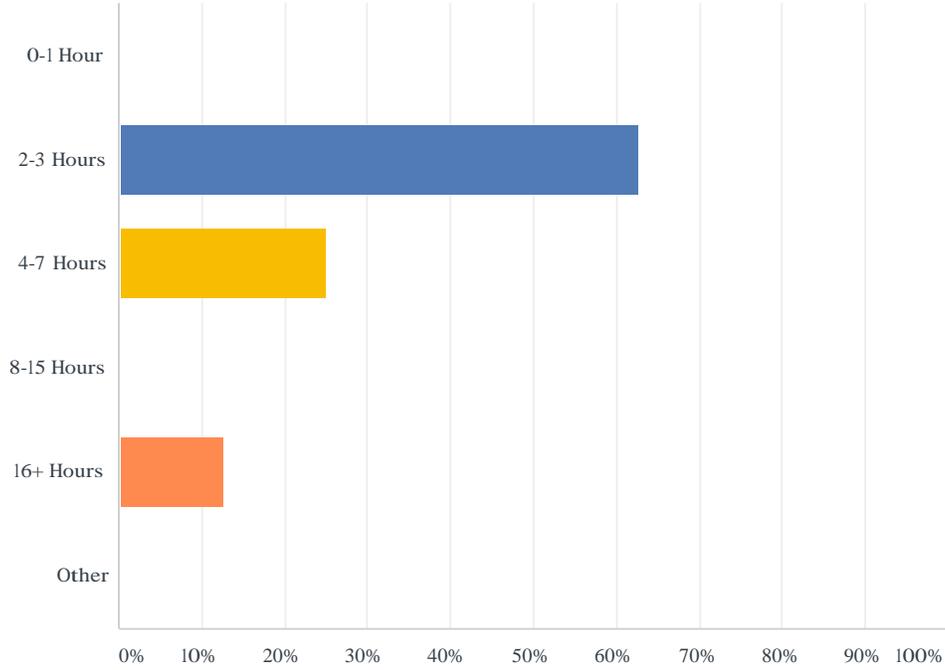


	HAVE DONE	PLAN TO DO	NOT DONE	UNABLE TO DO	TOTAL	WEIGHTED AVERAGE
Attend meetings or received written information on natural disasters or emergency preparedness?	62.50% 5	0.00% 0	37.50% 3	0.00% 0	8	1.75
Talked with members in your household about what to do in case of a natural disaster or emergency?	62.50% 5	25.00% 2	12.50% 1	0.00% 0	8	1.50
Developed a "Household/Family Emergency Plan" in order to decide what everyone would do in the event of a disaster?	50.00% 4	37.50% 3	12.50% 1	0.00% 0	8	1.63
Prepared a "Disaster Supply Kit" (Stored extra food, water, batteries, or other emergency supplies)?	62.50% 5	25.00% 2	12.50% 1	0.00% 0	8	1.50
In the last year, has anyone in your household been trained in First Aid or Cardio-Pulmonary Resuscitation (CPR)?	75.00% 6	0.00% 0	25.00% 2	0.00% 0	8	1.50

Household Natural Hazards Preparedness Survey

Q13 Hours per year your household would be willing to spend on preparedness activities?

Answered: 8 Skipped: 0

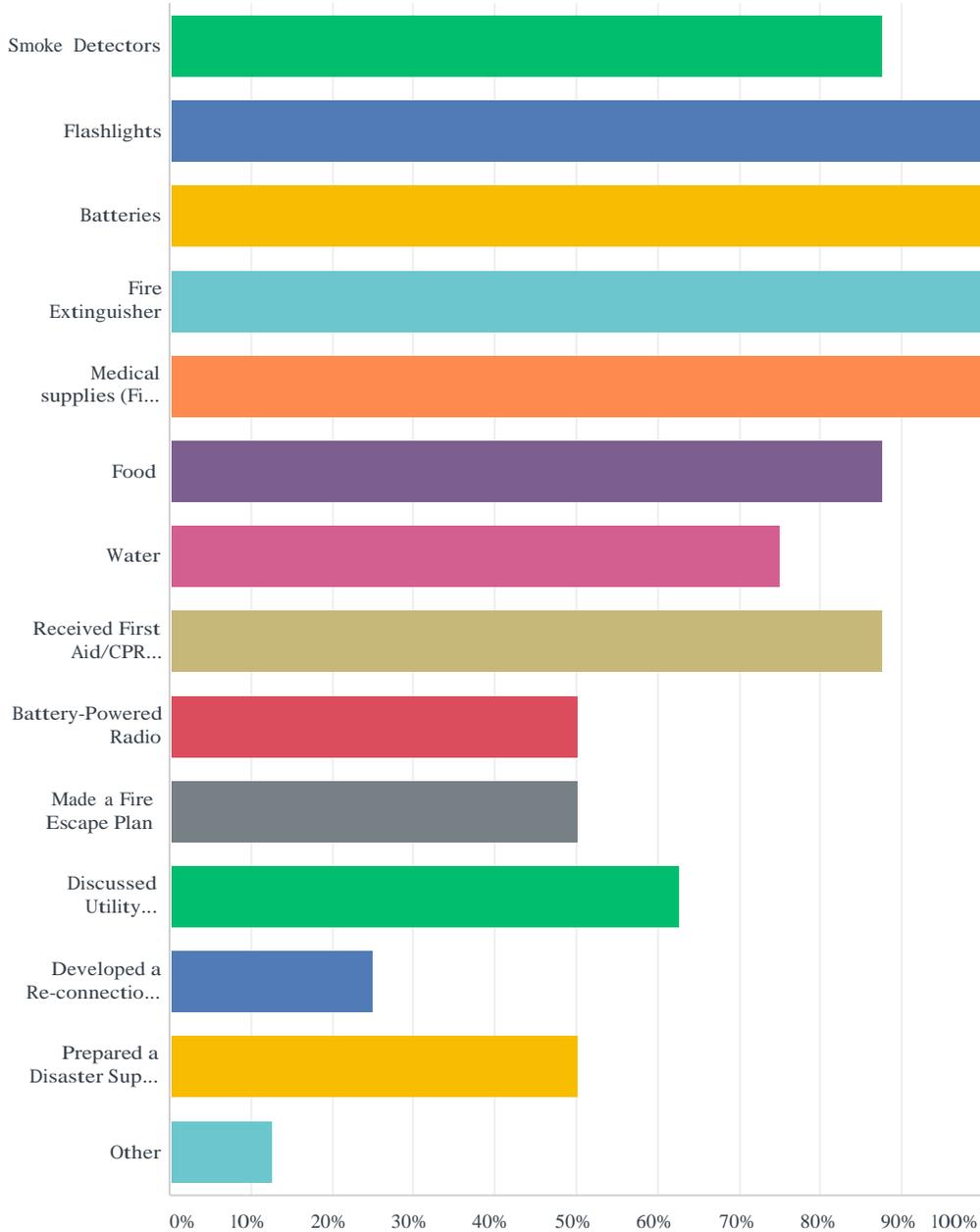


ANSWER CHOICES	RESPONSES	
0-1 Hour	0.00%	0
2-3 Hours	62.50%	5
4-7 Hours	25.00%	2
8-15 Hours	0.00%	0
16+ Hours	12.50%	1
Other	0.00%	0
TOTAL		8

Household Natural Hazards Preparedness Survey

Q14 Please choose the preparedness steps your household has already taken. (Choose all that apply)

Answered: 8 Skipped: 0



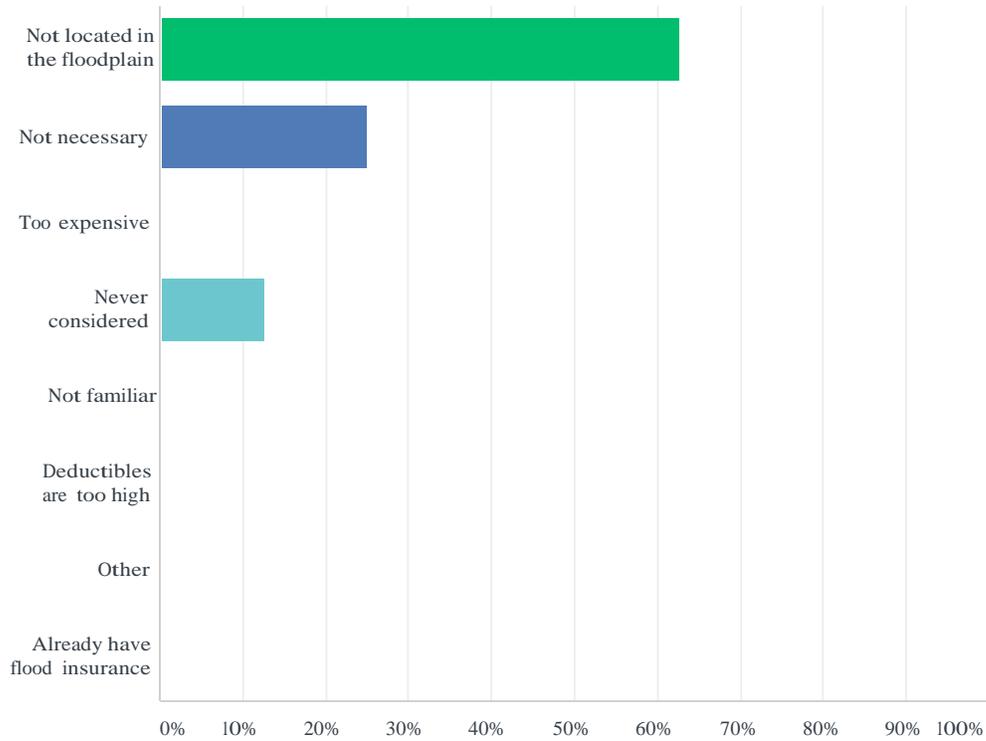
ANSWER CHOICES	RESPONSES	
Smoke Detectors	87.50%	7
Flashlights	100.00%	8
Batteries	100.00%	8
Fire Extinguisher	100.00%	8

Household Natural Hazards Preparedness Survey

Medical supplies (First Aid Kit)	100.00%	8
Food	87.50%	7
Water	75.00%	6
Received First Aid/CPR Training	87.50%	7
Battery-Powered Radio Made a	50.00%	4
Fire Escape Plan Discussed	50.00%	4
Utility Shutoffs Developed a Re-	62.50%	5
connection Plan Prepared a	25.00%	2
Disaster Supply Kit Other	50.00%	4
Total Respondents: 8	12.50%	1

Q15 Reason for not having flood insurance?

