Volume I:
Basic Mitigation Plan

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Clackamas County

Natural Hazards Mitigation Plan

Plan for:

Clackamas County Emergency Management

2200 Kaen Road

Oregon City, Oregon 97045

Prepared by:

University of Oregon's Community Service Center:

Resource Assistance to Rural Environments &

Oregon Partnership for Disaster Resilience

1209 University of Oregon

Eugene, Oregon 97403-1209

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UNIVERSITY OF OREGON

RARE Resource Assistance for Rural Environments

PARTNERSHIP FOR DISASTER RESILIENCE

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Special Thanks & Acknowledgements

Clackamas County developed this Natural Hazard Mitigation Plan through a regional partnership funded by the Federal Emergency Management Agency's Pre-Disaster Mitigation Competitive Grant Program. FEMA awarded the Mid-Columbia Gorge Region grant to support the update of natural hazard mitigation plans for eight counties in the region. The region's planning process utilized a four-phased planning process, plan templates and plan development support provided by Resource Assistance for Rural Environments (RARE) and the Oregon Partnership for Disaster Resilience (OPDR) at the University of Oregon's Community Service Center. This project would not have been possible without technical and financial support provided by the Mid-Columbia Council of Governments.

Regional partners include:

- Mid-Columbia Council of Governments
- Oregon Department of Forestry
- Oregon Emergency Management
- Oregon Public Health
- FEMA Region X
- Oregon Partnership for Disaster Resilience at the University of Oregon's Community Service Center
- Resource Assistance to Rural Environments at the University of Oregon's Community Service Center
- Oregon Department of Geology and Mineral Industries

Project Steering Committee:

COUNTY DEPARTMENT AND SPECIAL DISTRICTS

- Nancy Bush, Clackamas County Emergency Management
- Rebecca Ceniga, Clackamas County Transportation and Development - Planning
- Steve Hanschka, Clackamas County Transportation and Development - Planning
- Clair Klock, Clackamas County Soil and Water Conservation District
- Zach Koellermeier, Clackamas County Water Environment Services
- Cindy Kolomechuk, Oregon Department of Forestry
- Eric Laufer, Clackamas County Geographic Information Systems
- Larry MacDaniels, Clackamas County Community Health
- Sherry Patterson, Rivergrove Water District
- Gregg Ramirez, Clackamas Fire District #1
- Andy Robins, Clackamas County Water Environment Services
- Jeff Rubin, Tualatin Valley Fire and Rescue

- Kimberly Swan, Clackamas Providers
- Jay Wilson, Clackamas County Emergency Management
- Susan Ziolko, Clackamas County Sustainability
- Scott Caufield, Clackamas County Transportation and Development – Building Codes*
- Mic Elby, Hoodland Fire*

*Indicates that members were invited to meetings but did not participate in the 2012 update process

CITY LEADS

- Jorge Tro, City of Canby
- Erika Palmer, City of Damascus
- Melanie Wagner, City of Estacada
- Chief Jim Pryde, City of Gladstone*
- Maria Aikin, City of Gladstone
- Steve Campbell, City of Happy Valley*
- Judy Davis, City of Johnson City
- Captain Larry Goff, City of Lake Oswego
- Bonnie Hirshberger, City of Lake Oswego
- Captain David Rash, City of Milwaukie
- Ellen Barnes, City of Molalla
- Kathy Griffin, City of Oregon City*
- Bob Cullison, City of Oregon City
- Sherry Patterson, City of Rivergrove
- Alice Busch, City of Sandy
- Seth Atkinson, City of Sandy*
- Captain Ron Schwartz, City of West Linn
- Delora Kerber, City of Wilsonville*
- Steve Munsterman, City of Wilsonville

*Indicates that city leads were invited to participate in the county's NHMP meetings but did not participate in the 2012 update process

Project Managers:

- Laura Comstock, RARE participant
- Jay Wilson, Clackamas County Emergency Management

Community Service Center Staff:

- Megan Smith, Director, Resource Assistance for Rural Environments; Co-Director, Community Service Center
- Josh Bruce, Interim Director, Partnership for Disaster Resilience
- Mike Howard, Program Specialist, Partnership for Disaster Resilience
- Titus Tomlinson, Program Assistant, Resource Assistance for Rural Environments
- Julie Foster, Grants Administrator, Community Service Center
- Linda White, Office Coordinator, Community Service Center

Geographic Information Systems (GIS) Maps:

The Clackamas County GIS department helped update all of the maps enclosed in the Natural Hazards Mitigation Plan. The Vulnerability Analysis table was also generated and updated by the GIS department; this table was a vital component to the committee's review and update of the hazard analysis. The contributions from this department were essential in illustrating the extent and potential losses associated with the natural hazards affecting the community

- Eric Laufer, Clackamas County Geographic Information Systems

Plan Template Disclaimer

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

About the Community Service Center

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

About the Oregon Partnership for Disaster Resilience

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

About Resource Assistance to Rural Environments

RARE is an AmeriCorps program administered through the University of Oregon's Community Service Center. RARE is currently supported through grants from the Corporation for National & Community Service (AmeriCorps), The Ford Family Foundation, the University of Oregon, the Oregon Food Bank, the Federal Emergency Management Agency, the Oregon Department of Transportation, and other agencies. In addition, each participating community provides $19,000 of approximately $32,000 needed to place, train, and support a full-time RARE member.

Clackamas County
Natural Hazards Mitigation Plan

Table of Contents

Volume I: Basic Mitigation Plan

Volume II: Hazard Annexes

Volume III: City Addenda

Volume IV: Mitigation Resources

Executive Summary

Clackamas County Emergency Management developed this multi-jurisdictional Natural Hazards Mitigation Plan in an effort to prepare for the long term effects resulting from natural hazards. This plan was developed with and for the following jurisdictions: Canby, Damascus, Estacada, Gladstone, Happy Valley, Johnson City, Lake Oswego, Milwaukie, Molalla, Oregon City, Sandy, West Linn, and Wilsonville. It is impossible to predict exactly when these hazards will occur, or the extent to which they will affect the community. However, with careful planning and collaboration among public agencies, private sector organizations, and citizens within the community, it is possible to create a resilient community that will benefit from long-term recovery planning efforts.

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

The Federal Emergency Management Agency (FEMA) defines mitigation as ". . . 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.

Why Develop this Mitigation Plan?

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

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

Who Participated in Developing the Plan?

The Clackamas County Natural Hazard 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. A project steering committee guided the plan development process. The project steering committee included representatives from the following organizations.

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

- Clackamas County Emergency Management
- Clackamas County Department of Transportation and Development
- Clackamas County Geographic Information Systems
- Clackamas County Soil and Water Conservation District
- Clackamas County Sustainability
- Clackamas County Water Environment Services
- Clackamas County Community Health
- Oregon Department of Forestry
- Clackamas Fire District #1
- Tualatin Valley Fire and Rescue
- Rivergrove Water District
- Clackamas Providers*
- Hoodland Fire*

*Indicates that members were invited to meetings but did not participate in the 2012 update process

The County Administrator is identified as the plan's convener; for the 2012 update the County Administrator designated Clackamas County Emergency Management to convene the planning process. The County Administrator (or staff designee) will continue to serve as the lead in implementing, maintaining and updating the NHMP. Public participation played a key role in the development of goals and action items. To ensure that these opportunities will continue, the County and participating jurisdictions will:

- Post copies of their plans on corresponding websites and in local libraries;
- Place articles in the local newspaper directing the public where to view and provide feedback;
- Use existing newsletters such as schools and utility bills to inform the public where to view and provide feedback; and
- Clackamas County Emergency Management will host a booth at the Clackamas County Fair on August 19th, giving the public a chance to provide feedback on the plan. Two brief presentations (one in the morning and one in the afternoon) will be made informing the public on the importance of the county's Natural Hazard Mitigation Plan.

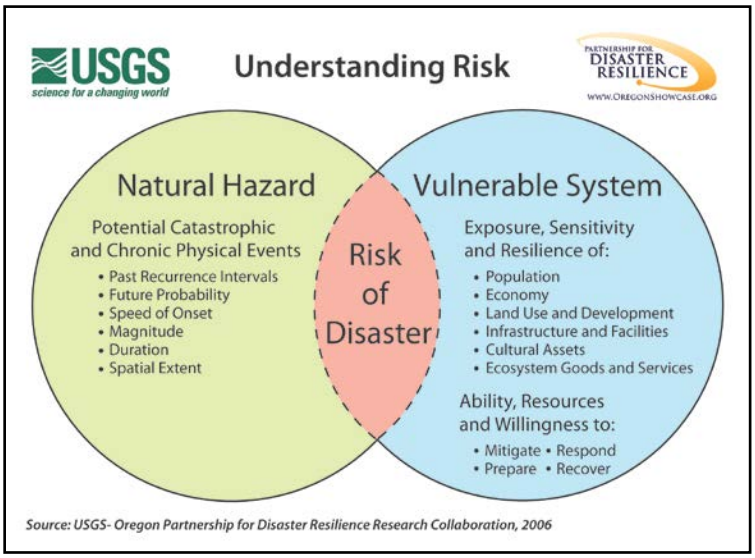
In addition to the involvement activities listed above, the county's multi-jurisdictional Natural Hazard Mitigation Plan has been archived and posted on the Partnership website via the University of Oregon Libraries' Scholar's Bank Digital Archive.

How Does this Mitigation Plan Reduce Risk?

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

This natural hazard mitigation plan is intended to assist Clackamas County and the cities of: Canby, Damascus, Estacada, Gladstone, Happy Valley, Johnson City, Lake Oswego, Milwaukie, Molalla, Oregon City, Sandy, West Linn, and Wilsonville to reduce the risk from natural hazards by identifying resources, information, and strategies for risk reduction. It is also intended to guide and coordinate mitigation activities throughout the County. A risk assessment consists of three phases: hazard identification, vulnerability assessment, and risk analysis, as illustrated in the following graphic.

Figure i.1 Understanding Risk



Source: OPDR

By identifying and understanding the relationship between natural hazards, vulnerable systems, and existing capacity, communities in Clackamas 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?

Clackamas County conducted a risk assessment to evaluate the probability of each hazard as well as the vulnerability of the community to that hazard. The Steering Committee used the results of the county process to compare risk and vulnerability. Table i.1 below presents the overall risk assessment for Clackamas County including both the county's hazard analysis and relative risk. The hazards are listed in rank order based on the relative risk scores from high to low, taking consideration for past historical events, vulnerability to populations, the

maximum threat, and the probability, or likelihood of a particular hazard event occurring. Note that the total threat rankings may differ from the relative risk ranking. The top three hazards based on total threat are (1) Cascadia Subduction Earthquake, (2) Winter Storm, and (3) Crustal Earthquake.

Table i.1: Risk Assessment Summary

Hazard	Probability Total	Vulnerability Total	Total Threat Score	Severity Impact Score	Relative Probability	Relative Risk	Hazard Ranking
Flood	63	20	139	2.80	4.5	12.60	1
Winter Storm	56	30	160	2.80	4.0	11.20	2
Wildfire	49	25	130	3.00	3.5	10.50	3
Landslide/Debris Flow	63	15	112	2.20	4.5	9.90	4
Windstorm	42	15	121	2.95	3.0	8.85	5
Earthquake - Cascadia	14	50	164	4.50	1.0	4.50	6
Drought	28	10	60	2.00	2.0	4.00	7
Volcano	14	35	101	3.15	1.0	3.15	8
Earthquake - Crustal	7	45	146	4.50	0.5	2.25	9
Extreme Heat	14	20	90	1.50	1.0	1.50	10

Source: Clackamas County Hazard Mitigation Advisory Committee: Risk Assessment Steering Committee Meeting, February 14, 2012 and OEM Hazard Analysis Update Meeting, April 25, 2012

What is the Plan's Mission?

The mission of the Clackamas County Natural Hazards Mitigation Plan is to, "Promote sound public policy designed to protect citizens, critical facilities, infrastructure, private property, and the environment from natural hazards."

What are the Plan Goals?

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

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

- Protect life and property
- Enhance Natural Systems
- Augment Emergency Services
- Encourage Partnerships for Implementation
- Promote Public Awareness

How are the Action Items Organized?

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

The action items are organized within an action matrix (located at the end of this Summary), which lists all the multi-hazard and hazard-specific action items included in the mitigation plan. 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 action along with, the coordinating organization, timeline, and the plan goals addressed.

How will the plan be implemented?

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

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

The plan maintenance section of this plan details the formal process that will ensure that the Clackamas 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. Cities and special districts developing addendums to the county plan will also designate a convener and will work closely with the county convener to coordinate the plans. The plan maintenance process includes a schedule for monitoring and evaluating the plan annually and producing a plan revision every five years. The plan maintenance section also describes how the communities will integrate public participation throughout the plan maintenance process.

Plan Adoption

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

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

After the plan is locally reviewed and deemed complete, the County Administrator or designee submits it to the State Hazard Mitigation Officer at Oregon Emergency Management. Oregon 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. Once the plan is pre-approved by FEMA, the county formally adopts the plan via resolution. The individual jurisdiction's conveners will be responsible for ensuring local adoption of the Clackamas County multi-jurisdictional Natural Hazards Mitigation Plan and providing the support necessary to ensure plan implementation at the local level. Once the resolutions are executed at the local level and documentation is provided to FEMA, the plan is formally acknowledged by FEMA and the county gains (or maintains) eligibility for the Pre-Disaster Mitigation Grant Program, the Hazard Mitigation Grant Program funds, and the Flood Mitigation Assistance program funds.

The accomplishment of the Natural Hazards Mitigation Plan goals and actions depends upon maintenance and implementation by 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 NHMP will result in the efficient and effective implementation of appropriate mitigation activities and a reduction in the risk and the potential for loss from future natural hazard events.

Clackamas County Multi-Jurisdictional NHMP Adoption Dates

Jurisdiction	Local Adoption Date	Plan Valid Through
Clackamas County		
City of Canby		
City of Damascus		
City of Estacada		
City of Gladstone		
City of Happy Valley		
City of Johnson City		
City of Lake Oswego		
City of Milwaukie		
City of Mollala		
City of Oregon City		
City of Sandy		
City of West Linn		
City of Wilsonville		

To be completed by Clackamas County NHMP Plan Convener upon local plan adoption.

Section I: Introduction

This section provides a general introduction to natural hazard mitigation planning in Clackamas 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, such as mitigation brochures targeted toward Spanish speaking or elderly audiences. 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?

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.

Clackamas County initially developed a multi-jurisdictional Natural Hazards Mitigation Plan (NHMP) in an effort to reduce future loss of life and damage to property resulting from natural hazards. In 2002, Clackamas County became the first county in the nation to have a FEMA approved NHMP. As part of the 2007 update to the plan, the county's first Community Wildfire Protection Plan (CWPP) supplemented the Wildfire chapter. The county developed this current update to the plan with and for the following jurisdictions: Clackamas County and the cities of: Canby, Damascus, Estacada, Gladstone, Happy Valley,

Johnson City, Lake Oswego, Milwaukie, Molalla, Oregon City, Sandy, West Linn, and Wilsonville.

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 certain types of federal mitigation funds. 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.

What Federal Requirements Does This Plan Address?

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

As stated in 44 CFR 201.6, the Natural Hazards Mitigation Plan is a representation of Clackamas County'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. Subsection (a) states that in order to apply for and receive mitigation project grants under all mitigation grant programs, a local government must have a mitigation plan approved pursuant to this section. Subsection (b) states that an effective plan is one that includes an open public involvement process, for the public to comment on the plan prior to plan approval. Subsection (c) requires that the plan includes proper documentation of the planning process, a risk assessment providing a factual basis for activities proposed in the strategy to reduce the risk to life and property, a mitigation strategy that provides the county's blueprint for reducing the potential losses identified in the risk assessment, and a plan maintenance process that describes how the plan will be maintained, monitored, and updated within the five-year cycle.

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 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?

Clackamas County's first Natural Hazards Mitigation Plan was developed and approved in 2002. Then in 2007, it went through its first update cycle. The 2011 plan update process marks the 2nd update, and the third version of the county's NHMP. This updated NHMP will consolidate and replace prior versions of the plan.

2011 Plan Update Process

Clackamas County funded the 2011 update of the Natural Hazards Mitigation Plan through a 2011 Pre-Disaster Mitigation (PDM) Planning Grant from FEMA. The Oregon Partnership for Disaster Resilience (OPDR) and Oregon Emergency Management utilized the PDM planning grant to update eight counties' mitigation plans in the Columbia Gorge region.

The Clackamas County Emergency Management office, with support from the Hazard Mitigation Coordinator and a dedicated Resource Assistance to Rural Environments service member, served as the convener for Clackamas County's Natural Hazards Mitigation Plan update process. The Hazard Mitigation Coordinator developed a new plan steering committee to review and update the mitigation plan and to oversee the planning process. The committee included both existing members from the prior plan updates and new partners to ensure that county departments and special districts maintained active participation in the process. Between October 2011 and July 2012, the steering committee convened for five update meetings. Appendix B: Planning and Public Process includes meeting materials and sign-in sheets for each of the plan update meetings.

CLACKAMAS COUNTY PLAN UPDATE INTRODUCTORY MEETING (OCTOBER 2011)

On October 18, 2011, the Hazard Mitigation Advisory Committee (HMAC) reconvened for an introductory meeting with OPDR and the RARE participant, to provide an overview of the plan update process. The purpose of the meeting was to (1) give an overview of the plan update process, (2) identify strategies for community involvement during the update process, (3) discuss the role of OPDR and the RARE participant during the update process, and (4) discuss the role of each city and the update process for the city addenda.

CLACKAMAS COUNTY RISK ASSESSMENT MEETING (FEBRUARY 2012)

On February 14, 2012, HMAC met for a work session to go over and update the county's hazard analysis. The purpose of the meeting was to (1) identify community vulnerabilities for each hazard addressed in the plan, (2) identify the relative risk for each hazard likely to affect the county, (3) gather information for the drought and extreme heat hazards. Using

information gathered from this meeting, the RARE participant updated the hazard analysis to include relative risk scores.

Clackamas County Hazard Analysis Meeting (April 2012)

On April 25, 2012, county representatives and special districts of the HMAC met for a work session to review and update the county's hazard analysis. The purpose of the meeting was to (1) gather and update hazard history and probability and vulnerability estimates for each of the hazards identified in the county, and (2) update the hazard analysis matrix for each of the hazards. The information gathered at this meeting was used to update the Risk Assessment and Hazard Analysis portion of the plan. The HMAC reordered the hazards in terms of their overall relative risk and impact severity on the county, and used to identify which hazards were the biggest threats to the county.

Clackamas County Mitigation Strategy Meeting (May 2012)

On May 21, 2012, HMAC met once again to review and update the NHMP's mitigation strategy. The purpose of this work session was to (1) review and update the mitigation plan's mission statement and goals, (2) determine the status and progress of the 2007 mitigation plan's action items, and (3) discuss new action items for the 2012 plan update.

Clackamas County Mitigation Strategy Meeting (June 2012)

An HMAC work session was held on June 28, 2012 to review and update the plan implementation and maintenance schedule. The purpose of this meeting was to, (1) identify a convener and coordinating body for continued plan implementation, (2) review and update the plan's method and schedule for monitoring and evaluating the plan, (3) discuss the process for prioritizing mitigation action items, (4) review and edit the finalized sections of the NHMP.

City NHMP Addendum Update Meetings

In addition to the county specific work sessions, the Hazard Mitigation Coordinator facilitated meetings in each of the cities with addendums to the Clackamas County NHMP. Because the majority of cities in the county developed their addenda within the last two years (under FEMA HMGP# 1733.0005), these meetings provided cities with an opportunity to review and incorporate updated county information into their respective addenda. In addition, the meetings served to re-engage cities in the mitigation planning process and assess progress to date. Between May and June 2012, the RARE participant met with city steering committees to review the updated county risk assessment, discuss local mitigation planning progress and review and update the city mitigation strategy. Appendix B: Planning and Public Process includes meeting materials and sign-in sheets for each of the plan update meetings. Table 1.1 below lists the cities and the dates of each meeting. In some cases, individual cities convened additional steering committee meetings.

Table 1.1: City NHMP Addendum Update Meeting Dates

City	Meeting Date
Milwaukie	May 29, 2012
Estacada	May 30, 2012
Molalla	May 30, 2012
Johnson City	June 1, 2012
Happy Valley	June 5, 2012
Oregon City	June 6, 2012
West Linn	June 6, 2012
Wilsonville	June 8, 2012
Lake Oswego	June 11, 2012
Gladstone	June 12, 2012
Sandy	June 12, 2012
Canby	June 13, 2012
Damascus	June 13, 2012

Source: Clackamas County

PUBLIC OUTREACH AND PARTICIPATION

Public outreach began early on and in the fall of 2011; the Oregon Partnership for Disaster Resilience (OPDR) distributed a mailed survey to 7,500 random households throughout an eight county region in Northern Oregon; 2,500 Clackamas County households received the survey. OPDR developed and distributed the survey in partnership with the University of Oregon's Resource Assistance for Rural Environments (RARE) Program. The voluntary survey consisted of 24 questions divided into four sections: natural hazard information; community vulnerabilities and hazard mitigation strategies; mitigation and preparedness activities in your household; and general household information. OPDR and RARE designed the survey to determine public perceptions and opinions regarding natural hazards. Questions also focused on the methods and techniques survey respondents prefer to use in reducing the risks and losses associated with natural hazards. Appendix E: Regional Hazard Mitigation Public Opinion Survey includes the survey instrument and results from the regional household preparedness survey.

During the final stages of the NHMP update, the HMAC hosted a booth at the Clackamas County Fair during the summer of 2012 to involve the public in the plan update process. The booth had draft copies of the updated NHMP and allowed for the public to review and make comments. A PowerPoint presentation regarding the plan update process was playing on a loop for the public to watch.

Clackamas County Emergency Management also utilized their social media platforms to involve the public. Posts were made to Facebook encouraging the public to follow the link provided by the Oregon Partnership for Disaster Resilience, and provide comments and feedback on the draft NHMP.

In accordance with the CFR, this planning process: (1) provides an opportunity for the public to comment on the plan during the drafting stage, (2) gives neighboring communities, local

and regional agencies a change to become involved in hazard mitigation activities, and (3) reviews and incorporates, where appropriate, existing plans, studies, reports, and technical information.

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 county citizens, businesses, and the environment. Combined, the sections work in synergy to create a mitigation plan that furthers the community's mission to *promote sound public policy designed to protect citizens, critical facilities, infrastructure, private property, and the environment from natural hazards.* This plan structure enables stakeholders to use the section(s) of interest to them.

Volume I: Multi-jurisdictional Natural Hazard 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 Addendums.

SECTION 2: COMMUNITY RISK ASSESSMENT

Section 2 provides the factual basis for the mitigation strategies contained in Section 3. This section provides an overall description of Clackamas County. The section includes a brief community profile, discussion of the government structure, listing of existing plans, policies, and programs, listing of community organizations, 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 Addendums.

SECTION 3: MISSION, GOALS AND ACTION ITEMS

This section documents the plan vision, mission, goals, and actions and also describes the components that guide implementation of the identified mitigation strategies. 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 action items are located in Volume III: City/Special District Addendums.

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

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

- Drought;
- Earthquake;
- Flood;
- Landslide/Debris Flow;
- Severe Weather;
- Volcanic Event; and
- Wildfire.

Volume III: City/Special District Addendums

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

The plan includes city addenda update appendixes for the following jurisdictions:

- Canby;
- Damascus;
- Estacada;
- Gladstone;
- Happy Valley;
- Johnson City;
- Lake Oswego;
- Milwaukie;
- Molalla;
- Oregon City;
- Sandy;
- West Linn; and
- Wilsonville.

Volume IV: Resource Appendices

The resource appendices are designed to provide the users of the insert County name 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 strategies 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, and summaries of Steering Committee meetings as well as any other public involvement methods.

Appendix C: Community Profile

This report was developed by the RARE participant and it serves to inform the mitigation strategy. Using the best available data, the community profile includes demographic, infrastructure and economic information about the county. In addition to describing characteristics and trends, each profile section identifies the traits that indicate sensitivity to natural hazards.

Appendix D: Economic Analysis of Natural Hazards Mitigation Projects

This appendix describes the Federal Emergency Management Agency's (FEMA) requirements for benefit cost analysis in natural hazards mitigation, as well as various approaches for conducting economic analysis of proposed mitigation activities. This appendix was developed by OPDR. It has been reviewed and accepted by the Federal Emergency Management Agency as a means of documenting how the prioritization of actions shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

Appendix E: Regional Hazard Mitigation Public Opinion Survey

This appendix includes the survey instrument and results from the regional hazard mitigation public opinion survey implemented by OPDR. The survey aims to gauge household knowledge of mitigation tools and techniques to assist in reducing the risk and loss from natural hazards, as well as assessing household disaster preparedness.

Appendix F: Vulnerability Analysis Table

This appendix is a comprehensive table, developed by the county's GIS department. The table is an analysis of the percentage of hazard vulnerabilities within the county in regards to potentially impacted parcels, potentially impacted locations, infrastructure, and economic development.

Appendix G: Clackamas Community Wildfire Protection Plan

This appendix is the adopted Community Wildfire Protection Plan. The contents of this appendix help supplement the wildfire hazard section as well as provide action items for the Hazard Mitigation Advisory Committee to follow.

Appendix H: Grant Programs

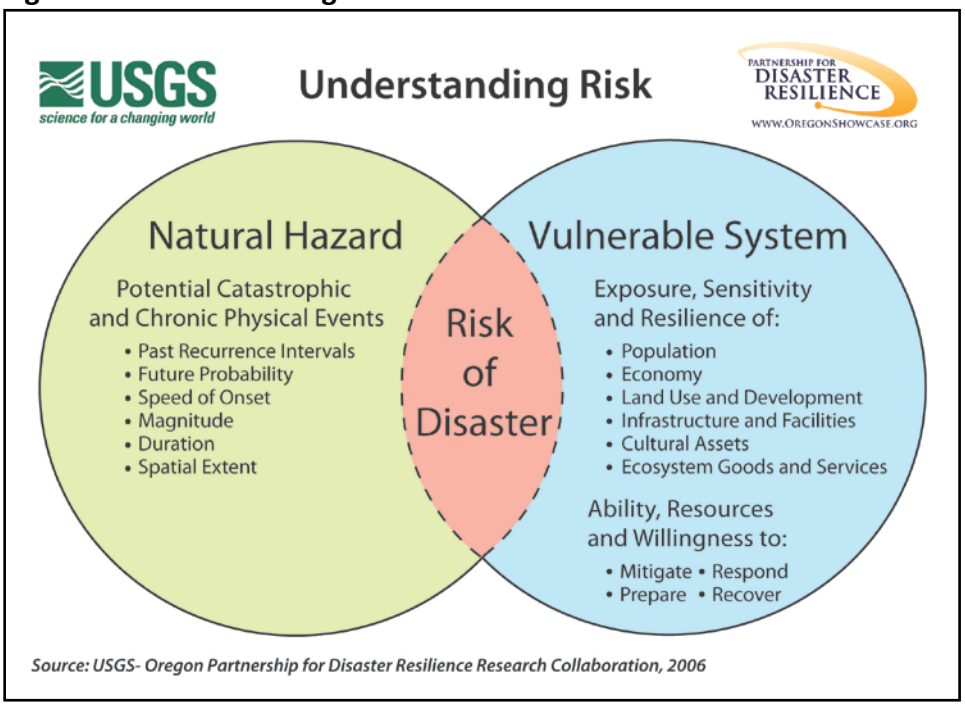
This appendix lists state and federal resources and programs by hazard.

Section 2:
All-Hazard Risk Assessment

This section of the NHMP addresses 44 CFR 201.6(c)(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 – type, location, extent, etc. 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 Annex 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 4 – Mitigation Strategy. The risk assessment process is graphically depicted in Figure 2.1 below. Ultimately, the goal of hazard mitigation is to reduce the area where hazards and vulnerable systems overlap.

Figure 2.1 Understanding Risk



Source: OPDR

Hazard Identification

Table 2.1 presents the Clackamas County Hazard Overview and outlines each hazard and their generalized locations. While most hazards impact the county as a whole, each hazard type tends to have localized impacts. For example, winter storms are often characterized by heavy snow and freezing temperatures which will affect the entire county; however, the event may also result in isolated landslide and flooding events throughout the county.

Table 2.1 Clackamas County Hazard Overview

Hazard	Generalized Locations
Drought	Countywide
Earthquake	Countywide
Extreme Heat	Countywide
Flood	Localized Risks Countywide
Landslide	Localized Risks Countywide
Volcanic Event	Countywide
Wildfire	Primarily the Eastern portion of the county, with localized risks countywide
Windstorm	Localized Risks Countywide
Winter Storm	Localized Risks Countywide

Source: State of Oregon Natural Hazards Mitigation Plan, Region 2: Northern Willamette Valley/Portland Metro Regional Profile, 2012

Below are brief descriptions of the natural hazards present in Clackamas County. These descriptions were taken from the county's Emergency Operations Plan (EOP).[1] Further detail about each hazard is described in the Hazard Annexes presented in Volume II.

Drought

This hazard involves a period of prolonged dryness resulting from a lack of precipitation or diversion of available water supplies. The county has suffered periods of drought in the past; however impact has been to agriculture, fish, and wildlife, and an increased fire risk. A severe drought could require strict conservation measures to assure that an adequate supply of potable water is maintained.[2]

Earthquake

The Cascadia Subduction Zone is located just off the Oregon coast. This zone, where the Pacific plate sinks beneath the North American plate, is part of a larger Subduction system that includes the seismically active, and extremely hazardous, San Andreas Fault and Alaskan earthquake zones. Clackamas County is well within the impact area for a major Subduction earthquake occurring along the Cascadia Subduction Zone.

[1] Clackamas County Emergency Operations Plan, *Atmospheric Emergencies and Geologic* Emergencies Incident Annexes, 2011.

[2] Ibid.

In addition, there are several known crustal fault lines throughout the county with further geologic analyses ongoing. An earthquake measuring 5.6 on the Richter scale occurred in March 1993 and caused damage throughout the county, especially in the Molalla area.

Scientists estimate the chance in the next 50 years of a great Subduction zone earthquake is between 10 and 20 percent, assuming that the recurrence is on the order of 400 +/- 200 years. These events are estimated to have an average recurrence interval between 500 and 600 years, although the time interval between individual events ranges from 150 to 1000 years. The last Cascadia Subduction Zone event occurred approximately 300 years ago.[3]

Additional fault zones throughout the county and region may produce localized crustal earthquakes up to 6.0. Table 2.2 presents a list of the different Class A and B fault lines throughout the county. A local earthquake of M 6.0 or a regional M 9.0 earthquake is likely to cause substantial structural damage to bridges, buildings, utilities, and communications systems, as well as the following impacts to infrastructures and the environment:

- Floods and landslides
- Fires, explosions, and hazardous materials incidents
- Disruption of vital services such as water, sewer, power, gas, and transportation routes
- Disruption of emergency response systems and services
- Displaced Households
- Economic losses for buildings
- Economic loss to highways, airports, communications
- Generated debris
- Illness, injury, and death
- Significant damage to critical and essential facilities, including schools, hospitals, fire stations, police departments, city hall

[3] State of Oregon Natural Hazards Mitigation Plan, Region 2: Northern Willamette Valley/Portland Metro Regional Profile, 2012.

Table 2.2: Class A and B Faults Located in Clackamas County

Name	Class	Fault ID	Primary County, State	Length (km)	Time of Most Recent Deformation	Slip-Rate Category
Bolton Fault	B	874	Clackamas County, Oregon	9km	Quaternary (<1.6 Ma)	Less than 0.2 mm/yr
Bull Run Thrust	B	868	Clackamas County, Oregon	9km	Quaternary (<1.6 Ma)	Less than 0.2 mm/yr
Canby-Molalla Fault	A	716	Clackamas County, Oregon	50km	Latest Quaternary (<15ka)	Less than 0.2 mm/yr
Clackamas River Fault Zone	A	864	Marion County, Oregon	29km	Quaternary (<1.6 Ma)	Less than 0.2 mm/yr
Damascus-Tickle Creek Fault Zone	A	879	Multnomah County, Oregon	17km	Middle and Late Quaternary (<750ka)	Less than 0.2 mm/yr
East Bank Fault	A	876	Clackamas County, Oregon	29km	Latest Quaternary (<15ka)	Less than 0.2 mm/yr
Oatfield Fault	A	875	Washington County, Oregon	29km	Quaternary (<1.6 Ma)	Less than 0.2 mm/yr
Portland Hills Fault	A	877	Columbia County, Oregon	49km	Quaternary (<1.6 Ma)	Less than 0.2 mm/yr

Source: US Geological Survey (USGS), Quaternary Fault and Fold Database

A number of seismic vulnerability assessments conducted by the Oregon Department of Geology and Mineral Industries have highlighted the need for seismic retrofits to critical facilities. As a result, the county has recently completed several structural and non-structural seismic upgrades in key facilities and is in the process of identifying additional facilities for upgrades.

Flood

Flooding of rivers, streams, and tributaries may occur during periods of heavy rain and/or rapid snow melt. The rapid rise of water in a number of rivers and streams present severe risks to life and property, and any impending flood may require the evacuation of significant numbers of people and animals. Landslides are an associated problem that may occur as a result of flooding. Table 2.3 identifies specific locations and river drainages that are of particular concern for the county.

Table 2.3: Locations of Identified Flooding Problems

Location	River	Description
Tranquility Lane	Clackamas River	Road
Paradise Park	Clackamas River	Open space
Welches	Salmon River	Unicorporated community
Lolo Pass	Sandy River	Road
Timberline	Sandy River	Housing development
Dickie Prairie Road	Molalla River	Road
Feyrer Park/Shady Dell	Molalla River	Open space and housing development
Alder Creek Area	Alder Creek	Open Space
Canby	Pudding River	City
Dogwood Drive/Rivergrove	Tualatin River	City
Oregon City	Confluence of Willamette River and Clackamas River	City
Johnson Creek Basin	Johnson Creek	Basin
Abernethy Creek Basin	Abernethy Creek	Basin

Source: Clackamas County Emergency Management

Landslide

Landslides can include the down slope movement of rock, soil, or other debris or the opening of sinkholes. These hazards are often triggered by other natural hazard incidents such as floods, earthquake, or volcanic eruptions. Because of the moderate to high relief characteristics of the county's riverbeds, along with hilly and mountainous terrain, the chance of landslides occurring in Clackamas County is high, but not deemed to present a serious threat to large numbers of people.

Severe Weather

Clackamas County identifies several categories of severe weather as follows:

Extreme Heat

Although rare, Clackamas County is subject to heat extremes when temperatures climb to 100 degrees or more. Many residences lack air conditioning or cooling systems, creating an environment especially hazardous to the elderly, children, and others with certain medical conditions.[4]

Windstorm

Windstorms, including the possibility of tornadoes, may occur suddenly, leaving little time for people to react and move to safety. Even with ample warning that a windstorm or tornado is likely, its path may be difficult to predict. Damage from these incidents may be extensive and severe, or confined to a narrow path of destruction, but they pose serious risks to life, infrastructure, and property whenever weather conditions make them likely.

Winter Storm

Winter storms are among the most common weather incidents impacting the county. These events often involve heavy accumulations of snow and ice that make travel dangerous or impossible, disrupt transportation of goods and services, damage trees and power lines, and cause widespread power outages. Dangerous road conditions make emergency response

[4] Clackamas County Emergency Operations Plan, *Situation and Planning Assumptions*, 2011.

more difficult and complicate the evacuation of people from areas at risk and the delivery of personnel, equipment and supplies to damaged areas. Avalanche risk is generally confined to the higher elevations surrounding Mount Hood.

Volcanic Event

The last known major eruptions of Mount Hood, located on Clackamas County's eastern border, occurred in the middle of the 19th century. Such recent eruptions, as well as the thermal activity that continues to be present, suggest that molten rock is still located within or beneath Mount Hood. Risks associated with a volcanic eruption include pyroclastic flows (incendiary avalanches) and lahars (mud flows), river flooding, destruction of property and woodlands, risk to the Bull Run watershed, and volcanic ash fall. Heavy ash fall in Clackamas County can cause health problems for individuals with certain medical conditions, create havoc with transportation, and pose a significant risk to the public.

Wildfire

Over half of Clackamas County's land mass is forested and wildfires are a natural part of the forest ecosystem in Clackamas County. In fact, wildfires have shaped the forests and rangelands valued by county residents and visitors. However, decades of timber harvest and aggressive fire suppression have significantly altered forest composition and structure. The result is an increase in the wildfire hazard as forest vegetation has accumulated to create a more closed, tighter forest environment that tends to burn more intensely than in the past. The exposure to wildfire hazards is also increasing, as recent population growth has spurred more residential interface (WUI). As development encroaches upon forests with altered fire regimes that are more conducive to larger, more intense fires, the risk to life, property, and natural resources continues to escalate.

FEMA Disaster 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 March 2012, FEMA has approved a total of 28 federal disaster declarations, two emergency declarations and 49 fire management assistance declarations in Oregon.[5] 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. Table 2.4 summarizes the major disasters declared for Clackamas County by FEMA since 1953. Since the 2007 Natural Hazards Mitigation Plan (NHMP), there have been two FEMA disaster declarations impacting Clackamas County. The table shows that all but one of the disaster declarations for the county are a result of severe winter storms with some

[5] FEMA. Declared Disasters by Year or State. http://www.fema.gov/news/disaster_totals_annual.fema#markS. Accessed 05 March 2012.

degree of flooding, mudslides, landslides, or debris flow. Since 1953, there have been a total of nine disaster declarations for the county; four of those occurred in the past ten years.

Table 2.4: FEMA Major Disaster Declarations – Clackamas County

Declaration Date:	Incident(s):	Incident(s) Period:
17-Feb-11	Severe Winter Storm, Flooding, Mudslides, Landslides, and Debris Flows	13-Jan-11 to 21-Jan-11
2-Mar-09	Severe Winter Storm, Record and Near Record Snow, Landslides, and Mudslides	13-Dec-08 to 26-Dec-08
20-Mar-06	Severe Storms, Flooding, Landslides, and Mudslides	18-Dec-05 to 21-Jan-06
19-Feb-04	Severe Winter Storms	26-Dec-03 to 14-Jan-04
9-Feb-96	Severe Storms/Flooding	4-Feb-96 to 21-Feb-96
26-Apr-93	Earthquake	25-Mar-93
25-Jan-74	Severe Storms, Snowmelt, Flooding	25-Jan-74
21-Jan-72	Severe Storms, Flooding	21-Jan-72
24-Dec-64	Heavy Rains & Flooding	24-Dec-64

Source: FEMA, Oregon Disaster History, Major Disaster Declarations

Hazard Probability

Probability is the likelihood of future natural hazard events within a specified period of time. Clackamas County evaluated the best available probability data to develop the probability scores presented below. For the purposes of this plan, the county utilized the Oregon Emergency Management Hazard Analysis Methodology probability definitions to determine hazard probability. The definitions are:

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

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

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

Table 2.5 presents the probability scores for ten natural hazards that consistently affect or threaten Clackamas County. As shown in the table, individual natural hazard events in the county have varying levels of probability. Flood, landslide/debris flow, and winter storms have a high probability of occurrence. Wildfire, earthquake, and windstorm events have a

medium probability of occurrence, while volcanic events have a low probability of occurrence.

Table 2.5: Natural Hazard Probability Assessment Summary – Clackamas County

Threat Event/Hazard	Severity	Weight Factor	Subtotal	Probability
Flood	9	7	63	High
Landslide/Debris Flow	9	7	63	High
Winter Storm	8	7	56	High
Wildfire	7	7	49	Medium
Earthquake - Cascadia	6	7	42	Medium
Earthquake - Crustal	6	7	42	Medium
Windstorm	6	7	42	Medium
Drought	4	7	28	Medium
Extreme Heat	2	7	14	Low
Volcanic Event	2	7	14	Low

Source: Clackamas County HMAC, OEM Hazard Analysis, updated April 25, 2012

Community Vulnerability

Natural disasters occur as a predictable 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 (cultural institutions, community organization, business climate, service provision, etc.). A natural disaster occurs when a hazard impacts the built environment or societal systems and creates adverse conditions within a community.

It is not always possible to predict exactly when a natural disaster 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.[6]

Populations[7]

Natural disasters do not have boundaries, and they affect a variety of people. It is important to consider different types of vulnerable populations that will be affected in a natural disaster event. Below, Table 2.6 lists specific populations that are most vulnerable in a hazard event, along with the accompanied hazards likely to affect those populations.

Child care facilities, schools, and adult care homes are important and current mitigation measures include the seismic retrofitting of some schools. Hospitals become an issue if they are threatened by a natural disaster. Hospitals are an essential facility, but in this case can also be a critical facility. It is important for the county to focus on ensuring that hospitals remain a safe haven for its occupants.

[6] State of Oregon Natural Hazards Mitigation Plan, Region 2: Northern Willamette Valley/Portland Metro Regional Profile, 2012.

[7] Clackamas County NHMP Community Profile, Socio Demographic Capacity

Low Income

Low-income populations may require additional assistance following a disaster because they may not have the savings to withstand economic setbacks, and if work is interrupted, housing, food, and necessities become a greater burden. Additionally, low-income households are more reliant upon public transportation, public food assistance, public housing, and other public programs, all which can be impacted in the event of a natural disaster. According to the 2010 Census Estimates, 10.2% of the county's population is below poverty.

Age

Age is a very important factor which has a direct impact on what actions are prioritized for mitigation and how responses to hazard incidents are carried out. Young people represent a potentially vulnerable segment of the population. During the natural hazard mitigation process, special considerations should be given to young populations and schools, where children spend much of their time. Likewise, the elderly population may require special consideration due to increased sensitivities to heat and cold, possible reliance upon transportation for medications, and comparative difficulty in making home modifications that reduce risk to hazards. According to the 2010 Census Data, 26.2% of the county's population is under the age of 20, and 20.2% is over the age of 60. These two percentages show that significant outreach to these age groups is important. Residents in these age groups were taken into consideration when the HMAC developed the population asset chart.

Non-English speaking

Special consideration should be given to populations who do not speak English as their primary language. Non-English speaking populations can be harder to reach with preparedness and mitigation information and materials. According to the 2010 Census, 11% of the county's population speaks a language other than English. In addition to language barriers, cultural differences need to be considered when assessing vulnerability and developing mitigation strategies. Resiliency efforts need to be tailored to the specific needs of non-English speaking segments of the population.

Disabled

Individual and community health play an integral role in community resiliency. Members of the population with a disability may face increased vulnerability depending on the type and extent of their disability and the specific resources available to them at the time of the disaster. A primary consideration for disabled and alter-abled members of the population is mobility and response effort in a time of disaster. Notably, of the 12.6% of the population with a disability, about 37% are over the age of 65.

Table 2.6: Clackamas County Population Issues

Clackamas County Asset Identification	Drought	Earthquake	Extreme Heat	Flood	Landslide	Volcano	Wildfire	Windstorm	Winter storm
Schools (particularly those not up to code)		X							
Child Care Facilities		X	X	X		X	X		
Adult Care Homes/Assisted Living Facilities		X	X	X			X		
Homeowners in WUI							X		
Hospitals		X		X			X	X	X
Mass Transit		X		X				X	X
Clackamas County Jail		X							

Source: Clackamas County HMAC

Economy

Clackamas County's economy is highly susceptible to economic disturbance from Natural Hazards. Table 2.7 identifies they county's economic assets that, if disrupted could significantly impact the local economy. A majority of the community assets listed, such as the Clackamas Town Center and the Fred Meyer Distribution Center, are most affected by earthquakes, and other assets are affected by wildfire and severe storms, including agriculture and forestry. The HMAC matched specific community economic assets with the hazards that are most likely to impact them as outlined in Table 2.7 below.

Table 2.7: Clackamas County Economic Issues

Clackamas County Asset Identification	Drought	Earthquake	Extreme Heat	Flood	Landslide	Volcano	Wildfire	Windstorm	Winter storm
Clackamas Town Center		X							
Precision Cast Parts		X							
Fred Meyer Distribution Center		X							
Agriculture (feed procedurement, seasonal worker procurement, harvest delivery, refrigeration, etc)	X		X				X	X	X
Forestry							X	X	X
Tourism (Hotels and Restaurants)		X		X			X	X	X
City water supply	X	X		X	X				
Transportation Cooridors/Bridges		X			X				

Source: Clackamas County HMAC

Land-use and Development

To accommodate rapid growth, communities engaged in mitigation planning should address the vulnerability of the community's housing stock and development patterns. Eliminating or limiting development in hazard prone areas, such as floodplains, can reduce vulnerability to hazards, and the potential loss of life and injury and property damage. Communities in the process of developing land for housing and industry need to ensure that these goals are being met to prevent future risks.[8]

[8] State of Oregon Natural Hazards Mitigation Plan, Region 2: Northern Willamette Valley/Portland Metro Regional Profile, 2012.

The county's HMAC identified land use and development assets that are susceptible to natural hazards. The Forest Edge Apartments is an apartment complex located on hill in Oregon City. This location has a history of severe landslides near the homes, and action needs to take place to ensure the safety of the residents. Development along established floodplains is another land use issue that can affect homeowners after natural disasters including earthquake, flood, landslide, and volcano. Table 2.8 below outlines county land use and development issues identified by the county's HMAC, and lists the hazards that are most likely to impact them.

Table 2.8: Clackamas County Land Use and Development Issues

Clackamas County Asset Identification	Drought	Earthquake	Extreme Heat	Flood	Landslide	Volcano	Wildfire	Windstorm	Winter storm
Homeowners in Forest Edge Apartments		X			X				
Carver Mobile Home Ranch				X					X
Development on established floodplains, historic and pre-historic debris flow plains		X		X	X	X			
Decentrilized water and sewage systems	X	X		X	X				
Increased development in the wildland-urban interface							X	X	X

Source: Clackamas County HMAC

Environment

River corridors, farm fields, marshes, scenic outlooks, wildflowers, spawning beds for salmon, deer and elk wintering areas, gravel quarries, magnificent stands of trees along Oatfield Ridge, or reservoirs of hot water beneath the slopes of Mt. Hood are all part of the wealth of Clackamas County's environment.[9] The HMAC identified environmental issues and are outlined below in Table 2.9 along with the hazards associated with each issue.

[9] Clackamas County Comprehensive Plan, Chapter 3 - Natural Resources and Energy, III-1.

Table 2.9: Clackamas County Environmental Issues

Clackamas County Asset Identification	Drought	Earthquake	Extreme Heat	Flood	Landslide	Volcano	Wildfire	Windstorm	Winter storm
Forest/woodland areas							X		
Streams/Riparian zones (property damage, bridges/culverts)	X			X					
County/City Parks				X			X	X	X
General groundwater issues	X			X		X	X		
Groundwater and surface water contamination from industrial area disruption		X		X	X				

Source: Clackamas County HMAC

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 the region. 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.[10] Daily, transportation infrastructure capacity and the condition of bridges are factors that affect risk from natural hazards. Natural hazards can further disrupt automobile traffic and create gridlock, while incapacitated bridges can disrupt traffic and exacerbate economic losses because of the inability of industries to transport services and products to clients.[11] Table 2.10 displays critical facilities and infrastructure identified by the county's HMAC; the associated hazards are also listed.

[10] State of Oregon Natural Hazards Mitigation Plan, Region 2: Northern Willamette Valley/Portland Metro Regional Profile, 2012.

[11] State of Oregon Natural Hazards Mitigation Plan, Region 2: Northern Willamette Valley/Portland Metro Regional Profile, 2012.

Table 2.10: Clackamas County Critical Infrastructure and Services Issues

Clackamas County Asset Identification	Drought	Earthquake	Extreme Heat	Flood	Landslide	Volcano	Wildfire	Windstorm	Winter storm
Electrical grid		X	X	X	X			X	X
All highways and bridges		X		X	X			X	X
City Halls		X							
Cellular communications infrastructure		X						X	X
Fiber optics lines		X						X	X
Water intake facilities		X		X	X				
Emergency Services (fire department, police department, hospitals, EOC's)		X		X	X		X	X	X
Water sewer treatment plants		X		X					

Source: Clackamas County HMAC

National Flood Insurance Program (NFIP)

Clackamas County's Flood Insurance Rate Maps are current as of June 17, 2008. Table 2.11 shows that as of November 21, 2011, there were a total of 1,374 National Flood Insurance Program (NFIP) policies in force throughout unincorporated Clackamas County with a total coverage of nearly $348 million. Between 1978 and July 25, 2011, there were a total of 442 NFIP claims which paid just over $9 million in claims. Unincorporated Clackamas County has 55 repetitive flood loss properties. Clackamas County's last Community Assistance Visit was in February of 2011. Clackamas County is an active member of the Community Rating System (CRS), with a current class ranking of 5.

The table also displays information about each of the jurisdictions. All 15 jurisdictions within the county have Flood Insurance Rate Maps that are current as of June 17, 2008. The only city that is not a participant in the National Flood Insurance Program is Johnson City. Oregon

City is the only city that is an active member of the CRS with a class ranking of 7. The cities of Lake Oswego and West Linn have the two highest numbers of NFIP policies with 302 and 121 policies, respectively. Although the city of Milwaukie only has 52 NFIP policies, they have the highest number of repetitive loss properties at 19.

Table 2.11 NFIP Summary Table

Jurisdiction	FIRM Status	FIRM Date	NFIP Status	# NFIP Policies	Ttl Coverage	# NFIP Claims	Ttl Paid	# Repetitive Loss Properties	CRS Status
Clackamas County	**REVISED**	**Jun-08**	**P**	**1,374**	**$347,876,500**	**442**	**$9,305,431**	**55**	**5**
Barlow	REVISED	Jun-08	P	0	$0	0	$0	0	NA
Canby	REVISED	Jun-08	P	23	$5,513,800	2	$67,371	0	NA
Damascus	REVISED	Jun-08	P	10	$2,115,700	0	$0	2	NA
Estacada	ALL ZONE C&X PUBLISHED FIRM	Jun-08	P	3	$775,000	0	$0	0	NA
Gladstone	REVISED	Jun-08	P	46	$11,050,600	10	$137,427	0	NA
Happy Valley	REVISED	Jun-08	P	7	$2,450,000	0	$0	0	NA
Johnson City	ALL ZONE C&X PUBLISHED FIRM	Jun-08	NP	0	$0	0	$0	0	NA
Lake Oswego*	REVISED	Jun-08	P	302	$88,571,900	64	$3,583,026	0	NA
Milwaukie*	REVISED	Jun-08	P	52	$14,563,200	57	$1,904,200	19	NA
Molalla	ALL ZONE C&X PUBLISHED FIRM	Jun-08	P	8	$2,419,700	5	$110,943	2	NA
Oregon City	REVISED	Jun-08	P	64	$21,061,200	24	$1,467,600	2	7
Rivergrove	REVISED	Jun-08	P	45	$12,200,700	22	$590,751	9	NA
Sandy	REVISED	Jun-08	P	21	$5,075,100	2	$574	0	NA
West Linn	REVISED	Jun-08	P	121	$34,665,200	51	$1,872,689	2	NA
Wilsonville*	REVISED	Jun-08	P	29	$9,217,800	5	$73,826	0	NA

*Portions of jurisdiction not in Clackamas County
Source: State NFIP Coordinator; p=participating, np=not participating

Vulnerability Summary

Vulnerability is a measure of the exposure of the built environment to hazards. The exposure of community assets to hazards is critical in assessing the degree of risk a community has to each hazard. Identifying the facilities and infrastructure at risk from various hazards can assist the county in prioritizing resources for mitigation, and can assist in directing damage assessment efforts after a hazard event has occurred. The exposure of county assets to each hazard and potential implications are explained in each hazard section.

Table 2.12 summarizes the exposure of county land, critical facilities, and infrastructure assets to natural hazards. This table shows the amount of acres and number of parcels that are located in the hazard zones for earthquake, flooding, wildfire, landslide, and volcano. The table also lists potentially impacted locations and infrastructure in each hazard zone. Please note that Winter Storm and Windstorm are not included, as there is insufficient data to perform an analysis on these hazards. The full vulnerability analysis table is provided in Appendix F: Vulnerability Analysis Table.

Table 2.12 Vulnerability Analysis Table

	Potentially Impacted Parcels		Potentially Impacted Locations			Infrastructure				
Hazard	# of Parcels	% of Total Parcels	Ctritical Facilities	Essential Facilities	Vulnerable Populations	Miles of Road	Miles of Sewer Lines	Bridges	Cell Towers	Dams
County Total	151,520	Not Applicable	237	52	576	4902	324	520	17	58
Relative Earthquake Hazard										
High	12,494	8%	19	9	48	577	30	100	1	12
Flooding										
100 year Floodplain	4,615	3%	7	1	13	73	17	90	0	4
Overall Wildfire Risk										
High	204	< 1%	0	0	2	239	1	1	4	0
Landslide Hazard										
High	197	<1%	1	0	0	44	1	0	0	0
Volcano										
Exposed	7,634	5%	7	2	2	273	21	55	1	1

Source: Clackamas County GIS

The table illustrates that only 8% of the total parcels in the county are located in the relative high earthquake hazard zone. Likewise, only 3% are located within the 100-year floodplain, less than 1% in each of the overall high wildfire risk and landslide hazard zones, and only 8% are exposed to the volcano hazard. There are also 19 critical facilities and 100 bridges located in the high earthquake zone. There are only seven critical facilities located within the 100 year floodplain. While there aren't any critical or essential facilities located in the high wildfire risk zone, there are 82 critical facilities and 139 vulnerable populations located in the moderate risk zone. This assessment provides the HMAC an outlook on which types of potentially impacted locations, infrastructure, and economic locations are at risk, and outlines which areas can seek mitigation improvements.

Vulnerability is the percentage of population and property likely to be affected under an "average" occurrence of the hazard. Clackamas County evaluated the best available vulnerability data to develop the vulnerability scores presented below. For the purposes of this plan, the county utilized the Oregon Emergency Management Hazard Analysis Methodology vulnerability definitions to determine hazard probability. The definitions are:

LOW = less than 1-percent affected scores between 1 and 3 points

MEDIUM = between 1 and 10-percent affected scores between 4 and 7 points

HIGH = more than 10-percent affected scores between 8 and 10 points

Table 2.13 displays the vulnerability scores for each of the natural hazards present in Clackamas County. The county is highly vulnerable to earthquake events, and moderately vulnerable to volcanic, winter storm, wildfire, and flood events. There is a low vulnerability to landslide/debris flow and windstorm events in Clackamas County.

Table 2.13 Community Vulnerability Assessment Summary – Clackamas County

Threat Event/Hazard	Severity	Weight Factor	Subtotal	Vulnerability
Earthquake - Cascadia	10	5	50	High
Earthquake - Crustal	9	5	45	High
Volcanic Event	7	5	35	Medium
Winter Storm	6	5	30	Medium
Wildfire	5	5	25	Medium
Extreme Heat	4	5	20	Medium
Flood	4	5	20	Medium
Landslide/Debris Flow	3	5	15	Low
Windstorm	3	5	15	Low
Drought	2	5	10	Low

Source: Clackamas County HMAC, OEM Hazard Analysis, updated April 25, 2012

Risk Assessment

Clackamas County evaluated natural hazard risk using several tools, an updated vulnerability analysis and an up-to-date history of hazard events occurring in the past 100 year. The vulnerability analysis table (Table 2.12) outlines the amount of parcels, acres, facilities and infrastructure located in hazard prone areas; the table is explained in more detail in the above section. The list of hazard events described in detail the number of events, magnitude, and damage that has occurred in the county within the past 100 years. Both of these tools provided useful information to assist in the county's risk assessment update.

In order to develop a more comprehensive understanding of the natural hazard risks present in Clackamas County, the Hazard Mitigation Advisory Committee collaboratively worked through and discussed the hazard analysis to update the scoring system. In conjunction with this hazard analysis, the hazard evaluation tools described above provided support and background information to illustrate the level of impact each hazard has on the county.

At the HMAC's Risk Assessment Steering Committee Meeting on February 14, 2012, the committee developed severity impact scores to represent the potential impact of various natural hazards, through a relative risk questionnaire. The questionnaire, created by the Oregon Partnership for Disaster Resilience in collaboration with University of Oregon Emergency Management, intends to show how the likelihood of each hazard event, combined with the severity and magnitude of the impacts determines the overall relative risk Clackamas County residents face. This questionnaire focused on topics regarding general health and safety (by potential deaths and injuries), facilities (by physical damage and costs), and community (by expected economic, ecologic and social interruption). Each hazard received an overall severity impact score by averaging each hazard's specific responses to the ten question survey. Below, Table 2.14 illustrates that earthquake ranked number one for overall impact, with volcano following closely; extreme heat received the lowest impact score overall. A copy of the relative risk questionnaire can be found in Appendix B: Planning and Public Process.

The probability score (described in Table 2.5) and vulnerability score (described in Table 2.13) along with two other variables, event history and maximum threat, established a total threat score for each individual hazard. On April 25, 2012, a HMAC sub-committee made up of county department and special district staff updated the total threat scores. These scores are used by the HMAC to identify the level of priority for addressing the action items outlined in Section 4.

Below, Table 2.14 presents the overall risk assessment for Clackamas County including both the county's hazard analysis and relative risk. The hazards are listed in rank order from high to low, taking consideration for past historical events, vulnerability to populations, the maximum threat, and the probability, or likelihood of a particular hazard event occurring. The data shows that flood is the highest ranked hazard in the county, followed by winter storm and wildfire events. Landslide/debris flow, windstorm, Cascadia earthquakes, and drought events are ranked in the middle, with volcanic events, crustal earthquakes and extreme heat at the bottom with significantly lower relative risk scores than any of the other prevalent hazards in the county. The hazards are listed in rank order based on the relative risk scores from high to low, taking consideration for past historical events, vulnerability to populations, the maximum threat, and the probability, or likelihood of a particular hazard event occurring. Note that the total threat rankings may differ from the relative risk ranking. The top three hazards based on total threat are (1) Cascadia Subduction Earthquake, (2) Winter Storm, and (3) Crustal Earthquake.

Table 2.14: Risk Assessment Summary – Clackamas County

Hazard	Probability Total	Vulnerability Total	Total Threat Score	Severity Impact Score	Relative Probability	Relative Risk	Hazard Ranking
Flood	63	20	139	2.80	4.5	12.60	1
Winter Storm	56	30	160	2.80	4.0	11.20	2
Wildfire	49	25	130	3.00	3.5	10.50	3
Landslide/Debris Flow	63	15	112	2.20	4.5	9.90	4
Windstorm	42	15	121	2.95	3.0	8.85	5
Earthquake - Cascadia	14	50	164	4.50	1.0	4.50	6
Drought	28	10	60	2.00	2.0	4.00	7
Volcano	14	35	101	3.15	1.0	3.15	8
Earthquake - Crustal	7	45	146	4.50	0.5	2.25	9
Extreme Heat	14	20	90	1.50	1.0	1.50	10

Source: Clackamas County Hazard Mitigation Advisory Committee: Risk Assessment Steering Committee Meeting, February 14, 2012 and OEM Hazard Analysis Update Meeting, April 25, 2012

The table shows that, Cascadia and Crustal earthquake events rank the highest in terms of overall impact. However, note that because the relative probability of both earthquake events is lower than most of the other hazards, Cascadia and Crustal earthquakes rank #6 and #9, respectively, in terms of the overall hazard risk. This is because this risk assessment summary takes into consideration several factors that include: the total threat score, the overall impact of a hazard event, and the relative risk associated with that hazard. With low relative probabilities for both earthquake events, the relative risk scores drop as well.

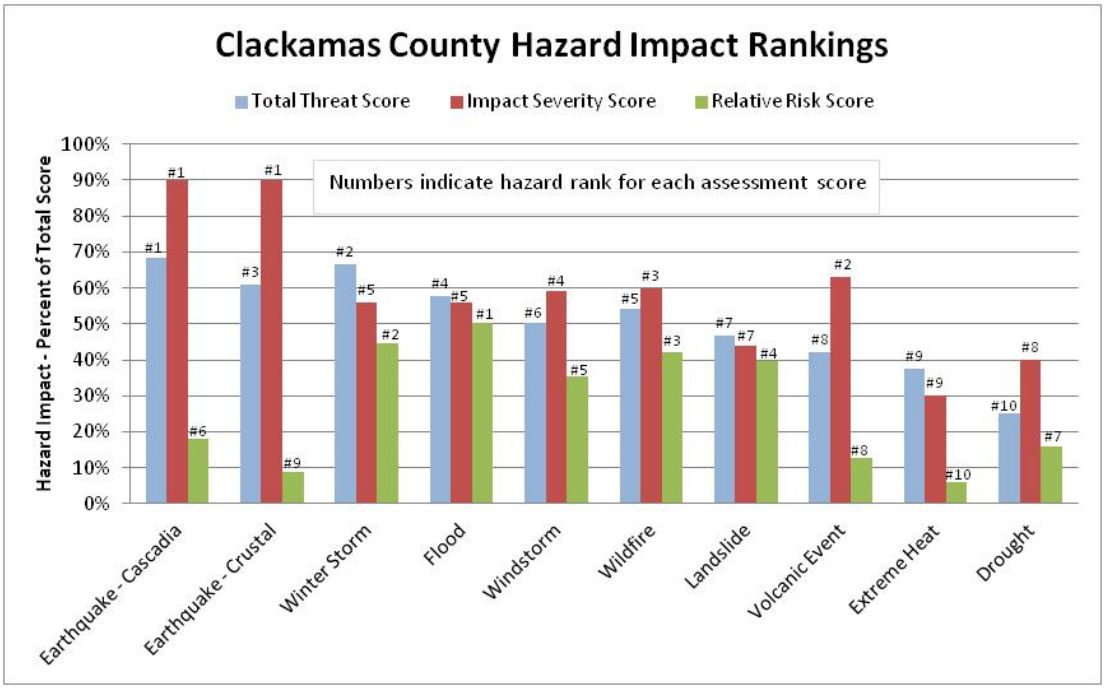
Volcanic event is ranked second when it comes to impact severity with a low probability of volcanic events occurring. Since there would be moderate impacts to all of Clackamas

County if it were to happen, the overall impact is high, but the probability of an event occurring lowers the overall hazard ranking.

Lastly, there is a high probability of a flood event occurring, and if it did happen, it would most likely to be an isolated event; therefore the overall impact is low. However, a generally high total threat score combined with the relative risk and overall impact makes flood events the #1 relative risk hazard, making it the most significant hazard threat to the county.

Figure 2.2 below provides additional analysis for the total threat, impact severity and relative risk scores from Table 2.8. The scores are presented as a percentage of the overall scoring potential for each hazard, and then assigned a rank based on their placement among the other hazard scores. In other words, the figure helps illustrate how each component of the hazard's overall relative risk is weighted.

Figure 2.2: Hazard Impact Rankings – Clackamas County



Source: Clackamas County Hazard Mitigation Advisory Committee: Risk Assessment Steering Committee Meeting, February 14, 2012 and OEM Hazard Analysis Update Meeting, April 25, 2012

The figure shows the relationship between each of the three scoring factors, and how each hazard varies in terms of their total threat, impact severity, and the overall relative risk. For example, crustal earthquake events have a very low relative risk score, yet they rank #1 in terms of impact severity. Conversely, flood events are ranked #1 in terms of relative risk, yet it is ranked #4 and #5 in terms of total threat and impact severity, respectively.

The hazard impact rankings isolate and target specific hazards that have a higher risk of impacting the county allowing the county's HMAC to easily identify potential areas of focus for future mitigation projects.

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Section 3: Mitigation Strategy

This section of the 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. This section 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. City specific mission, goal and action item information is located in Volume III: City/Special District Addendums.

Mitigation Plan Mission

A 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. A good 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.

The mission of the Clackamas County Natural Hazards Mitigation Plan is to:

> *Promote sound public policy designed to protect citizens, critical facilities, infrastructure, private property, and the environment from natural hazards.*

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

Mitigation Plan 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 plan goals help guide the direction of future activities aimed at reducing risk and preventing loss from natural hazards. In addition, the goals listed below are multi-objective in nature, and serve as checkpoints for the various county agencies and organizations involved in implementing mitigation actions.

Meetings with the Hazard Mitigation Advisory Committee, previous hazard event reports, and the previous county Natural Hazards Mitigation Plans served as methods to obtain input and identify priorities in developing goals for reducing risk and preventing loss from natural hazards in Clackamas County.

The goals of the Clackamas County Natural Hazards Mitigation Plan are organized under several broad categories. The goals are:

Protect Life and Property

- Implement activities that assist in protecting lives by making homes, businesses, infrastructure, critical facilities, and other property more resistant to natural hazards.
- Reduce losses and repetitive damages for chronic hazard events while promoting insurance coverage for catastrophic hazards.
- Improve hazard assessment information to make recommendations for discouraging new development and encouraging preventative measures for existing development in areas vulnerable to natural hazards.

Enhance Natural Systems

- Balance watershed planning, natural resource management, and land use planning with natural hazards mitigation to protect life, property, and the environment.
- Preserve, rehabilitate, and enhance natural systems to serve natural hazard mitigation functions.

Augment Emergency Services

- Establish policy to ensure mitigation projects for critical facilities, services, and infrastructure.
- Strengthen emergency operations by increasing collaboration and coordination among public agencies, non-profit organizations, and business, and industry.
- Coordinate and integrate natural hazards mitigation activities, where appropriate, with emergency operations plans and procedures.

Encourage Partnerships for Implementation

- Strengthen communication and coordinate participation among and within public agencies, citizens, non-profit organizations, business, and industry to gain a vested interest in implementation.
- Encourage leadership within public and private sector organizations to prioritize and implement local, county, and regional hazard mitigation activities.

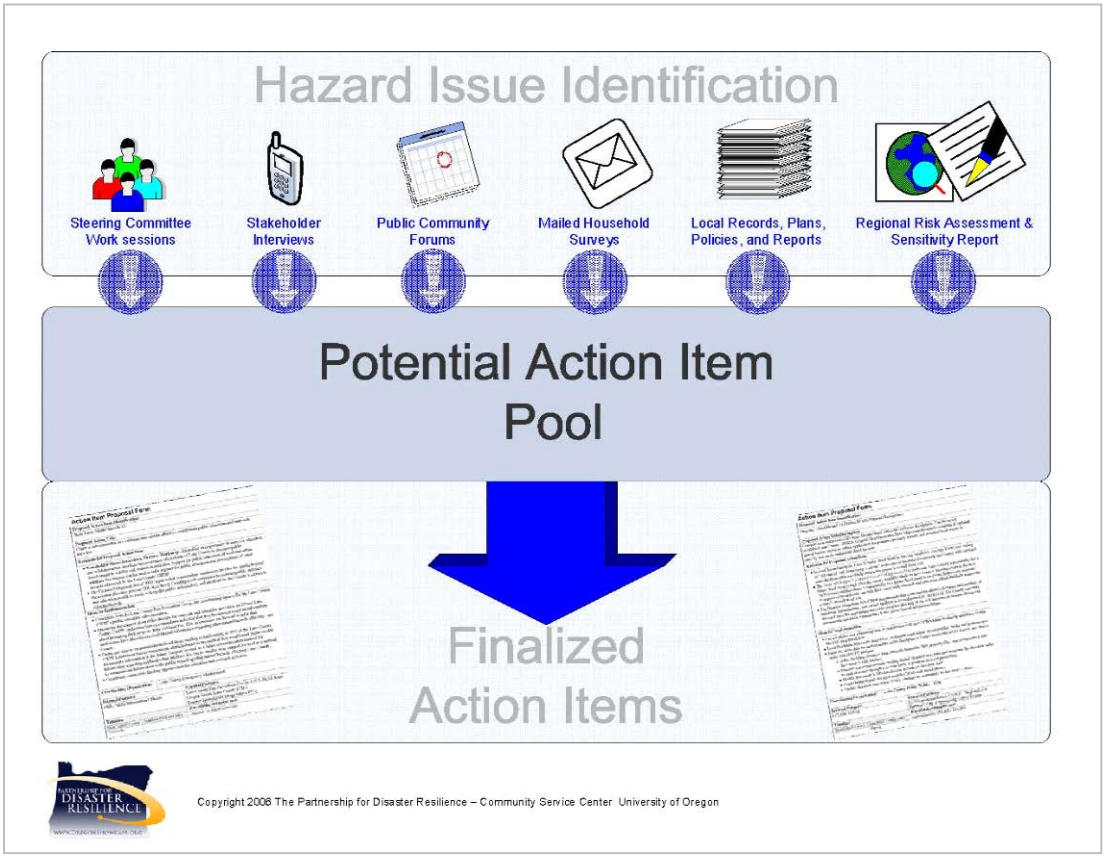
Promote Public Awareness

- Develop and implement education and outreach programs to increase public awareness of the risks associated with natural hazards.
- Provide information on tools, partnership opportunities, and funding resources to assist in implementing mitigation activities.

Mitigation Plan Action Items

Action items are detailed recommendations for activities that local departments, citizens and others could engage in to reduce risk. The action items identified through the planning process form the core of the mitigation strategy. 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

The Hazard Mitigation Advisory Committee decided to modify the prioritization of action items. Because all action items are important to the mitigation plan, the group prioritized the action items with tiered priorities. Each functional category contains a set of specific action items. Appendix A provides a detailed description of each action item. The prioritization structure groups the top action item for each category. Categories include:

EDUCATION AND OUTREACH

Enhancing individual jurisdictional responsibility and accountability is a low-cost, high-benefit way to increase resilience throughout the county. Education and outreach programs already exist. The actions in this category are intended in some cases for the general public, but are predominantly aimed at better educating and informing local officials about actions they can take to make their communities more disaster resilient.

GIS/MAPPING

The actions in this category address mapping needs that are essential to the plans risk assessment of each hazard. The ability to utilize data gathered by the county's GIS department and other local and state organizations allows the risk assessment to continually be updated and reviewed.

MAINTENANCE/PLANNING

Actions in this category stress the importance of maintaining elements of this Clackamas County NHMP, the date that supports the Clackamas County NHMP, and also promote the development of plans and reports that support the goals of the Clackamas County NHMP.

CRITICAL INFRASTRUCTURE/ESSENTIAL FACILITIES

The actions within this category address critical infrastructure and public facilities that are essential to the basic functioning of society, and fundamentally necessary for effective emergency response, as well as recovery and redevelopment efforts following a disaster event.

LAND USE/DEVELOPMENT

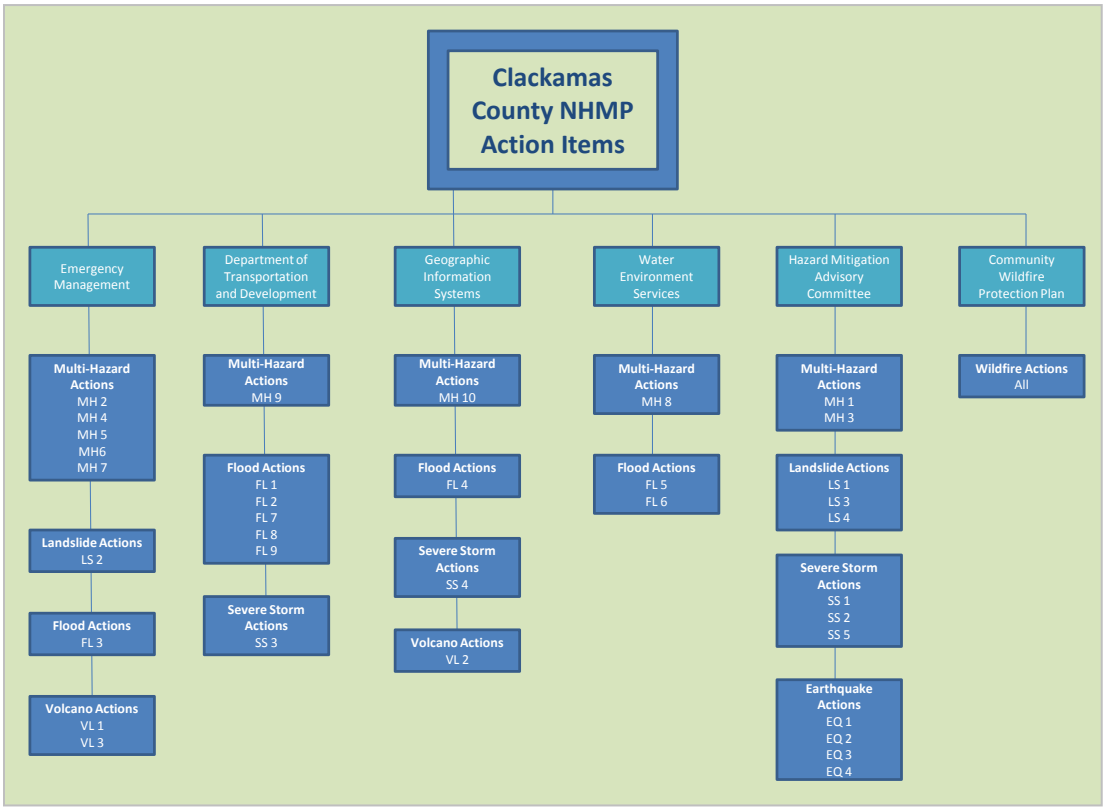
Actions within this category seek to utilize laws, regulations, and other tools regarding the use and development of land as methods of protecting lives and property.

Action Item Framework

Many of the Clackamas 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, Clackamas County will implement the multi-jurisdictional Natural Hazard Mitigation Plan's recommended actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, and can adapt easily to changing conditions and needs.[1] Implementing the Natural Hazard Mitigation Plan's action items through such plans and policies increases their likelihood of being supported and implemented. Below, Figure 3.2 outlines which county department or committee is the lead responsible for implementing and documenting progress on each action item.

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

Figure 3.2 Action Item Framework:



Source: Hazard Mitigation Advisory Committee, 2012

Action Item Prioritization

The following subsection describes how the HMAC prioritized the action items, listed in full detail in Appendix A. During the May 28, 2012 mitigation strategy meeting, the RARE participant facilitated a discussion regarding the existing action item categorization. The HMAC agreed to re-categorize the action items, reword a number of existing actions to make them more specific and to remove others that no longer apply (see Appendix A for an updated list of action items). The HMAC established the plan's new action item categories as presented above. During the June 28, 2012 HMAC meeting, the RARE participant presented an overview of the action item changes and received consent from the HMAC on the implemented changes.

Listed below are the most critical (top priority) action items, determined by the Hazard Mitigation Advisory Committee, proposed for implementation within each category:

EDUCATION AND OUTREACH

- FL-3. Develop better flood warning systems.

GIS/MAPPING

- MH-10. Update County Comprehensive Plan to integrate most current natural hazard mapping data for Clackamas County and make available to county GIS to improve technical analysis of natural hazards.

- FL-4. Maintain data and mapping for floodplain information within the county, and identify and map flood-prone areas outside of designated floodplains.

MAINTENANCE/PLANNING

- FL-7. Establish a framework to compile and coordinate surface water management plans and data throughout the county.

CRITICAL INFRASTRUCTURE/ESSENTIAL FACILITIES

- MH-6. Update and maintain inventories of at-risk buildings and infrastructure and prioritize mitigation projects.

LAND USE/DEVELOPMENT

- MH-8. Use technical knowledge of natural ecosystems and events to link natural resources management and land use organizations to mitigation activities and technical assistance.
- MH-9. Enhance strategies for debris management.
- FL-5. Encourage development of acquisition and management strategies to preserve open space for flood mitigation, fish habitat, and water quality in the floodplain and reduce risk to flood prone properties as well as preserve space for open space property.

Although this methodology provides a guide for the HMAC in terms of implementation, the HMAC has the option to implement any of the action items at any time. This option to consider all action items for implementation allows the committee to consider mitigation strategies as new opportunities arise, such as capitalizing on funding sources that could pertain to an action item that is not the highest priority.

Action Item Worksheets

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

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 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 Clackamas County multi-jurisdictional Natural Hazard 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. Clackamas County currently addresses statewide planning goals and legislative requirements through its comprehensive land use plan, capital improvements plan, mandated standards and building codes. To the extent possible, Clackamas County will work to incorporate the recommended mitigation action items into existing programs and procedures.

COORDINATING ORGANIZATION:

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

INTERNAL AND EXTERNAL PARTNERS:

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

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

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

PLAN GOALS ADDRESSED:

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

TIMELINE:

All broad scale action items have been determined to be ongoing, as opposed to short-term or long-term. This is because the action items are broad ideas, and although actions may be implemented to address the broad ideas, the efforts should be ongoing. For example, although *Flood Action Item #3: Develop better flood warning systems* has been addressed by working with the National Weather Service to install flood staff gauges around troublesome areas, the HMAC will continue this effort of mitigating flood loss.