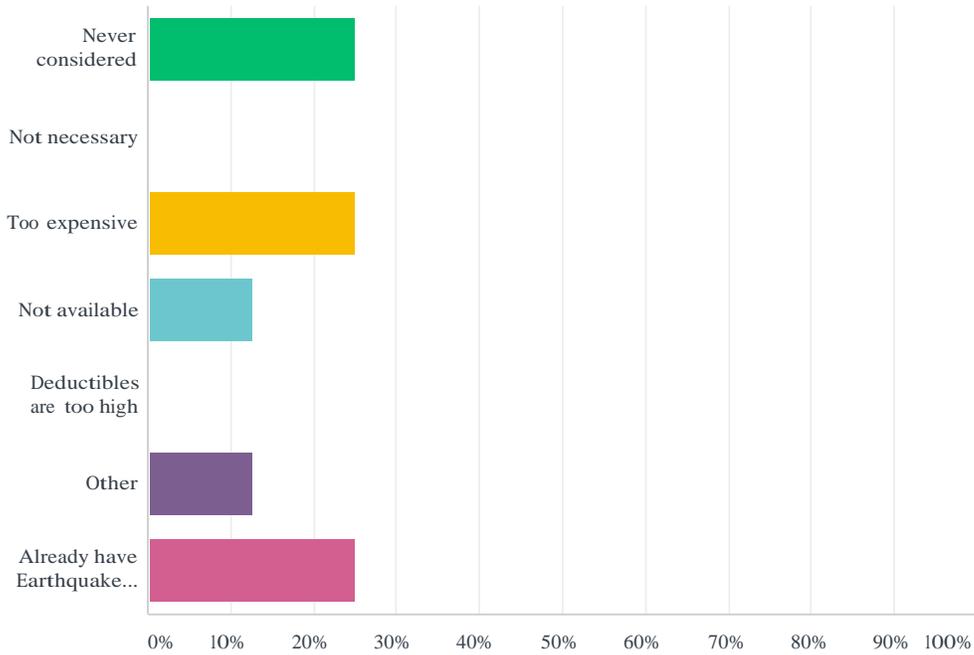
Answered: 8 Skipped: 0



ANSWER CHOICES	RESPONSES	
Not located in the floodplain	62.50%	5
Not necessary	25.00%	2
Too expensive	0.00%	0
Never considered	12.50%	1
Not familiar	0.00%	0
Deductibles are too high	0.00%	0
Other	0.00%	0
Already have flood insurance	0.00%	0
TOTAL		8

Q16 Reason for not having Earthquake insurance?

Answered: 8 Skipped: 0

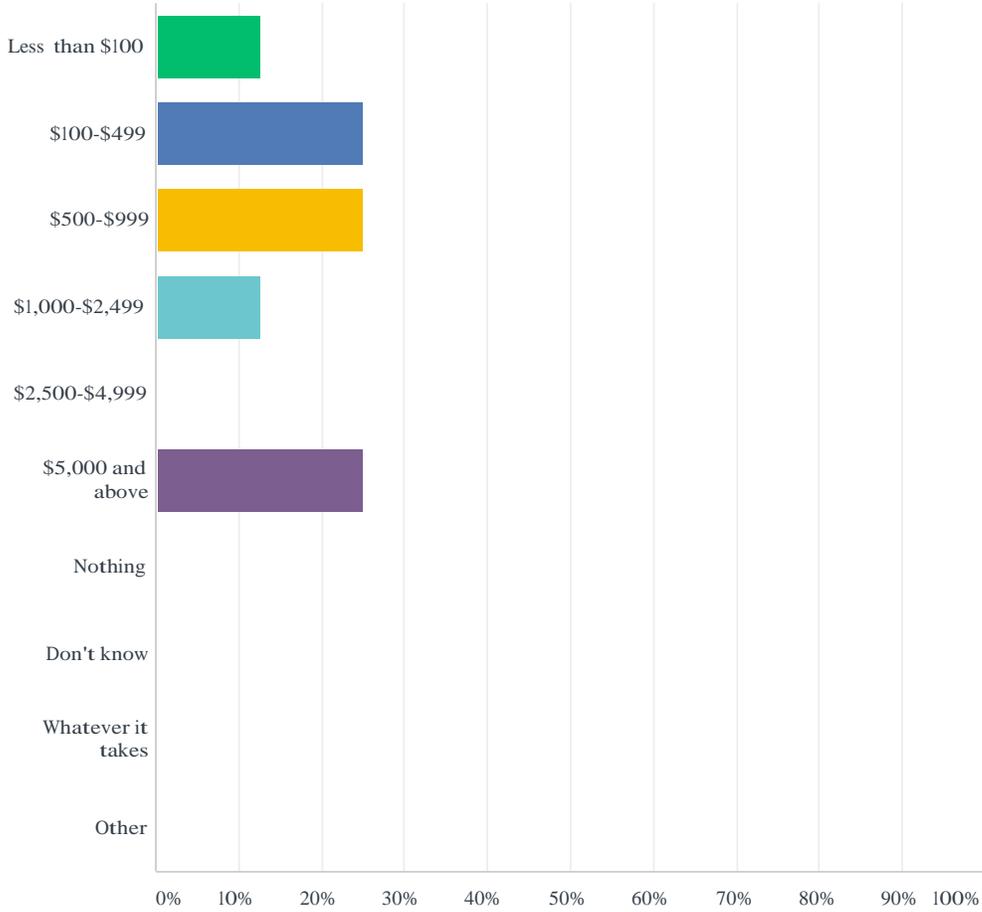


ANSWER CHOICES	RESPONSES	
Never considered	25.00%	2
Not necessary	0.00%	0
Too expensive	25.00%	2
Not available	12.50%	1
Deductibles are too high	0.00%	0
Other	12.50%	1
Already have Earthquake insurance	25.00%	2
TOTAL		8

Household Natural Hazards Preparedness Survey

Q17 How much are you willing to spend to make your home more resistant to natural disasters?

Answered: 8 Skipped: 0

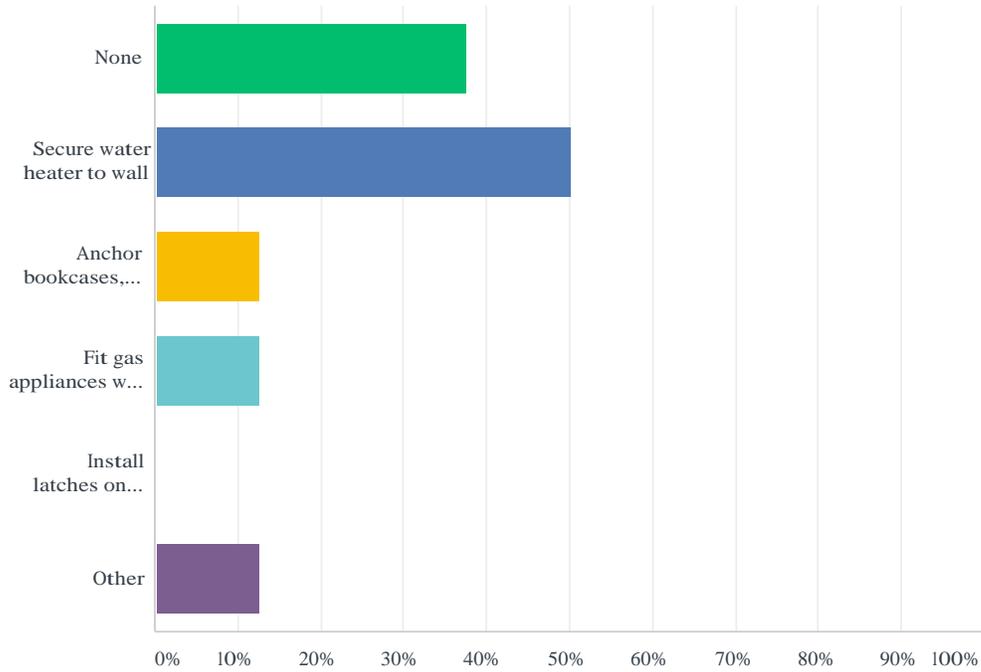


ANSWER CHOICES	RESPONSES	
Less than \$100	12.50%	1
\$100-\$499	25.00%	2
\$500-\$999	25.00%	2
\$1,000-\$2,499	12.50%	1
\$2,500-\$4,999	0.00%	0
\$5,000 and above	25.00%	2
Nothing Don't	0.00%	0
know Whatever it	0.00%	0
takes	0.00%	0
Other	0.00%	0
Total		8

Household Natural Hazards Preparedness Survey

Q18 What steps have you already taken to make your home more resilient to a natural disaster? (Choose all that apply)

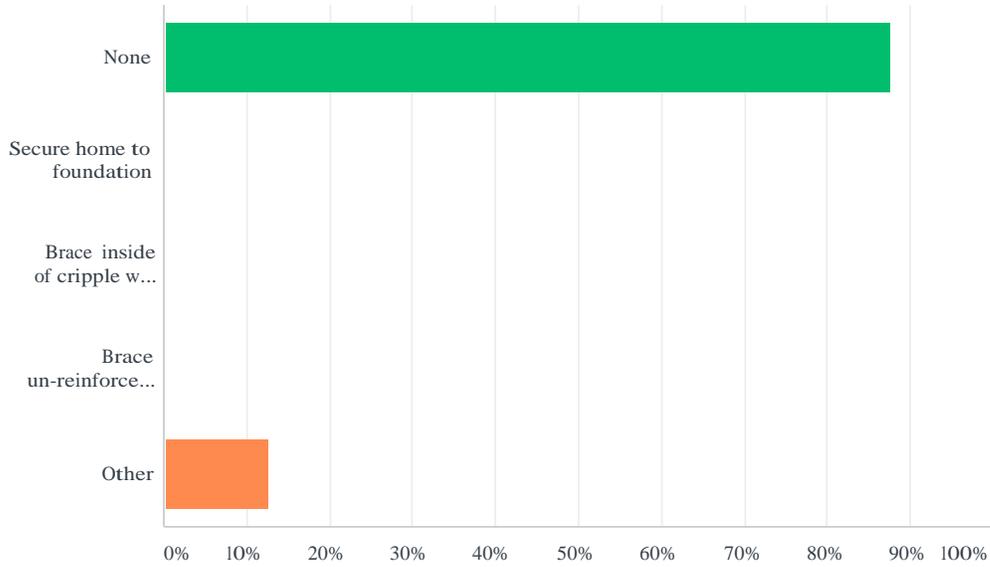
Answered: 8 Skipped: 0



ANSWER CHOICES	RESPONSES	
None	37.50%	3
Secure water heater to wall	50.00%	4
Anchor bookcases, cabinets to wall	12.50%	1
Fit gas appliances with flexible connections	12.50%	1
Install latches on drawers/cabinets	0.00%	0
Other	12.50%	1
Total Respondents: 8		

Q19 What structural modifications have you made to your home? (Choose all that apply)

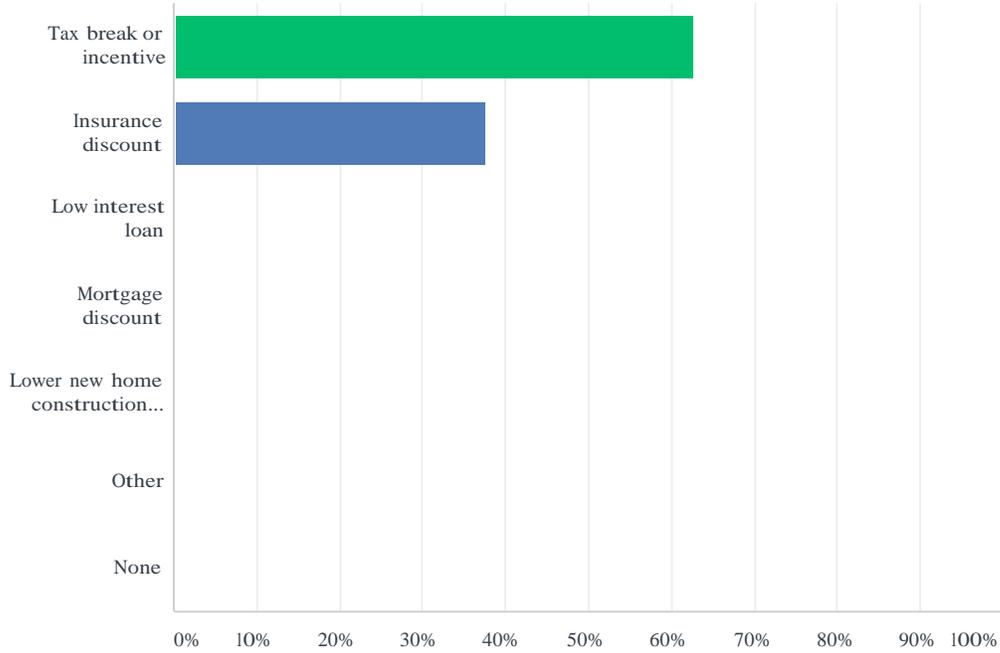
Answered: 8 Skipped: 0



ANSWER CHOICES	RESPONSES	
None	87.50%	7
Secure home to foundation	0.00%	0
Brace inside of cripple wall with sheathing	0.00%	0
Brace un-reinforced masonry & concrete walls and foundations	0.00%	0
Other	12.50%	1
Total Respondents: 8		

Q20 What incentives would motivate you to take additional steps to better protect your home?

Answered: 8 Skipped: 0

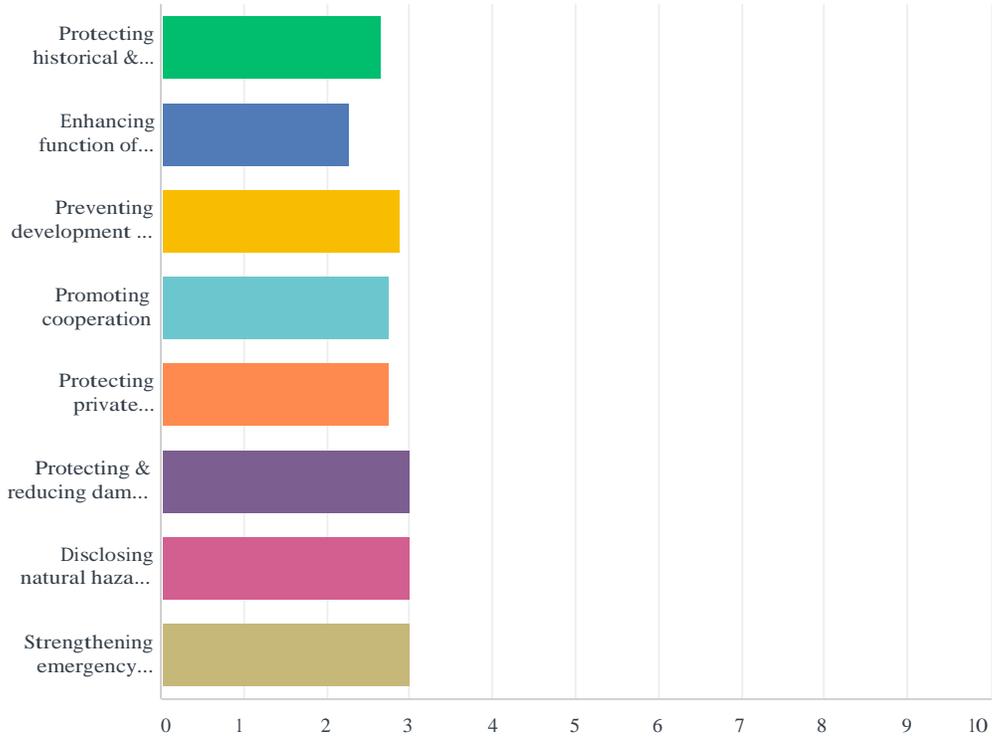


ANSWER CHOICES	RESPONSES	
Tax break or incentive	62.50%	5
Insurance discount	37.50%	3
Low interest loan	0.00%	0
Mortgage discount	0.00%	0
Lower new home construction costs	0.00%	0
Other	0.00%	0
None	0.00%	0
TOTAL		8

Household Natural Hazards Preparedness Survey

Q21 Please place an importance level on the following.