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Natural Hazard	Action Item	Coordinating Organization	Priority	2012 Update	Plan Goals Addressed				
					Protect Life and Property	Augment Emergency Services	Encourage Partnerships & Implementation	Promote Public Awareness	Enhance Natural Systems
Education and Outreach									
Multi-Hazard #4	Identify, improve, and sustain collaborative programs focusing on the real estate and insurance industries, public and private sector organizations, and individuals to avoid activity that increases risk to natural hazards	CCEM - Lead PGA CCED	High	•In March 2012, Clackamas County published a brochure, "You May Need Flood Insurance" to promote consideration for NFIP Preferred Risk policies. The brochure targeted residents and business that may be at lower risk but can take advantage of coverage if flooded. •Clackamas County Emergency Management briefed Committee for Citizen Involvement •Clackamas County Emergency Management and Planning Departments worked with the Oregon Partnership for Disaster Resilience on a cost-effectiveness study of the Clackamas County CRS program, titled *Clackamas County Community Rating System Program Review, Nov. 2011.*	✓		✓	✓	
Multi-Hazard #7	Strengthen emergency services preparedness and response by linking emergency services with natural hazard mitigation programs, and enhancing and implementing public education programs on a regional scale.	CCEM - Lead DTD PGA GIS H3S	High	Clackamas County continues to participate in safety fairs all over the county. Each city sponsors workshops in conjunction with the Emergency Management Department. The county's Hazard Mitigation Specialist continues to present at local and regional workshops, conferences, and fairs.	✓	✓		✓	
Flood #1	Identify opportunities to educate people within Clackamas County's public and private flood prone properties and identify feasible mitigation options	DTD: Planning - Lead HMAC	High	•The CRS continues to be updated annually. The biggest void that the HMAC and Planning Department faces is the lack of knowledge on the part of insurance lenders. •The Sandy Sustainable Flood Recovery Group continues education and outreach in Sandy.	✓		✓		
Flood #3*	Develop better flood warning systems	CCEM - Lead PGA DTD	Medium	Clackamas County Emergency Management worked with the National Weather Service to install flood staff gauges on the Molalla River at Shady Dell and three flood staff gauges in the upper Sandy River Basin. The county is currently applying for a DR-19560-OR HMGP project to install five electronic river gauges in the upper Sandy Basin.	✓	✓			
Flood #8	Encourage purchase of flood insurance	DTD: Planning - Lead HMAC CCEM	Low	New Action Item, 2012.	✓			✓	
Landslide #1	Continue to improve knowledge of landslide hazard areas and understanding of vulnerability and risk to life and property in hazard-prone areas	HMAC - Lead GIS	Medium	The county is working with DOGAMI to finalize a hazard assessment done in 6 different quadrants of the county. The maps and assessments are still not finalized, but have worked with the public to identify discrepancies.	✓			✓	
Landslide #3	Continue to limit activities in identified potential and historical landslide areas through regulation and public outreach	HMAC	High	DOGAMI continues to map out landslide hazard areas and get the word out. There haven't been any changes in land use ordinances, however land use regulation picks up new information automatically. Steep slope land use maps continue to refer to hazardous areas.	✓			✓	✓
Severe Storm #2	Continue to educate the public on severe storm mitigation activities.	HMAC	Medium	Ongoing.	✓			✓	
Earthquake #2	Encourage purchase of earthquake hazard insurance	HMAC	Low	CCEM continues to encourage the purchase of earthquake hazard insurance at annual preparedness fairs all over the county.	✓			✓	
Earthquake #4	Encourage reduction of nonstructural and structural earthquake hazards in homes, schools, businesses, and government offices through public education	HMAC	Medium	Ongoing.	✓	✓		✓	
Volcano #3	Strengthen response and recovery programs, and work with the USGS-CVO to enhance public education programs for volcanic eruption hazards.	CCEM	Low	•CCEM participated in a 2010 presentation to the Congressional Hazards Caucus in Washington DC to promote improvements for volcano early warning. •CCEM provided evaluation of FEMA/USGS Volcano Crisis Awareness Course in 2011 to complete FEMA's final course certification process. •Worked with USGS Geographer Nate Wood on a multi-hazard vulnerability study for the Hoodland area, with an emphasis on assessing volcanic risk.	✓	✓		✓	

^Indicates that the action item also belongs in other categories

*Indicates that the action item is the top action of focus

Natural Hazard	Action Item	Coordinating Organization	Priority	2012 Update	Plan Goals Addressed				
					Protect Life and Property	Augment Emergency Services	Encourage Partnerships & Implementation	Promote Public Awareness	Enhance Natural Systems
GIS/Mapping									
Multi-Hazard #10*^	Update County Comprehensive Plan to integrate most current natural hazard mapping data for Clackamas County and make available to county GIS to improve technical analysis of earthquake hazards.	GIS - Lead DTD: Planning	Medium	The current Clackamas County Comprehensive Plan does not include any earthquake hazard mapping.	✓		✓		
Flood #4*	Maintain data and mapping for floodplain information within the county, and identify and map flood-prone areas outside of designated floodplains	GIS - Lead DTD WES	Medium	•Clackamas County GIS has access to the newest FEMA 2008 flood plain information. This is displayed on the hazard plain flood map 1. GIS currently has 2004-2007 LiDAR coverage for a large portion of the county; 2ft contours are available for most of this coverage. GIS just placed a request with DOGAMI to receive some new limited area LiDAR data from 2011 that was used in a recent study of the Sandy River flooding and channel migration zones. GIS has not used the available LiDAR data to update or create any hazard layers at this time. The GIS department has also coordinated with Emergency Management to map property losses from the 2011 flooding out along the Sandy. •DOGAMI 2011 Mt Hood MH study uses LiDAR to locate building footprints in the 100 and 500 year flood plain. •DOGAMI Channel Migration Zone Study for Sandy River estimates hazard areas for potential movement of river channel.	✓				
Severe Storm #4	Map and publicize locations around the county that have the highest incidence of extreme windstorms.	GIS	Low	The county's GIS department is unaware of the PGE power outage prone area information. If available, this information would be useful if the HMAC wanted an action item dedicated to creating and distributing educational flyers or similar to individuals living in these areas. GIS can easily generate mailing lists of folks in defined areas. At this time, no progress has been reported.	✓		✓	✓	
Volcano #2	Utilize existing risk assessments and collaborate with USGS-CVO and related agencies to develop ash fall models that are specific to Clackamas County	GIS - Lead CCEM	Low	•USGS funded DOGAMI MH study of proximal and distal land-based exposure to volcano hazards for Sandy River and Hood River valleys. This may provide the basis for vulnerability assessments for near-field ash hazard assessments. •From the GIS standpoint, no one has done or has access to any ash fall models or maps at this time. GIS is a tool that could model some of this if the base data was available. Once the DOGAMI Mt Hood study becomes available, it may provide the county with initial debris flow and possibly ash fall models.	✓		✓	✓	

^Indicates that the action item also belongs in other categories

*Indicates that the action item is the top action of focus

Natural Hazard	Action Item	Coordinating Organization	Priority	2012 Update	Plan Goals Addressed				
					Protect Life and Property	Augment Emergency Services	Encourage Partnerships & Implementation	Promote Public Awareness	Enhance Natural Systems
Maintenance/Planning									
Multi-Hazard #1	Integrate the goals and action items from the Clackamas County Natural Hazard Mitigation Plan into existing regulatory documents and programs, where appropriate.	HMAC	High	•The HMAC continues to work with the county on integrating action items for the NHMP into regulatory documents and programs. •Forest regulation has been revised with more enforcement and wildfire clearance set backs. •Capital funds are being used for earthquake mitigation activities and capital projects are addressing an erosion study. •Clackamas County Facilities Management is working with Emergency Management to create a Damage Assessment policy and process. The policy and process will include building and functions priorities identified, key department functions, and a process to assess and report on buildings status. As of May 2012, there have been three different meetings discussing various portions of the policy and process. •Facilities Management has received training on FEMA 74 - Earthquake Hazards mitigation for Nonstructural Elements. Facilities Management has started a process of reviewing buildings and implementation of action to reduce earthquake hazards within the buildings. Currently, the Central Utility Plant (CUP) has been completed. The Development Services Building (DSB) and Public Services Building (PSB) are currently being reviewed. Facilities Management will work on creating a policy for this process.			✓		
Multi-Hazard #2	Identify and pursue funding opportunities to develop and implement local and county mitigation activities.	CCEM - Lead DTD	High	The following are different funding opportunities used to develop and implement local and county mitigation activities: •1 FMA grant award for flood elevation •1 HMGP award for flood elevation •5 HMGP awards for flood acquisitions •1 PDM award for seismic retrofit of water treatment facility •$2 million in wildfire mitigation for ODF for wildfire mitigation and fuels reduction activities			✓		
Multi-Hazard #3	Establish a formal role for the Clackamas County Natural Hazards Mitigation Committee to develop a sustainable process for implementing, monitoring, and evaluating countywide mitigation activities	HMAC	Medium	The Hazard Mitigation Advisory Committee continues to meet annually. The following are the dates of past HMAC meetings prior to the 2011-2012 NHMP update process: •April 15, 2008 •March 30, 2009 •November 18, 2009 •September 22, 2010 The Sandy Sustainable Flood Recovery Group has continued to meet twice a month since March 2011 to discuss long-term mitigation activities.			✓		
Multi-Hazard #5	Develop public and private partnerships to foster natural hazard mitigation program coordination and collaboration in Clackamas County	CCEM - Lead CCED DTD	Medium	Since 2007 there have been two county-wide, Presidential Disaster Declarations. As a result, there has been outreach to affected residents regarding SBA loans. There has also been some outreach with the Chamber of Commerce.			✓		

Natural Hazard	Action Item	Coordinating Organization	Priority	2012 Update	Plan Goals Addressed				
					Protect Life and Property	Augment Emergency Services	Encourage Partnerships & Implementation	Promote Public Awareness	Enhance Natural Systems
Maintenance/Planning, Cont.									
Multi-Hazard #10*^	Update County Comprehensive Plan to integrate most current natural hazard mapping data for Clackamas County and make available to county GIS to improve technical analysis of earthquake hazards.	GIS - Lead DTD: Planning	Medium	The current Clackamas County Comprehensive Plan does not include any earthquake hazard mapping.	✓		✓		
Flood #7*	Establish a framework to compile and coordinate surface water management plans and data throughout the county.	DTD : Planning - Lead WES GIS	Medium	At this point, there are no resources or support available to make progress thus far.	✓		✓		
Flood #9	Develop a floodplain management plan as a standalone for the CRS program	DTD: Planning - Lead CCEM	Medium	New Action Item, 2012.			✓		
Landslide #2	Identify safe evacuation routes in high-risk debris flow and landslide areas.	CCEM	Medium	•There is currently a USGS report in review that examines concentrations of residents, employees and visitors in the Hoodland area with seasonal variability to serve as a tool for evacuation planning. •DOGAMI MH study for Mt. Hood contains exposure analysis for landslide and debris flow hazards in the Sandy River Basin.	✓	✓			
Severe Storm #1	Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe storms	HMAC	Medium	Ongoing.		✓	✓		
Severe Storm #3	Monitor and implement programs to keep trees from threatening lives, property, and public infrastructure during windstorm events	DTD: Roads Division	High	Ongoing.		✓	✓		
Volcano #1	Work with the state and other impacted jurisdictions to update and exercise the Mount Hood Inter-Agency Coordination Plan	CCEM	Medium	Clackamas County Emergency Management has convened the Mt Hood Plan Facilitation Committee twice. CCEM has also worked with CVO and TVF&R on delivering a Mt Hood table-top scenario to elected officials from around the greater Portland Metro area.		✓	✓	✓	

^Indicates that the action item also belongs in other categories

*Indicates that the action item is the top action of focus

Natural Hazard	Action Item	Coordinating Organization	Priority	2012 Update	Plan Goals Addressed				
					Protect Life and Property	Augment Emergency Services	Encourage Partnerships & Implementation	Promote Public Awareness	Enhance Natural Systems
Critical Infrastructure/Essential Facilities									
Multi-Hazard #6*	Update and Maintain inventories of at-risk buildings and infrastructure and prioritize mitigation projects	CCEM - Lead DTD GIS DTD: Building Codes Facilities	High	The Maintenance Department is working with Emergency Management to develop a list/inventory of the at-risk buildings and infrastructure. Emergency Management maintains the prioritized list. The county also utilizes the, *Statewide Seismic Needs Assessment Using Rapid Visual Screening (RVS)* , DOGAMI Open-File Report O-07-02.	✓		✓		
Flood #6	Identify and address surface water drainage problematic sites for all parts of unincorporated Clackamas County	WES - Lead DTD: Roads Division GIS	Medium	An ongoing project for WES is replacing culverts throughout the county.	✓				
Earthquake #1	Pursue funding opportunities for structural and nonstructural retrofitting of homes, schools, businesses, and government offices that are identified as seismically vulnerable	HMAC	Medium	Funding source of limited implementation is the Oregon Seismic Rehabilitation Grant Program (SRGP) that depends on the State Treasurer to obligate bond capacity and the ability of the Oregon Military Department to incur bond dept into their operating budget.			✓	✓	
Earthquake #3	Encourage seismic strength evaluations for existing critical facilities in the County to identify vulnerabilities for mitigation of schools and universities, public infrastructure, and critical facilities to meet current seismic standards	HMAC	High	Currently, all new facilities must comply with and meet seismic standards. If someone moves into an old building, they must upgrade to current standards. DOGAMI recently did a windshield survey of schools, fire stations, police, and city halls. The focus was on action of existing buildings and information was shared with participants.	✓	✓			

^Indicates that the action item also belongs in other categories

*Indicates that the action item is the top action of focus

Natural Hazard	Action Item	Coordinating Organization	Priority	2012 Update	Plan Goals Addressed				
					Protect Life and Property	Augment Emergency Services	Encourage Partnerships & Implementation	Promote Public Awareness	Enhance Natural Systems
Land Use/Development									
Multi-Hazard #8*	Use technical knowledge of natural ecosystems and events to link natural resources management and land use organizations to mitigation activities and technical assistance.	WES - Lead DTD	Medium	Clackamas County Department of Transportation and Develop is working with Water Environment Services and the Sandy River Watershed Council to use the best available data to accurately redefine the erosion zone and not just the flood zone. WES is working with LiDAR studies, and is working to map the meander zones to include all public infrastructure.					✓
Multi-Hazard #9*	Enhance strategies for debris management	DTD: Sustainability - Lead CCEM Community Environment DTD: Roads Metro RMG	High	The Clackamas County Sustainability department has one member attending the regional workgroup, as well as the FEMA Debris Management training. They have been training and working with the intent to talk with some of the city partners to come up with an action plan that will allow the county to refine the initial plan which received comments by FEMA staff but not yet approved.		✓	✓		✓
Flood #2	Recommend revisions to requirements for development within the floodplain, where appropriate	DTD - Lead GIS WES	Low	Clackamas County Planning is working on trying to get the residents more involved. The county dropped to a 4 in the CRS rating because those who benefit from the program are still reluctant to purchase insurance. At this point the cost of implementing the program is higher than the actual cost, so the county is working on ways to resolve this.	✓				
Flood #5*	Encourage development of acquisition and management strategies to preserve open space for flood mitigation, fish habitat, and water quality in the floodplain and reduce risk to flood prone properties as well as preserve space for open space property.	WES - Lead DTD	Medium	Metro recently purchased 31E15 02100, 23 acres along the Willamette River.	✓				✓
Landslide #4	Recommend construction and subdivision design that can be applied to steep slopes to reduce the potential adverse impacts from development.	HMAC	High	New Action Item, 2012.	✓			✓	✓
Severe Storm #5	Support/encourage electrical utilities to use underground construction methods where possible to reduce power outages from windstorms.	HMAC	Medium	•All new county electrical utilities are underground.			✓		✓

^Indicates that the action item also belongs in other categories

*Indicates that the action item is the top action of focus

Section 4: Plan Implementation and Maintenance

This section details the formal process that will ensure that the Clackamas 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 Plan 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 Plan

After the Plan is locally reviewed and deemed complete, the County will submit it to the State Hazard Mitigation Officer at Oregon Emergency Management. Oregon Emergency Management will review and submit the plan to the Federal Emergency Management Agency (FEMA--Region X) for review. This review addresses the federal criteria outlined in the FEMA Interim Final Rule 44 CFR Part 201. Upon acceptance by FEMA, the County will adopt the plan via resolution. At that point the County will gain eligibility for the Pre-Disaster Mitigation Grant Program, the Hazard Mitigation Grant Program funds, and Flood Mitigation Assistance program funds. Following County adoption, the participating jurisdictions should adopt their addendums.

Convener

The Board of County Commissioners (BCC) will adopt the Clackamas County Natural Hazards Mitigation Plan, and the Hazard Mitigation Advisory Committee will take responsibility for plan implementation. The County Administrator or designee will serve as the plan convener to facilitate the Hazard Mitigation Advisory Committee meetings, and will assign tasks such as updating and presenting the Plan to the members of the committee.

Roles and responsibilities of the convener include:

- Coordinate and document ongoing meetings;
- Serve as the plan's contact person between the Steering Committee and key plan stakeholders;
- Identify emergency management-related funding sources for natural hazard mitigation projects; and
- Coordinate the plan update process.

Plan implementation and evaluation will be a shared responsibility among all of the Hazard Mitigation Advisory Committee members.

Coordinating Body

A Clackamas County Hazard Mitigation Advisory Committee (HMAC) serves as the coordinating body for the mitigation plan and is responsible for coordinating implementation of Plan action items and undertaking the formal review process. The BCC will assign representatives from county agencies, including, but not limited to, the current Hazard Mitigation Advisory Committee members.

Roles and responsibilities of the HMAC include:

- Attending future meetings;
- Prioritizing projects and recommending funding for natural hazard risk reduction projects;
- Participation in the plan update process;
- 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
- Development and coordination of ad hoc and/or standing subcommittees as needed.

HMAC Members

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

- Clackamas County Departments
- Incorporated Cities within Clackamas County
- Clackamas Fire District #1
- Tualatin Valley Fire and Rescue (TVF&R)
- Clackamas Soil Water Conservation District
- Rivergrove Water District
- Clackamas Providers
- Hoodland Fire
- Oregon Department of Forestry (ODF)

University of Oregon's Community Service Center

- Oregon Partnership for Disaster Resilience (OPDR)
- Resource Assistance for Rural Environments (RARE)

To make the coordination and review of the Clackamas County multi-jurisdictional Natural Hazard Mitigation Plan as broad and useful as possible, the HMAC will engage additional stakeholders and other relevant hazard mitigation organizations and agencies to implement the identified action items. Specific organizations have been

identified as either internal or external partners on the individual action item forms found in Appendix A.

Plan Maintenance

Plan maintenance is a critical component of the natural hazard mitigation plan. Proper maintenance of the plan ensures that this plan will maximize the County's and city/special district's efforts to reduce the risks posed by natural hazards. This section was developed by the University of Oregon's Partnership for Disaster Resilience and 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 plan 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. During the first meeting the Committee will:

- Review existing action items to determine appropriateness for funding;
- Educate and train new members on the plan and mitigation in general;
- Identify issues that may not have been identified when the plan was developed; 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 county's Hazard Mitigation Coordinator will host a meeting once a year with the city leads for participating jurisdictions. This meeting is an opportunity for the cities to report back to the county on progress that has been made towards their Natural Hazard Mitigation Plan Addenda. This meeting will also serve as a means for the Hazard Mitigation Coordinator to provide information regarding potential funding sources for mitigation projects, as well as provide additional support for the cities steering committees.

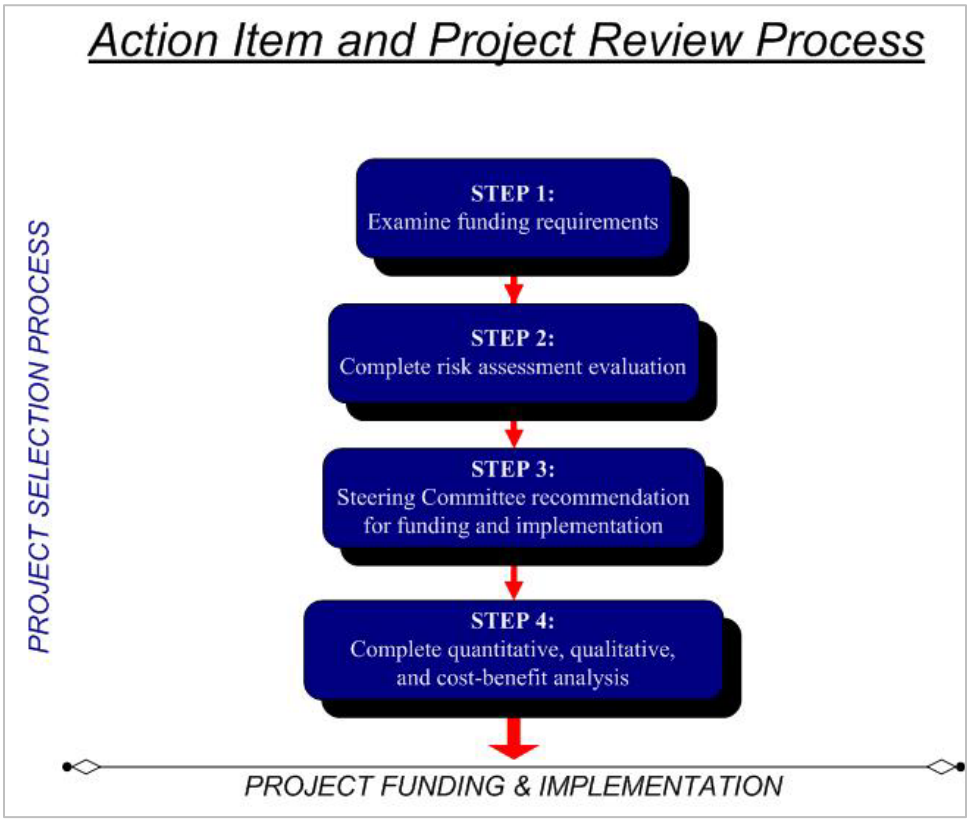
The convener will be responsible for documenting the outcome of the semi-annual meetings in Appendix B: Planning and Public Process. The process the coordinating body will use to prioritize mitigation projects is detailed in the section below. The plan's format allows the county and participating jurisdictions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

Project Prioritization Process

Section III describes the process the HMAC used to establish the current prioritization of action items. Understanding that priorities may change over time depending on new events or resource availability, the Disaster Mitigation Act of 2000 requires that jurisdictions identify a process for future action item prioritization. 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 a project development and prioritization process the HMAC can use in the future.

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 E Grant Programs for a more comprehensive list of potential grant programs.

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

STEP 2: COMPLETE RISK ASSESSMENT EVALUATION

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

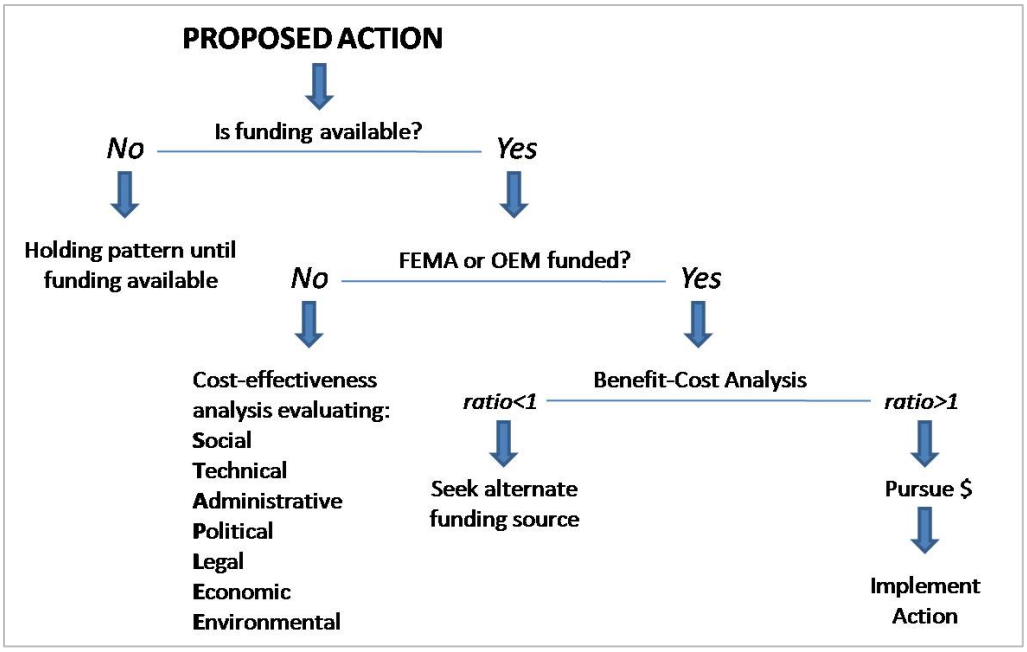
STEP 3: COMMITTEE RECOMMENDATION

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 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 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 committee will use a multivariable assessment technique called STAPLE/E to prioritize these actions. STAPLE/E stands for Social, Technical, Administrative, Political, Legal, Economic, and Environmental. Assessing projects based upon these seven variables can help define a project's qualitative cost effectiveness. 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 C: Economic Analysis for a description of the STAPLE/E evaluation methodology.

Continued Public Involvement & Participation

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

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

- Post copies of their plans on corresponding websites and in local libraries;

- Place articles in the local newspaper directing the public where to view and provide feedback;
- Use existing newsletters such as schools and utility bills to inform the public where to view and provide feedback; and
- Continue to host a booth at the Clackamas County Fair on an annual basis and will present information about hazard mitigation. For example, on August 29, 2012, Clackamas County Emergency Management set up a looped PowerPoint presentation regarding the plan update process at the fair booth. In addition, CCEM staffed the booth and were available to answer questions and engage interested members of the public directly. The county will continue to employ direct outreach strategies such as this at future county wide events.
- Clackamas County Emergency Management will continue to utilize their social media platforms to involve the public. For example, during the plan update process, the county made posts to Facebook encouraging the public to follow the link provided by the Oregon Partnership for Disaster Resilience, and provide comments and feedback on the draft NHMP. The county will continue to employ social media platforms to engage the public about hazard mitigation.

In addition to the involvement activities listed above, the county's multi-jurisdictional Natural Hazard Mitigation Plan has been archived and posted on the Partnership website via the University of Oregon Libraries' Scholar's Bank Digital Archive.

Five-Year Review of Plan

This plan will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. The Clackamas County Natural Hazards Mitigation Plan is due to be updated in the fall of 2017. The convener will be responsible for organizing the coordinating body to address plan update needs. The coordinating body will be responsible for updating any deficiencies found in the plan, and for ultimately meeting the Disaster Mitigation Act of 2000's plan update requirements.

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

Mitigation Plan Update Checklist

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?			
Do future annexations include hazard prone areas?			
Are there new high risk populations?			
Are there completed mitigation actions that have decreased overall vulnerability?			
Did the plan document and/or address National Flood Insurance Program repetitive flood loss properties?			Document any changes to flood loss property status

OVER→

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

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Volume II:
Hazard Chapters

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Drought Hazard

Causes and Characteristics of Droughts

A drought is a period of drier than normal conditions that results in water-related problems. Droughts are generally defined as Short-Term or Long-Term. Short-Term droughts last less than six-months and generally impact agriculture and grassland resources; Long-Term droughts have a duration longer than six-months and can impact larger hydrologic or ecologic systems. Drought occurs in virtually all climatic zones, but its characteristics vary significantly from one region to another. Drought is a temporary condition; it differs from aridity, which is restricted to low rainfall regions and is a permanent feature of climate. Droughts are categorized on the following scale:

Table DR-1: Drought intensity Categories

Drought Category	Drought Intensity
D0	Abnormally Dry (pre- or post-drought condition)
D1	Moderate Drought
D2	Severe Drought
D3	Extreme Drought
D4	Exceptional Drought

Source: U.S. Drought Monitor, http://droughtmonitor.unl.edu/

The National Drought Mitigation Center and the National Center for Atmospheric Research defines drought by categorizing it according the "type of drought." These types include the following:

Meteorological or Climatological Droughts

Meteorological droughts are defined in terms of the departure from a normal precipitation pattern and the duration of the event. These droughts are a slow-onset phenomenon that can take at least three months to develop and may last for several seasons or years.

Agricultural Droughts

Agricultural droughts link the various characteristics of meteorological drought to agricultural impacts. The focus is on precipitation shortages and soil-water deficits. Agricultural drought is largely the result of a deficit of soil moisture. A plant's demand for water is dependent on prevailing weather conditions, biological characteristics of the specific plant, its stage of growth, and the physical and biological properties of the soil.

Hydrological Droughts

Hydrological droughts refer to deficiencies in surface water and sub-surface water supplies. It is measured as stream flow, and as lake, reservoir, and ground water levels. Hydrological measurements are not the earliest indicators of drought. When precipitation is reduced or deficient over an extended period of time, the shortage will be reflected in declining surface and sub-surface water levels.

Socioeconomic Droughts

Socioeconomic droughts occur when physical water shortage begins to affect people, individually and collectively. Most socioeconomic definitions of drought associate it with supply, demand, and economic good. One could argue that a physical water shortage with no socio-economic impacts is a policy success.

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. The Oregon Drought Severity Index is the most commonly used drought measurement in the state because it incorporates both local conditions and mountain snow pack. The Oregon Drought Severity Index categorizes droughts as mild, moderate, severe, and extreme.

National Drought Status 2012

More of the United States is in moderate drought or worse than at any other time in the history of the U.S. Drought Monitor, with 46.84 percent of the nation's land area in various stages of drought on the map dated July 3, 2012. Looking only at the 48 contiguous states, 55.96 percent of the country's land area is in moderate drought or worse -also the highest percentage on record.[1]

Risk Assessment

The extent of the drought depends upon the degree of moisture deficiency, and the duration and size of the affected area. Typically, droughts occur as regional events and often affect more than one county. In severe droughts, environmental and economic consequences can be significant.

History of Drought in Clackamas County Area

Clackamas County experiences annual dry conditions typically during the summer months from July through September. Dates for significant regional drought events that affected Clackamas County include the following:

[1] Source: National Drought Mitigation Center, University of Nebraska, Lincoln http://drought.unl.edu/

1928-1941

A significant drought affected all of Oregon from 1928 to 1941. The prolonged statewide drought created significant problems for the agriculture industry. The first of the three Tillamook Forest burns occurred during this drought in 1933.85

1976-1981

During this five-year drought period in western Oregon, low stream flows prevailed. The period between 1976 and 1977 was the single driest year of the century. The Portland Airport received only 7.19 inches of rain between October 1976 and February 1977.11 In the twelve-month period from September, 1976 through August, 1977, Corvallis received only 22.2 inches of precipitation, 52 percent of the "normal" of 42.7 inches.86 During the winter of that year, airborne dry ice seeding was used in Polk County as a means of enhancing winter precipitation for agricultural use.

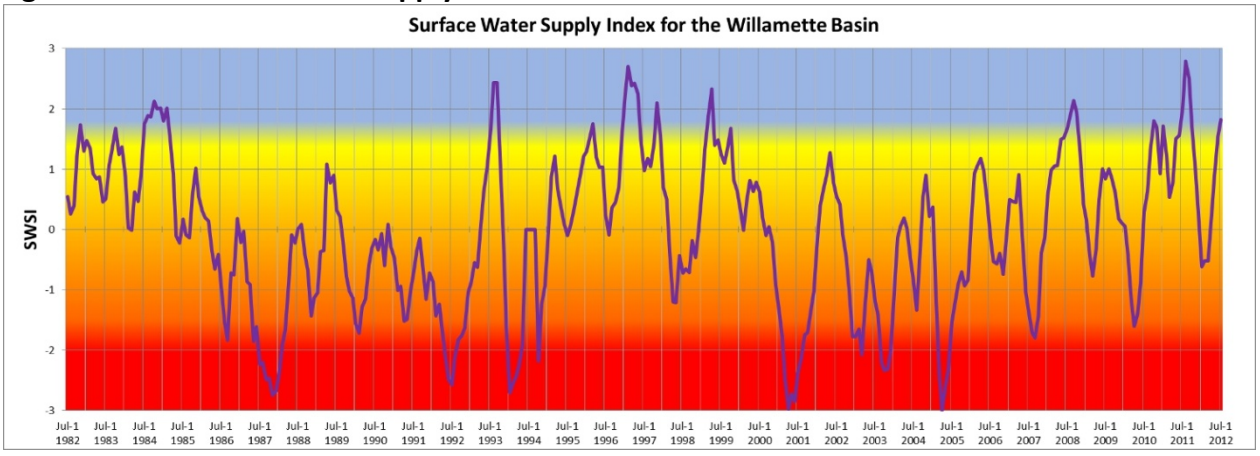
1985-1994

A dry period lasting from 1985 to 1994 caused significant problems statewide. The peak year was 1992, when the state declared a drought emergency. In the seven-year period from 1986-1992, Medford received only five years' worth of precipitation and other areas of southern Oregon were also significantly affected. Forests throughout Oregon suffered from a lack of moisture with fires common and insect pests flourishing.

2005

February 2005 was the driest February on record since 1977, surpassing 2001's conditions.88 The Governor's Office posted a State of Oregon Drought and Fire Web page. This page features weekly updates, drought and fire information, and agency links. Above normal temperatures contributed to decreased water availability for the summer. Stream and river levels dropped significantly and watermasters regulated live flow use by irrigators.

Figure DR-1: Surface Water Supply Index for the Willamette Basin



Surface Water Supply Index (SWSI) for the Willamette Basin. SWSI was developed by the Natural Resources Conservation Service. Values below -1.5 are considered "abnormally dry" and would be a reasonable indicator of drought. Provided by National Weather Service -Portland Weather Forecast Office.

Probability of Future Occurrence

Droughts are not uncommon in Oregon, nor are they just an "east of the mountains" phenomenon. They occur in all parts of the state, in both summer and winter. Oregon's drought history reveals many short term and a few long-term events. The average recurrence interval for severe droughts in Oregon is somewhere between 8 and 12 years.

The 2007 the Clackamas County Hazard Analysis did not address the drought hazard. Given the average recurrence interval for severe droughts in Oregon and Clackamas County's drought history, the steering committee determined that there is a high probability Clackamas County will experience severe extended drought conditions, meaning that one drought event is likely to occur within the next ten to 35 years.

Vulnerability Assessment

The severity of a drought occurrence poses a risk for agricultural and timber losses, property damage, and disruption of water supplies and availability in urban and rural areas. Factors used to assess drought risk include agricultural practices, such as crop types and varieties grown, soil types, topography, and water storage capacity.

"The chronic drought that hit western North America from 2000 to 2004 left dying forests and depleted river basins in its wake and was the strongest in 800 years, scientists have concluded, but they say those conditions will become the "new normal" for most of the coming century."

http://www.homelandsecuritynewswire.com/dr20120730-chronic-20004-u-s-drought-worst-in-800¬-years-may-be-the-new-normal

The 2006 Clackamas County Hazard Analysis did not address the drought hazard. Due to the nature of droughts and their extensive effects, the Clackamas County steering committee determined that Clackamas County has a high vulnerability to drought, meaning over ten percent of the county's population or regional assets would be affected.

Risk Analysis

A risk analysis estimating the potential loss of life and property for the drought hazard in Clackamas County has not been completed at this time. However, given the county's high vulnerability to the drought hazard, a risk analysis is recommended.

Community Hazard Issues

What is susceptible to damage during a hazard event?

Drought is frequently an "incremental" hazard, meaning both the onset and end are often difficult to determine. Also, its effects may accumulate slowly over a considerable period of time and may linger for years after the termination of the event.

Droughts are not just a summer-time phenomenon; winter droughts can have a profound impact on agriculture, particularly east of the Cascade Mountains. Also, below average snowfall in higher elevations has a far-reaching effect, especially in terms of

hydro-electric power, irrigation, recreational opportunities and a variety of industrial uses. Clackamas County has a large agricultural economy which would suffer significantly during an extended drought.

Drought can affect all segments of a jurisdiction's population, particularly those employed in water-dependent activities (e.g., agriculture, hydroelectric generation, recreation, etc.). Also, domestic water-users may be subject to stringent conservation measures (e.g., rationing) and could be faced with significant increases in electricity rates.

There also are environmental consequences to drought. A prolonged drought in forests promotes an increase of insect pests, which in turn, damage trees already weakened by a lack of water. The incidence of forest and range fires increases substantially during extended droughts, which in turn places both human and wildlife populations at higher levels of risk.

Some environmental effects of drought are short-term and conditions quickly return to normal following the end of the drought. Other environmental effects linger for some time or may even become permanent. Wildlife habitat, for example, may be degraded through the loss of wetlands, lakes, and vegetation. Many species, however, will eventually recover from this temporary aberration. Oregon has several fish species listed as threatened or endangered pursuant to the Endangered Species Act (ESA) of 1973. Some of these species have habitat requirements that often conflict with the needs or desires of the human environment. For example, in times of scarcity, the amount of water necessary to maintain certain fish species may conflict with the needs of the local agricultural community. The degradation of landscape quality, including increased soil erosion, may lead to a more permanent loss of biological productivity of the landscape.

Implementing Drought Hazard Mitigation

The Clackamas Soil and Water Conservation District suggests the following drought mitigation measures:

- Education to residents to encourage residential installation of a rainwater harvesting system (for water storage and conservation) as well as rain gardens for groundwater infiltration (preventive measure to mitigate groundwater withdrawal).
- Installation of potable rainwater harvesting systems and rain gardens if possible at county emergency facilities and other facilities that use large quantities of water. Three examples to start with are:
- Clackamas Events Center – designated emergency center for animals
- Clackamas County Dog Service – managers have expressed interest in a system for conservation as well as emergency disaster conditions such as drought and earthquakes
- Other emergency shelter throughout the county such as fire stations and schools. The fire station could use the system for immediate supply of water in case of disaster

Drought Mitigation Action Items

Drought actions are listed in Section 3 Mitigation Strategy. For detailed information regarding each action, please refer to Appendix A – Action Items.

Resources:

Oregon Water Resources Department – Drought Watch

http://cms.oregon.egov.com/owrd/pages/wr/drought.aspx

National Integrated Drought Information System

www.drought.gov

US Drought Monitor – University of Nebraska, Lincoln

http://droughtmonitor.unl.edu/

National Weather Service, Portland Bureau, (February 2002)

http://www.wrh.noaa.gov/Portland.

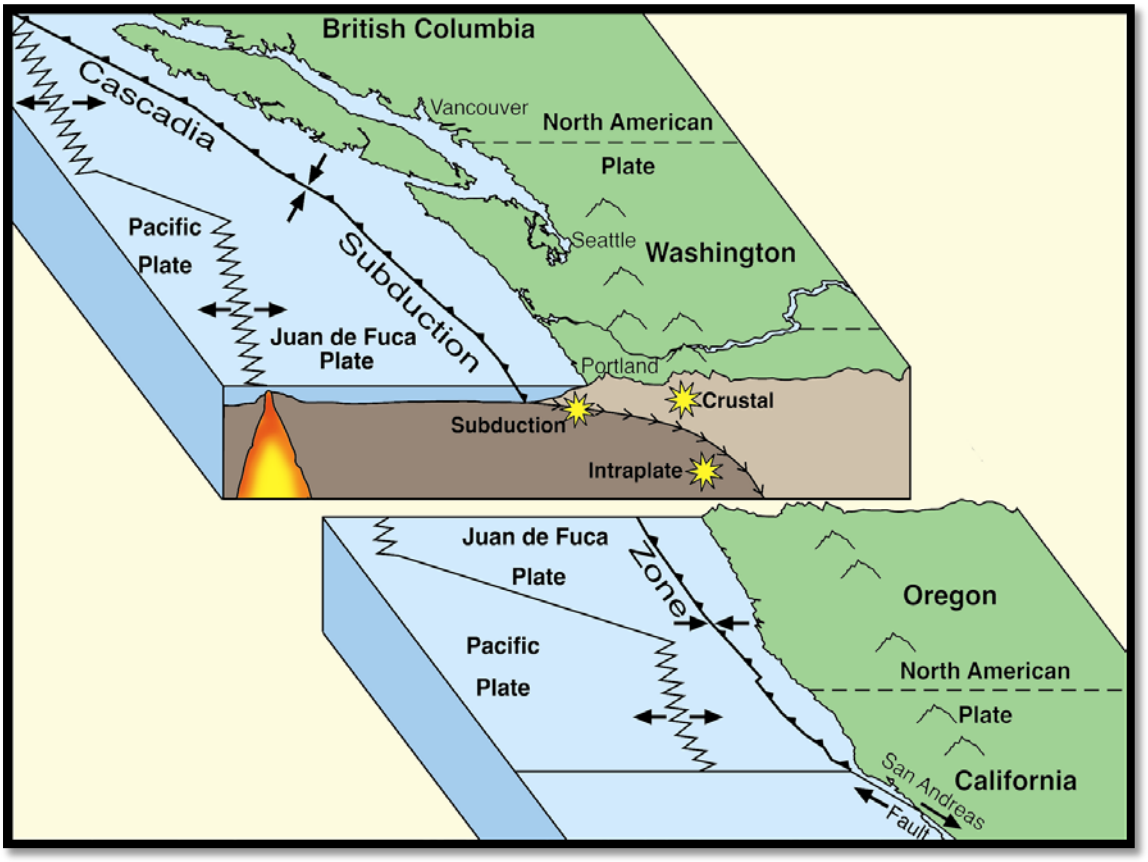
Earthquake Hazard

The Pacific Northwest is "earthquake country" and the lack of a seriously damaging earthquake for the Portland metropolitan region in the last two hundred years means that many old buildings and critical infrastructure are poised for substantial damage. Earthquakes in Oregon happen on a regular basis but mostly at such a low magnitude that communities are woefully under prepared.

Causes and Characteristics of the Hazard

Earthquakes in the Pacific Northwest are generated by the following three fault types: shallow crustal, deep intraplate, or subduction zone earthquakes. These earthquakes can have great impact on Oregon communities.

Figure EQ-1: Cascadia Subduction Zone



Source: Source: Planning for Natural Hazards: The Oregon Technical Resource Guide, Department of Land Conservation and Development (July 2000), Ch. 8, pp. 7.

Crustal Fault Earthquakes

Crustal fault earthquakes are the most common earthquakes and occur at relatively shallow depths of 6-12 miles below the surface.[i] While most crustal fault earthquakes are smaller than magnitude 4 and generally create little or no damage, they can produce earthquakes of magnitudes up to 7, which cause extensive damage. Clackamas County has seven documented crustal faults that could cause serious damage to buildings and infrastructure. These include: Portland Hills, Sandy River, Bolton, Mount Angel, Grant Butte, Clackamas Creek, and Mount Hood. These faults could generate earthquakes 6.5 or larger.

Deep Intraplate Earthquakes

Occurring at depths from 25 to 40 miles below the earth's surface in the subducting oceanic crust, deep intraplate earthquakes can reach up to magnitude 7.5.[ii] The February 28, 2001 earthquake in Washington State was a deep intraplate earthquake. It produced a rolling motion that was felt from Vancouver, British Columbia to Coos Bay, Oregon and east to Salt Lake City, Utah. A 1965 magnitude 6.5 intraplate earthquake centered south of Seattle-Tacoma International Airport caused seven deaths.[iii]

Subduction Zone Earthquakes

The Pacific Northwest is located at a convergent plate boundary, where the Juan de Fuca and North American tectonic plates meet. The two plates are converging at a rate of about 1-2 inches per year. This boundary is called the Cascadia Subduction Zone (CSZ). It extends from British Columbia to northern California. Subduction zone earthquakes are caused by the abrupt release of slowly accumulated stress.[iv]

Subduction zones similar to the CSZ have produced earthquakes with magnitudes of 8 or larger. Historic subduction zone earthquakes include the 1960 Chile (magnitude 9.5) and 1964 southern Alaska (magnitude 9.2) earthquakes[v] with more recent events being the 2004 Indian Ocean (magnitude 9.1) and 2011 Japan (magnitude 9).

Geographic Extent

According to the Relative Earthquake Hazard Map (10), about 45% of the total county land area is in moderate to high hazard zones. In addition, 54% of total tax parcels have moderate to high earthquake hazards. Moderate to High earthquake hazard zones are concentrated along rivers, floodplains, and hill slopes due to the lack of soil stability in these areas.

Earthquake Related Hazards

Ground shaking, landslides, liquefaction, and amplification are the specific hazards associated with earthquakes. The severity of these hazards depends on several factors, including soil and slope conditions, proximity to the fault, earthquake magnitude, and the type of earthquake.

Ground Shaking

Ground shaking is the motion felt on the earth's surface caused by seismic waves generated by the earthquake. It is the primary cause of earthquake damage. The strength of ground shaking depends on the magnitude of the earthquake, the type of fault, and distance from

the epicenter (where the earthquake originates). Buildings on poorly consolidated and thick soils will typically see more damage than buildings on consolidated soils and bedrock.

Earthquake-Induced Landslides

Earthquake-induced landslides are secondary earthquake hazards that occur from ground shaking. They can destroy the roads, buildings, utilities, and other critical facilities necessary to respond and recover from an earthquake. Many communities in Oregon have a high likelihood of encountering such risks, especially in areas with steep slopes.[vi]

Liquefaction

Liquefaction occurs when ground shaking causes wet granular soils to change from a solid state to a liquid state. This results in the loss of soil strength and the soil's ability to support weight. Buildings and their occupants are at risk when the ground can no longer support these buildings and structures.[vii]

To develop a regional liquefaction hazard map (Map 8) for Clackamas County, DOGAMI started by collecting the best available geologic information. Hazard groupings were primarily based on lithologies and checked with individual data points. With the available information compiled, DOGAMI assigned liquefaction susceptibility classes based on the dominant lithologies for each geologic unit in the study area, checked source data boundaries, and simplified the GIS outputs into four relative hazard classes: None/Very Low, Low, Moderate, and High. Areas with Moderate to High liquefaction susceptibilities are concentrated along the rivers and flood plains in the Willamette Valley, Cascade Range tributaries, and major stream valleys within the Cascade Range. Older river terrace and Missoula Flood deposits in the Willamette Valley were assigned a lower liquefaction hazard, yet are still considered susceptible to liquefaction in larger earthquakes. It is important to note that the quality and scale of the available base maps precluded identification of all liquefaction hazard areas, particularly in the eastern portion of the county.

Amplification

Soils and soft sedimentary rocks near the earth's surface can modify ground shaking caused by earthquakes. One of these modifications is amplification. Amplification increases the magnitude of the seismic waves generated by the earthquake. The amount of amplification is influenced by the thickness of geologic materials and their physical properties. The degree of amplification greatly affects the performance of infrastructure in earthquake. Buildings and structures built on soft and unconsolidated soils, for example, face greater risk.[viii] Amplification can also occur in areas with deep sediment filled basins and on ridge tops.

DOGAMI developed the ground shaking amplification map (Map 9) based generally on the NEHRP 1997 method of categorizing relative hazards, and simplified the GIS outputs into relative hazard classes – Low, Moderate, and High. The resulting map is not intended to be used in place of site-specific studies. The high hazard soils are located along and adjacent to streams and rivers in Clackamas County. The eastern portion of the county is varied, with competent bedrock areas mapped as Low hazard, dense soil areas mapped as Moderate

hazard, and younger landslide and alluvial deposit areas mapped as High hazard for ground shaking amplification.[1]

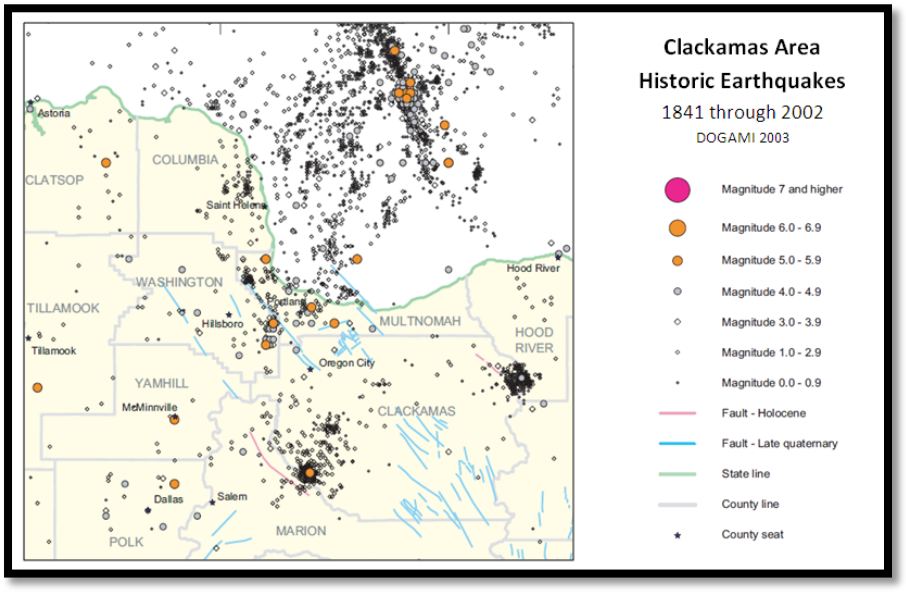
Risk Assessment

History of the Hazard

Dating back to 1841, there have been more than 6,000-recorded earthquakes in Oregon, most with a magnitude below three. Portland and its surrounding region is potentially the most seismically active area within Oregon.[ix] The Portland metropolitan region has encountered seventeen earthquakes of an estimated magnitude of four and greater, with major earthquakes in. 1877 (magnitude 5.3), 1962 (magnitude 5.2), and 1993 (magnitude 5.6). Although seismograph stations were established as early as 1906 in Seattle and 1944 in Corvallis, improved seismograph coverage of the Portland region did not begin until 1980, when the University of Washington expanded its regional network into northwestern Oregon.

Geologic evidence shows that the Cascadia Subduction Zone has generated great earthquakes, most recently about 300 years ago. It is generally accepted to have been magnitude 9 or greater. The average recurrence interval of these great Cascadia earthquakes is approximately 500 years, with gaps between events as small as 200 years and as large as 1,000 years. Such earthquakes may cause great damage to the coastal area of Oregon as well as inland areas in western Oregon. Shaking from a large subduction zone earthquake could last up to five minutes.[x]

Figure EQ-2: Historic Clackamas County Earthquakes



Source: OFR O-03-02, Map of Selected Earthquakes for Oregon,1841 through 2002 by Clark A. Niewendorp and Mark E. Neuhaus, Oregon Department of Geology and Mineral Industries

[1]Hofmeister, Hasenberg, Madin, Wang, 2003. "Earthquake and Landslide Hazard Maps and Future Earthquake Damage Estimates for Clackamas County, Oregon: Oregon Department of Geology and Mineral Industries Open-File Report 0-03-10."

Hazard Identification

Clackamas County partnered with the Department of Geologic and Mineral Industries (DOGAMI) for the purpose of developing earthquake and landslide hazard maps and future damage estimates for Clackamas County, Oregon. The two main objectives of this study were to (a) develop a set of county-wide maps to identify areas of relatively low and high earthquake and landslide hazard (hazard maps), and (b) to improve the county's capabilities for earthquake damage and loss estimation (earthquake damage and loss modeling using HAZUS). The report is entitled, "Earthquake and Landslide Hazard Maps and Future Earthquake Damage Estimates for Clackamas County, Oregon: Oregon Department of Geology and Mineral Industries Open-File Report 0-03-10."

Probability of Future Occurrence

The County Hazard Mitigation Advisory Committee ranks the probability of a CSZ event and a damaging crustal fault earthquake equally with a “low” estimate meaning that one incident is likely within a 75 to 100 year time frame. This was a revised estimate down from the 2007 ranking of “high” probability to address the rare nature of damaging earthquakes in Oregon and the Pacific Northwest relative to other more frequent natural hazards. The earlier ranking was based on a the higher probability of more frequent Magnitude 4 earthquakes that have occurred over the last 150 years, but these are rarely damaging.

Paleoseismic studies along the Oregon coast indicate that the state has experienced seven CSZ events possibly as large as M9 in the last 3500 years. These events are estimated to have an average recurrence interval between 500 and 600 years, although the time interval between individual events ranges from 150 to 1000 years. The last CSZ event occurred approximately 300 years ago. Scientists estimate the chance in the next 50 years of a great subduction zone earthquake is between 10 and 20 percent, assuming that the recurrence is on the order of 400 +/- 200 years. (Oregon Geology, Volume 64, No. 1, Spring 2002)

New research from Oregon State University suggests that the CSZ has at least 4 segments that sometimes rupture independently of one another. Magnitude-9 ruptures affecting the entire subduction zone have occurred 19 times in the past 10,000 years. Over that time, shorter segments have ruptured farther south in Oregon and Northern California, producing magnitude-8 quakes. As such, the risks of a subduction zone quake may differ from north to south. Quakes originating in the northern portion of the CSZ tend to rupture the full length of the subduction zone. In southern Oregon and Northern California, quakes along the subduction zone appear to strike more frequently. (Rojas-Burke, Joe. “Predicting the next Northwest mega-quake still a struggle for geologists.” The Oregonian. April 20, 2010.)

Vulnerability Assessment

Clackamas County considers two main earthquake related vulnerability categories: Life and Property and Critical Facilities and Infrastructure. Both categories are discussed in further detail below. In general terms, Clackamas County’s vulnerability to the earthquake hazard is high.

Risk to Life and Property: High

For 2012, 44% of total parcels that are exposed to moderate and high earthquake hazards represent about 48% of total market value of all parcels in the county. This means that a significant amount of public and private property could be damaged from earthquakes. In

addition, the risk to life is extremely great, as much of the building stock was built prior to adoption of building codes designed for earthquake safety. Over 243 vulnerable population sites are in moderate to high hazard zones.

Risk to Critical Facilities and Infrastructure: High

The risk to critical facilities and infrastructure is invariably high. Over 115 critical and essential facilities are in moderate to high hazard zones. Many of these fire stations, law enforcement centers, and schools are unreinforced masonry, which perform extremely poorly to ground shaking. This means that emergency responders will have difficulty assisting others. Many miles of lots of road, water and sewer lines, 388 bridges, 12 cell towers, 30 substations, and 46 dams are in moderate to high hazard zones.

Relative Earthquake Hazards

DOGAMI and Clackamas County GIS worked together to combine the ground shaking, amplification, and liquefaction date to develop a composite Relative Earthquake Hazard Map (Map 10). This map represents the overall earthquake hazards in Clackamas County.

Critical Facility and Schools Assessment

In 2007 the Oregon Department of Geology and Mineral Industries (DOGAMI) released the Statewide Seismic Needs Assessment, which covers public school buildings, acute inpatient care facilities, fire stations, police stations, sheriffs' offices and other law enforcement agency buildings. Over 1,000 K -12 schools qualified for the assessment, covering 90% of enrolled public school students in every county and 100% of the vulnerable coastal community schools were surveyed.

DOGAMI Rapid Visual Screening for Clackamas County Area -Listing of 179 facilities in the unincorporated County and incorporated cities.

http://www.oregongeology.org/sub/projects/rvs/county/county-clackamas.htm

Senate Bill 1566 (2012) amended ORS 329.105 to require all school districts and education service districts to notify the Oregon Department of Geology and Mineral Industries (DOGAMI) of any construction of new school buildings or modification of an existing school building in a manner that may affect the seismic risk category of a school.

Existing Hazard Mitigation Activities

Clackamas County considers seismic hazards from a Cascadia subduction zone earthquake or a strong crustal earthquake as the highest overall threat to the jurisdiction area due to the potential for localized severity and overall regional impacts. Annually the County conducts earthquake drills, provides information and outreach to specific audiences on personal safety measures and preparedness tips, and integrates seismic planning into continuity of operations plans.

County Emergency Management is working with Building Codes and Facilities managers on a process for post-earthquake building safety evaluation and provides the ATC-20 "Post-Earthquake Safety Evaluation of Buildings" training to County staff for free.

The County Hazard Mitigation Coordinator is allowed to serve on the Oregon Seismic Safety Policy Advisory Commission (OSSPAC) as a Public Member. This arrangement helps translate local concerns into policy discussion at the state level and conversely bring state policy direction into consideration at the local implementation level.

Oregon Seismic Rehabilitation Grant Program (SRGP)

Milwaukie Elementary in North Clackamas School District received a SRGP grant in 2010 for $1,088,604. The Milwaukie Elementary project was conducted in 2 phases and will be completed by September 30, 2012. This was an unreinforced masonry (URM) facility with a Very High Collapse Potential, per the 2007 DOGAMI Rapid Visual Screening assessment report.

Seismic Mitigation Project Implementation

Clackamas River Water used a $1.5 million FEMA Pre-Disaster Mitigation grant to complete seismic upgrades to two above-groundwater reservoirs, and integrate external buttress walls and install rebar and bracing to internal walls at their treatment plant facility. They also strengthened their pumping station intake.

Clackamas River Water Seismic Retrofit Project -Left side: Buttress walls added to treatment plant. Right side: Reservoir wrapped with carbon fiber reinforced polymer.

Earthquake Mitigation Action Items

Earthquake actions are listed in Section 3 Mitigation Strategy. For detailed information regarding each action, please refer to Appendix A – Action Items.

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[i] Madin, Ian P. and Zhenming Wang. *Relative Earthquake Hazard Maps Report.* (1999) DOGAMI.

[ii] *Planning for Natural Hazards: The Oregon Technical Resource Guide,* Department of Land Conservation and Development (July 2000), Ch. 8, pp. 8.

[iii] March 4, 2001. "A region at risk." The Oregonian.

[iv] *Questions and Answers on Earthquakes in Washington and Oregon* (February 2001) www.geophys.washington.edu/seis/pnsn/info_general/faq.html.

[v] "A region at risk." March 4, 2001. The Oregonian.

[vi]Ibid.

[vii]Ibid.

[viii]Ibid.

[ix]Bott, Jacqueline D.J. and Wong, Ivan G. *Historical earthquakes in and around Portland, Oregon.* September (1993). Oregon Geology 55 (5). 116.

[x]*Planning for Natural Hazards: The Oregon Technical Resource Guide,* Department of Land Conservation and Development (July 2000), Ch. 8, pp. 9.

Flood Hazard

Causes and Characteristics of the Hazard

Flooding occurs when climate (or weather patterns), geology, and hydrology combine to create conditions where water flows outside of its usual course. In Clackamas County, geography and climate combine to create chronic seasonal flooding conditions.

Precipitation

Because Clackamas County spans a wide range of climatic and geologic regions, there is considerable variation in precipitation, with elevation being the largest factor in precipitation totals. Moving east from Oregon City at 55 feet above sea level to Mt Hood at 11,235 feet above sea level, annual precipitation averages range from 47.06 inches to over 124.51 inches, respectively. This change in elevation causes a significant increase in precipitation, in the form of both rain and snow. Although the majority of the county enjoys a fairly mild winter, with less than 5-10 inches of snow per year, the higher elevations surrounding Mt. Hood are covered with snow for the majority of the winter months. This is of primary concern when dealing with potential flood events. Mt. Hood's snowmelt provides a continuous water source throughout the year, and can be a major contributor to high waters.

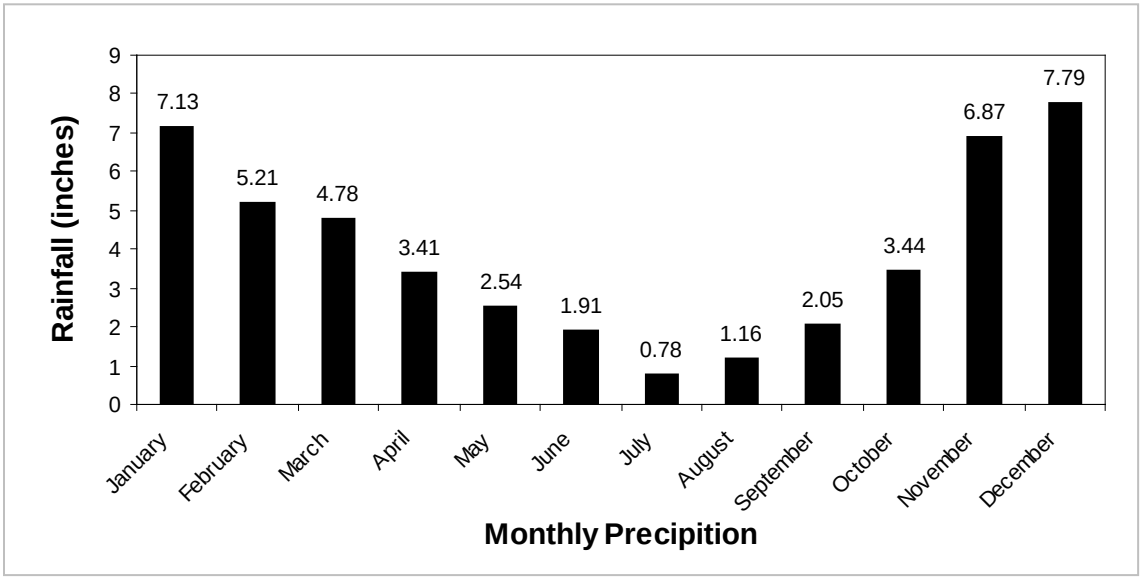
Sandy River Flooding – January 16, 2011
Source: Clackamas County Emergency Management

Flooding is most common from October through April, when storms from the Pacific Ocean, 60 miles away, bring intense rainfall to the area.[1] Clackamas County receives approximately 40 inches of rain on average each year. During the rainy season, monthly rainfall totals average far higher than other months of the year (refer to Figure FH.1). This results in high water, particularly in December and January. The larger floods are the result of heavy rains of two-day to five-day durations

[1] Interagency Hazard Mitigation Team, *State Hazard Mitigation Plan* (2000) Oregon Emergency Management.

augmented by snowmelt at a time when the soil is near saturation from previous rains. Frozen topsoil also contributes to the frequency of floods.[2]

Figure FH.1: Average Monthly Rainfall for Oregon City, Oregon



Source: The Climate of Oregon

Geography and Geology

A large portion of Clackamas County's area lies in the lower Willamette River basin. The broad floodplain of the valley can be easily inundated by floodwaters. The surface material includes poorly drained, unconsolidated, fine-grained deposits of Willamette silt, sand, and gravel. Torrential flood events can introduce large deposits of sand and gravel that assist in the drainage of the otherwise poorly drained soils.[3]

The flood events in Clackamas County usually occur when storms move in from the Pacific, dropping heavy precipitation into the Willamette valley. Flooding in the valley becomes a problem when human activities infringe on the natural floodplain.

Two types of flooding primarily affect Clackamas County: riverine flooding and urban flooding (see descriptions below). In addition, any low-lying area has the potential to flood. The flooding of developed areas may occur when the amount of water generated from rainfall and runoff exceeds a storm water system's (ditch or sewer) capability to remove it.

RIVERINE FLOODING

Riverine flooding is the overbank flooding of rivers and streams. The natural processes of riverine flooding add sediment and nutrients to fertile floodplain areas. Flooding in large river systems typically results from large-scale weather systems that generate prolonged

[2] Taylor, George H., Hannan, Chris, The Climate of Oregon (1999). Oregon State University Press. Corvallis, Oregon.
[3] Geologic Hazards of the Bull Run Watershed Multnomah and Clackamas Counties, Oregon. DOGAMI. Bulletin 82. 1974

rainfall over a wide geographic area, causing flooding in hundreds of smaller streams, which then drain into the major rivers. Map 4 shows the various river basins in Clackamas County.

Shallow area flooding is a special type of riverine flooding. FEMA defines shallow flood hazards as areas that are inundated by the 100-year flood with flood depths of only one to three feet. These areas are generally flooded by low velocity sheet flows of water.

URBAN FLOODING

As land is converted from fields or woodlands to roads and parking lots, it loses its ability to absorb rainfall. Urbanization of a watershed changes the hydrologic systems of the basin. Heavy rainfall collects and flows faster on impervious concrete and asphalt surfaces. The water moves from the clouds, to the ground, and into streams at a much faster rate in urban areas. Adding these elements to the hydrological systems can result in floodwaters that rise very rapidly and peak with violent force.

Almost one-eighth of the area in Clackamas County is incorporated, and has a high concentration of impermeable surfaces that either collect water, or concentrate the flow of water in unnatural channels. During periods of urban flooding, streets can become swift moving rivers and basements can fill with water. Storm drains often back up with vegetative debris causing additional, localized flooding.

CHANNEL MIGRATION AND BANK EROSION

Following the 2011 flood on the Sandy River, County staff began to emphasize the different nature of the flood hazard in the upper reaches of the river, as that of bank erosion due to channel migration. The upper Sandy may not have to reach flood stage in order to achieve a level of flow capable of mobilizing sediments and impounding gravel and woody debris in the channel. These impoundments can redirect the main channel into the bank and cause failures that exacerbate further erosion downstream.

Sandy River Channel Migration Damage – January 16, 2011
Source: Oregonian

History of the Hazard

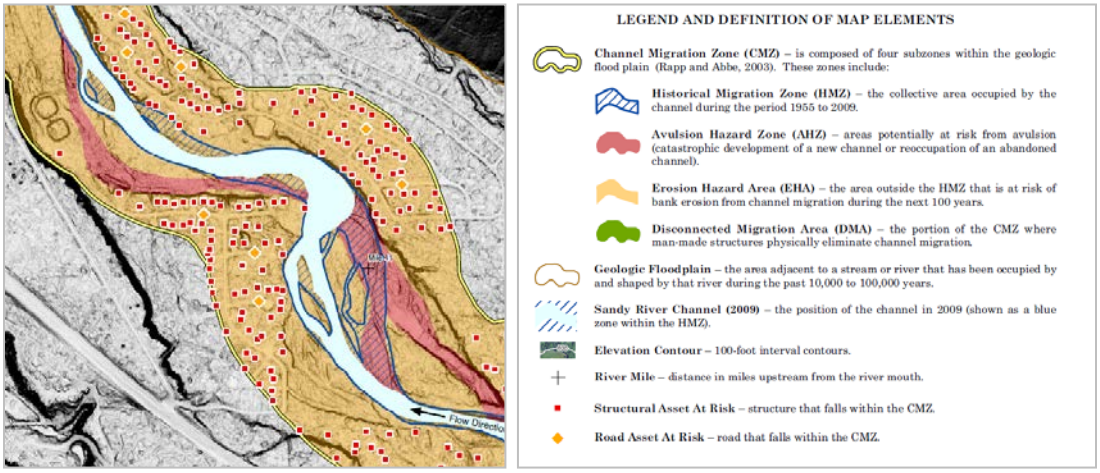
Clackamas County has many rivers and small tributaries in both unincorporated and incorporated areas that are susceptible to flooding. Major floods have affected the citizens of the county since as early as 1861, when it was reported that the streets of Oregon City were inundated with about four feet of Willamette overbank flow. Although the 1996 floods were devastating to the entire region, the floods of 1861, 1890, and 1964 were larger. All four floods have been estimated to exceed the 100-year or base flood.

Risk Assessment

The assessment of risk takes into account the extent and location of the hazard; the probability the hazard will occur; and the extent to which community assets are vulnerable.

Mapping

FEMA flood hazard mapping for updating the Flood Insurance Rate Maps (FIRMs) is underway for the Sandy River and is scheduled to be in public review by mid-2013. The Oregon Department of Geology and Mineral Industries (DOGAMI) has contributed a Channel Migration Zone mapping study for the Sandy River and has been critical in generating LiDAR-based maps for the Sandy Basin and other flood-prone areas of the County.



Channel Migration Map and Legend for Timberline Rim Area on Sandy River
Source: Oregon Department of Geology and Mineral Industries

In 2008 FEMA undertook an update of all FIRMs in Clackamas County as part of a recalibration of the datum for measuring elevation into the Digital FIRM (DFIRM) format. After the January 2009 flood event on South Creek Road along Abernethy Creek, Clackamas County sponsored an inquiry to FEMA into mapping errors for transitioning the 1978 FIRM into DFIRM and argued that the original FIRM Approximate A Zone polygon was incorrectly registered that at least two properties in the Approximate A Zone were now outside of the flood zone, even Abernethy Creek itself. Following the 2009 flood event, the County petitioned FEMA for reconsideration and eventually submitted an inquiry through Senator Wyden's office to the Mitigation Directorate at FEMA Headquarters, but the request was denied.

Table FH.1 below lists the locations of known chronic flooding problems in Clackamas County.

Table FH-1: Locations of Identified Flooding Problems

Location	Stream
Tranquility Lane	Clackamas River
Paradise Park	Clackamas River
Welches	Salmon River
Lolo Pass Road	Sandy and Zig Zag Rivers
Timberline Rim	Sandy River
Dickie Prairie Road	Molalla River
Feryer Park/ Shady Dell	Molalla River
Alder Creek Area	Alder Creek
Canby	Pudding River
Dogwood Drive/ Rivergrove	Tualatin River
Oregon City	Confluence of Willamette River and Clackamas River
Johnson Creek Basin	Johnson Creek
Abernethy Creek Basin	Abernethy Creek

Source: Clackamas County

Probability of Future Occurrence

Based on the Hazard Mitigation Advisory Committee's (HMAC) current assessment, flood hazard is ranked with a high history score along with a high probability of future occurrence. Due to the limited number of residents and facilities directly exposed to flood hazards, the HMAC considers the vulnerability and maximum threat to be ranked as medium.

Climate change will likely be an influencing factor for future flood probabilities. Long-term modeling suggests increases in annual average temperatures may translate in the Pacific Northwest to less total accumulated snow pack and faster storm runoff. This could mean flashier flood events for upper watersheds and the need for greater attention to storm water management in floodplains.

Vulnerability Assessment

Vulnerability assessment combines the floodplain boundary, generated through hazard identification, with an inventory of the property within the floodplain. Understanding the population and property exposed to natural hazards will assist in reducing risk and preventing loss from future events.

The amount of property in the floodplain, as well as the type and value of structures on those properties, is calculated to provide a working estimate for potential flood losses. Table FH.2 below describes the number of acres, tax lots, and the value of property within Clackamas County's 100-year floodplain.

Table FH-2: Flood Hazard Vulnerability Assessment

Measure	Amount	Percentage
Acres in the 100-year Floodplain	27,627	3%
Number of Tax lots within the 100-year Floodplain (all or partial)	10,859	7%
Total Property Value in the 100-year Floodplain	$ 5,130,123,907*	10%

Source: Clackamas County Geographic Information Systems 2012
* Percentage and value of property in the 100-year floodplain may include property in tax lots that intersect the floodplain, including property that does not physically reside in the floodplain itself.

Community Rating System

The Natural Hazard Mitigation Plan functions as, among other things, the County's Floodplain Management plan so that the County receives credit for, and maintains compliance with, its membership within the National Flood Insurance Program (NFIP) Community Rating System (CRS), which recognizes jurisdictions for participating in floodplain management practices that exceed NFIP minimum requirements. The County was admitted into the CRS program in April 2004 and received a rating of Class 5, becoming the highest rated jurisdiction in Oregon and one of only 23 nationally. Currently in 2012, the County has a Class 6 rating that results in a 20 percent discount in flood insurance premiums for residents of unincorporated Clackamas County in a special flood hazard zone.

Below are several CRS related activities that the 2012 NHMP documents for credit under the Activity 510 – Floodplain Management Plan:

RISK ANALYSIS - REPETITIVE LOSS PROPERTIES:

Clackamas County works to mitigate problems regarding flood issues when they arise. Some areas in the county are more susceptible to flooding issues, and have incurred repetitive losses, meaning that they could have greater than two NFIP claims in the past ten years, in which the cost to repair the flood damage, on average, equals or exceeds 25 percent of the market value of the structure at the time of each flood loss event. There are currently twenty-one properties in the County that have sustained repetitive loss. The majority of repetitive loss properties are located outside of city limits.

Two repetitive loss properties along South Creek Road have received mitigation assistance against future flood losses. Following the flood of January 2009 along Abernethy Creek, one used HMGP funds to elevate at least eight feet above grade and three feet above the flood of record. The second property was an HMGP flood acquisition along Abernethy Creek that is returning the property to permanent open space in the floodplain.

Culvert Replacement with Improved Fish-passage Capacity

From 1998 to 2012 the County's Department of Transportation and Development (DTD) lead or partnered with other agencies to install at least 86 expanded culverts or bridges that improved fish passage and reduced flood potential for 203.9 stream miles at a cost of approximately $11.6 million.

2011 Culvert Replacement Project: Before and After - Removal of two 54" culverts to alleviate flooding and improve fish passage. Partners - US Forest Service, Clackamas River Basin Partners, Clackamas Stewardship Partners, and Oregon Watershed Enhancement Board.

Stream Restoration & Habitat Enhancement Projects

Since 2009 at least 17 projects, such as stream bank restorations and opening side channels, have been completed in the County through partnerships with local watershed councils, federal land managers like the Bureau of Land Management, and groups like The Freshwater Trust and Oregon Wildlife Heritage. These types of projects promote water quality and fish habitat and also improve floodplain functions such as increasing water storage capacity during periods of high water events.

Storm Water Drainage Improvement Projects

Since 2010 there have been at least twelve projects completed or initiated to maintain or improve storm drain system capacity: six by the Oak Lodge Sanitary District and six by the Water Environment Services (WES) Clackamas County service District No. 1. Examples include improving storm water conveyance and catchment basins, removing invasive species from drainage areas, and property acquisition for regional water detention facilities.

Title 13 - Buffer Enhancement and Restoration Activities

Title 13, adopted in 2005, is a section of Metro's Urban Growth Management Functional Plan that aims to protect water quality and fish and wildlife habitat throughout the region.

The purpose of this title is to conserve, protect and restore a continuous ecologically viable streamside corridor system that is integrated with upland wildlife habitat and the surrounding urban landscape.

Since 2010 WES worked with a number of groups like the Clackamas River Basin Council, SOLV and the Friends of Trees to implement at least ten streamside-restoration projects, acquire six conservation easements, and worked with three area high schools to train teachers in their Watershed Health Program curriculum.

FLOOD PROTECTION ASSISTANCE

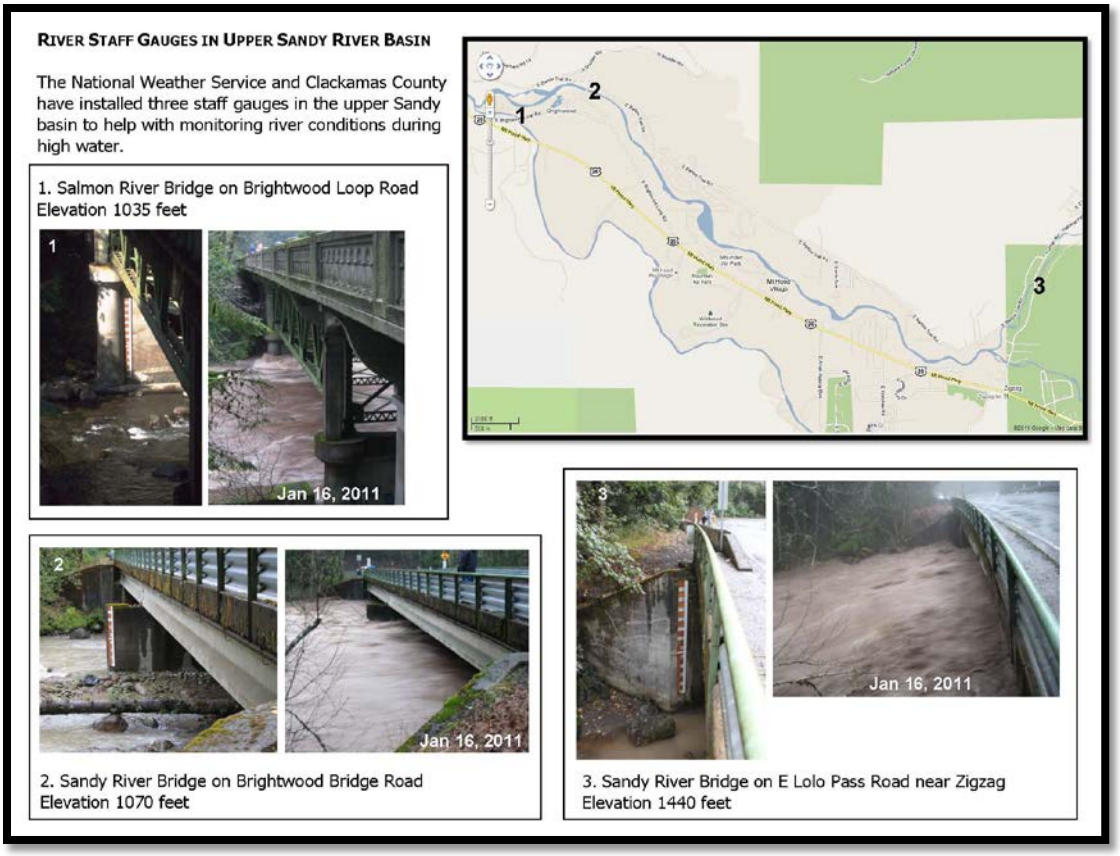
The County provides technical advice and assistance to interested property owners and annually publicizes the service. Following the January 11 Sandy River flood event, the County convened three community-specific workshops for Zig Zag Village, Timberline Rim and the Autumn Lane/Lolo Pass Rd flood-affected areas. The County-facilitated workshops provide an opportunity to go over post-flood property protection options and coordinated with the Oregon Department of State Lands, and the US Army Corps and the National Marine Fisheries Service to provide the broadest level of information regarding permits and legal considerations for flood recovery.

PUBLIC EDUCATION AND OUTREACH

The County attends regular public events and meetings annually to promote flood safety and property protection. Following the Sandy River flood the County held two widely attended town hall meetings in the flood affected community on Mt Hood to address concerns and questions from the community about response and recovery efforts. The County works closely with the Sandy River Basin Watershed Council and participated in the annual Sandy River Expo in April of 2011 and 2012 to highlight floodplain management practices and promote the purchase of flood insurance.