Answered: 8 Skipped: 0

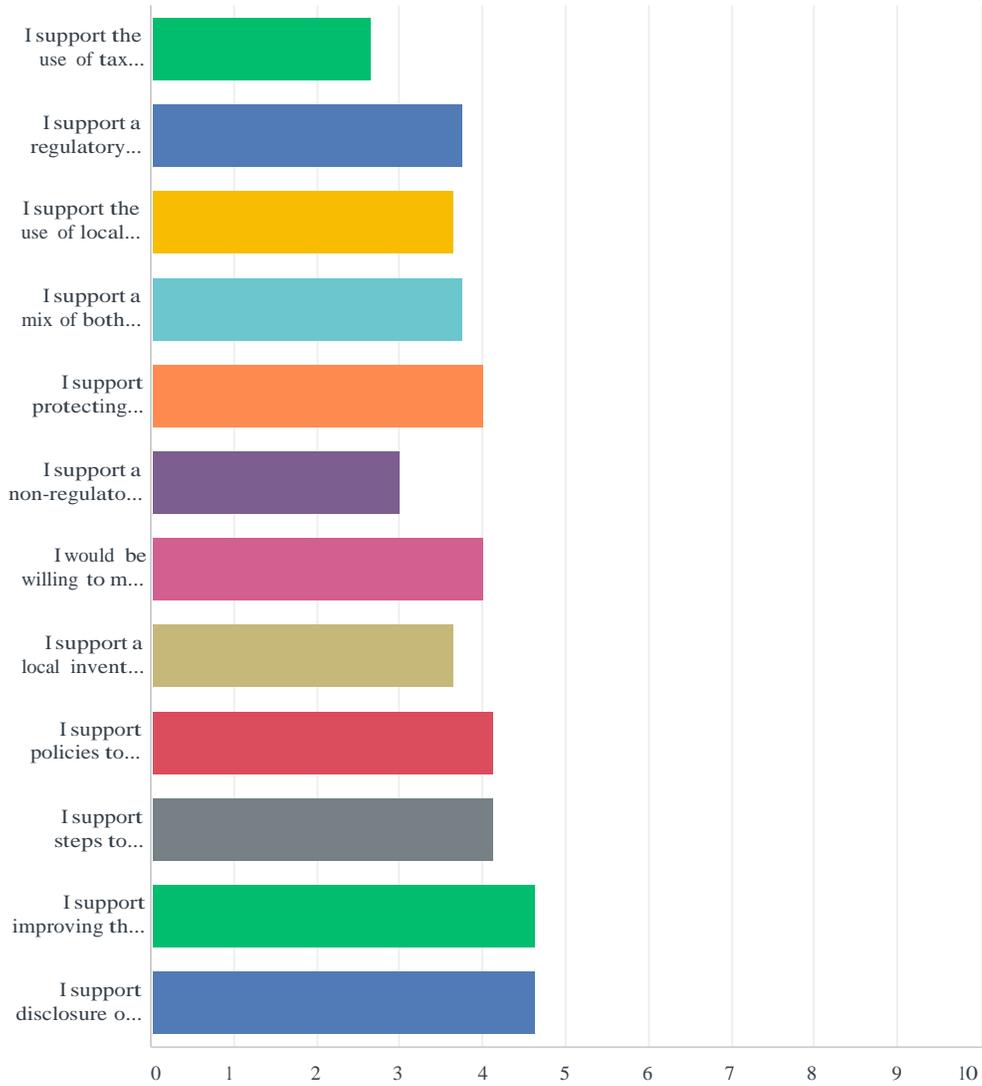


	NOT IMPORTANT	SOMEWHAT IMPORTANT	NEUTRAL	IMPORTANT	EXTREMELY IMPORTANT	TOTAL	WEIGHTED AVERAGE
Protecting historical & cultural landmarks	12.50% 1	12.50% 1	0.00% 0	37.50% 3	37.50% 3	8	2.63
Enhancing function of natural features	25.00% 2	0.00% 0	25.00% 2	50.00% 4	0.00% 0	8	2.25
Preventing development in hazard areas	0.00% 0	0.00% 0	14.29% 1	57.14% 4	28.57% 2	7	2.86
Promoting cooperation	12.50% 1	0.00% 0	0.00% 0	25.00% 2	62.50% 5	8	2.75
Protecting private property	12.50% 1	0.00% 0	0.00% 0	62.50% 5	25.00% 2	8	2.75
Protecting & reducing damage to utilities	0.00% 0	0.00% 0	0.00% 0	37.50% 3	62.50% 5	8	3.00
Disclosing natural hazard risks during real estate transactions	0.00% 0	0.00% 0	0.00% 0	37.50% 3	62.50% 5	8	3.00
Strengthening emergency services	0.00% 0	0.00% 0	0.00% 0	25.00% 2	75.00% 6	8	3.00

Household Natural Hazards Preparedness Survey

Q22 What is your general level of agreement regarding community-wide strategies?

Answered: 8 Skipped: 0



	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE	TOTAL	WEIGHTED AVERAGE
I support the use of tax dollars to compensate landowners for not developing in hazard areas	37.50% 3	0.00% 0	37.50% 3	12.50% 1	12.50% 1	8	2.63
I support a regulatory approach to reducing risk	12.50% 1	0.00% 0	25.00% 2	25.00% 2	37.50% 3	8	3.75
I support the use of local tax dollars to reduce risks & losses	12.50% 1	0.00% 0	12.50% 1	62.50% 5	12.50% 1	8	3.63
I support a mix of both regulatory & non-regulatory approaches	12.50% 1	0.00% 0	12.50% 1	50.00% 4	25.00% 2	8	3.75

Household Natural Hazards Preparedness Survey

I support protecting historical & cultural structures	12.50% 1	0.00% 0	0.00% 0	50.00% 4	37.50% 3	8	4.00
I support a non-regulatory approach to reducing risk	25.00% 2	12.50% 1	12.50% 1	37.50% 3	12.50% 1	8	3.00
I would be willing to make my home more disaster resilient	0.00% 0	0.00% 0	12.50% 1	75.00% 6	12.50% 1	8	4.00
I support a local inventory of at-risk buildings and infrastructures	0.00% 0	12.50% 1	25.00% 2	50.00% 4	12.50% 1	8	3.63
I support policies to prohibit development in natural hazard areas	12.50% 1	0.00% 0	0.00% 0	37.50% 3	50.00% 4	8	4.13
I support steps to safeguard the local economy after a disaster	12.50% 1	0.00% 0	0.00% 0	37.50% 3	50.00% 4	8	4.13
I support improving the disaster preparedness of local schools	0.00% 0	0.00% 0	0.00% 0	37.50% 3	62.50% 5	8	4.63
I support disclosure of natural hazard risks during real estate transactions	0.00% 0	0.00% 0	0.00% 0	37.50% 3	62.50% 5	8	4.63

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;

- Encouraging long-term, comprehensive hazard mitigation planning;
 - Responding to the needs of communities participating in the NFIP to expand their mitigation activities beyond floodplain development activities; and
 - Complementing other federal and state mitigation programs with similar, long-term mitigation goals.
- <http://www.fema.gov/flood-mitigation-assistance-program>

Detailed program and application information for federal post-disaster and pre-disaster programs can be found in the f, available at :
<https://www.fema.gov/library/viewRecord.do?id=4225>

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: Dennis Sigrist, dennis.sigrist@oem.state.or.us

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.
http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs

Oregon Watershed Enhancement Board

- While OWEB's primary responsibilities are implementing projects addressing coastal salmon restoration and improving water quality statewide, these projects can sometimes also benefit efforts to reduce flood and landslide hazards. In addition, OWEB conducts watershed workshops for landowners, watershed councils, educators, and others, and conducts a biennial conference highlighting watershed efforts statewide. Funding for OWEB programs comes from the general fund, state lottery, timber tax revenues, license plate revenues, angling license fees, and other sources. OWEB awards approximately \$20 million in funding annually.
<http://www.oregon.gov/OWEB/Pages/index.aspx>

Federal Mitigation Programs, Activities & Initiatives

Basic & Applied Research/Development

- National Earthquake Hazard Reduction Program (NEHRP), National Science Foundation. Through broad based participation, the NEHRP attempts to mitigate the effects of earthquakes. Member agencies in NEHRP are the US Geological Survey (USGS), the National Science Foundation (NSF), the Federal Emergency Management Agency (FEMA), and the

National Institute for Standards and Technology (NIST). The agencies focus on research and development in areas such as the science of earthquakes, earthquake performance of buildings and other structures, societal impacts, and emergency response and recovery. <http://www.nehrp.gov/>

- Decision, Risk, and Management Science Program, National Science Foundation. Supports scientific research directed at increasing the understanding and effectiveness of decision making by individuals, groups, organizations, and society. Disciplinary and interdisciplinary research, doctoral dissertation research, and workshops are funded in the areas of judgment and decision making; decision analysis and decision aids; risk analysis, perception, and communication; societal and public policy decision making; management science and organizational design. The program also supports small grants for exploratory research of a time-critical or high-risk, potentially transformative nature. http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5423

Hazard ID and Mapping

- National Flood Insurance Program: Flood Mapping; FEMA. Flood insurance rate maps and flood plain management maps for all NFIP communities. <http://www.fema.gov/national-flood-insurance-program-flood-hazard-mapping>
- National Digital Orthophoto Program, DOI – USGS. Develops topographic quadrangles for use in mapping of flood and other hazards. <http://www.ndop.gov/>
- Mapping Standards Support, DOI-USGS. Expertise in mapping and digital data standards to support the National Flood Insurance Program. <http://ncgmp.usgs.gov/standards.html>
- Soil Survey, USDA-NRCS. Maintains soil surveys of counties or other areas to assist with farming, conservation, mitigation or related purposes. http://soils.usda.gov/survey/printed_surveys/

Project Support

- Coastal Zone Management Program, NOAA. Provides grants for planning and implementation of non-structural coastal flood and hurricane hazard mitigation projects and coastal wetlands restoration. <http://coastalmanagement.noaa.gov/>
- Community Development Block Grant Entitlement Communities Program, 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- income persons. http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs/entitlement
- 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>

- Emergency Watershed Protection Program, USDA-NRCS. Provides technical and financial assistance for relief from imminent hazards in small watersheds, and to reduce vulnerability of life and property in small watershed areas damaged by severe natural hazard events. <http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/ewpp>
- Rural Development Assistance – Utilities, USDA. Direct and guaranteed rural economic loans and business enterprise grants to address utility issues and development needs. http://www.rurdev.usda.gov/Utilities_Programs_Grants.html
- Rural Development Assistance – Housing, USDA. Grants, loans, and technical assistance in addressing rehabilitation, health and safety needs in primarily low-income rural areas. Declaration of major disaster necessary. <http://www.rurdev.usda.gov/HAD-HCFPGGrants.html>
- Public Assistance Grant Program, FEMA. The objective of the Federal Emergency Management Agency's (FEMA) Public Assistance (PA) Grant Program is to provide assistance to State, Tribal and local governments, and certain types of Private Nonprofit organizations so that communities can quickly respond to and recover from major disasters or emergencies declared by the President. <http://www.fema.gov/public-assistance-local-state-tribal-and-non-profit>
- National Flood Insurance Program, FEMA. 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. <http://www.hud.gov/offices/cpd/affordablehousing/programs/home/>
- Disaster Recovery Initiative, HUD. Grants to fund gaps in available recovery assistance after disasters (including mitigation). http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs/dri
- Emergency Management Performance Grants, FEMA. Helps state and local governments to sustain and enhance their all-hazards emergency management programs. <http://www.fema.gov/fy-2012-emergency-management-performance-grants-program>
- Partners for Fish and Wildlife, DOI – FWS. 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. <http://www.fws.gov/birdhabitat/Grants/index.shtm>
- Federal Land Transfer / Federal Land to Parks Program, DOI-NPS. Identifies, assesses, and transfers available Federal real property for acquisition for State and local parks and recreation, such as open space. <http://www.nps.gov/ncrc/programs/flp/index.htm>

- Wetlands Reserve program, USDA-NCRS. Financial and technical assistance to protect and restore wetlands through easements and restoration agreements.
<http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/wetlands>
- Secure Rural Schools and Community Self-Determination Act of 2000, US Forest Service. Reauthorized for FY2012, it was originally enacted in 2000 to provide five years of transitional assistance to rural counties affected by the decline in revenue from timber harvests on federal lands. Funds have been used for improvements to public schools, roads, and stewardship projects. Money is also available for maintaining infrastructure, improving the health of watersheds and ecosystems, protecting communities, and strengthening local economies. <http://www.fs.usda.gov/pts/>

Appendix F: Maps

Table of Contents

ODF Wildfire Maps (2017)

Vegetation Condition Class Departure in Wasco County F-2

Historic Fire Regimes in Wasco County F-3

DOGAMI Risk Report Maps (2018)

Building Distribution Map of Wasco County F-4

Population Density of Wasco County F-5

Liquefaction Map of Wasco County F-6

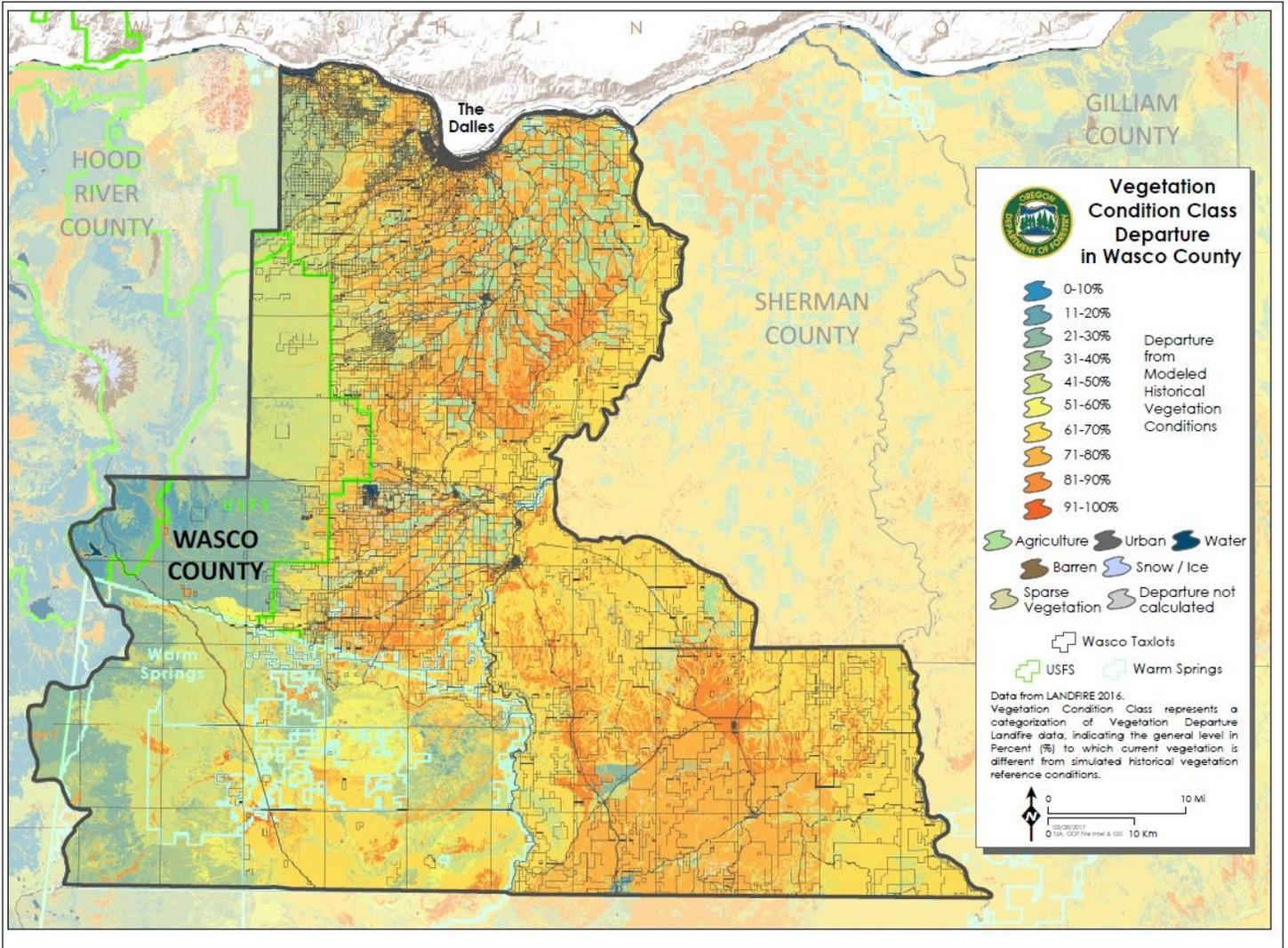
Landslide Susceptibility Map of Wasco County F-7

Wildfire Risk Map of Wasco County F-8

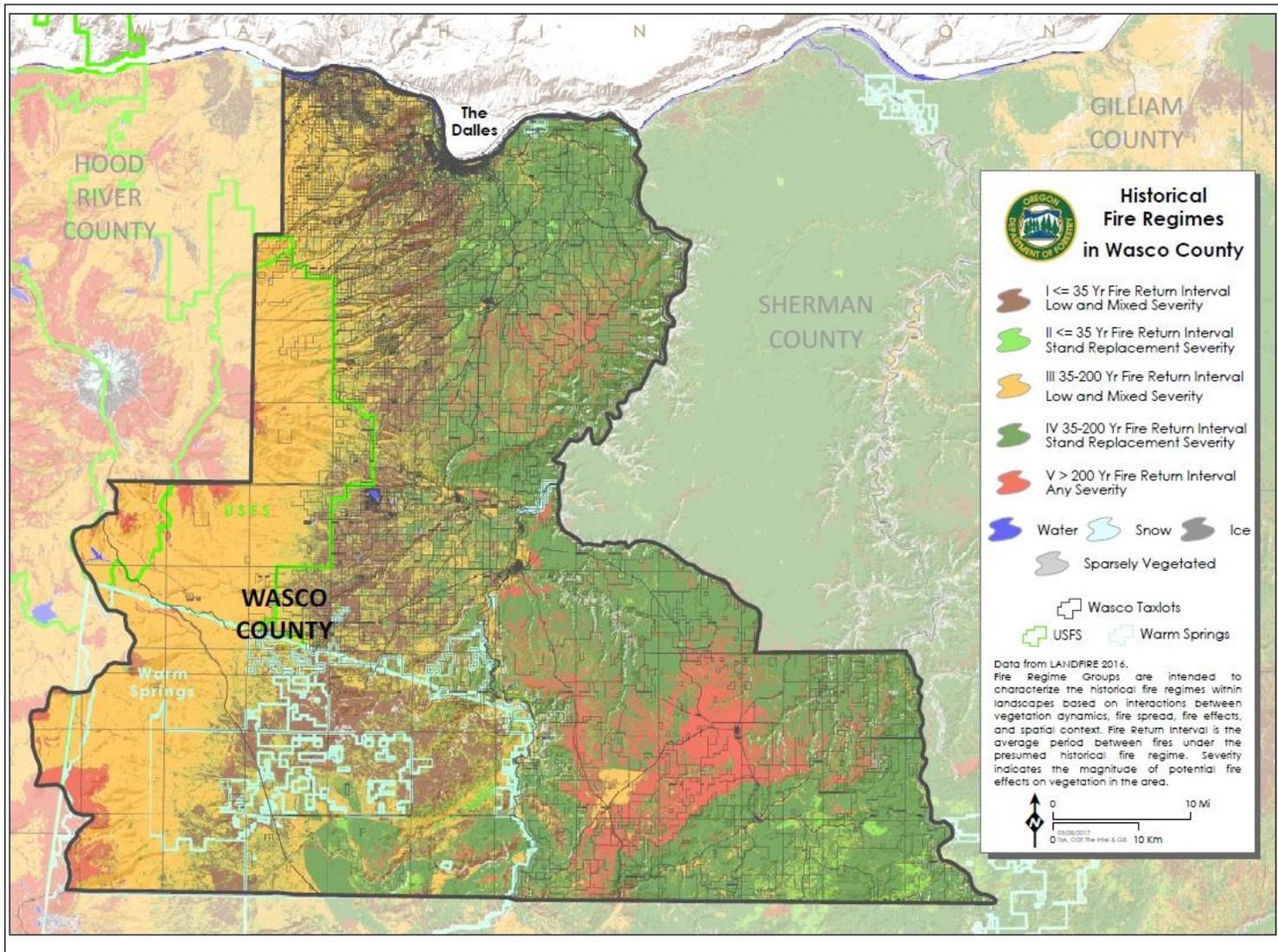
Wasco County Environmental Protection Districts 1 and 2