FLOOD WARNING PROGRAM

In 2010 the County began a project with the staff Hydrologist at the National Weather Service (NWS) - Portland Weather Forecast Office to assess which flood prone areas of the County were lacking a commensurate level of flood warning capability compared to the level of risk. Three areas were targeted for the following areas: Shady Dell along the Molalla River; the upper Sandy River Basin; and upper Abernethy creek Basin along S Creek Rd. In autumn of 2011 three flood staff gauges were installed in the Sandy area and one in the Shady Dell area; all on County bridges with agreements for local volunteers to monitor and report the river readings to the NWS during high water events. The Abernethy Creek site is still planned, pending the completion of a flood acquisition project as a flood gauge site.



Flood Warning Program and Public Education – Brochure page showing locations of new flood staff gauges. Back page (not shown) detailed how to access NWS website and view river levels on these gauges during periods of potential flooding.
Source: Clackamas County

CLACKAMAS COUNTY CRS PROGRAM REVIEW

In 2009-10 the County requested the University of Oregon's Partnership for Disaster Resilience to lead a project to assess the feasibility and benefits of a more efficient, streamlined and integrated approach to flood mitigation and flood plain management in the county. A 2011 report found that programmatic improvements are expected to reduce the risk of damage to property and life resulting from flood; establish better coordination of mitigation actions and activities across public, private and not-for-profit entities; enhance and restore natural and constructed flood control functionality; and maximize the use of limited resources.[4]

[4] http://csc.uoregon.edu/opdr/sites/csc.uoregon.edu.opdr/files/docs/CRS%20Report_Final_Full_sm.pdf

Implementing Flood Hazard Mitigation

Clackamas County works closely with Oregon Emergency Management and FEMA to reduce flood losses and seeks to best utilize federal mitigation grant funds to minimze future flood risk. With that said, Clackamas County has demonstrated in the two most recent disaster their investment in flood mitigation actions through priortizing substantially damaged properties and repetitive loss properties when applying for flood acquisition projects. The County considers these buyouts of flood prone properties to be the most cost effective approach to reduce future flood losses for property owners, minimize future disaster-related expenses to the community and provide savings to federal tax payers on a permenant reduction in flood exposed properties.

Since 2007 Clackamas County completed two flood elevations: upper Sandy River in February 2008 using a Flood Mitigation Assistance Grant and along Abernethy Creek in March 2010 using the Hazard Mitigation Grant Program (HMGP).

Mitigation Success - Abernethy Creek elevation completed in March 2010 and successfully tested on January 19, 2012.
Source: Clackamas County

Following the 2009 flooding along Abernethy Creek, the County completed three flood acquisitions or “buyouts” using HMGP and returned the properties to the functional floodplan as open space. The County is currently pursuing three additional buyouts on the upper Sandy River following the January 2011 flood event and federal declaration DR-1956-OR.

Additional HMGP projects include a flood erosion study for the upper Sandy River to re-characterize the nature of the flood hazard as one more likely to erode banks due to channel migration than typical riverine flooding. Another HMGP project is a flood warning system for the upper Sandy Basin to install five sonar-based river level gauges on five County bridges to provide automated readings and flood levels on the National Weather Service's Portland Office river forecast web site.

One of the best investments for implementing hazard mitigation is not only through projects but to affect policy, such as land use planning and even long-term recovery planning. Following the 2011 flood disaster, Clackamas County convened a standing group to address sustainable flood recovery on the upper Sandy River. This group has begun addressing the interdepartmental roles and responsibilities in transitioning from response activities to recovery phase.

Discussions are underway on how the expected updated 2013 DFIRMS for the Sandy River will influence the DOGAMI Channel Migration Zone study and possible implications for long-term land use decisions on replacing damaged infrastructure and recovery for private property owners. County staff is working with the Sandy River Basin Watershed Council's "restorative flood response" outreach to homeowners and associations on providing education about benefits from combining multiple goals of enriching habitat, cost-effectiveness, elevated bank protection and equitable performance towards neighboring properties.

The County is also reviewing the level of flood insured properties in the upper Sandy Basin and investing in public outreach to encourage more Preferred Risk policies for residences outside of the Special Flood Hazard Zone and that by having flood insurance, homeowners can also take advantage of the Flood Mitigation Assistance Program for projects like acquisitions that do not require a disaster declaration.

Public outreach was employed a number of times since the January 2011 flood event to address public concerns, present flood response and recovery operations status, discuss flood threat issues to property owners and promote the purchase of flood insurance.

Flood Hazard Mitigation Action Items

Flood actions are listed in Section 3 Mitigation Strategy. For detailed information regarding each action, please refer to Appendix A – Action Items.

Landslide Hazard

Landslides are a common hazard in and around Oregon. In fact, a prominent theme of the 1996 flood disaster was that a significant amount of building damage affected structures outside of identified flood hazard areas. Many of the 5,000 Clackamas County applicants eligible for FEMA housing assistance grants were not floodplain cases, but were landslide and erosion losses.i

Causes and Characteristics of the Hazard

Geographic Extent: Slope Stability (Map 5) was used to determine the geographic extent of potential landslides hazards in the County. About 32% of the total acres in Clackamas County are in moderate to high landslide hazards areas. These are concentrated in areas of high slopes, and close to river valleys.

Risk Assessment

Factors included in assessing landslide risk include population and property distribution in the hazard area, the frequency of landslide or debris flow occurrences, slope steepness, soil characteristics, and precipitation intensity. This type of analysis could generate estimates of the damages to Clackamas County due to a specific landslide or debris flow event. At the time of publication of this plan, data was insufficient to conduct a risk analysis and the software needed to conduct this type of analysis was not available.

History of the Hazard

In many parts of Clackamas County, weathering and the decomposition of geologic materials produces conditions conducive to landslides. Human activity has further exacerbated the landslide problem in many parts of the county. A study conducted by Dr. Scott Burns at Portland State University found that changes to the slope through cutting or filling increased the risk of landslides in 76% of the 701 inventoried landslides in the Metro region. The study documented 48 landslides that occurred in Oregon City in February 1996, and found that only about half the slides were considered natural.[ii]

Landslides in Clackamas County are not a localized problem. For example, sediment generated by the slides can affect regional water quality. During the winter of 1972, a relatively small landslide on the north fork of the Bull Run River in the western Cascades introduced a large volume of silt and clay into Portland's main water supply reservoir. Consequently, the city's water supply was discolored for several weeks.[iii]

Many landslides are difficult to mitigate, particularly in areas of large historic movement with weak underlying geologic materials. As communities continue to modify the terrain and influence natural processes, it is important to be aware of the physical properties of the underlying bedrock as it, along with climate, dictates hazardous terrain. Without proper planning, landslides will continue to threaten the safety of people, property, and infrastructure.

Development coupled with natural processes such as heavy rainfall or rapid snowmelt can cause landslides or re-activate historical landslide sites. The County has received four Presidential Disaster Declarations since 2002, three of which included major landslide damage to county roads and infrastructure.

Hazard Identification

Mapping: The NHMP uses soil stability overlaid with percent slope to identify potential landslide hazard areas. Map 5 shows slope stability for Clackamas County.

Although the DOGAMI Senate Bill 12 maps showing debris flow hazard areas were developed, they were not published or adopted, as there was not adequate guidance for implementing the measures outlined in the legislation at the local level. DOGAMI provided the data to local governments for reference, and the debris flow hazard areas for Clackamas County are shown in Map __.

2009 Landslide that ignited a fire and destroyed a rural residence. Source: Clackamas County.

Probability of Future Occurrence

Hundreds of landslides have occurred in past 150 years. The HMAC recognizes the historical frequency of landslides with a high severity ranking of seven and ranks the probability of future occurrences with a very high of nine. The HMAC estimates the frequency of 2-3 major events landside every year.

Climate change will likely play a factor in the potential increase in future landslide hazards due to variability of severe weather.

Vulnerability Assessment

The vulnerability assessment is based on Map 5: Slope Stability. Only those community assets exposed to moderate or high hazard zones are discussed, as low hazard zones are not of primary concern.

Risk to Life & Property: Low to Moderate

According to County GIS, there is approximately $10.2 billion in market value comprising 16% of County parcels exposed to moderate and high landslide hazards which represents about 22% of the total market value for all parcels in the county.

Although only seven vulnerable population sites (six of which are preschools) are exposed to landslide hazards, the threat to life is slightly greater than that of flooding, since fast-moving landslides (debris flows) can occur without warning, and people cannot outrun them.

Risk to Critical Facilities and Infrastructure: Moderate

The key infrastructure exposed to moderate and high landslide hazards are dams, bridges, cell towers, and substations. The greatest risk to this infrastructure would be dam failure, as the cascading effects on the downstream environment could be catastrophic. Four dams are in the high hazard zones, and four are in moderate hazard zones. However, the dams are built to sustain earthquake hazards, and likely would be able to withstand the weight of landslides.

There are two bridges in high hazard areas and three that have moderate landslide hazards. Disruption to these bridges could hinder emergency response and evacuation efforts in these areas.

Ten cell towers are in moderate to high hazard zones, and fifteen substations are in moderate to high hazard zones. Failure of these critical pieces of infrastructure could result in communication deficiencies and power outages.

Community Hazard Issues

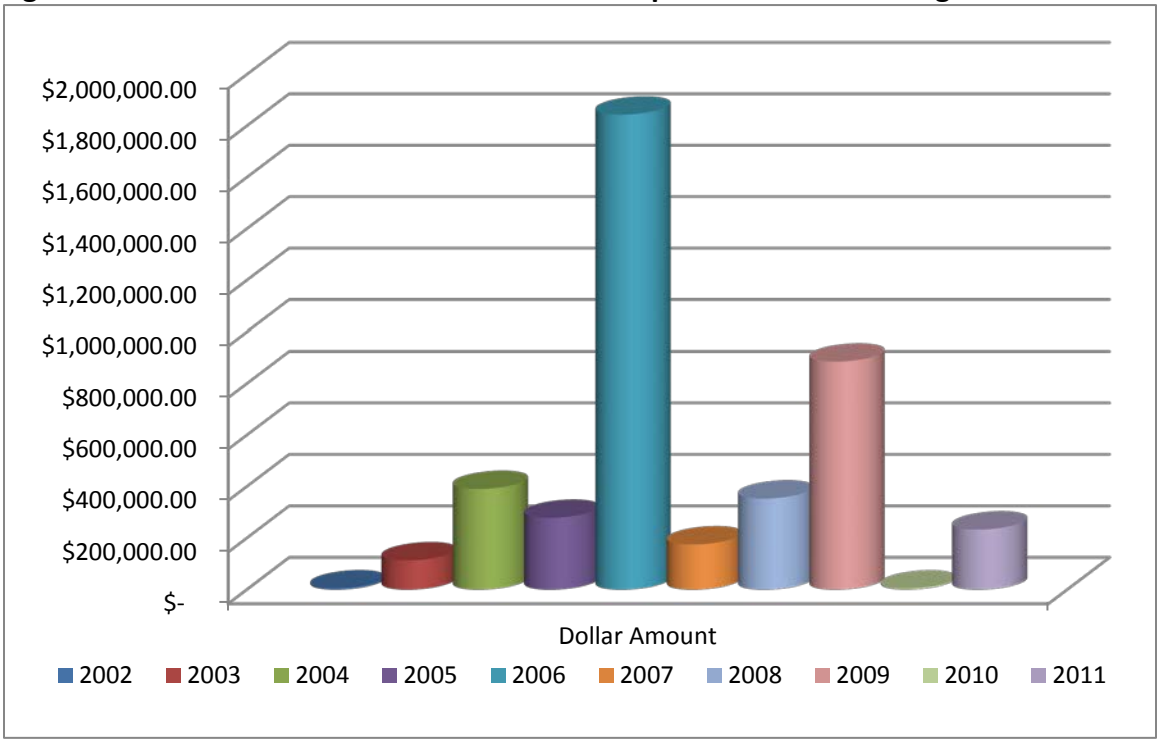
Landslides can affect utility services, transportation systems, and critical lifelines. Communities may suffer immediate damages and loss of service. Disruption of infrastructure, roads, and critical facilities may also have a long-term effect on the economy. Utilities, including potable water, wastewater, telecommunications, natural gas, and electric power are all essential to service community needs. Loss of electricity has the most widespread impact on other utilities and on the whole community. Natural gas pipes may also be at risk of breakage from landslide movements as small as an inch or two.[iv]

Roads and Bridges

Large losses incurred from landslide hazards in Clackamas County have been associated with roads. The Clackamas County Roads Division is responsible for responding to slides that inhibit the flow of traffic or are damaging a road or a bridge. The roads department does its best to communicate with residents impacted by landslides, but can usually only repair the road itself, as well as the areas adjacent to the slide where the county has the right of way.

It is not cost effective to mitigate all slides because of limited funds and the fact that some historical slides are likely to become active again even with mitigation measures. The county Roads Division alleviates problem areas by grading slides, and by installing new drainage systems on the slopes to divert water from the landslides. This type of response activity is often the most cost-effective in the short-term, but is only temporary. Unfortunately, many property owners are unaware of slides and the dangers associated with them.

Figure LS-1: Annual Clackamas Landslide Road Repair Costs 2002 through 2011



Source: County Department of Transportation and Development.

Existing Hazard Mitigation Activities

Clackamas County is currently working with DOGAMI on developing a series of landslide hazard susceptibility maps using a FEMA Hazard Mitigation Grant Program. This project will cover most of the northwestern portion of the County where the majority of development occurs. DOGAMI will be employing LiDAR technology to provide a bare earth representation of historic landslide scars and to be the basis for updating landslide inventory maps, and to create susceptibility maps for deep-seated and shallow-seated landslides, as well as debris flows. This project is scheduled to be completed by the end of December 2013.

Landslide Mitigation Action Items

Landslide actions are listed in Section 3 Mitigation Strategy. For detailed information regarding each action, please refer to Appendix A – Action Items.

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[i] Interagency Hazard Mitigation Team, *State Hazard Mitigation Plan* (2000) Oregon Emergency Management.

[ii] Burns, Burns, James, and Hinchke. Landslides in Portland, Oregon Metropolitan Area (resulting from Storm of 1996: Inventory, Map Data, and Evaluation.)

[iii] Schlicker, Ht., and Finlayson Ct. (1979) Geologic and Geohazards of NW Clackamas County. Bulletin 99. DOGAMI, OR.)

[iv] *"All Hazard Mitigation Plan: Clackamas County, Oregon"*. G&E Engineering Systems Report 32.07.01, Revision 0. September 23, 1998.

Severe Weather

Clackamas County experiences a range of weather-related hazards on an annual basis, such as severe heat, winter storms and wind storms. This section combines the above hazard sections from the previous two Mitigation Plans into a single Severe Weather section.

Causes and Characteristics of Severe Weather

Severe weather events occur throughout Oregon at all times of the year. Often originating in the Pacific Ocean, westerly winds pummel the coast, slowing as they cross the Coastal mountain range and head into the inland valleys.[1] Similarly, severe winter storms consisting of rain, freezing rain, ice, snow, cold temperatures, and wind originate from troughs of low pressure offshore in the Gulf of Alaska or in the central Pacific Ocean that ride along the jet stream during fall, winter, and early spring months. [2] In summer, the most common wind directions are from the west or northwest; in winter, they are from the south and east. Local topography, however, plays a major role in affecting wind direction. For example, the north-south orientation of the Willamette Valley channels the wind most of the time, causing predominately north and south winds.

Climate Change Factors

Oregon and the Pacific Northwest experience a variety of extreme weather incidents ranging from severe winter storms and floods to drought and dust storms, often resulting in morbidity and mortality among people living in the impacted regions. According to the Oregon Climate Change Research Institute, climate change is expected to increase the frequency and intensity of some weather incidents.[3]

Climate change poses risks for increased injuries, illnesses and deaths from both direct and indirect effects. Incidents of extreme weather (such as floods, droughts, severe storms, heat waves and fires) can directly affect human health as well as cause serious environmental and economic impacts. Indirect impacts can occur when climate change alters or disrupts natural systems.

SEVERE HEAT

Between 1979 and 2003, heat waves killed at least 8,015 Americans, according to the Centers for Disease Control and Prevention. That's more than hurricanes, lightning,

[1] US Department of Agriculture. http://www.fsa.usda.gov/or/Notice/Flp104.pdf

[2] Interagency Hazard Mitigation Team. 2000. State Hazard Mitigation Plan. Salem, OR: Oregon State Police – Office of Emergency Management

[3] Oregon Climate Change Research Institute http://occri.net/wp-content/uploads/2011/04/chapter9ocar.pdf Page 412

tornadoes, floods and earthquakes combined. And it's largely an urban problem—the bulk of those deaths occur in cities.[4]

Severe Heat History

A severe heat episode or "heat wave" occurs about every two to three years and typically lasting two to three days, but can last as many as five days. A severe heat episode can be defined as consecutive days of upper 90s to around 100. Severe heat hazard in the Portland metro region can be described as the average number of days we have temperatures greater than or equal to 90F and 100F. Listed below are climatological data for high temperatures in the Portland area. These are based on new 30-year climate averages (1981-2010) from the National Weather Service – Portland Weather Forecast Office.

Table SW-1: Average Annual High Heat Events

Temperature	Average Days/Year
>= 90F	13.6
>= 100F	1.4

Source: NWS Portland Weather Forecast Office

At the time of this report entry (August 2012), the Portland metro area had experienced two days exceeding 100F in 2012. The region's last severe heat episode was a five day event in July 2009. The five-day event delivered three consecutive days in excess of 100F and two days over 90F; high temperatures on July 28-29 of 2009 were recorded at 106F each day. The most recent event prior to the 2009 event occurred in July 2006.

Urban Heat Island Effect

Cities are more vulnerable to heat waves because that's where more people are concentrated but also because there is less vegetation to permit evaporation, cars and factories give off heat, and the proximity of asphalt roads and buildings store and radiate heat. On a hot summer day, urban areas can be 5°F to 18°F hotter than surrounding rural areas which is enough to turn a heat wave into a serious health crisis.[5]

Mitigation Actions to reduce the urban heat island effect include:

1. Planting appropriate trees to provide shade and passive cooling of buildings and to provide local cooling though evaporation.
2. Improving the reflective surfaces of urban roof tops to bounce light (heat) rather than absorbing it. Ideally, solar panel arrays could absorb sunlight and shade the

[4] U.S. Centers for Disease Control and Prevention
http://www.bt.cdc.gov/disasters/extremeheat/heat_guide.asp

[5] Study: Many U.S. Cities Unprepared for Future Heat Waves (*Washington Post: Ezra Klein's Wonk Blog*)

roof tops from storing heat, while also providing a source of energy for the internal powering of fans, or air conditioning and diminish the draw on local and regional power demands at peak use periods.

Community Vulnerability

Very high temperatures can create serious health problems. Pets are also affected by the higher temperatures. "Prevention is the best defense," said Mel Kohn, M.D., M.P.H., director of Oregon Public Health. "Drinking plenty of water, staying out of the sun during the hottest part of the day, knowing the warning signs of heat-related illness and taking precautions when swimming are a few important steps people can take." Kohn added: "We have had hot weather in the past, but with the climate change we are likely to have more high temperature days in Oregon."[6]

A significant percentage of the population does not have air conditioning, so once temperatures get into the 90s, it is quite uncomfortable. If a hot weather pattern persists for a few days, the situation gets worse because of the number of days in sequence. Reports show that heat-health related problems really increase once you get multiple days in a row of very hot weather. Oregon Public Health officials remind people to take precautions to avoid getting sick from extreme heat and be careful when swimming in Oregon's lakes, streams and the ocean.

The first symptoms of health problems from the heat can include headache, dizziness and weakness. In extreme cases heat-related illness can cause convulsions and sudden loss of consciousness and can be fatal. Those at greatest risk for heat-related illness include infants and children up to 4 years of age, people 65 and older, people who are overweight, and people who are ill or on certain medications, as well as those who work outdoors.

Climate Change factor

Predicted average increases in summer temperatures will make heat waves a greater likelihood. Without mitigation, increased numbers of extreme heat events will likely result in additional heat-related morbidity and mortality, especially among vulnerable populations, such as the elderly, low income populations, pregnant women and those who work in outdoor occupations.[7]

WINTER STORMS

Severe winter storms can consist of rain, freezing rain, ice, snow, cold temperatures, and wind. They often originate from troughs of low pressure offshore that ride along the jet stream during fall, winter, and early spring months. Severe winter storms affecting the Clackamas County typically originate in the Gulf of Alaska or in the central Pacific Ocean. These storms are most common from October through March.[8]

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[6] Oregon Health Authority http://cms.oregon.gov/DHS/news/2010news/2010-0813.pdf

[7] Oregon Climate Change Research Institute http://occri.net/wp-content/uploads/2011/04/chapter9ocar.pdf Page 408.

[8] Interagency Hazard Mitigation Team. 2000. State Hazard Mitigation Plan. Salem, OR: Oregon State Police – Office of Emergency Management

Winter Storm History

The County received a FEMA Disaster Declaration for an extended severe winter weather event from December 22 through December 28, 2008, when Clackamas County (and Oregon in general) experienced heavy snow accumulations, ice, and sustained freezing temperatures that caused extensive property damage. Transportation networks were significantly affected, as major freeways railways, and the Portland International Airport were periodically closed.

Downed trees disrupted power to several portions of the county, leaving many residents without heat or water for several days. Residential care facilities, home-bound ill personnel requiring daily treatment, hospital patients, and anyone requiring emergency assistance was affected by this winter storm because obstructed roadways prevented emergency vehicle movement. The damage to fire stations, equipment, roads, and other infrastructure affected the ability to effectively respond, as well as reducing the operating budgets of these facilities.

Car covered in ice, 2004

Source: Clackamas County Emergency Management

Hazard Identification

Mapping:

The County does not have adequate data for mapping the winter storm hazards, as Climatic hazards are difficult to portray geographically.

Geographic Extent:

Winter storm events can occur countywide. The primary effects of winter storms are on road and power systems, which cause widespread transportation disruption and prolonged power outages over widespread areas.

Frequency:

According to historical records, there have been an estimated 16 severe winter storm events in the past 100 years, which is about one every six years.

Vulnerability Assessment

Risk to Life & Property: Moderate to High

Winter storms are deceptive killers. Many of the deaths that occur are indirectly related to the actual storm, including deaths resulting from traffic accidents on icy roads, heart attacks while shoveling snow, and hypothermia from prolonged exposure to the cold.

RISK TO CRITICAL FACILITIES AND INFRASTRUCTURE: MODERATE TO HIGH

Trees, power lines, telephone lines, and television and radio antennas can be impacted by ice, wind, snow, and falling trees and limbs. Delay in emergency personnel response may pose a secondary threat to life if police, fire, and medical personnel cannot respond to calls.

Risk Assessment

Factors that should be included in a winter storm risk analysis include: population and property distribution in the hazard area; the frequency of winter storm events; and information on the types of trees and failure rates most susceptible to severe storm events as well as and information on utilities, and infrastructure that may be impacted by severe winter storms. Modeling software is required to predict potential losses from a particular storm event.

Due to insufficient data and modeling capability, Clackamas County is unable to perform a quantitative severe storm risk assessment at this time. The County has addressed this issue in the action items, and will be completing a risk assessment as data and resources become available.

WINDSTORMS

Damaging windstorms are not uncommon in the Pacific Northwest. When a strong windstorm strikes a community, it leaves behind a distinctive trail. Trees toppled over on buildings and cars, downed power lines crisscrossing the roads, and widespread power outages are a few of the signs that a windstorm has struck. After such an event, it can take communities days, weeks, or longer to return to normal activities. In addition to costly structural damages, windstorms can cause injury or even death.

Windstorms History

The most destructive windstorm ever recorded in Oregon, in terms of loss of life and property damage, was the Columbus Day storm of 1962. Damage was most severe in the Willamette Valley.[9] The storm killed thirty-eight people and did upwards of $200 million in damage (over $800 million in today's dollars).[10] Hundreds of thousands of homes were without power for short periods of time, while others were without power for two to three weeks. More than 50,000 homes were seriously damaged, and nearly 100 were completely destroyed. The storm destroyed fruit and nut orchards and killed scores of livestock. Intense wind speeds were recorded in the metropolitan areas with gusts of 116 mph on Portland's Morrison Bridge.

More recently, Clackamas County experienced several high wind events during the past five years since the October 2007 Hazard Mitigation Plan Update. A regional storm in early December 2007 that required a federal disaster declaration along the Oregon Coast brought high winds and heavy rain to the County.

[9] National Weather Service, Portland Bureau, (February 2002) http://www.wrh.noaa.gov/Portland.
[10] Ibid

On March 13, 2011, 50 mph winds with 70 mph gusts brought trees down in numerous areas of the County and left power out for tens of thousands of residents. Damages were concentrated in the eastern half of the County along in communities like Molalla and Estacada in the Cascade foothills.

Since 2007 the National Weather Service reports three tornadoes that have touched down in or near Clackamas County: On January 10, 2008 an EF1 tornado touched down in Vancouver, Washington causing considerable damage; October 26, 2009 an EF0 tornado touched down near Oregon City causing damage to many houses; and on December 14, 2010 a damaging EF2 tornado struck in the City of Aumsville in Marion County not far from the southern border of Clackamas County.

Windstorm damage – March 13, 2011

Source: Clackamas County Emergency Management

Hazard Identification

MAPPING:

The County does not have adequate data for mapping the windstorm hazards, as Climatic hazards are difficult to portray geographically.

GEOGRAPHIC EXTENT:

Windstorms occur countywide. The primary effects of windstorms are on road and power systems, which cause widespread transportation issues and prolonged power outages.

FREQUENCY:

According to historical records, there have been an estimated six major windstorm events in the past 100 years, which is about one every 16-17 years.

Vulnerability Assessment

RISK TO LIFE AND PROPERTY: MODERATE

The major risk to property results from exposed utilities, especially power lines and water pipes that are damaged by wind, broken tree limbs. Businesses also suffer economic losses when they must close as the result of the inclement weather and/or the loss of power, which, in turn, disrupts the local supply chain of goods and services. When transportation

routes are impassable, emergency response services are hindered and the mobility of residents is limited, which could result in serious life safety issues.

Tornadoes and can cause significant property damage and pose a risk for injuries and loss of life. They can also require need to shelter and care for individuals impacted by the events. Although the majority of windstorm events in Clackamas County likely will not be as sudden and severe as tornados, it is important to consider the potential effects of these events on life and property because there is the potential for significant windstorms in Clackamas County.

RISK TO CRITICAL FACILITIES AND INFRASTRUCTURE: MODERATE

Windstorms can cause power outages, transportation, and economic disruptions, roof or building component failures and considerable structural damage. Trees, power lines, telephone lines, and television and radio antennas can be impacted by wind, falling trees and limbs. Delay in emergency personnel response may pose a secondary threat to life if police, fire, and medical personnel cannot respond to calls.

Risk Assessment

Factors that should be included in a windstorm risk analysis include: population and property distribution in the hazard area; the frequency of windstorm events; and information on the types of trees and failure rates most susceptible to severe windstorm events as well as and information on utilities, and infrastructure that may be impacted by windstorms. These inputs can be used in modeling software such as Multi-Hazard HAZUS to predict potential losses from a particular storm event.

Due to insufficient data and modeling capability, Clackamas County is unable to perform a quantitative severe storm risk assessment at this time. The County has addressed this issue in the action items, and will be completing a risk assessment as data and resources become available.

Severe Weather Mitigation Action Items

The following severe weather actions have been identified by the Clackamas County NHMP steering committee, and are recommended for mitigating the potential effects of severe weather in Clackamas County. Refer to the individual city addenda for city specific severe weather actions. Appendix A provides a full list of county mitigation action item worksheets.

SW#1:

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Volcanic Eruption Hazard

The Pacific Northwest lies on the "Ring of Fire," an area of active volcanic activity surrounding the Pacific Basin. Volcanic eruptions occur along the Ring of Fire, in part, because of the movement of the Earth's tectonic plates. The Earth's outermost shell, the lithosphere, is broken into a series of slabs known as tectonic plates. These plates are rigid, but they float on a hotter, softer layer in the Earth's mantle. As the plates move about on the layer beneath them, they spread apart, collide, or slide past each other. Volcanoes occur most frequently at the boundaries of these plates and volcanic eruptions occur when the hotter, molten materials, or magma, rise to the surface. The primary volcanic threat to lives and property in Clackamas County is from eruptions of Mount Hood that generate mud and debris flows that can sweep down river valleys for tens of miles, and from ash clouds that drift downwind to the county from near or distant eruptions.

A Mount Hood eruption could impact up to 68 percent of homes, 60 percent of residents, 73 percent of businesses and 87 percent of employees in the Hoodland area of Clackamas County. A mega-eruption scenario would increase population exposure, but the increase is not substantial—typically 10 percent or less of an increase in population exposed.

Population exposure to volcano hazards is largest in the proximal hazard zone, including 65 percent of the local workforce, 80 percent of educational facilities, 82 to 100 percent of daytime visitors to recreation sites (summer and winter month averages, respectively), and approximately two thirds of overnight visitors. (USGS in publication)

Causes and Characteristics of the Hazard

History of the Hazard

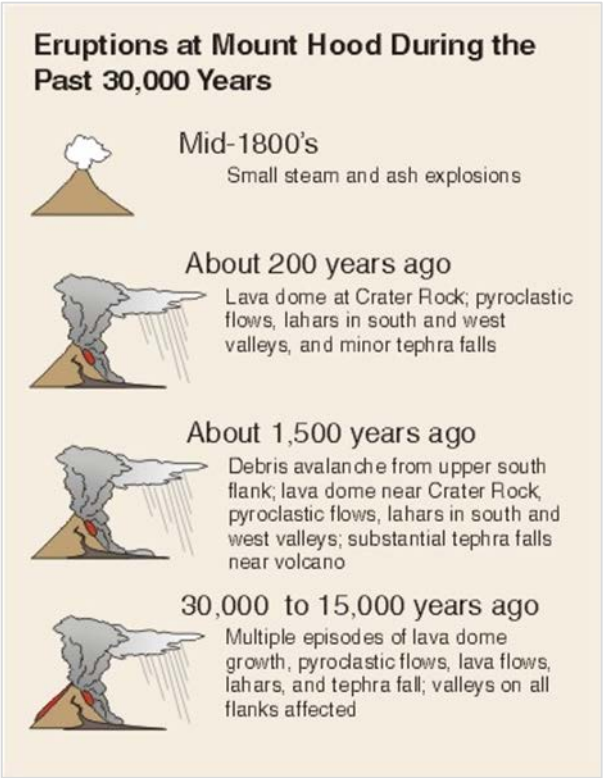
Any eruption in the Cascades could have an effect on Clackamas County if the wind blows in the right direction. Only Mount Hood and Mount St. Helens are known to have had direct effects in the county in the past. However, any eruption in the Cascades that affects regional infrastructure, air traffic, bridges, or Interstates 5 and 84 will have a direct or indirect impact on the county.

Mount Hood

Mount Hood is located on the eastern boundary of Clackamas County and has been recurrently active over the past 500,000 years. It has had two significant eruptive periods in recent times - one about 1,500 years ago and another about 200 years ago. Figure (USGS 060-00) shows the major geologic events in the Mount Hood Region during the past 30,000 years. In addition to these eruptive episodes, there is evidence of an eruption occurring just before Lewis and Clark traversed the region (1804-1806). There is also evidence of several minor eruptions between about 1846 and 1865.

The strongest earthquake in the Mount Hood area in decades occurred on June 29, 2002. The magnitude 4.5 event, which was located about 4.5 km south of the summit at a depth of

6 km, was widely felt. Hundreds of aftershocks followed, including two >M3. Typically, several earthquake swarms occur each year at Mount Hood, with little or no damage.



While Mount Hood maintains a very low level of volcanic activity in the form of earthquake swarms and gas emissions, scientists predict the next eruption will likely consist of lava dome growth and collapse, which will generate pyroclastic flows, ash clouds, and lahars (mud and debris flows). Future eruptions from Mount Hood could seriously disrupt transportation, water supplies, and hydroelectric power generation and transmission in northwest Oregon and southwest Washington.

Although Mount Hood does not have a history of violent explosive eruptions, there are significant hazards associated with this volcano. The flanks of the volcano were formed in part by lava flows, which flowed up to 8 miles from the summit. These slow-moving lava flows are destructive, but do not pose a serious threat to life and safety because people have ample time to evacuate. Lava erupting from Mount Hood is too viscous to flow and accumulates around vents to form steep-sided lava domes. Lava domes can collapse, forming fast moving pyroclastic flows, hot avalanches of lava blocks, ash, and hot gases. These pyroclastic flows can swiftly melt snow and ice to form lahars or volcanic mudflows that can continue far down river valleys. Mount Hood has also generated lahars from landslides, or debris avalanches, of weakened, saturated masses of rock high on the volcano. Lahars are the most dangerous potential threat posed by the seemingly dormant volcano in eastern Clackamas County.

Mount St. Helens

Mount St. Helens remains an active and potentially dangerous volcano. The most recent episode of unrest occurred from October of 2004 through January of 2008 with the rebuilding lava dome and steam explosions. Ash fall was primarily limited to areas adjacent to the volcano.

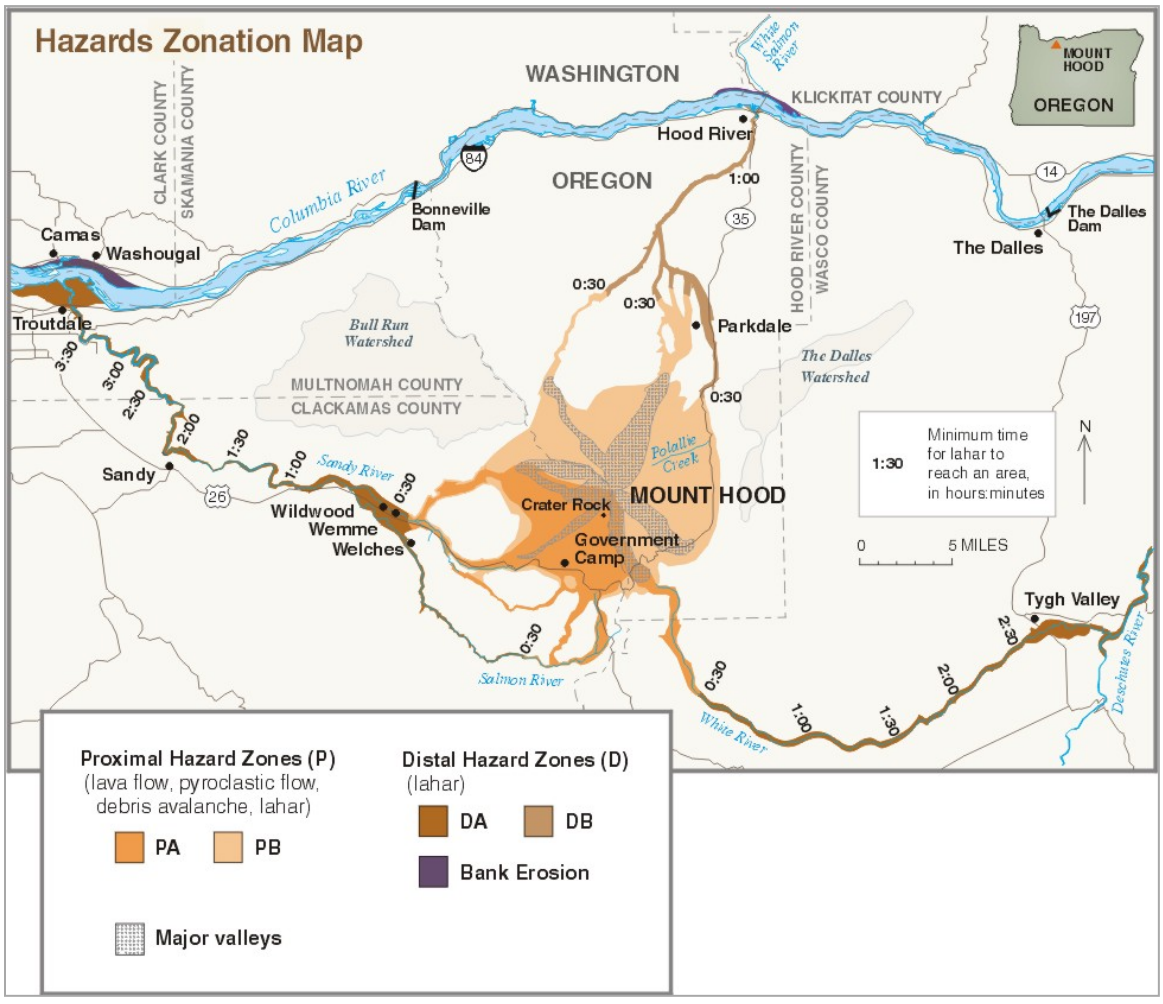
Mount St. Helens is a fifty thousand year old volcano, located in southwestern Washington about sixty miles northeast of Clackamas County. In the last 515 years, it is known to have produced 4 major explosive eruptions (each with at least 1 cubic kilometer of eruption deposits) and dozens of lesser eruptions. Two of the major eruptions were separated by only 2 years. One of those, in 1480 A.D., was about 5 times larger than the May 18, 1980

eruption, and even larger eruptions are known to have occurred during Mount St. Helens' brief but very active 50,000-year lifetime.

Risk Assessment

How are Hazard Areas Identified?

Mapping: The USGS/Cascades Volcano Observatory (CVO) produced a volcanic hazard zonation report for Mount Hood in 1997 and 2000. The report includes a description of potential hazards that may occur to immediate communities. The hazard zones illustrated on Map (USGS 060-00) were determined based on the distance from the volcano, vent location, and type of hazardous events. The two Proximal zones show two potential eruptive scenarios. The zone shown in peach indicates failure of the vents on the north, east, or western flanks. The proximal hazard zone shown in orange is the more likely scenario, which is a failure of the lava dome, Crater Rock, and primarily would affect the drainages in the Sandy River basin in Clackamas County.



Geographic Extent: According to County GIS about 8% of total county acres are exposed to volcano hazards. These areas are centralized around potential failure areas in the proximal zone, as well as the Sandy and Hood River valleys in the distal zones. Only 5% of total county parcels are exposed, as the volcanic landscape generally does not lend itself well to development.

Probability of Future Occurrence

Frequency: Mount Hood represents the highest volcanic hazard to Clackamas County. The likelihood of a Mount Hood eruption originating near Crater Rock, the youngest lava dome on the mountain, is between 1 in 15 and 1 in 30 in the next 30 years. The likelihood of an extreme event is even lower -- 1 in 10,000 in the next 30 years, but such an event would be catastrophic for the region (Scott and others, 1997b). However, Mount St. Helens could also affect Clackamas County from ashfall and indirect regional environmental and economic impacts. Mount St Helens has a frequency of about 6 events every 100 years.

Vulnerability Assessment

Building and Infrastructure Damage

Ash fall of about 0.4 inch is capable of creating temporary disruptions of transportation operations and sewage disposal and water treatment systems. Highways and roads could be closed for hours, days, or weeks afterwards. The series of eruptions at Mount St. Helens in 1980 caused Interstate 90 from Seattle to Spokane to close for a week. US 26 in Oregon faced similar problems. The impact of the ash fall caused the Portland International Airport to close for a few days. The airport faced a series of challenges in cleaning up the ash that accumulated on its runways.

The fine-grained, gritty ash can also cause substantial problems for internal-combustion engines and other mechanical and electrical equipment. The ash can contaminate oil systems, clog air filters, and scratch moving surfaces. Fine ash can also cause short circuits in electrical transformers, which in turn cause power blackouts.

During an eruption at Mount Hood, Bonneville Power Administration transmission lines may be severed. A number of high voltage lines are located in the immediate vicinity of Mount Hood. These lines provide a portion of the electrical power to Clackamas County, the Portland Metropolitan Area, and the rest of the Willamette Valley.

Pollution and Visibility

Ash fallout from an eruption column can blanket areas within a few miles of the vent with a thick layer of pumice. High-altitude winds may carry finer ash from tens to hundreds of miles from the volcano, posing a hazard to flying aircraft, particularly those with jet engines.[1] Fine ash in water supplies will cause brief muddiness and chemical contamination. Ash suspended in the atmosphere is especially a concern for airports, where aircraft machinery could be damaged or clogged.

Ash fall also decreases visibility and disrupts daily activities. For example, some individuals may encounter eye irritation. When the ash fall produced by the Mount St. Helens' eruption

[1] Volcano Hazards of the Lassen Volcanic National Park Area, (March 2001), USGS.

started to blow towards Oregon in June 1980, some of the airlines at the Portland International Airport responded immediately by stopping their service.

Economy

Volcanic eruptions can disrupt the normal flow of commerce and daily human activity without causing severe physical harm or damage. Ash that is a few inches thick can halt traffic, cause rapid wear of machinery, clog air filters, block drains, creeks, and water intakes, and impact agriculture.[2] Removal and disposal of large volumes of deposited ash can also have significant impacts on government and business.

The interconnectedness of the region's economy can be disturbed after a volcanic eruption. Roads, railroads, and bridges can be damaged from lahars and mudflows. The Mount St. Helens' May 1980 eruption demonstrated the negative effect on the tourism industry. Conventions, meetings, and social gatherings were canceled or postponed in cities and resorts throughout Washington and Oregon in areas not initially affected by the eruption. However, the eruption did lead to the creation of a thriving tourist industry for decades following event.

Transportation of goods may also be halted. Subsequent airport closures can disrupt airline schedules for travelers. In addition, the movement of goods via the Columbia River and other major waterways can also be halted due to debris in the river, and tephra in the air. The Mount St. Helens event in May 1980 cost the trade and commerce industry an estimated $50 million in only two days, as ships were unable to navigate the Columbia.[3] Clouds of ash often cause electrical storms that start fires and damp ash can short-circuit electrical systems and disrupt radio communication. Volcanic activity can also lead to the closure of nearby recreation areas as a safety precaution long before the activity ever culminates into an eruption.

Risk to Life & Property: High

Proximal Hazard Zones 1 and 2 are areas subject to rapidly moving debris avalanches, pyroclastic flows, and lahars that can reach the hazard boundary in less than 30 minutes, as well as slow-moving lava flows. Areas within proximal hazard zones should be evacuated before an eruption begins because there is little time to get people out of harm's way once an eruption starts. Most pyroclastic flows, lava flows, and debris avalanches will stop within the proximal hazard zone, but lahars can travel much farther. Evacuation may prove problematic, as volcanoes are difficult to predict, and there is only one primary route (Hwy 26) off the mountain. In addition, Mount Hood is a prime destination for visitors during all seasons. For these reasons, the threat to life is quite high.

Risk to Critical Facilities and Infrastructure: High

Distal Hazard Zone 3 includes areas adjacent to rivers that are pathways for lahars. Estimated travel time for lahars to reach these zones is more than 30 minutes, which may allow individuals time to move to higher ground and greater safety if given notice. Lahars could affect transportation corridors by damaging or destroying roads, and can damage Bull Run pipelines that cross the Sandy River. Although only one critical facility is exposed to the

[2] Ibid.
[3] Clackamas County Courier Newspaper. October, 1986.

volcano hazard, the affect of lahars and pyroclastic flows and ashfall on equipment and infrastructure will be devastating.

Community Hazard Issues

Volcano hazards could impact, depending on event severity (typical eruption and mega-eruption, respectively), between 50 to 60 percent of residents, 63 to 73 percent of businesses, and 84 to 87 percent of employees.

The number of daytime visitors to recreation sites is greatest in the winter season (averaging 129,300 people per month) largely due to snow sport activity on Mount Hood, which places these people in the proximal volcano hazard zone.

The number of daytime visitors to recreation sites in summer months is less (averaging 58,000 people per month) and, in addition to being exposed to proximal volcano hazards, they also are in areas classified as having a "moderate" or greater wildfire risk. The number of overnight visitors is greatest during the summer (an average of 34,000 people per month) with 71 percent of them in areas considered less than a "moderate" level of wildfire risk but 66 percent of them in proximal volcanic hazards. In general, volcano hazards pose threat to an average of approximately 94,000 people per month regardless of event magnitude with 82 percent facing impact specifically from fast-traveling, proximal volcanic hazards. (USGS in publication)

Implementing Volcano Hazard Mitigation Activities

Clackamas County Emergency Management hosted the Regional Emergency Management Governance (REMG) members in May 2010 for a facilitated discussion using a Mount Hood scenario as a way to discuss the range of decisions and uncertainties when responding to volcanic unrest and the need for advance relationships between scientists and public safety officials.

The County's Hazard Mitigation Coordinator participated in a volcano hazards briefing to the Congressional Hazards Caucus in Washington DC in April 2010. Clackamas County discussed its approach to understanding the low probability but high consequence volcanic threat in the context of nearby mountain communities, recreational and resort destinations and regional critical infrastructure.

In early 2012 FEMA announced the Volcano Crisis Awareness Course (AWR-233) is now listed in the National Training and Education Division catalog. This course provides an understanding of: the processes, impacts, and causes of volcanic hazards; current monitoring and hazard assessment tools and products; volcano warning and dissemination systems and methods and community response to eruptions and volcanic crises. The Cascades version (also Alaska and Hawaii versions) allows students to participate in a facilitator-led Mount Hood Scenario. In these activities participants apply their knowledge of the presented materials to actual preparedness, mitigation, and response issues. https://ndptc.hawaii.edu/training/catalog/4

The Mount Hood Coordination Plan was adopted in September 2005 to coordinate the actions that various agencies must take to minimize the loss of life and damage to property before, during, and after hazardous geologic events at Mount Hood volcano. The plan

strives to ensure timely and accurate dissemination of warnings and public information leading up to the point of activating an incident command structure. The plan also includes the necessary legal authorities as well as statements of responsibility of County, State and Federal agencies. In June of 2012, the Plan's Facilitating Committee reconvened to initiate a review and update for the plan.

Volcanic Eruption Mitigation Action Items

Volcano actions are listed in Section 3 Mitigation Strategy. For detailed information regarding each action, please refer to Appendix A – Action Items.

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Wildfire Hazard

Recent fires in Oregon and across the western United States have increased public awareness of the potential losses to life, property, and natural and cultural resources. In June of 2004, the Board of Clackamas County Commissioners (BCC) directed the County Departments to work with state and federal agencies, fire protection districts, and community organizations throughout the County to develop an integrated wildfire plan. The BCC initiated this effort to reduce wildfire risk to citizens, the environment, and quality of life within Clackamas County.

In the Fall of 2012 the CCWPP 2012 Update will be adopted to ensure that the Plan remain an up-to-date and relevant document. The CCWPP will serve as the wildfire chapter of the Clackamas County NHMP. The following presents a brief summary of key information; refer to the full CCWPP for a complete description and evaluation of the wildfire hazard.

Causes and Characteristics of the Hazard

Climate Change Factor

Wildfire will likely increase in all Oregon forest types in the coming decades. Warmer and drier summers leave forests more vulnerable to the stresses from fire danger west of the Cascades. Wildfire in forests east of the Cascades is mainly influenced by vegetation growth in the winters prior to the fire. An increase in fire activity is expected for all major forest types in the state under climate change. Large fires could become more common in Western Oregon forests.[1]

Community Hazard Issues

Fire District Coordination

The 2012 CWPP Update focused on taking a more localized approach to wildfire planning by creating individual CWPP's for each fire agency. Chapter 10: Fire Agencies has been expanded to include a brief description of wildfire hazards, emergency operations, structural ignitability, community outreach and education and fuels reduction priorities for each local fire agency. Local Communities at Risk were also identified. Each Fire Agency CWPP is complete with action plans to address wildfire issues specific to the local area.

[1] *Oregon Climate Change Research Institute* http://occri.net/ocar

Community Involvement

The WFPEC partnered with the North Clackamas Parks and Recreation District Wildfire Management Plan team to engage the public in the 2012 CWPP Update process. A website was established to provide wildfire resources and two neighborhood workshops were conducted to educate the public about wildfire risk and provide an opportunity for citizens to give input on the 2012 CCWPP.

Firewise Communities

In August 2012, Zig Zag Village was certified as the first Firewise Community in the North Cascades District and Government Camp is on its way to becoming the second Firewise Community with the Firewise Clean Up Day scheduled in mid-September .

Photo WF-1: Firewise Community Award to Zig Zag Village

Homeowners Association members accept recognition sign from Hoodland Fire District and Oregon Department of Forestry
Source: Clackamas County

Sustaining Fire Plan Efforts

The Wildfire Planning Executive Committee has led CCWPP implementation by meeting quarterly to collaborative and cooperative environment between community-based organizations, fire districts, local government, and the public land management agencies to reduce wildfire risk. The WFPEC is committed to maintaining this cooperation with the public and local fire agencies.

Hazard Mitigation Action Items

CCWPP Planning Process

A Wildfire Planning Executive Committee (WFPEC) guided the development of the plan by identifying the primary issues to be addressed and assembling technical subcommittees to develop priorities for action. The CCWPP Action Plan includes over fifty actions that can be taken to reduce wildfire hazards and improve response efforts. The following chapters of the CCWPP document the objectives of the CCWPP and highest priority strategies for action:

Table WF-1: CWPP Objectives and Priority Actions

CCWPP Chapter	Priority Actions
Chapter 4: Wildfire Risk Assessment	1.) Maintain and Update the Fuels Reduction and Communities at Risk Maps and databases.
	2.) Continue to track structural vulnerability data throughout the County through structural triage assessments.
	3.) Update the Overall Wildfire Risk Assessment as new data becomes available.
Chapter 5: Hazardous Fuels Reduction and Biomass Utilization	1.)Develop and maintain and inventory of potential and successful FR projects by meeting with parks and natural lands managers quarterly.
	2.)Continue securing funding to implement projects/ hire seasonal ODF staff
	3.) Coordinate a Fuels Reduction Project Tour.
Chapter 6: Emergency Operations	1.) Include 12 hour operation period in FDB Fire Mutual Aid Agreement
	2.) Develop an FDB Communications Work Group
	3.) Conduct a Conflagration Exercise
Chapter 7: Education and Community Outreach	1.) Develop Firewise toolkit for CAR's.
	2.) Create incentives for fuels reduction.
	3.) Update and distribute the Burn Permitting and Fire Restrictions Brochure.
	4.) Implement a Burn Barrel Program.
	5.) Continue to improve address signage throughout the County.
Chapter 8: Structural Ignitability Policies and Programs	1.) Identify a DTD representative for the WFEPC.
	2.) Improve coordination with Rural Fire Agencies.
	3.) Integrate WUI into Plan Map and include a public outreach strategy.

Source: Clackamas County CWPP

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Volume III:
City Addenda

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Volume III
City Addenda

Background and Introduction

In 2008, the Oregon Partnership for Disaster Resilience (OPDR) at the University of Oregon's Community Service Center partnered with Oregon Emergency Management (OEM) to develop a 2009 Hazard Mitigation Grant Program (HMGP) planning grant proposal (reference DR 1733) to update or develop natural hazards mitigation plan addenda for Clackamas County cities. FEMA subsequently awarded NHMP planning funds, and planning efforts with the cities of began in the fall of 2008. The Partnership facilitated and documented each of the cities' planning processes. The 12 cities adopted their respective NHMP Addenda between June of 2009 and August of 2010.

In 2011, OPDR successfully applied for Pre-Disaster Mitigation Planning funds to assist with the update of the 2007 Clackamas County NHMP (FEMA approved on October 19, 2007). This volume (Volume III) of the Clackamas County Multi-Jurisdictional NHMP incorporates the city addenda by reference and identifies city specific updates identified during the 2011/2012 update of the Clackamas County NHMP.

The referenced addenda are specifically identified as follows:

- City of Canby Addendum to the Clackamas County Multi-Jurisdictional Natural Hazards Mitigation Plan, locally adopted October 7, 2009 (https://scholarsbank.uoregon.edu/xmlui/handle/1794/10764).
- City of Damascus Addendum to the Clackamas County Multi-Jurisdictional Natural Hazards Mitigation Plan, locally adopted November 16, 2009 (https://scholarsbank.uoregon.edu/xmlui/handle/1794/10753).
- City of Estacada Addendum to the Clackamas County Multi-Jurisdictional Natural Hazards Mitigation Plan, locally adopted November 23, 2009 (https://scholarsbank.uoregon.edu/xmlui/handle/1794/10754).
- City of Gladstone Addendum to the Clackamas County Multi-Jurisdictional Natural Hazards Mitigation Plan, locally adopted February 9, 2010 (https://scholarsbank.uoregon.edu/xmlui/handle/1794/10758).
- City of Happy Valley Addendum to the Clackamas County Multi-Jurisdictional Natural Hazards Mitigation Plan, locally adopted March 2, 2010 (https://scholarsbank.uoregon.edu/xmlui/handle/1794/10759).
- City of Johnson City Addendum to the Clackamas County Multi-Jurisdictional Natural Hazards Mitigation Plan, locally adopted December 21, 2009 (https://scholarsbank.uoregon.edu/xmlui/handle/1794/10760).
- City of Lake Oswego Addendum to the Clackamas County Multi-Jurisdictional Natural Hazards Mitigation Plan, locally adopted March 23, 2010 (https://scholarsbank.uoregon.edu/xmlui/handle/1794/10763).

- City of Milwaukie Addendum to the Clackamas County Multi-Jurisdictional Natural Hazards Mitigation Plan, locally adopted June 16, 2009 (https://scholarsbank.uoregon.edu/xmlui/handle/1794/9640).
- City of Molalla Addendum to the Clackamas County Multi-Jurisdictional Natural Hazards Mitigation Plan, locally adopted August 25, 2010 (http://csc.uoregon.edu/sites/csc.uoregon.edu.opdr/files/docs/PDM_General/Molalla_NHMP_062910.pdf).
- City of Oregon City Addendum to the Clackamas County Multi-Jurisdictional Natural Hazards Mitigation Plan, locally adopted September 2, 2009 (https://scholarsbank.uoregon.edu/xmlui/handle/1794/10762).
- City of Sandy Addendum to the Clackamas County Multi-Jurisdictional Natural Hazards Mitigation Plan, locally adopted January 4, 2010 (https://scholarsbank.uoregon.edu/xmlui/handle/1794/10766).
- City of Wilsonville Addendum to the Clackamas County Multi-Jurisdictional Natural Hazards Mitigation Plan, locally adopted February 17, 2010 (https://scholarsbank.uoregon.edu/xmlui/handle/1794/10788).

To coordinate planning efforts, the Clackamas County NHMP update coordinator[1] met with representatives from each participating city. The specific plan development processes, including the steering committee makeup and public outreach strategy for each city, are documented in Section I of the respective city addenda; the process descriptions are incorporated herein by reference.

Because the Clackamas County initiated the count NHMP update process soon after adoption of the individual city addenda, the cities determined that re-opening a full planning process was neither feasible (due to resources) or desirable (implementation being the priority). The county encouraged cities participation in plan update process (refer to Appendix B: Planning and Public Process). In addition, county emergency management representatives communicated and met with city officials from each jurisdiction on multiple occasions during the planning process. Due to funding availability, local resource constraints, staffing changes, local desires/priorities or a combination thereof, extensive re-hashing of the city addenda at the local level was not possible.

The following city Appendix sections describe necessary edits to the city plans based on new information contained in the updated Clackamas County NHMP. These Appendixes will be adopted and incorporated into each of the city addenda following pre-approval of the full Clackamas County Multi-Jurisdictional NHMP by FEMA.

[1] The Clackamas County Emergency Management office, with support from the Hazard Mitigation Coordinator and a dedicated Resource Assistance to Rural Environments service member, served as the convener for Clackamas County's Natural Hazards Mitigation Plan update process. The RARE service member met with representatives from each city to develop these addenda update appendixes.

Appendix B:
City of Canby

Addendum to the Clackamas County Natural Hazards Mitigation Plan 2012 Amendments and Update

The Oregon Partnership for Disaster Resilience prepared this Appendix to the City of Canby Addendum to the Clackamas County Natural Hazard Mitigation Plan (Canby Addendum) as part of the 2011-12 update to the Clackamas County Natural Hazard Mitigation Plan. Upon local adoption, the appendix will become part of the Canby Addendum and will ensure that the City of Canby maintains FEMA Pre-Disaster Mitigation Program eligibility as well as compliance with the Clackamas County NHMP.

This appendix is organized according to the sections outlined in the Canby Addendum. A description of each section is presented below with proposed changes and updates following each.

Section 1: Planning Process

The planning process section of the Canby Addendum describes the activities used by the steering committee and community to develop the plan. Updates to the Planning Process section are as follows:

On Page 3, following Section 1.2 "2009 Plan Update," insert the following section:

1.3 2012 Addendum Update

In accordance with the county's 2012 multi-jurisdictional Natural Hazards Mitigation Plan update process, the City of Canby participated in the update of their 2009 addendum. By doing so, Canby will now be aligned with the county, and will update their NHMP in five years.

2012 Committee members included:

- *Barbara Benson, Canby Utility*
- *Matilda Deas, City of Canby – Development Services, Planning*
- *Shane J Hester, City of Canby – Streets*
- *Jerry Nelzen, City of Canby*
- *Kim Scheafer, City of Canby*
- *Jorge Tro, Canby Police Department*

Planning Process

The RARE Participant and Clackamas County Emergency Management developed and facilitated one plan update meeting with the EMC on June 13, 2012. Please see Appendix A for the meeting agenda and minutes.

NHMP Update Meeting - June 13, 2012: The RARE participant worked with the city lead to convene the steering committee and meet to review and update the city's Natural Hazards Mitigation Plan Addendum. Because the county is in the process of updating their NHMP, each of the cities were required to update their addendums, regardless of when their plan was last updated or developed. As part of this meeting, the steering committee reviewed the county's updated hazard assessment and made necessary changes to their hazard assessment, if necessary. The committee also reviewed their list of community assets to determine if any new additions or changes needed to be made. The committee also reported on progress made to the action items listed in the current NHMP. The committee reviewed the mitigation strategy and plan implementation and maintenance pieces and made changes if necessary.

On Page 8, Paragraph 2 following the "Formal Review Process" subsection, delete the paragraph and replace with the following paragraph:

~~*Semi-Annual Meetings*~~

~~*The EMC will meet on a semi-annual basis to review, implement and update information in the addendum. During the first meeting, the EMC will:*~~

Annual Meeting

The EMC will meet once a year. The meeting will be coordinated by the convener. This meeting will debrief on the previous hazard seasons and prepare for the upcoming hazard seasons. In addition to debriefing and preparing for the upcoming hazard seasons, the committee will:

On Page 8, first sentence following the first set of bullets under the "Formal Review Process" subsection, delete the following sentence:

~~*During the second meeting of each year, the committee will:*~~

On Page 8, following the set of bullets under the "Formal Review Process" subsection, insert the following paragraph:

The convener, or city lead designee, will be responsible for meeting annually with the county Hazard Mitigation Coordinator. This meeting will provide a chance for each of the city leads to meet together and discuss updates and progress with the Hazard Mitigation Coordinator. The convener will report back to the EMC with information gathered. The Coordinator will be responsible for setting up the meeting, and providing the city leads with updates on new studies or potential funding opportunities for mitigation projects.

On Page 8, delete Paragraph 3 of the "Formal Review Process" subsection, and insert the following:

~~*The Canby Police Department will be responsible for organizing, facilitating, and documenting the outcomes of semi-annual meetings.*~~

The Canby Police Department will be responsible for organizing, facilitating, and documenting the outcomes of the annual meetings.

On Page 10, delete the following sentence from Paragraph 2 of the "Continued Public Involvement & Participation" subsection:

~~*If resources become available, the EMC will create a brochure to advertise and describe the plan to the public.*~~

Section 2: Community Profile

The community profile section of the Canby Addendum describes a variety of community characteristics specific to the City of Canby. Given the limited amount of time that has elapsed since the community profile was developed, no changes are required or proposed.

Section 3: Hazard Assessment

The hazard assessment section of the Canby Addendum provides information on identifying hazards based on their geographic location, probability, and intensity; vulnerability assessment and inventory of community assets, and; a risk analysis estimating potential losses from each hazard. Based on new information compiled during the Clackamas County NHMP update process, updates to the Canby Addendum include the following:

On Page 27, list of Critical Facilities under section "Community Assets: Vulnerability Assessment" delete the following bullet and replace with:

- ~~*Fire Station 62 (EOC #1)*~~
- *Fire Station 62 (EOC #2)*

On Page 27, list of Critical Facilities under section "Community Assets: Vulnerability Assessment" delete the following bullet and replace with:

- ~~*City of Canby Public Works Building (EOC #2)*~~
- *City of Canby Public Works Building (EOC #3)*

On Page 27, list of Critical Facilities under section "Community Assets: Vulnerability Assessment" delete the following bullet and replace with:

- ~~*Canby Police Department*~~
- *Canby Police Department (EOC #1)*

On Page 27, list of Critical Facilities under section "Community Assets: Vulnerability Assessment" delete the following bullet and replace with:

- ~~*Fire Station 65 (EOC #3)*~~

- *Fire Station 65*

On Page 27, list of Critical Facilities under section "Community Assets: Vulnerability Assessment" add the following bullet:

- *Development Services Building*

On Page 27, list of Essential Facilities under section "Community Assets: Vulnerability Assessment" delete the following bullet:

- ~~*Riverside School*~~

On Page 27, list of Essential Facilities under section "Community Assets: Vulnerability Assessment" add the following bullets:

- *Baker Prairie School*
- *Canby Center*
- *St. Patricks Church*

On Page 28, list of Vulnerable Populations under section "Community Assets: Vulnerability Assessment" delete the following bullet and replace with:

- ~~*Willamette Falls Health Center*~~
- *Providence Health Center*

On Page 28, list of Cultural or Historic Assets under section "Community Assets: Vulnerability Assessment" delete the following bullet and replace with:

- ~~*Clackamas County Fairgrounds*~~
- *Clackamas County Event Center*

On Page 28, list of Cultural or Historic Assets under section "Community Assets: Vulnerability Assessment" delete the following bullets:

- ~~*Barlow House*~~
- ~~*Macksburg Church*~~
- ~~*Three Rivers Farm*~~
- ~~*Riverside School*~~

On Page 29, list of Economic Assets/Population Centers under section "Community Assets: Vulnerability Assessment" delete the following bullets:

- ~~*Canby Grove*~~
- ~~*Pat's Acres Race Track*~~

On Page 29, list of Economic Assets/Population Centers under section "Community Assets: Vulnerability Assessment" add the following bullet:

- *Pioneer Pump*

On Page 29, list of Economic Assets/Population Centers under section "Community Assets: Vulnerability Assessment" delete the following bullet and replace with:

- ~~*Canby Fairgrounds*~~
- *Clackamas County Event Center*

On Page 29, list of Environmental Assets under section "Community Assets: Vulnerability Assessment" add the following bullet:

- *Emerald Park*

Section 4: Natural Hazards

The Natural Hazards section of the Canby Addendum describes the types, causes, characteristics and relative risk posed by each individual natural hazard for the city of Canby. Based on new information compiled during the Clackamas County NHMP update process, updates to the Canby Addendum include the following:

On Page 33, delete the last sentence of Paragraph 1 of the "Flood Mitigation Project" section and replace with:

> ~~*Willow Creek Wetlands also assist in reducing flood waters by increasing the infiltration capacity of the soils in the area.*~~
>
> *Willow Creek wetlands also assist in reducing flood waters by increasing the infiltration capacity of the soils in this area; this has become a public works project area focused on clearing the area weekly.*

On Page 34, insert the following sentence at the end of Paragraph 1 of the "Flood Mitigation Action Items" subsection:

> *The updated action items detailing progress up to 2012 can be found in Appendix B of this plan.*

On Page 34, Remove all of the action items following Paragraph 1 of the "Flood Mitigation Action Items" subsection and move them to Appendix B.

On Page 39, insert the following sentence at the end of Paragraph 1 of the "Landslide Mitigation Action Items" subsection:

> *The updated action item detailing progress up to 2012 can be found in Appendix B of this plan.*

On Page 39, Remove the action item following Paragraph 1 of the "Landslide Mitigation Action Items" subsection and move it to Appendix B.

On Page 43, insert the following sentence at the end of Paragraph 1 of the "Wildfire Mitigation Action Items" subsection:

The updated action item detailing progress up to 2012 can be found in Appendix B of this plan.

On Page 43, Remove the action item following Paragraph 1 of the "Wildfire Mitigation Action Items" subsection and move it to Appendix B.

On Page 45, remove the section, "Severe Storms: Wind and Winter" and replace with:

~~***Severe Storms: Wind and Winter***~~

Severe Weather: Wind, Winter, and Extreme Heat

On Page 45, Paragraph 1 of the "Severe Weather: Wind, Winter, and Extreme Heat" subsection, delete the following sentence and insert the following:

~~*Clackamas County Natural Hazards Mitigation Plan adequately describes the location and extent of wind and winter storms.*~~

The Clackamas County Natural Hazards Mitigation Plan adequately describes the location and extent of windstorms, winter storms, and extreme heat events.

On Page 47, after Paragraph 6 of the "Severe Weather: Wind, Winter, and Extreme Heat" subsection, insert the following paragraph:

Extreme heat has a low threat in Canby. The EMC estimates the probability for future extreme heat events is 'moderate,' meaning one incident is likely within a 35 to 75 year period. This estimate is lower than the county's 'high' rating. The vulnerability estimate of future extreme heat events is 'moderate,' meaning between 1% and 10% of the population and assets would be affected in a major event. This estimate is the same as the county's 'moderate' rating.

On Page 47, remove the section, "Existing Severe Storm Mitigation Activities" and replace with:

~~***Existing Severe Storm Mitigation Activities***~~

Existing Severe Weather Mitigation Activities

On Page 47, insert the following sentence at the end of paragraph 1, "Existing Severe Weather Mitigation Activities":

A forester is working with Canby Utility to plant proper trees and assisted in removing 5 hazardous trees. The forester works with the street trees and complies with city ordinances.

On Page 47, remove the section, "Severe Storm Mitigation Action Items" and replace with:

~~***Severe Storm Mitigation Action Items***~~

Severe Weather Mitigation Action Items

On Page 47, insert the following sentence at the end of Paragraph 1 of the "Severe Weather Mitigation Action Items" subsection:

The updated action item detailing progress up to 2012 can be found in Appendix B of this plan.

On Page 47, Remove the action item following Paragraph 1 of the "Severe Weather Mitigation Action Items" subsection and move it to Appendix B.

On Page 49, Paragraph 2 of the "Earthquake Hazard Assessment" subsection, delete the last sentence and replace with the following:

~~*This is in agreement with the county's 'high' rating as well.*~~

This is higher than the county's 'moderate' rating.

On Page 51, last sentence of the "Existing Earthquake Mitigation Activities" subsection, delete the following word and replace it with:

~~*Telecom*~~

Telcom

On Page 51, insert the following sentence at the end of Paragraph 1 of the "Earthquake Mitigation Action Items" subsection:

The updated action item detailing progress up to 2012 can be found in Appendix B of this plan.

On Page 51, Remove the action item following Paragraph 1 of the "Earthquake Mitigation Action Items" subsection and move it to Appendix B.

On Page 57, Paragraph 6 of the "Volcanic Eruption Hazard Assessment" subsection, delete the last sentence and replace with:

~~*This is in agreement with the county's 'high' vulnerability rating as well.*~~

This is higher than the county's 'moderate' vulnerability rating.

On Page 58, following the "Volcano" subsection, insert the following new "Drought" subsection:

Drought Profile

The Clackamas County Multi-Jurisdictional Natural Hazards Mitigation Plan adequately describes the causes and characteristics, history, location, extent and impacts of drought affecting the city of Canby. Descriptions of the drought hazard

can be found on pages DR-1 to DR-6 of the 2012 Clackamas County Natural Hazards Mitigation Plan update.

The probability of drought in Canby was determined using scientific data, historical occurrences, and local knowledge. The EMC estimates the probability of drought to be 'moderate' meaning one incident is likely within a 35 to 75 year period. This is in agreement with the county's 'moderate' rating. The EMC estimates that Canby has a 'moderate' vulnerability to drought conditions, meaning between 1% and 10% of the population could be affected in a large-scale regional event. This is higher than the county's 'low' rating.

Drought Mitigation Activities

The existing drought hazard mitigation activities are conducted at the county, regional, state, and federal levels and are described in the Clackamas County Natural Hazards Mitigation Plan. As such, the information will not be repeated here.

Drought Mitigation Action Items

The city of Canby does not believe that implementing drought-related mitigation activities will be cost-effective at this time. As such, the city has not identified drought mitigation action items. Canby will partner with Clackamas County, however, on the implementation of mitigation strategies that benefit both jurisdictions.

On Page 59, Delete the following section at the end of Paragraph 1 of the "Multi-Hazard" section and replace with:

~~***Multi-Hazard Action Items (MH)***~~

~~*Multi-Hazard action items are those activities that pertain to all seven hazards in the mitigation plan: flood, landslide, wildfire, severe winter storm, windstorm, earthquake, and volcanic eruption.*~~

Multi-Hazards

Multi-Hazard action items are those activities that pertain to all seven hazards in the mitigation plan: flood, landslide, wildfire, severe winter storm, windstorm, extreme heat earthquake, and volcanic eruption. The updated action items detailing progress up to 2012 can be found in Appendix B of this plan.

On Page 59, Remove all of the action items following Paragraph 1 of the "Multi-Hazard Mitigation Action Items" subsection and move them to Appendix B.

Section 5: Mitigation Planning Priority System

The Mitigation Planning Priority Section of the Canby Addendum describes the project review and prioritization process for the action items outlined for each hazard in Appendix B: Action Items Worksheets. Based on new information

compiled during the Clackamas County NHMP update process, updates to the Canby Addendum include the following:

On Page 62, Insert a new section before the current, "5.1 Action Item Prioritization Methodology" to include:

5.1 Action Items

Action items are 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. Full action item descriptions with the 2012 updated progress are located in Appendix B of this addendum. Descriptions include ideas for implementation, and coordinating/partner organizations.

- *MH#1: Update and revise the Canby Emergency Operations Plan*
- *MH#2: Ensure there are adequate shelter facilities in hazard-free zones to serve Canby residents. Identify potential shelter sites and evaluate their relative structural risks/structural deficiencies. Seek funding for upgrades on shelter sites if needed.*
- *MH#3: Develop, enhance, and implement education programs designed to reduce the losses from natural hazards.*
- *MH#4: Integrate the goals and action items from the Canby Natural Hazard Mitigation Plan into existing regulatory documents and programs, where appropriate.*
- *MH#5: Improve the hazard Assessment in the Canby Natural Hazard Mitigation Plan.*
- *MH#6: Identify and pursue funding opportunities to develop and implement hazard mitigation activities.*
- *MH#7: Identify, plan, and establish an alternate potable water source on the Willamette River.*
- *FL#1: Evaluate & upgrade surface water management infrastructure and identify appropriate mitigation strategies.*
- *FL#2: Ensure continued compliance in the National Flood Insurance Program (NFIP) through enforcement of local floodplain management ordinances.*
- *FL#3: Identify mitigation strategies to address flooding issues in the bottom lands.*
- *LS#1: Reduce the vulnerability of property owners in landslide-prone areas.*
- *EQ#1: Conduct seismic evaluations and upgrades on identified critical/essential facilities & infrastructure from implementing appropriate structural and non-structural mitigation strategies.*
- *SS#1: Obtain funding to bury power lines subject to frequent failures to reduce power outages from the windstorm and severe winter storm hazard, where possible.*
- *WF#1: Promote fire-resistant strategies for new and existing developments.*

Note: the City of Canby does not believe that implementing drought and volcanic-related mitigation activities will be cost-effective at this time. As such, the city has not identified drought or volcanic-eruption mitigation action items.

Appendix D:
City of Damascus

Addendum to the Clackamas County Natural Hazards Mitigation Plan 2012 Amendments and Update

The Oregon Partnership for Disaster Resilience prepared this Appendix to the City of Damascus Addendum to the Clackamas County Natural Hazard Mitigation Plan (Damascus Addendum) as part of the 2011-12 update to the Clackamas County Natural Hazard Mitigation Plan. Upon local adoption, the appendix will become part of the Damascus Addendum and will ensure that the City of Damascus maintains FEMA Pre-Disaster Mitigation Program eligibility as well as compliance with the Clackamas County NHMP.

This appendix is organized according to the sections outlined in the Damascus Addendum. A description of each section is presented below with proposed changes and updates following each.

Section 1: Planning Process

The planning process section of the Damascus Addendum describes the activities used by the steering committee and community to develop the plan. Updates to the Planning Process section are as follows:

On Page 3, delete paragraph 1 following the "Participants in Planning Process" subsection and replace with:

> ~~*Representatives from the Sandy Emergency Operations Center Group (SEOC) served as steering committee members for the City of Damascus's natural hazards mitigation planning process.*~~
>
> *Representatives from the city of Damascus' Natural Features Topic Specific Team (TST) served as steering committee members for the City of Damascus's natural hazards mitigation planning process.*

On Page 4, following the "Planning Process" subsection, insert the following section:

> ***2012 Update Planning Process***
>
> *The RARE Participant and Clackamas County Emergency Management developed and facilitated one plan update meeting with the Natural Features Topic Specific Team on June 13, 2012. Please see Appendix B for the meeting agenda and minutes.*

2012 Natural Features Steering Committee members included:

- *Bruce Adams, Natural Features TST*
- *John Ferguson, Natural Features TST*
- *Andrew Jackman, City Councilor*
- *Barb Ledbury, City Councilor*
- *Erika Palmer, Damascus Senior Planner*

NHMP Update Meeting - June 13, 2012: The participant worked with the city lead to convene the steering committee and meet to review and update the city's Natural Hazards Mitigation Plan Addendum. Because the county is in the process of updating their NHMP, each of the cities were required to update their addendums, regardless of when their plan was last updated or developed. This is to ensure that the county and all of the cities are on the same timeline, and will now all update their NHMP's in 5 years. As part of this meeting, the steering committee reviewed the county's updated hazard assessment and made necessary changes to their hazard assessment, if necessary. The committee also reviewed their list of community assets to determine if any new additions or changes needed to be made. The committee also reported on progress made to the action items listed in the current NHMP. The committee reviewed the mitigation strategy and plan implementation and maintenance pieces and made changes if necessary.

On Page 3, delete paragraph 2 of the "Participants in Planning Process" subsection, and insert the following language:

~~*The Sandy Emergency Operations Center Group is a standing committee comprised of emergency first responders, CERT and NERT team members, city staff from Damascus and Sandy, and representatives from a number of citizen groups. Additionally, Damascus and Sandy share a number of common stakeholders due to their close proximity to one another. As such, natural hazards mitigation planning meetings for both Damascus and Sandy occurred in tandem via standing SEOC meetings.*~~

The Damascus Natural Features Topic Specific Team (TST), or another committee or group to be appointed or convened by the city will oversee the update, implementation, and maintenance of the Natural Hazards Mitigation Plan.

On Page 8, second paragraph following the "Plan Maintenance" subsection, delete the following sentence and replace with:

~~*Semi-Annual Meetings*~~

~~*The Natural Features TST will meet on a semi-annual basis to complete the following tasks. During the first meeting, the committee will:*~~

Annual Meeting

The Natural Features TST or another committee or group appointed or convened by the city will meet once a year. The meeting will be coordinated by the convener. This meeting will debrief on the previous hazard seasons and prepare for the upcoming

hazard seasons. In addition to debriefing and preparing for the upcoming hazard seasons, the committee will:

On Page 8, first sentence following the first set of bullets under the "Plan Maintenance" subsection, delete the following sentence:

~~*During the second meeting of each year, the committee will:*~~

On Page 8, before paragraph 1 following the set of bullets under the "Plan Maintenance" subsection, insert the following paragraph:

The convener, or city lead designee, will be responsible for meeting annually with the county Hazard Mitigation Coordinator. This meeting will provide a chance for each of the city leads to meet together and discuss updates and progress with the Hazard Mitigation Coordinator. The convener will report back to the appropriate city designated committee with information gathered. The Coordinator will be responsible for setting up the meeting, and providing the city leads with updates on new studies or potential funding opportunities for mitigation projects.

On Page 8, third paragraph following the "Plan Maintenance" subsection, delete the first sentence and replace with the following sentence:

~~*The convener will be responsible for documenting the outcome of the semi-annual meetings.*~~

The convener will be responsible for documenting the outcome of the annual meeting, as well as the meeting with the county's Hazard Mitigation Coordinator.