Environmental Protection District 1 – Flood Hazard Overlay F-9

Environmental Protection District 2 – Geologic Hazard Overlay F-10



Source: Teresa Z Alcock, ODF Fire Intel & GIS, March 28, 2017



Source: Teresa Z Alcock, ODF Fire Intel & GIS, March 28, 2017



Building Distribution Map of Wasco County, Oregon

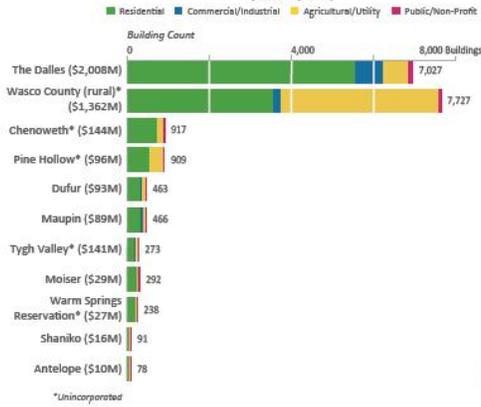
PLATE 1



Building Occupancy

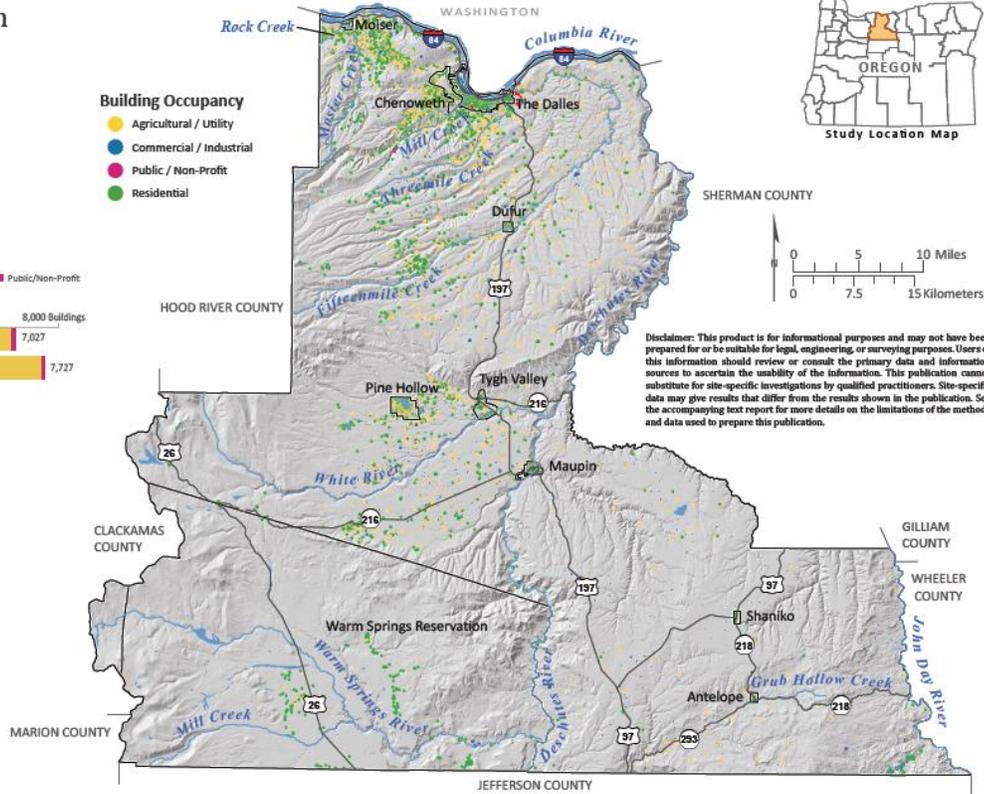
- Agricultural / Utility
- Commercial / Industrial
- Public / Non-Profit
- Residential

Buildings by Occupancy Class
(Ranked by Value)

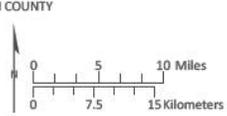


Data Sources:
 Building Footprints: Oregon Department of Geology and Mineral Industries (2016)
 Roads: Oregon Department of Transportation Signed Routes (2013)
 Place names: U.S. Geological Survey Geographic Names Information System (2015)
 City Limits: Oregon Department of Transportation (2014)
 Base map: U.S. Geological Survey and Oregon LIDAR Consortium (2012)

Projection: NAD 1983 UTM Zone 10N
Software: Esri® ArcMap 10, Adobe® Illustrator CS6
Cartography: by Lowell Anthony, 2018



Disclaimer: This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information. This publication cannot substitute for site-specific investigations by qualified practitioners. Site-specific data may give results that differ from the results shown in the publication. See the accompanying text report for more details on the limitations of the methods and data used to prepare this publication.

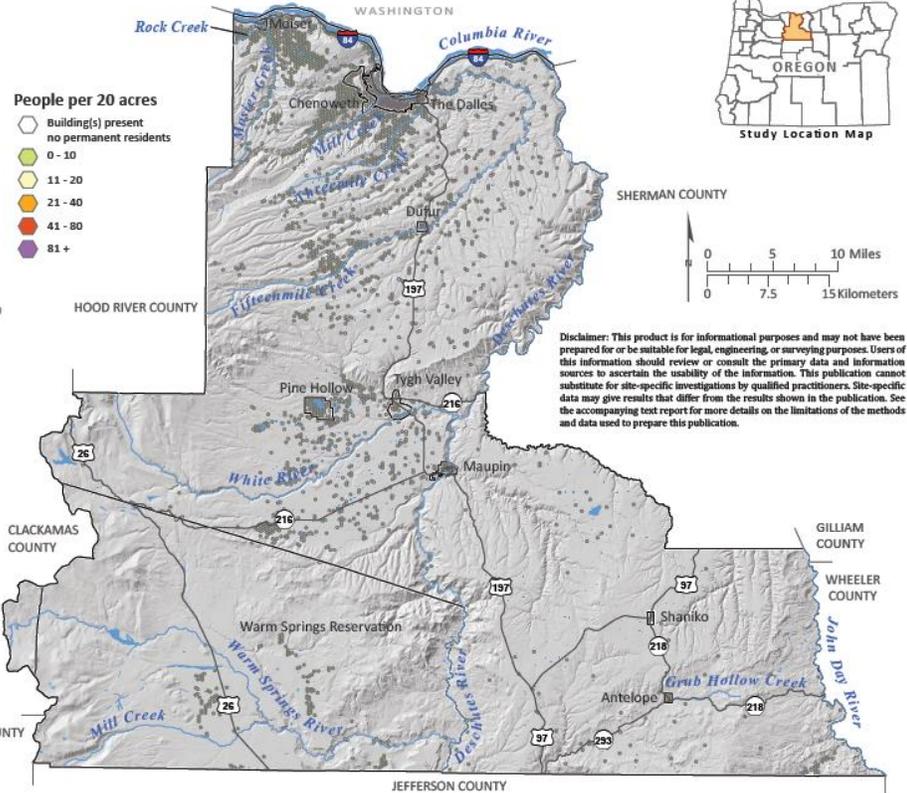
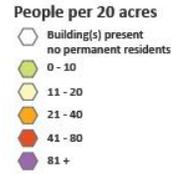
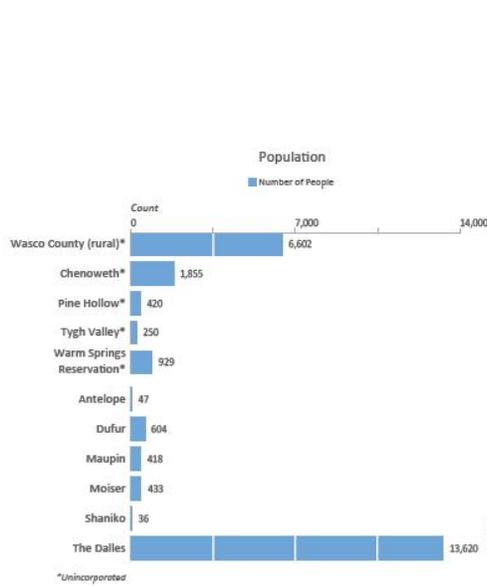


Source: Natural Hazard Risk Report for Wasco County, Oregon (Draft), DOGAMI, 2018



Population Density Map of Wasco County, Oregon

PLATE 2



Disclaimer: This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information. This publication cannot substitute for site-specific investigations by qualified practitioners. Site-specific data may give results that differ from the results shown in the publication. See the accompanying text report for more details on the limitations of the methods and data used to prepare this publication.

Data Sources:
 Population data: U.S. Census (2010)
 Roads: Oregon Department of Transportation Signed Routes (2013)
 Place names: U.S. Geological Survey Geographic Names Information System (2015)
 City limits: Oregon Department of Transportation (2014)
 Base map: U.S. Geological Survey and Oregon Lidar Consortium (2012)

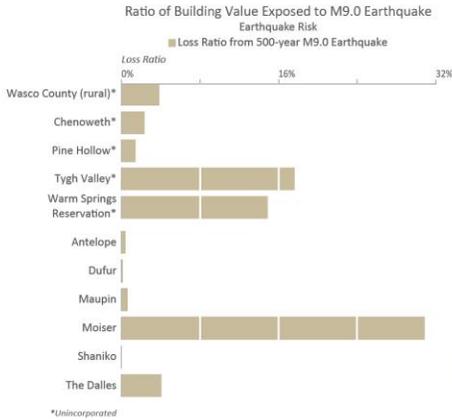
Projection: NAD 1983 UTM Zone 10N
Software: Esri® ArcMap 10, Adobe® Illustrator CS6
Cartography by: Lowell Anthony, 2018

Source: Natural Hazard Risk Report for Wasco County, Oregon (Draft), DOGAMI, 2018