Section 2: Community Profile

The community profile section of the Damascus Addendum describes a variety of community characteristics specific to the City of Damascus. Based on new information compiled during the Clackamas County NHMP update process, updates to the Damascus Addendum include the following:

On Page 20, under the "Critical Facilities" subsection, add the following bullets:

- *Clackamas Fire District #1 Station 172nd*
- *Encompass Urgent Care*

On Page 20, under the "Critical Facilities" subsection, delete the following bullet and replace with:

- ~~*Damascus Emergency Operations Center (EOC) located at City Hall*~~

- *Damascus Emergency Operations Center (EOC) located at City Hall**

**Future Location of Damascus' new EOC will be the Public Works Building*

On Page 21, under the "Critical Infrastructure" subsection, add the following bullets:

- *Hoffmeister Road*

On Page 21, under the Church section of the "Essential Facilities" subsection, add the following bullets:

- Christ the Vine Lutheran Church
- Trinity Church

On Page 21, under the "Economic Assets/Population Centers" subsection, add the following bullets:

- *Nature's Country Store*
- *Leo Gentry Nursery*

On Page 21, after "Economic Assets/Population Centers" subsection, add the following new section:

Environmental Assets: *Environmental assets are those parks, green spaces, wetlands, and rivers that provide an aesthetic and functional service for the community.*

- *New Park/Open Space on Vogel Road*
- *Trillium Creek Park*
- *Damascus Civic Park*
- *Clackamas River*

On Page 21, following the "Environmental Assets" subsection, add the following new section:

Hazardous Materials: *Those sites that store, manufacture, or use potentially hazardous materials.*

- *LKQ Automotive*
- *Cement Factory*

Section 3: Risk Assessment

The risk assessment section of the Damascus Addendum describes the types, causes, characteristics and relative risk posed by natural hazards on the City of Damascus. Based on new information compiled during the Clackamas County NHMP update process, updates to the Damascus Addendum include the following:

On Page 32, Paragraph 6 of the "Flood" subsection, add the following bullet for flood mitigation actions:

- *Any development must be evaluated by a licensed hydrologist or civil engineer to determine the quantities of increased surface runoff water from the development. Water runoff must be detained or infiltrated on site so that no increase in runoff into drainage ways or onto other properties results from the development as compared to the pre-development state. In addition the detention or infiltration of water is to be evaluated by a license engineering*

geologist, geotechnical engineer, or hydrologist to determine its impact on slope stability.

On Page 32, Last paragraph of the "Flood" subsection, delete the paragraph and replace with the following paragraph:

~~*The SEOC estimates that the probability of future flooding events in Damascus is 'high,' meaning one event is likely to occur within a 10 to 35 year period. The SEOC additionally estimates that the city's vulnerability to flooding events is 'moderate' meaning 1-10% of the city's population and/or assets could be affected in a major flood event. Both ratings are in agreement with the county's probability and vulnerability estimates.*~~

The Natural Features Topic Specific Team (TST) estimates the probability of future flooding events in Damascus is 'high' meaning one event is likely to occur within a 10 to 35 year period. This estimate is in agreement with the county's 'high' probability ranking. The Natural Features Topic Specific Team (TST) estimates the city's vulnerability to flooding events is 'high,' meaning more than 10% of the city's population and/or assets could be affected in a major flood event. This is higher than the county's 'moderate' vulnerability ranking.

On Page 33, Paragraph 4 of the "Landslide" subsection, delete the paragraph and replace with the following paragraph:

~~*The SEOC estimates the probability of future landslide events is 'high,' meaning one event is likely to occur within a 10 to 35 year period. This estimate is in agreement with the county's 'high' probability estimate. The SEOC additionally estimates that Damascus has a 'moderate' vulnerability to landslide hazards. A 'moderate' ranking means that between 1-10% of the population and/or community assets could be affected by a landslide event. The city's vulnerability estimate is higher than the county's 'low' vulnerability rating due to potential impacts described below.*~~

The Natural Features Topic Specific Team (TST) estimates the probability of future landslide events is 'high,' meaning one event is likely to occur within a 10 to 35 year period. This estimate is in agreement with the county's 'high' probability estimate. The Natural Features Topic Specific Team (TST) additionally estimates that Damascus has a 'high' vulnerability to landslide hazards. A 'high' ranking means that more than 10% of the population and/or community assets could be affected by a landslide event. The city's vulnerability estimate is higher than the county's 'low' vulnerability rating due to potential impacts described below.

On Page 34, delete the second bullet of Paragraph 9 of the "Landslide" subsection, and insert the following:

~~*Before a building permit or other land use approval is issued, the slope conditions should be verified by subsurface exploration. If the slopes are found to be unstable, analysis and mitigation measures should be made in conjunction with a Geotechnical Engineer (GE) using Oregon State Board of Geologist Examiners (OSBGE) guidelines and the Oregon State Board of Examiners for Engineering and Land Surveying (OSBEELS) standards of care for engineering practice. (pg. 18).*~~

Before a building permit or other land use approvals is issued, the existing slope conditions and the impacts on slopes from the development should be evaluated by a slope stability study. If slopes are found to be potentially unstable in their existing undeveloped condition or if development might result in slopes becoming unstable, analysis and mitigation measures should be made in conjunction with a Geotechnical Engineer (GE) using Oregon State Board of Geologist Examiners (OSBGE) guidelines and the Oregon State Board of Examiners for Engineering and Land Surveying (OSBEELS) standards of care for engineering practice. (pg. 18).

On Page 35, end of Paragraph 9 of the "Landslide" subsection, add the following bullets:

- *Preliminary geologic assessment prior to development should include more than just a visual evaluation. It should also include a review of available geologic literature, aerial photography and LiDAR mapping where available.*
- *Before a building permit is issued slope conditions are required to be verified by subsurface exploration per the plan. There should also be requirements for laboratory testing of soils and for a slope stability analysis to be performed.*

On Page 36, Paragraph 4 of the "Wildfire" subsection, delete the following paragraph and insert the following:

~~*The SEOC estimates the probability of future wildfire events to be 'moderate,' meaning one event is likely within a 35 to 75 year period. This is in agreement with the county's 'moderate' probability rating. The SEOC additionally ranked the city's vulnerability to wildfires as 'high,' meaning more than 10% of the population and community assets would be affected by a major wildfire event. This is higher than the county's 'moderate' rating.*~~

The Natural Features Topic Specific Team (TST) estimates the probability of future wildfire events to be 'moderate,' meaning one event is likely within a 35 to 75 year period. This is in agreement with the county's 'moderate' probability rating. The Natural Features Topic Specific Team (TST) additionally ranked the city's vulnerability to wildfires as 'high,' meaning more than 10% of the population and community assets would be affected by a major wildfire event. This is higher than the county's 'moderate' rating.

On Page 37, delete the section title and replace with the following:

~~***3.4 Severe Storms: Wind and Winter***~~

3.4 Severe Storms: Wind, Winter, and Extreme Heat

On Page 37, Paragraph 3 of the "Severe Storms: Wind, Winter, and Extreme Heat" subsection, delete the first sentence of the paragraph and replace with the following:

~~*The SEOC estimates that the probability of severe wind and winter storm events is 'high,' meaning one event is likely within a 10 to 35 year period.*~~

The Natural Features Topic Specific Team (TST) estimates that the probability of severe wind and winter storm events is 'high,' meaning one event is likely within a 10 to 35 year period.

On Page 37, Paragraph 3 of the "Severe Storms: Wind, Winter, and Extreme Heat" subsection, delete the fourth sentence of the paragraph and replace with the following:

~~*The SEOC estimates a 'moderate' vulnerability to wind and winter storms, meaning 1-10% of the population and community assets could be affected by a severe event.*~~

The Natural Features Topic Specific Team (TST) estimates a 'moderate' vulnerability to wind and winter storms, meaning 1-10% of the population and community assets could be affected by a severe event.

On Page 38, after Paragraph 3 of the "Severe Storms: Wind, Winter, and Extreme Heat" subsection, insert the following paragraph:

Extreme heat has a very low threat in Damascus. The Natural Features Topic Specific Team (TST) estimates the probability for future extreme heat events is 'low,' meaning one incident is likely within a 75 to 100 year period. This estimate is in accordance with the county's 'low' rating. The vulnerability estimate of future extreme heat events is 'moderate,' meaning between 1% and 10% of the population and assets would be affected in a major event. This estimate is in agreement with the county's rating.

On Page 39, Last paragraph of the "Earthquake" subsection, delete the last paragraph and replace with the following:

~~*The SEOC ranks the probability of future earthquake events as 'high,' meaning one event is likely within a 10 to 35 year period. This estimate is the same as the country's 'high' probability estimate. The SEOC ranked the vulnerability to earthquakes as 'high,' meaning more than 10% of the population and assets would likely be affected in a major event. This is also in agreement with the county's 'high' vulnerability estimate.*~~

The Natural Features Topic Specific Team (TST) ranks the probability of future earthquake events as 'moderate,' meaning one event is likely within a 35 to 75 year period. This estimate is the higher than the country's 'low' probability estimate. The Natural Features Topic Specific Team (TST) ranked the vulnerability to earthquakes as 'high,' meaning more than 10% of the population and assets would likely be affected in a major event. This is in agreement with the county's 'high' vulnerability estimate.

On Page 41, Paragraph 5 of the "Volcano" section, delete the following sentences, and replace with:

~~*Clackamas County estimates a low probability that volcanic eruptions will occur in the future and a high vulnerability to volcanic events. Both ratings are true for the city of Damascus as well.*~~

The Natural Features Topic Specific Team (TST) estimates that the city of Damascus has a 'low' probability that volcanic eruptions will occur, meaning, one incident is likely within a 75 to 100 year period. This is in agreement with the county's 'low' rating. Additionally, the Natural Features Topic Specific Team (TST) estimates a 'high' vulnerability to volcanic eruptions, meaning more than 10% of the population and infrastructure is likely to be affected. This is higher than the county's 'moderate' rating.

On Page 41, following the "Volcano" subsection, insert the following new "Drought" subsection:

Drought Profile

The Clackamas County Multi-Jurisdictional Natural Hazards Mitigation Plan adequately describes the causes and characteristics, history, location, extent and impacts of drought affecting the city of Damascus. Descriptions of the drought hazard can be found on pages DR-1 to DR-6 of the 2012 Clackamas County Natural Hazards Mitigation Plan update.

The probability of drought in Damascus was determined using scientific data, historical occurrences, and local knowledge. The Natural Features Topic Specific Team (TST) estimates the probability of drought to be 'moderate' meaning one incident is likely within a 35 to 75 year period. This is in agreement with the county's 'moderate' rating. The Natural Features Topic Specific Team (TST) estimates that Damascus has a 'low' vulnerability to drought conditions, meaning less than 1% of the population could be affected in a large-scale regional event. This is also in agreement with the county's 'low' rating.

Drought Mitigation Activities

The existing drought hazard mitigation activities are conducted at the county, regional, state, and federal levels and are described in the Clackamas County Natural Hazards Mitigation Plan. As such, the information will not be repeated here.

Drought Mitigation Action Items

The city of Damascus does not believe that implementing drought-related mitigation activities will be cost-effective at this time. As such, the city has not identified drought mitigation action items. Damascus will partner with Clackamas County, however, on the implementation of mitigation strategies that benefit both jurisdictions.

Section 4: Action Items

The action items section of the Damascus Addendum describes detailed recommendations for activities that local departments, citizens and others could engage in to reduce risk. Based on new information compiled during the Clackamas County NHMP update process, updates to the Damascus Addendum include the following:

On Page 47, Paragraph 1 of the "Action Items" subsection, delete the last sentence of the paragraph and replace with the following:

~~*Full action item worksheets are located in Appendix A of this addendum.*~~

The full action item worksheets with updated progress for 2012 are located in Appendix A of this addendum.

On Page 43, Paragraph 2 of the "Action Items" subsection, delete the first two sentences of the paragraph and replace with the following:

~~*Note: the City of Damascus does not believe that implementing volcano-related mitigation activities will be cost-effective at this time. As such, the city has not identified landslide, severe storm, or volcanic-eruption mitigation action items.*~~

Note: the City of Damascus does not believe that implementing drought and volcanic-related mitigation activities will be cost-effective at this time. As such, the city has not identified drought or volcanic-eruption mitigation action items.

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Appendix C:
City of Estacada

Addendum to the Clackamas County Natural Hazards Mitigation Plan 2012 Amendments and Update

The Oregon Partnership for Disaster Resilience prepared this Appendix to the City of Estacada Addendum to the Clackamas County Natural Hazard Mitigation Plan (Estacada Addendum) as part of the 2011-12 update to the Clackamas County Natural Hazard Mitigation Plan. Upon local adoption, the appendix will become part of the Estacada Addendum and will ensure that the City of Estacada maintains FEMA Pre-Disaster Mitigation Program eligibility as well as compliance with the Clackamas County NHMP.

This appendix is organized according to the sections outlined in the Estacada Addendum. A description of each section is presented below with proposed changes and updates following each.

Section 1: Planning Process

The planning process section of the Estacada Addendum describes the activities used by the steering committee and community to develop the plan. Updates to the Planning Process section are as follows:

On Page 4, following the "Planning Process" subsection, insert the following:

2012 Planning Process

The RARE Participant and Clackamas County Emergency Management developed and facilitated one plan update meeting with the Hazard Mitigation Advisory Committee on May 30, 2012. Please see Appendix A for the meeting agenda and minutes.

2012 Committee members included:

- *Becky Arnold, City of Estacada, Mayor*
- *Laura Comstock, Clackamas County Emergency Management/RARE*
- *Norm Ernst, City of Estacada, City Councilor*
- *Eric Jespersen, PGE, Maintenance Supervisor*
- *Jerry Polzin, City of Estacada, Chair of Infrastructure Committee*
- *Dave Stone, City of Estacada, Lead Operator*
- *Melanie Wagner, City of Estacada, Assistant to the City Manager*

NHMP Update Meeting - May 30, 2012: The participant worked with the city lead to convene the steering committee and meet to review and update the city's Natural Hazards Mitigation Plan Addendum. Because the county is in the process of updating their NHMP, each of the cities were required to update their addendums, regardless of when their plan was last updated or developed. This is to ensure that the county and all of the cities are on the same timeline, and will now all update their NHMP's in 5 years. As part of this meeting, the steering committee reviewed the county's updated hazard assessment and made necessary changes to their hazard assessment, if necessary. The committee also reviewed their list of community assets to determine if any new additions or changes needed to be made. The committee also reported on progress made to the action items listed in the current NHMP. The committee reviewed the mitigation strategy and plan implementation and maintenance pieces and made changes if necessary.

On Page 7, second paragraph following the "Plan Maintenance" subsection, delete the entire paragraph and replace with the following paragraph:

~~*Semi-Annual Meetings*~~

~~*The HMAC will meet on a semi-annual basis to complete the following tasks. Meetings will be held in the spring and fall to discuss the previous hazard season and prepare for the upcoming hazard seasons. During the first meeting, the committee will:*~~

Annual Meeting

The HMAC will meet once a year. The meeting will be coordinated by the convener. This meeting will debrief the committee on the previous hazard seasons and prepare for the upcoming hazard seasons. In addition to debriefing and preparing for the upcoming hazard seasons, the committee will:

On Page 7, first sentence following the first set of bullets under the "Plan Maintenance" subsection, delete the following sentence:

~~*During the second meeting of each year, the committee will:*~~

On Page 8, first paragraph following the set of bullets under the "Plan Maintenance" subsection, insert the following paragraph:

The convener, or city lead designee, will be responsible for meeting annually with the county Hazard Mitigation Coordinator. This meeting will provide a chance for each of the city leads to meet together and discuss updates and progress with the Hazard Mitigation Coordinator. The convener will report back to the HMAC with information gathered. The Coordinator will be responsible for setting up the meeting, and providing the city leads with updates on new studies or potential funding opportunities for mitigation projects.

On Page 8, fourth paragraph following the "Plan Maintenance" subsection, delete the first sentence and replace with the following sentence:

~~*The convener will be responsible for documenting the outcome of the semi-annual meetings.*~~

The convener will be responsible for documenting the outcome of the annual meeting, as well as the meeting with the county's Hazard Mitigation Coordinator.

Section 2: Community Profile

The community profile section of the Estacada Addendum describes a variety of community characteristics specific to the City of Estacada. Based on new information compiled during the Clackamas County NHMP update process, updates to the Estacada Addendum include the following:

On Page 23, under the "Critical Facilities" subsection, remove the following bullet:

- ~~*George Community Fire Station (#115)*~~

On Page 23, remove the following bullet under the "Critical Facilities" subsection, and insert:

- ~~*Clackamas County Sherriff's Office/Community Center*~~
- *Clackamas County Sherriff's Office/City Hall*

On Page 23, remove the following bullet under the "Critical Infrastructure" subsection, and insert the follow:

- ~~*Three bridges on 6th Ave*~~
- *One bridge on 6th Ave*

On Page 23, remove the following bullet under the "Critical Infrastructure" subsection, and insert the follow:

- ~~*Bridge on Cemetery Road*~~
- *Culvert on Cemetery Road*

On Page 23, under the "Essential Facilities" subsection, remove the following bullet:

- ~~*Thriftway Grocery Store*~~

On Page 23, under the "Essential Facilities" subsection, add the following bullet:

- *George Community Fire Station (#115)*

On Page 24, under the "Vulnerable Populations" subsection, remove the following bullets:

- ~~*Estacada Mobile Village*~~
- ~~*Mountain View Mobile Estates*~~
- ~~*Silver Fox RV Park*~~

On Page 24, remove the following bullets under the "Economic Assets/Population Centers" subsection, and replace with the follow:

- ~~*Estacada/Clackamas River Area Chamber of Commerce*~~
- ~~*Thriftway*~~

- *Thriftway Grocery Store*
- *Reliance Connects Phone Company*
- *US Forest Service*

On Page 24, under the "Environmental Assets" subsection, add the following bullet:

- *Cazadero Heights Neighborhood Park*

On Page 24, insert the following section, "Hazardous Materials":

Hazardous Materials: Those sites that store, manufacture, or use potentially hazardous materials.

- *Public Works*
- *Old Mill Site*

Section 3: Risk Assessment

The risk assessment section of the Estacada Addendum describes the types, causes, characteristics and relative risk posed by natural hazards on the City of Estacada. Based on new information compiled during the Clackamas County NHMP update process, updates to the Estacada Addendum include the following:

On Page 42, Paragraph 9 of the "Wildfire" subsection, delete the paragraph and replace with the following paragraph:

~~*The HMAC estimates the probability of future wildfire events to be 'moderate,' meaning one event is likely within a 35 to 75 year period, and vulnerability is 'moderate,' meaning between 1% and 10% of the population or community assets would be affected by a major wildfire event. Both rankings are in agreement with the county's 'moderate' ratings.*~~

The HMAC estimates the probability of future wildfire events to be 'low,' meaning one event is likely within a 75 to 100 year period, and vulnerability is 'low,' meaning less than 1% of the population or community assets would be affected by a major wildfire event. Both rankings are lower than the county's 'moderate' ratings.

On Page 53, Paragraph 6 of the "Severe Storms: Wind and Winter" subsection, delete the following paragraph and replace with the following:

~~*The HMAC estimates a 'high' vulnerability to wind and winter storms, meaning more than 10% of the population or assets could be affected by a severe winter storm. Both ratings are higher than the county's 'moderate' winter storm vulnerability rating and 'low wind storm vulnerability rating.*~~

The HMAC estimates a 'moderate' vulnerability to wind and winter storms, meaning between 1% and 10% of the population or assets could be affected by a

severe winter storm. The windstorm rating is higher than the county's 'low' rating, and the winter storm rating is in accordance with the county's 'moderate' rating.

On Page 53, after Paragraph 6 of the "Severe Storms: Wind and Winter" subsection, insert the following paragraph:

Extreme heat has a moderate threat to Estacada. The HMAC estimates the probability for future extreme heat events is 'high,' meaning one incident is likely within a 10 to 35 year period. This estimate is higher than the county's 'low' rating. The vulnerability estimate of future extreme heat events is 'medium,' meaning between 1% and 10% of the population and assets would be affected in a major event. This estimate is the same as the county's 'moderate' rating.

On Page 55, Paragraph 4 of the "Earthquake" subsection, delete the entire paragraph and insert the following:

~~*Clackamas County estimates a high probability that earthquakes will occur in the future (event is likely within a 10 to 35 year period), and a high vulnerability to earthquake events (more than 10% of the population and assets would likely be affected in a major event). Both ratings are true for the city of Estacada as well.*~~

The HMAC estimates a 'moderate' probability that earthquakes will occur, meaning one event is likely within a 45 to 75 year period. This is higher than the county's 'low' rating. Additionally, the HMAC estimates a 'high' vulnerability meaning more than 10% of the population and infrastructure is likely to be affected. This is in agreement with the county's 'high' rating.

On Page 57, Paragraph 4 of the "Volcano" subsection, delete the first two sentences and replace with the following:

~~*Clackamas County estimates a low probability that volcanic eruptions will occur in the future (one incident within a 75-100 year period), and a high vulnerability (>10% of population or assets affected) to volcanic events. Both ratings are true for the city of Estacada as well.*~~

Clackamas County estimates a low probability that volcanic eruptions will occur in the future (one incident within a 75-100 year period), and a moderate vulnerability (between 1% and 10% of population or assets affected) to volcanic events. Both ratings are true for the city of Estacada as well.

On Page 57, following the "Volcano" subsection, insert the following new "Drought" subsection:

Drought Profile

The Clackamas County Multi-Jurisdictional Natural Hazards Mitigation Plan adequately describes the causes and characteristics, history, location, extent and impacts of drought affecting the city of Estacada. Descriptions of the drought hazard can be found on pages DR-1 to DR-6 of the 2012 Clackamas County Natural Hazards Mitigation Plan update.

The probability of drought in Estacada was determined using scientific data, historical occurrences, and local knowledge. The HMAC estimates the probability of drought to be 'moderate' meaning one incident is likely within a 35 to 75 year period. This is the same as the county's 'moderate' rating. The HMAC estimates that Estacada has a 'high' vulnerability to drought conditions, meaning more than 10% of the population could be affected in a large-scale regional event. This is higher than the county's 'low' rating.

Drought Mitigation Activities

The existing drought hazard mitigation activities are conducted at the county, regional, state, and federal levels and are described in the Clackamas County Natural Hazards Mitigation Plan. As such, the information will not be repeated here.

Drought Mitigation Action Items

The city of Estacada does not believe that implementing drought-related mitigation activities will be cost-effective at this time. As such, the city has not identified drought mitigation action items. Estacada will partner with Clackamas County, however, on the implementation of mitigation strategies that benefit both jurisdictions.

Section 4: Action Items

The action items section of the Estacada Addendum describes detailed recommendations for activities that local departments, citizens and others could engage in to reduce risk. Based on new information compiled during the Clackamas County NHMP update process, updates to the Estacada Addendum include the following:

On Page 59, Paragraph 1 of the "Action Items" subsection, delete the last sentence of the paragraph and replace with the following:

~~*Full action item worksheets are located in Appendix B of this addendum.*~~

The full action item worksheets with updated progress for 2012 are located in Appendix B of this addendum.

On Page 59, List of action items under the "Action Items" subsection, delete the following bullets and add the following:

- ~~*FL#3: Conduct a study on the drain system to evaluate efficiency.*~~

- *SS#2: Encourage facilities to become certified Red Cross shelter sites and maintain a list of disaster shelters located throughout Estacada.*

On Page 43, Paragraph 2 of the "Action Items" subsection, delete the first two sentences of the paragraph and replace with the following:

~~*Note: the City of Estacada does not believe that implementing landslide or volcano-related mitigation activities will be cost-effective at this time. As such, the city has not identified landslide or volcanic eruption mitigation action items.*~~

Note: the City of Estacada does not believe that implementing landslide, volcano-related, or drought mitigation activities will be cost-effective at this time. As such, the city has not identified landslide, volcanic-eruption, or drought mitigation action items.

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Appendix D:
City of Gladstone

Addendum to the Clackamas County Natural Hazards Mitigation Plan 2012 Amendments and Update

The Oregon Partnership for Disaster Resilience prepared this Appendix to the City of Gladstone Addendum to the Clackamas County Natural Hazard Mitigation Plan (Gladstone Addendum) as part of the 2011-12 update to the Clackamas County Natural Hazard Mitigation Plan. Upon local adoption, the appendix will become part of the Gladstone Addendum and will ensure that the City of Gladstone maintains FEMA Pre-Disaster Mitigation Program eligibility as well as compliance with the Clackamas County NHMP.

This appendix is organized according to the sections outlined in the Gladstone Addendum. A description of each section is presented below with proposed changes and updates following each.

Section 1: Planning Process

The planning process section of the Gladstone Addendum describes the activities used by the steering committee and community to develop the plan. Updates to the Planning Process section are as follows:

On Page 5, following the "Plan Update Changes by Section" subsection, insert the following section:

1.3 2012 Addendum Update

In accordance with the county's Natural Hazards Mitigation Plan update, the City of Gladstone participated in the update of their addendum. By doing so, Gladstone will now be aligned with the county, and will update their NHMP in five years.

2012 Committee members included:

- *Maria Aiken, Gladstone Police*
- *Barbara Bell, GEMS*
- *Lee Jundt, Gladstone Police*
- *Len Nelson, Gladstone City Council*
- *Jim Pryde, Gladstone Police*
- *Jeff Smith, Gladstone Fire*
- *Scott Tabor, Gladstone Public Works*

2012 Planning Process

The RARE Participant and Clackamas County Emergency Management developed and facilitated one plan update meeting with the Hazard Mitigation Advisory Committee on June 12, 2012. Please see Appendix A for the meeting agenda and minutes.

NHMP Update Meeting - June 12, 2012: The participant worked with the city lead to convene the steering committee and meet to review and update the city's Natural Hazards Mitigation Plan Addendum. Because the county is in the process of updating their NHMP, each of the cities were required to update their addendums, regardless of when their plan was last updated or developed. As part of this meeting, the steering committee reviewed the county's updated hazard assessment and made necessary changes to their hazard assessment, if necessary. The committee also reviewed their list of community assets to determine if any new additions or changes needed to be made. The committee also reported on progress made to the action items listed in the current NHMP. The committee reviewed the mitigation strategy and plan implementation and maintenance pieces and made changes if necessary.

On Page 8, second paragraph following the "Formal Review Process" subsection, delete the entire paragraph and replace with the following paragraph:

~~*Semi-Annual Meetings*~~

~~*The HMAC will meet on a semi-annual basis to review, implement and update information in the addendum. Additional meetings may be scheduled when necessary. During the first meeting, the HMAC will:*~~

Annual Meeting

The HMAC will meet once a year. The meeting will be coordinated by the convener. This meeting will debrief on the previous hazard seasons and prepare for the upcoming hazard seasons. In addition to debriefing and preparing for the upcoming hazard seasons, the committee will:

On Page 8, first sentence following the first set of bullets under the "Formal Review Process" subsection, delete the following sentence:

~~*During the second meeting of each year, the HMAC will:*~~

On Page 8, first paragraph following the set of bullets under the "Formal Review Process" subsection, insert the following paragraph:

The convener, or city lead designee, will be responsible for meeting annually with the county Hazard Mitigation Coordinator. This meeting will provide a chance for each of the city leads to meet together and discuss updates and progress with the Hazard Mitigation Coordinator. The convener will report back to the HMAC with information gathered. The Coordinator will be responsible for setting up the meeting,

and providing the city leads with updates on new studies or potential funding opportunities for mitigation projects.

On Page 8, third paragraph following the "Formal Review Process" subsection, delete the first sentence and replace with the following sentence:

~~*The Gladstone Police Chief will be responsible for organizing, facilitating, and documenting the outcomes of semi-annual meetings.*~~

The Gladstone Police Chief will be responsible for documenting the outcome of the annual meeting, as well as the meeting with the county's Hazard Mitigation Coordinator.

Section 2: Community Profile

The community profile section of the Gladstone Addendum describes a variety of community characteristics specific to the City of Gladstone. Based on new information compiled during the Clackamas County NHMP update process, updates to the Gladstone Addendum include the following:

On Page 23, Paragraph 2 of the "Historic and Cultural Resources" subsection, edit the following sentence:

- ~~*Each July, there is a large celebration of the venue and its unique history.*~~

- *Each August, there is a large celebration of the venue and its unique history.*

Section 3: Hazard Assessment

The hazard assessment section of the Gladstone Addendum provides information on identifying hazards based on their geographic location, probability, and intensity; vulnerability assessment and inventory of community assets, and; a risk analysis estimating potential losses from each hazard. Based on new information compiled during the Clackamas County NHMP update process, updates to the Gladstone Addendum include the following:

On Page 26, list of Critical Facilities & Infrastructure under section "Community Assets: Vulnerability Assessment" add the following bullets:

- *Gladstone Senior Center (EOC)*
- *City Hall*
- *Sanitary Sewer Collection System and Pump Station*

On Page 26, list of Critical Facilities & Infrastructure under section "Community Assets: Vulnerability Assessment" delete the following bullet and replace with:

- ~~*Tri-City Baptist – Red Cross Shelter*~~
- *Tri-City Baptist – Red Cross Shelter (Backup EOC)*

On Page 26, list of Essential Facilities under section "Community Assets: Vulnerability Assessment" delete the following bullets:

- ~~*Sewer Pump Station & Treatment Facility*~~
- ~~*Evergreen Lane*~~
- ~~*River View Care Center*~~
- ~~*Dr. King's Office*~~

On Page 27, list of Vulnerable Populations under section "Community Assets: Vulnerability Assessment" delete the following bullet:

- ~~*River View Care Center*~~

On Page 27, list of Vulnerable Populations under section "Community Assets: Vulnerability Assessment" add the following bullets:

- *Gladstone Center for Children and Families (GCCF)*
- *7th Day Adventist Annual Conference in July – Gladstone Park*

On Page 27, list of Economic Assets/Populations Centers under section "Community Assets: Vulnerability Assessment" add the following bullet:

- *7th Day Adventist Camp*

On Page 27, list of Environmental Assets under section "Community Assets: Vulnerability Assessment" delete the following bullet and replace with:

- ~~*McLoughlin/Risely Wetland*~~
- *Olsen Wetland*

Section 4: Natural Hazards

The Natural Hazards section of the Gladstone Addendum describes the types, causes, characteristics and relative risk posed by each individual natural hazard for the city of Gladstone. Based on new information compiled during the Clackamas County NHMP update process, updates to the Gladstone Addendum include the following:

On Page 42, insert the following sentence at the end of Paragraph 1 of the "Flood Mitigation Action Items" subsection:

> *The updated action items detailing progress up to 2012 can be found in Appendix C of this plan.*

On Page 43, Remove all of the action items following Paragraph 1 of the "Flood Mitigation Action Items" subsection and move them to Appendix C.

On Page 51, insert the following sentence at the end of Paragraph 1 of the "Landslide Mitigation Action Items" subsection:

> *The updated action items detailing progress up to 2012 can be found in Appendix C of this plan.*

On Page 51, Remove the action item following Paragraph 1 of the "Landslide Mitigation Action Items" subsection and move it to Appendix C.

On Page 57, insert the following sentence at the end of Paragraph 1 of the "Wildfire Mitigation Action Items" subsection:

> *The updated action items detailing progress up to 2012 can be found in Appendix C of this plan.*

On Page 57, Remove the action items following Paragraph 1 of the "Wildfire Mitigation Action Items" subsection and move it to Appendix C.

On Page 61, remove the section, "Severe Storms: Wind and Winter" and replace with:

> ~~***Severe Storms: Wind and Winter***~~
>
> ***Severe Weather: Wind, Winter, and Extreme Heat***

On Page 61, remove the section, "Severe Storms Hazard Assessment" and replace with:

> ~~***Severe Storm Hazard Assessment***~~
>
> ***Severe Weather Hazard Assessment***

On Page 62 after Paragraph 5 of the "Severe Weather Hazard Assessment" subsection, insert the following paragraph:

> *Extreme heat has a low threat in Gladstone. The HMAC estimates the probability for future extreme heat events is 'low,' meaning one incident is likely within a 75 to 100 year period. This estimate is lower than the county's 'high' rating. The vulnerability estimate of future extreme heat events is 'moderate,' meaning between 1% and 10% of the population and assets would be affected in a major event. This estimate is the same as the county's 'moderate' rating.*

On Page 62, remove the section, "Existing Severe Storm Mitigation Activities" and replace with:

> ~~***Existing Severe Storm Mitigation Activities***~~
>
> ***Existing Severe Weather Mitigation Activities***

On Page 62, remove the section, "Existing Severe Storm Mitigation Activities" and replace with:

> ~~***Severe Storm Mitigation Action Items***~~
>
> ***Severe Weather Mitigation Action Items***

On Page 62, insert the following sentence at the end of Paragraph 1 of the "Severe Weather Mitigation Action Items" subsection:

The updated action item detailing progress up to 2012 can be found in Appendix C of this plan.

On Page 62 Remove the action item following Paragraph 1 of the "Severe Weather Mitigation Action Items" subsection and move it to Appendix C.

On Page 63, Paragraph 2 of the "Earthquake Hazard Assessment" subsection, delete the first two sentences of the paragraph and replace with the following:

~~*The HMAC estimates that the probability of an earthquake occurring in Gladstone is 'high,' meaning one event is likely to occur within a 10 to 35 year period. This is in agreement with the county's 'high' rating as well*~~

The HMAC estimates that the probability of an earthquake occurring in Gladstone is 'high,' meaning one event is likely to occur within a 10 to 35 year period. This is higher than the county's 'moderate' ranking.

On Page 66, insert the following sentence at the end of Paragraph 1 of the "Earthquake Mitigation Action Items" subsection:

The updated action item detailing progress up to 2012 can be found in Appendix C of this plan.

On Page 66, Remove the action item following Paragraph 1 of the "Earthquake Mitigation Action Items" subsection and move it to Appendix C.

On Page 74, Paragraph 4 of the "Volcanic Eruption Hazard Assessment" subsection, delete the last sentence and replace with:

~~*This is in agreement with the county's 'high' vulnerability rating as well.*~~

This is higher than the county's 'moderate' vulnerability rating.

On Page 74, following the "Volcano" subsection, insert the following new "Drought" subsection:

Drought Profile

The Clackamas County Multi-Jurisdictional Natural Hazards Mitigation Plan adequately describes the causes and characteristics, history, location, extent and impacts of drought affecting the city of Gladstone. Descriptions of the drought hazard can be found on pages DR-1 to DR-6 of the 2012 Clackamas County Natural Hazards Mitigation Plan update.

The probability of drought in Gladstone was determined using scientific data, historical occurrences, and local knowledge. The HMAC estimates the probability of drought to be 'moderate' meaning one incident is likely within a 35 to 75 year period. This is in agreement with the county's 'moderate' rating. The HMAC estimates that Gladstone has a 'low' vulnerability to drought conditions, meaning less than 1% of the population could be affected in a large-scale regional event. This is in agreement with the county's 'low' rating.

Drought Mitigation Activities

The existing drought hazard mitigation activities are conducted at the county, regional, state, and federal levels and are described in the Clackamas County Natural Hazards Mitigation Plan. As such, the information will not be repeated here.

Drought Mitigation Action Items

The city of Gladstone does not believe that implementing drought-related mitigation activities will be cost-effective at this time. As such, the city has not identified drought mitigation action items. Gladstone will partner with Clackamas County, however, on the implementation of mitigation strategies that benefit both jurisdictions.

On Page 75, Delete sentence 1 of Paragraph 1 of the "Multi-Hazard" section and replace with:

~~***Multi-Hazard Action Items (MH)***~~

~~*Multi-Hazard action items are those activities that pertain to all seven hazards in the mitigation plan: flood, landslide, wildfire, severe winter storm, windstorm, earthquake, and volcanic eruption.*~~

Multi-Hazards

Multi-Hazard action items are those activities that pertain to all seven hazards in the mitigation plan: flood, landslide, wildfire, severe winter storm, windstorm, extreme heat earthquake, and volcanic eruption.

On Page 75, insert the following sentence at the end of Paragraph 1 of the "Multi-Hazard" section:

The updated action items detailing progress up to 2012 can be found in Appendix C of this plan.

On Page 75, Remove all of the action items following Paragraph 1 of the "Multi-Hazard Mitigation Action Items" subsection and move them to Appendix C.

Section 5: Mitigation Planning Priority System

The Mitigation Planning Priority Section of the Gladstone Addendum describes the project review and prioritization process for the action items outlined for each hazard in Section 4: Natural Hazards. Based on new information compiled during

the Clackamas County NHMP update process, updates to the Gladstone Addendum include the following:

On Page 79, delete Paragraph 1 of the "Action Items" subsection and replace with the following:

> ~~*Short and long-term action items identified through the planning process are an important part of the mitigation plan. Action items are detailed recommendations for activities that local departments, citizens and others can engage in to reduce risk. Full action items descriptions are located in the corresponding hazard section of this addendum. Descriptions include ideas for implementation, and coordinating/partner organizations.*~~
>
> *Action items are 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. Full action item descriptions with the 2012 updated progress are located in Appendix C of this addendum. Descriptions include ideas for implementation, and coordinating/partner organizations.*

On Page 80, Paragraph 2 of the "Action Items" subsection, delete the first two sentences of the paragraph and replace with the following:

> ~~*Note: the City of Gladstone does not believe that implementing volcano-related mitigation activities will be cost-effective at this time. As such, the city has not identified volcanic-eruption mitigation action items.*~~
>
> *Note: the City of Gladstone does not believe that implementing drought and volcanic-related mitigation activities will be cost-effective at this time. As such, the city has not identified drought or volcanic-eruption mitigation action items.*

Appendix D:
City of Happy Valley

Addendum to the Clackamas County Natural Hazards Mitigation Plan 2012 Amendments and Update

The Oregon Partnership for Disaster Resilience prepared this Appendix to the City of Happy Valley Addendum to the Clackamas County Natural Hazard Mitigation Plan (Happy Valley Addendum) as part of the 2011-12 update to the Clackamas County Natural Hazard Mitigation Plan. Upon local adoption, the appendix will become part of the Happy Valley Addendum and will ensure that the City of Happy Valley maintains FEMA Pre-Disaster Mitigation Program eligibility as well as compliance with the Clackamas County NHMP.

This appendix is organized according to the sections outlined in the Happy Valley Addendum. A description of each section is presented below with proposed changes and updates following each.

Section 1: Planning Process

The planning process section of the Happy Valley Addendum describes the activities used by the steering committee and community to develop the plan. Updates to the Planning Process section are as follows:

On Page 5, following the "Planning Process" subsection, insert the following:

2012 Update Planning Process

The RARE Participant and Clackamas County Emergency Management developed and facilitated one plan update meeting with the Hazard Mitigation Team on June 5, 2012. Please see Appendix A for the meeting agenda and minutes.

2012 Committee members included:

- *Steve Campbell, City of Happy Valley, Director of Community Services/Public Safety*
- *Laura Comstock, Clackamas County Emergency Management/RARE*
- *Carol Earle, City of Happy Valley, Engineer Manager*
- *RyanKersey, City of Happy Valley, Code Enforcement Supervisor*
- *Justin Popilck, City of Happy Valley, Associate Planner*
- *Chris Randall, City of Happy Valley, Public Works Director*
- *Matt Rozzell, City of Happy Valley, Building Official*
- *Shane Strangfield, Happy Valley Police, Police Chief*

NHMP Update Meeting - June 5, 2012: The participant worked with the city lead to convene the steering committee and meet to review and update the city's Natural Hazards Mitigation Plan Addendum. Because the county is in the process of updating their NHMP, each of the cities were required to update their addendums, regardless of when their plan was last updated or developed. This is to ensure that the county and all of the cities are on the same timeline, and will now all update their NHMP's in 5 years. As part of this meeting, the steering committee reviewed the county's updated hazard assessment and made necessary changes to their hazard assessment, if necessary. The committee also reviewed their list of community assets to determine if any new additions or changes needed to be made. The committee also reported on progress made to the action items listed in the current NHMP. The committee reviewed the mitigation strategy and plan implementation and maintenance pieces and made changes if necessary.

On Page 9, second paragraph following the "Plan Maintenance" subsection, delete the entire paragraph and replace with the following paragraph:

~~*Semi-Annual Meetings*~~

~~*The HMT will meet on a semi-annual basis. Meetings will be held in the spring and fall to discuss the previous hazard season and prepare for the upcoming hazard seasons. During the first meeting each year, the committee will:*~~

Annual Meeting

The HMT will meet once a year. The meeting will be coordinated by the convener and will debrief the committee on the previous hazard seasons, as well as prepare for the upcoming hazard seasons. In addition to debriefing and preparing for the upcoming hazard seasons, the committee will:

On Page 9, first sentence following the first set of bullets under the "Plan Maintenance" subsection, delete the following sentence:

~~*During the second meeting of each year, the committee will:*~~

On Page 10, following the set of bullets under the "Plan Maintenance" subsection, insert the following paragraph:

The convener, or city lead designee, will be responsible for meeting annually with the county Hazard Mitigation Coordinator. This meeting will provide a chance for each of the city leads to meet together and discuss updates and progress with the Hazard Mitigation Coordinator. The convener will report back to the HMTF with information gathered. The Coordinator will be responsible for setting up the meeting, and providing the city leads with updates on new studies or potential funding opportunities for mitigation projects.

On Page 10, Paragraph 3 following the "Plan Maintenance" subsection, delete the first sentence and replace with the following:

~~*The convener will be responsible for documenting the outcome of the semi-annual meetings.*~~

The convener will be responsible for documenting the outcome of the annual meeting, as well as the meeting with the county's Hazard Mitigation Coordinator.

Section 2: Community Profile

The community profile section of the Happy Valley Addendum describes a variety of community characteristics specific to the City of Happy Valley. Based on new information compiled during the Clackamas County NHMP update process, updates to the Happy Valley Addendum include the following:

On Page 25, under the "Critical Facilities" subsection, edit the following bullet:

- ~~*162nd Park*~~

- *Hood View Park*

On Page 25, under the "Critical Facilities" subsection, add the following bullets:

- *Station 5*
- *Station 8*
- *Fire Training Center (Pleasant Valley Golf Course)*
- *Abundant Life*
- *Encompass Urgent Care*

On Page 25, under the "Critical Infrastructure" subsection, remove the following bullet:

- ~~*Water treatment, storage, and distribution lines*~~

On Page 25, under the "Critical Infrastructure" subsection, edit the following bullet:

- ~~*Water treatment plant*~~
- *Sunrise Water Authority*

On Page 26, under the "Essential Facilities" subsection, add the following bullets:

- *Sunnyside Foursquare Church*
- *Sunnyside Library*

On Page 26, under the "Environmental Assets" subsection, edit the following bullet:

- ~~*Future home of 162nd Park*~~
- *Hood View Park*

On Page 26, under the "Environmental Assets" subsection, add the following bullets:

- Pleasant Valley Golf Course
- Mt. Talbert

On Page 26, under the "Environmental Assets" subsection, add the following subsection:

> ***Economic Assets/Population Centers: Economic Centers*** *are those businesses that employ large numbers of people, and provide an economic resource to the City of Happy Valley. If damaged, the loss of these economic centers could significantly affect economic stability and prosperity.* ***Population Centers*** *usually are aligned with economic centers, and will be of particular concern for evacuation/notification during a hazard event.*
>
> - *Happy Valley Town Center*
> - *Sunnyside Village*

Section 3: Risk Assessment

The risk assessment section of the Happy Valley Addendum describes the types, causes, characteristics and relative risk posed by natural hazards on the City of Happy Valley. Based on new information compiled during the Clackamas County NHMP update process, updates to the Happy Valley Addendum include the following:

On Page 44, Paragraph 4 of the "Landslide" subsection, delete the third and fourth sentences and replace with the following:

> ~~*The HMT additionally estimates that Happy Valley has a 'moderate' vulnerability to landslide hazards. A 'moderate' ranking means that between 1-10% of the population and/or community assets could be affected by a landslide event, which is higher than the county's 'low' vulnerability rating.*~~
>
> *The HMT additionally estimates that Happy Valley has a 'high' vulnerability to landslide hazards. A 'high' ranking means that more than 10% of the population and/or community assets could be affected by a landslide event, which is higher than the county's 'low' vulnerability rating.*

On Page 49, Paragraph 4 of the "Wildfire" subsection, delete the paragraph and replace with the following paragraph:

> ~~*The HMT estimates the probability of future wildfire events is 'moderate,' meaning one event is likely within a 35 to 75 year period. Vulnerability is 'moderate,' meaning between 1% and 10% of the population or community assets would be affected by a major wildfire event. Both rankings are in agreement with the county's 'moderate' ratings.*~~
>
> *The HMT estimates the probability of future wildfire events is 'high,' meaning one event is likely within a 10 to 35 year period. This is higher than the county's 'moderate' probability rating. Vulnerability is 'moderate,' meaning between 1% and 10% of the population or community assets would be affected by a major wildfire event. This is in accordance with the county's 'moderate' rating for vulnerability.*

On Page 53, remove the section, "Severe Storms: Wind and Winter" and replace with:

~~***Severe Storms: Wind and Winter***~~

Severe Weather: Wind, Winter, and Extreme Heat

On Page 54, following Paragraph 5 of the "Severe Weather: Wind, Winter, and Extreme Heat" subsection, insert the following paragraph:

Extreme heat has a very low threat in Happy Valley. The HMT estimates the probability for future extreme heat events is 'low,' meaning one incident is likely within a 75 to 100 year period. This estimate is lower than the county's 'high' rating. The vulnerability estimate of future extreme heat events is 'low,' meaning less than 1% of the population and assets would be affected in a major event. This estimate is lower than the county's 'moderate' rating.

On Page 56, Paragraph 5 of the "Earthquake" subsection, delete the entire paragraph and replace with the following:

~~*Clackamas County estimates a high probability that earthquakes will occur in the future (event is likely within a 10 to 35 year period), and a high vulnerability to earthquake events (more than 10% of the population and assets would likely be affected in a major event). Both ratings are true for the city of Happy Valley as well.*~~

The HMT estimates a 'high' probability that earthquakes will occur in the future (event is likely within a 10 to 35 year period); this is higher than the county's 'low' rating. The HMT also estimates a high vulnerability to earthquake events (more than 10% of the population and assets would likely be affected in a major event); the estimate is the same as the county's 'high' rating.

On Page 64, remove the first two sentences of paragraph 4 and replace with the following:

~~*Clackamas County estimates a low probability that volcanic eruptions will occur in the future meaning one event is likely within a 75 to 100 year period, and a high vulnerability to volcanic events, meaning more than 10% of the population or assets would be affected. Both ratings are true for the city of Happy Valley as well.*~~

The HMT estimates a 'low' probability that volcanic eruptions will occur, meaning one incident is likely within a 75 to 100 year period. This is in agreement with the county's 'low' rating. Additionally, the HMT estimates a 'high' vulnerability to volcanic eruptions, meaning more than 10% of the population and infrastructure is likely to be affected. This is higher than county's 'moderate' ranking.

On Page 64, following the "Volcano" subsection, insert the following new "Drought" subsection:

Drought Profile

The Clackamas County Multi-Jurisdictional Natural Hazards Mitigation Plan adequately describes the causes and characteristics, history, location, extent and

impacts of drought affecting the city of Happy Valley. Descriptions of the drought hazard can be found on pages DR-1 toDR-6 of the 2012 Clackamas County Natural Hazards Mitigation Plan update.

The probability of drought in Valley was determined using scientific data, historical occurrences, and local knowledge. The HMT estimates the probability of drought to be 'low' meaning one incident is likely within a 75 to 100 year period. This is lower than the county's 'moderate' rating. The HMT estimates that Happy Valley has a 'low' vulnerability to drought conditions, meaning less than 1% of the population could be affected in a large-scale regional event. This is in agreement with the county's 'low' rating.

Drought Mitigation Activities

The existing drought hazard mitigation activities are conducted at the county, regional, state, and federal levels and are described in the Clackamas County Natural Hazards Mitigation Plan. As such, the information will not be repeated here.

Drought Mitigation Action Items

The city of Happy Valley does not believe that implementing drought-related mitigation activities will be cost-effective at this time. As such, the city has not identified drought mitigation action items. Happy Valley will partner with Clackamas County, however, on the implementation of mitigation strategies that benefit both jurisdictions.

Section 4: Action Items

The action items section of the Happy Valley Addendum describes detailed recommendations for activities that local departments, citizens and others could engage in to reduce risk. Based on new information compiled during the Clackamas County NHMP update process, updates to the Happy Valley Addendum include the following:

On Page 65, Paragraph 1 of the "Action Items" subsection, delete the last sentence of the paragraph and replace with the following:

~~*Full action item worksheets are located in Appendix B of this addendum.*~~

The full action item worksheets with 2012 updated progress are located in Appendix B of this addendum.

On Page 43, Paragraph 2 of the "Action Items" subsection, delete the first two sentences of the paragraph and replace with the following:

~~*Note: the City of Happy Valley does not believe that implementing landslide or volcano-related mitigation activities will be cost-effective at this time. As such, the city has not identified landslide or volcanic eruption mitigation action items.*~~

Note: the City of Happy Valley does not believe that implementing landslide, drought, and volcanic-related mitigation activities will be cost-effective at this time.

As such, the city has not identified landslide, drought, or volcanic-eruption mitigation action items.

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Appendix C:
City of Johnson City

Addendum to the Clackamas County Natural Hazards Mitigation Plan 2012 Amendments and Update

The Oregon Partnership for Disaster Resilience prepared this Appendix to the City of Johnson City Addendum to the Clackamas County Natural Hazard Mitigation Plan (Johnson City Addendum) as part of the 2011-12 update to the Clackamas County Natural Hazard Mitigation Plan. Upon local adoption, the appendix will become part of the Johnson City Addendum and will ensure that the City of Johnson City maintains FEMA Pre-Disaster Mitigation Program eligibility as well as compliance with the Clackamas County NHMP.

This appendix is organized according to the sections outlined in the Johnson City Addendum. A description of each section is presented below with proposed changes and updates following each.

Section 1: Planning Process

The planning process section of the Johnson City Addendum describes the activities used by the steering committee and community to develop the plan. Updates to the Planning Process section are as follows:

On Page 6, following the "Planning Process" subsection, insert the following:

2012 Update Planning Process

The RARE Participant and Clackamas County Emergency Management developed and facilitated one plan update meeting with the Hazard Mitigation Task Force on June 1, 2012. Please see Appendix A for the meeting agenda and minutes.

2012 Committee members included:

- *B.J. DiCario, Johnson City Planning Commission*
- *Judy Davis, Johnson City Recorder*
- *Kay Mordock, Mayor of Johnson City*
- *Kevin Johnson, Johnson Mobile Estates*
- *Laura Comstock, Clackamas County Emergency Management/RARE*

NHMP Update Meeting - June 1, 2012: The participant worked with the city lead to convene the steering committee and meet to review and update the city's Natural Hazards Mitigation Plan Addendum. Because the county is in the process of updating their NHMP, each of the cities were required to update their addendums,

regardless of when their plan was last updated or developed. This is to ensure that the county and all of the cities are on the same timeline, and will now all update their NHMP's in 5 years. As part of this meeting, the steering committee reviewed the county's updated hazard assessment and made necessary changes to their hazard assessment, if necessary. The committee also reviewed their list of community assets to determine if any new additions or changes needed to be made. The committee also reported on progress made to the action items listed in the current NHMP. The committee reviewed the mitigation strategy and plan implementation and maintenance pieces and made changes if necessary.

On Page 8, first paragraph following the "Coordinating Body" subsection, delete sentence one and replace with the following sentence:

~~*The Hazard Mitigation Task Force (HMTF) will serve as the coordinating body for Johnson City's Natural Hazards Mitigation Plan Addendum.*~~

In conjunction with the City Council, the Hazard Mitigation Task Force (HMTF) will serve as the coordinating body for Johnson City's Natural Hazards Mitigation Plan Addendum.

On Page 8, first paragraph following the "Convener" subsection, delete sentence one and replace with the following sentence:

~~*The Johnson City Emergency Manager (from Clackamas Fire District #1) will serve as the plan's convener.*~~

The Mayor of Johnson City will serve as the plan's convener.

On Page 9, first paragraph following the "Plan Maintenance" subsection, delete the last sentence and replace with the following sentence:

~~*The Hazard Mitigation Task Force and Emergency Manager will be responsible for maintaining the plan.*~~

The Hazard Mitigation Task Force and Mayor will be responsible for maintaining the plan.

On Page 9, second paragraph following the "Plan Maintenance" subsection, delete the entire paragraph and replace with the following paragraph:

~~*Semi-Annual Meetings*~~

~~*The HMTF will meet on a semi-annual basis. Meetings will be held in the spring and fall of each year to allow the committee to debrief on the previous hazard seasons and prepare for the upcoming hazard seasons. In addition to debriefing and preparing for the upcoming hazard seasons, at each spring meeting the committee will:*~~

Annual Meeting

The HMTF will meet once a year. The meeting will be coordinated by the convener and will coincide with a city council meeting. This meeting will debrief on the previous hazard seasons and prepare for the upcoming hazard seasons. In addition to debriefing and preparing for the upcoming hazard seasons, the committee will:

On Page 9, set of bullets under the "Plan Maintenance" subsection, delete these bullets and replace with the following bullets:

- ~~*Document hazard events that occurred in the previous fall and winter months;*~~
- ~~*Prepare public education pieces for the upcoming spring and summer month hazards;*~~
- ~~*Document hazard events that occurred in the previous spring and summer months;*~~
- ~~*Prepare public education pieces for the upcoming fall and winter month hazards;*~~

- *Document hazard events that occurred in the previous year;*
- *Prepare public education pieces for the upcoming hazard seasons*

On Page 9, first sentence following the first set of bullets under the "Plan Maintenance" subsection, delete the following sentence:

~~*During the second meeting of each year, the committee will:*~~

On Page 10, first paragraph following the set of bullets under the "Plan Maintenance" subsection, insert the following paragraph:

The convener, or city lead designee, will be responsible for meeting annually with the county Hazard Mitigation Coordinator. This meeting will provide a chance for each of the city leads to meet together and discuss updates and progress with the Hazard Mitigation Coordinator. The convener will report back to the HMTF with information gathered. The Coordinator will be responsible for setting up the meeting, and providing the city leads with updates on new studies or potential funding opportunities for mitigation projects.

On Page 10, third paragraph following the "Plan Maintenance" subsection, delete the first sentence and replace with the following sentence:

~~*The convener will be responsible for documenting the outcome of the semi-annual meetings.*~~

The convener will be responsible for documenting the outcome of the annual meeting, as well as the meeting with the county's Hazard Mitigation Coordinator.

Section 2: Community Profile

The community profile section of the Johnson City Addendum describes a variety of community characteristics specific to the City of Johnson City. Based on new information compiled during the Clackamas County NHMP update process, updates to the Johnson City Addendum include the following:

On Page 19, under the "Environmental Assets" subsection, edit the following bullet:

- ~~*Park adjacent to Lake Leona*~~

- *Mordock Park*

Section 3: Risk Assessment

The risk assessment section of the Johnson City Addendum describes the types, causes, characteristics and relative risk posed by natural hazards on the City of Johnson City. Based on new information compiled during the Clackamas County NHMP update process, updates to the Johnson City Addendum include the following:

On Page 23, Paragraph 5 of the "Flood" subsection, delete the paragraph and replace with the following paragraph:

~~*The HMTF estimates the probability of future flooding events in Johnson City is 'high' meaning one event is likely to occur within a 10 to 35 year period. The HMTF estimates the city's vulnerability to flooding events is 'moderate' meaning between 1% and 10% of the city's population and/or assets could be affected in a major flood event. Both estimates are in agreement with the county's probability and vulnerability ratings.*~~

The HMTF estimates the probability of future flooding events in Johnson City is 'moderate' meaning one event is likely to occur within a 35 to 75 year period. This estimate is lower than the county's 'high' probability ranking. The HMTF estimates the city's vulnerability to flooding events is 'moderate' meaning between 1% and 10% of the city's population and/or assets could be affected in a major flood event. This is in agreement with the county's 'moderate' vulnerability ranking.

On Page 28, Paragraph 4 of the "Wildfire" subsection, delete the paragraph and replace with the following paragraph:

~~*The HMTF estimates the probability of future wildfire events is 'moderate,' meaning one event is likely within a 35 to 75 year period. The HMTF additionally estimates that the city has a 'moderate' vulnerability to wildfire hazards, meaning between 1% and 10% of the population or community assets could be affected by a major wildfire event. Both rankings are in agreement with the county's 'moderate' ratings.*~~

The HMTF estimates the probability of future wildfire events is 'low,' meaning one event is likely within a 75 to 100 year period. The HMTF additionally estimates that the city has a 'low' vulnerability to wildfire hazards, meaning less than 1% of the population or community assets could be affected by a major wildfire event. Both rankings are lower than the county's 'moderate' rankings.

On Page 31, remove the section, "Severe Storms: Wind and Winter" and replace with:

~~***Severe Storms: Wind and Winter***~~

Severe Weather: Wind, Winter, and Extreme Heat

On Page 31, Paragraph 1 of the "Severe Weather: Wind, Winter, and Extreme Heat" subsection, delete the following sentence and insert the following:

~~*Additionally, the historical severe storm events up to September 2007 have also been described in the county plan, and are applicable to Johnson City.*~~

Additionally, the historical severe weather events up to September 2012 have also been described in the county plan, and are applicable to Johnson City.

On Page 31, Paragraph 2 of the "Severe Weather: Wind, Winter, and Extreme Heat" subsection, delete the first and last sentence of the paragraph and replace with the following sentences:

~~*The HMTF estimates the probability of future winter storm events is 'high,' meaning one incident is likely within a 10 to 35 year period.*~~

~~*Both the probability and vulnerability rankings for winter storms are in agreement with the county's rankings.*~~

The HMTF estimates the probability of future winter storm events is 'moderate,' meaning one incident is likely within a 35 to 75 year period.

The probability estimate is in accordance with the county's 'moderate' ranking, but the vulnerability estimate is higher than the county's 'low' rating.

On Page 31, after Paragraph 4 of the "Severe Weather: Wind, Winter, and Extreme Heat" subsection, insert the following paragraph:

Extreme heat has a very low threat in Johnson City. The HMTF estimates the probability for future extreme heat events is 'low,' meaning one incident is likely within a 75 to 100 year period. This estimate is lower than the county's 'high' rating. The vulnerability estimate of future extreme heat events is 'low,' meaning less than 1% of the population and assets would be affected in a major event. This estimate is lower than the county's 'moderate' rating.

On Page 33, Paragraph 6 of the "Earthquake" subsection, delete the first two sentences of the paragraph and replace with the following:

~~*The HMTF ranks both the probability of future earthquake events and vulnerability as 'high,' meaning one event is likely within a 10 to 35 year period and more than 10% of population and assets would be affected in a major event. Both estimates are in agreement with the county's 'high' ratings.*~~

The HMTF ranks the probability of future earthquake events as 'moderate,' meaning one incident is likely within a 35 to 75 year period. This is higher than the county's 'low' rating. Additionally, the HMTF estimates the vulnerability of future earthquake events is 'high,' meaning more than 10% of the population and assets could be affected in a major event. This is in agreement with the county's 'high' rating.

On Page 42, Paragraph 4 of the "Volcano Profile" section, remove the following sentences and replace with:

~~*Clackamas County estimates a low probability that volcanic eruptions will occur in the future and a high vulnerability to volcanic events. Both ratings are true for the city of Johnson City as well.*~~

Johnson City estimates a 'low' probability of volcanic eruptions occurring, meaning one event is likely within a 75 to 100 year period. This is in agreement with the county's 'low' rating. Johnson City estimates a 'high' vulnerability to volcanic eruptions, meaning more than 10% of the population and infrastructure will be affected. This is higher than the county's 'moderate' rating.

On Page 42, following the "Volcano" subsection, insert the following new "Drought" subsection:

Drought Profile

The Clackamas County Multi-Jurisdictional Natural Hazards Mitigation Plan adequately describes the causes and characteristics, history, location, extent and impacts of drought affecting the city of Johnson City. Descriptions of the drought hazard can be found on pages DR-1 to DR-6 of the 2012 Clackamas County Natural Hazards Mitigation Plan update.

The probability of drought in Johnson City was determined using scientific data, historical occurrences, and local knowledge. The HMTF estimates the probability of drought to be 'low' meaning one incident is likely within a 75 to 100 year period. This is lower than the county's 'moderate' rating. The HMTF estimates that Johnson City has a 'low' vulnerability to drought conditions, meaning less than 1% of the population could be affected in a large-scale regional event. This is in agreement with the county's 'low' rating.

Drought Mitigation Activities

The existing drought hazard mitigation activities are conducted at the county, regional, state, and federal levels and are described in the Clackamas County Natural Hazards Mitigation Plan. As such, the information will not be repeated here.

Drought Mitigation Action Items

The city of Johnson City does not believe that implementing drought-related mitigation activities will be cost-effective at this time. As such, the city has not identified drought mitigation action items. Johnson City will partner with Clackamas County, however, on the implementation of mitigation strategies that benefit both jurisdictions.

Section 4: Action Items

The action items section of the Johnson City Addendum describes detailed recommendations for activities that local departments, citizens and others could engage in to reduce risk. Based on new information compiled during the Clackamas County NHMP update process, updates to the Johnson City Addendum include the following:

On Page 43, Paragraph 1 of the "Action Items" subsection, delete the last sentence of the paragraph and replace with the following:

~~*Full action item worksheets are located in Appendix B of this addendum.*~~

The full action item worksheets with updated progress for 2012 are located in Appendix B of this addendum.

On Page 43, List of action items under the "Action Items" subsection, delete the following bullets and replace with the following:

- ~~*MH #2: Integrate the goals and action items from the Natural Hazards Mitigation Plan into existing regulatory documents and programs, where appropriate.*~~
- ~~*MH #5: Maintain records of the locations of all underground utility lines.*~~
- ~~*FL #1: Explore participation in the National Flood Insurance Program (NFIP).*~~
- ~~*FL #2: Coordinate with Clackamas County to keep Kellogg Creek clear of debris.*~~

- *MH #2: Update, maintain, and map records of the locations of all underground utility lines.*
- *FL #1: Coordinate with Clackamas County to keep Kellogg Creek clear of debris.*
- *SW #1: Conduct public outreach campaigns to raise awareness about severe storm hazards, shelter sites, and mitigation actions residents can take to reduce the impact of severe weather in Johnson City.*

On Page 43, Paragraph 2 of the "Action Items" subsection, delete the first two sentences of the paragraph and replace with the following:

~~*Note: the City of Johnson City does not believe that implementing landslide, severe storm and volcano-related mitigation activities will be cost-effective at this time. As such, the city has not identified landslide, severe storm, or volcanic-eruption mitigation action items.*~~

Note: the City of Johnson City does not believe that implementing landslide, drought, and volcanic-related mitigation activities will be cost-effective at this time. As such, the city has not identified landslide, drought, or volcanic-eruption mitigation action items.

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Appendix D:
City of Lake Oswego

Addendum to the Clackamas County Natural Hazards Mitigation Plan 2012 Amendments and Update

The Oregon Partnership for Disaster Resilience prepared this Appendix to the City of Lake Oswego Addendum to the Clackamas County Natural Hazard Mitigation Plan (Lake Oswego Addendum) as part of the 2011-12 update to the Clackamas County Natural Hazard Mitigation Plan. Upon local adoption, the appendix will become part of the Lake Oswego Addendum and will ensure that the City of Lake Oswego maintains FEMA Pre-Disaster Mitigation Program eligibility as well as compliance with the Clackamas County NHMP.

This appendix is organized according to the sections outlined in the Lake Oswego Addendum. A description of each section is presented below with proposed changes and updates following each.

Section 1: Planning Process

The planning process section of the Lake Oswego Addendum describes the activities used by the steering committee and community to develop the plan. Updates to the Planning Process section are as follows:

On Page 6, following Section 1.2 "2009 Plan Update," insert the following section:

1.3 2012 Addendum Update

In accordance with the county's Natural Hazards Mitigation Plan update, the City of Lake Oswego participated in the update of their addendum. By doing so, Lake Oswego will now be aligned with the county, and will update their NHMP's together in five years.

2012 Committee members included:

- *Rob Amsberry, Lake Oswego Public Works – Engineering*
- *Laura Comstock, Clackamas County Emergency Management/RARE*
- *David Donaldson, City Manager*
- *Larry Goff, Lake Oswego Fire Department*
- *Leslie Hamilton, Lake Oswego Planning Department*
- *John Harris, Lake Oswego Public Works – Operations*
- *Bonnie Hirshberger, Lake Oswego City Manager's Office – Public Affairs*
- *Dale Jorgensen, Lake Oswego Police Department*

- *Phil Sample, Lake Oswego Fire Department, Fire Marshal*
- *Ed Wilson, Lake Oswego Fire Department*

2012 Update Planning Process

The RARE Participant and Clackamas County Emergency Management developed and facilitated one plan update meeting with the Hazard Mitigation Advisory Committee on June 11, 2012. Please see Appendix A for the meeting agenda and minutes.

NHMP Update Meeting - June 11, 2012: The participant worked with the city lead to convene the steering committee and meet to review and update the city's Natural Hazards Mitigation Plan Addendum. Because the county is in the process of updating their NHMP, each of the cities were required to update their addendums, regardless of when their plan was last updated or developed. As part of this meeting, the steering committee reviewed the county's updated hazard assessment and made necessary changes to their hazard assessment, if necessary. The committee also reviewed their list of community assets to determine if any new additions or changes needed to be made. The committee also reported on progress made to the action items listed in the current NHMP. The committee reviewed the mitigation strategy and plan implementation and maintenance pieces and made changes if necessary.

On Page 9, second paragraph following the "Formal Review Process" subsection, delete the entire paragraph and replace with the following paragraph:

~~*Semi-Annual Meetings*~~

~~*The HMAC will meet on a semi-annual basis in the spring and fall of each year to review, implement and update information in the addendum. During the first meeting of each year, the HMAC will:*~~

Annual Meeting

The HMAC will meet once a year. The meeting will be coordinated by the convener. This meeting will debrief on the previous hazard seasons and prepare for the upcoming hazard seasons. In addition to debriefing and preparing for the upcoming hazard seasons, the committee will:

On Page 9, set of bullets under the "Formal Review Process" subsection, delete these bullets and replace with the following bullets:

- ~~*Document hazard events that occurred in the previous fall and winter months;*~~
- ~~*Prepare public education pieces for the upcoming spring and summer month hazards;*~~
- ~~*Document hazard events that occurred in the previous spring and summer months;*~~
- ~~*Prepare public education pieces for the upcoming fall and winter month hazards;*~~

- *Document hazard events that occurred in the previous year;*
- *Prepare public education pieces for the upcoming hazard seasons*

On Page 9, first sentence following the first set of bullets under the "Formal Review Process" subsection, delete the following sentence:

~~*During the second meeting of each year, the committee will:*~~

On Page 9, first paragraph following the set of bullets under the "Formal Review Process" subsection, insert the following paragraph:

The convener, or city lead designee, will be responsible for meeting annually with the county Hazard Mitigation Coordinator. This meeting will provide a chance for each of the city leads to meet together and discuss updates and progress with the Hazard Mitigation Coordinator. The convener will report back to the HMAC with information gathered. The Coordinator will be responsible for setting up the meeting, and providing the city leads with updates on new studies or potential funding opportunities for mitigation projects.

On Page 9, third paragraph following the "Formal Review Process" subsection, delete the first sentence and replace with the following sentence:

~~*The City Manager's Office will be responsible for organizing, facilitation, and documenting the outcomes of semi-annual meetings.*~~

The City Manager's Office will be responsible for documenting the outcomes of the annual meeting, as well as the meeting with the county's Hazard Mitigation Coordinator.

Section 2: Community Profile

The community profile section of the Lake Oswego Addendum describes a variety of community characteristics specific to the City of Lake Oswego. Based on new information compiled during the Clackamas County NHMP update process, updates to the Lake Oswego Addendum include the following:

On Page 20, under the "Historic & Cultural Assets" subsection, delete the following bullets:

- ~~*Drew House*~~
- ~~*Platts House*~~

On Page 19, under the "Historic & Cultural Assets" subsection, add the following bullets:

- *Didzun House*
- *Lake Grove Fire Station*
- *Noel Dew House*
- *Trueblood House*
- *Headrick-Carothers House*

Section 3: Hazard Assessment

The hazard assessment section of the Lake Oswego Addendum provides information on identifying hazards based on their geographic location, probability, and intensity; vulnerability assessment and inventory of community assets, and; a risk analysis estimating potential losses from each hazard. Based on new information compiled during the Clackamas County NHMP update process, updates to the Lake Oswego Addendum include the following:

On Page 21, Paragraph 6 of the "Government Structure" subsection, delete the first sentence and replace with:

~~***Maintenance Services** provides many of the basic urban services to the citizens of Lake Oswego, including water sanitary sewer and storm drainage systems, and their maintenance and repair.~~

***Public Works Operations** provides many of the basic urban services to the citizens of Lake Oswego, including water sanitary sewer and storm drainage systems, and their maintenance and repair.*

On Page 24, List of Critical Facilities under the "Community Assets: Vulnerability" section, delete the following and replace with:

~~*City Maintenance Facility*~~

Public Works Operations

On Page 24, List of Essential Facilities under the "Community Assets: Vulnerability" section, delete the following and replace with:

~~*Waluga Junior High*~~

~~*Bryant Elementary*~~

Bryant Campus

On Page 24, List of Essential Facilities under the "Community Assets: Vulnerability" section, delete the following:

~~*Palisades Elementary*~~

~~*Uplands Elementary*~~

On Page 24, List of Critical Infrastructure under the "Community Assets: Vulnerability" section, edit the following and replace with:

~~*Tryon Creek Wastewater Treatment Plant and main lines*~~

Tryon Creek Wastewater Treatment Plant, lift stations, and main lines

On Page 25, List of Environmental Assets under the "Community Assets: Vulnerability" section, edit the following and replace with:

~~*Millennium Park*~~

Millennium Plaza Park

On Page 25, List of Environmental Assets under the "Community Assets: Vulnerability" section, add the following assets:

Sundeleaf Park

Lusher Farm

On Page 25, following "Environmental Assets," add a new subsection, "Vulnerable Populations":

Vulnerable Populations: *Populations that have special needs or require special consideration.*

- *Child Care Facilities*
  - *Children's Hour Academy*
  - *Touchstone School*
  - *Lake Oswego Montessori School*
  - *Exploration Learning School*
  - *Park Academy*
  - *Bethlehem Church Pre-School*
  - *NW Montessori*
  - *Lake Oswego Kindercare*
  - *Rockinghorse Day School*
  - *Sonshine Express Preschool*
  - *West Lake Montessori*
  - *Community Arts Pre-School*
  - *Maple Street Kids*
  - *Christ Church Episcopal Preschool*
  - *Mountain Park Kindercare*
  - *Mountain Park Playschool*
  - *Kings Kids*
  - *Kiddie Care Child Care*
  - *Village Montessori*
  - *Mayam's Preschool*
  - *R D & S Daycare*
  - *Oswego Play School*
  - *Kiddie Care Child Care*
  - *Vermont Hills Family Life Center*
  - *International Leadership Academy*
- *Adult Care Facilities*
  - *Abby's Adult Foster Care*
  - *Always Caring*
  - *Autumn Health Care II*
  - *Best Family Care*
  - *Carmen Oaks Assisted Living*
  - *Cherry Crest Adult Care Home*
  - *Daniel's Adult Care Home*
  - *Eva & Gabriel Adult Care Home*

- *Felicia's Adult Care Home*
- *Green Ridge Estates*
- *Greentree Adult Care Home*
- *Health For Life*
- *Hillside Home Adult Care*
- *Hope's Sweet Home*
- *Indian Springs Adult Care Home*
- *Lake Oswego Care Home*
- *Lake Oswego Comfort Living*
- *Loving Care Adult Care Home*
- *Lucky's Home*
- *Mary's Woods*
- *Oswego Care Home LTD.*
- *Oswego Place Assisted Living*
- *Oswego Pointe Adult Care Home*
- *Rosewood Inn Adult Foster Care*
- *Sunshine Adult Foster Care*
- *The Pearl at Kruse Way*
- *The Stafford*

On Page 25, following "Vulnerable Populations," add a new subsection, "Economic Assets/Population Centers":

***Economic Assets/Population Centers: Economic Assets** are those businesses that employ large numbers of people, and provide an economic resource to the city of Lake Oswego. If damaged, the loss of these economic assets could significantly affect economic stability and prosperity. **Population Centers** usually are aligned with economic centers, and will be of particular concern for evacuation/notification during a hazard event.*

- *Lake Oswego School District*
- *Lake Oswego City Hall*
- *Meadows Road and Center Pointe Complex's*

On Page 25, following "Economic Assets/Population Centers," add a new subsection, "Hazardous Materials":

***Hazardous Materials:** Those sites that store, manufacture, or use potentially hazardous materials.*

- *Portland Willamette Railroad*
- *City of Lake Oswego*
- *McCormack Coil Co Inc.*
- *Taylor Made Labels Inc.*
- *Cascade Pools*
- *Red Fox Hills Town Associate*
- *Lakeshore Concrete Co.*
- *Gage Industries*
- *Qwest Corporation*

- *Verizon Northwest Inc.*
- *Cascade Pools*
- *Portland Willamette Railroad*
- *Interstate 5*
- *State Highway 43*

Section 4: Natural Hazards

The Natural Hazards section of the Lake Oswego Addendum describes the types, causes, characteristics and relative risk posed by each individual natural hazard for the city of Lake Oswego. Based on new information compiled during the Clackamas County NHMP update process, updates to the Lake Oswego Addendum include the following:

On Page 37, Insert the following sentence at the end of paragraph 1 under the "Flood Mitigation Projects" subsection:

> *The LOIS project was completed in winter of 2011-2012. Additionally, the City constructed seismic upgrades to the elevated wastewater main pipes that lead into the Tryon Creek Wastewater Treatment Plant.*

On Page 37, Insert the following paragraph at the end of paragraph 1 under the "Flood Mitigation Projects" subsection:

> *Lake Oswego has currently been working with a consultant to incrementally model the flood levels of the Tualatin River. The final product of this effort will be the production of a series of flood inundation area maps that will be based upon the level of the river as measured at the USGS "West Linn" gage station. The city will use these maps to provide critical information to the Emergency Operation Center and crews in the field in an effort to better manage flood response. The maps will allow for strategic allocation of resources necessary to evacuate specific areas, close threatened roads, set up detours and deploy sand bagging materials.*

On Page 38, Insert the following sentence at the end of paragraph 2 under the "Flood Mitigation Projects" subsection:

> *The FAN drainage plan was completed and identifies several projects. The projects have been included in the city CIP Plan, currently listed as unfunded.*

On Page 38, Insert the following sentence at the end of paragraph 4 under the "Flood Mitigation Projects" subsection:

> *With improvements to the dam spillway in 2011-2012, the city will no longer need to consider blocking the flow path into Lakewood Bay. All flood flows (up to the 100-yr event) will spill over the dam.*

On Page 39, Insert the following sentence at the end of paragraph 1 under the "Flood Mitigation Action Items" subsection:

Detailed Flood Mitigation Action Item worksheets with 2012 updates are located in Appendix A of this Addendum.

On Page 39, Remove all of the action items following Paragraph 1 of the "Flood Mitigation Action Items" subsection, and move them to Appendix C.

On Page 46, Insert the following sentence at the end of paragraph 2 of the "Landslide Mitigation Projects" subsection:

The city is currently working on a Capital Project to improve the surface water drainage in the area.

On Page 46, Insert the following sentence at the end of paragraph 1 under the "Landslide Mitigation Action Items" subsection:

Detailed Landslide Mitigation Action Item worksheets with 2012 updates are located in Appendix A of this Addendum.

On Page 46, Remove all of the action items following Paragraph 1 of the "Landslide Mitigation Action Items" subsection, and move them to Appendix C.

On Page 52, Insert the following sentence at the end of paragraph 1 under the "Wildfire Mitigation Action Items" subsection:

Detailed Wildfire Mitigation Action Item worksheets with 2012 updates are located in Appendix A of this Addendum.

On Page 52, Remove all of the action items following Paragraph 1 of the "Wildfire Mitigation Action Items" subsection, and move them to Appendix C.

On Page 55, edit Section 4.4 title, "Severe Storm: Wind and Winter" to be:

4.4 Severe Storm: Wind, Winter, and Extreme Heat

On Page 55, delete sentence 1 of the subsection, "Severe Storm Profile" and replace with the following:

~~*The historical severe windstorm and winter storm events are described in the County plan, and are applicable to Lake Oswego.*~~

The historical severe windstorm, winter storm, and extreme heat events are described in the County plan, and are applicable to Lake Oswego.

On Page 55, Paragraph 2 of the "Severe Storm Hazard Assessment" subsection, delete the second and third paragraphs, and replace with:

~~*The HMAC estimates that the probability of severe winter storm and wind storms events is 'high,' meaning one incident is likely to occur in a 10 to 35 year period. The winter storm probability rating is in agreement with the County's rating, however Lake Oswego's wind storm rating is higher than the County's 'moderate' rating.*~~

The HMAC estimates that the probability of severe winter storm and wind storms events is 'high,' meaning one incident is likely to occur in a 10 to 35 year period, and 'low' for extreme heat events, meaning one incident likely within a 75 to 100 year period. The winter storm and extreme heat probability ratings are in agreement with the County's ratings, however Lake Oswego's wind storm rating is higher than the county's 'moderate' rating.

On Page 55, Paragraph 4 of the "Severe Storm Hazard Assessment" subsection, delete the first and second paragraphs, and replace with:

~~*The HMAC estimates a 'moderate' vulnerability to severe storms, meaning between 1% and 10% of the population and assets would be affected. This rating agrees with the County's 'moderate' winter storm vulnerability rating, but is higher than the County's 'low' vulnerability rating for wind storms.*~~

The HMAC estimates a 'moderate' vulnerability to severe storms, meaning between 1% and 10% of the population and assets would be affected. This rating agrees with the County's 'moderate' winter storm and extreme heat vulnerability ratings, but is higher than the county's 'low' vulnerability rating for wind storms.