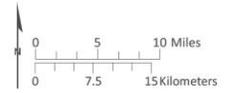
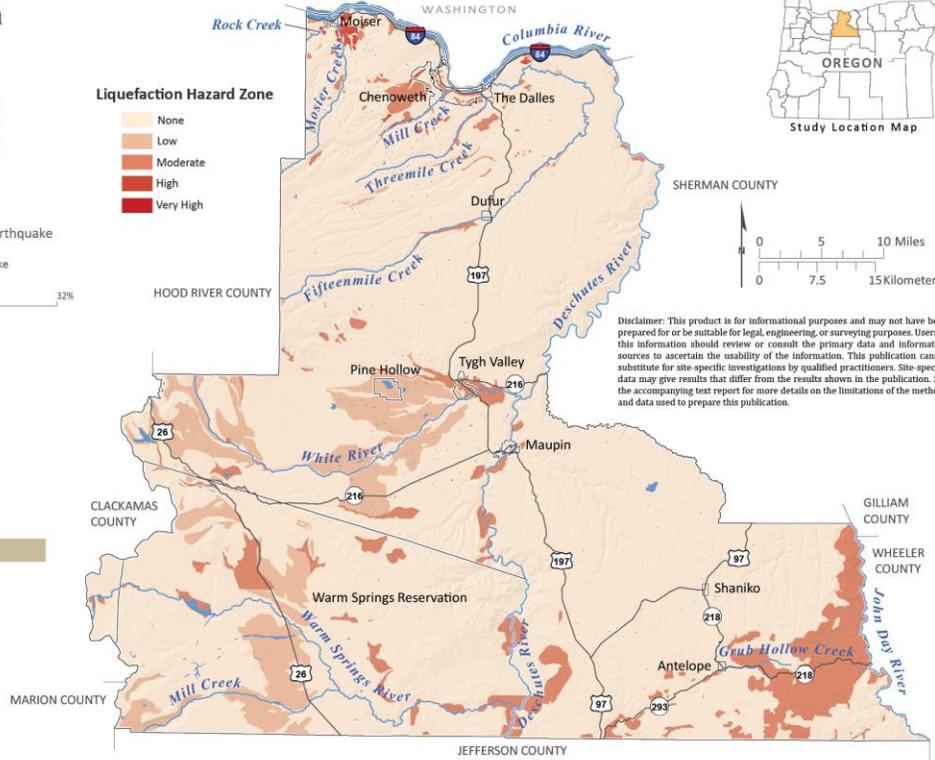
Liquefaction Map of Wasco County, Oregon

Two potential earthquake-induced hazards are liquefaction and landslides. Liquefaction is when saturated soils substantially lose bearing capacity due to ground shaking, causing it to behave like a liquid, which can be a source of tremendous damage. If the earthquake occurs near populated areas, it may cause casualties, economic disruption, and extensive property damage.



Data Sources:
 Earthquake liquefaction susceptibility: Oregon Resilience Plan, Madin and Burns (2013)
 Roads: Oregon Department of Transportation Signed Routes (2013)
 Place names: U.S. Geological Survey Geographic Names Information System (2015)
 City limits: Oregon Department of Transportation (2014)
 Basemap: U.S. Geological Survey and Oregon Lidar Consortium (2012)
 Projection: NAD 1983 EPSG Zone 10N
 Software: Esri® ArcMap 10, Adobe® Illustrator CS6
 Cartography by: Lowell Anshong, 2018

Liquefaction Hazard Zone



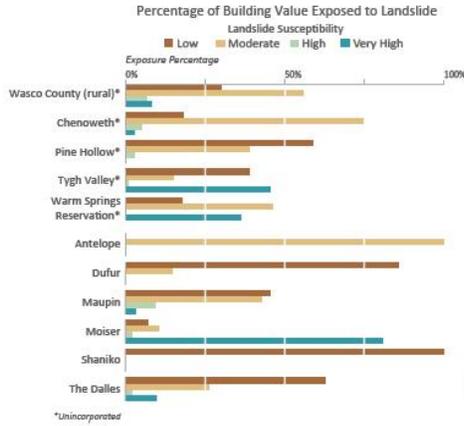
Disclaimer: This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information. This publication cannot substitute for site-specific investigations by qualified practitioners. Site-specific data may give results that differ from the results shown in the publication. See the accompanying text report for more details on the limitations of the methods and data used to prepare this publication.

Source: Natural Hazard Risk Report for Wasco County, Oregon (Draft), DOGAMI, 2018



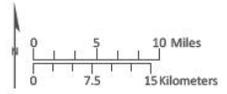
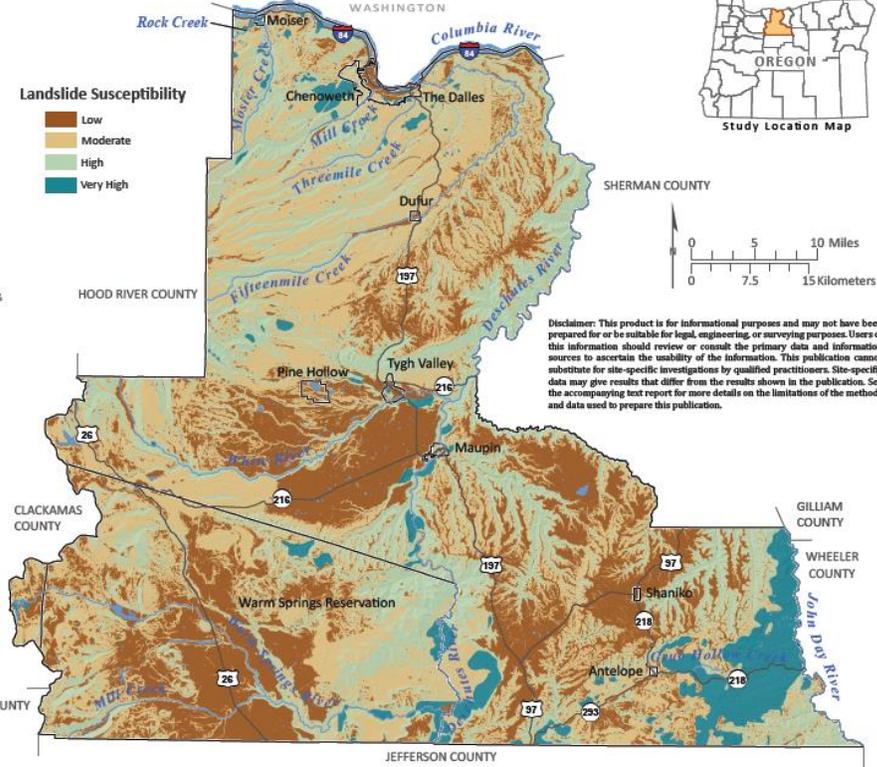
Landslide Susceptibility Map of Wasco County, Oregon

Landslide susceptibility is categorized as Low, Moderate, High, and Very High which describes the general level of susceptibility to landslide hazard. The dataset is an aggregation of three primary sources: landslide inventory (SLIDO), generalized geology, and slope.



Data Sources:
 Landslide susceptibility: Stearns and others (2016)
 Roads: Oregon Department of Transportation Signed Routes (2013)
 Place names: U.S. Geological Survey Geographic Names Information System (2015)
 City limits: Oregon Department of Transportation (2014)
 Basemap: U.S. Geological Survey and Oregon Lidar Consortium (2012)

Projection: NAD 1983 UTM Zone 10N
 Software: Esri® ArcMap 10, Adobe® Illustrator CS6
 Cartography by: Lowell Anthony, 2018



Disclaimer: This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information. This publication cannot substitute for site-specific investigations by qualified practitioners. Site-specific data may give results that differ from the results shown in the publication. See the accompanying text report for more details on the limitations of the methods and data used to prepare this publication.

Source: Natural Hazard Risk Report for Wasco County, Oregon (Draft), DOGAMI, 2018



Wildfire Risk Map of Wasco County, Oregon

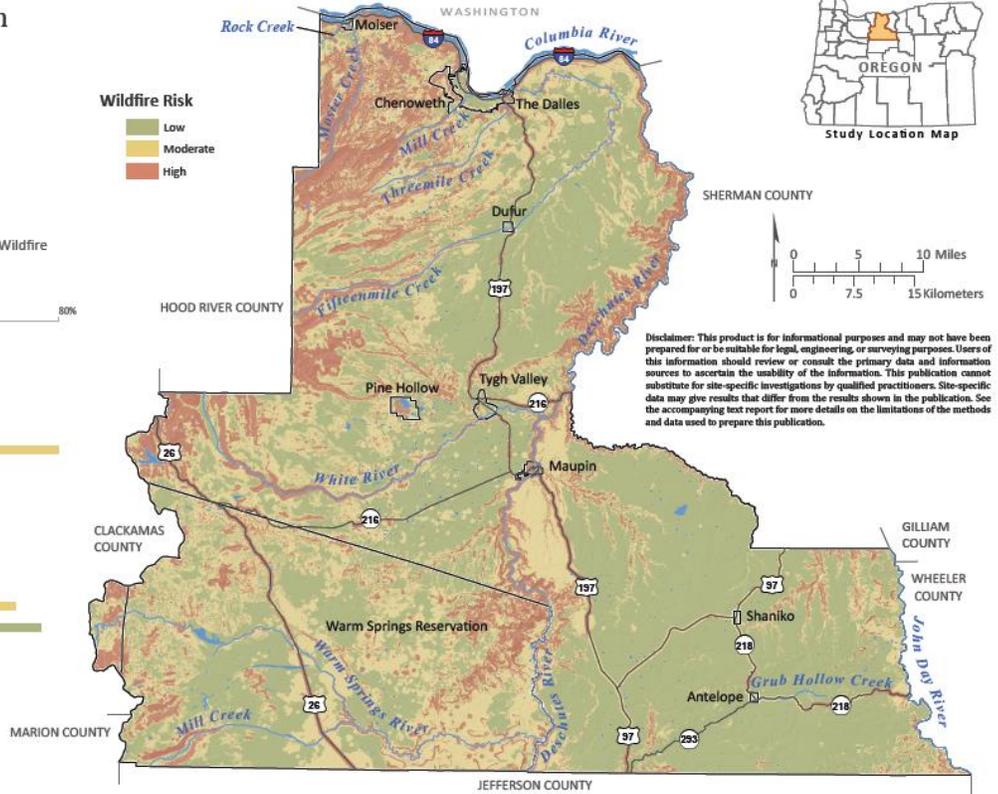
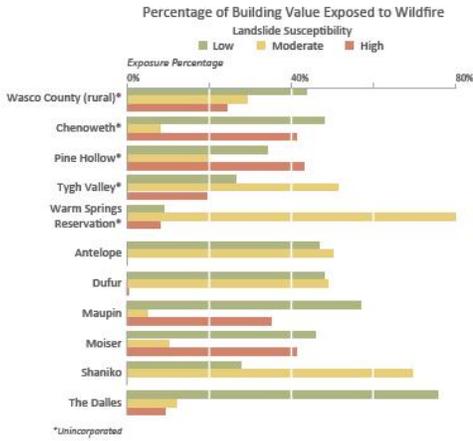
Wildfire Risk is categorized as Low, Moderate, and High and indicates the level of risk a location has to wildfire hazard. The Wildfire Risk data layer (Fire Risk Index) is derived from a combination of the Fire Threat Index (fire history and behavior) and the Fire Effects Index (infrastructure and assets).