On Page 57, Paragraph 1 of the "Severe Wind and Winter Storm Mitigation Projects" subsection, delete the last sentence and replace with:

~~*Each year, the City of Lake Oswego Maintenance Services conducts the following activities.*~~

Each year, the City of Lake Oswego Public Works Operations conducts the following activities.

On Page 57, Insert a new bullet at the end of paragraph 1 of the "Severe Wind and Winter Storm Mitigation Projects"

- *New weather stations and a webcam were installed to monitor storm systems.*

On Page 57, delete the first sentence of the "Severe Storm Mitigation Action Items" subsection and replace with:

~~*The severe wind and winter storm mitigation action item provides direction on specific activities that organizations and residents in Lake Oswego can undertake to reduce risk and prevent loss from severe winter storm events.*~~

The severe extreme heat, wind and winter storm mitigation action item provides direction on specific activities that organizations and residents in Lake Oswego can undertake to reduce risk and prevent loss from severe winter storm events.

On Page 57, Insert the following sentence at the end of paragraph 1 under the "Severe Storm Mitigation Action Items" subsection:

Detailed Severe Storm Mitigation Action Item worksheets with 2012 updates are located in Appendix A of this Addendum.

On Page 57, Remove all of the action items following Paragraph 1 of the "Severe Storm Mitigation Action Items" subsection, and move them to Appendix C.

On Page 61, Paragraph 2 of the "Earthquake Hazard Assessment" subsection, delete the first two sentences of the paragraph and replace with the following:

~~*The HMAC estimates the probability of an earthquake occurring is 'high,' meaning one event is likely to occur within a 10-35 year period. This is in agreement with the County's 'high' rating as well.*~~

The HMAC estimates the probability of an earthquake occurring is 'high,' meaning one event is likely to occur within a 10-35 year period. This is higher than the county's 'low' rating.

On Page 63, Delete the last sentence at the end of paragraph 2 of the "Existing Earthquake Mitigation Activities" subsection and replace with the following:

~~*Seismic studies were completed for City Hall and the police station building, City maintenance facilities, and the sewer interceptor system.*~~

Seismic studies were completed for City Hall and the police station building, City maintenance facilities, and the sewer interceptor system and as a result, the wastewater (sewer) interceptor system was completely rebuilt and seismically upgraded with the LOIS Project, including the overhead mains into the treatment plant.

On Page 64, Insert the following sentence at the end of paragraph 1 under the "Earthquake Mitigation Action Items" subsection:

Detailed Earthquake Mitigation Action Item worksheets with 2012 updates are located in Appendix A of this Addendum.

On Page 65, Remove all of the action items following Paragraph 1 of the "Earthquake Mitigation Action Items" subsection, and move them to Appendix C.

On Page 70, Paragraph 5 of the "Volcanic Eruption Hazard Assessment" remove the following sentence and replace with:

~~*The HMAC estimates that Lake Oswego has a 'high' vulnerability to volcanic eruptions, meaning more than 10% of the population could be affected in a large-scale event. This is in agreement with the County's 'high' vulnerability rating as well.*~~

The HMAC estimates that Lake Oswego has a 'high' vulnerability to volcanic eruptions, meaning more than 10% of the population and infrastructure is likely to be affected. This is higher than the county's 'moderate' rating.

On Page 70, following the "Volcano" subsection, insert the following new "Drought" subsection:

Drought Profile

The Clackamas County Multi-Jurisdictional Natural Hazards Mitigation Plan adequately describes the causes and characteristics, history, location, extent and impacts of drought affecting the city of Lake Oswego. Descriptions of the drought hazard can be found on pages DR-1 to DR-6 of the 2012 Clackamas County Natural Hazards Mitigation Plan update.

The probability of drought in Lake Oswego was determined using scientific data, historical occurrences, and local knowledge. The HMAC estimates the probability of drought to be 'moderate' meaning one incident is likely within a 35 to 75 year period. This is in agreement with the county's 'moderate' rating. The HMAC estimates that Lake Oswego has a 'low' vulnerability to drought conditions, meaning less than 1% of the population could be affected in a large-scale regional event. This is in agreement with the county's 'low' rating.

Drought Mitigation Activities

The existing drought hazard mitigation activities are conducted at the county, regional, state, and federal levels and are described in the Clackamas County Natural Hazards Mitigation Plan. As such, the information will not be repeated here.

Drought Mitigation Action Items

The city of Lake Oswego does not believe that implementing drought-related mitigation activities will be cost-effective at this time. As such, the city has not identified drought mitigation action items. Lake Oswego will partner with Clackamas County, however, on the implementation of mitigation strategies that benefit both jurisdictions.

On Page 71, Insert the following sentence at the end of paragraph 1 under the "Multi-Hazard Mitigation Action Items" subsection:

Detailed Severe Storm Mitigation Action Item worksheets with 2012 updates are located in Appendix A of this Addendum.

On Page 71, Remove all of the action items following Paragraph 1 of the "Multi-Hazard Mitigation Action Items" subsection, and move them to Appendix C.

Section 5: Mitigation Planning Priority System

The Mitigation Planning Priority Section of the Lake Oswego Addendum describes the project review and prioritization process for the action items outlined for each hazard in Appendix C: Action Items Worksheets. Based on new information compiled during the Clackamas County NHMP update process, updates to the Lake Oswego Addendum include the following:

On Page 75, Paragraph 1 of the "Action Items" subsection, delete the second to last sentence of the paragraph and replace with the following:

> ~~*Full action item descriptions are located in the corresponding hazard section of this addendum.*~~
>
> *The full action item descriptions with the 2012 updated progress are located in Appendix C of this addendum.*

On Page 76, Paragraph 2 of the "Action Items" subsection, delete the first two sentences of the paragraph and replace with the following:

> ~~*Note: the City of Lake Oswego does not believe that implementing volcano-related mitigation activities will be cost-effective at this time. As such, the city has not identified volcanic-eruption mitigation action items.*~~
>
> *Note: the City of Lake Oswego does not believe that implementing drought and volcanic-related mitigation activities will be cost-effective at this time. As such, the city has not identified drought or volcanic-eruption mitigation action items.*

Appendix C:
City of Milwaukie

Addendum to the Clackamas County Natural Hazards Mitigation Plan 2012 Amendments and Update

The Oregon Partnership for Disaster Resilience prepared this Appendix to the City of Milwaukie Addendum to the Clackamas County Natural Hazard Mitigation Plan (Milwaukie Addendum) as part of the 2011-12 update to the Clackamas County Natural Hazard Mitigation Plan. Upon local adoption, the appendix will become part of the Milwaukie Addendum and will ensure that the City of Milwaukie maintains FEMA Pre-Disaster Mitigation Program eligibility as well as compliance with the Clackamas County NHMP.

This appendix is organized according to the sections outlined in the Milwaukie Addendum. A description of each section is presented below with proposed changes and updates following each.

Section 1: Planning Process

The planning process section of the Milwaukie Addendum describes the activities used by the steering committee and community to develop the plan. Updates to the Planning Process section are as follows:

On Page 7, following Section 1.2 "Development of the 2009 Milwaukie Natural Hazards Mitigation Plan Addendum," insert the following section:

1.3 2012 Addendum Update

In accordance with the county's Natural Hazards Mitigation Plan update, the City of Milwaukie participated in the update of their addendum. By doing so, Milwaukie will now be aligned with the county, and will update their NHMP in five years.

2012 Committee members included:

- *Laura Comstock, Clackamas County Emergency Management/RARE*
- *Tom Larsen, Milwaukie Building Official*
- *Willie Miller, Milwaukie Facilities Maintenance Coordinator*
- *Gregg Ramirez, Clackamas Fire District #1 Emergency Manager*
- *Dave Rash, Milwaukie Police Captain*
- *Kate Rosson, Milwaukie GIS Coordinator*
- *Jay Wilson, Clackamas County Emergency Management*

2012 Planning Process

The RARE Participant and Clackamas County Emergency Management developed and facilitated one plan update meeting with the Hazard Mitigation Advisory Committee on May 31, 2012. Please see Appendix A for the meeting agenda and minutes.

NHMP Update Meeting - May 31, 2012: The participant worked with the city lead to convene the steering committee and meet to review and update the city's Natural Hazards Mitigation Plan Addendum. Because the county is in the process of updating their NHMP, each of the cities were required to update their addendums, regardless of when their plan was last updated or developed. As part of this meeting, the steering committee reviewed the county's updated hazard assessment and made necessary changes to their hazard assessment, if necessary. The committee also reviewed their list of community assets to determine if any new additions or changes needed to be made. The committee also reported on progress made to the action items listed in the current NHMP. The committee reviewed the mitigation strategy and plan implementation and maintenance pieces and made changes if necessary.

On Page 9, first sentence following the "Convener" subsection, delete sentence one and replace with the following sentence:

~~*Milwaukie's Public Works Operations Department will serve as the 'convener' for future HMAC meetings.*~~

Milwaukie's Police Captain will serve as the 'convener' for future HMAC meetings.

On Page 9, second paragraph following the "Plan Maintenance" subsection, delete the entire paragraph and replace with the following two paragraphs:

~~*Milwaukie's Addendum to the Clackamas County Natural Hazards Mitigation Plan will be evaluated on a quarterly basis to determine the effectiveness of programs, and to reflect changes in land development or programs that may affect mitigation priorities. The convener will be responsible for contacting HMAC members and organizing the quarterly meetings. HMAC members will be responsible for monitoring and evaluation the progress of the mitigation strategies in the addendum.*~~

Milwaukie's Addendum to the Clackamas County Natural Hazards Mitigation Plan will be evaluated on an annual basis to determine the effectiveness of programs, and to reflect changes in land development or programs that may affect mitigation priorities. The convener will be responsible for contacting HMAC members and organizing the annual meeting. HMAC members will be responsible for monitoring and evaluation the progress of the mitigation strategies in the addendum.

The convener, or city lead designee, will also be responsible for meeting annually with the county Hazard Mitigation Coordinator. This meeting will provide a chance for each of the city leads to meet together and discuss updates and progress with the Hazard Mitigation Coordinator. The convener will report back to the HMAC with information gathered. The Coordinator will be responsible for setting up the meeting, and providing the city leads with updates on new studies or potential funding opportunities for mitigation projects.

On Page 10, second paragraph following the "Formal Review Process" subsection, delete the first sentence and replace with the following:

~~*Although the addendum will be revisited and potentially updated on a quarterly basis, the HMAC will be required to formally update the addendum every five years.*~~

Although the addendum will be revisited and potentially updated on an annual basis, the HMAC will be required to formally update the addendum every five years.

On Page 10, second paragraph following the "Formal Review Process" subsection, delete the last sentence and replace with the following:

~~*The next addendum update is scheduled to occur in September 2012.*~~

The next addendum update is scheduled to occur in September 2017.

On Page 10, third paragraph following the "Formal Review Process" subsection, delete the first sentence and replace with the following:

~~*The Milwaukie HMAC should begin the five year update process in the fall of 2011 to allow enough time for the review and update of the entire addendum by September 2012.*~~

The Milwaukie HMAC should begin the five-year update process in the fall of 2016 to allow enough time for the review and update of the entire addendum by September 2017.

On Page 11, second paragraph under the "Continued Public Involvement" subsection, delete the first sentence and insert the following:

~~*During the 2009 addendum update process, OPDR's website (www.OregonShowcase.org) served as an outreach tool to the community.*~~

During the 2012 addendum update process, OPDR's website (www.csc.uoregon.edu/opdr) served as an outreach tool to the community.

On Page 12, last paragraph under the "Continued Public Involvement" subsection, delete the second sentence and insert the following:

~~*The final adopted and approved addendum will be posted on the ciyt's website at www.cityofmilwaukie.or/publicsafety, on the county's emergency management website at http://www.clackamas.us/emergency/publications.html, and on the University of Oregon Libraries' Scholar's Bank Digital Archive.*~~

The final adopted and approved addendum will be posted on the following websites: the city of Milwaukie, Clackamas County Emergency Management, Clackamas Fire District #1, and the University of Oregon's Libraries' Scholar's Bank Digital Archive.

Section 2: Community Profile

The community profile section of the Milwaukie Addendum describes a variety of community characteristics specific to the City of Milwaukie. Given the limited

amount of time that has elapsed since the community profile was developed, no changes are required or proposed.

Section 3: Hazard Assessment

The hazard assessment section of the Milwaukie Addendum provides information on the location of hazard locations, and an analysis of risk to life, property, and the environment that may result from natural hazard events. Based on new information compiled during the Clackamas County NHMP update process, updates to the Milwaukie Addendum include the following:

On Page 27, list of city hospitals under section "Community Assets: Vulnerability Assessment" delete the following bullet and replace with the following:

- ~~*Milwaukie Providence Hospital*~~
- *Providence Milwaukie Hospital*

On Page 28, list of schools under section "Community Assets: Vulnerability Assessment" remove the following bullet and replace it under subsection, "Potential Shelter Sites:

- ~~*Hector Campbell Elementary*~~
- *Hector Campbell Elementary*

On Page 28, list of schools under subsection "Potential Shelter Sites" add the following bullet:

- *Wichita Community Center*

On Page 29, add the following subsection "Vulnerable Populations," and insert the following:

- *Royal Marc Retirement Residence*
- *Milwaukie Convalescent Center*
- *Hillside Manor*

On Page 30, add the following subsection "Hazardous Materials," and insert the following:

- *Precision Cast Parts*
- *North Industrial Road*
- *International Way*

Section 4: Natural Hazards

The Natural Hazards section of the Milwaukie Addendum describes the types, causes, characteristics and relative risk posed by each individual natural hazard for the city of Milwaukie. Based on new information compiled during the Clackamas County NHMP update process, updates to the Milwaukie Addendum include the following:

On Page 34, insert the following introductory paragraph:

The Natural Hazards section of the Milwaukie Addendum describes the types, causes, characteristics and relative risk posed by each individual natural hazard for the city of Milwaukie. Based on new information compiled during the NHMP update process, an updated list of the 2012 action items for the city of Milwaukie are included in Appendix A: Planning & Public Process.

On Page 38, under "Section 4.1.5 Flood Mitigation Actions," delete the current timeline and insert the following:

~~*Timeline: 3-5 years*~~

Timeline: Ongoing

On Page 45, Paragraph 3 of the "Severe Windstorm Profile" subsection, delete the following two sentences and insert the following:

~~*Milwaukie's HMAC estimates that the probability of severe windstorms occurring is 'high,' meaning one incident is likely within a 10 to 35 year period. This estimate is higher than the county's 'moderate' probability estimate..*~~

Milwaukie's HMAC estimates that the probability of severe windstorms occurring is 'Moderate,' meaning one incident is likely within a 35 to 75 year period. This estimate is in accordance with the county's estimate.

On Page 45, following the "Severe Windstorm Profile" subsection, insert the following paragraph:

Extreme heat has a very low threat in Milwaukie. The HMAC estimates the probability for future extreme heat events is 'low,' meaning one incident is likely within a 75 to 100 year period. This estimate is in accordance with the county's 'low' rating.

On Page 45, Paragraph 2 of the "Vulnerability Assessment" subsection, delete the first paragraph and insert the following:

~~*The HMAC estimates the vulnerability to severe storms is 'high,' meaning more than 10% of the population and assets would be affected. This is higher than the county's 'moderate' rating because history has shown that most of Milwaukie's population and community assets are affected in severe storm events.*~~

The HMAC estimates the vulnerability to winter storms is 'moderate,' meaning 1 to 10% of the population will be affected. This rating is in accordance with the county's rating. The HMAC estimates the vulnerability to windstorms is 'low,' meaning less than 1% of the population will be affected. This rating is also in accordance with the county's vulnerability to windstorms. The vulnerability estimate of future extreme heat events is 'moderate,' meaning between 1 and 10% of the population and assets would be affected in a major event. This estimate is in accordance with the county's rating.

On Page 46, following the 'Severe Storm Mitigation Actions" section, add the following to the "Status" section:

Since 2009, a FEMA grant was used to evaluate the trees along particular routes.

On Page 49, Paragraph 2 of the "Wildfire Profile" subsection, delete the second sentence and replace with:

~~*Milwaukie's HMAC estimates that the probability of wildfires occurring is 'high,' meaning one incident is likely within a 10 to 35 year period. This estimate is higher than the county's 'moderate' probability estimate because Milwaukie has not had a large fire in recent years, thus allowing fuel load to build.*~~

Milwaukie's HMAC estimates that the probability of wildfires occurring is 'low,' meaning one incident is likely within 75 to 100 years. This estimate is lower than the county's probability of 'moderate' because Milwaukie has not had a large fire in recent years, thus allowing fuel load to build.

On Page 53, Paragraph 3 of the "Earthquake Profile" subsection, delete the second sentence and replace with:

~~*Milwaukie's HMAC estimates that the probability of earthquakes occurring is 'high,' meaning one incident is likely within a 10 to 35 year period.*~~

Milwaukie's HMAC estimates that the probability of earthquakes occurring is 'moderate,' meaning one incident is likely within a 35 to 75 year period.

On Page 58, Paragraph 2 of the "Volcanic Eruption Profile" subsection, insert the following sentence:

The vulnerability of volcanic eruptions in Milwaukie is 'moderate' meaning between 1% and 10% will be affected. This is in agreement with the county's rating.

On Page 58, following the "Volcano" subsection, insert the following new "Drought" subsection:

Drought Profile

The Clackamas County Multi-Jurisdictional Natural Hazards Mitigation Plan adequately describes the causes and characteristics, history, location, extent and impacts of drought affecting the city of Milwaukie. Descriptions of the drought hazard can be found on pages DR-1 to DR-6 of the 2012 Clackamas County Natural Hazards Mitigation Plan update.

The probability of drought in Milwaukie was determined using scientific data, historical occurrences, and local knowledge. The HMAC estimates the probability of drought to be 'moderate' meaning one incident is likely within a 35 to 75 year period. This is in accordance with the county's rating. The HMAC estimates that Milwaukie has a 'low' vulnerability to drought conditions, meaning less than 1% of the population could be affected in a large-scale regional event. This is in agreement with the county's 'low' rating.

Drought Mitigation Activities

The existing drought hazard mitigation activities are conducted at the county, regional, state, and federal levels and are described in the Clackamas County Natural Hazards Mitigation Plan. As such, the information will not be repeated here.

Drought Mitigation Action Items

The drought mitigation actions provide direction on specific activities that organizations and residents in Milwaukie can take to reduce risk and prevent loss from Drought events. Each mitigation action is followed by ideas for implementation, which can be used by the steering committee and local decision makers in pursuing strategies for implementation.

DT #1: **Develop public brochures to raise awareness about drought hazards and mitigation actions residents can take to reduce the impact of drought.**

Ideas for Implementation:

- Meet monthly with neighborhood associations to raise awareness and explain the threat of drought.
- Write articles in the city newsletter, The Pilot, explaining drought hazards and mitigation activities.
- Utilize the website to post information regarding drought.
- Have a booth at the Farmer's Market from May-November, providing information to the public about the dangers of drought and mitigation activities that residents can take.

Coordinating Organization: Neighborhood Services
Timeline: Ongoing
Plan Goals Addressed: *Protect Life and Property, Encourage Partnerships and Implementation, Promote Public Awareness*
Status: *Added during the 2012 update. Yet to be completed.*

On Page 59, following the "Multi-Hazard Mitigation Actions" section, add the following to the "Status" section for action item, MH#1:

Since 2009, the Clackamas Watershed Council has worked with Milwaukie to plant trees and native species along Johnson Creek. The city has two Code Compliance Officers who enforce the city's codes regarding overgrown vegetation per the Milwaukie Municipal Code, Section 8.04.110 Weeds and Noxious Growth – Death or decaying trees or tree limbs.

On Page 59, following the "Multi-Hazard Mitigation Actions" section, remove the current coordinating organization and add the following for action item, MH#2:

~~*Clackamas Fire District #1 Emergency Manager*~~

CERT Volunteer

On Page 59, following the "Multi-Hazard Mitigation Actions" section, add the following to the "Status" section for action item, MH#2:

> *Since 2009, a CERT Volunteer has worked to identify facilities that are adequate shelter sites for Milwaukie residents. There are currently two facilities in Milwaukie that are Red Cross certified and trained shelter facilities, The American Legion and Eagles Wings Ministries.*

On Page 60, following the "Multi-Hazard Mitigation Actions" section, remove the first two bullets under, "Ideas for Implementation" and replace with:

- ~~*Address 800MHz communication deficiencies;*~~
- ~~*Work with the Oregon OEM office of emergency management and the UASI communications working group to resolve 800 MHz communication inoperability*~~

- *Address 800MHz communication deficiencies, if any arise;*
- *Work with the Oregon OEM office of emergency management and the Regional Disaster Preparedness Organization (RDPO) working group to resolve 800 MHz communication inoperability*
- *Inform residents about the County's Emergency Notification System (CCENS)*
- *Work to tie-in or interface with both Code Red and CCENS to help with redundancy*

On Page 60, following the "Multi-Hazard Mitigation Actions" section, add the following to the "Status" section for action item, MH#4:

> *Since 2009, the city has engaged in a broad effort to educate the public about Emergency Preparedness. A city webpage was dedicated to the topic, as well as efforts to coordinate a monthly speaker's series on emergency preparation with topics ranging from preparing for earthquakes to community resiliency. Citizens and neighborhood association members are encouraged to become trained through CERT. Two shelters have become Red Cross certified, The American Legion and Eagles Wings Ministries. Emergency Preparedness tips are sent through the city's newsletter, The Pilot, which goes to every address in the city of Milwaukie. Emergency Preparedness tips are provided at each of the seven neighborhood associate meetings.*

On Page 61, following the "Multi-Hazard Mitigation Actions" section, delete the MH#5 and insert the following:

> ~~*MH #5: Promote CERT program activity in the area and recruit new members for training.*~~
>
> *MH #5: Maintain and promote CERT program activity in the area and recruit new members for training.*

On Page 61, following the "Multi-Hazard Mitigation Actions" section, add the following to the "Status" section for action item, MH#5:

As of 2012, there are currently 20 residents who are trained as CERT responders. The American Legion is currently completing training which will double the current number.

On Page 61, following the "Multi-Hazard Mitigation Actions" section, delete the MH#6 and insert the following:

~~*MH #6: Develop and enhance strategies for debris management for all hazards.*~~

MH #6: Maintain and enhance strategies for regional debris management for all hazards.

On Page 61, following the "Multi-Hazard Mitigation Actions" section, remove the following from the "Ideas for Implementation" section for action item, MH#6:

~~*Work with regional partners to develop a debris removal plan.*~~

On Page 61, following the "Multi-Hazard Mitigation Actions" section, add the following to the "Status" section for action item, MH#6:

As of 2012, the debris management plan was just completed.

On Page 61, following the "Multi-Hazard Mitigation Actions" section, delete the label LT-MH#1 and replace with MH#7, and add the following to the "Status" section for action item, MH#7:

Since 2009, this was completed for the entire region as part of an old UASI (now RDPO) plan.

On Page 62, following the "Multi-Hazard Mitigation Actions" section, delete the label LT-MH#2 and replace with MH#8, and add the following to the "Ideas for Implementation" section for action item, MH#8:

- *Incorporated new information obtained by the 2012 DOGAMI LIDAR Quadrant Mapping Project.*

On Page 62, following the "Multi-Hazard Mitigation Actions" section, delete the label LT-MH#3 and replace with MH#9.

Section 5: Mitigation Planning Priority System

The Mitigation Planning Priority Section of the Milwaukie Addendum describes the project review and prioritization process for the action items outlined for each hazard in Section 4: Natural Hazards. Given the limited amount of time that has elapsed since the mitigation planning project prioritization was developed, no changes are required or proposed.

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Appendix C:
City of Molalla

Addendum to the Clackamas County Natural Hazards Mitigation Plan 2012 Amendments and Update

The Oregon Partnership for Disaster Resilience prepared this Appendix to the City of Molalla Addendum to the Clackamas County Natural Hazard Mitigation Plan (Molalla Addendum) as part of the 2011-12 update to the Clackamas County Natural Hazard Mitigation Plan. Upon local adoption, the appendix will become part of the Molalla Addendum and will ensure that the City of Molalla maintains FEMA Pre-Disaster Mitigation Program eligibility as well as compliance with the Clackamas County NHMP.

This appendix is organized according to the sections outlined in the Molalla Addendum. A description of each section is presented below with proposed changes and updates following each.

Section 1: Planning Process

The planning process section of the Molalla Addendum describes the activities used by the steering committee and community to develop the plan. Updates to the Planning Process section are as follows:

On Page 6, following the "Planning Process" subsection, insert the following language:

2012 Update Planning Process

The RARE Participant and Clackamas County Emergency Management developed and facilitated one plan update meeting with the Hazard Mitigation Advisory Committee on May 30, 2012. Please see Appendix A for the meeting agenda and minutes.

2012 Committee members included:

- *Ellen Barnes, City of Molalla, City Manager*
- *Glen Boreth, City of Molalla, Citizen/Molalla Planning Commission*
- *Laura Comstock, Clackamas County Emergency Management/RARE*
- *Rod Lucich, Molalla Police Department, Police Chief*
- *Deborah Rogge, City of Molalla, Council President*
- *Grant Sharp, City of Molalla, Planning*
- *Vince Stafford, Molalla Fire Department, Fire Chief*

NHMP Update Meeting - May 30, 2012: The participant worked with the city lead to convene the steering committee and meet to review and update the city's Natural Hazards Mitigation Plan Addendum. Because the county is in the process of updating their NHMP, each of the cities were required to update their addendums, regardless of when their plan was last updated or developed. This is to ensure that the county and all of the cities are on the same timeline. Now the county and all of the cities will update their NHMP's in 5 years. As part of this meeting, the steering committee reviewed the county's updated hazard assessment and made necessary changes to the city's hazard assessment. The committee also reviewed the list of community assets to determine if any additions or changes needed to be made. The committee also reported on progress made to the action items listed in the current NHMP. The committee reviewed the mitigation strategy and plan implementation and maintenance pieces and made necessary changes.

On Page 8, first line following "Implementing the Plan" subsection, delete sentence and replace with the following sentence:

~~*After the plan is locally reviewed and deemed complete, the planning director will submit the plan to the state hazard mitigation officer at Oregon Emergency Management.*~~

After the plan is locally reviewed and deemed complete, the city manager will submit the plan to the state hazard mitigation officer at Oregon Emergency Management.

On Page 9, first paragraph following the "Coordinating Body" subsection, delete sentence one and replace with the following sentence:

~~*The Planning Commission, in addition to two representatives from the police and fire departments, will serve as the coordinating body for Molalla's Natural Hazards Mitigation Plan Addendum.*~~

A new committee, the Hazard Mitigation Advisory Committee (HMAC), was formed and delegated to be the coordinating body for the Molalla's Natural Hazards Mitigation Plan Addendum.

On Page 9, second full paragraph under the "Coordinating Body" subsection, delete sentence one and replace with the following sentence.

~~*To make the coordination and review of the Molalla Addendum as broad and useful as possible, the Planning Commission will engage additional stakeholders and other relevant hazard mitigation organizations and agencies to implement the identified action items.*~~

To make the coordination and review of the Molalla Addendum as broad and useful as possible, the Hazard Mitigation Advisory Committee will engage additional stakeholders and other relevant hazard mitigation organizations and agencies to implement the identified action items.

On Page 9, first paragraph following the "Convener" subsection, delete sentence one and replace with the following sentence:

~~*The planning director will serve as the plan's convener.*~~

Molalla's City Manager will serve as the plan's convener.

On Page 10, second paragraph following the "Plan Maintenance" subsection, delete the entire paragraph and replace with the following paragraph:

~~*Semi-Annual Meetings*~~

~~*The Planning Commission will meet on a semi-annual basis to maintain and update the city's natural hazards mitigation plan. Meetings will be held at the first of the year in January, and again in June. The Planning Commission will draw from the following agenda items when developing future meeting topics:*~~

Annual Meeting

The HMAC will meet once a year. The meeting will be coordinated by the convener. This meeting will debrief on the previous hazard seasons and prepare for the upcoming hazard seasons. In addition to debriefing and preparing for the upcoming hazard seasons, possible agenda items may include:

On Page 10, third bullet under Semi-Annual Meetings subsection, delete the "[continue to]".

On Page 10, sixth bullet under Semi-Annual Meetings subsection, delete the sentence and replace with the following sentence:

~~*Update the community profile's census data following the 2010 census.*~~

Update the community profile with most current population and other demographic data.

On Page 11, second full paragraph under "Five-Year Plan Update" subsection, delete the second, third and fourth sentences and replace with the following:

~~*Because this is an addendum to the Clackamas County Natural Hazards Mitigation Plan, the addendum must be updated in conjunction with the county's fiver-year plan update schedule. As such, Molalla must update this addendum by September 2012 (and then again five years thereafter). Sufficient time should be allotted for plan update activities and FEMA review, meaning the city should begin the plan update process by September 2011.*~~

As such, Molalla must update this addendum by September 2017. Sufficient time should be allotted for plan update activities and FEMA review, meaning the city should begin the plan update process by September 2016.

Section 2: Community Profile

The community profile section of the Molalla Addendum describes a variety of community characteristics specific to the City of Molalla. Based on new information compiled during the Clackamas County NHMP update process, updates to the Molalla Addendum include the following:

On Page 16, under section 2.2 Population & Demographics, replace the first paragraph with the following:

~~*Molalla has remained a small community since it was incorporated in 1913, but over the past twenty years, the city has grown significantly. In 2008, Molalla's population was estimated to be 7,590, an increase of 34.4% since 2000 and 109% since 1990 (see Table 2.1 below). Since 2000, the population of Molalla has increased about 3.7% annually.*~~

Molalla has remained a small community since it was incorporated in 1913, but over the past twenty years, the city has grown significantly. In 2010, Molalla's population was estimated to be 8,108, an increase of 41% since 2000 and 120% since 1990 (see Table 2.1 below). Since 2000, the population of Molalla has increased an average of 3.4% annually.

On Page 16, under section 2.2 Population & Demographics, replace the table with the following table:

~~***Table 2.1 Population Change from 1970 to 2008***~~

~~***Year***~~	~~***Molalla***~~	~~***Percent Change***~~	~~***Clackamas County***~~	~~***Percent Change***~~	~~***Oregon***~~	~~***Percent Change***~~
~~*1970*~~			~~*166,088*~~		~~*2,091,533*~~	
~~*1980*~~			~~*241,919*~~	~~*45.7%*~~	~~*2,633,105*~~	~~*25.9%*~~
~~*1990*~~	~~*3,63*~~		~~*278,850*~~	~~*15.3%*~~	~~*2,842,321*~~	~~*7.9%*~~
~~*2000*~~	~~*5,64*~~	~~*55%*~~	~~*338,391*~~	~~*21.4%*~~	~~*3,421,399*~~	~~*20.4%*~~
~~***2008 Estimate***~~	~~***7,590***~~	~~***34.4%***~~	~~***376,660***~~	~~***11.3%***~~	~~***3,791,075***~~	~~***10.8%***~~

Table 2.1 Population Change from 1970 to 2010

Year	***Molalla***	***Percent Change***	***Clackamas County***	***Percent Change***	***Oregon***	***Percent Change***
1970	*2,005*		*166,088*		*2,091,533*	
1980	*2,992*	*49%*	*241,919*	*46%*	*2,633,105*	*26%*
1990	*3,683*	*23%*	*278,850*	*15%*	*2,842,337*	*8%*
2000	*5,734*	*56%*	*338,387*	*21%*	*3,421,437*	*20%*
2010 Estimate	***8,108***	***41%***	***375,992***	***11%***	***3,831,074***	***12%***

On Page 16, the last paragraph on the page, replace sentences 5 and 6 with the following:

~~*In 2000, roughly 11.4% of the population was non-white and almost 18.2% were disabled. Additionally, over 10% of the city's population, or 598 people, were 65 years or older (see Table 2.2 below).*~~

In 2010, roughly 8.7% of the population was non-white. Additionally, approximately 10% of the city's population, or 797 people were 65 years of age or older (see Table 2.2 below).

On Page 17, replace Table 2.2 with the following:

~~**Table 2.2 Population by Age, 2000**~~		
~~**Age Range**~~	~~**Total Persons**~~	~~**Percent of Population**~~
~~Under 5~~	~~568~~	~~10.1%~~
~~5 to 19~~	~~1,379~~	~~24.4%~~
~~20 to 44~~	~~2,222~~	~~39.3%~~
~~45 to 64~~	~~880~~	~~15.6%~~
~~65 and over~~	~~598~~	~~10.6%~~
~~**Total 5,64**~~	~~**7**~~	~~**100%**~~

Table 2.2 Population by Age, 2010		
Age Range	**Total Persons**	**Percent of Population**
Under 5	782	9.6%
5 to 19	1,924	23.7%
20 to 44	3,019	37.1%
45 to 64	1,586	19.6%
65 and over	797	9.8%
Total	**8,108**	**100%**

On Page 17, under section 2.3 Land Use & Development, first full paragraph, replace second to the last line with the following:

~~*Molalla also maintains an Urban Growth Boundary and an Urban Reserve Area.*~~

Molalla also maintains an Urban Growth Boundary.

On Page 17, under section 2.3 Land Use & Development, first full paragraph, replace the last line with the following:

~~*Please see the city's zoning map below on page 16.*~~

Please see the city's zoning map on page 18.

On Page 17, under section 2.3 Land Use & Development, delete the third paragraph and replace with the following:

~~*The City of Molalla is currently revising its Comprehensive Plan. The plan will outline where growth will occur. In 2009, the city completed residential and employment needs assessments for the years 2027 and 2058. There is a projected land deficit of 552 acres in 2027 and an additional 1,536 acres in 2058. The urban reserve area will need to be expanded to accommodate employment, residential, and*~~

~~*school needs to meet projected growth. In total, the urban reserve area will need to encompass about two additional square miles of land. Of the additional land only some will be developable. Recently, the City of Molalla completed a natural features inventory that identified land that is unsuitable for development (i.e., steep slopes, floodplains, wetlands, etc.). The Comprehensive Plan outlines policies that prevent growth from occurring in unsuitable development areas.*~~

The City of Molalla currently is revising its Comprehensive Plan. The plan will outline where growth will occur. Recently, the City of Molalla completed a natural features inventory that identified land that is unsuitable for development (i.e., steep slopes, floodplains, wetlands, etc.). The Comprehensive Plan will outline policies that prevent growth from occurring in unsuitable development areas.

Pages 19 and 20 are not included in document. Please renumber accordingly.

On Page 21, section 2.4 Housing, delete the second paragraph and replace with the following:

~~*In 2000, Molalla had 2,027 housing units, 1,948 of which were occupied. Of the occupied housing hunts, 67% (1,306) were owner-occupied and 33% (642 units) were renter-occupied. Molalla also has a large number of older housing structures that may be vulnerable to earthquakes. Roughly half of all housing units were built before 1980 when more stringent seismic codes were put into place (see Table 2.3 below). Additionally, mobile homes represent 11.8% of Molalla's housing units (see Table 2.4 below).*~~

In 2010, Molalla had 2,908 housing units, 2,884 of which were occupied. Of the occupied housing units, 72% (2,077) were owner-occupied and 28% (807 units) were renter-occupied. Molalla also has a large number of older housing structures that may be vulnerable to earthquakes. Roughly one third of all housing units were built before 1980 when more stringent seismic codes were put into place (see Table 2.3 below). Additionally, mobile homes represent 5% of Molalla's housing units (see Table 2.4 below).

On Page 21, under section 2.4 Housing, update tables 2.3 and 2.4 as follows:

Table 2.3 Age of Housing Structures

Year Built	Number Structures	Percent of Structures
2005 or later	153	5.3%
2000 to 2004	594	20.4%
1990 to 1999	746	25.7%
1980 to 1989	281	9.7%
1970 to 1979	587	20.2%
1960 to 1969	147	5.1%
1950 to 1959	69	2.4%
1940 to 1959	113	3.9%
1939 and earlier	218	7.5%

Source: US Census, 2010

Table 2.4 Housing by Type, 2010

Housing type	Total Structures	Percent of Structures
1-unit, detached	*2,142*	*73.7%*
1-unit, attached	*-*	*NA*
2 units	*138*	*4.7%*
3 or 4 units	*128*	*4.4%*
5 to 9 units	*285*	*9.8%*
10 to 19 units	*28*	*1.0%*
20 or more units	*53*	*1.8%*
Mobile home	*134*	*4.6%*
Boat, RV, van, etc.	*-*	*NA*
Total	***2,908***	***100.0%***

Source: US Census 2010

On Page 22, section 2.5 Employment and Economics, update Table 2.5 as follows:

Table 2.5 City of Molalla Employment by Major Industry, 2010

Industry	Total Persons	Employed Percent
Manufacturing	*516*	*15.60%*
Retail Trade	*400*	*12.10%*
Educational Services, health care, Social Services	*362*	*11.00%*
Construction	*344*	*10.40%*
Professional, scientific, and management, and administrative and waste management services	*302*	*9.20%*
Finance and insurance, and real estate and rental and leasing	*265*	*8.00%*
Wholesale trade	*262*	*7.90%*
Transportation and warehousing and utilities	*246*	*7.50%*
Other services, except public administration	*221*	*6.70%*
Arts, entertainment, and recreation and accommodation and food services	*207*	*6.30%*
Public administration	*106*	*3.20%*

Agriculture, forestry, fishing, hunting and mining	*56*	*1.70%*
Information	*13*	*0.40%*
Civilian employed population 16 years and over	***3,300***	***100%***

Source: US Census, 2010

On Page 22, section 2.5 Employment and Economics, replace the paragraph following Table 2.5 with the following:

~~*The five largest employers in Molalla include: Molalla School District, Floragon Forest Products, Safeway Stores, Scotts Hyponex Corporation, and Northwest Polymers.*~~

The five largest employers in Molalla include: Molalla School District, Brentwood Industries, Molalla Communications, iMDS, and Northwest Polymers.

On Page 22, section 2.6 Transportation and Commuting Patterns, replace the last sentence of the last paragraph as follows:

~~*Additionally, Highway 213 connects Molalla to the smaller adjacent unincorporated communities of Liberal and Mulino (north) as well as Marquan and Scotts Mills (south).*~~

Additionally, Highway 213 connects Molalla to the smaller adjacent unincorporated communities of Liberal and Mulino (north) as well as Marquam and Scotts Mills (south).

On Page 23, replace the last sentence of the first full paragraph as follows:

~~*The transportation map shown below on page 20 highlights the major transportation networks that run through Molalla.*~~

The transportation map shown below on page 24 highlights the major transportation networks that run through Molalla.

On Page 23, insert the following new subsection, "2.7 Community Assets" after subsection "2.6 Transportation and Commuting Patterns."

2.7 Community Assets

This section outlines the resources, facilities and infrastructure that if damaged could significantly impact public safety, economic conditions, and/or the environmental integrity of Molalla.

Critical Facilities & Infrastructure: *Those critical facilities and infrastructure necessary for emergency response efforts.*

- *City Hall and Police Department*
- *Molalla Main Fire Station (Station 82)(EOC)*

- *Transportation Networks: Highways 213 and 211*
- *Public Works*
- *Water Distribution/Drainage Infrastructure*
- *Sewage Infrastructure*
- *Bridges*
    - *Wagon Wheel Park Bridge*
    - *Milk Creek Bridge*
    - *Pudding River Bridge*
    - *Bridge over the Molalla River*
    - *Mulino Bridge*
    - *Feyer Park Bridge*
- *Communications Towers*
- *NW Natural Pipelines*
- *Power Substations*
- *Molalla Adult Community Center*
- *Molalla Medical (Urgent Care)*
- *Providence Medical*
- *Sewage Treatment Plant*
- *Hobart Oil*

Essential Facilities: *Those facilities and infrastructure that supplement response efforts.*

- *Granges*
    - *Foothills*
    - *Molalla Grange*
    - *South Molalla*

- *Moose Lodge*
- *Safeway*
- *High School Football Field*
- *Molalla Aquatic Center*
- *Molalla Public Library*
- *Molalla Communications Company*
- *Masonic Lodge*
- *Skydive Oregon Airport*
- *Churches*
    - *Molalla Assembly of God*
    - *Saint James Catholic Church*
    - *Molalla Christian Church*
    - *Church of Christ of Latter Day Saints*
    - *South Clackamas Community Church*
    - *Evangelical Church of North America*
    - *Molalla Four Square Church*
    - *Grace Lutheran Church*
    - *United Methodist Church*

    - *Church of the Nazarene*
    - *Country Church*
    - *Seventh-Day Adventist*
- *Schools*
    - *Molalla Elementary School*
    - *Rural Dell Elementary School*
    - *Molalla River Middle School*
    - *Molalla High School*
    - *Mulino Elementary*

Vulnerable Populations: *Locations serving populations that have special needs or require special consideration.*

- *Molalla Adult Community Center*
- *Assisted Living Facilities*
    - *Evergreen Court*
    - *Pheasant Pointe*
    - *Molalla Manor*
    - *Twin Firs Mobile Home Park*
- *Molalla Mobile Manor*
- *Child care centers*
    - *24 Hours Child Care/Preschool*
    - *Early Horizons Preschool Childcare, Inc.*
- *Schools*
    - *Molalla Elementary School*
    - *Rural Dell Elementary School*
    - *Molalla River Middle School*
    - *Molalla High School*
    - *Mulino Elementary*
- *Plaza Los Robles (Spanish speaking)*
- *Cole Apartments (Spanish speaking)*

Economic Assets/ Population Centers: ***Economic Centers*** *are those businesses that employ large numbers of people and provide an economic resource to Molalla. If damaged, the loss of these economic centers could significantly affect economic stability and prosperity.* ***Population Centers*** *usually are aligned with economic centers and will be if particular concern for evacuation/notification during a hazard event.*

Economic Centers:

- *Molalla Buckaroo*
- *Brentwood Corp.*
- *International Forest Products Limited (Interfor)*
- *Molalla Redi-Mix*
- *Northwest Polymers*
- *Pacer Propane*

- *RGS Forest Products, Inc.*
- *IDMS*
- *Titanic Ice Co*
- *Molalla Market Center*
- *Bus Company – First Student*
- *Valley Dental*
- *Safeway Shopping Center*
- *IXL Propane*
- *Sause Marine Services, Inc.*

Population Centers

- *Schools*
- *Molalla School District*
- *Stone Place Apartments*
- *Fir Crest*
- *Big Meadows Subdivision*
- *Rondel Court*
- *Toliver Terrace*
- *Sunrise Acres*
- *Shalimar Estates*
- *Lexington Estates*

Environmental Assets: *Environmental assets are those parks, green spaces, wetlands, and rivers that provide an aesthetic and functional service for the community.*

- *Clark Park*
- *Ivor Davies Trail Park*
- *Leonard Long Park*
- *Sally Fox Park*
- *Billy Sheets Field*
- *The Molalla BMX Track*
- *Bohlander Field*
- *Rosse Posse Acres (Elk Farm)*
- *High School Sports Complex*

Hazardous Materials*: Those sites that store, manufacture, or use potentially hazardous materials.*

- *Gas Stations*
- *Pacer Propane*
- *IXL Propane*
- *IDMS*
- *Hobart Oil*

- *Molalla Wastewater Treatment Plant*
- *Molalla Aquatic Center*
- *Molalla Water Treatment Plant*

Pages 25 and 26 are not included in document. Please renumber accordingly.

On Page 27, renumber the two remaining subsections under the "Community Profile" section as follows:

~~*2.7 Historic and Cultural Resources*~~

~~*2.8 Existing Plans and Policies*~~

2.8 Historic and Cultural Resources

2.9 Existing Plans and Policies

On Page 27, section 2.8 Existing Plans and Policies, change the Date of Last Revision of the Comprehensive Plan from "February 2010" to "June 1980". Add the following sentence "Revisions to the City's existing Comprehensive Plan are currently underway."

On Page 28, section addressing Parks and Recreation Master Plan. Delete November 2008 as the Date of Last Revision and replace with "The City of Molalla is currently developing the Parks and Recreation Master Plan."

Section 3: Risk Assessment

The risk assessment section of the Molalla Addendum describes the types, causes, characteristics and relative risk posed by natural hazards on the City of Molalla. Based on new information compiled during the Clackamas County NHMP update process, updates to the Molalla Addendum include the following:

On Page 31, Paragraph 1 of the "Flood" subsection, delete the last sentence and insert the following:

~~*Potential flood-related impacts are adequately described within the county's plan, and apply to the City of Molalla as well.*~~

Potential flood related impacts are adequately described within the county's plan and apply to the City of Molalla as well. One event requires further explanation:

- *January 2010: unusually heavy rains created flood conditions that resulted in flooded, impassable streets. Storm water surcharged the city's sewer systems resulting in wastewater backup at several locations.*

On Page 31, section 3.1 Flood, the sixth paragraph beginning with "The Molalla Planning Commission…",first sentence, delete "The Molalla Planning Commission" and replace with "The Hazard Mitigation Advisory Committee" and the second sentence, delete "The Planning Commission" and replace with "The Committee".

On Page 32, Paragraph 7 of the "Flood" subsection, delete #7:

~~*7) The city offers hazard mitigation training once a year for flood, fire, and earthquake. This training is open to the public and advertised through the Molalla Pioneer (newspaper) and email lists.*~~

On Page 32, Paragraph 7 of the "Flood" subsection, replace #8 with the following:

~~*8) Molalla has a Water System Master Plan and Storm Water Master Plan. Neither is available electronically.*~~

7) Molalla has a Water System Master Plan and Storm Water Master Plan, which can be accessed electronically.

On Page 33, Following the first sentence of Paragraph 1 "Flood Mitigation Action Items" insert the following:

The full action item worksheets with updated progress for 2012 Flood Mitigation Action Items are located in Appendix A of this Addendum.

On Page 33, remove all action items following the first paragraph (these items are provided in the Mitigation Action Items located in Appendix A).

On Page 34, remove all action items (these items are provided in the Mitigation Action Items located in Appendix A).

On Page 35, fourth paragraph, first sentence, delete "The city's Planning Commission" and replace with "The Hazard Mitigation Advisory Committee (HMAC)"On Page 35, Paragraph 4 of the "Landslide" subsection, delete the last two sentences and replace with:

~~*Additionally, the Planning Commission estimates that the city has a 'low' vulnerability to landslides, meaning less than 1% of the population or community assets would be affected by a major landslide event. This is in agreement with the county's vulnerability estimate.*~~

Additionally, the HMAC estimates that the city has a 'high' vulnerability to landslides, meaning more than 10% of the population or community assets would be affected by a major landslide event. This is higher than the county's 'low' vulnerability estimate.

On Page 35, subsection Existing Landslide Mitigation Activities, bullet #1, first sentence, insert "proposed" between "The" and "Molalla Comprehensive Plan"…

On Page 36, Following the "Landslide Mitigation Action Items" subsection, delete the entire paragraph and insert the following:

~~*The City of Molalla does not believe that implementing landslide-related mitigation activities will be cost-effective at this time. As such, the city has not identified landslide mitigation action items. Molalla will partner with Clackamas County, however, on the implementation of mitigation strategies outside city boundaries that benefit both jurisdictions.*~~

Landslide Mitigation Action Items

The landslide mitigation action items provide direction on specific activities that organizations and residents in Molalla can undertake to reduce risk and prevent loss and damage from landslide events. The full action item worksheets for the 2012 Landslide Mitigation Action Items are located in Appendix A of this Addendum.

On Page 37, section 3.3 Wildfire, third full paragraph, second sentence, update page reference accordingly.

On Page 37, section 3.3 Wildfire, fourth full paragraph, delete the first, second and third sentences and replace as follows:

~~*The Molalla Planning Commission estimates a 'moderate' probability that wildfires will occur in the future, meaning one incident is likely to occur within a 35-75 year period. This rating is in agreement with the coutny's probability estimate. The Planning Commission additionally estimates a 'high' vulnerability to wildfire events, meaning more than 10% of the population or community assets would be affected by a major wildfire event.*~~

The Hazard Mitigation Advisory Committee estimates a 'moderate' probability that wildfires will occur in the future, meaning one incident is likely to occur within a 35-75 year period. This rating is in agreement with the coutny's probability estimate. The HMAC additionally estimates a 'high' vulnerability to wildfire events, meaning more than 10% of the population or community assets would be affected by a major wildfire event.

On Page 38, in paragraph 1 of the "Wildfire Mitigation Action Items" subsection insert the following after sentence 1:

The full action item worksheets for the 2012 Wildfire Mitigation Action Items are located in Appendix A of this Addendum.

On Page 38, remove all action items following paragraph 1 (these items are provided in the Mitigation Action Items located in Appendix A).

On Page 41, rename the "Severe Storms: Wind and Winter" subsection, to be:

~~*Severe Storms: Wind and Winter*~~

Severe Storms: Wind, Winter, and Extreme Heat

On Page 41, third full paragraph, fourth sentence, replace "The Planning Commission" with "The Hazard Mitigation Advisory Committee".

On Page 41, fifth full paragraph, first sentence, replace "The Planning Commission" with "The Hazard Mitigation Advisory Committee".

On Page 41, after Paragraph 5 of the "Severe Storms: Wind and Winter" subsection, insert the following paragraph:

Extreme heat has a high threat in Molalla. The HMAC estimates the probability for future extreme heat events is 'high,' meaning one incident is likely within a 10 to 35 year period. This estimate is higher than the county's 'low' rating. The vulnerability estimate of future extreme heat events is 'moderate,' meaning between 1% and 10% of the population and assets would be affected in a major event. This estimate is in accordance with the county's 'moderate' rating.

On Page 41, subsection Existing Severe Storm Mitigation Activities, bullet #1, delete the first sentence.

~~The city has snowplows and clears arterials first.~~

On Page 42, In paragraph 1 of the "Severe Storm Mitigation Action Items" subsection insert the following sentence after sentence 1:

The full action item worksheets for the 2012 Severe Storm Mitigation Action Items are located in Appendix A of this Addendum.

On Page 42, remove all action items following paragraph 1(these items are provided in the Mitigation Action Items located in Appendix A).

On Page 44, Paragraph 4 of the "Earthquake" subsection, delete the first two sentences and replace with:

~~*The Planning Commission estimates a 'high' probability that an earthquake will occur, meaning one event is likely to happen within a 10-35 year period. This is in agreement with the county's 'high' rating as well.*~~

The HMAC estimates a 'high' probability that an earthquake will occur, meaning one event is likely to happen within a 10-35 year period. This is higher than the county's 'low' rating.

On Page 45, Paragraph 1 of the "Earthquake Mitigation Action Items" subsection, insert the following after the first sentence:

The full action item worksheets for the 2012 Earthquake Mitigation Action Items are located in Appendix A of this Addendum.

On Page 54, Paragraph 4 of the "Volcano" section, remove the following sentences and replace with:

~~*Clackamas County estimates a low probability that volcanic eruptions will occur in the future, meaning one event is likely within a 75 to 100 year period, and a high vulnerability to volcanic events, meaning more than 10% of the population or assets would be affected. Both ratings are true for the city of Molalla as well.*~~

The HMAC estimates a 'low' probability for volcanic eruptions, meaning one event is likely to occur within a 75 to 100 year period. This is in agreement with the county's 'low' rating. Additionally, the HMAC estimates that the city of Molalla has a high vulnerability to volcanic eruptions, meaning more than 10% of the population and property are likely to be affected. This estimate is higher than the county's 'moderate' ranking.

On Page 43, section 3.5 Earthquake, 6th paragraph, first sentence, update page reference accordingly.

On Page 44, first paragraph first sentence, delete "The Planning Commission" and replace with "The Hazard Mitigation Advisory Committee".

On Page 44, second paragraph first sentence, delete "The Planning Commission" and replace with "The Hazard Mitigation Advisory Committee".

On Page 44, subsection Earthquake Mitigation Action Items, add the following sentence after the first sentence.

The full action item worksheets for the 2012 Severe Storm Mitigation Action Items are located in Appendix A of this Addendum.

On Page 44, remove all action items following paragraph 2 (the section titled Earthquake Mitigation Action Items). (These items are provided in the Mitigation Action Items located in Appendix A).

On Page 55, Insert the following sentence at the end of the first paragraph of the "Multi-Hazard" subsection:

The full action item worksheets for the 2012 Multi-Hazard Mitigation Action Items are located in Appendix A of this Addendum.

On Page 55, remove all of the action items following Paragraph 1 of the "Multi-Hazard" subsection.

On Page 54, following the "Volcano" subsection, insert the following new "Drought" subsection:

Drought Profile

The Clackamas County Multi-Jurisdictional Natural Hazards Mitigation Plan adequately describes the causes and characteristics, history, location, extent and impacts of drought affecting the city of Molalla. Descriptions of the drought hazard can be found on pages DR-1 to DR-6 of the 2012 Clackamas County Natural Hazards Mitigation Plan update.

The probability of drought in Molalla was determined using scientific data, historical occurrences, and local knowledge. The HMAC estimates the probability of drought to be 'moderate' meaning one incident is likely within a 35 to 75 year period. This is in agreement with the county's 'moderate' rating. The HMAC estimates that Molalla

has a 'moderate' vulnerability to drought conditions, meaning between 1% and 10% of the population could be affected in a large-scale regional event. This is in higher than the county's 'low' rating.

Drought Mitigation Activities

The existing drought hazard mitigation activities are conducted at the county, regional, state, and federal levels and are described in the Clackamas County Natural Hazards Mitigation Plan. As such, the information will not be repeated here.

Drought Mitigation Action Items

The city of Molalla does not believe that implementing drought-related mitigation activities will be cost-effective at this time. As such, the city has not identified drought mitigation action items. Molalla will partner with Clackamas County, however, on the implementation of mitigation strategies that benefit both jurisdictions.

On Page 55, Delete the following title and renumber the subsection "Multi-Hazard" to be:

~~*4.7 Multi-Hazard*~~

3.7 Multi-Hazard

Section 4: Mitigation Planning Priority System

The action items section of the Molalla Addendum describes detailed recommendations for activities that local departments, citizens and others could engage in to reduce risk. Based on new information compiled during the Clackamas County NHMP update process, updates to the Molalla Addendum include the following:

On Page 59, for the list of action items under the "Action Items" subsection, add the following bullets under "Multi-Hazard":

- *MH#6: Identify and encourage churches and other facilities to become certified Red Cross shelter sites and maintain a list of disaster shelters located throughout Molalla.*
- *MH#7: Identify and map out evacuation routes for all hazards.*

On Page 59, Delete the list of flood action items under the "Action Items" subsection, and insert the following numbered bullets:

- ~~*Evaluate flooding risk in areas being considered for future growth.*~~
- ~~*Obtain funding for implementing recommendations outlined in the Stormwater Master Plan.*~~
- ~~*Minimize overall impervious cover, and disconnect impervious areas.*~~
- ~~*Continue compliance with the National Flood Insurance Program through the enforcement of local floodplain management ordinances.*~~

- *FL#1: Evaluate flooding risk in areas being considered for future growth.*

- *FL #2: Obtain funding for implementing recommendations outlined in the Storm Water Master Plan.*
- *FL #3: Minimize overall impervious cover, and disconnect impervious areas.*
- *FL#4: Continue compliance with the National Flood Insurance Program through the enforcement of local floodplain management ordinances.*

On Page 59, for the list of action items under the "Action Items" subsection, insert the following bullets under "Flood":

- *FL#5 Identify and locate a second, accessible water system.*

On Page 60, First paragraph after the bullets of the "Action Items" subsection, delete the first two sentences of the paragraph and replace with the following:

~~*Note: the City of Molalla does not believe that implementing landslide or volcano-related mitigation activities will be cost-effective at this time. As such, the city has not identified landslide or volcanic eruption mitigation action items.*~~

Note: the City of Molalla does not believe that implementing volcano-related or drought mitigation activities will be cost-effective at this time. As such, the city has not identified landslide, volcanic-eruption, or drought mitigation action items.

On Page 61, second paragraph, first sentence, remove "Hazard Mitigation Team (HMT) and replace with Hazard Mitigation Advisory Committee (HMAC).

On Page 61, remove reference to "HMT" and replace with "HMAC".

Appendices, delete all references to "Lake Oswego" (also showing in the footer on some pages) and replace with "City of Molalla".

If the Action Items are now identified as Appendix A, then need to rename the appendix for the Planning and Public Process.

Appendix C:
City of Oregon City

Addendum to the Clackamas County Natural Hazards Mitigation Plan 2012 Amendments and Update

The Oregon Partnership for Disaster Resilience prepared this Appendix to the City of Oregon City Addendum to the Clackamas County Natural Hazard Mitigation Plan (Oregon City Addendum) as part of the 2011-12 update to the Clackamas County Natural Hazard Mitigation Plan. Upon local adoption, the appendix will become part of the Oregon City Addendum and will ensure that the City of Oregon City maintains FEMA Pre-Disaster Mitigation Program eligibility as well as compliance with the Clackamas County NHMP.

This appendix is organized according to the sections outlined in the Oregon City Addendum. A description of each section is presented below with proposed changes and updates following each.

Section 1: Planning Process

The planning process section of the Oregon City Addendum describes the activities used by the steering committee and community to develop the plan. Updates to the Planning Process section are as follows:

On Page 4, following Paragraph 7 of the "Who Participated in Developing the Addendum?" subsection, insert the following language:

2012 Effort

- *Laura Comstock, Clackamas County Emergency Management/RARE*
- *Bob Cullison, Oregon City Public Works*
- *Kathy Griffin, Oregon City Public Works*
- *Gail Hoskins, OCSD #62*
- *David Knoll, GIS Coordinator*
- *Nancy Kraushaar, Oregon City Public Works*
- *Scott Linfesty, Oregon City Building Official*
- *Gregg Ramirez, Clackamas Fire District #1*
- *Pete Walter, Oregon City Planning*

2012 Planning Process

The RARE Participant and Clackamas County Emergency Management developed and facilitated one plan update meeting with the Hazard Mitigation Plan Committee on June 6, 2012. Please see Appendix A for the meeting agenda and minutes.

June 6th, 2012: *The participant worked with the city lead to convene the steering committee and meet to review and update the city's Natural Hazards Mitigation Plan Addendum. Because the county is in the process of updating their NHMP, each of the cities were required to update their addendums, regardless of when their plan was last updated or developed. This is to ensure that the county and all of the cities are on the same timeline, and will now all update their NHMP's in 5 years. As part of this meeting, the steering committee reviewed the county's updated hazard assessment and made necessary changes to their hazard assessment, if necessary. The committee also reviewed their list of community assets to determine if any new additions or changes needed to be made. The committee also reported on progress made to the action items listed in the current NHMP. The committee reviewed the mitigation strategy and plan implementation and maintenance pieces and made changes if necessary.*

On Page 6, first paragraph following the "Formal Review Process" subsection, delete the entire paragraph and replace with the following paragraphs:

~~*The HMPC will meet semi-annually to identify funding for the implementation of mitigation actions, evaluate the effectiveness of the plan, develop new mitigation actions to reduce losses from natural hazards, and to reflect changes in land development or programs that may affect mitigation priorities. The first meeting will be held in the spring, and the second meeting will be held in the fall. At the spring meeting the group can reflect on the previous winter season and prepare for hazards related to summer, such as wildfires. During the fall meeting the group can prepare for winter-related hazards, such as winter storms and floods. A new list of members will be generated at the beginning of each year to ensure the committee remains relevant.*~~

The HMPC will meet annually to identify funding for the implementation of mitigation actions, evaluate the effectiveness of the plan, develop new mitigation actions to reduce losses from natural hazards, and to reflect changes in land development or programs that may affect mitigation priorities. At the meeting the group can reflect on the previous hazard season and prepare for upcoming hazards. A new list of members will be generated at the beginning of each year to ensure the committee remains relevant.

The convener, or city lead designee, will also be responsible for meeting annually with the county Hazard Mitigation Coordinator. This meeting will provide a chance for each of the city leads to meet together and discuss updates and progress with the Hazard Mitigation Coordinator. The convener will report back to the HMPC with information gathered. The Coordinator will be responsible for setting up the meeting, and providing the city leads with updates on new studies or potential funding opportunities for mitigation projects.

The convener will be responsible for documenting the outcome of the annual meeting, as well as the meeting with the county's Hazard Mitigation Coordinator.

On Page 9, first paragraph of the "What are the Mitigation Actions Identified by the City of Oregon City?" subsection, delete the sentences 3 and 4:

~~*Short-term action items (ST) are activities that agencies may implement with existing resources and authorities within one to two years. Long-term action items (LT) may require new or additional resources or authorities, and may take between one and five years to implement.*~~

On Page 9, first paragraph of the "What are the Mitigation Actions Identified by the City of Oregon City?" subsection, delete the last sentence and replace with the following:

~~*The action items are organized within the following matrix, which lists all of the multi-hazard and hazard-specific action items included in the mitigation plan addendum.*~~

The action items are organized in Appendix B: Action Items, which lists all of the multi-hazard and hazard-specific action items included in the mitigation plan addendum.

Section 2: Community Profile

The community profile section of the Oregon City Addendum describes a variety of community characteristics specific to the City of Oregon City. Based on new information compiled during the Clackamas County NHMP update process, updates to the Oregon City Addendum include the following:

On Page 19, under the "Historical and Cultural Resources" subsection, remove the following bullets:

- ~~*Baker Cabin Historic Site*~~
- ~~*Philip Foster Farm*~~

On Page 19, under the "Historical and Cultural Resources" subsection, add the following bullet:

- *Barclay House*

Section 3: Hazard Assessment

The hazard assessment section of the Oregon City Addendum provides information on identifying hazards based on their geographic location, probability, and intensity; vulnerability assessment and inventory of community assets, and; a risk analysis estimating potential losses from each hazard. Based on new information compiled during the Clackamas County NHMP update process, updates to the Oregon City Addendum include the following:

On Page 32, end of Paragraph 1 of the "Community Assets: Vulnerability Assessment" section, insert the following:

It is important to note that the facilities identified as "critical" and "essential" are characterized differently than the structural code that identifies buildings as "essential" and "non-essential." The structural code uses different language and

criteria and therefore have completely different meanings than the buildings identified in Oregon City's NHMP.

On Page 32, under the "Community Assets: Vulnerability Assessment" section, edit the following bullets listed under "City Facilities":

- ~~*Willamette Falls Hospital (C)*~~
- ~~*Operations Center (C)*~~
- ~~*Oregon City Carnegie Center*~~

- *Providence Willamette Falls Hospital (C)*
- *Public Works Operations Center (C)*
- *Oregon City Carnegie Center Library (E)*

On Page 32, under the "Community Assets: Vulnerability Assessment" section, add the following bullets listed under "City Facilities":

- Hilltop Fire Station (C)

On Page 32, under the "Community Assets: Vulnerability Assessment" section, remove the following bullets listed under "City Facilities":

- ~~Abernethy Center (E)~~
- ~~City Office Buildings (E)~~

On Page 32, under the "Community Assets: Vulnerability Assessment" section, add the following bullets listed under "County Facilities":

- Clackamas County Roads Services

On Page 32, under the "Community Assets: Vulnerability Assessment" section, remove the following bullets listed under "County Facilities":

- ~~Beavercreek Fire Station (C)~~

On Page 32, under the "Community Assets: Vulnerability Assessment" section, remove the following bullets listed under "Federal Facilities":

~~***Federal Facilities***~~

- ~~*National Guard Armory (E)*~~

On Page 32, under the "Community Assets: Vulnerability Assessment" section, edit the following bullets listed under "Schools (Potential Shelter Sites)":

- ~~*Oregon City High School – Jackson Campus*~~
- *Jackson Campus*

On Page 33, under the "Community Assets: Vulnerability Assessment" section, edit the following bullets listed under "Infrastructure - Wastewater":

- ~~*Settler's Point Lift Station (E)*~~

- *Settler's Point Pump Station (E)*

On Page 33, under the "Community Assets: Vulnerability Assessment" section, remove the following bullets listed under "Infrastructure - Water":

- ~~*Boynton Lift Station (E)*~~

On Page 33, under the "Community Assets: Vulnerability Assessment" section, edit the following bullet listed under "Infrastructure - Water":

- ~~*Boynton Standpipe Reservoir (C)*~~
- *Boynton Standpipe Reservoir and Pump Station (C)*

On Page 34, under the "Community Assets: Vulnerability Assessment" section, edit the following bullet listed under "Infrastructure – Bridges, Overpasses and Main Culverts (C)":

- ~~*Willamette River Bridge*~~
- *Highway 43 Arch Bridge*

On Page 34, under the "Community Assets: Vulnerability Assessment" section, edit the following bullet listed under "Infrastructure – Bridges, Overpasses and Main Culverts (C)":

- ~~*I-205 at Clackamas River*~~
- *I-205 bridge over Clackamas River*

On Page 34, under the "Community Assets: Vulnerability Assessment" section, edit the following bullet listed under "Infrastructure – Bridges, Overpasses and Main Culverts (C)":

- ~~*McLoughlin Blvd at Willamette River*~~
- *McLoughlin Blvd Viaduct*

On Page 34, under the "Community Assets: Vulnerability Assessment" section, edit the following bullet listed under "Infrastructure – Bridges, Overpasses and Main Culverts (C)":

- ~~*I-205 at Main Street*~~
- *Main Street overcrossing at I-205*

On Page 34, under the "Community Assets: Vulnerability Assessment" section, edit the following bullet listed under "Infrastructure – Bridges, Overpasses and Main Culverts (C)":

- ~~*Washington Street at Abernethy Creek*~~
- *Washington Street Bridge (at Abernethy Creek)*

On Page 34, under the "Community Assets: Vulnerability Assessment" section, edit the following bullet listed under "Infrastructure – Bridges, Overpasses and Main Culverts (C)":

- ~~*Holcomb Blvd at Oregon 213*~~
- *Oregon 213 overcrossing at Holcomb Blvd*

On Page 34, under the "Community Assets: Vulnerability Assessment" section, edit the following bullet listed under "Infrastructure – Bridges, Overpasses and Main Culverts (C)":

- ~~*McLoughlin Tunnel at UPRR*~~
- *McLoughlin Blvd Tunnel at UPRR*

On Page 34, under the "Community Assets: Vulnerability Assessment" section, edit the following bullet listed under "Infrastructure – Bridges, Overpasses and Main Culverts (C)":

- ~~*Anchor Way at Abernethy*~~
- *Anchor Way Bridge at Abernethy Creek*

On Page 34, under the "Community Assets: Vulnerability Assessment" section, edit the following bullet listed under "Infrastructure – Bridges, Overpasses and Main Culverts (C)":

- ~~*George Abernethy Bridge/I-205 over Willamette*~~
- *George Abernethy Bridge (I-205 at Willamette)*

On Page 34, under the "Community Assets: Vulnerability Assessment" section, edit the following bullet listed under "Infrastructure – Bridges, Overpasses and Main Culverts (C)":

- ~~*Hwy 213/Redland Road overpass*~~
- *Redland Road overcrossing at Hwy 213*

On Page 34, under the "Community Assets: Vulnerability Assessment" section, edit the following bullet listed under "Infrastructure – Bridges, Overpasses and Main Culverts (C)":

- ~~*McLoughlin Blvd. at Clackamas Road*~~
- *Main Street Extension overcrossing at McLoughlin Blvd.*

On Page 34, under the "Community Assets: Vulnerability Assessment" section, edit the following bullet listed under "Infrastructure – Bridges, Overpasses and Main Culverts (C)":

- ~~*McLoughlin at Abernethy Culvert*~~
- *Abernethy Creek Culvert underneath McLoughlin Blvd.*

On Page 34, under the "Community Assets: Vulnerability Assessment" section, edit the following bullet listed under "Infrastructure – Bridges, Overpasses and Main Culverts (C)":

- ~~*S.E. 82nd Pedestrian Bridge*~~
- *Pedestrian Bridge to Gladstone*

On Page 34, under the "Community Assets: Vulnerability Assessment" section, add the following bullet listed under "Infrastructure – Bridges, Overpasses and Main Culverts (C)":

- *Washington Street overcrossing at Hwy 213*

Section 4: Natural Hazards

The risk assessment section of the Oregon City Addendum describes the types, causes, characteristics and relative risk posed by natural hazards on the City of Oregon City. Based on new information compiled during the Clackamas County NHMP update process, updates to the Oregon City Addendum include the following:

On Page 45 Paragraph 1 of the "Flood Mitigation Action Items" subsection, insert the following sentence at the end:

> *The action item worksheets with updated progress for 2012 are located in Appendix B: Action Items of this addendum.*

On Page 46-47, Remove all of the action items following Paragraph 1 of the "Flood Mitigation Action Items" subsection, and move them to Appendix B: Action Items.

On Page 51, Sentence 5 of the "Hazard Scores" subsection, edit the following sentence:

> ~~*History of landslide hazard events was determined to be high, meaning four or more landslide events have occurred in a 100 year period.*~~
>
> *History of landslide hazard events was determined to be moderate, meaning 2 to 3 events have occurred in the past 100 years.*

On Page 53 Paragraph 1 of the "Landslide Mitigation Action Items" subsection, insert the following sentence at the end:

> *The action item worksheets with updated progress for 2012 are located in Appendix B: Action Items of this addendum.*

On Page 53-54, Remove all of the action items following Paragraph 1 of the "Landslide Mitigation Action Items" subsection, and move them to Appendix B: Action Items.

On Page 57, remove Paragraph 1 under the "Hazard Scores" subsection and replace with the following:

> ~~*The HMPC determined the probably of a wildfire to be moderate, meaning one or more wildfire events are likely within a 50 year period. This is in agreement with the county's moderate rating. Vulnerability is moderate; meaning 1-10% of the population is likely to be affected by a wildfire. This score is also in agreement with the county's moderate rating. History of wildfire events was determined to be*~~

~~*moderate, meaning 2-3 wildfire events have occurred in a 100 year period. Finally, the HMPC determined maximum threat to be moderate; meaning a maximum of 5-25% of the population could be affected by a wildfire in a worst case scenario. These scores will be used and discussed in more detail in Section 5.*~~

The HMPC determined the probability of a wildfire to be low, meaning one incident is likely within a 75 to 100 year period. This is lower than the county's moderate rating. Vulnerability is low; meaning less than 1 percent of the population is likely to be affected by a wildfire. This score is also lower than the county's moderate rating. History of wildfire events was determined to be low, meaning 0-1 wildfire events have occurred in a 100 year period. Finally, the HMPC determined maximum threat to be low; meaning less than 5% of the population could be affected by a wildfire in a worst case scenario. These scores will be used and discussed in more detail in Section 5.

On Page 58 Paragraph 1 of the "Wildfire Mitigation Action Items" subsection, insert the following sentence at the end:

The action item worksheets with updated progress for 2012 are located in Appendix B: Action Items of this addendum.

On Page 58-59, Remove all of the action items following Paragraph 1 of the "Wildfire Mitigation Action Items" subsection, and move them to Appendix B: Action Items.

Page 61, remove the heading, "Severe Storm: Wind and Winter" and replace with the following

- ~~***Severe Storm: Wind and Winter***~~
- ***Severe Storm: Wind, Winter, and Extreme Heat***

Page 61, remove Paragraph one of the "Severe Storm" subsection and insert the following:

~~*Wind and winter storms are caused by severe weather conditions. Wind storms can occur at any time of the year while severe winter storms are limited to the winter months.*~~

Wind, winter, and extreme heat (severe storms) are caused by severe weather conditions. Wind storms can occur at any time of the year, while winter storms are limited to the winter months. These storms produce linear winds rarely exceeding 90 miles per hour. A winter storm can be accompanied by high winds. Wind, winter, and extreme heat events are addressed together because they exhibit similar impacts, particularly in the form of damage to trees, power lines and utility lines.

Page 61, End of Paragraph 2 of the "Severe Storm" subsection, insert the following:

Extreme heat is characterized as several consecutive days with temperatures exceeding 100 degrees. With dangerous temperatures, the risk is especially high to vulnerable populations including young children and the elderly.

On Page 62, remove the second to last sentence under the "Hazard Scores" subsection and replace with the following:

~~*Finally, the HMPC determined maximum threat to be high, meaning more than 25% of the population could be affected by a severe storm in a worse case scenario.*~~

Finally, the HMPC determined maximum threat to be moderate; meaning between 5% and 25% of the population could be affected by a severe storm in a worst case scenario.

On Page 62, insert the following paragraph at the end of Paragraph 1 under the "Hazard Scores" subsection:

Extreme heat has a very low threat in Oregon City. The HMPC estimates the probability for future extreme heat events is 'low,' meaning one incident is likely within a 75 to 100 year period. This estimate is in accordance with the county's 'low' rating. The vulnerability estimate of future extreme heat events is 'low,' meaning less than 1% of the population and assets would be affected in a major event. This estimate is lower than the county's 'moderate' rating. The HMPC also determined that both the maximum threat of heat events and the history were 'low' meaning less than 5% of the population will be affected during an extreme heat event, and only 0 to 1 extreme heat events have occurred in the past 100 years, respectively.

On Page 63 Paragraph 1 of the "Severe Storm Mitigation Action Items" subsection, insert the following sentence at the end:

The action item worksheets with updated progress for 2012 are located in Appendix B: Action Items of this addendum.

On Page 63, Remove all of the action items following Paragraph 1 of the "Severe Storm Mitigation Action Items" subsection, and move them to Appendix B: Action Items.

On Page 68, remove sentences 1 and 2 from Paragraph 1 under the "Hazard Scores" subsection and replace with the following:

~~*The HMPC determined the probably of an earthquake to be moderate, meaning one or more earthquakes are likely within a 50 year period. This is lower than the county's high rating because based on history the HMPC did not believe they would have one or more large-scale earthquakes within a 10 year period.*~~

The HMPC determined the probability of an earthquake to be moderate, meaning one or more earthquakes are likely within a 35 to 75 year period. This is higher than the county's low rating.

On Page 68 Paragraph 1 of the "Earthquake Mitigation Action Items" subsection, insert the following sentence at the end:

> *The action item worksheets with updated progress for 2012 are located in Appendix B: Action Items of this addendum.*

On Page 68-69, Remove all of the action items following Paragraph 1 of the "Earthquake Mitigation Action Items" subsection, and move them to Appendix B: Action Items.

On Page 71, edit the following sentence under the "Hazard Scores" subsection, and replace with the following:

> ~~*Vulnerability is low; meaning less than 1% of the population is likely to be affected. This score is lower than the county's high rating because Oregon City is located very far from any active volcanoes, whereas parts of the county border Mt. Hood.*~~
>
> *Vulnerability is low; meaning less than 1% of the population is likely to be affected. This score is lower than the county's moderate rating.*

On Page 72, following the "Volcano" subsection, insert the following new "Drought" subsection:

> ***Drought Profile***
>
> *The Clackamas County Multi-Jurisdictional Natural Hazards Mitigation Plan adequately describes the causes and characteristics, history, location, extent and impacts of drought affecting the City of Oregon City. Descriptions of the drought hazard can be found on pages DR-1 to DR-6 of the 2012 Clackamas County Natural Hazards Mitigation Plan update.*
>
> *The probability of drought in Oregon City was determined using scientific data, historical occurrences, and local knowledge. The HMPC estimates the probability of drought to be 'low' meaning one incident is likely within a 75 to 100 year period. This is lower than the county's 'moderate' rating. The HMPC estimates that Oregon City has a 'low' vulnerability to drought conditions, meaning less than 1% of the population could be affected in a large-scale regional event. This is in agreement with the county's 'low' rating.*
>
> ***Drought Mitigation Activities***
>
> *The existing drought hazard mitigation activities are conducted at the county, regional, state, and federal levels and are described in the Clackamas County Natural Hazards Mitigation Plan. As such, the information will not be repeated here.*
>
> ***Drought Mitigation Action Items***
>
> *The City of Oregon City does not believe that implementing drought-related mitigation activities will be cost-effective at this time. As such, the city has not identified drought mitigation action items. Oregon City will partner with Clackamas*

County, however, on the implementation of mitigation strategies that benefit both jurisdictions.

On Page 73, Paragraph 1 of the "Multi-Hazard Action Items (MH)" subsection, edit the following sentence:

~~*Multi-hazard action items are those activities that pertain to all seven hazards in the mitigation plan: flood, landslide, wildfire, severe winter storm, windstorm, earthquake, and volcanic eruption.*~~

Multi-hazard action items are those activities that pertain to all nine hazards in the mitigation plan: flood, landslide, wildfire, severe winter storm, windstorm, extreme heat, earthquake, volcanic eruption, and drought.

On Page 73 Paragraph 1 of the "Multi-Hazard Action Items (MH)" subsection, insert the following sentence:

The action item worksheets with updated progress for 2012 are located in Appendix B: Action Items of this addendum.

On Page 73-75, Remove all of the action items following Paragraph 1 of the "Multi-Hazard Mitigation Action Items" subsection, and move them to Appendix B: Action Items.

Section 5: Mitigation Planning Priority System

The Mitigation Planning Priority Section of the Oregon City Addendum describes the project review and prioritization process for the action items outlined for each hazard in Appendix B: Action Items Worksheets. Based on new information compiled during the Clackamas County NHMP update process, updates to the Oregon City Addendum include the following:

On Page 76, following Paragraph 1 of the "Action Item Prioritization Methodology" subsection, insert the following:

Note: the City of Oregon does not believe that implementing drought and volcanic-related mitigation activities will be cost-effective at this time. As such, the city has not identified drought or volcanic-eruption mitigation action items.

On Page 78, replace "Table 5.1 Natural Hazards Prioritization Score" with the following updated Table:

Table 5.1 Natural Hazards Prioritization Score

Hazard Weight Factor	History 2	Vulnerability 5	Max. Threat 10	Probability 7	Total	Points Assigned
Multi-Hazard	-	-	-	-	-	10
Winter Storms	18	40	50	56	164	9
Flood	20	20	50	70	160	8
Earthquake	4	25	60	35	124	7
Landslide	12	15	30	56	113	5
Wind Storms	8	30	40	35	113	5
Volcano	2	10	70	7	89	4
Wildfire	6	15	30	21	72	3
Drought	1	2	2	2	7	1
Extreme Heat	1	2	2	2	7	1

Appendix C:
City of Sandy

Addendum to the Clackamas County Natural Hazards Mitigation Plan 2012 Amendments and Update

The Oregon Partnership for Disaster Resilience prepared this Appendix to the City of Sandy Addendum to the Clackamas County Natural Hazard Mitigation Plan (Sandy Addendum) as part of the 2011-12 update to the Clackamas County Natural Hazard Mitigation Plan. Upon local adoption, the appendix will become part of the Sandy Addendum and will ensure that the City of Sandy maintains FEMA Pre-Disaster Mitigation Program eligibility as well as compliance with the Clackamas County NHMP.

This appendix is organized according to the sections outlined in the Sandy Addendum. A description of each section is presented below with proposed changes and updates following each.

Section 1: Planning Process

The planning process section of the Sandy Addendum describes the activities used by the steering committee and community to develop the plan. Updates to the Planning Process section are as follows:

On Page 8, following the "Planning Process" subsection, insert the following language:

2012 Planning Process

The RARE Participant and Clackamas County Emergency Management developed and facilitated one plan update meeting with the Sandy Emergency Operations Center Group on June 12, 2012. Please see Appendix B for the meeting agenda and minutes.

2012 Committee members included:

- *Seth Atkinson, City of Sandy*
- *Scott Howland, Sandy Fire District*
- *Alice Lasher - Busch, Sandy Fire Public Education and Information Officer*
- *Jason McKinnon, Sandy Fire District*
- *Gary McQueen, Sandy Fire District*
- *Nolan O'Meara, OTSD 46*
- *Phil Schneider, Sandy Fire District*
- *Kim Yamashita, Sandy Police*

<u>NHMP Update Meeting - June 12, 2012:</u> The participant worked with the city lead to convene the steering committee and meet to review and update the city's Natural Hazards Mitigation Plan Addendum. Because the county is in the process of updating their NHMP, each of the cities were required to update their addendums, regardless of when their plan was last updated or developed. This is to ensure that the county and all of the cities are on the same timeline, and will now all update their NHMP's in 5 years. As part of this meeting, the steering committee reviewed the county's updated hazard assessment and made necessary changes to their hazard assessment, if necessary. The committee also reviewed their list of community assets to determine if any new additions or changes needed to be made. The committee also reported on progress made to the action items listed in the current NHMP. The committee reviewed the mitigation strategy and plan implementation and maintenance pieces and made changes if necessary.

On Page 11, Following the first paragraph of the "Convener" subsection insert the following:

The convener, or city lead designee, will be responsible for meeting annually with the county Hazard Mitigation Coordinator. This meeting will provide a chance for each of the city leads to meet together and discuss updates and progress with the Hazard Mitigation Coordinator. The convener will report back to the SEOC with information gathered. The Coordinator will be responsible for setting up the meeting, and providing the city leads with updates on new studies or potential funding opportunities for mitigation projects.

Section 2: Community Profile

The community profile section of the Sandy Addendum describes a variety of community characteristics specific to the City of Sandy. Based on new information compiled during the Clackamas County NHMP update process, updates to the Sandy Addendum include the following:

On Page 20, under the "Critical Infrastructure" subsection, edit the following bullet:

- ~~*McKinnonn Airport*~~
- *McKinnon Airport*

On Page 20, under the "Critical Infrastructure" subsection, add the following bullets:

- *Portland Water Intertie (Hudson Road)*

On Page 20, under the "Essential Facilities" subsection, remove the following bullets:

- ~~*Bull Run School*~~
- ~~*Kelso Grade School*~~
- ~~*Firwood Medical Clinic*~~

On Page 20, under the "Essential Facilities" subsection, edit the following bullet:

- ~~*Cottrell Grade School*~~
- Oregon Trail Primary Academy

On Page 21, under the "Essential Facilities" subsection, edit the following bullet:

- ~~*Adventist Health Clinic*~~
- *Adventist Health Clinic and Urgent Care*

On Page 21, under the "Vulnerable Populations" subsection, edit the following bullet:

- ~~*Haroldon Apartments*~~
- *Harlon Garden Apartments*

On Page 22, under the "Hazardous Materials" subsection, edit the following bullet:

- ~~*US Metal*~~
- *US Metal Works Inc./US Meat & Restaurant Supply*

On Page 23, under the "Hazardous Materials" subsection, add the following bullets:

- *Fred Meyer*
- *Arco/AMPM*
- *Bi-Mart*
- *Olin Aquatic Center*
- *Camp Namanu*
- *Camp Howard*

On Page 23, under the "Historical Resources Include" subsection, edit the following bullet:

- ~~*Gerdes Store Post Office*~~
- *Gerdes Store and Sandy Post Office*

On Page 23, under the "Historical Resources Include" subsection, edit the following bullet:

- ~~*Evangelical Lutheran Church*~~
- *Evangelical Lutheran Mission*

On Page 23, under the "Historical Resources Include" subsection, edit the following bullet:

- ~~*Junker Home*~~
- *Casper Junker Home*

On Page 23, under the "Historical Resources Include" subsection, edit the following bullet:

- ~~*Junker Building*~~
- *Junker Business Building*

On Page 23, under the "Historical Resources Include" subsection, edit the following bullet:

- ~~*Meining Park*~~
- *The Meinig Park*

On Page 23, under the "Historical Resources Include" subsection, add the following bullet :

- *Hoffman's Sandy Meat Market.*

Section 3: Risk Assessment

The risk assessment section of the Sandy Addendum describes the types, causes, characteristics and relative risk posed by natural hazards on the City of Sandy. Based on new information compiled during the Clackamas County NHMP update process, updates to the Sandy Addendum include the following:

On Page 31, remove the section, "Severe Storms: Wind and Winter" and replace with:

~~***Severe Storms: Wind and Winter***~~

Severe Storms: Wind, Winter, and Extreme Heat

On Page 32, after Paragraph 4 of the "Severe Storms: Wind, Winter, and Extreme Heat" subsection, insert the following paragraph:

Extreme heat has a very low threat in Sandy. The SEOC estimates the probability for future extreme heat events is 'low,' meaning one incident is likely within a 75 to 100 year period. This estimate is in accordance with the county's 'low' rating. The vulnerability estimate of future extreme heat events is 'moderate,' meaning between 1% and 10% of the population and assets would be affected in a major event. This estimate is in agreement with the county's 'moderate' rating.

On Page 33, Paragraph 3 of the "Earthquake" subsection, delete the first two sentences of the paragraph and replace with the following:

~~*The SEOC ranks both the probability of future earthquake events as 'high,' meaning one event is likely within a 10 to 35 year period. This estimate is the same as the county's 'high' probability estimate.*~~

The SEOC ranks both the probability of future earthquake events as 'moderate,' meaning one event is likely within a 35 to 75 year period. This estimate is the same as the county's 'moderate' probability estimate.

On Page 44, Paragraph 4 of the "Volcano" subsection, delete the last sentence of the paragraph and replace with the following:

~~*Both ratings are in agreement with Clackamas County's probability and vulnerability estimates.*~~

The probability rating is the same as the county's estimate of 'low' but the vulnerability rating is higher than the county's 'moderate' rating.

On Page 45, following the "Volcano" subsection, insert the following new "Drought" subsection:

Drought Profile

The Clackamas County Multi-Jurisdictional Natural Hazards Mitigation Plan adequately describes the causes and characteristics, history, location, extent and impacts of drought affecting the city of Sandy. Descriptions of the drought hazard can be found on pages DR-1 to DR-6of the 2012 Clackamas County Natural Hazards Mitigation Plan update.

The probability of drought in Sandy was determined using scientific data, historical occurrences, and local knowledge. The SEOC estimates the probability of drought to be 'moderate' meaning one incident is likely within a 35 to 75 year period. This is the same as the county's 'moderate' rating. The SEOC estimates that Sandy has a 'low' vulnerability to drought conditions, meaning less than 1% of the population could be affected in a large-scale regional event. This is in agreement with the county's 'low' rating.

Drought Mitigation Activities

The existing drought hazard mitigation activities are conducted at the county, regional, state, and federal levels and are described in the Clackamas County Natural Hazards Mitigation Plan. As such, the information will not be repeated here.

Drought Mitigation Action Items

The city of Sandy does not believe that implementing drought-related mitigation activities will be cost-effective at this time. As such, the city has not identified drought mitigation action items. Sandy will partner with Clackamas County, however, on the implementation of mitigation strategies that benefit both jurisdictions.

Section 4: Action Items

The action items section of the Sandy Addendum describes detailed recommendations for activities that local departments, citizens and others could engage in to reduce risk. Based on new information compiled during the Clackamas County NHMP update process, updates to the Sandy Addendum include the following:

On Page 49, Paragraph 1 of the "Action Items" subsection, delete the last sentence of the paragraph and replace with the following:

~~*Full action item worksheets are located in Appendix A.*~~

The full action item worksheets with updated progress for 2012 are located in Appendix A of this addendum.

On Page 50, Paragraph 2 of the "Action Items" subsection, delete the first two sentences of the paragraph and replace with the following:

~~*Note: the City of Sandy does not believe that implementing volcano-related mitigation activities will be cost-effective at this time. As such, the city has not identified volcanic-eruption mitigation action items.*~~

Note: the City of Sandy does not believe that implementing drought and volcanic-related mitigation activities will be cost-effective at this time. As such, the city has not identified drought or volcanic-eruption mitigation action items.

Appendix 4:
City of West Linn

Addendum to the Clackamas County Natural Hazards Mitigation Plan 2012 Amendments and Update

The Oregon Partnership for Disaster Resilience prepared this Appendix to the City of West Linn Addendum to the Clackamas County Natural Hazard Mitigation Plan (West Linn Addendum) as part of the 2011-12 update to the Clackamas County Natural Hazard Mitigation Plan. Upon local adoption, the appendix will become part of the West Linn Addendum and will ensure that the City of West Linn maintains FEMA Pre-Disaster Mitigation Program eligibility as well as compliance with the Clackamas County NHMP.

This appendix is organized according to the sections outlined in the West Linn Addendum. A description of each section is presented below with proposed changes and updates following each.

Section 1: Planning Process

The planning process section of the West Linn Addendum describes the activities used by the steering committee and community to develop the plan. Updates to the Planning Process section are as follows:

On Page 1, following Paragraph 2 of the "Planning Participants" subsection, insert the following:

2012 Update Planning Process

The RARE Participant and Clackamas County Emergency Management developed and facilitated one plan update meeting with the Hazard Mitigation Advisory Committee on June 6, 2012. Please see Appendix 3: Planning and Public Process for the meeting agenda and minutes.

2012 Committee members included:

- *Laura Comstock, Clackamas County Emergency Management/RARE*
- *Grant Oakes, WLPSAB*
- *Jeff Randall, City of West Linn – Transportation*
- *Ron Schwartz, West Linn Police Department*
- *Jay Wilson, Clackamas County Emergency Management*

NHMP Update Meeting - June 6, 2012: The participant worked with the city lead to convene the steering committee and meet to review and update the city's Natural

Hazards Mitigation Plan Addendum. Because the county is in the process of updating their NHMP, each of the cities were required to update their addendums, regardless of when their plan was last updated or developed. This is to ensure that the county and all of the cities are on the same timeline, and will now all update their NHMP's in 5 years. As part of this meeting, the steering committee reviewed the county's updated hazard assessment and made necessary changes to their hazard assessment, if necessary. The committee also reviewed their list of community assets to determine if any new additions or changes needed to be made. The committee also reported on progress made to the action items listed in the current NHMP. The committee reviewed the mitigation strategy and plan implementation and maintenance pieces and made changes if necessary.

On Page 4, first paragraph following the "Formal Review Process" subsection, insert the following paragraphs:

Annual Meeting

The HMAC will meet once a year. The meeting will be coordinated by the convener. This meeting will debrief on the previous hazard seasons and prepare for the upcoming hazard seasons. In addition to debriefing and preparing for the upcoming hazard seasons, the committee will:

The convener, or city lead designee, will also be responsible for meeting annually with the county Hazard Mitigation Coordinator. This meeting will provide a chance for each of the city leads to meet together and discuss updates and progress with the Hazard Mitigation Coordinator. The convener will report back to the HMAC with information gathered. The Coordinator will be responsible for setting up the meeting, and providing the city leads with updates on new studies or potential funding opportunities for mitigation projects.

The convener will be responsible for documenting the outcome of the annual meeting, as well as the meeting with the county's Hazard Mitigation Coordinator.

On Page 5, at the end of the "City of West Linn Mitigation Strategies" subsection, edit the following sentence:

- ~~*The action items are organized within the following matrix, which lists all of the multi-hazard and hazard-specific action items included in the mitigation plan.*~~

- *The action items are organized in Appendix 2 and document the updated progress that has occurred from 2007 to 2012.*

On Pages 5-6, at the end of the "City of West Linn Mitigation Strategies" subsection, remove the action item matrix.

Section 2: Community Profile

The community profile section of the West Linn Addendum describes a variety of community characteristics specific to the City of West Linn. Based on new

information compiled during the Clackamas County NHMP update process, updates to the West Linn Addendum include the following:

On Page 10, Paragraph 1 of the "Population and Demographics" subsection insert the following sentence at the end:

By 2010, the census listed the population of West Linn at 25,109.

Section 3: Hazard Assessment

The hazard assessment section of the West Linn Addendum provides information on identifying hazards based on their geographic location, probability, and intensity; vulnerability assessment and inventory of community assets, and; a risk analysis estimating potential losses from each hazard. Based on new information compiled during the Clackamas County NHMP update process, updates to the West Linn Addendum include the following:

On Page 24, under the "Community Assets" subsection, insert the following sentence at the end:

An updated list of community assets is located in Appendix 1: Vulnerability Analysis Data Tables of this addendum.

Section 4: Natural Hazards

The risk assessment section of the West Linn Addendum describes the types, causes, characteristics and relative risk posed by natural hazards on the City of West Linn. Based on new information compiled during the Clackamas County NHMP update process, updates to the West Linn Addendum include the following:

On Page 40, insert a new subsection at the end of the "Flood Hazard Assessment" to include:

Hazard Scores

The HMAC determined that the probability of floods in West Linn is moderate, meaning one incident is likely to occur within 35 to 75 years. This is lower than the county's high rating. Vulnerability of floods was determined to be moderate meaning 1% to 10% of the population and infrastructure are likely to be affected. This rating is the same as the county's. There is a moderate history of flood events in West Linn with a low maximum threat. Both of these are lower than the county's high and moderate rankings, respectively.

On Page 42 Paragraph 1 of the "Flood Mitigation Action Items" subsection, insert the following sentence at the end:

The action item worksheets with updated progress for 2012 are located in Appendix 2: Action Items of this addendum.

On Page 42-43, Remove all of the action items following Paragraph 1 of the "Flood Mitigation Action Items" subsection, and move them to Appendix 2: Action Items.

On Page 47, insert a new subsection at the end of the "Landslide Hazard Assessment" to include:

Hazard Scores

The HMAC determined that the probability of landslides in West Linn is low, meaning one incident is likely to occur within 75 to 100 years. This is lower than the county's high rating. Vulnerability of landslides was determined to be high meaning more than 10% of the population and infrastructure is likely to be affected. This rating is higher than the county's low ranking. There is a low history of landslides events in West Linn, which is lower than the county's moderate rating and the maximum threat of landslides is moderate, which is higher than the county's low rating.

On Page 49 Paragraph 1 of the "Landslide Mitigation Action Items" subsection, insert the following sentence at the end:

The action item worksheets with updated progress for 2012 are located in Appendix 2: Action Items of this addendum.

On Page 49, Remove all of the action items following Paragraph 1 of the "Landslide Mitigation Action Items" subsection, and move them to Appendix 2: Action Items.

On Page 55, insert a new subsection at the end of the "Earthquake Hazard Assessment" to include:

Hazard Scores

The HMAC determined that the probability of earthquakes in West Linn is low, meaning one incident is likely to occur within 75 to 100 years. This is in agreement with than the county's low rating. Vulnerability of earthquakes was determined to be high meaning more than 10% of the population and infrastructure is likely to be affected. This rating is the same as the county. There is a low history of earthquake events in West Linn with a high maximum threat. Both of these are in agreement with the county's ratings.

On Page 55 Paragraph 1 of the "Earthquake Mitigation Action Items" subsection, insert the following sentence at the end:

The action item worksheets with updated progress for 2012 are located in Appendix 2: Action Items of this addendum.

On Page 55-56, Remove all of the action items following Paragraph 1 of the "Earthquake Mitigation Action Items" subsection, and move them to Appendix 2: Action Items.

On Page 59, remove the section, "Severe Storms" and replace with:

~~***Severe Storms***~~

Severe Weather

Page 59, remove Paragraph one of the "Severe Storm Profile" subsection and insert the following:

~~*Severe Storm Profile*~~

~~*Wind, snow and ice storms (severe storms) are caused by severe weather conditions. Wind storms can occur at any time of the year, while ice storms are limited to the winter months. These storms produce linear winds rarely exceeding 90 miles per hour. An ice and/or snow storm can be accompanied by high winds. Wind and ice/snow storms are addressed together because they exhibit similar impacts, particularly in the form of damage to trees, power lines and utility lines.*~~

Severe Weather Profile

Wind, snow and ice storms, and extreme heat (severe weather) are caused by severe weather conditions. Wind storms can occur at any time of the year, while ice storms are limited to the winter months. These storms produce linear winds rarely exceeding 90 miles per hour. An ice and/or snow storm can be accompanied by high winds. Wind and ice/snow storms are addressed together because they exhibit similar impacts, particularly in the form of damage to trees, power lines and utility lines. Extreme heat is characterized as several consecutive days with temperatures exceeding 100 degrees. With dangerous temperatures, the risk is especially high to vulnerable populations including young children and the elderly.

On Page 60, remove the section, "Severe Storms Hazard Assessment" and replace with:

~~***Severe Storm Hazard Assessment***~~

Severe Weather Hazard Assessment

On Page 61, insert a new subsection at the end of the "Severe Weather Hazard Assessment" to include:

Hazard Scores

The HMAC determined that the probability of windstorms and winter storm events in West Linn are moderate, meaning one incident is likely to occur within 35 to 75 years. These are in agreement with the county's moderate ranking for windstorms, but lower than the county's high ranking for winter storms. The HMAC determined the probability of extreme heat events was low, which is lower than the county's

'high' rating. Vulnerability of windstorms and winter storm events were determined to be high meaning more than 10% of the population and infrastructure is likely to be affected. This rating is higher than the county's low rating for windstorms and moderate rating for winter storms. The vulnerability for extreme heat events in West Linn was determined to be moderate, which is in agreement with the county's rating. The HMAC determined the history of all three severe weather events was high. This is in agreement with the county's high rating for extreme heat events but higher than the county's moderate ratings for both windstorms and winter storms. The maximum threat of severe weather events was determined to be high for both windstorms and winter storms, which is higher than the county's moderate ranking for both; maximum threat for extreme heat events was determined to be moderate, which is in agreement with the county's rating.

On Page 62, remove the section, "Severe Storm Mitigation Action Items" and replace with:

~~***Severe Storm Mitigation Action Items***~~

Severe Weather Mitigation Action Items

On Page 62 Paragraph 1 of the "Severe Weather Mitigation Action Items" subsection, insert the following sentence at the end:

The action item worksheets with updated progress for 2012 are located in Appendix 2: Action Items of this addendum.

On Page 62-63, Remove all of the action items following Paragraph 1 of the "Severe Weather Mitigation Action Items" subsection, and move them to Appendix 2: Action Items.

On Page 67, insert a new subsection at the end of the "Wildfire Hazard Assessment" to include:

Hazard Scores

The HMAC determined that the probability of wildfires in West Linn is low, meaning one incident is likely to occur within 75 to 100 years. This is lower than the county's moderate rating. Vulnerability of wildfires was determined to be moderate meaning 1% to 10% of the population and infrastructure is likely to be affected. This rating is the same as the county. There is a moderate history of wildfire events in West Linn, which is higher than the county's low rating. Lastly, there is moderate maximum threat which is in agreement with the county's rating.

On Page 68 Paragraph 1 of the "Wildfire Mitigation Action Items" subsection, insert the following sentence at the end:

The action item worksheets with updated progress for 2012 are located in Appendix 1: Action Items of this addendum.

On Page 68-70, Remove all of the action items following Paragraph 1 of the "Wildfire Mitigation Action Items" subsection, and move them to Appendix 2: Action Items.

On Page 76, insert a new subsection at the end of the "Volcanic Eruption Hazard Assessment" to include:

Hazard Scores

The HMAC determined that the probability of volcanic eruptions in West Linn is low, meaning one incident is likely to occur within 75 to 100 years. This is in agreement with the county's rating. Vulnerability of volcanic eruptions was determined to be moderate meaning 1% to 10% of the population and infrastructure is likely to be affected. This rating is the same as the county. There is a low history of volcanic eruptions events in West Linn, which is in agreement with the county's rating and a low maximum threat, which is lower than the county's moderate ranking.

On Page 77, following the "Volcano" subsection, insert the following new "Drought" subsection:

Drought Profile

The Clackamas County Multi-Jurisdictional Natural Hazards Mitigation Plan adequately describes the causes and characteristics, history, location, extent and impacts of drought affecting the city of West Linn. Descriptions of the drought hazard can be found on pages DR-1 to DR-6 of the 2012 Clackamas County Natural Hazards Mitigation Plan update.

The probability of drought in West Linn was determined using scientific data, historical occurrences, and local knowledge. The HMAC estimates the probability of drought to be 'moderate' meaning one incident is likely within a 35 to 75 year period. The HMAC estimates that West Linn has a 'low' vulnerability to drought conditions, meaning less than 1% of the population could be affected in a large-scale regional event. The HMAC determined that the history and maximum threat of drought events in West Linn was determined to be low. All four ratings are in agreement with the county's.

Drought Mitigation Activities

The existing drought hazard mitigation activities are conducted at the county, regional, state, and federal levels and are described in the Clackamas County Natural Hazards Mitigation Plan. As such, the information will not be repeated here.

Drought Mitigation Action Items

The city of West Linn does not believe that implementing drought-related mitigation activities will be cost-effective at this time. As such, the city has not identified drought mitigation action items. West Linn will partner with Clackamas County,

however, on the implementation of mitigation strategies that benefit both jurisdictions.

On Page 79, Paragraph 1 of the "Multi-Hazard Action Items (MH)" subsection, edit the following sentence:

~~*Multi-hazard action items are those activities that pertain to all seven hazards in the mitigation plan: flood, landslide, wildfire, severe winter storm, windstorm, earthquake, and volcanic eruption.*~~

Multi-hazard action items are those activities that pertain to all nine hazards in the mitigation plan: flood, landslide, wildfire, severe winter storm, windstorm, extreme heat, earthquake, volcanic eruption, and drought.

On Page 79 Paragraph 1 of the "Multi-Hazard Mitigation Action Items" subsection, insert the following sentence at the end:

The action item worksheets with updated progress for 2012 are located in Appendix 2: Action Items of this addendum.

On Page 79-81, Remove all of the action items following Paragraph 1 of the "Multi-Hazard Mitigation Action Items" subsection, and move them to Appendix 2: Action Items.

Section 5: Mitigation Planning Priority System

The Mitigation Planning Priority Section of the West Linn Addendum describes the project review and prioritization process for the action items outlined for each hazard in Appendix 2: Action Items Worksheets. Based on new information compiled during the Clackamas County NHMP update process, updates to the West Linn Addendum include the following:

On Page 82, following Paragraph 2 of the "Mitigation Planning Priority System" subsection, insert the following:

Note: the City of West Linn does not believe that implementing drought and volcanic-related mitigation activities will be cost-effective at this time. As such, the city has not identified drought or volcanic-eruption mitigation action items.

On Page 84, replace "Table 5-1 Natural Hazards Prioritization Score" with the following updated Table:

Table 5-1 Natural Hazards Prioritization Score

Hazard Weight Factor	History 2	Vulnerability 5	Max. Threat 10	Probability 7	Total	Hazard Score
Multi-Hazard	-	-	-	-	-	10
Wind Storms	18	40	90	49	197	8
Winter Storms	18	40	90	49	197	8
Earthquake	2	50	100	14	166	7
Wildfire	8	35	50	14	107	6
Landslide	2	40	40	21	103	5
Flood	12	20	20	49	101	4
Extreme Heat	16	20	40	14	90	3
Volcano	2	25	30	14	64	2
Drought	2	10	20	28	60	1

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Appendix C:
City of Wilsonville

Addendum to the Clackamas County Natural Hazards Mitigation Plan 2012 Amendments and Update

The Oregon Partnership for Disaster Resilience prepared this Appendix to the City of Wilsonville Addendum to the Clackamas County Natural Hazard Mitigation Plan (Wilsonville Addendum) as part of the 2011-12 update to the Clackamas County Natural Hazard Mitigation Plan. Upon local adoption, the appendix will become part of the Wilsonville Addendum and will ensure that the City of Wilsonville maintains FEMA Pre-Disaster Mitigation Program eligibility as well as compliance with the Clackamas County NHMP.

This appendix is organized according to the sections outlined in the Wilsonville Addendum. A description of each section is presented below with proposed changes and updates following each.

Section 1: Planning Process

The planning process section of the Wilsonville Addendum describes the activities used by the steering committee and community to develop the plan. Updates to the Planning Process section are as follows:

On Page 8, following the "Planning Process" subsection, insert the following:

2012 Planning Process

The RARE Participant and Clackamas County Emergency Management developed and facilitated one plan update meeting with the Hazard Mitigation Advisory Committee on June 8, 2012. Please see Appendix A for the meeting agenda and minutes.

2012 Committee members included:

- *Martin Brown, City of Wilsonville – Building Official*
- *Ray Brunstrom, Wilsonville Citizen*
- *Laura Comstock, Clackamas County Emergency Management/RARE*
- *Randy Edmiston, Sysco Portland Inc.*
- *Blaise Edmonds, City of Wilsonville – Planning*
- *Delora Kerber, City of Wilsonville – Public Works*
- *Steve Munsterman, City of Wilsonville – Public Works*
- *Jeff Rubin, TVF&R*
- *Daniel Stark, City of Wilsonville – GIS*

- *Tim Woodley, WLWV-SD*

NHMP Update Meeting - June 8, 2012: The participant worked with the city lead to convene the steering committee and meet to review and update the city's Natural Hazards Mitigation Plan Addendum. Because the county is in the process of updating their NHMP, each of the cities were required to update their addendums, regardless of when their plan was last updated or developed. This is to ensure that the county and all of the cities are on the same timeline, and will now all update their NHMP's in 5 years. As part of this meeting, the steering committee reviewed the county's updated hazard assessment and made necessary changes to their hazard assessment, if necessary. The committee also reviewed their list of community assets to determine if any new additions or changes needed to be made. The committee also reported on progress made to the action items listed in the current NHMP. The committee reviewed the mitigation strategy and plan implementation and maintenance pieces and made changes if necessary.

On Page 11, second paragraph following the "Plan Maintenance" subsection, delete the entire paragraph and replace with the following paragraph:

~~*Semi Annual Meetings*~~

~~*The HMAC will meet on a semi-annual basis. Meetings will be held in the April and October of each year to allow the committee to debrief on the previous hazard seasons and prepare for the upcoming hazard seasons. In addition to debriefing and preparing for the upcoming hazard seasons, at the first meeting the committee will:*~~

Annual Meeting

The HMAC will meet once a year. The meeting will be coordinated by the convener. This meeting will debrief on the previous hazard seasons and prepare for the upcoming hazard seasons. In addition to debriefing and preparing for the upcoming hazard seasons, the committee will:

On Page 11, first sentence following the first set of bullets under the "Plan Maintenance" subsection, delete the following sentence:

~~*During the second meeting of each year, the committee will:*~~

On Page 12, first paragraph following the set of bullets under the "Plan Maintenance" subsection, insert the following paragraph:

The convener, or city lead designee, will be responsible for meeting annually with the county Hazard Mitigation Coordinator. This meeting will provide a chance for each of the city leads to meet together and discuss updates and progress with the Hazard Mitigation Coordinator. The convener will report back to the HMAC with information gathered. The Coordinator will be responsible for setting up the meeting, and providing the city leads with updates on new studies or potential funding opportunities for mitigation projects.

On Page 12, third paragraph following the "Plan Maintenance" subsection, delete the first sentence and replace with the following sentence:

~~*The convener will be responsible for documenting the outcome of the semi-annual meetings.*~~

The convener will be responsible for documenting the outcome of the annual meeting, as well as the meeting with the county's Hazard Mitigation Coordinator.

Section 2: Community Profile

The community profile section of the Wilsonville Addendum describes a variety of community characteristics specific to the City of Wilsonville. Based on new information compiled during the Clackamas County NHMP update process, updates to the Wilsonville Addendum include the following:

On Page 27, under the "Critical Infrastructure" subsection, edit the following bullet:

- ~~*Waste Water Treatment Plant*~~
- *Water Treatment Plant – Arrowhead Creek Lane Bridge*

On Page 27, under the "Critical Infrastructure" subsection, edit the following bullet:

- ~~*Commuter Rail Station (WES); freight tracks*~~
- *Freight tracks*

On Page 27, under the "Critical Infrastructure" subsection, edit the following bullet:

- ~~*Communications towers (Elligsen, Pioneer Court, Villebois)*~~
- *Communications towers (Elligsen, Pioneer Court, Villebois, 1st Street)*

On Page 27, under the "Critical Infrastructure" subsection, add the following bullet:

- *First Student Fleet & Dispatch*

On Page 27, under the "Essential Facilities" subsection, delete the following bullet:

- ~~*WLWV at Town Center (Pre school to 7th grade)*~~

On Page 28, under the "Essential Facilities" subsection, edit the following bullet:

- ~~*New primary school at Villebois (under construction)*~~
- *Lowrie (Villebois) Primary School*

On Page 28, under the Schools bullet of the "Essential Facilities" subsection, add the following bullet:

- *Oregon Institute of Technology*

On Page 28, under the Food provider's bullet of the "Essential Facilities" subsection, add the following bullets:

- *Fred Meyer*
- *Pacific Natural Foods*

On Page 28, under the Pharmacies bullet of the "Essential Facilities" subsection, add the following bullet:

- *Fred Meyer*

On Page 28, under the "Vulnerable Populations" subsection, edit the following bullet:

- ~~*Canyon Creek Correctional Facility*~~
- *Coffee Creek Correctional Facility*

On Page 29, under the "Economic Assets/Population Centers" subsection, edit the following bullet:

- ~~*Sysco Food Services of Portland, Inc.*~~
- *Sysco Portland, Inc.*

On Page 29, under the "Economic Assets/Population Centers" subsection, add the following bullets:

- *Old Town Square*
- *Pacific Natural Foods*
- *Georgia Pacific*

On Page 29, under the "Environmental Assets" subsection, delete the following bullet:

- ~~*South Tributary*~~

On Page 30, under the "Environmental Assets" subsection, combine and edit the following bullets:

- ~~*Charbonneau*~~
- ~~*Golf Course*~~
- *Charbonneau Golf Course*

On Page 30, under the "Environmental Assets" subsection, add the following bullets:

- *Sofia Park*
- *Palermo Park*

On Page 33, under the "Historic and Cultural Resources" section, edit the following sentence:

- ~~*Historic and cultural resources in Wilsonville include the Magness Memorial Tree Farm, Memorial Park, Graham Oaks Nature Park and Trailhead, Fir Point Farm, Town Center Park, Boones Ferry Park, Murase Plaza, the Oregon Korean War Memorial, Clackamas County Visitors*~~

~~*Center, CREST Environmental Learning Center, and the annual Wilsonville Festival of Arts and Parade featuring the world of local and regional artists, poetry readings, story-telling, music and dance performances.*~~

- *Historic and cultural resources in Wilsonville include the Magness Memorial Tree Farm, Memorial Park, Graham Oaks Nature Park and Trailhead, Fir Point Farm, Town Center Park, Boones Ferry Park, Murase Plaza, the Oregon Korean War Memorial, Clackamas County Visitors Center, and the CREST Environmental Learning Center.*

Section 3: Risk Assessment

The risk assessment section of the Wilsonville Addendum describes the types, causes, characteristics and relative risk posed by natural hazards on the City of Wilsonville. Based on new information compiled during the Clackamas County NHMP update process, updates to the Wilsonville Addendum include the following:

On Page 47, remove the section, "Severe Storms: Wind and Winter" and replace with:

~~***Severe Storms: Wind and Winter***~~

Severe Weather: Wind, Winter, and Extreme Heat

On Page 47, after Paragraph 4 of the "Severe Storms: Wind and Winter" subsection, insert the following paragraph:

Extreme heat has a moderate threat in Wilsonville. The HMAC estimates the probability for future extreme heat events is 'moderate,' meaning one incident is likely within a 35 to 75 year period. This estimate is lower than the county's 'high' rating. The vulnerability estimate of future extreme heat events is 'moderate,' meaning between 1% and 10% of the population and assets would be affected in a major event. This estimate is in agreement with the county's 'moderate' rating.

On Page 49, Paragraph 5 of the "Earthquake" subsection, delete the first two sentences of the paragraph and replace with the following:

~~*The SEOC ranks the probability of future earthquake events as 'low,' meaning one event is likely within a 75 to 100 year period. This estimate is lower than the county's 'high' probability estimate.*~~

The HMAC ranks the probability of future earthquake events as 'low,' meaning one event is likely within a 75 to 100 year period. This estimate is lower than the county's 'moderate' probability estimate.

On Page 54, Paragraph 4 of the "Volcano" subsection, delete sentences one and two and insert the following:

Clackamas County estimates a low probability that volcanic eruptions will occur in the future and a high vulnerability to volcanic events. Both ratings are true for the city of Wilsonville as well.

Clackamas County estimates a low probability that volcanic eruptions will occur in the future and a moderate vulnerability to volcanic events. Both ratings are true for the city of Wilsonville as well.

On Page 54, following the "Volcano" subsection, insert the following new "Drought" subsection:

Drought Profile

The Clackamas County Multi-Jurisdictional Natural Hazards Mitigation Plan adequately describes the causes and characteristics, history, location, extent and impacts of drought affecting the city of Wilsonville. Descriptions of the drought hazard can be found on pages DR-1 to DR-6 of the 2012 Clackamas County Natural Hazards Mitigation Plan update.

The probability of drought in Wilsonville was determined using scientific data, historical occurrences, and local knowledge. The HMAC estimates the probability of drought to be 'moderate' meaning one incident is likely within a 35 to 75 year period. This is in agreement with the county's 'moderate' rating. The HMAC estimates that Wilsonville has a 'low' vulnerability to drought conditions, meaning less than 1% of the population could be affected in a large-scale regional event. This is in agreement with the county's 'low' rating.

Drought Mitigation Activities

The existing drought hazard mitigation activities are conducted at the county, regional, state, and federal levels and are described in the Clackamas County Natural Hazards Mitigation Plan. As such, the information will not be repeated here.

Drought Mitigation Action Items

The city of Wilsonville does not believe that implementing drought-related mitigation activities will be cost-effective at this time. As such, the city has not identified drought mitigation action items. Wilsonville will partner with Clackamas County, however, on the implementation of mitigation strategies that benefit both jurisdictions.

Section 4: Action Items

The action items section of the Wilsonville Addendum describes detailed recommendations for activities that local departments, citizens and others could engage in to reduce risk. Based on new information compiled during the Clackamas County NHMP update process, updates to the Wilsonville Addendum include the following:

On Page 55, Paragraph 1 of the "Action Items" subsection, delete the last sentence of the paragraph and replace with the following:

~~*Full action item worksheets are located in Appendix B of this addendum.*~~

The full action item worksheets with updated progress for 2012 are located in Appendix B of this addendum.

On Page 56, Paragraph 2 of the "Action Items" subsection, delete the first two sentences of the paragraph and replace with the following:

> ~~*Note: the City of Wilsonville does not believe that implementing landslide and volcano-related mitigation activities will be cost-effective at this time. As such, the city has not identified landslide or volcanic-eruption mitigation action items.*~~
>
> *Note: the City of Wilsonville does not believe that implementing landslide, drought, and volcanic-related mitigation activities will be cost-effective at this time. As such, the city has not identified landslide, drought, or volcanic-eruption mitigation action items.*

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Volume IV: Appendixes

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Appendix A:
Action Item Forms

Multi-Hazard #1

Proposed Action Item:	Alignment with Plan Goals:
Integrate the goals and action items from the Clackamas County Natural Hazard Mitigation Plan into existing regulatory documents and programs, where appropriate.	*Encourage Partnerships & Implementation*

Alignment with Existing Plans/Policies:

Capital Improvement Plan; Comprehensive Plan

2012 Status/Rationale for Proposed Action Item:

•The HMAC continues to work with the county on integrating action items for the NHMP into regulatory documents and programs.
•Forest regulation has been revised with more enforcement and wildfire clearance setbacks.
•Capital funds are being used for earthquake mitigation activities and capital projects are addressing an erosion study.
•Clackamas County Facilities Management is working with Emergency Management to create a Damage Assessment policy and process. The policy and process will include building and functions priorities identified, key department functions, and a process to assess and report on buildings status. As of May 2012, there have been three different meetings discussing various portions of the policy and process.
•Facilities Management has received training on FEMA 74 - Earthquake Hazards mitigation for Nonstructural Elements. Facilities Management has started a process of reviewing buildings and implementation of action to reduce earthquake hazards within the buildings. Currently, the Central Utility Plant (CUP) has been completed. The Development Services Building (DSB) and Public Services Building (PSB) are currently being reviewed. Facilities Management will work on creating a policy for this process.

Ideas for Implementation:

- Use the mitigation plan to help the county's Comprehensive Land Use Plan meet State Land Use Planning Goal 7, designed to protect life and property from natural disasters and hazards through planning strategies that restrict development in areas of known hazards;
- Integrate the county's mitigation plan into current capital improvement plans; and
- Partner with other organizations and agencies with similar goals to promote building codes that are more disaster resistant at the state level.

Coordinating Organization:	NHMP Advisory Committee

Internal Partners:	External Partners:
Emergency Management; Facilities Management; Development Services; Planning and Zoning	Forest Service; Canby, Damascus, Estacada, Gladstone, Happy Valley, Johnson City, Lake Oswego, Milwaukie, Molalla, Oregon City, Sandy, West Linn, Wilsonville

Potential Funding Sources:	Estimated cost:	Timeline:
General Fund	Unknown	☐ Short Term (0-2 years) ☐ Long Term (2-4+ years) X Ongoing

Form Submitted by:	Existing action item
Priority:	High

Multi-Hazard #2

Proposed Action Item:	Alignment with Plan Goals:
Identify and pursue funding opportunities to develop and implement local and county mitigation activities.	*Encourage Partnerships & Implementation*

Alignment with Existing Plans/Policies:

Capital Improvement Plan

2012 Status/Rationale for Proposed Action Item:

The following are different funding opportunities used to develop and implement local and county mitigation activities:
•1 FMA grant award for flood elevation
•1 HMGP award for flood elevation
•5 HMGP awards for flood acquisitions
•1 PDM award for seismic retrofit of water treatment facility
•$2 million in wildfire mitigation for ODF for wildfire mitigation and fuels reduction activities

Ideas for Implementation:

- Develop incentives for local governments, citizens, and businesses to pursue hazard mitigation projects;
- Allocate county resources and assistance to mitigation projects when possible; and
- Partner with other organizations and agencies in Clackamas County to identify grant programs and foundations that may support mitigation activities.

Coordinating Organization:	Emergency Management

Internal Partners:	External Partners:	
Department of Transportation; Development Services; Public Works	Oregon Emergency Management (FEMA); Oregon Department of Forestry; Community Foundations, etc.	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
Capital Funds; FEMA PDM, HMGP and FMA Grants; Forest Service Grants; Other grant sources	Calculated on a project by project basis	□ Short Term (0-2 years) □ Long Term (2-4+ years) X Ongoing

Form Submitted by:	Existing action item
Priority:	High

Multi-Hazard #3

Proposed Action Item:	**Alignment with Plan Goals:**
Establish a formal role for the Clackamas County Natural Hazards Mitigation Committee to develop a sustainable process for implementing, monitoring, and evaluating countywide mitigation activities.	*Encourage Partnerships & Implementation*

Alignment with Existing Plans/Policies:

N/A

2012 Status/Rationale for Proposed Action Item:

The Hazard Mitigation Advisory Committee continues to meet annually. The following are the dates of past HMAC meetings prior to the 2011-2012 NHMP update process:
•April 15, 2008
•March 30, 2009
•November 18, 2009
•September 22, 2010

The Sandy Sustainable Flood Recovery Group has continued to meet twice a month since March 2011 to discuss long-term mitigation activities.

Ideas for Implementation:

- Establish clear roles for participants, meeting regularly to pursue and evaluate implementation of mitigation strategies;
- Oversee implementation of the mitigation plan;
- Establish measurable standards to evaluate mitigation policies and programs and provide a mechanism to update and revise the mitigation plan;
- Monitor hazard mitigation implementation by jurisdictions and participating organizations through surveys and other reporting methods;
- Develop updates for the Natural Hazards Mitigation Action Plan based on new information;
- Conduct a full review of the Natural Hazards Mitigation Action Plan every 5 years by evaluating mitigation successes, failures, and areas that were not addressed; and
- Provide training for Committee members to remain current on developing issues in the natural hazard loss reduction field.

Coordinating Organization:	NHMP Advisory Committee

Internal Partners:	**External Partners:**
Emergency Management;	

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
General Fund	Low	☐ Short Term (0-2 years) ☐ Long Term (2-4+ years) X Ongoing

Form Submitted by:	Existing Action Item
Priority:	Medium

Multi-Hazard #4

Proposed Action Item:	Alignment with Plan Goals:
Identify, improve, and sustain collaborative programs focusing on the real estate and insurance industries, public and private sector organizations, and individuals to avoid activity that increases risk to natural hazards.	*Encourage Partnerships & Implementation; Promote Public Awareness; Protect Life and Property*

Alignment with Existing Plans/Policies:

2012 Status/Rationale for Proposed Action Item:

•In March 2012, Clackamas County published a brochure, "You May Need Flood Insurance" to promote consideration for NFIP Preferred Risk policies. The brochure targeted residents and business that may be at lower risk but can take advantage of coverage if flooded.
•Clackamas County Emergency Management briefed Committee for Citizen Involvement
•Clackamas County Emergency Management and Planning Departments worked with the Oregon Partnership for Disaster Resilience on a cost-effectiveness study of the Clackamas County CRS program, titled Clackamas County Community Rating System Program Review, Nov. 2011.

Ideas for Implementation:

- Distribute information about flood, fire, earthquake, and other forms of natural hazards insurance to property owners in areas identified to be at risk through hazard mapping;
- Develop a one-page handout on types of insurance and deliver through county utility or service agencies;
- Educate individuals and businesses on the benefit of engaging in mitigation activities such as developing impact analyses;
- Pinpoint areas of high risk and transfer the cost of risk to property owners through insurance (rather than to the public);
- Encourage the development of unifying organizations to ensure communication and dissemination of natural hazard mitigation information;
- Identify activities for private sector and citizen involvement such as nonstructural seismic daycare retrofits; and
- Continue development of the Regional Emergency Preparedness Calendar.

Coordinating Organization:	Emergency Management

Internal Partners:	External Partners:
Public and Government Affairs; Economic Development	Realtors; utility providers; property owners

Potential Funding Sources:	Estimated cost:	Timeline:
General Fund	Low to Medium	□ Short Term (0-2 years) □ Long Term (2-4+ years) X Ongoing

Form Submitted by:	Existing action item
Priority:	High

Multi-Hazard #5

Proposed Action Item:	**Alignment with Plan Goals:**
Develop public and private partnerships to foster natural hazard mitigation program coordination and collaboration in Clackamas County.	*Encourage Partnerships & Implementation*

Alignment with Existing Plans/Policies:

2012 Status/Rationale for Proposed Action Item:

Since 2007 there have been two county-wide, Presidential Disaster Declarations. As a result, there has been outreach to affected residents regarding SBA loans. There has also been some outreach with the Chamber of Commerce.

Ideas for Implementation:

- Work with city governments to develop local Natural Hazards Mitigation Plans that are consistent with the goals and framework of the County Plan;
- Identify all organizations within Clackamas County that have programs or interests in natural hazards mitigation;
- Involve private businesses throughout the county in mitigation planning;
- Improve communication between ODOT and county road departments, and work together to prioritize and identify strategies to deal with road problems; and
- Establish protocol for communication electric providers and the Department of Transportation and Development to assure rapid restoration of transportation capabilities.

Coordinating Organization:	Emergency Management

Internal Partners:	**External Partners:**
Department of Transportation; Development Services; Economic Development; Public and Government Affairs	Chamber of Commerce

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
General Fund; Business Partnerships	Medium	☐ Short Term (0-2 years) ☐ Long Term (2-4+ years) X Ongoing

Form Submitted by:	Existing action item
Priority:	Medium

Multi-Hazard #6

Proposed Action Item:	**Alignment with Plan Goals:**
Update and Maintain inventories of at-risk buildings and infrastructure and prioritize mitigation projects.	*Protect Life and Property; Encourage Partnerships & Implementation*

Alignment with Existing Plans/Policies:

Comprehensive Plan

2012 Status/Rationale for Proposed Action Item:

The Maintenance Department is working with Emergency Management to develop a list/inventory of the at-risk buildings and infrastructure. Emergency Management maintains the prioritized list. The county also utilizes the, Statewide Seismic Needs Assessment Using Rapid Visual Screening (RVS), DOGAMI Open-File Report O-07-02.

Ideas for Implementation:

- Identify critical facilities at risk from natural hazards events;
- Develop strategies to mitigate risk to these facilities, or to utilize alternative facilities should natural hazards events cause damages to the facilities in question;
- Incorporate the building inventory developed by the Department of Geology and Mineral Industries (Dec. 2002) into the hazard assessment; and
- Identify bridges at risk from flood or earthquake hazards, identify enhancements, and implement projects needed to reduce the risks.

Coordinating Organization:	Geographic Information Services

Internal Partners:	**External Partners:**
Emergency Management; Facilities; Department of Transportation and Development;	DOGAMI

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
Capital Funds	Medium to high	□ Short Term (0-2 years) □ Long Term (2-4+ years) X Ongoing

Form Submitted by:	Existing Action Item
Priority:	High

Multi-Hazard #7

Proposed Action Item:	**Alignment with Plan Goals:**
Strengthen emergency services preparedness and response by linking emergency services with natural hazard mitigation programs, and enhancing public education on a regional scale.	*Augment Emergency Services*

Alignment with Existing Plans/Policies:

Emergency Operations Plan

2012 Status/Rationale for Proposed Action Item:

Clackamas County continues to participate in safety fairs all over the county. Each city sponsors workshops in conjunction with the Emergency Management Department. The county's Hazard Mitigation Specialist continues to present at local and regional workshops, conferences, and fairs.

Ideas for Implementation:

- Develop a program to encourage private property owners to upgrade their bridges to support weight of fire trucks and emergency vehicles;
- Encourage individual and family preparedness through public education projects such as safety fairs;
- Identify opportunities for partnering with citizens, private contractors, and other jurisdictions to increase availability of equipment and manpower for efficiency of response efforts;
- Work with Community Planning Organizations (CPO's) and other neighborhood groups to establish community response teams; and
- Familiarize public officials of requirements regarding public assistance for disaster response.

Coordinating Organization:	Emergency Management

Internal Partners:	**External Partners:**
Department of Transportation and Development; Public and Government Affairs; Geographic Information Systems; Health, Housing and Human Services	Community planning organizations; neighborhood associations

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
Emergency Management Grant Program; General Fund	Medium	☐ Short Term (0-2 years) ☐ Long Term (2-4+ years) X Ongoing

Form Submitted by:	Existing Action Item
Priority:	High

Multi-Hazard #8

Proposed Action Item:	**Alignment with Plan Goals:**
Use technical knowledge of natural ecosystems and events to link natural resource management and land use organizations to mitigation activities and technical assistance.	*Enhance Natural Systems*

Alignment with Existing Plans/Policies:

2012 Status/Rationale for Proposed Action Item:
Clackamas County Department of Transportation and Develop is working with Water Environment Services and the Sandy River Watershed Council to use the best available data to accurately redefine the erosion zone and not just the flood zone. WES is working with LiDAR studies, and is working to map the meander zones to include all public infrastructure.

Ideas for Implementation:
• Review ordinances that protect natural systems and resources to mitigate for natural hazards for possible enhancements; • Pursue vegetation and restoration practices that assist in enhancing and restoring the natural and beneficial functions of the watershed; and • Develop education and outreach programs that focus on protecting natural systems as a mitigation activity.

Coordinating Organization:	Water Environment Services

Internal Partners:	**External Partners:**
Planning and Zoning; Department of Transportation and Development	Watershed Councils; Soil Watershed Conservation Districts; Oregon Watershed Enhancement Board

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
Oregon Watershed Enhancement Board; General Fund		□ Short Term (0-2 years) □ Long Term (2-4+ years) □ Ongoing

Form Submitted by:	Existing Action Item
Priority:	Medium

Multi-Hazard #9

Proposed Action Item:	**Alignment with Plan Goals:**
Enhance strategies for debris management.	*Encourage Partnerships and Implementation; Augment Emergency Services; Enhance Natural Systems*

Alignment with Existing Plans/Policies:
Emergency Operations Plan

2012 Status/Rationale for Proposed Action Item:
The Clackamas County Sustainability department has one member attending the regional workgroup, as well as the FEMA Debris Management training. They have been training and working with the intent to talk with some of the city partners to come up with an action plan that will allow the county to refine the initial plan which received comments by FEMA staff but not yet approved.

Ideas for Implementation:
• Work with Metro to complete a regional debris management plan; and • Identify local resources available to implement debris management plan.

Coordinating Organization:	Emergency Management

Internal Partners:	**External Partners:**
Sustainability; Department of Transportation and Development – Roads;	Metro; RMG

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
General Fund	Low to Medium	X Short Term (0-2 years) ☐ Long Term (2-4+ years) X Ongoing

Form Submitted by:	Existing Action Item
Priority:	High

Multi-Hazard #10

Proposed Action Item:	Alignment with Plan Goals:
Update County Comprehensive Plan to integrate most current natural hazard mapping data for Clackamas County and make available to county GIS to improve technical analysis of natural hazards.	*Protect Life and Property; Encourage Partnerships & Implementation*

Alignment with Existing Plans/Policies:
Clackamas County Comprehensive Plan; Statewide Planning Goal 7

2012 Status/Rationale for Proposed Action Item:
The current Clackamas County Comprehensive Plan does not include any earthquake hazard mapping.

Ideas for Implementation:
• Utilize LIDAR technology to enhance earthquake mapping efforts.

Coordinating Organization:	Geographic Information Systems

Internal Partners:	External Partners:
Office of Planning and Zoning; Emergency Management	Metro; DOGAMI; USGS

Potential Funding Sources:	Estimated cost:	Timeline:
General Fund; Grants	Unknown	☐ Short Term (0-2 years) X Long Term (2-4+ years) ☐ Ongoing

Form Submitted by:	Existing Action Item
Priority:	Medium

Flood #1

Proposed Action Item:	Alignment with Plan Goals:
Identify opportunities to educate Clackamas County residents with flood prone properties and identify feasible mitigation options.	*Protect Life and Property; Encourage Partnerships & Implementation*

Alignment with Existing Plans/Policies:

2012 Status/Rationale for Proposed Action Item:

The CRS continues to be updated annually. The biggest void that the HMAC and Planning Department faces is the lack of knowledge on the part of insurance lenders. The Sandy Sustainable Flood Recovery Group continues education and outreach in Sandy.

Ideas for Implementation:

- Identify appropriate and feasible mitigation activities for identified repetitive flood properties. Funding may be available through FEMA's Hazard Mitigation Grant and Flood Mitigation Assistance Programs and the Pre-disaster Mitigation Program;
- Contact repetitive loss property owners to discuss mitigation opportunities, and determine interest should future project opportunities arise;
- Explore options for incentives to encourage property owners to engage in mitigation;
- Determine mitigation strategies to reduce undermining of Anderson road by Pudding River; and
- Encourage and support the relocation of the Clackamas County Roads Department out of the floodplain.

Coordinating Organization:	Office of Planning and Zoning

Internal Partners:	External Partners:
Emergency Management; HMAC	DLCD; OEM

Potential Funding Sources:	Estimated cost:	Timeline:
General Fund; HMA; FEMA RiskMap	Medium	☐ Short Term (0-2 years) ☐ Long Term (2-4+ years) X Ongoing

Form Submitted by:	Existing Action Item
Priority:	High

Flood #2

Proposed Action Item:	Alignment with Plan Goals:
Recommend revisions to requirements for development within the floodplain, where appropriate	*Protect Life and Property*

Alignment with Existing Plans/Policies:
Flood Ordinance; Zoning Code

2012 Status/Rationale for Proposed Action Item:
Clackamas County Planning is working on trying to get the residents more involved. The county dropped to a 4 in the CRS rating because those who benefit from the program are still reluctant to purchase insurance. At this point the cost of implementing the program is higher than the actual cost, so the county is working on ways to resolve this.

Ideas for Implementation:
• Explore raising the base elevation requirement for new residential construction to two or three feet above base flood elevation, or greater. An increased elevation standard is one activity the county can engage in to receive credit from the NFIP Community Rating System Program; and • Consider adopting regulations specific to meandering streams such as the Sandy and Molalla Rivers.

Coordinating Organization:	Office of Planning and Zoning

Internal Partners:	External Partners:
Emergency Management; Water and Environment Services; Geographic Information Services.	DLCD; National Association of State Flood Plain Managers

Potential Funding Sources:	Estimated cost:	Timeline:
General Fund	Unknown	☐ Short Term (0-2 years) X Long Term (2-4+ years) ☐ Ongoing

Form Submitted by:	Existing Action Item
Priority:	Low

Flood #3

Proposed Action Item:	Alignment with Plan Goals:
Develop better flood warning systems.	*Protect Life and Property; Augment Emergency Services*

Alignment with Existing Plans/Policies:
Emergency Operations Plan

2012 Status/Rationale for Proposed Action Item:
Clackamas County Emergency Management worked with the National Weather Service to install flood staff gauges on the Molalla River at Shady Dell and three flood staff gauges in the upper Sandy River Basin. The county is currently applying for a DR-19560-OR HMGP project to install five electronic river gauges in the upper Sandy Basin.

Ideas for Implementation:
• Coordinate with appropriate organizations to evaluate the need for more stream gauges; and • Distribute information regarding flooding to the general public efficiently.

Coordinating Organization:	Emergency Management

Internal Partners:	External Partners:
Geographic Information Services; Department of Transportation and Development	NWS; FEMA; OEM

Potential Funding Sources:	Estimated cost:	Timeline:
General Fund; NWS; FEMA		☐ Short Term (0-2 years) ☐ Long Term (2-4+ years) X Ongoing

Form Submitted by:	Existing Action Item
Priority:	Medium

Flood #4

Proposed Action Item:	Alignment with Plan Goals:
Maintain data and mapping for floodplain information within the county, and identify and map flood-prone areas outside of designated floodplains.	*Protect Life and Property; Promote Public Awareness*

Alignment with Existing Plans/Policies:
Flood Ordinance

2012 Status/Rationale for Proposed Action Item:
Clackamas County GIS has access to the newest FEMA 2008 flood plain information. This is displayed on the hazard plain flood map 1. GIS currently has 2004-2007 LiDAR coverage for a large portion of the county; 2ft contours are available for most of this coverage. GIS just placed a request with DOGAMI to receive some new limited area LiDAR data from 2011 that was used in a recent study of the Sandy River flooding and channel migration zones. GIS has not used the available LiDAR data to update or create any hazard layers at this time. The GIS department has also coordinated with Emergency Management to map property losses from the 2011 flooding out along the Sandy. DOGAMI 2011 Mt Hood MH study uses LiDAR to locate building footprints in the 100 and 500 year flood plain. DOGAMI Channel Migration Zone Study for Sandy River estimates hazard areas for potential movement of river channel.

Ideas for Implementation:
• Apply for FEMA's cooperative technical partnership using the 2-foot contour interval floodplain mapping data acquired by Clackamas County GIS; • Use WES inventory and mapping data to update the flood-loss estimates for Clackamas County; and • Identify opportunities to upgrade Federal Insurance Rate Maps, and arrange for Cooperative Technical Partnership mapping upgrades for select areas.

Coordinating Organization:	Geographic Information Services

Internal Partners:	External Partners:
Department of Transportation and Development; Water Environment Services; Emergency Management	DOGAMI; FEMA; DLCD

Potential Funding Sources:	Estimated cost:	Timeline:
RiskMap; General Fund; FEMA	Medium	☐ Short Term (0-2 years) ☐ Long Term (2-4+ years) X Ongoing

Form Submitted by:	Existing Action Item
Priority:	Medium

Flood #5

Proposed Action Item:	Alignment with Plan Goals:
Encourage development of acquisition and management strategies to preserve open space for flood mitigation, fish habitat, and water quality in the floodplain.	*Protect Life and Property; Enhance Natural Systems*

Alignment with Existing Plans/Policies:

2012 Status/Rationale for Proposed Action Item:

Metro recently purchased 31E15 02100, 23 acres along the Willamette River.

Ideas for Implementation:

- Develop a comprehensive strategy for acquiring and managing floodplain open space in Clackamas County;
- Explore funding for property acquisition from federal (e.g., FEMA Hazard Mitigation Grant Program), state, regional, and local governments, as well as private and non-profit organizations, trails programs, fish programs;
- Develop a regional partnership among flood mitigation, fish habitat, and water quality enhancement organizations/programs to improve educational programs;
- Identify sites where environmental restoration work can benefit flood mitigation, fish habitat, and water quality;
- Work with landowners to develop flood management practices that provide healthy fish habitat; and
- Identify existing watershed education programs and determine which programs would support a flood education component.

Coordinating Organization:	Water and Environment Services

Internal Partners:	External Partners:
Department of Transportation and Development	Metro; FEMA

Potential Funding Sources:	Estimated cost:	Timeline:
Capital Funds; General Fund; FEMA; OWEB	Unknown	☐ Short Term (0-2 years) ☐ Long Term (2-4+ years) X Ongoing

Form Submitted by:	Existing Action Item
Priority:	Medium

Flood #6

Proposed Action Item:	Alignment with Plan Goals:
Identify surface water drainage problematic sites for all parts of unincorporated Clackamas County.	*Protect Life and Property; Enhance Natural Systems*

Alignment with Existing Plans/Policies:

2012 Status/Rationale for Proposed Action Item:
An ongoing project for WES is replacing culverts throughout the county.

Ideas for Implementation:
• Map culverts in unincorporated areas of the county; • Prepare an inventory of culverts that historically create flooding problems and target them for retrofitting; and • Prepare an inventory of major urban drainage problems, and identify causes and potential mitigation actions for urban drainage problem areas (e.g. reduce standing water on Telford Road along Johnson Creek by upgrading the 20 inch culvert on Spring Water Trail to drain more efficiently with the County 60 inch culvert in that area.).

Coordinating Organization:	Water and Environment Services

Internal Partners:	External Partners:
Department of Transportation and Development; Geographic Information Services	Soil and Water Conservation Districts; Watershed Councils

Potential Funding Sources:	Estimated cost:	Timeline:
Capital Funds	Unknown	☐ Short Term (0-2 years) ☐ Long Term (2-4+ years) X Ongoing

Form Submitted by:	Existing Action Item
Priority:	Medium

Flood #7

Proposed Action Item:	**Alignment with Plan Goals:**
Establish a framework to compile and coordinate surface water management plans and data throughout the county.	*Protect Life and Property; Encourage Partnerships & Implementation*

Alignment with Existing Plans/Policies:

2012 Status/Rationale for Proposed Action Item:
At this point, there are no resources or support available to make progress thus far.

Ideas for Implementation:
• Develop surface water management plans for areas that are not currently within surface water management plan boundaries.

Coordinating Organization:	Office of Planning and Zoning

Internal Partners:	**External Partners:**
Water Environment Services; Geographic Information Systems	

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
Unidentified	Unknown	☐ Short Term (0-2 years) X Long Term (2-4+ years) ☐ Ongoing

Form Submitted by:	Existing Action Item
Priority:	Medium

Flood #8

Proposed Action Item:	**Alignment with Plan Goals:**
Encourage Clackamas County residents to purchase Flood Insurance.	*Protect Life and Property; Encourage Partnerships & Implementation; Promote Public Awareness*

Alignment with Existing Plans/Policies:

2012 Status/Rationale for Proposed Action Item:

New 2012 Action Item.

There are many Clackamas County property owners located in the flood plain that do not have flood insurance. Clackamas County Planning is working on trying to get the residents more involved. The county dropped to a 4 in the CRS rating because those who benefit from the program are still reluctant to purchase insurance. This situation adds to the public burden when floods occur. Increasing the number of insurance policies on properties in the flood plain will benefit the County CRS rating.

Ideas for Implementation:

- Develop an outreach program that addresses communities located in or near the 100 and 500 year floodplain and provides them with valuable information on the NFIP.

Coordinating Organization:	Office of Planning and Zoning

Internal Partners:	**External Partners:**
Emergency Management; HMAC	DLCD; Insurance Providers

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
Unknown	Unknown	☐ Short Term (0-2 years) ☐ Long Term (2-4+ years) X Ongoing

Form Submitted by:	HMAC
Priority:	Medium

Flood #9

Proposed Action Item:	Alignment with Plan Goals:
Develop a floodplain management plan as a standalone for the CRS program	*Encourage Partnerships & Implementation*

Alignment with Existing Plans/Policies:

2012 Status/Rationale for Proposed Action Item:

New 2012 action item.

Clackamas County does not have a comprehensive floodplain management plan. Numerous county departments and outside agencies have responsibility and oversight over pieces of the floodplain, however, activities are not always coordinated. This results in inefficiencies and has hampered the county's efforts to document activities under the CRS program.

Ideas for Implementation:

- Create a floodplain management plan that can be used for the CRS program. This new plan will give the CRS program new weight and can help improve the county's current CRS rating score.

Coordinating Organization:	Office of Planning and Development

Internal Partners:	External Partners:	
Emergency Management; Sustainability; Water Resources; Administration		
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
General Fund	Unknown	☐ Short Term (0-2 years) X Long Term (2-4+ years) ☐ Ongoing

Form Submitted by:	HMAC
Priority:	Medium

Landslide #1

Proposed Action Item:	**Alignment with Plan Goals:**
Continue to improve knowledge of landslide hazard areas and understanding of vulnerability and risk to life and property in hazard-prone areas.	*Protect Life and Property; Promote Public Awareness*

Alignment with Existing Plans/Policies:

2012 Status/Rationale for Proposed Action Item:

The county is working with DOGAMI to finalize a hazard assessment done in 6 different quadrants of the county. The maps and assessments are still not finalized, but have worked with the public to identify discrepancies.

Ideas for Implementation:

- Develop public information to emphasize economic risk when building on potential or historical landslide areas;
- Identify funding sources to enhance site-specific geohazard mapping the Urban Growth Boundary;
- Partner with PSU to develop a descriptive landslide inventory along all Clackamas County roadways, including appropriate mitigation strategies; and
- Identify existing mechanisms for public outreach (e.g., SWCD, NRCS, watershed councils, etc.).

Coordinating Organization:	Geographic Information Services

Internal Partners:	**External Partners:**
HMAC	DOGAMI

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
General Fund		X Short Term (0-2 years) ☐ Long Term (2-4+ years) ☐ Ongoing

Form Submitted by:	Existing Action Item
Priority:	Medium

Landslide #2

Proposed Action Item:	Alignment with Plan Goals:
Identify safe evacuation routes in high-risk debris flow and landslide areas.	*Protect Life and Property; Augment Emergency Services; Promote Public Awareness*

Alignment with Existing Plans/Policies:

2012 Status/Rationale for Proposed Action Item:

There is currently a USGS report in review that examines concentrations of residents, employees and visitors in the Hoodland area with seasonal variability to serve as a tool for evacuation planning. DOGAMI study for Mt. Hood contains exposure analysis for landslide and debris flow hazards in the Sandy River Basin.

Ideas for Implementation:

- Identify potential debris removal resources;
- Increase participation in regional committee planning for emergency transportation routes;
- Identify and publicize information regarding emergency transportation routes; and
- Work with County Evacuation Planning Committee to develop and exercise evacuation plans.

Coordinating Organization:	Emergency Management

Internal Partners:	External Partners:
Department of Transportation and Development	DOGAMI

Potential Funding Sources:	Estimated cost:	Timeline:
General Fund		X Short Term (0-2 years) ☐ Long Term (2-4+ years) ☐ Ongoing

Form Submitted by:	Existing Action Item
Priority:	Medium

Landslide #3

Proposed Action Item:	Alignment with Plan Goals:
Continue to limit activities in identified potential and historical landslide areas through regulation and public outreach	*Protect Life and Property; Promote Public Awareness; Enhance Natural Systems*

Alignment with Existing Plans/Policies:

Comprehensive Plan; Development Code

2012 Status/Rationale for Proposed Action Item:

DOGAMI continues to map out landslide hazard areas and get the word out. There haven't been any changes in land use ordinances, however land use regulation picks up new information automatically. Steep slope land use maps continue to refer to hazardous areas.

Ideas for Implementation:

- Analyze and recommend improvements to existing regulations regarding development in landslide prone areas. Consider using the City of Salem Landslide Ordinance as an example of effective regulation for development;
- Incorporate the data from the historic and potential debris flow and landslides hazard map (DOGAMI, 2003) into the county's Comprehensive Land Use Plan to assist in meet State Land Use Planning Goal 7, designed to protect life and property from natural disasters and hazards through the implementation of planning strategies that restrict development in areas of known hazards;
- Examine logging regulations on private property to ensure accountability of cumulative downslope effects; and
- Identify existing mechanisms for public outreach (e.g., SWCD, NRCS, watershed councils, etc.).

Coordinating Organization:	HMAC

Internal Partners:	External Partners:
Office of Planning and Zoning; Building	DOGAMI; DLCD

Potential Funding Sources:	Estimated cost:	Timeline:
		☐ Short Term (0-2 years) ☐ Long Term (2-4+ years) X Ongoing

Form Submitted by:	Existing Action Item
Priority:	High

Landslide #4

Proposed Action Item:	Alignment with Plan Goals:
Recommend construction and subdivision design that can be applied to steep slopes to reduce the potential adverse impacts from development.	*Protect Life and Property; Promote Public Awareness*

Alignment with Existing Plans/Policies:

2012 Status/Rationale for Proposed Action Item:

New 2012 action item.

Existing hillside development regulations have not been updated recently.

Ideas for Implementation:

- Analyze and recommend improvements to existing regulations regarding development in landslide prone areas. Consider using the City of Salem Landslide Ordinance as an example of effective regulation for development;
- Incorporate the data from the historic and potential debris flow and landslides hazard map (DOGAMI, 2003) into the county's Comprehensive Land Use Plan to assist in meet State Land Use Planning Goal 7, designed to protect life and property from natural disasters and hazards through the implementation of planning strategies that restrict development in areas of known hazards;
- Examine logging regulations on private property to ensure accountability of cumulative downslope effects; and
- Identify existing mechanisms for public outreach (e.g., SWCD, NRCS, watershed councils, etc.).

Coordinating Organization:	HMAC

Internal Partners:	External Partners:
Office of Planning and Zoning; Building	DOGAMI; DLCD; SWCD, NRCS, watershed councils

Potential Funding Sources:	Estimated cost:	Timeline:
General Fund	Unknown	X Short Term (0-2 years) ☐ Long Term (2-4+ years) ☐ Ongoing

Form Submitted by:	Existing Action Item
Priority:	High

Wildfire Actions (refer to Clackamas County CWPP)

Proposed Action Item:	**Alignment with Plan Goals:**
	Protect Life and Property; Augment Emergency Services; Encourage Partnerships & Implementation; Promote Public Awareness; Enhance Natural Systems

Alignment with Existing Plans/Policies:

2012 Status/Rationale for Proposed Action Item:
The wildfire mitigation action items provide direction on specific activities that organizations and residents in Clackamas can take to reduce wildfire hazards. The CCWPP includes action items for Fuels Reduction, Structural Ignitability, Community Outreach, Risk Assessment, and Emergency Operations. Please see Appendix G: Clackamas Community Wildfire Protection Plan for a full listing of all wildfire action items.

Ideas for Implementation:
•

Coordinating Organization:	

Internal Partners:	**External Partners:**

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
		□ Short Term (0-2 years) □ Long Term (2-4+ years) □ Ongoing

Form Submitted by:	Existing Action Item
Priority:	

Severe Weather #1

Proposed Action Item:	**Alignment with Plan Goals:**
Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe weather.	*Augment Emergency Services; Encourage Partnerships & Implementation*

Alignment with Existing Plans/Policies:

2012 Status/Rationale for Proposed Action Item:

Ongoing.

Ideas for Implementation:

- Partner with responsible agencies and organizations to design and implement programs that reduce risk to life, property, and utility systems;
- Develop partnerships between utility providers and county and local public works agencies to document known hazard areas;
- Reduce icy conditions or other hazards at public access public service buildings and ensure public safety by prioritizing critical facilities' parking lots to be cleared before other roads.
    - Improve traffic management
    - Track progress of road crews.
    - Provide public/staff with info. regarding road closures, sanding and plowing routes, time the roads were plowed, and a safety rating via cable access and website; and
- Enhance County plowing capability
    - Purchase a residential snow plow and a de-icer machine

Coordinating Organization:	HMAC

Internal Partners:	**External Partners:**
Department of Transportation and Development	Mutual Aid Partners

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
Capital Funds	TBA	☐ Short Term (0-2 years) ☐ Long Term (2-4+ years) ☐ Ongoing

Form Submitted by:	Existing Action Item
Priority:	Medium

Severe Weather #2

Proposed Action Item:	**Alignment with Plan Goals:**
Continue to educate and increase public awareness of severe weather mitigation activities.	*Protect Life and Property; Promote Public Awareness*

Alignment with Existing Plans/Policies:

2012 Status/Rationale for Proposed Action Item:
Ongoing

Ideas for Implementation:

- Distribute educational materials to Clackamas residents and public and private sector organizations regarding evacuation routes during road closures;
- Target the vulnerable populace for disseminating preparedness information; and
- Reduce freezing pipes and resultant damage by encouraging water providers to put a flyer in November water bills to advise of preventions measures available.
- Annual CCEM Calendars with monthly mitigation tips.

Coordinating Organization:	HMAC

Internal Partners:	**External Partners:**
Public and Government Affairs	

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
General Fund	Low	☐ Short Term (0-2 years) ☐ Long Term (2-4+ years) X Ongoing

Form Submitted by:	Existing Action Item
Priority:	Medium

Severe Weather #3

Proposed Action Item:	**Alignment with Plan Goals:**
Monitor and implement programs to keep trees from threatening lives, property, and public infrastructure during windstorm events.	*Augment Emergency Services; Encourage Partnerships & Implementation*

Alignment with Existing Plans/Policies:

2012 Status/Rationale for Proposed Action Item:

Ongoing

Ideas for Implementation:

- Partner with responsible agencies and organizations to design and disseminate education information to property owners to reduce risk from tree failure to life, property, and utility systems;
- Develop partnerships between utility providers and county and local public works agencies to document known hazard areas; and
- Identify potentially hazardous trees in urban areas.

Coordinating Organization:	Department of Transportation and Development - Roads

Internal Partners:	**External Partners:**
Forestry	Utility Providers

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
General Fund	Medium	□ Short Term (0-2 years) □ Long Term (2-4+ years) X Ongoing

Form Submitted by:	Existing Action Item
Priority:	High

Severe Weather #4

Proposed Action Item:	Alignment with Plan Goals:
Map and publicize locations around the county that have the highest incidence of extreme windstorms.	*Protect Life and Property; Encourage Partnerships & Implementation; Promote Public Awareness*

Alignment with Existing Plans/Policies:

Emergency Operations Plan

2012 Status/Rationale for Proposed Action Item:

The county's GIS department is unaware of the PGE power outage prone area information. If available, this information would be useful if the HMAC wanted an action item dedicated to creating and distributing educational flyers or similar to individuals living in these areas. GIS can easily generate mailing lists of folks in defined areas. At this time, no progress has been reported.

Ideas for Implementation:

- Identify a responsible agency for central collection and reporting of storm data. Data collected should include:
  - Windstorm data (sustained speeds, gusts, storm durations) for localities throughout the county;
  - Maps of the locations within the county, which are most vulnerable to high winds;
  - Injury and property damage estimates, including locations; and
- Identify public infrastructure and facilities subject to damage or closure during windstorm events.

Coordinating Organization:	Geographic Information Systems

Internal Partners:	External Partners:
Emergency Management	Utility Providers

Potential Funding Sources:	Estimated cost:	Timeline:
General Fund		☐ Short Term (0-2 years) X Long Term (2-4+ years) ☐ Ongoing

Form Submitted by:	Existing Action Item
Priority:	Low

Severe Weather

Proposed Action Item:	Alignment with Plan Goals:
Support/encourage electrical utilities to use underground construction methods where possible to reduce power outages from windstorms.	*Encourage Partnerships & Implementation; Enhance Natural Systems*

Alignment with Existing Plans/Policies:

2012 Status/Rationale for Proposed Action Item:
All new county electrical utilities (non-transmission) are required to be constructed underground.

Ideas for Implementation:
• Increase the use of underground utilities where possible.

Coordinating Organization:	Building

Internal Partners:	External Partners:
Office of Planning and Zoning	Utility Providers

Potential Funding Sources:	Estimated cost:	Timeline:
Permit fees	Low	☐ Short Term (0-2 years) ☐ Long Term (2-4+ years) X Ongoing

Form Submitted by:	Existing Action Item
Priority:	Medium

Earthquake #1

Proposed Action Item:	Alignment with Plan Goals:
Pursue funding opportunities for structural and nonstructural retrofitting of structures that are identified as seismically vulnerable.	*Protect Life and Property; Augment Emergency Services; Encourage Partnerships & Implementation*

Alignment with Existing Plans/Policies:

2012 Status/Rationale for Proposed Action Item:

Funding source of limited implementation is the Oregon Seismic Rehabilitation Grant Program (SRGP) that depends on the State Treasurer to obligate bond capacity and the ability of the Oregon Military Department to incur bond debt into their operating budget.

Ideas for Implementation:

- Provide information for property owners, small businesses, and organizations on sources of funds (loans, grants, etc.); and
- Work with owners of buildings included in the DOGAMI seismic survey to ensure that they are aware of potential grant opportunities. Current Needs:
    - Rivergrove Water has completed seismic analysis on reservoirs, and needs funding for seismic bracing.
    - Milwaukie Community Center (owned by Milwaukie, maintained and operated by Clackamas County North Parks Recreation District) is in need of seismic upgrade. No engineering studies have been completed.
    - Colton Fire has an engineering report and is in need of seismic upgrades

Coordinating Organization:	HMAC

Internal Partners:	External Partners:
Emergency Management; Administration	OEM; FEMA

Potential Funding Sources:	Estimated cost:	Timeline:
FEMA; OEM Seismic Grants; Capital Funds; Local bonds	High	☐ Short Term (0-2 years) X Long Term (2-4+ years) ☐ Ongoing

Form Submitted by:	Existing Action Item
Priority:	Medium

Earthquake #2

Proposed Action Item:	Alignment with Plan Goals:
Encourage purchase of earthquake hazard insurance.	*Protect Life and Property; Promote Public Awareness*

Alignment with Existing Plans/Policies:

2012 Status/Rationale for Proposed Action Item:
CCEM continues to encourage the purchase of earthquake hazard insurance at annual preparedness fairs all over the county.

Ideas for Implementation:
• Provide earthquake insurance information to Clackamas County residents; and • Coordinate with insurance companies and organizations such as the Insurance Information Service of Oregon and Idaho to produce and distribute earthquake insurance information.