Wildfire Risk

- Low
- Moderate
- High



PLATE 7

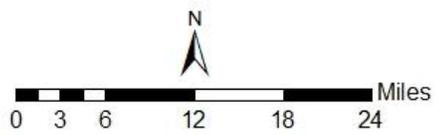
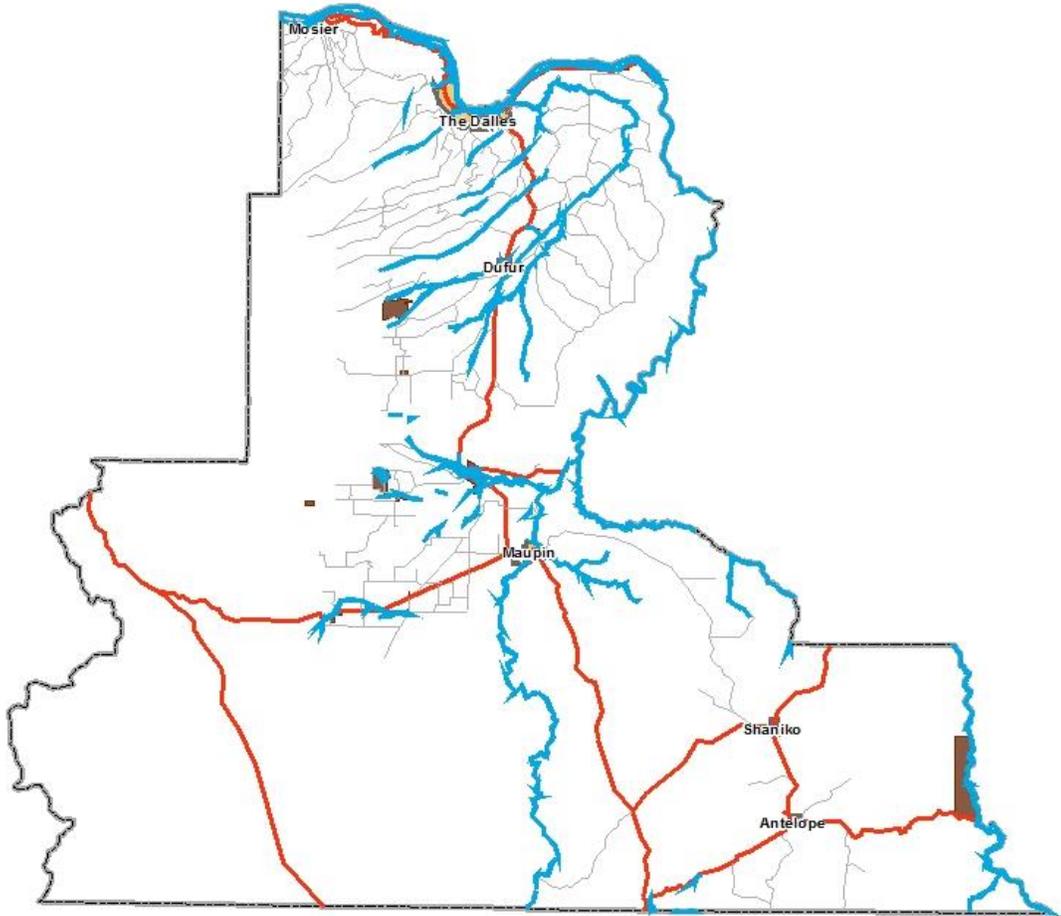


Data Sources:
 Wildfire risk data: Oregon Department of Forestry (2013)
 Roads: Oregon Department of Transportation Signed Routes (2013)
 Place names: U.S. Geological Survey Geographic Names Information System (2015)
 City limits: Oregon Department of Transportation (2014)
 Base map: U.S. Geological Survey and Oregon Lidar Consortium (2012)

Projection: NAD 1983 UTM Zone 10N
 Software: Esri® ArcMap 10, Adobe® Illustrator CS6
 Cartography by: Lowell Anthony, 2018

Source: Natural Hazard Risk Report for Wasco County, Oregon (Draft), DOGAMI, 2018

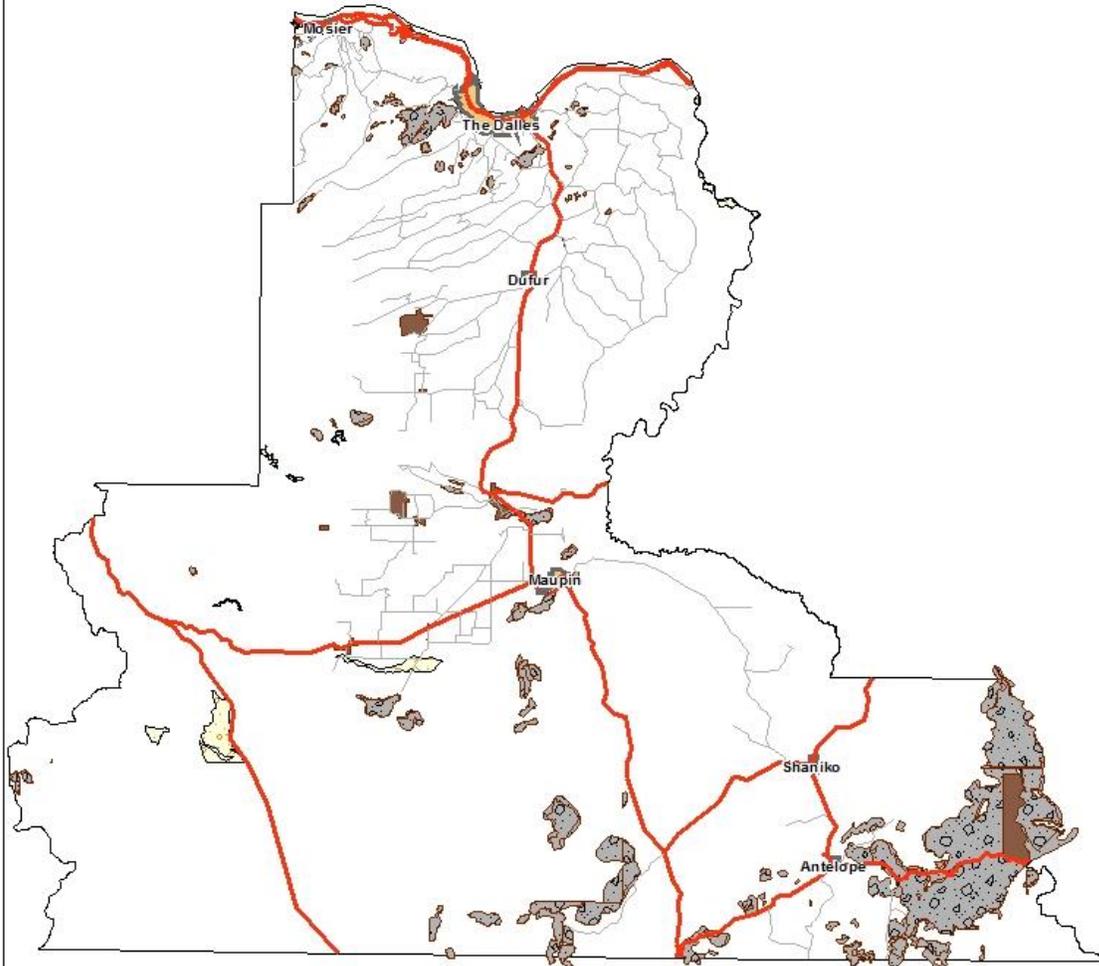
EPD 1: FLOOD HAZARD OVERLAY



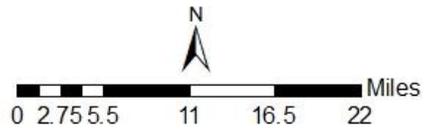
This product is for informational purposes and has not been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.



EPD 2: GEOLOGIC HAZARDS OVERLAY



<ul style="list-style-type: none"> State Roads County Roads Municipalities Unincorporated Places Wasco County 	<p style="text-align: center;">EPD 2 Geologic</p> <ul style="list-style-type: none"> Landslide Fan Talus-Colluvium
---	---



This product is for informational purposes and has not been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