Coordinating Organization:	HMAC

Internal Partners:	External Partners:
Emergency Management	Insurance Providers

Potential Funding Sources:	Estimated cost:	Timeline:
	Low	☐ Short Term (0-2 years) ☐ Long Term (2-4+ years) X Ongoing

Form Submitted by:	Existing Action Item
Priority:	LOW

Earthquake #3

Proposed Action Item:	Alignment with Plan Goals:
Encourage seismic strength evaluations for existing critical facilities in the county to identify vulnerabilities for mitigation of schools and universities, public infrastructure, and critical facilities to meet current seismic standards.	*Protect Life and Property; Augment Emergency Services*

Alignment with Existing Plans/Policies:
Emergency Operations Plan

2012 Status/Rationale for Proposed Action Item:
Currently, all new facilities must comply with and meet seismic standards. If someone moves into an old building, they must upgrade to current standards. DOGAMI recently did a windshield survey of schools, fire stations, police, and city halls. The focus was on action of existing buildings and information was shared with participants.

Ideas for Implementation:
• Encourage owners of non-retrofitted reservoirs to upgrade them to meet seismic standards; • Encourage all water providers to replace all old cast iron pipes with more ductile iron, and identify partnership opportunities with other agencies for pipe replacement; and • Perform FEMA 154 seismic evaluations on all buildings not included in the recent DOGAMI inventory.

Coordinating Organization:	Emergency Management

Internal Partners:	External Partners:

Potential Funding Sources:	Estimated cost:	Timeline:
	High	☐ Short Term (0-2 years) X Long Term (2-4+ years) ☐ Ongoing

Form Submitted by:	Existing Action Item
Priority:	High

Earthquake #4

Proposed Action Item:	Alignment with Plan Goals:
Encourage reduction of nonstructural and structural earthquake hazards in homes, schools, businesses, and government offices through public education.	*Protect Life and Property; Promote Public Awareness*

Alignment with Existing Plans/Policies:

2012 Status/Rationale for Proposed Action Item:

Ongoing.

Ideas for Implementation:

- Provide information to government building and school facility managers and teachers on nonstructural mitigation techniques including: securing bookcases, filing cabinets, light fixtures, and other objects that can cause injuries and block exits;
    - Encourage facility managers, business owners, and teachers to refer to FEMA's practical guidebook: Reducing the Risks of Nonstructural Earthquake Damage;
    - Encourage homeowners and renters to use Is Your Home Protected from Earthquake Disaster? A Homeowner's Guide to Earthquake Retrofit (IBHS) for economic and efficient mitigation techniques;
- Use the FEMA 154 seismic evaluations generated by DOGAMI to prioritize critical and essential buildings for upgrades;
- Explore partnerships to provide retrofitting classes for homeowners, renters, building professionals, and contractors; and
- Target development located in potential fault zones or in unstable soils for intensive education and retrofitting resources.

Coordinating Organization:	HMAC

Internal Partners:	External Partners:
Emergency Management	

Potential Funding Sources:	Estimated cost:	Timeline:
		☐ Short Term (0-2 years) ☐ Long Term (2-4+ years) X Ongoing

Form Submitted by:	Existing Action Item
Priority:	Medium

Volcanic Eruption #1

Proposed Action Item:	Alignment with Plan Goals:
Work with the state and other impacted jurisdictions to implement and update the Mount Hood Inter-Agency Coordination Plan.	*Augment Emergency Services; Encourage Partnerships & Implementation; Promote Public Awareness*

Alignment with Existing Plans/Policies:

2012 Status/Rationale for Proposed Action Item:
Clackamas County Emergency Management has convened the Mt Hood Plan Facilitation Committee twice. CCEM has also worked with CVO and TVF&R on delivering a Mt Hood table-top scenario to elected officials from around the greater Portland Metro area.

Ideas for Implementation:
• Coordinate with local and regional groups to conduct exercises, plan evaluation and revisions.

Coordinating Organization:	Emergency Management

Internal Partners:	External Partners:
	DOGAMI; USGS; OEM; Metro; CVO; TVF&R

Potential Funding Sources:	Estimated cost:	Timeline:
General Fund	Unknown	☐ Short Term (0-2 years) X Long Term (2-4+ years) ☐ Ongoing

Form Submitted by:	Existing Action Item
Priority:	Medium

Volcanic Eruption #2

Proposed Action Item:	Alignment with Plan Goals:
Utilize existing risk assessments and collaborate with USGS-CVO and related agencies to develop ash fall models that are specific to Clackamas County.	*Protect Life and Property; Augment Emergency Services; Encourage Partnerships & Implementation; Promote Public Awareness*

Alignment with Existing Plans/Policies:

Emergency Operations Plan

2012 Status/Rationale for Proposed Action Item:

USGS funded DOGAMI MH study of proximal and distal land-based exposure to volcano hazards for Sandy River and Hood River valleys. This may provide the basis for vulnerability assessments for near-field ash hazard assessments.

From the GIS standpoint, no one has done or has access to any ash fall models or maps at this time. GIS is a tool that could model some of this if the base data was available. Once the DOGAMI Mt Hood study becomes available, it may provide the county with initial debris flow and possibly ash fall models.

Ideas for Implementation:

- Determine critical activities that must be implemented for varying degrees of ash fall; and
- Work with the National Early Volcano Warning System collaborative group to better assess ash fall modeling and warning systems in Clackamas County.

Coordinating Organization:	Geographic Information Systems

Internal Partners:	External Partners:
Emergency Management	DOGAMI; USGS

Potential Funding Sources:	Estimated cost:	Timeline:
USGS		☐ Short Term (0-2 years) X Long Term (2-4+ years) ☐ Ongoing

Form Submitted by:	Existing Action Item
Priority:	Low

Volcanic Eruption #3

Proposed Action Item:	Alignment with Plan Goals:
Strengthen response and recovery programs, and work with the USGS-CVO to enhance public education programs for volcanic eruption hazards.	*Protect Life and Property; Augment Emergency Services; Encourage Partnerships & Implementation; Promote Public Awareness*

Alignment with Existing Plans/Policies:

2012 Status/Rationale for Proposed Action Item:

CCEM participated in a 2010 presentation to the Congressional Hazards Caucus in Washington DC to promote improvements for volcano early warning.

CCEM provided evaluation of FEMA/USGS Volcano Crisis Awareness Course in 2011 to complete FEMA's final course certification process.

Worked with USGS Geographer Nate Wood on a multi-hazard vulnerability study for the Hoodland area, with an emphasis on assessing volcanic risk.

Ideas for Implementation:

- Develop basic public education materials that describe volcanic eruption hazards (pyroclastic surges, pyroclastic flows, lahars, mudflows, landslides, ash fall), potential impacts, and appropriate response and mitigation activities;
- Coordinate with the media for volcanic hazard education programs to reduce conveyance of misinformation;
- Participate with the USGS-CVO to develop a public education program for volcano hazards specific to Clackamas County; and
- Work with active citizen groups to sustain volcanic hazards education programs.

Coordinating Organization:	Emergency Management

Internal Partners:	External Partners:
	USGS

Potential Funding Sources:	Estimated cost:	Timeline:
USGS		☐ Short Term (0-2 years) X Long Term (2-4+ years) ☐ Ongoing

Form Submitted by:	Existing Action Item
Priority:	Low

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Appendix B:
Planning and Public Process

Table of Contents

2012 Mitigation Plan Update

Mitigation Plan Implementation

2012 Mitigation Plan Update

Meeting: Natural Hazards Mitigation Plan Update – Kickoff Meeting

Date: October 18, 2011

Time: 1:00 pm – 4:00 pm

Location: EOC

AGENDA

I. Introductions and Background (60 minutes)

- Welcome & Introductions
- Today's Primary Goals
- Workshop Overview
- Why Are We Here?
- Who is Involved?

II. What is Natural Hazards Mitigation Planning? (90 minutes)

- What is Natural Hazards Mitigation Planning?
- Grant Opportunities
- Plan Update Process
- Steering Committees
- Public Involvement Strategies
- Community Profile
- Before Our Next Meeting…

III. Questions? (30 minutes)

CLACKAMAS COUNTY

SIGN-IN SHEET

Clackamas County Natural Hazards Mitigation Plan Update - Kickoff Meeting

Clackamas County EOC
October 18, 2011
1:00 – 4:00 pm

Name	Email	Representing	Job Title	Roundtrip mileage (if applicable)
Steve Munsterman		City of Wilsonville	Public Works Supervisor	22
Cindy Kolomechuk		ODF	Wildfire Planner	30
Erika Palmer	epalmer@ci.damascus.or.us	City of Damascus	Senior Planner	?
Bonnie Hirshberger		Lake Oswego		
MARIA ATKIN		Gladstone	Exec admin/police	
Bob CULLISON		Oregon City	DEV SVC MGR	5
Eric Lafter		CCGIS	GIS Tech	
Rebecca Lenga		CC DTD	Planner	
Melanie Wagner	wagner@cityofestacada.org	City of Estacada	Asst. to the City Manager	34
Susan Zjolko		DTD – Sustainability	Sust. Supervisor	
William Clark		RARE / ODDR		
GARRETT JENSEN		RARE / ODDR		-

CLACKAMAS COUNTY

Name	Email	Representing	Job Title	Roundtrip mileage (if applicable)
Jon LeBaron	lebaronj@ci.milwaukie.or.us	Milwaukie	Public Works Operations Director	
Dave Rash	rashd@ci.milwaukie.or.us	Milwaukie	Police Captain	
Ken Horn	KenhorECCFD1.com	Clackamas Fire	Emergency Manager	
Michael Howard	mrhoward@uoregon.edu	OPDR	Program Specialist	
Laura Comstock	lcomstock@clackamas.us	RARE / CLEM	Hazard Mitigation Specialist	

Meeting: HMAC Natural Hazards Mitigation Plan Update – Meeting #2

Date: Tuesday, February 14, 2012

Time: 1:00 pm – 4:00 pm

Location: Clackamas County EOC
2200 Kaen Road, Oregon City, OR 97015

MEETING AGENDA

I. Welcome and Introductions (5 minutes)

II. Overview of Risk Assessment Process (10 minutes)

III. Review of Hazard Identification (45 minutes)

- Review Hazards Inventory
- Discussion of new information available

BREAK (5 minutes)

IV. Vulnerability Assessment Review (90 minutes)

- OEM Hazard Analysis
- Relative Risk Exercise

V. Review Existing Vulnerability Information (10 minutes)

- Review of Community Asset Worksheet

VI. Community Profile Discussion (10 minutes)

VII. Next Time: Action Items (5 minutes)

CLACKAMAS COUNTY

SIGN-IN SHEET

HMAC – Risk Assessment Review and Update Work Session

Clackamas County EOC
February 14, 2012
1:00 – 4:00 pm

Name	Email	Representing	Job Title	Roundtrip mileage (if applicable)
Larry Goff	lgoff@ci.oswego.or.us	LOFD	A/C	15
Sherry Patterson	sherrypatt@comcast.net	RLD + LGFD	Commissioner/Director	
Steve Munsterman		City of Wilsonville	Public Works Supv	
Cindy Kolomechuk	CKolomechuk@odf.state.or.us	ODF	Wildfire Planner	50 miles
MARIA AIKIN	aikin@ci.gladstone.or.us	Gladstone PD	Exec admin to Chief	
Susan Ziolko	-	DTD/OS	Sust. Supervisor	
Bob Cullison	bcullison@orcity.org	OC	Dev Svc. Mgr/PW	4
Judy Davis	johnson.city@hotmail.com	Johnson City	City Recorder	18
CLAIR KLOEK	ckloek@conservationdistrict.org	ClackSWCD	Sr. Res. Conser	4
Jorge Tro	trojec@ci.canby.or.us	City of Canby	Police Lieutenant	
Larry MacDonald	larrymac@co.clackamas.or.us	Comm Health	EMS supervisor	
Erika Palmer	epalmer@ci.damascus.or.us	DAMASCUS	Senior Planner	
Dave Rash	rash3@ci.milwaukie.or.us	Milwaukie PD	Captain	2
Andrew Robins	cindyrob@co.clackamas.or.us	WES	Exec Ops Sup	

CLACKAMAS COUNTY

Name	Email	Representing	Job Title	Roundtrip mileage (if applicable)
Melanie Wagner	Wagner@cityofestacada.org	City of Estacada	Asst. to the city manager	~~25mi~~ 34mi.
Titus Tomlinson	titus+@uoregon.edu	PARE / CSC	Program Coord.	
Mike Howard	—	OPDR	—	
STEVE HANSCHKA	stevehan@co.clackamas.or.us	DTD - Planning	SR. PLANNER, CFM	
Bonnie Hirshberger	bhirshberger@ci.oswego.or.us	Lake Oswego	Emerg Mgmt/Public Affairs	15
Eric Lawter		Clack GIS		
Laura Comstock	lcomstock@clackamas.us	RAPE	Haz. Mit. Specialist	

Meeting: HMAC – Hazard Analysis Update

Date: Wednesday, April 25, 2012

Time: 2:00 pm – 4:00 pm

Location: EOC

AGENDA

I.	**Welcome and Introductions**	(5 minutes)
II.	**Past 100-year Hazard Event Review**	(25 minutes)
III.	**Vulnerability Assessment Table Review**	(25 minutes)
IV.	**Hazard Analysis Update**	(60 minutes)
V.	**Community Asset Worksheet**	(5 minutes)

SIGN-IN SHEET

HMAC – Hazard Analysis Update

Clackamas County EOC
April 25, 2012
2:00 – 4:00 pm

Name	Email	Representing	Job Title	Roundtrip mileage (if applicable)
GREGG RAMIREZ	gregg.ramirez@ccfd1.com	ccfd1.com	EM	
Nancy Bush	nbush@co.clackamas.or.us	CCEM	Deputy Director	
Eric Lanfer		GIS		
Alice Busch	sfd72fmo@hotmail.com	Sandy	FPO	
Cindy Kolomechuk	ckolomechuk@odf.state.or.us	ODF	Wildfire Planner	40
Zach Koellermeier	zachkoe@co.clackamas.or.us	WES	Collections tech	
Larry MacDaniels	larrymac@co.clackamas.or.us	CH	EMS supervisor	
Jay Wilson	jaywilson@clackamas.us	EM		
Laura Comstock	lcomstock@clackamas.us	RARE | CCEM		

Meeting: HMAC – Natural Hazards Mitigation Plan Update: Mitigation Strategy

Date: Monday, May, 21, 2012

Time: 2:00 pm – 5:50 pm

Location: Clackamas County EOC

AGENDA

I. Welcome and Introductions (5 minutes)

II. Overview of Mitigation Strategy Process (20 minutes)

III. Review Current Mitigation Strategy (90 minutes)
a. What is the progress?
b. Update Goals and Action Items

IV. Update Mitigation Strategy (60 minutes)
a. Review Risk Assessment vs. Overall Relative Risk
b. Develop new Action Items

V. Next Steps (5 minutes)

CLACKAMAS COUNTY

SIGN-IN SHEET

HMAC – Action Items and Mitigation Goals

Clackamas County EOC
May 21, 2012
2:00 – 5:00 pm

Name	Email	Representing	Job Title	Roundtrip mileage (if applicable)
Ron Seaward	RSEAWARD@WESTLINNORE.GOV	WLPD	CRAFT	
Darrel Burnum	dburnebur@co.clackamas.or.us	DTD	Road Supervisor	
MARIA AIKIN	aikin@ci.gladstone.or.us	Gladstone PD		
Cindy Kolonechuk	CKolonechuk@odf.state.or.us	ODF	Wildfire Planner	40
Cory Johnson	cjohnson@co.clackamas.or.us	& Facilities		
Randy Harmon	Randyh@co.clackamas.or.us	DTD	Road Surveyor	
Larry Goff	lgoffeci.oswego.or.us	LOFD	Assistant Chief	
Bob Cullison	bcullison@oregon.gov	OC	Dev Svc Mgr	
Bonnie Hirshberger	bhirshberger@ci.oswego.or.us	Lake Oswego		
Ellen Barnes	barnes@cityofmolalla.net	City of Molalla	City Manager	
Josh Bruce	JDBRUCE@UOREGON.EDU	OPDR-UO	PROGRAM COORD.	

CLACKAMAS COUNTY

Name	Email	Representing	Job Title	Roundtrip mileage (if applicable)
Steve Munsterman		City of Wilsonville		
Rebecca Geniga		DTD - Planning		
Susan Zoiko		DTD - Sustainability		
Laura Lomstock		RARE		

Meeting:	HMAC – NHMP Update: Plan Implementation & Maintenance
Date:	Thursday, June 28, 2012
Time:	2:00 pm – 3:30 pm
Location:	Clackamas County EOC

AGENDA

I.	**Welcome and Introductions**	(5 minutes)
II.	**Risk Assessment Review**	(30 minutes)
III.	**Action Item Prioritization**	(30 minutes)
IV.	**Plan Implementation & Maintenance**	(20 minutes)
V.	**Next Steps**	(5 minutes)

SIGN-IN SHEET

HMAC – Plan Implementation & Maintenance

Clackamas County EOC
June 28, 2012
2:00 – 3:30 pm

Name	Email	Representing	Job Title	Roundtrip mileage (if applicable)
Jay Wilson		CCEM	Haz. Mit. Coord	
Eric Laufer		CCGIS		
Ron Schantz [illegible]		WLPD		
MARIA AIKIN		GLADSTONE PD		
STEVE HANSCHKA		PLANNING	PLANNER	
Gregg Ramirez		CFD#1	Emergency Manager	
Susan Ziolko		Sustainability		
Jeff Rubin		TVFR	Emergency Manager	
Josh Bruce - Call in		OPDR		
Laura Armstrong		RARE/CCEM		

2007-2011 Plan Development Process

Event: Hazard Mitigation Advisory Council (HMAC) Meeting
Date: April 15, 2008
Time: 9:00 AM – 11:00 AM
Location: Clackamas County EOC

Agenda

1) Welcome and Introductions

2) Clackamas County Natural Hazard Mitigation Plan (NHMP)

3) City Hazard Mitigation Plans – Current Status and Future Options

4) Potential technical assistance to the county and/or cities with regard to plan updates and new plans

5) Vulnerability Analysis for Mt. Hood Hazard Areas

6) Future role of Hazard Mitigation: Ties to Sustainability

7) Good of the Order

HMAC meeting 4/14/05

Name	Organization	email
Jerry Giger	City of Molalla	jerryg1g@co.clackamas.or.us
Dave Ford	P.G.E.	dave.ford@pgn.com
Larry Goff	City of Lake Oswego	lgoff@ci.oswego.or.us
Kristen Meyers	FEMA RX	kristen.meyers@dhs.gov
Dennis Sigrist	OEM	dsigrist@oem.state.or.us
Krista Dillon	OPDR - UO	kristam@uoregon.edu
Megan Findley	OPDR. UO	mfindley@uoregon.edu
Rebecca Lenga	Clack.Co. DTD Bldg Svs	rebeccac@co.clackamas.or.us
Kelly Summetz	Clackamas DTD Bldg	kellysum@co.clackamas.or.us

Event: Hazard Mitigation Advisory Council (HMAC) Meeting
Date: March 30, 2009
Time: 1:30pm – 4:30pm
Location: Clackamas County EOC

Agenda

1. Introductions
2. New Business
3. City Hazard Mitigation Planning
4. Mt Hood Area Vulnerability/Risk Analysis
5. Hazard Mitigation, Disaster Recovery and Sustainability
6. Hazard Mitigation Grants
7. Next Steps
8. Good of the Order

HMAC
March 30, 2009
Time: 1:30 – 4:30pm
Location: Clackamas County EOC

Attendees
Erika Palmer – City of Damascus Planning
Kelly Sumetz – CC Building Codes
Rob Hungerford – CC Water & Environmental Services
Nancy Kraushaar – Oregon City Public Works
Cindy Kolomechuk – Clackamas SWCD
Barb Kwapich – City of Milwaukie
John Borge – CC Planning Division
Steve Hanschka – CC Floodplain Manager
Carol Dawson – CC Planning Division
Amy Mathis – US Geological Survey
Nate Wood – US Geological Survey
Sherri Dow – CC Office of Sustainability
Jorge Tro – City of Canby Police
Kelly Neumeier – CC GIS
Dana Robinson - CCEM
Jay Wilson – CCEM

Event: **Hazard Mitigation Advisory Council (HMAC) Meeting**
Date: **November 18, 2009**
Time: **1:30pm – 4:30pm**
Location: **Clackamas County EOC**
2200 Kaen Rd, Oregon City 97045

Agenda

1. Introductions (5 min)

2. New Business

    a. Oregon Seismic Rehabilitation Grant Program (15 min)
    b. Other

3. County Updates

    a. City Hazard Mitigation Planning update (5 min)
    b. DR-1824-OR Flood Mitigation Projects (20 min)
    c. Mt Hood Area Vulnerability/Risk Analysis (10 min)
    d. Clackamas River Water Seismic Retrofit (5 min)

4. DOGAMI Landslide Hazard Mapping – Bill Burns (30 min)

5. Break (10 min)

6. Stream Gages (30 min)

7. Grant Project Consideration (30 min)

8. Good of the Order

Hazard Mitigation Advisory Committee November 18, 2009
Attendees

Name	Affiliation	Email
CHRIS ALFINO	City of DAMASCUS	CALFINO@CI.DAMASCUS.OR.US
Bill Burns	ODOT/HWY	bill.burns@odot.state.or.us
Brad Stein	Lake Oswego	bstein@ci.oswego.or.us
Kimberly Swan	CRWP	kims@clackamasproviders.org
Andy Bryant	NOAA-NWS	andy.bryant@noaa.gov
Rebecca Campos	Bldg Services	rebeccac@co.clackamas.or.us
Tonia Burns	Clack County Parks	tburns@co.clackamas.or.us
Marc Gonzales	C.C. Finance	
Cindy Kolomechuk	CC SWCD	
Nancy Kraushaar	Oregon City PW	

Clackamas County Emergency Management

Hazard Mitigation Advisory Committee

September 22, 2010

Agenda

County Hazard Mitigation Plan 5 – year update to begin fall 2011

- Assistance from U of O Partnership for Disaster Resilience
- Scope of work to include possible audit of comprehensive plan

Relationship of HM Plan to Other County Planning Efforts

- Evaluation of how HM plan interfaces with NFIP Community Rating System
- Need for formal County Floodplain Management Plan?
- Integration with storm water plan and watershed action plans?
- Sustainability and Long-Term Planning?

Flood hazard

- Status of Abernethy flood acquisition projects
- Proposed new flood mapping of the Sandy River
- Flood staff gages

Mt Hood vulnerability study update

Sign In Sheet

Name	Contact
Josh Bruce, OPDR	JDBRUCE@UOREGON.EDU (541) 346-7326
Alice Busch	971.563.3051 sfd72@mo
MIC EBY	MICEBY@HOODLANDFIRE.ORG
Megan Findley	mfindley@uoregon.edu
Kelly Sumetz	kellysum@co.clackamas.or.us
Andy Bryant	andy.bryant@noaa.gov
Kathy Griffin	*kgriffin@orcity.org 503-742-4512
STEVE HANSCOMA	stevehan@co.clackamas.or.us
Rebecca Cenyza	beckycen@ "
Jon McDaniel	jonmcd@co.clackamas.or.us.
Kim Swan	Kims@clackamasproviders.org

Appendix C: Community Profile

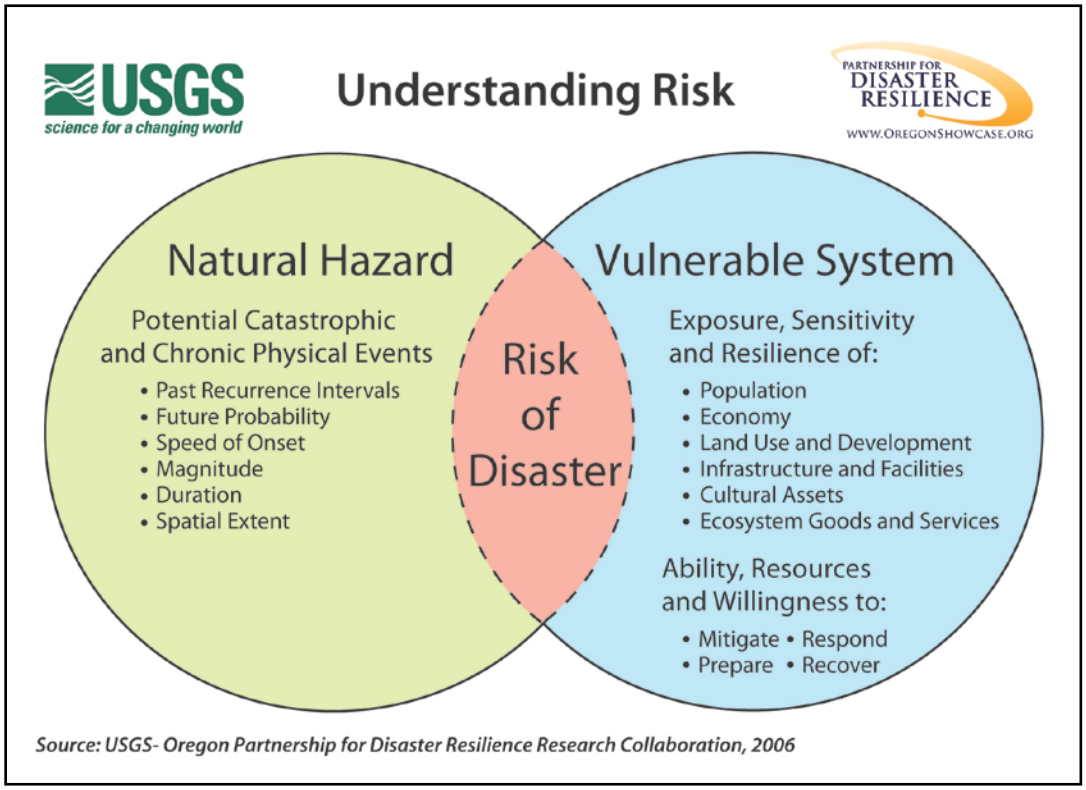
The following section describes the county from a number of perspectives in order to help define and understand the county's sensitivity and resilience to natural hazards. Sensitivity and resilience indicators are identified through the examination of community capitals which include natural environment, socio-demographic capacity, regional economy, physical infrastructure, community connectivity, and political capital. These community capitals can be defined as resources or assets that represent all aspects of community life. When paired together, community capitals can influence the decision making process to ensure that the needs of the community are being met.[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 (e.g., governmental structure, agency missions and directives, and plans, policies, and programs).

The information in this section represents a snapshot in time of the current sensitivity and resilience factors in the county when the plan was developed. The information documented below, along with the hazard assessments located in *Section 3: All-Hazard Risk Assessment*, should be used as the local level rationale for the risk reduction action items identified in *Appendix B*. The identification of actions that reduce the county's sensitivity and increase its resilience assist in reducing overall risk, or the area of overlap in Figure 2.1 below.

[1] Mary Emery and others, "Using Community Capitals to Develop Assets for Positive Community Change," *CD*
Practice 13 (2006): 2

Figure 2.1 Understanding Risk



Source: Clackamas County

Why Plan for Natural Hazards in Clackamas County?

Natural hazards impact citizens, property, the environment, and the economy of Clackamas County. Flooding, landslides, windstorms, severe winter storms, volcanoes, and earthquakes have exposed Clackamas County residents and businesses to the financial and emotional costs for recovering after natural disasters. The risk associated with natural hazards increases as more people move to areas affected by natural hazards. The inevitability of natural hazards, and the growing population 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 s 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 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 a Natural Hazards Mitigation Plan.

Natural Environment Capacity

Geography

Clackamas County has an area of 1,879 square miles and is located along the Willamette River in Northwestern Oregon. About one-eighth of the land area in Clackamas County is incorporated, while a majority is unincorporated. More than three-fourths of the county's area lies within the lower Willamette River basin. The Clackamas, Molalla, Pudding, and Tualatin rivers are major tributaries which flow into the Willamette. The remaining one-fourth of the county is within the Sandy River basin, a tributary of the Columbia River.[2]

Elevations in the county range from a high of 11,235-feet at the peak of Mount Hood (the highest point in the state) to a low of 55-feet in Oregon City located along the shores of the Willamette River. There are a variety of complex eco-regions, including high-altitude forests, foothills, lowlands and valleys, prairie terraces, and riparian forest. Clackamas County has two major physiographic regions that should be considered in planning for natural hazards: the Willamette River Valley, and the Cascade Range Mountains. The Willamette Valley, in western Clackamas County, is the most heavily populated portion and is characterized by flat or gently hilly topography. The Cascade Range, in eastern and southern Clackamas County has a relatively small population and is characterized by heavily forested slopes.[3]

Clackamas County has a long growing season and mild temperatures, which lead to a wide range of agricultural activities. Seasonal flooding, high ground water levels, and soil erosion cause most of the non-urban drainage problems in the county. When maintained in their natural state, Clackamas County's wetlands control runoff and decrease soil erosion and water pollution while reducing potential damage from flooding and helping to recharge water supplies.

Cascade Mountains

As Oregon's tallest peak, Mount Hood borders the eastern edge of Clackamas County and rises to 11,235 feet. Nearby volcanic neighbors along the Cascade Range include Mount St. Helens, Mount Adams, and Mount Jefferson. Mount Hood has had at least four major eruptive periods in the past 15,000 years, with the most recent one taking place around 1805, shortly before the arrivals of Lewis and Clark. These eruptions produced deposits that were primarily distributed along the Sandy and Zigzag rivers in Clackamas County. As one of the major volcanoes in the Cascade Range, it contributes to valuable water, scenic, and recreational resources which help to sustain agricultural and tourist segments throughout the region. When Mount Hood erupts again, volcanic ash is expected to fall and severely affect areas on its flanks as well as downstream in the major river valleys that lie in the path of the volcano.[4]

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[2] Clackamas County Website: http://www.co.clackamas.or.us/co_dev/cityrev.html.

[3] All Hazard Mitigation Plan Clackamas County, Oregon. G&E Engineering Systems Report 32.07.01, Revision.
September 23, 1988.

[4] U.S. Geological Survey, The Cascade Range, "*Description: Mount Hood Volcano*". Accessed 19 December 2011.
http://vulcan.wr.usgs.gov/Volcanoes/Hood/description_hood.html.

Willamette River

The Willamette River Basin covers 11,500 square miles, encompassing 16,000 miles of streams and is ranked 12th among US rivers in volume.[5] The river is about 187 miles long and is unique because it flows from the south to the north, originating in the mountains of west central Oregon, passing through Oregon City and over Willamette Falls, passing through the City of Portland and then emptying out into the Columbia River.[6] The Willamette River is a vital, multi-purpose waterway that touches the lives of millions of people along its banks throughout the Pacific Northwest. The Willamette River has generated economic growth and promoted quality of life for the past 150 years. It is a source of power, irrigation, forestry, agriculture, and recreation. However, to achieve these benefits, the structure and integrity of the river have been compromised with increased population growth and development.

Clackamas River

Located west of the Cascade Range, the Clackamas River flows through a steep-walled canyon lined with dense forest and basalt crags as it heads towards its confluence with the Willamette River near Gladstone and Oregon City.[7] This river was added to the Federal Wild and Scenic River System in 1988, and qualifies as "outstandingly remarkable" in five different resource categories—recreation, fish, wildlife, historic, and vegetation.[8]

The Clackamas River Basin is largely forested but has large areas of pasture used for grazing. More than 400,000 people depend on the Clackamas River for their drinking water. Parts of three streams/rivers within the watershed are listed as "water-quality limited" on the state's 303(d) list, mostly for high water temperatures in the summer. These include the: lower Clackamas River (river mouth to River Mill Dam), Fish Creek (mouth to headwaters), and Eagle Creek (mouth to wilderness boundary). Occurrences of taste and odor problems in drinking water from the river have increased in recent years, apparently due to blue-green algae blooms. Upon request of a local consortium of drinking water providers, a proposal was developed to examine nutrient, algae, and water quality conditions basin wide.[9]

The Clackamas River and its tributaries provide numerous spawning and rearing areas for steelhead, as well as Coho and Chinook salmon. However, the Endangered Species Act listed the river's steelhead as "threatened" on March 13th, 1998. The watershed is home to two wilderness areas: the Salmon-Huckleberry Wilderness and the Bull of the Woods

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[5] Portland Bureau of Environmental Services. "Willamette Watershed." Accessed 19 December 2011. http://www.portlandonline.com/bes/index.cfm?a=231466&c=30938.

[6] Willamette River Water Coalition. "About the Willamette River." Accessed 19 December 2011. http://www.willametteriver.org/willamette.php.

[7] Oregon Rivers. Accessed 19 December 2011. http://www.oregon.com/oregon_rivers.

[8] Ibid.

[9] U.S. Geological Survey, Oregon Water Science Center, "Clackamas River Basin Water Quality Assessment".
Accessed 1 December 2011. http://or.water.usgs.gov/clackamas/or176.html.

Wilderness. More than 72 percent of land in the watershed is publicly owned, predominantly by the U.S. Forest Service.[10]

Sandy River

The Sandy River originates high on the slopes of Mount Hood, located about 50 miles east of Portland. The headwaters are beneath Reid and Sandy Glaciers at 6,000 feet in elevation. From there the river flows due west through the Hoodland Corridor. It cascades past the communities of Welches, Brightwood, and Sandy, then turns north to enter the Columbia River near Troutdale, which is 10 miles east of Portland, Oregon. Two separate sections of the Sandy River have been designated Federal Wild and Scenic Waterways. Riverside trails offer spectacular scenery, easily observed geologic features, unique plant communities, and other wilderness experiences. Just outside Portland, the lower Sandy flows through a deep, winding, forested gorge known for its anadromous fish runs, botanical diversity, recreational boating, and beautiful parks.[11]

Climate

Temperature

Situated in the northern portion of the Willamette Valley, Clackamas County experiences a relatively mild climate with cool, wet winters and warm, dry summers.[12] As Table 2.1 shows, temperatures in Oregon City, located in the Valley, rarely exceed 90°F in the summer or drop below 30°F in the winter. Average temperatures in the summer range from the low 80s down to the low 50s, while average temperatures in the winter range from the mid 40s to the low 30s. Because of these mild temperatures, the average growing season in Clackamas County generally lasts for 150-180 days in the lower valley and for 110-130 days in the foothills (i.e. roughly above 800–feet in elevation).[13]

[10] Ibid.
[11] Oregon Rivers. Accessed 19 December 2011. http://www.oregon.com/oregon_rivers.
[12] Loy, W. G., ed. 2001. *Atlas of Oregon,* 2nd Edition. Eugene, OR: University of Oregon Press.
[13] Ibid.

Table 2.1: Monthly and Annual Average Temperatures (deg F), Oregon City, 1971-2000

Month	Mean max	Mean min	Mean temp	Extreme max	Extreme min
January	47.9	35.7	41.8	66	12
February	52.8	37.3	45.10	75	10
March	58	39.70	48.9	81	22
April	63.4	42.6	53	92	28
May	70	47.60	58.80	104	33
June	75.8	52.10	64	102	37
July	82.6	56	69.3	104	41
August	83	56.1	69.6	107	42
September	77.7	52.10	64.90	105	34
October	65.9	45.6	55.8	96	24
November	53.4	40.2	46.80	73	15
December	47	35.9	41.50	68	6
Annual	**64.8**	**45.1**	**55**	**107**	**6**

Source: The Oregon Climate Service, "Climate of Clackamas County."
http://ocs.oregonstate.edu/county_climate/Clackamas_files/Clackamas.html#table3

Precipitation and Snowfall

The most important determinant of precipitation is elevation. Because Clackamas County widely spans from the valley floor of Oregon City at 55 feet to the top of Mount Hood at 11,235 feet, it is no surprise that there is considerable variation of precipitation totals in the form of rain and snow, throughout the county. Below, Table 2.2 displays the monthly and annual averages of precipitation throughout weather stations across the county. The table shows that North Willamette Experiment Station, located near Canby, receives the lowest annual average precipitation rate at 42.6 inches and Government Camp has the highest annual average precipitation rate of 88.72 inches.

Table 2.2: Precipitation, Monthly and Annual Averages, 1971-2000

Month	Estacada 2 SE	Government Camp	Headworks Ptld Wtr Br	N Willamette Exp Stn.	Oregon City	Scotts Mills 8 SE	Three Lynx
January	8.04	12.86	10.42	5.94	6.59	11.64	10.47
February	6.95	10.23	9.00	5.07	5.51	9.87	8.85
March	6.18	8.50	8.19	4.28	4.70	9.03	7.58
April	5.08	7.54	7.04	3.14	3.46	6.85	5.94
May	4.04	5.20	5.60	2.50	2.70	5.41	4.36
June	2.68	3.80	4.07	1.75	1.83	3.55	3.01
July	1.07	1.36	1.57	0.73	0.83	1.38	1.01
August	1.28	1.61	1.86	0.83	1.00	1.54	1.08
September	2.47	3.60	3.90	1.77	1.93	3.35	2.82
October	4.77	6.51	6.23	3.36	3.48	6.19	5.29
November	8.45	13.13	10.90	6.48	6.79	12.23	11.03
December	8.47	14.38	11.30	6.75	7.23	12.47	11.27
Annual	**59.48**	**88.72**	**80.08**	**42.60**	**46.05**	**83.51**	**72.71**

Source: The Oregon Climate Service, "Climate of Clackamas County."
http://ocs.oregonstate.edu/county_climate/Clackamas_files/Clackamas.html#table1

Table 2.3 displays the monthly and annual averages of snowfall which clearly shows that while the Valley floor experiences a mild winter with an average of 5-10 inches of snow per year, the areas surrounding the foothills of Mount Hood, such as Government Camp, are covered with snow for a majority of the winter months.[14] Figure 2.1 is a map identifying the location of each weather station.

Table 2.3: Snowfall, Monthly and Annual Averages, 1971-2000

Month	Estacada 2 SE	Government Camp	Headworks Ptld Wtr Br	N Willamette Exp Stn.	Oregon City	Scotts Mills 8 SE	Three Lynx
January	0.8	53.9	3	0.5	0.6	13.7	5.7
February	0.9	41.5	2	0.3	0.8	14.3	3.1
March	0.1	36.7	0.7	0	0	12.6	0.9
April	0	25.6	0.2	0	0	5.8	0.4
May	0	7.6	0	0	0	0.5	0
June	0	0.6	0	0	0	0	0
July	0	0	0	0	0	0	0
August	0	0	0	0	0	0	0
September	0	0.3	0	0	0	0	0
October	0	5.3	0	0	0	0.4	0
November	0.3	36	1.4	0.1	0.1	6.3	2.3
December	0.6	45.6	1.6	0.6	0.6	11.5	3.5
Annual	**2.6**	**253.3**	**8.6**	**1.7**	**1.7**	**65**	**15.3**

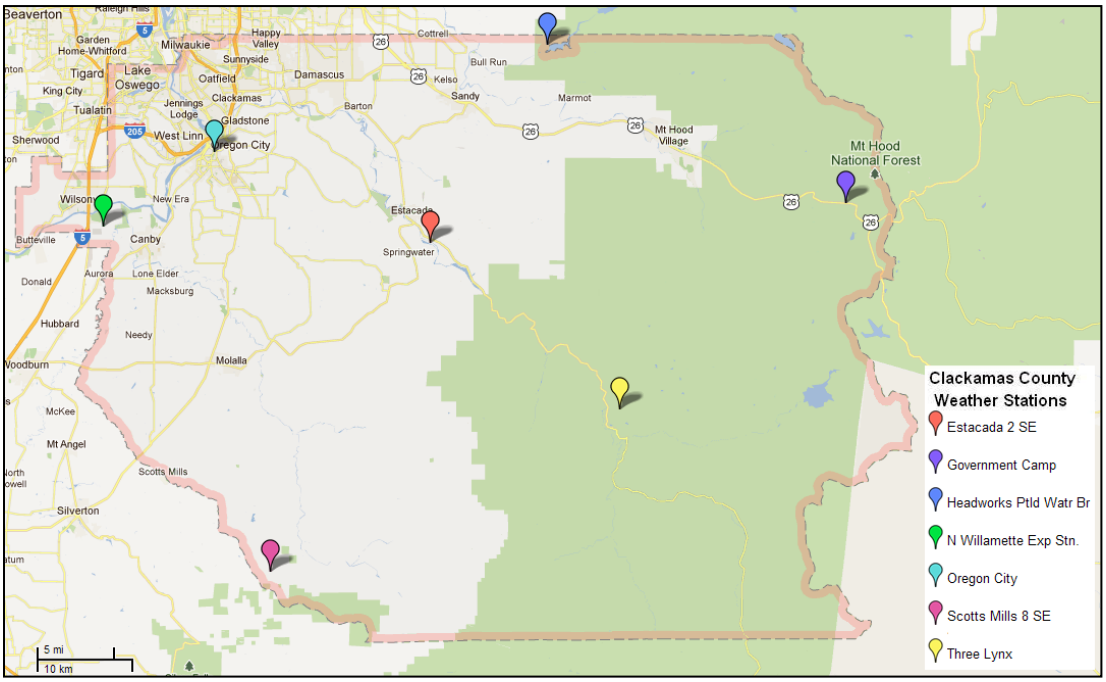
Source: The Oregon Climate Service, "Climate of Clackamas County."
http://ocs.oregonstate.edu/county_climate/Clackamas_files/Clackamas.html#table4

Since 2001 there have been thirteen heavy rain events, six hail events, and sixteen flood events in Clackamas County that have been reported by the NOAA Satellite and Information Service center.[15] Since 2009 there have been two major flood events in Clackamas County which have both resulted in Presidential Disaster Declarations.[16] When the county experiences storm events that include heavy rain events in a very short amount of time, the likelihood of flooding and landslides increases. The most common landslide types, slides and flows, have occurred after several hours or, in some cases, several days of heavy rain or rapid snow melt. Flows may occur hours after the period of the heaviest rain in a storm.[17]

[14] Loy, W. G., ed. 2001. *Atlas of Oregon,* 2nd Edition. Eugene, OR: University of Oregon Press.
[15] NOAA Satellite and Information Service. Accessed 2 December 2011. http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms.
[16] FEMA, Oregon Disaster History. Accessed 18 December 2011. http://www.fema.gov/news/disasters_state.fema?id=41.

[17] Oregon Geology: Landslide Hazards in Oregon. Accessed 15 December 2011. http://www.oregongeology.com/sub/publications/landslide-factsheet.pdf.

Figure 2.1: Map of Clackamas County Weather Station Locations



Source: Map: Online Google Map Query, 2012
Source: Weather Stations: World Climate. Accessed 9 January 2012. http://www.worldclimate.com/.

Hazard Severity

Situated in the Willamette Valley with the Cascades just off to the east, the county is susceptible to a variety of storms that can affect residents and damage property. Typical hazards to affect the county include floods, landslides, wildfires, severe winter storms, windstorms, earthquakes, and volcanic eruptions. While the entire county is susceptible to all these types of natural hazards, the hamlets and villages located around the Mount Hood vicinity seem to be most affected by seasonal floods that are characterized by periods of heavy rains in a short amount of time, as well as a hard snowfall and ice storm immediately followed by warm temperatures causing that fresh snow to melt at a faster rate. With the amount of volcanic sediment that has settled in the streams and valleys over the years since Mount Hood's last eruption, the houses located in this vicinity are vulnerable to landslides and floods as the water permeates in the soil more easily; another factor to consider is the erosive behavior of the Sandy River's migrating channel. As this part of the county is mostly forested, wildfires also affect this area.

Land Cover

More than half of the land in Clackamas County is federally owned by either the BLM (6%) or the US Forest Service (45%). Comparatively, Clackamas County has a higher percentage of privately owned land, as well as federally owned, US Forest Service land, while all other land ownerships are significantly lower than state totals.[18] Table 2.4 provides the total amount of land ownership in Clackamas County by category, measured in thousands of acres.

[18] Loy, W. G., ed. 2001. *Atlas of Oregon,* 2nd Edition. Eugene, OR: University of Oregon Press.

Table 2.4: Land Ownership in Thousands of Acres

	Private	% of Total	BLM	% of Total	USFS	% of Total	State	% of Total	Other	% of Total	Total Land
Clackamas	558	46%	74	6%	545	45%	12	1%	18	1%	1,207
Oregon	27,181	44%	15,715	25%	15,643	25%	1,557	3%	1,832	3%	61,928

Source: Atlas of Oregon, 2nd Edition, Pg. 84 (2001).

The eastern portion of the county is mostly rural and is where most of the US Forest Service owns their land. On the contrary, the western portion of the county is more urbanized with a higher percentage of privately owned land. The western portion also includes zoning for agriculture, forest, rural exception, and the urban growth boundary; a vast majority of this portion of the county is either included in the Urban Growth Boundary or is designated as rural reserve.[19]

According to the *Willamette Valley Land Use/Land Cover Map Informational Report*, a majority of the land cover that includes farmland used for production of tree fruits, vineyards, berries, Christmas trees, and nursery stock can be found in Clackamas County.[20] The report goes on to discuss that the valley portion of the county can be characterized by row crops in the bottomland along the Willamette, Pudding, and Molalla Rivers, with its upland areas characterized by a combination of all the agricultural cover types.[21] Because this area is interlaced with all types and sizes of creeks and swales, the land drains better here, than the rest of the Willamette Valley.[22] The foothill areas leading into the Cascade Range can be characterized by rural non-farm small parcels that are agriculture lands with little or no management, as well as large parcels that are being, or have been, broken to make smaller ranches for single-family dwellings.[23] The foothill area in the Cascade Range has also seen a conversion from all types of forested areas to Christmas tree plantations and solid Douglas Fir Forest.[24]

Other Significant Geologic Features

Clackamas County, like most of the Pacific Northwest, lies over the area of Cascadia Subduction Zone where the North American crustal plate overrides the Juan de Fuca plate underneath the earth's crust. The fault along these two plates creates a structural sag at the Willamette River Valley. Volcanoes are present along this structural sag, and the activity on these mountains is caused by the buoyant melted rock of the Juan de Fuca plate, as it rises to the surface.

[19] Loy, W. G., ed. 2001. *Atlas of Oregon,* 2nd Edition. Eugene, OR: University of Oregon Press.
[20] "Willamette Valley Land Use/Land Cover Map Informational Report," Pg. 25. Accessed 19 December 2011. http://nwhi.org/inc/data/gisdata/docs/willamette/wvveg24k.pdf.
[21] Ibid.
[22] Ibid.
[23] Ibid.
[24] Ibid.

Minerals and Soils

The characteristics of the minerals and soils present in Clackamas County indicate the potential types of hazards that may occur. Rock hardness and soil characteristics can determine whether or not an area will be prone to geologic hazards such as earthquakes and landslides. Some of Oregon's richest soils are located in areas surrounding Canby, Sandy, Molalla, and Wilsonville. In fact, 87% of non-urban soil is classified as productive, agricultural land. These deep alluvial soils are rich in minerals and are great for agriculture, but serve to amplify the effects of earthquakes. Steep slopes toward the Cascade Range increase the potential for landslides. The four mineral and soil types in Clackamas County are valley fill and semi-consolidated sedimentary rocks, basaltic lavas, marine sedimentary rocks, and Eocene-age volcanic and sedimentary rocks.[25]

The surface material includes unconsolidated, fine-grained deposits of Willamette silt, sand, gravel, and recent floodplain deposits. Torrential flood events can introduce large deposits of sand and gravel. Sandy silt and silt containing clay are moderately dense and firm, and are primarily considered to be prone to liquefaction, an earthquake related hazard. Basaltic lava consists mainly of weathered and non-weathered, dense, fine-grained basalt. Though the characteristics of this lava may offer solid foundation support, landslides are common in many of these areas where weathered residual soil overlies the basalt. Understanding the geologic characteristics of Clackamas County is an important step in mitigation and avoiding at-risk development.[26]

Synthesis

This natural environment capacity section is composed of elements known as natural capital. Natural capital is essential in sustaining all forms of life including human life and plays an often under represented role in community resiliency to natural hazards. The growing population and increased development in Clackamas County increases its risk from natural hazard events by threatening loss of life, property, and long-term economic disruption.

With mild temperatures and diverse terrain, the most typical natural hazards that affect Clackamas County are widespread heavy rain events followed by major flood events, as well as the occasional wildfire. With eminent hazard events such as these, it is important that the county is able to react in the event that the county's water supply, supplied by several of the major rivers flowing throughout, is heavily impacted by disaster.

Oregon City experiences an annual mean temperature of 55°F, and the average of the annual amount of precipitation for parts of the county range from an average of 89 feet per year in Government Camp down to an average of 43 feet per year at the North Willamette Experiment Station near Canby. Contrastingly, snowfall rates are drastically different with Government Camp seeing an annual average of 253 feet of snow, while the North Willamette Experiment Station will only see an average of two feet of snow.

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[25] Schlicker, Herbert G. and Deacon, Robert J., Engineering geology of the Tualatin Valley Region, Oregon (1967),
(Bulletin 60). Oregon: Department of Geology and Mineral Industries.
[26] Ibid.

Highlighting natural capitals such as key river systems, as well as temperature and precipitation patterns, will allow the county to identify key hazard areas that need to be better prepared for and mitigated, to increase the resiliency of each community.

Socio Demographic Capacity

Population

Clackamas County is the third largest county in the state of Oregon in terms of population. With 375,992 residents, resiliency and hazard mitigation efforts are a lot harder to manage. The US Census Bureau reported that in 2000 the population of the county was 338,391. With an increase in 11.1% in population growth since 2000, the county experienced an average annual growth rate of 1.1%. These figures both were below the change experienced by the state of Oregon as a whole. Table 2.5 describes the Population Growth throughout Clackamas County and its surrounding counties.

Table 2.5: County Population Growth from 2000 to 2010

County	Population (2010)	Population (2000)	Population Change (2000-2010)	Percent Change (2000-2010)	Average Annual Growth Rate
Clackamas	**375,992**	**338,391**	**37,601**	**11.1%**	**1.1%**
Hood River	22,346	20,411	1,935	9.5%	1.0%
Marion	315,335	284,834	30,501	10.7%	1.1%
Multnomah	735,334	660,486	74,848	11.3%	1.1%
Wasco	25,213	23,791	1,422	6.0%	0.6%
Washington	529,710	445,342	84,368	18.9%	1.9%
Yamhill	99,193	84,992	14,201	16.7%	1.7%
Oregon	3,831,074	3,421,399	409,675	12.0%	1.2%

Source: US Census Bureau, 2000 and 2010 Demographic Profile Data, DP-1.

While the county only experienced an 11.1% increase in population from 2000 to 2010, some of the incorporated cities throughout Clackamas experienced significant growth. Below, Table 2.6 represents population growth for incorporated cities throughout Clackamas County. The city of Happy Valley experienced the biggest growth with an average annual growth rate of 20.8% and an increase of 208% since 2000 with a current population of 13,903. Lake Oswego, the county's most populated city at 36,619 residents, increased by about 4% since 2000. The city of Sandy almost doubled in size and is now at a population of 9,570. The county seat, Oregon City increased by 24% and currently has a population of 31,859. Four cities, Barlow, Johnson City, Milwaukie, and Rivergrove, saw slight decreases in population.

Table 2.6: Incorporated Cities Population Growth from 2000 to 2010

City	Population (2010)	Population (2000)	Population Change (2000-2010)	Percent Change (2000-2010)	Average Annual Growth Rate
Barlow	135	140	-5	-3.6%	-0.4%
Canby	15,829	12,790	3,039	23.8%	2.4%
Damascus*	10,539	9,611	928	9.7%	1.0%
Estacada	2,695	2,371	324	13.7%	1.4%
Gladstone	11,497	11,438	59	0.5%	0.6%
Happy Valley	13,903	4,519	9,384	207.7%	20.8%
Johnson City	566	634	-68	-10.7%	-1.1%
Lake Oswego	36,619	35,278	1,341	3.8%	0.4%
Milwaukie	20,291	20,490	-199	-1.0%	-0.1%
Molalla	8,108	5,647	2,461	43.6%	4.4%
Oregon City	31,859	25,754	6,105	23.7%	2.4%
Rivergrove	289	324	-35	-10.8%	-1.1%
Sandy	9,570	5,385	4,185	77.7%	7.8%
West Linn	25,109	22,385	2,724	12.2%	1.2%
Wilsonville	19,509	13,991	5,518	39.4%	3.9%
Clackamas County	375,992	338,391	37,601	11.1%	1.1%

Source: US Census Bureau, 2000 and 2010 Demographic Profile Data, DP-1, and US Census Bureau, 2006 Population Estimates, T1.
*Damascus data is from 2005 to 2010

Population size itself is not an indicator of vulnerability; other factors such as location, composition, and capacity of the population within the county also need to be considered. Research by social-scientists demonstrates that human capital such as language, race, age, income, education, and health can affect the integrity of a community, and therefore can impact community resilience to natural hazards.

Language

Special consideration should be given to populations who do not speak English as their primary language. Non-English speaking populations can be harder to reach with preparedness and mitigation information and materials.[27] Table 2.7 lists the languages spoken in Clackamas County homes. It shows that 11% of the population speaks a language other than English. Though this is a low percentage, what needs to be highlighted is that of those who speak another language, a large portion of those populations are not proficient in English. For example, 5.5% of the county speaks Spanish, of this 5.5%, 48.2% of them are not proficient in English.

[27] State of Oregon Natural Hazards Mitigation Plan, Region 2: Northern Willamette Valley/Portland Metro Regional
Profile, 2012.

Table 2.7: Clackamas County Language Barriers, 2010

Language Spoken at Home	Total Number of Speakers	Number of People not Proficient in English	Percent of People not Proficient in English
Population 5 years and over	355,782	-	-
English only	316,097	-	-
Language other than English	39,685	15,682	39.5%
Spanish	19,439	9,364	48.2%
Other Indo-European Languages	11,221	2,535	22.6%
Asian and Pacific Islander Languages	8,209	3,527	43.0%
Other	816	256	31.4%

Source: US Census Bureau, 2010 American Community Survey 1-year Estimates, DP02

Race and Ethnicity

The impact in terms of loss and ability to recover may also vary among minority population groups following a disaster. Racial and ethnic minorities can be more vulnerable to natural disaster events as historic patterns of inequality among racial or ethnic divides have often resulted in minority communities that are more likely to live in inferior building stock, degraded infrastructure, or less access to public services. Table 2.8 describes Clackamas County's population by race while Table 2.9 describes the county's population by ethnicity.

Table 2.8: Race in Clackamas County, 2010

Race	Count	Percent of Population
Total Population	375,992	
One Race	364,127	96.8%
White	331,571	88.2%
Black or African American	3,.082	0.8%
American Indian or Alaska Native	3,122	0.8%
Asian	13,729	3.7%
Native Hawaiian and other Pacific Islander	867	0.2%
Other	11,756	3.1%
Two or more Races	11,865	3.2%

Source: US Census Bureau, 2010 Demographic Profile Data, DP-1.

Table 2.9: Ethnicity in Clackamas County, 2010

Ethnicity	Count	Percent of Population
Total Population	375,992	
Hispanic or Latino (of any race)	29,138	7.7%
Not Hispanic of Latino	346,854	92.3%

Source: US Census Bureau, 2010 Demographic Profile Data, DP-1.

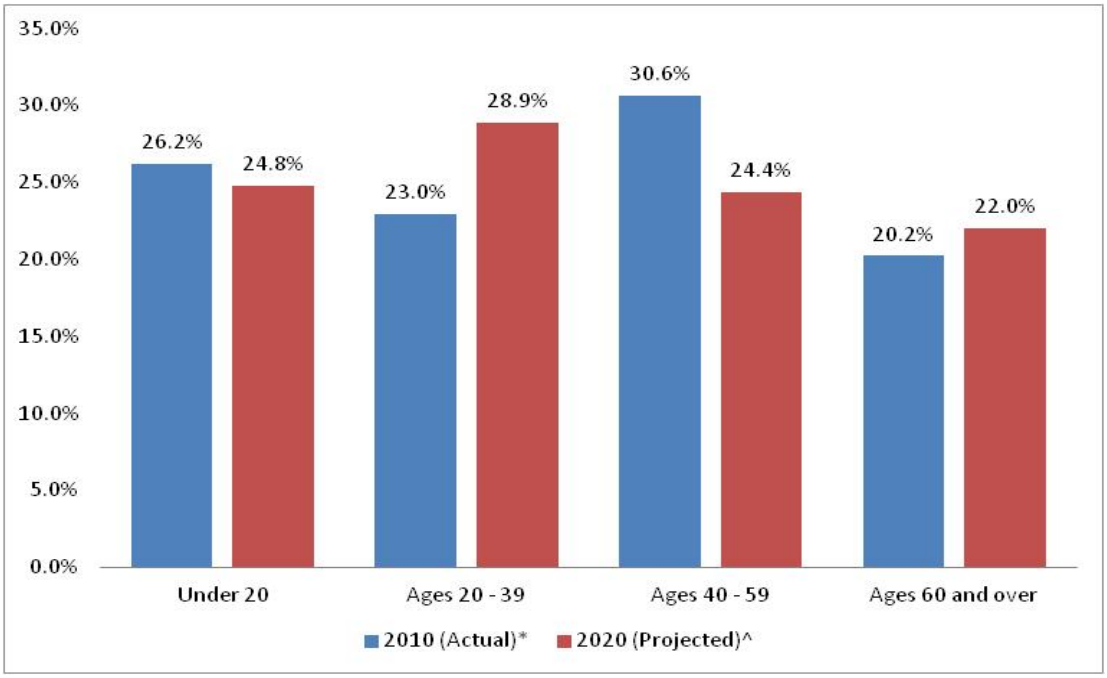
Both tables indicate that there is a fairly small minority population throughout the county. The county has a significantly large population, 88.2%, that racially identifies themselves as White; 8.6% identify as non-white, one race, with the remaining 3.2% who identify as two or more races. Ethnically, only 7.7% of the population identify themselves as Hispanic or

Latino, with the remaining 92.3% identifying as not Hispanic or Latino. It will still be important for the county to identify specific ways to support all portions of the community through hazard preparedness and response, such as providing preparedness handouts and presentations in the languages spoken by the population which can increase community resilience.

Age

Age is a very important factor which has a direct impact on what actions are prioritized for mitigation and how responses to hazard incidents are carried out. Young people represent a potentially vulnerable segment of the population. Special considerations should be given to young populations and schools, where children spend much of their time, during the natural hazard mitigation process. Likewise, the elderly population may require special consideration due to increased sensitivities to heat and cold, possible reliance upon transportation for medications, and comparative difficulty in making home modifications that reduce risk to hazards. Figure 2.2 illustrates the current and projected percentage of population by age groups within the county. Currently the county has a higher population of individuals ages 40-59 at 30.6% of the population. It is projected that by 2020, individuals ages 20-39 will be a majority of the population at 28.9%. For the county, this suggests that they should equally be reaching out to all age groups as with each decade the majority age will fluctuate.

Figure 2.2: Percent of Population by Age in Clackamas County for 2010 and 2020



Source*: 2010 (Actual): US Census Bureau, 2010 Demographic Profile Data, DP-1.
Source^: 2020 (Projected): Office of Economic Analysis, Department of Administrative Services, State of Oregon, Released April 2004.

Table 2.10 identifies the percent of population by age in each of the county's incorporated cities. What we can learn from this table is that the county percentages and the City percentages of age groups are almost identical. About half of the incorporated cities have

the highest percentage of populations in the age group, *Under 20*, while the rest of the cities have the highest percentage in the age group, *Ages 40-59*.

Table 2.10: Percent of Population by Age in Incorporated Cities, 2010

City	Under 20	Ages 20 - 39	Ages 40 - 59	Ages 60 and over
Barlow	34.1%	20.0%	27.4%	18.5%
Canby	31.1%	23.6%	25.9%	19.3%
Damascus	27.4%	17.3%	32.9%	21.4%
Estacada	29.1%	27.0%	26.3%	17.6%
Gladstone	26.0%	25.2%	29.6%	19.2%
Happy Valley	32.5%	22.8%	31.7%	13.0%
Johnson City	21.7%	18.6%	31.1%	28.6%
Lake Oswego	23.9%	17.9%	33.8%	24.3%
Milwaukie	22.9%	27.2%	30.0%	19.9%
Molalla	33.4%	30.4%	22.8%	13.4%
Oregon City	28.2%	27.4%	27.9%	16.4%
Rivergrove	22.5%	11.8%	40.1%	25.6%
Sandy	31.9%	29.2%	24.8%	14.1%
West Linn	28.4%	19.1%	34.5%	18.0%
Wilsonville	24.0%	31.7%	26.4%	17.9%

Source: US Census Bureau, 2010 Demographic Profile Data, DP-1.

Other important considerations for high risk populations are the number of people over the age of 64 living alone and single parent households with children under 18. Table 2.11 identifies all High Risk Households in Clackamas County. While a large percentage of households have individuals under 18 or individuals over 65, it is the 9.3% of householders who are 65 years and older living alone and the 7.9% of single parent households with children under 18. These populations will likely require additional support during a disaster and could result in strains on the system if strategies to mitigate these population vulnerabilities are not implemented.

Table 2.11 High Risk Households in Clackamas County, 2010

High Risk Households	Clackamas County	Percent of Households
Total Households	145,790	
Households with individuals under 18	47,821	32.8%
Single householder with own children under 18	11,483	7.9%
Households with individuals 65 and over	36,935	25.3%
Householder 65 years and older living alone	13,486	9.3%

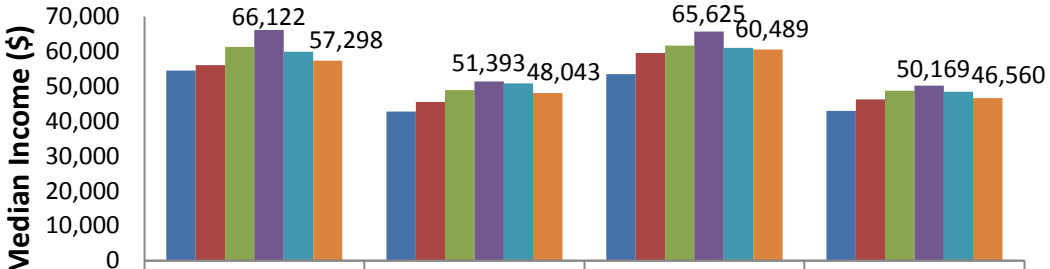
Source: US Census Bureau, 2010 Demographic Profile Data, DP-1.

Income

Household income and poverty status levels are some other indicators of socio demographic capacity and the stability of the local economy. The median household income throughout Clackamas County is $57,298 which is significantly higher than the state average. Figure 2.3 illustrates the changes in median household income from 2005 to 2010 in Clackamas

County, Multnomah County, and Washington County. Data shows that 2008 peaked as the highest median income for all counties, including the state. The median household income has since dropped each year since its peak with data also showing the current median household income. Table 2.12 also shows that of all three counties, Clackamas has significantly seen the least amount of change in Median Household Income since 2005 with only a 5.2% increase.

Figure 2.3: Median Household Income, 2005 to 2010 (U.S. $)



	Clackamas County	Multnomah County	Washington County	Oregon
2005	54,480	42,773	53,431	42,944
2006	56,000	45,507	59,481	46,230
2007	61,220	48,883	61,628	48,730
2008	66,122	51,393	65,625	50,169
2009	59,876	50,773	60,963	48,457
2010	57,298	48,043	60,489	46,560

Source: US Census Bureau, Selected Economic Characteristics, 2005-2010, 1-year Estimates, DP03.

Table 2.12: Median Household Income, 2005-2010 (U.S. $)

	2005	2006	2007	2008	2009	2010	Percent Change from 2005 to 2010	Average Annual Growth Rate
Clackamas County	**54,480**	**56,000**	**61,220**	**66,122**	**59,876**	**57,298**	**5.2%**	**1.9%**
Multnomah County	42,773	45,507	48,883	51,393	50,773	48,043	12.3%	2.3%
Washington County	53,431	59,481	61,628	65,625	60,963	60,489	13.2%	2.5%
Oregon	42,944	46,230	48,730	50,169	48,457	46,560	8.4%	1.6%

Source: US Census Bureau, Selected Economic Characteristics, 2005-2010, 1-year Estimates, DP03.

Low-income populations may require additional assistance following a disaster because they may not have the savings to withstand economic setbacks, and if work is interrupted, housing, food, and necessities become a greater burden. Additionally, low-income households are more reliant upon public transportation, public food assistance, public housing, and other public programs, all which can be impacted in the event of a natural disaster. Table 2.13 details the number of families below poverty level in Clackamas County. Although the percentages of families, as well as families with children under 18 below poverty are lower than both the state and Nation, it is still important to consider their needs in resiliency and mitigation efforts.

Table 2.13: Families Below Poverty Level, 2010

	Families Below Poverty in 2010			
	Families	Percent of Population	Families with Children Under 18	Percent of Population
Clackamas County	**38,265**	**10.2%**	**10,807**	**12.2%**
Oregon	596,408	15.8%	183,859	21.6%
United States	46,215,956	15.3%	15,749,129	21.6%

Source: US Census Bureau, 2010 American Community Survey, 1-year Estimates, S1701

Additionally, while Clackamas County has the second highest median household income between the three largest counties (Clackamas, Multnomah, and Washington) they have the lowest percentage of Public School Children eligible to receive free or reduced lunch. Table 2.14 shows the distribution and percentage of children who are eligible to receive these lunches from 2005 to 2010.

Table 2.14: Percent of Public School Children Eligible to Receive Free/Reduced Lunch During the School Year, 2005-2012

School Year	2005	2006	2007	2008	2009	2010	Change from 2005 to 2010
Clackamas County	**27.0%**	**27.8%**	**26.7%**	**27.5%**	**30.5%**	**35.4%**	**Up 8.4%**
Multnomah County	49.0%	48.0%	48.0%	47.6%	51.8%	54.4%	Up 5.4%
Washington County	30.0%	31.1%	31.7%	36.2%	36.9%	40.3%	Up 10.3%
Oregon	42.0%	42.6%	42.1%	36.2%	47.0%	54.1%	Up 12.1%

Source: Children First for Oregon, Status of Oregon's Children County Data Book, Years 2005-2010

Education

Educational attainment is another important factor that influences socio demographic capacity. Table 2.15 describes the education attainment throughout Clackamas County. Compared to the state, the county has a higher percentage of high school graduates, as well as a higher percentage of individuals who have obtained a Bachelor's degree or higher.

Table 2.15: Education Attainment in Clackamas County, 2010

	Clackamas County		Oregon	
	Count	Percent of Population	Count	Percent of Population
Population 25 years and over	259,973		2,614,886	
High school graduate or higher	236,658	91.00%	2,320,749	88.80%
Bachelor's degree or higher	77,263	29.70%	751,803	28.80%

Source: US Census Bureau, 2010 American Community Survey, 1-year Estimates, DP02

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.

Health

Individual and community health play an integral role in community resiliency. A variety of indicators such as health insurance, people with disabilities, and crime rate translate to the county's ability to prepare, respond, and cope with the impacts of disaster. Analyzing health insurance coverage and people with disability throughout the county will help determine the amount of special attention needed for these vulnerable populations during a disaster.

Those who lack health insurance coverage or who have a disability will often require more additional county support and resources and have a higher vulnerability to hazards. Table 2.16 illustrates the amount of health insurance coverage across the county. The US Census reports that 87% of the population in Clackamas is insured which is higher than both the state and the Nation.[28]

Table 2.16: Health Insurance Coverage, 2010

	Population with Health Insurance	Percent of Population	Population without Health Insurance	Percent of Population
Clackamas County	**326,628**	**87.0%**	**48,947**	**13.0%**
Oregon	3,147,603	82.9%	651,504	17.1%
United States	257,079,614	84.5%	47,208,222	15.5%

Source: US Census Bureau, 2010 American Community Survey, 1-year Estimates, DP03

Those with a disability face a high risk of vulnerability and response effort in a time of disaster. Below, Table 2.17 describes the disability status throughout Clackamas County. While only a small percentage of the total population has a disability, 12.6%, about 37% of those with disabilities are over the age of 65.

Table 2.17: Clackamas County Disability Status, 2010

	2010 Estimates	Percent of Population
Population	375,575	-
With a Disability	47,166	12.6%
Population Under 18 years	89,324	-
With a Disability	5,200	5.8%
Population 18 to 64 years	235,629	-
With a Disability	23,249	9.9%
65 years and over	50,662	-
With a Disability	18,717	37.0%

Source: US Census Bureau, 2010 American Community Survey, 1-year Estimates, DP02

Crime rate is another indicator of the county's overall health. Looking at the crime rate in Clackamas County, can determine whether or not special attention needs to be made during a disaster towards troublesome areas or populations. Table 2.18 shows that the violent crime rate in Clackamas County is lower than the other two surrounding counties, Multnomah and Washington, as well as the state as a whole. Although the crime rate is

[28] US Census Bureau, 2010 American Community Survey, 1-year Estimates, DP03.

relatively low, in times of disaster and in combination with a high stress environment an increase in crime incidents may occur.

Table 2.18: Crime Rate, 2006-2008

	Aggregate Population from 2006-2008	Violent Crimes 2006-2008	Violent Crime Rate per 100,000 people
Clackamas County	**1,128,969**	**1,406**	**125**
Multnomah	2,101,898	12,742	606
Washington	1,532,863	2,491	159
Oregon	N/A	N/A	275

Source: Oregon Health Authority, County Health Rankings, Violent Crime Rate

Synthesis

Socio demographic capacity is a significant indicator of county hazard resiliency. Clackamas County is the third largest county in the state of Oregon, in terms of population. With 375,992 residents, resiliency and hazard mitigation efforts can be a lot harder to manage. The characteristics and qualities of the community population such as age, race, education, income, and health and safety are significant factors that can influence the county'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 stability ultimately affecting future resiliency of Clackamas County.

One important thing to consider is that there are a high number of residents who are not proficient in English. Of the residents that speak another language other than English, 39.5% are not proficient in English. Language barriers will often make it difficult to reach populations of residents who don't speak English. Resiliency efforts need to focus on targeting these populations as they will be most vulnerable and may have trouble knowing what to do in the event of a disaster. It is also important to think about the county's population in terms of its age groups; it is important to cater information towards each of these populations individually, as it is necessary to be able to reach out to all age groups. In 2010, the highest percentage of residents were aged 40-59 with the population aged under 20 following close behind; by 2020, those aged 20-39 will dominate the county. While disasters don't affect certain age groups more than others, information can be dispersed and catered depending on who may be the most vulnerable.

Clackamas County socio-economic factors to consider include:

- With a 5.2% growth from 2005 to 2010, the median household income across the county has increased to $57,298
- 10.2% of the population is below poverty
- 12.2% of the population that is below poverty are families with children 18 years or younger
- 35.4% of public school children are eligible for free or reduced school lunches
- 87% of the county's residents have health insurance
- 12.6% of the population has a disability, where a majority, 37%, of this population is 65 years or older

Highlighting the above socio-economic factors and looking at the Socio Demographic Capacity of the county is important as it affects the resiliency of the county and helps determine target areas and potential vulnerable populations for increased notification on mitigation and resiliency efforts.

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 the existing economic picture. Once any 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. If the county reflects high income inequality or housing cost burden, the potential for home owners and renters implementing mitigation can be drastically reduced. 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 of the strength of a region's economic stability. Table 2.19 shows that between 1999 and 2009, the median household in Clackamas County has risen slower than both the state and the Nation, even though the county's median income is higher than both the state and National averages.

Table 2.19: Median Household Income, 1999 and 2009

	1999*	2009^	Change	Average Annual Growth Rate
Clackamas County	**$52,080**	**$60,051**	**$7,971**	**1.4%**
Oregon	$40,916	$48,325	$7,409	1.7%
United States	$41,994	$50,221	$8,227	1.8%

Source*: US Census Bureau, Profile of General Demographic Characteristics: 2000, DP-1
Source^: US Census Bureau, State and County QuickFacts, 2010 Census

Income Inequality

Income equality is a measure of the distribution of economic resources, as measured by income, across a population. It is a statistic defining the degree to which all persons have the same income. Values that are closer to 1 signify a more equal distribution of income while values that are closer to zero signify more unequal distribution of income.[29]

[29] US Census Bureau, Income, Narrative (Middle Class). Accessed 30 December 2011. http://www.census.gov/hhes/www/income/data/inequality/middleclass.html.

Clackamas County's level of income equality is noticeably higher than both the state and National average as depicted in Table 2.20. As a point of reference, out of all the Counties in Oregon (for which data is available), the highest income equality rating is represented by Yamhill County at 0.62, while Benton County represents the lowest at 0.5.[30]

Table 2.20: Income Equality, 2010

	Income Equality
Clackamas County	**0.57**
Oregon	0.55
United States	0.53

Source: US Census Bureau, 2010 American Community Survey, Gini Index of Income Inequality, B19083

Housing Affordability

Housing affordability is a measure of economic security gauged by the percentage of a metropolitan area's households paying less than 35% of their income on housing.[31] Households spending more than 35% are considered housing cost burdened. Table 2.21 displays the percentage of both home owners and renters which reflect the housing cost burden in Clackamas County, as well as the averages for Oregon and the United States as a whole. In general, the population that spends more of their income on housing has proportionally fewer resources and less flexibility for alternative investments in times of crisis.[32]

High incidence of housing cost burden can impose serious challenges for a community recovering from a disaster, as housing costs may exceed the ability of local residents to repair or move to a new location. Clackamas County has a higher amount of homeowners paying more than 35% of their income on housing compared to the state and the Nation. However, the number of renters paying more than 35% of income on housing is about the same as the Nation and just slightly lower than the state.

Table 2.21: Households Spending >35% of Income on Housing, 2010

	Owners*	Renters^
Clackamas County	**27.1%**	**40.6%**
Oregon	25.7%	43.5%
United States	23.4%	40.4%

Source*: US Census Bureau, 2010 American Community Survey, 1-year Estimates, B25091.
Source^: US Census Bureau, 2010 American Community Survey, 1-year Estimates, B25070.

[30] US Census Bureau, 2010 American Community Survey, Gini Index of Income Inequality, B19083.
[31] University of California Berkeley, Building Resilient Regions, Resilience Capacity Index. Accessed 30 December 2011. http://brr.berkeley.edu/rci/.
[32] Ibid.

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 with the state of Oregon, 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.

Table 2.22 illustrates that Clackamas County ranks number 1 in terms of economic diversity out of all of Oregon's 36 counties. Clackamas County sits beside neighboring Counties, Multnomah which is ranked number 2 and Washington, ranked number 7.

Table 2.22 County Hachman Index Scores, 2009

County	2009 Hachman Index Score	State Rank
Clackamas County	**0.855**	**1**
Multnomah County	0.838	2
Washington County	0.656	7

Source: Oregon Employment Department

While illustrative, economic diversity does not guarantee economic vitality or resilience. For example, as of 2011, though Clackamas County and neighboring Multnomah County are ranked 1 and 2, respectively in terms of economic diversity in the state as a whole, they are both listed as "economically distressed" by the Oregon Business Development Commission.[33] 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 indicate that Clackamas County's labor force (defined as the population of 16 years and older which are in the labor force) increased 5% from 178,724 in 2000 to 199,046 in 2010.[34] With a decrease in the unemployment rate from 2009, the county is still below the state's rate at 10.1% for the county. Table 2.23 shows that both neighboring counties also experienced a decrease in the unemployment rate as well.

[33] Business Oregon, Oregon Economic Data, *Distressed Areas in Oregon*. Accessed 30 December 2011. http://www.oregon4biz.com/Oregon-by-the-numbers/oregon-economic-data/Distressed-Areas-in-Oregon/.

[34] US Census Bureau, Selected Economic Characteristics, 2000 and 2010, DP-3 and DP03.

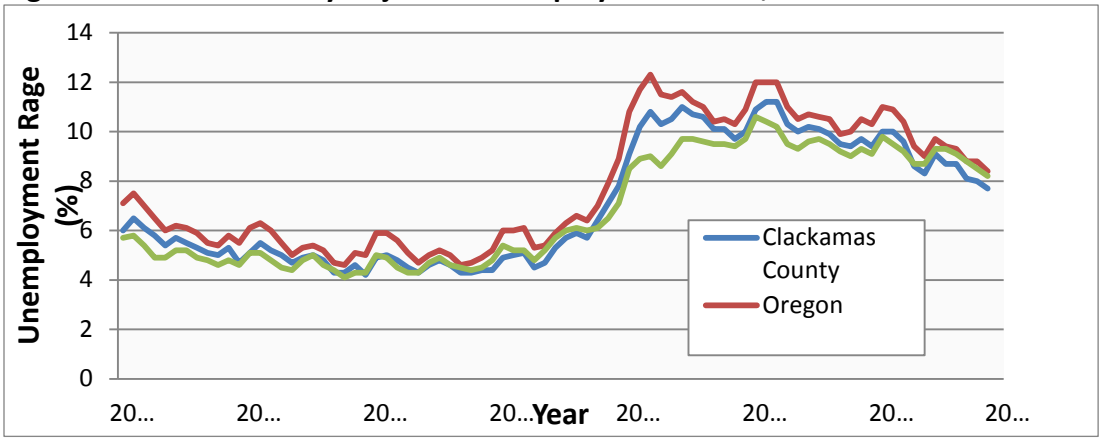
Table 2.23: Regional Unemployment, 2010

County	2010 Unemployment Rate	Percent Change from 2009
Clackamas County	**10.1**	**-1.9%**
Multnomah County	10.1	-2.9%
Washington County	9.1	-3.2%
Oregon	10.8	-2.7%

Source: Oregon Employment Department, *Local Area Employment Statistics*. http://www.qualityinfo.org/olmisj/labforce

Employment data from the Oregon Employment Department demonstrate that the unemployment rate has remained fairly stable since 2009 with the biggest increase occurring at the end of 2008 and well into 2009. Figure 2.4 shows the gradual increase in the Unemployment Rate throughout Clackamas County compared the Oregon and the United States. While the county follows the national trend, in 2008 the unemployment rate was lower than both the state and Nation and then gradually rose in 2009 and 2010 to be higher than the National average. Towards the end of 2011 you can see that the unemployment rate for the county has once again dipped below both the state and National levels.

Figure 2.4 Not Seasonally Adjusted Unemployment Rates, 2005-2011



Source: Oregon Employment Department, *Local Area Unemployment Statistics.* http://www.qualityinfo.org/olmis/labforce.

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 2.24 displays the county Covered Employment and Payroll numbers for Clackamas County, its surrounding counties, and the state in 2010. While the average pay for employees in Clackamas County was $42,153 and lower than neighboring counties, Multnomah and Washington, it was remained than the state's average pay. Clackamas County also has a significantly lower number of employees than both surrounding counties.

Table 2.24: County Covered Employment and Payroll, 2010

County	# of Employees	Annual Payroll	Average Pay
Clackamas County	**136,805**	**$5,766,675,559**	**$42,153**
Multnomah County	421,452	$19,898,507,268	$47,214
Washington County	234,762	$12,675,106,283	$53,991
Oregon	1,598,642	$66,613,214,679	$41,669

Source: Oregon Employment Department, 2010 Oregon Covered Employment and Wages.

Industry

Major Regional Industry

Key industries are those that represent major employers, major revenue generators, and for the purposes of hazard mitigation planning, industries that are represented by a high number of businesses. 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.[35]

It is important to recognize that the impact that a natural hazard event has on one industry can reverberate throughout the regional economy. The effect is especially great when the businesses concerned belong to a basic sector industry. Basic sector industries are those that are dependent on sales outside of the local community; they bring money into a local community via employment. The farm and ranch, information, and wholesale trade industries are all examples of basic industries. Non-basic sector industries are those that are dependent on local sales for their business, such as retail trade, construction, and health and social assistance.[36]

Employment by Industry

Table 2.25 identifies employment by industry. The four industries in Clackamas County with the most employees, as of 2011, are Government (12.4%), Health and Social Assistance (12.1%), Retail (11.9%), and Manufacturing (11.4%). Only one industry in the top five of Clackamas County's primary employment, Manufacturing, is of the basic nature and 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.

[35] State of Oregon Natural Hazards Mitigation Plan, Region 2: Northern Willamette Valley/Portland Metro Regional
Profile, 2012.
[36] Ibid.

Table 2.25: Total Covered Employment by Industry, 2010

Industry	Employment	Percent Employment
Government	16,970	12.4%
Health and Social Assistance	16,599	12.1%
Retail	16,322	11.9%
Manufacturing	15,559	11.4%
Professional and Business Services	15,043	11.0%
Leisure and Hospitality	12,787	9.3%
Wholesale	10,305	7.5%
Construction	8,305	6.1%
Financial Activities	6,908	5.0%
Other Services	5,304	3.9%
Transportation, Warehousing and Utilities	4,282	3.1%
Natural Resources and Mining	4,053	3.0%
Education	2,218	1.6%
Information	2,092	1.5%
Private Non-Classified	57	0.0%
Total Employment - All Industries	**136,805**	**100%**

Source: Oregon Employment Department, Covered Employment and Wages, Clackamas County, 2010.

The Oregon Employment Department estimates net employment growth between 2001 and 2010. Table 2.26 describes the total nonfarm employment by industry from 2005 to 2010. During this time, only one of the county's top five largest employers experienced growth. The county's Education and Health Services field experienced an increase of 19% while the others all significantly decreased. The second lowest employer, the Information Industry experienced the biggest growth at 1.3%.

Table 2.26: Total Nonfarm Employment by Industry, 2005 and 2010

Industry	Annual Average		Change from 2005 to 2010		
	2005	2010	Difference	Percent	AAGR
Mining and Logging	200	200	0	0.0%	0.00%
Construction	10,700	8,500	-2,200	-20.6%	-4.50%
Manufacturing	18,200	15,700	-2,500	-13.7%	-2.91%
Wholesale	10,200	10,200	0	0.0%	0.00%
Retail	17,200	16,300	-900	-5.2%	-1.07%
Transportation, Warehousing, and Utilities	5,800	4,400	-1,400	-24.1%	-5.38%
Information	1,600	2,100	500	21.3%	5.59%
Financial Activities	10,300	8,400	-1900	-18.4%	-4.00%
Professional and Business Services	15,700	15,000	-700	-4.5%	-0.91%
Education and Health Services	15,800	18,800	3,000	19.0%	3.54%
Leisure and Hospitality	12,600	12,800	200	1.6%	0.32%
Other Services	5,300	5,000	-300	-5.7%	-1.16%
Government	17,300	17,500	200	1.2%	0.23%
Total Annual Average Nonfarm Employment	**140,900**	**134,900**	**-6,000**	**-4.3%**	**-0.87%**

Source: Oregon Employment Department, Current Employment Statistics, Clackamas County Nonfarm Employment 2005 and 2010.

Overall, the county had a net loss of 6,000 jobs with three industries taking a majority of those losses: Construction (-2,200), Transportation, Warehousing, and Utilities (-2,500), and Financial Activities (-1,900). Over the five year period, Clackamas County experienced a decrease of 4.3% in non-farm employment.

HIGH REVENUE SECTORS

The top two nonfarm sectors with the highest known revenue reported in 2007 were Manufacturing (38.8%) and Retail (34.9%). Table 2.27 shows the revenue generated by each economic sector. All of the sectors combined generated more than $14.6 billion in revenue for the county in 2007 (the most recent year for which data is available).

Table 2.27: Revenue of Nonfarm Sectors in Clackamas County, 2007

Sectors	Percent of Total Revenue
Manufacturing	38.8%
Retail	34.9%
Health Care and Social Assistance	11.7%
Accommodation and Food Services	4.2%
Real Estate and Rental and Leasing	3.9%
Administrative and Support and Waste Management and Remediation Services	3.3%
Other Services (Except Public Administration)	2.2%
Arts, Entertainment, and Recreation	0.7%
Educational Services	0.5%
Information	NA
Professional, Scientific, and Technical Services	NA
Total Revenue (in thousands)	$14,606,010

Source: US Census Bureau, 2007 Economic Census, Table 1: Selected Statistics by Economic Sector: 2007.

The *Manufacturing* sector of Clackamas County brought in the most revenue during 2007, generating more than $5.6 billion.[37] As revenue is dependent on how fast a product can be made and distributed to consumers, this sector is highly dependent on its facility. It is important to note that 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.

The *Retail Trade* sector of Clackamas County brought in the second highest revenue in 2007, generating almost $6 billion.[38] It contains small businesses that tend to be more sensitive to hazard induced costs. Retail trade is also largely dependent on wholesale trade and the transportation network for the delivery of goods for sale. Disruption of the transportation system could have severe consequences for retail businesses. The potential income from tourists also diminishes after a natural disaster as people are deterred from visiting the impacted area.[39]

[37] US Census Bureau, Selected Statistics by Economic Sector: 2007, Table 1.
[38] Ibid.
[39] State of Oregon Natural Hazards Mitigation Plan, Region 2: Northern Willamette Valley/Portland Metro Regional
Profile, 2012.

In the event that the any of the county's primary revenue sectors are impacted by a disaster, Clackamas County may experience a significant disruption of economic productivity and should therefore plan accordingly.

Regional Industry Employment Forecast

During the hazard mitigation planning process, special attention also warranted to sectors that are anticipated to be major employers in the future. According to the Oregon Employment Department's *Employment Projections by Industry and Occupation,* between 2008 and 2018, the largest employment growth in the county is anticipated to occur in the Educational and Health Services field with a 23% change and an addition of 4,110 new jobs. Other sectors that will see growth by 2018 are Professional and Business Services with a 16% increase with an addition of 2,780 jobs and Leisure and Hospitality, also with a 16% increase and an addition of 2,290 new jobs. The Government sector overall plans to add 560 new jobs; the local government will see the largest increase with 540 new jobs and the federal government will drop 5% losing about 70 jobs.[40] Considering these projected industry growths are relatively reflective of the highest revenue generating industries in Clackamas County, as of 2007, all of the above mentioned concerns should be incorporated in 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, 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 Clackamas County reside.

Below, Table 2.28 shows where workers commute to, who reside in Clackamas County. While the county employs the most of its residents with 36.8% working in Clackamas and also living here, it makes sense that given the close proximity to Portland, OR, 31.2% of Clackamas County residents work there. It is also important to note that very few residents commute so far. The top three counties that residents commute to, aside from the one they live in, surround the borders of the county.

[40] Oregon Employment Department, *Employment Projections by Industry and Occupation 2008-201,* Pg. 333. Accessed 3 January 2011. http://info.org/pubs/projections/projections.pdf.

Table 2.28: Commute Shed (Where Workers are Employed who Live in Clackamas County), 2009

Location	Count	Percent
Clackamas County	**59,557**	**36.8%**
Oregon City	8,459	5.2%
Lake Oswego	6,008	3.7%
Milwaukie	5,236	3.2%
Wilsonville	4,911	3.0%
Multnomah County	57,896	35.8%
Portland	50,434	31.2%
Gresham	5,910	3.7%
Washington County	25,018	15.5%
Beaverton	6,298	3.9%
Tigard	5,779	3.6%
Tualatin*	4,586	2.8%
Hillsboro	3,264	2.0%
Marion County	6,707	4.1%
Clark County, WA	2,014	1.2%
Lane County	1,550	1.0%
Yamhill County	1,198	0.7%
Deschutes County	735	0.5%
King County, WA	698	0.4%
Linn County	605	0.4%
All Other Locations	5,798	3.6%
Total All Jobs	**161,776**	**100%**

Source: US Census Bureau, OnTheMap, Work.

Likewise, Table 2.29 show where workers live who work in Clackamas County. Again, the results are similar as 41.9% of the people who work in Clackamas County live here. The locations outside of Clackamas County where the highest number of workers come from are neighboring Multnomah and Washington counties. There seems to be a large percent of those employed in Clackamas County living in nearby Portland, while a majority of workers who reside within Clackamas County lines live in either Oregon City or Lake Oswego.

Table 2.29: Labor Shed (Where Workers Live who are Employed in Clackamas County), 2009

Location	Count	Percent
Clackamas County	**59,557**	**41.9%**
Oregon City	5,893	4.1%
Lake Oswego	4,408	3.1%
West Linn	4,079	2.9%
Milwaukie	3,600	2.5%
Canby	2,893	2.0%
Multnomah County	33,977	23.9%
Portland	26,411	18.6%
Gresham	5,434	3.8%
Washington County	198,649	13.8%
Beaverton	3,930	2.8%
Marion County	7,163	5.0%
Clark County, WA	5,443	3.8%
Yamhill County	2,292	1.6%
Lane County	1,934	1.4%
Linn County	1,127	0.8%
Deschutes County	1,097	0.8%
Columbia County	1,081	0.8%
All Other Locations	8,833	6.2%
Total All Jobs	**142,153**	**100%**

Source: US Census Bureau, OnTheMap, Home.

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 diversifications, 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 county to absorb disaster impacts for a quick recovery.

With an above average income equality, Clackamas County has a greater median household income than the state and Nation, as well as an unemployment rate of 10.1% which is lower than both the state and the Nation. And although the county is ranked number 1 as having the most diverse economy throughout all of Oregon, more Clackamas County residents are paying greater than 35% of their income on housing, than the Nation as a whole.

While two industries, Information and Education and Health Sciences, saw significant increases in employment from 2005 to 2010, all of the other sectors saw dramatic declines or limited growth. Thus, relying heavily on its top two revenue-producing industries, manufacturing and retail, it is important for the county to consider the economic impacts

that affect its residents in the event of a disaster. Strategies and actions to reduce vulnerability from an economic focus are imperative and should focus on risk management for the county's dominant industries.

Built Capacity

Housing Building Stock

When it comes to hazard mitigation planning it is important to consider housing characteristics as the character of the housing stock affects the level of risk that communities face from natural hazards. Table 2.30 identifies the type of housing most common throughout Clackamas County. It is evident that a majority of the housing stock are single units, as 71.8% of the total housing units are single units. It is important to keep this in mind as hazard mitigation efforts throughout the County should provide outreach and information that highly address preparedness in single housing units.[41] It should also be noted that the percentage of Mobile Homes throughout the county is at 6.8%. While this is a low number compared to the single housing units, mobile homes tend to be more at risk by the affects of disasters as moveable structures are likely to shift on their foundations and create hazardous conditions for occupants.[42]

Table 2.30: Housing Types, 2010

Housing Type	Number of Units	Percentage of Total Housing Types
1 Unit	112,761	71.8%
2 to 9 Units	15,543	9.9%
10 to 19 Units	7,432	4.7%
20 or More Units	10,400	6.6%
Mobile Home	10,664	6.8%
Boat, RV, Van, Etc.	286	0.2%
Total Housing Units	**157,086**	**100%**

Source: US Census Bureau, 2010 American Community Survey, 1-year Estimates, B25024

The single-family housing trend has remained constant over the years and continues with construction permits for new, privately-owned residential building permits. Table 2.31 describes that although the number of permits have drastically decreased since 2005 by almost 75%, the number of permits requested just for single family homes have remained steady with an average of 98% for both 2005 and 2010. This shows that while new construction has significantly decreased, the amount of permits for single family homes has remained at the number one request for building permits.

[41] State of Oregon Natural Hazards Mitigation Plan, Region 2 Northern Willamette Valley/Portland Metro Regional
Profile.
[42] Ibid.

Table 2.31: Annual Privately-Owned Residential Building Permits, 2005 and 2010

	2005		2010	
	Buildings	**Units**	**Buildings**	**Units**
Single Family	2,430	2,430	607	607
Two Family	2	4	16	32
Three or Four Family	0	0	1	3
Five or More Family	20	226	1	5
Total	2,452	2,660	625	647
Percent Change of Permits between 2005 and 2010	-	-	**-74.50%**	**-75.70%**

Source: US Census Bureau, Annual Building Permits, Reported Only.
http://censtats.census.gov/bldg/bldgprmt.shtml

The age of a structure is also important to consider as the older the home is, the greater the risk of damage they face from natural disasters. This is because structures built after the late 1960s in the Northwest and California began using earthquake resistant designs and construction techniques for better resiliency, and so the older the home is the less resilient the structure may be. 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 over Base Flood Elevation (BFE). Knowing the age of a structure is helpful in targeting outreach regarding retrofitting and insurance for owners of older structures.[43]

As you can see in Table 2.32, about half of the housing in Clackamas County, 49.6%, has been built after the 1960s and 1970s when stricter building codes were enforced, while there is only about 17.4% of the housing stock that was built before the 1960s.[44] Residents in structures built before the 1960s face a higher risk of damage because of less stringent building codes and seismic stability. Although the percentage of homes built before the 1960s is low, it is still important to reach out to these residents for better preparedness and mitigation efforts.

[43] State of Oregon Natural Hazards Mitigation Plan, Region 2: Northern Willamette Valley/Portland Metro Regional
Profile, 2012.
[44] US Census Bureau, 2010 American Community Survey 1-year Estimates, B25034.

Table 2.32: Housing Stock by Age, 2010

Year Structure was Built	Number	Percent of Housing
Built 2005 or later	10,398	6.6%
Built 2000 to 2004	11,755	7.5%
Built 1990 to 1999	32,646	20.8%
Built 1980-1989	23,058	14.7%
Built 1970-1979	34,106	21.7%
Built 1960 to 1969	17,762	11.3%
Built 1950 to 1959	9,457	6.0%
Built 1940 to 1949	6,468	4.1%
Built 1939 or earlier	11,436	7.3%
Total Housing Units	**157,086**	**100%**

Source: US Census Bureau, 2010 American Community Survey, 1-year Estimates, B25034.

Mitigation and preparedness planning should also consider the type of occupancy when developing and distributing outreach and educational materials. Residents who own their own home are more likely to be more involved, prepared, and willing to take the extra steps needed to reduce the impact of natural hazards through mitigation and insurance methods, while residents who rent may only be focused on the preparedness and insurance methods as opposed to physical improvements to the structure. Below, Table 2.33 shows that only about 31% of the units in Clackamas County are renter-occupied.

Table 2.33: Housing Unit Occupancy Summary, 2010

Type of Unit	Number	Percent of Housing
Occupied Housing Units	145,790	92.9%
Owner-Occupied	100,982	69.3%
Renter-Occupied	44,808	30.7%
Vacant Housing Units	11,155	7.1%
Total Housing Units	**156,945**	**100%**

Source: US Census Bureau, 2010 General Housing Characteristics, QT-H1.

Physical Infrastructure

Physical infrastructure such as dams, roads, bridges, railways, and airports support Clackamas County communities and economies. Critical facilities are those facilities that are vital in government response and recovery activities and are important to consider as there can be serious secondary impacts to such facilities when disrupted. Critical facilities and infrastructure can be a wide range of things depending on the social, environmental, economic, and physical makeup of the area under consideration. Such facilities can include emergency services, communication services, transportation systems, government facilities, healthcare and public health facilities, information technology, water services, and energy generation and transmission. Due to the fundamental role that infrastructure plays both pre- and post-disaster, special attention in the context of creating more resilient

communities is important.[45] The information provided in this section will outline important infrastructures throughout the county which will help provide a basis for informed decisions about how to reduce the county's infrastructural vulnerabilities to natural hazards.

Dams

While Dam failures can occur at any time and are quite common, the potential for severe damage still exists. The Oregon Water Resources Department inventoried all dams located throughout Oregon. There are a total of 71 dams located throughout Clackamas County. Table 2.34 displays the Dam Threat Potential, and shows that only 6 are considered a High Threat. Of these six dams, only 1, Willamette Falls, hasn't been inspected in the past 3 years. It is important to note that Willamette Falls was last inspected in 1993.[46]

Table 2.34: Clackamas County Dam Inventory

Number of Dams	Dam Threat Potential
6	High
44	Low
21	Significant

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

Railroads

Railroads are major providers of regional and national cargo and trade flows. Railroads run through the Northern Willamette region provide vital transportation links from the pacific to the rest of the country. The Portland & Western (PNWR), the Union Pacific Railroad (UP), and the Oregon Pacific (OPR) are the three major railroads that run through Clackamas County. All three travel through the western portion of the county moving along north to south.[47]

Rails are sensitive to icing from the winter storms that can occur in the Northern Willamette region. For industries in the region that utilize rail transport, these disruptions in service can result in economic losses. The potential for rail accidents caused by natural hazards can also have serious implications for the local communities if hazardous materials are involved.[48]

Airports

Clackamas County has no commercial service airports, however Portland International Airport (PDX) which is the busiest airport in the state is located in neighboring Multnomah County. Clackamas County has 24 private airports and 4 heliports. Two heliports service

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[45] State of Oregon Natural Hazards Mitigation Plan, Region 2: Northern Willamette Valley/Portland Metro Regional Profile, 2012.

[46] Oregon Water Resources Department, Dam Inventory Query for Clackamas County. Accessed 29 December 2011. http://apps.wrd.state.or.us/apps/misc/dam_inventory/default.aspx.

[47] Oregon Department of Transportation, State Rail Maps. Accessed 29 December 2011. http://www.oregon.gov/ODOT/RAIL/docs/Maps_Drawings/OR_Railroad.pdf.

[48] State of Oregon Natural Hazards Mitigation Plan, Region 2: Northern Willamette Valley/Portland Metro Regional Profile, 2012.

hospitals, Providence Willamette Falls Medical Center and Meridian Park Hospital. Flights face potential for closure from a number of natural hazards that are common in Clackamas County, including windstorms and winter storms.[49]

Roads and Bridges

Clackamas County is responsible for over 1,436 miles of roads and 158 bridges in its 1,868 square mile territory.[50] The county's major expressway is Interstate 205. It runs North/South through Clackamas County and is one of the main passages for automobiles, buses, and trucks traveling through the state up to Washington via I-5 or along the Columbia via I-84. Other highways that service Clackamas County include:

- Interstate 5: runs north to South along the western portion of the county through Wilsonville eventually branching out to create Interstate 205.
- US Route 26: connects major Clackamas County cities, such as Sandy, to Portland via the Mount Hood Scenic Byway
- Oregon Route 211: runs south and west from Portland out to Sandy when it connects with US Route 26. It also runs concurrently for part of the way with OR 224 in Estacada and Eagle Creek, and intersects with OR 213 in Molalla.
- Oregon Route 212: runs east to west running from Clackamas and connecting the cities of Boring and Damascus.
- Oregon Route 213: connects with cities and other highways in different parts of the county including Molalla and Estacada with the OR 211, Oregon City with Interstate 205, Clackamas, Estacada, Mount Hood, and Johnson City with Oregon Route 212/Oregon Route 224, and Milwaukie and Clackamas with OR 224.
- Oregon Route 224: runs north to south throughout the county through the cities of Milwaukie, Clackamas, Eagle Creek, and Estacada.

Daily transportation infrastructure capacity throughout Clackamas County is stressed by maintenance, congestion, and oversized loads. Natural hazards can further disrupt automobile traffic and create gridlock, and will make evacuations difficult.[51]

Bridges are another major form of transportation infrastructure that could interrupt evacuation efforts if they are destroyed during a disaster. The Oregon Department of Transportation (ODOT) released a bridge inventory in which Table 2.35 describes the types of bridges present in Clackamas County. There are a total of 284 bridges located throughout the county that include state, county, and city highway bridges. It is important to be aware of the existing conditions of these bridges as incapacitated bridges can disrupt traffic and exacerbate economic losses because of the inability of industries to transport services and products to clients.[52]

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[49] Ibid.
[50] Clackamas County Website, Transportation and Development. Accessed 12 January 2012. http://www.clackamas.us/transportation/improvement/.
[51] State of Oregon Natural Hazards Mitigation Plan, Region 2: Northern Willamette Valley/Portland Metro Regional
Profile, 2012.
[52] Ibid.

Table 2.35: Clackamas County Bridge Inventory, 2011

	Clackamas County
State Highway Bridges	113
County Highway Bridges	155
City/Municipal Highway Bridges	16
Historical Covered Bridges	0
Total	**284**

Source: State of Oregon Natural Hazards Mitigation Plan, Region 2: Northern Willamette Valley/Portland Metro Regional Profile, 2012.

UTILITY LIFELINES

Utility lifelines are the resources that the public relies on daily such as, 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 infrastructures, like dams and power plants, as they transmit the power generated from these facilities.

The network of electricity transmission lines running throughout Clackamas County is operated by Portland General Electric.[53] With the Williams Gas Pipeline in the Northwest operating approximately 3,900 miles of pipe beginning in northern Washington, making its way down through Portland, Oregon and then ending in the Rogue Valley, most residents in Clackamas County have their natural gas operated by Northwest Natural Gas.[54] These lines may be vulnerable as infrequent natural hazards, like earthquakes, could disrupt service to natural gas consumers across the region.

CRITICAL FACILITIES

Critical facilities are those facilities that are essential to government response and recovery activities (e.g., polices and fire stations, public hospitals, public schools). It is important that these facilities are the most resilient to natural hazards as interruption or destruction of these facilities could restrict response efforts and time needed to assist those in danger. Below, Table 2.36 identifies the types and numbers the critical facilities located throughout Clackamas County.

[53] Allan, Stuart et. al., Atlas of Oregon. Pg. 102.
[54] Williams, Gas Pipeline, Natural Gas Transportation & Storage. Accessed 3 January 2011. http://www.williams.com/gas_pipeline/.

Table 2.36: Critical Facilities in Clackamas County

Types of Facilities	County Total
Hospitals (# of beds)	3 (408)
Police Stations	11
Fire & Rescue Stations	17
Dams	71 (6 High Threat)
Bridges	284
State Highway	113
County Highway	155
City Municipal Highway	16
School Districts & Colleges	10 Districts, 1 Community College, 1 University
Airports - General Aviation	4

Source: State of Oregon Natural Hazards Mitigation Plan, Region 2: Northern Willamette Valley/Portland Metro Regional Profile, 2012.

Clackamas County is served by the Clackamas County Sheriff's office, as well as individual city law enforcement teams. The county Sheriff's office provides services to unincorporated parts of the county as well as contracts police services to the incorporated cities of Wilsonville, Estacada, Happy Valley, and Damascus, while the rest of the incorporated cities have their own law enforcement agency that provides services within the city limits. [55] There are a total of 14 Fire Districts and Departments with over 70 fire stations located throughout the county. Clackamas Fire District #1 is one of the largest fire protection districts in Oregon, serving over 179,000 residents across the region.[56] Aside from just extinguishing fires, each fire district and department provides essential public services in the communities they serve, including emergency medical services, search and rescue, and fire prevention education.[57]

The county Courthouse is located in Oregon City and primarily houses state and court-related offices, the rest of the county departments are also located in Oregon City in either the Public Services Building or Development Services Building located in what is known as the Red Soils Campus.[58] The Clackamas County Department of Communications (C-COM) provides 9-1-1 emergency and non-emergency call taking service for all residents throughout the county except for residents within the city limits of Lake Oswego, West Linn and Milwaukie whose 9-1-1 calls are answered by Lake Oswego 9-1-1 (LOCOM). The county's Emergency Management Office is also located within the C-COM building.[59]

DEPENDENT FACILITIES

In addition to the critical facilities mentioned above in Table 2.36, there are other facilities vital to the continued delivery of health services and may significantly impact the public's ability to recover from emergencies. Facilities which have patients that are dependent on

[55] Clackamas County Website, Clackamas County Sheriff's Office. Accessed 30 December 2011. http://www.clackamas.us/sheriff/info.jsp?name=contractcities.htm.
[56] Clackamas County Wildfire Protection Plan, Pg. 90.
[57] Clackamas County Wildfire Protection Plan, Pg. 89.
[58] Clackamas County Website. Accessed 30 December 2011. http://www.clackamas.us/about.htm.
[59] Clackamas County Website, Clackamas County Communications. Accessed 30 December 2011. http://clackamas911.org/.

continued support and care include assisted living centers, nursing homes, residential mental health facilities, and psychiatric hospitals. In the event of a disaster, these facilities may also act as secondary medical facilities as they are equipped with nurses, medical supplies, and beds. Distributed across the county, Clackamas has 27 assisted living facilities, 14 registered nursing homes, 19 residential care facilities, and 1 mental health residential program that will assist those in need.[60]

CORRECTIONAL FACILITIES

Correctional facilities are incorporated into physical infrastructure as they play an important role in everyday society by maintaining safe separation from the public. There are two correctional facilities located in Clackamas County. The Clackamas County Jail and the Clackamas County Juvenile Department are both located in Oregon City. While correctional facilities are built to code to resist structural failure, they typically have backup power to sustain regulation of inmates following the immediate event of an emergency. It is when the impacts of the event continue over a long duration, that logistical planning of these facilities becomes a challenge.

Synthesis

Built capacity refers to the built environment and infrastructure that support a community. The various forms of built capital mentioned above will play significant roles in the event of a disaster. Physical infrastructures, along with utility and transportation lifelines are critical 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 will force communities to rely on local and immediate resources, so it is important to identify critical infrastructures throughout the county as they may play crucial roles in the mitigation and recovery stages of a disaster.

Although 71% of the housing stock in Clackamas County are single-family units, 13% are comprised of Mobile Homes and Buildings with 20 or more units, which are particularly prone to the effects of natural hazards and disasters. 17.4% of the total housing units throughout the county were also built before building codes enforced a more strict policy for seismic building standards. Similarly, 30.7% of the housing stock is renter-occupied. It is important for the county to consider these numbers when producing mitigation and educational outreach materials as it is important to reach all populations, especially the ones who face a higher risk of damage. There are 6 dams throughout the county classified with a high threat potential. With the county so large, there are a variety of critical facilities located throughout county limits that in the event of a disaster can make communication efforts challenging. Several major highways run throughout the county, giving residents a number of alternative routes that may provide service access, or serve as evacuation routes, yet if these roads are destroyed it can isolate communities and make rescue efforts more challenging.

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[60] Clackamas County Website. Clackamas County Social Services Resource Guide. http://www.clackamas.us/socialservices/rguide/.

Community Connectivity Capacity

Social Organizations

Social systems have the ability to easily reach vulnerable populations, which have a tendency to be more at-risk in the event of a disaster. Social systems can be community organizations and programs that provide social and community-based services for the public. It would be beneficial for the county to work with such programs to help distribute information that will help educate those who do not have the resources to learn about hazard mitigation. These services are predominantly located in urbanized areas of the county, which is synonymous with the general urbanizing trend of local residents.

Below are a few methods that social organizations located throughout Clackamas 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 outlets such as volunteerism or through local, state, and national politics, you can gauge the connection people have to their community by the more they are willing to help out.

For residents who want to become involved in their community through volunteering can join the county's program, Volunteer Connection. Through this program, residents can search online through a database of a variety of volunteer opportunities throughout the county and choose one that fits their schedule. This program, among many others, allows 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 2.37 outlines voter participation and turnout percentages from the 2008 Presidential General Election compared to the 2010 State Representative General Election. The 2008 Presidential General Election resulted in an 85.2% voter turnout in the county, while the 2010 State Representative General Election only resulted in a turnout of about 73.91% voter participation.[61] These results are synonymous with voter participation reported across the state.[62]

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[61] Clackamas County Website, Election Results. Accessed 15 December 2011. http://www.clackamas.us/elections/results.jsp.

[62] Oregon Blue Book. Accessed 15 December 2011. http://bluebook.state.or.us/state/elections/elections04.htm.

Table 2.37: Election Results, 2008 and 2010

	2008 Presidential		2010 State	
Jurisdiction	**Clackamas***	Oregon^	**Clackamas***	Oregon^
Total - Registered Voters	227,308	2,153,914	214,198	2,068,798
Total - Ballots Cast	193,688	1,845,251	158,315	1,487,210
Voter Turnout Percentage	85.21%	85.70%	73.91%	71.90%

Source*: Clackamas County Election Results
Source^: Oregon Blue Book Election Results

Cultural Resources

Cultural resources provide residents with a sense of belonging and provide a glimpse into the past to teach current residents about the histories and lives of past residents. Historic sites, museums, and libraries are just a few 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 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 2.38 categorizes the 83 different National Historic Sites located throughout Clackamas 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 2.38: List of National Register of Historic Sites in Clackamas County

Type of Structure	# of Structures
Bridges and Locks	2
Cabins, Estates, Farms, Houses, Huts, Lodges, Log Cabins	60
Mills	2
Ranger and Guard Stations	3
Roads	3
Churches	4
Schools	1
Historic Districts	2
Miscellaneous Buildings	6
Total	83

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 will use to stay connected. Clackamas County has a Library District in which all but one city, Johnson City, is a

participant.[63] The purpose of *The District* is to provide residents with one single library computer system which make it easy for residents to borrow materials from any or all of the libraries throughout the county. Residents can even request to have materials delivered via library courier to their neighborhood library for easy pick-up.[64] Below, Table 2.39 lists the libraries in the county by type, either public or academically operated.

Table 2.39: List of Libraries in Clackamas County

Type of Library	# of Libraries
Public - Run by individual cities	11
Public - Run by the county	2
Academic - Run by local colleges	3
Total	16

Source: Oregon State Library, Library Directory.
http://libdir.osl.state.or.us/index.php?sort=county&search_string=&search_filter=#C

Because all but one city within the county operates a public library, these facilities should be considered a common place for the community to gather during a disaster, as well as and serve a critical function in maintaining a sense of community.

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. Throughout Clackamas County there are a number of museums that provide information on topics that range from historical, technology, science, and art. As a preservation of history, it is important to also consider museums in the mitigation process for community resilience, as these structures should be protected in critical times, especially disasters.

Community Stability

Residential Geographic Stability

Geographic stability is often a result of feeling connected to one's community and a measure of one's rootedness. A person's place attachment refers to this sense of community and can often ones efforts to help revitalize a community.[65] When looking at the percentage of regional residential stability one can determine that the higher the number of residents who have stayed in a geographic location, the more likely they are to have a place attachment. Regional residential stability is important to consider in the mitigation process as those who have been here awhile are more likely to have a vested interest in the area and should be more willing to help with hazard mitigation efforts. Table 2.40 estimates residential stability across the region. It is calculated by the number of people who have lived in the same house and those who have moved within the same county area a year ago, compared to the percentage of people who have not. Clackamas County is estimated to

[63] Clackamas County Website, Library District. Accessed 6 December 2011. http://www.clackamas.us/librarydistrict/.
[64] Libraries in Clackamas County. Accessed 6 December 2011. http://www.lincc.org/uhtbin/cgisirsi/?ps=sonPjuH8pE/NT/199190208/1/520/X#.
[65] 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.

have 93.3% of its residents live in the same house or have moved within the county in the past year. The figures of community stability are relatively consistent across the region and state.

Table 2.40: Regional Residential Stability, 2010

County	Geographic Stability
Clackamas	**93.3%**
Multnomah	91.0%
Washington	93.5%
Oregon	93.0%

Source: US Census Bureau, 2010 American Community Survey, 1-year Estimates, *Geographical Mobility in the Past Year*, 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 something they can afford. Homeownership is an indicator that residents will return to a community post-disaster, as these people are economically and socially invested in the community. Likewise, homeowners are more likely to take necessary precautions in protecting their property. Table 2.41 identifies homeownership across the region, the remaining households are renters. With 69.3% of the resident's home owners, Clackamas County has a significantly higher percentage of homeownership compared to all of its surrounding counties, and the state. This high percentage can likely be attributed to affordability, location, and place attachment to the region.

Table 2.41: Regional Homeownership, 2010

County	Home Owners
Clackamas	69.6%
Multnomah	54.3%
Washington	61.8%
Oregon	62.5%

Source: US Census Bureau, US Census Bureau, 2010 Demographic Data, DP-1.

Synthesis

Community connectivity capacity places a strong emphasis on social structure, trust and norms, as well as 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 social and cultural resources, adversely affecting the community's coping and response mechanisms.

Place attachment can be determined through a variety of outlets. Clackamas County has a wide range of resources that vary from social organizations, civic engagement, and cultural capital that help support findings to suggest residents are well connected with a sense of community and regional stability. From high voter turnout percentage to higher than normal

percentages of regional stability and regional homeownership, residents of Clackamas County are staying put and getting involved. This means that the county needs 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

Clackamas County is governed by a five member Board of Commissioners. The Commissioners are elected to four-year terms and serve as the governing body which directs the general administration of county government. The county encompasses all or part of 15 cities, and four county urban renewal districts which include Clackamas Industrial Area, Clackamas Town Center, Government Camp and the North Clackamas Revitalization Area.[66] The Commissioners set policies, enact ordinances, and establish and manage budgets to perform the services that state law and citizens of the county requires.[67]

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

Some divisions and departments of Clackamas County government that have a role in hazard mitigation are:

- **Department of Emergency Management**: Develops, coordinates and implements a comprehensive all-hazards countywide program to minimize the impact of incidents or disasters which can potentially threaten the safety and welfare of citizens. Aside from being the first county in the country to have a FEMA-approved hazard mitigation plan, the Emergency Management Department also oversees emergency operations, damage assessment, disaster exercises, training, public education and outreach, a city liaison program, and is an active participant in the Portland Urban Area Security Initiative (UASI).[68]
- **Department of Transportation and Development**: Among other things, the DTD is responsible for a broad range of county services involving land use planning and permitting, building permits, county code enforcement, sustainability, and road construction and maintenance.

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[66] Clackamas County Website, About Clackamas County. Accessed 8 December 2011. http://clackamas.us/about.htm.
[67] Clackamas County Website, Board of County Commissioners. Accessed 8 December 2011. http://clackamas.us/bcc/.
[68] Clackamas County Website. Department of Emergency Management. Accessed 8 December 2011. http://www.clackamas.us/emergency/about.html.

    - **Building Codes**: Can collaborate to do outreach with owners of structures that were not built up to modern, resilient code. Professionals from this department could even be called on to help survey buildings after an incident.
    - **Planning and Zoning**: Conducts both short and long range plans that determine much of the built, physical community. Through the county Comprehensive Plan and subsequent polices, this department guides decisions about growth, development, and conservation of natural resources. The Planning Department can be partners in mitigation by developing, implementing, and monitoring polices such as ensuring homes, businesses, and other buildings are built to current seismic code and out of the flood zones.
    - **Transportation Maintenance**: Is responsible for maintaining the integrity and safety of over 1407 miles of county roads, 175 bridges, 1400 miles of road striping, 2398 miles of rock shoulder, 26,453 road signs and operates the Canby Ferry for more than 85,000 vehicles a year.[69] As transportation and infrastructure is a critical component of mobility, this department should be considered in hazard mitigation principles to ensure that residents and safety personnel are able to safely move about in the event of a disaster.
- **Department of Health, Housing and Human Services**: The mission of the Health, Housing and Human Services Department is to promote and assist individuals, families and communities to be safe, healthy and thrive.[70]
    - **Commission for Children and Families**: Plans, advocates, and engages the community around issues on behalf of families and children, often thought of as vulnerable populations due to increased sensitivity to the impacts of hazard incidents. Because this department s in frequent contact with a vulnerable population, it would be a natural partner in mitigation actions for outreach efforts and to build the county's awareness of the needs of children and families.
    - **Public Heath**: Provides community-wide health promotion and disease prevention services to assure the physical and mental well-being of county residents.[71] As an inherently mitigation focused department, Public Health can be an ally in preparing the community for natural hazards. Public Health likely has a distribution network established for information and supplies and these connection to the community will be to encourage personal preparedness and also during incident response.
- **Technology Services**: focuses on providing high quality, innovative, cost-effective technology for citizens, county departments, and county commissioners to conduct daily business.[72] Without this critical component, the county could not effectively serve the

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[69] Clackamas County Website. Roads and Bridges. Accessed 8 December 2011. http://www.clackamas.us/roads/.

[70] Clackamas County Website. Department of Health, Housing and Human Services. Accessed 8 December 2011. http://www.clackamas.us/dhs/.

[71] Clackamas County Website. Community Health. Accessed 8 December 2011. http://www.clackamas.us/community_health/ph/.

[72] Clackamas County Website. Technology Services. Accessed 8 December 2011. http://www.clackamas.us/ts/.

residents. Mitigation efforts from this department would not likely involve citizens at all, but would go a long way to ensuring uninterrupted services during hazard incidents.

- **Geographic Information Systems**: Develops and maintains a Geographic Information System (GIS) for Clackamas County and has the ability to assist in the decision making process by providing an additional tool to analyze and compare numerous geographic data layers along with traditional databases.[73] The GIS is composed of computer maps and associated databases. Examples of the maps include soils, flood hazard areas, and streams. In all phases of the disaster cycle, information is key. Building robust data that catalogues not only the county's risk and vulnerability, but also resources and response capability can ensure that efficient and effective mitigation activities.
- **Sheriff's Office**: The mission of the Clackamas County Sheriff's Office is to provide a number of services such as patrol, investigation, civil process corrections services and jail operations in a professional, ethical, and fiscally responsible manner. Life safety is the first goal of mitigation and response. Public Safety interacts with the vulnerable aspects of the community on a day-to-day basis and can help identify areas for focused mitigation.[74]

Existing Plans and Policies

The Clackamas 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 existing plans and polices within the county. Linking existing plans and policies to the Natural Hazards Mitigation Plan helps identify what resources already exist that can be used to implement action items identified in the Plan.

Implementing the action items detailed in the natural hazards mitigation plan through existing plans and policies will increase their likelihood of widespread support and updates, as well as maximizes the county's resources.

The following is a list of plans and policies already in place in Clackamas County:

- Clackamas County Comprehensive Plan
- Clackamas County Community Wildfire Protection Plan
- Clackamas County Transportation System Plan
- Clackamas County Emergency Operations Plan
- Mt. Hood Coordination Plan
- Housing and Community Development Plan
- Capital Improvement Plan
- Clackamas County Strategic Plan

[73] Clackamas County Website. Geographic Information Systems. Accessed 8 December 2011. http://www.clackamas.us/gis/.
[74] Clackamas County Website. Strategic Plan. Accessed 8 December 2011. http://www.clackamas.us/docs/bcc/strategicplan.pdf.

Synthesis

Recognized as the government and planning structures established within the community, Political Capital is an essential component of hazard resilience. Allowing the county to collaborate with several different county departments as well as outside entities makes the hazard mitigation plan more diverse. Because the Plan is composed with input from government and non-government parties, it seeks to ensure that all parties that might be involved in a disaster have a way to become more resilient. It is important that the Plan reaches out to as many entities as possible as disasters have no boundaries and can affect everyone and anyone. Being aware of hazard mitigation ahead of time will allow all parties to prepare and become more resilient.

Clackamas County works with several departments to include them during the Hazard Mitigation planning process which allows the plan to be diverse and include input from a variety of entities. Likewise, other planning documents and polices throughout the county refer to the Hazard Mitigation Plan as there is some overlap and balance in how the county deals with mitigation-related issues.

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Appendix D: Economic Analysis of Natural Hazard Mitigation Projects

This appendix was developed by the Oregon Partnership for Disaster Resilience at the University of Oregon's Community Service Center. It has been reviewed and accepted by the Federal Emergency Management Agency as a means of documenting how the prioritization of actions shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

The appendix outlines three approaches for conducting economic analyses of natural hazard mitigation projects. It describes the importance of implementing mitigation activities, different approaches to economic analysis of mitigation strategies, and methods to calculate costs and benefits associated with mitigation strategies. Information in this section is derived in part from: The Interagency Hazards Mitigation Team, *State Hazard Mitigation Plan*, (Oregon State Police – Office of Emergency Management, 2000), and Federal Emergency Management Agency Publication 331, *Report on Costs and Benefits of Natural Hazard Mitigation*. This section is not intended to provide a comprehensive description of benefit/cost analysis, nor is it intended to evaluate local projects. It is intended to (1) raise benefit/cost analysis as an important issue, and (2) provide some background on how economic analysis can be used to evaluate mitigation projects.

Why Evaluate Mitigation Strategies?

Mitigation activities reduce the cost of disasters by minimizing property damage, injuries, and the potential for loss of life, and by reducing emergency response costs, which would otherwise be incurred. Evaluating possible natural hazard mitigation activities provides decision-makers with an understanding of the potential benefits and costs of an activity, as well as a basis upon which to compare alternative projects.

Evaluating mitigation projects is a complex and difficult undertaking, which is influenced by many variables. First, natural disasters affect all segments of the communities they strike, including individuals, businesses, and public services such as fire, police, utilities, and schools. Second, while some of the direct and indirect costs of disaster damages are measurable, some of the costs are non-financial and difficult to quantify in dollars. Third, many of the impacts of such events produce "ripple-effects" throughout the community, greatly increasing the disaster's social and economic consequences.

While not easily accomplished, there is value, from a public policy perspective, in assessing the positive and negative impacts from mitigation activities, and obtaining an instructive benefit/cost comparison. Otherwise, the decision to pursue or not pursue various

mitigation options would not be based on an objective understanding of the net benefit or loss associated with these actions.

What are some Economic Analysis Approaches for Evaluating Mitigation Strategies?

The approaches used to identify the costs and benefits associated with natural hazard mitigation strategies, measures, or projects fall into three general categories: benefit/cost analysis, cost-effectiveness analysis and the STAPLE/E approach. The distinction between the three methods is outlined below:

Benefit/Cost Analysis

Benefit/cost analysis is a key mechanism used by the state Office of Emergency Management (OEM), the Federal Emergency Management Agency, and other state and federal agencies in evaluating hazard mitigation projects, and is required by the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended.

Benefit/cost analysis is used in natural hazards mitigation to show if the benefits to life and property protected through mitigation efforts exceed the cost of the mitigation activity. Conducting benefit/cost analysis for a mitigation activity can assist communities in determining whether a project is worth undertaking now, in order to avoid disaster-related damages later. Benefit/cost analysis is based on calculating the frequency and severity of a hazard, avoiding future damages, and risk. In benefit/cost analysis, all costs and benefits are evaluated in terms of dollars, and a net benefit/cost ratio is computed to determine whether a project should be implemented. A project must have a benefit/cost ratio greater than 1 (i.e., the net benefits will exceed the net costs) to be eligible for FEMA funding.

Cost-Effectiveness Analysis

Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. This type of analysis, however, does not necessarily measure costs and benefits in terms of dollars. Determining the economic feasibility of mitigating natural hazards can also be organized according to the perspective of those with an economic interest in the outcome. Hence, economic analysis approaches are covered for both public and private sectors as follows.

INVESTING IN PUBLIC SECTOR MITIGATION ACTIVITIES

Evaluating mitigation strategies in the public sector is complicated because it involves estimating all of the economic benefits and costs regardless of who realizes them, and potentially to a large number of people and economic entities. Some benefits cannot be evaluated monetarily, but still affect the public in profound ways. Economists have developed methods to evaluate the economic feasibility of public decisions which involve a diverse set of beneficiaries and non-market benefits.

INVESTING IN PRIVATE SECTOR MITIGATION ACTIVITIES

Private sector mitigation projects may occur on the basis of one or two approaches: it may be mandated by a regulation or standard, or it may be economically justified on its own merits. A building or landowner, whether a private entity or a public agency, required to conform to a mandated standard, may consider the following options:

1. Request cost sharing from public agencies;
2. Dispose of the building or land either by sale or demolition;
3. Change the designated use of the building or land and change the hazard mitigation compliance requirement; or
4. Evaluate the most feasible alternatives and initiate the most cost effective hazard mitigation alternative.

The sale of a building or land triggers another set of concerns. For example, real estate disclosure laws can be developed which require sellers of real property to disclose known defects and deficiencies in the property, including earthquake weaknesses and hazards to prospective purchases. Correcting deficiencies can be expensive and time consuming, but their existence can prevent the sale of the building. Conditions of a sale regarding the deficiencies and the price of the building can be negotiated between a buyer and seller.

STAPLE/E Approach

Considering detailed benefit/cost or cost-effectiveness analysis for every possible mitigation activity could be very time consuming and may not be practical. There are some alternate approaches for conducting a quick evaluation of the proposed mitigation activities which could be used to identify those mitigation activities that merit more detailed assessment. One of those methods is the STAPLE/E approach.

Using STAPLE/E criteria, mitigation activities can be evaluated quickly by steering committees in a synthetic fashion. This set of criteria requires the committee to assess the mitigation activities based on the Social, Technical, Administrative, Political, Legal, Economic and Environmental (STAPLE/E) constraints and opportunities of implementing the particular mitigation item in your community. The second chapter in FEMA's How-To Guide "Developing the Mitigation Plan – Identifying Mitigation Actions and Implementation Strategies" as well as the "State of Oregon's Local Natural Hazard Mitigation Plan: An Evaluation Process" outline some specific considerations in analyzing each aspect. The following are suggestions for how to examine each aspect of the STAPLE/E approach from the "State of Oregon's Local Natural Hazard Mitigation Plan: An Evaluation Process."

Social: Community development staff, local non-profit organizations, or a local planning board can help answer these questions.

- Is the proposed action socially acceptable to the community?
- Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- Will the action cause social disruption?

Technical: The city or county public works staff, and building department staff can help answer these questions.

- Will the proposed action work?
- Will it create more problems than it solves?

- Does it solve a problem or only a symptom?
- Is it the most useful action in light of other community goals?

Administrative: Elected officials or the city or county administrator, can help answer these questions.

- Can the community implement the action?
- Is there someone to coordinate and lead the effort?
- Is there sufficient funding, staff, and technical support available?
- Are there ongoing administrative requirements that need to be met?

Political: Consult the mayor, city council or county planning commission, city or county administrator, and local planning commissions to help answer these questions.

- Is the action politically acceptable?
- Is there public support both to implement and to maintain the project?

Legal: Include legal counsel, land use planners, risk managers, and city council or county planning commission members, among others, in this discussion.

- Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
- Are there legal side effects? Could the activity be construed as a taking?
- Is the proposed action allowed by the comprehensive plan, or must the comprehensive plan be amended to allow the proposed action?
- Will the community be liable for action or lack of action?
- Will the activity be challenged?

Economic: Community economic development staff, civil engineers, building department staff, and the assessor's office can help answer these questions.

- What are the costs and benefits of this action?
- Do the benefits exceed the costs?
- Are initial, maintenance, and administrative costs taken into account?
- Has funding been secured for the proposed action? If not, what are the potential funding sources (public, non-profit, and private?)
- How will this action affect the fiscal capability of the community?
- What burden will this action place on the tax base or local economy?
- What are the budget and revenue effects of this activity?

- Does the action contribute to other community goals, such as capital improvements or economic development?
- What benefits will the action provide? (This can include dollar amount of damages prevented, number of homes protected, credit under the CRS, potential for funding under the HMGP or the FMA program, etc.)

Environmental: Watershed councils, environmental groups, land use planners and natural resource managers can help answer these questions.

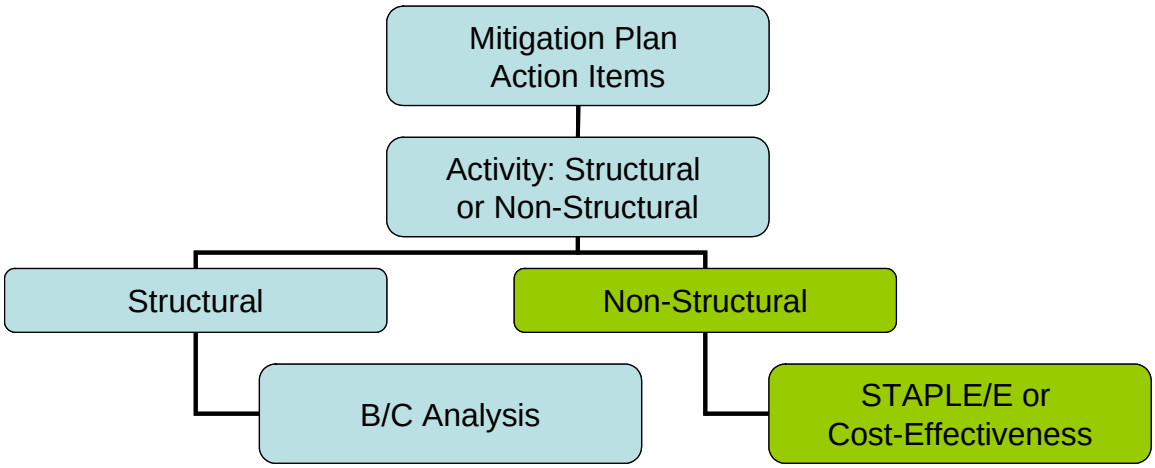
- How will the action impact the environment?
- Will the action need environmental regulatory approvals?
- Will it meet local and state regulatory requirements?
- Are endangered or threatened species likely to be affected?

The STAPLE/E approach is helpful for doing a quick analysis of mitigation projects. Most projects that seek federal funding and others often require more detailed benefit/cost analyses.

When to use the Various Approaches

It is important to realize that various funding sources require different types of economic analyses. The following figure is to serve as a guideline for when to use the various approaches.

Figure D.1: Economic Analysis Flowchart



Source: Oregon Partnership for Disaster Resilience at the University of Oregon's Community Service Center, 2005

Implementing the Approaches

Benefit/cost analysis, cost-effectiveness analysis, and the STAPLE/E are important tools in evaluating whether or not to implement a mitigation activity. A framework for evaluating

mitigation activities is outlined below. This framework should be used in further analyzing the feasibility of prioritized mitigation activities.

1. Identify the Activities

Activities for reducing risk from natural hazards can include structural projects to enhance disaster resistance, education and outreach, and acquisition or demolition of exposed properties, among others. Different mitigation projects can assist in minimizing risk to natural hazards, but do so at varying economic costs.

2. Calculate the Costs and Benefits

Choosing economic criteria is essential to systematically calculating costs and benefits of mitigation projects and selecting the most appropriate activities. Potential economic criteria to evaluate alternatives include:

- ***Determine the project cost***. This may include initial project development costs, and repair and operating costs of maintaining projects over time.
- ***Estimate the benefits***. Projecting the benefits, or cash flow resulting from a project can be difficult. Expected future returns from the mitigation effort depend on the correct specification of the risk and the effectiveness of the project, which may not be well known. Expected future costs depend on the physical durability and potential economic obsolescence of the investment. This is difficult to project. These considerations will also provide guidance in selecting an appropriate salvage value. Future tax structures and rates must be projected. Financing alternatives must be researched, and they may include retained earnings, bond and stock issues, and commercial loans.
- ***Consider costs and benefits to society and the environment***. These are not easily measured, but can be assessed through a variety of economic tools including existence value or contingent value theories. These theories provide quantitative data on the value people attribute to physical or social environments. Even without hard data, however, impacts of structural projects to the physical environment or to society should be considered when implementing mitigation projects.
- ***Determine the correct discount rate***. Determination of the discount rate can just be the risk-free cost of capital, but it may include the decision maker's time preference and also a risk premium. Including inflation should also be considered.

3. Analyze and Rank the Activities

Once costs and benefits have been quantified, economic analysis tools can rank the possible mitigation activities. Two methods for determining the best activities given varying costs and benefits include net present value and internal rate of return.

- ***Net present value***. Net present value is the value of the expected future returns of an investment minus the value of the expected future cost expressed in today's dollars. If the net present value is greater than the projected costs, the project may be determined feasible for implementation. Selecting the discount rate, and

identifying the present and future costs and benefits of the project calculates the net present value of projects.

- ***Internal rate of return***. Using the internal rate of return method to evaluate mitigation projects provides the interest rate equivalent to the dollar returns expected from the project. Once the rate has been calculated, it can be compared to rates earned by investing in alternative projects. Projects may be feasible to implement when the internal rate of return is greater than the total costs of the project. Once the mitigation projects are ranked on the basis of economic criteria, decision-makers can consider other factors, such as risk, project effectiveness, and economic, environmental, and social returns in choosing the appropriate project for implementation.

Economic Returns of Natural Hazard Mitigation

The estimation of economic returns, which accrue to building or land owners as a result of natural hazard mitigation, is difficult. Owners evaluating the economic feasibility of mitigation should consider reductions in physical damages and financial losses. A partial list follows:

- Building damages avoided
- Content damages avoided
- Inventory damages avoided
- Rental income losses avoided
- Relocation and disruption expenses avoided
- Proprietor's income losses avoided

These parameters can be estimated using observed prices, costs, and engineering data. The difficult part is to correctly determine the effectiveness of the hazard mitigation project and the resulting reduction in damages and losses. Equally as difficult is assessing the probability that an event will occur. The damages and losses should only include those that will be borne by the owner. The salvage value of the investment can be important in determining economic feasibility. Salvage value becomes more important as the time horizon of the owner declines. This is important because most businesses depreciate assets over a period of time.

ADDITIONAL COSTS FROM NATURAL HAZARDS

Property owners should also assess changes in a broader set of factors that can change as a result of a large natural disaster. These are usually termed "indirect" effects, but they can have a very direct effect on the economic value of the owner's building or land. They can be positive or negative, and include changes in the following:

- Commodity and resource prices
- Availability of resource supplies
- Commodity and resource demand changes

- Building and land values
- Capital availability and interest rates
- Availability of labor
- Economic structure
- Infrastructure
- Regional exports and imports
- Local, state, and national regulations and policies
- Insurance availability and rates

Changes in the resources and industries listed above are more difficult to estimate and require models that are structured to estimate total economic impacts. Total economic impacts are the sum of direct and indirect economic impacts. Total economic impact models are usually not combined with economic feasibility models. Many models exist to estimate total economic impacts of changes in an economy. Decision makers should understand the total economic impacts of natural disasters in order to calculate the benefits of a mitigation activity. This suggests that understanding the local economy is an important first step in being able to understand the potential impacts of a disaster, and the benefits of mitigation activities.

Additional Considerations

Conducting an economic analysis for potential mitigation activities can assist decision-makers in choosing the most appropriate strategy for their community to reduce risk and prevent loss from natural hazards. Economic analysis can also save time and resources from being spent on inappropriate or unfeasible projects. Several resources and models are listed on the following page that can assist in conducting an economic analysis for natural hazard mitigation activities.

Benefit/cost analysis is complicated, and the numbers may divert attention from other important issues. It is important to consider the qualitative factors of a project associated with mitigation that cannot be evaluated economically. There are alternative approaches to implementing mitigation projects. With this in mind, opportunity rises to develop strategies that integrate natural hazard mitigation with projects related to watersheds, environmental planning, community economic development, and small business development, among others. Incorporating natural hazard mitigation with other community projects can increase the viability of project implementation.

Resources

CUREe Kajima Project, *Methodologies for Evaluating the Socio-Economic Consequences of Large Earthquakes*, Task 7.2 Economic Impact Analysis, Prepared by University of California, Berkeley Team, Robert A. Olson, VSP Associates, Team Leader; John M. Eidinger, G&E Engineering Systems; Kenneth A. Goettel, Goettel and Associates, Inc.; and Gerald L. Horner, Hazard Mitigation Economics Inc., 1997

Federal Emergency Management Agency, *Benefit/Cost Analysis of Hazard Mitigation* Projects, Riverine Flood, Version 1.05, Hazard Mitigation Economics, Inc., 1996

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Goettel & Horner Inc., Earthquake Risk Analysis Volume III: The Economic Feasibility of Seismic Rehabilitation of Buildings in the City of Portland, Submitted to the Bureau of Buildings, City of Portland, August 30, 1995.

Goettel & Horner Inc., *Benefit/Cost Analysis of Hazard Mitigation Projects* Volume V, Earthquakes, Prepared for FEMA's Hazard Mitigation Branch, Ocbober 25, 1995.

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VSP Associates, Inc., *A Benefit/Cost Model for the Seismic Rehabilitation of Buildings*, Volumes 1 & 2, Federal Emergency management Agency, FEMA Publication Numbers 227 and 228, 1991.

VSP Associates, Inc., Benefit/Cost Analysis of Hazard Mitigation Projects: Section 404 Hazard Mitigation Program and Section 406 Public Assistance Program, Volume 3: Seismic Hazard Mitigation Projects, 1993.

VSP Associates, Inc., *Seismic Rehabilitation of Federal Buildings: A Benefit/Cost Model*, Volume 1, Federal Emergency Management Agency, FEMA Publication Number 255, 1994.

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Appendix E: Mid-Columbia Region Natural Hazard Mitigation Public Opinion Survey

Survey Purpose and Use

The purpose of this survey was to gauge the overall perception of natural disasters, determine a baseline level of loss reduction activity for residents in the community, and assess citizen's support for different types of individual and community risk reduction activities.

Data from this survey directly informs the natural hazard planning process. Counties in the Mid-Columbia region can use this survey data to enhance action item rationale and ideas for implementation. Other community organizations can also use survey results to inform their own outreach efforts. Data from the survey provides the counties with a better understanding of desired outreach strategies (sources and formats), a baseline understanding of what people have done to prepare for natural hazards, and desired individual and community strategies for risk reduction.

Background

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. Development of the Natural Hazards Mitigation Plan update process for eight counties in the Mid-Columbia Gorge and surrounding regions was pursued in compliance with subsections from 44 CFR 201.6 guidelines.

Citizen involvement is a key component in the natural hazard mitigation planning process. Citizens should have the opportunity to voice their ideas, interests and concerns about the impact of natural disasters on their communities. To that end, the DMA2K requires citizen involvement in the natural hazard mitigation planning process. It states: "An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

1. An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval
2. An opportunity for neighboring communities, 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."

According to Bierle[1], the benefits of citizen involvement include the following: (1) educate and inform public; (2) incorporate public values into decision making; (3) substantially improve the quality of decisions; (4) increase trust in institutions; (5) reduce conflict; and (6) ensure cost effectiveness.

Methodology

In the fall of 2011, the Oregon Partnership for Disaster Resilience (OPDR) distributed a mailed survey to 7,500 random households throughout an eight county region in Northern Oregon. The counties surveyed included: Clackamas, Hood River, Gilliam, Morrow, Sherman, Umatilla, Wasco, and Wheeler. OPDR developed and distributed the survey in partnership with three members of the University of Oregon's Resource Assistance for Rural Environments (RARE) program.

Given the geographic extent of the survey area and significant county population differences in the region, OPDR stratified the survey sample across three distinct sub-regions (see Table E-1 below). To ensure a minimum number of returns in each of the counties in sub-region three, OPDR leveled the sample at 400 surveys per county (excepting Umatilla). Once OPDR determined the sample size for each county, they contracted with the Oregon Secretary of State Elections Division (OED) to randomly select names and addresses from state voter rolls. Table E-1 shows the survey sample size by sub-region.

[1] Bierle, T. 1999. "Using social goals to evaluate public participation in environmental decisions." *Policy Studies Review*. 16(3/4), 75-103.

Table E-1: Survey Sample Size

County	Population '09	Pop as percent of subregion	Survey sample size by county
Subregion 1 - West			
Clackamas	379,845	100%	**2,500**
Subregion 2 - Gorge			
Hood River	21,725	47%	1,200
Wasco	24,230	53%	1,300
Subtotal	**45,955**	**100%**	**2,500**
Subregion 3 - East			
Sherman*	1,830	2%	400
Gilliam*	1,885	2%	400
Wheeler*	1,585	2%	400
Morrow	12,540	14%	400
Umatilla	72,430	80%	900
Subotal	**90,270**	**100%**	**2,500**
Combined Total	**516,070**		**7,500**

Source: 2011 NHMP Public Opinion Survey
*Indicates that OPDR modified the sample size in these counties in an attempt to ensure a minimum number of survey returns.

Each mailed survey packet contained: (1) a cover letter that explained the purpose of the survey and described the survey incentives; (2) a copy of the survey; (3) a survey participation card; and (4) a postage-paid envelope in which to return the completed survey and participation card.

The survey consisted of 24 questions divided into four sections: natural hazard information; community vulnerabilities and hazard mitigation strategies; mitigation and preparedness activities in your household; and general household information. OPDR and RARE designed the survey to determine public perceptions and opinions regarding natural hazards. Questions also focused on the methods and techniques survey respondents prefer to use in reducing the risks and losses associated with natural hazards.

The survey participation card asked survey recipients to enter the amount of time it took them to complete the survey. It also functioned as a voluntary entry form into a drawing for an assortment of household preparedness items. The drawing provided participants an incentive for completing the survey and expressed that it was not required, but rather encouraged, that they complete it. One winner from each of the eight participating counties was chosen at random by the OPDR office.

Ten days before the survey deadline, OPDR sent a reminder postcard to each household urging them to complete the survey and return it as soon as possible. Of the 7,500 surveys sent, 733 were returned undeliverable for a final sample size of 6,767. OPDR received 951 completed surveys for a 14-percent overall survey response rate.

A key concern of organizations that conduct surveys is statistical validity. If one were to assume that the sample was perfectly random *and* that there was no response bias, then the survey would have a margin of error of ±5-percent at the 95-percent confidence level. In simple terms, this means that if a survey were conducted 100 times, the results would end up within ±5-percent of those presented in this report.

One limitation of the study's methodology is potential non-response bias from the mailed survey. The survey results represent only those households where residents are registered to vote. There could also be a bias of answers based on which residents are renters compared to owners. Despite these areas of potential response bias, the intent of this survey was not to be statistically valid but instead to gain the perspective and opinions of resident's regarding natural hazards in the region. Our assessment is that the results reflect a range attitudes and opinions of residents throughout the eight surveyed counties

Survey Results

This section presents the compiled data and analysis for the 2011 Mid-Columbia Region Natural Hazard Mitigation Public Opinion Survey. We provide a copy of the survey instrument as Attachment A of this report; raw data is provided in Attachment B.

Natural Hazard Information

This section reports the experiences of survey respondents involving natural hazards, and their exposure to preparedness information.

The survey results indicate that about 28-percent of the respondents or someone in their household has personally experienced natural disasters in the past five years, or since they have lived in the community in which they currently reside (see Table E-2 below).

Table E-2: Direct Experience with Natural Disasters in Respondent County

Answer	Percent	Number
Yes	28%	249
No	72%	656
Q-1 total	100%	905

Source: 2011 NHMP Public Opinion Survey

Of those respondents who have experienced a natural disaster in the last five years, 51-percent experienced windstorms, 49-percent experienced wildfire, 38-percent experienced severe winter storms, and 19-percent experienced flood. Table E-3 illustrates the disasters experienced in the past five years in the Mid-Columbia region.

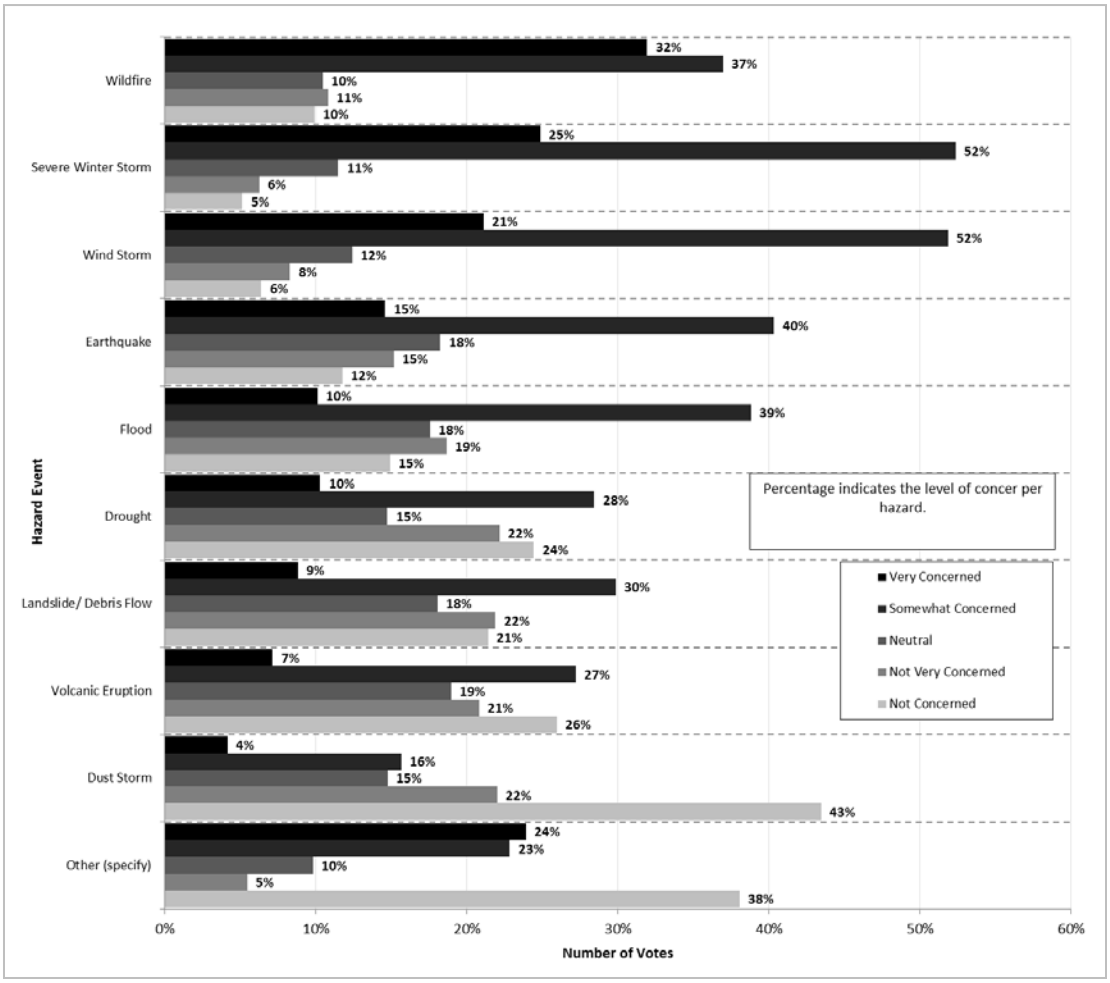
Table E-3: Type of Natural Disaster Experienced in Past Five Years

Hazard	Percent	Number
Windstorm	51%	126
Wildfire	49%	121
Severe Winter Storm	38%	94
Flood	19%	48
Drought	11%	27
Dust Storm	7%	17
Landslide/Debris Flow	7%	17
Earthquake	5%	13
Other	4%	10
Volcanic Eruption	1%	3
Q-1 "yes" answers	100%	249

Source: 2011 NHMP Public Opinion Survey

The survey also asked respondents to rank their personal level of concern for specific natural disasters affecting their community. Figure E-4 shows that more than 70-percent of respondents indicated that they are concerned or very concerned about windstorms and winter storms with nearly 60-percent indicating a high level of concern related to wildfires. A majority of respondents also demonstrated concern over earthquake and flood hazards with 55-percent and 49-percent of respondents marking “concerned” or “very concerned” for those two hazards respectively. Of lesser concern were the landslide, drought and volcano hazards with 47-, 46- and 43-percent of respondents marking “not very concerned” or “not concerned” for those hazards respectively. Dust storm is the hazard respondents are least concerned about with roughly 65-percent of respondents marking the “not very concerned” or “not concerned” choices. Figure E-1 summarizes respondent answers by hazard.

Figure E-1: Level of Concern About Natural Disasters Affecting Respondent County



Source: 2011 NHMP Public Opinion Survey

Next, the survey asked if survey recipients had received information about how to increase the safety of their households and homes from natural hazards. Table E-4 shows that over half (53-percent) of respondents indicated that they have received information regarding home and family safety from natural disasters at some time in the past.

Table E-4: Respondents Who Have Received Information Concerning Natural Disaster Home Safety

Answer	Percent	Number
Yes	53%	489
No	47%	438
Q-3 total	100%	927

Source: 2011 NHMP Public Opinion Survey

Of respondents who had received information, 27-percent received the information within the last six months and 20-percent received information six months to one year ago (see Table E-5). This suggests that, while outreach is occurring, it is reaching fewer than half of

the households in the Mid-Columbia region and surrounding areas, and that many of the households have not received any information in over a year.

Table E-5: Most Recent Date of Contact for Information Concerning Natural Disaster Home Safety

Answer	Percent	Number
Within last 6 months	27%	131
Between 6-12 months	20%	99
Between 1-2 years	22%	107
Between 2-5 years	15%	75
5 years or more	11%	55
Q-3 "yes" answers	100%	489

Source: 2011 NHMP Public Opinion Survey

Of the respondents who received information on natural hazard preparedness, the news media (36-percent) and government agencies (18-percent) were cited most often as being the source of the information. Table E-6 shows the sources most respondents last received information from. Note that while the question directed respondents to check only one answer, a number of respondents selected more than one choice. Therefore, readers should use some caution when interpreting these results.

Table E-6: Most Recent Provider of Natural Disaster Home Safety Information

Answer	Percent	Number
News Media	36%	174
Government Agency	18%	86
Other	15%	74
Not Sure	14%	68
Utility Company	8%	38
American Red Cross	6%	29
Neighbor/friend/family	5%	25
Insurance Agent/Company	5%	24
Other non-profit org.	4%	17
Social media (e.g. Facebook)	1%	4
Univ./research facility	0%	2
Elected official	0%	0
Q-4 total	111%	489

Source: 2011 NHMP Public Opinion Survey
Note: Total percentage exceeds 100% because some respondents chose more than one category.

Survey respondents provided an interesting contrast between the sources that they had recently received information from, and those that they perceived to be the most trustworthy. While only six-percent of respondents said they last received information from the American Red Cross, more respondents chose the American Red Cross as the most

trusted source of information than any other option. The second and third most trusted sources cited by respondents were “utility company” and “government agency”. “Elected Official” and “Social Media” received the lowest number of responses. Table E-7 shows the sources respondents trust the most for providing this information.

Table E-7: Most Trusted Providers of Information for Natural Disaster Home Safety

Answer	Number
American Red Cross	359
Utility Company	313
Government Agency	312
Univ./research facility	242
News Media	221
Insurance Agent/Company	186
Neighbor/friend/family	166
Not Sure	97
Other non-profit org.	93
Other	78
Elected official	14
Social media (e.g. Facebook)	9
Q-5 total	2,090

Source: 2011 NHMP Public Opinion Survey
Note: Respondents could check up to three information providers

When asked what the most effective way was to receive information, respondents indicated that television news (440 responses), newspaper stories (331 responses), and mail (315 responses) were the most effective. Interestingly, various types of advertisement (televisions, radio, billboards, newspaper) all received relatively low responses. Table E-8 shows the effectiveness rating of information dissemination methods expressed by survey respondents.

Table E-8: Most Effective Method for Respondents to Receive Information Concerning Natural Disaster-Related Home Safety

Answer	Number
Television news	440
Newspaper stories	331
Mail	315
Fire Department/Rescue	245
Radio news	227
Fact sheet/brochure	224
Email newsletters	220
Online news outlets	126
Public workshops/meetings	121
University or research institution	87
Schools	72
Television ads	56
Books	50
Social media (e.g. Facebook)	38
Magazine	34
Radio ads	33
Other	33
Outdoor ads (e.g. billboards, etc.)	32
Newspaper ads	26
Chamber of Commerce	21
Q-6 total	2,731

Source: 2011 NHMP Public Opinion Survey

An overwhelming majority of survey respondents (87-percent of those who answered Question 7) indicated that they were not aware of their county's natural hazards mitigation plan prior to receiving the survey. This suggests the need for increases in or changes to local NHMP education and outreach programs.

Table E-7: Respondent Knowledge/Awareness of County Natural Hazards Mitigation Plan

Answer	Percent	Number
Yes	13%	124
No	87%	814
Q-7 total	100%	938

Source: 2011 NHMP Public Opinion Survey

Consistent with the responses displayed in Table E-7, only 12-percent of respondents claimed to be aware, prior to the survey, that FEMA requires their county to update the NHMP every five years in order to be eligible for federal pre- and post-disaster hazard mitigation funds.

Table E-8: Respondent Awareness of FEMA Requirements for Five Year NHMP Update to Receive Hazard Mitigation Funding

Answer	Percent	Number
Yes	12%	110
No	88%	827
Q-8 total	100%	938

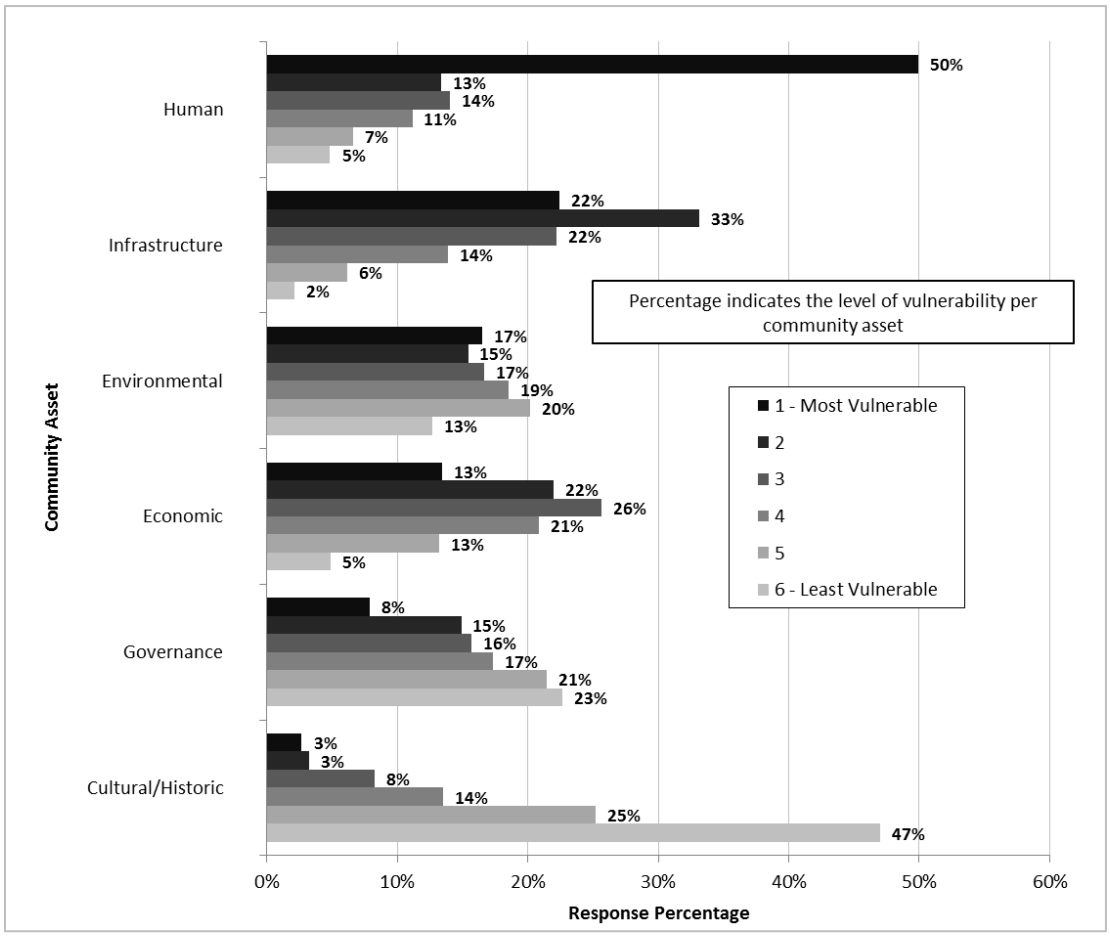
Source: 2011 NHMP Public Opinion Survey

Community Vulnerabilities and Hazard Mitigation Strategies

This section outlines the assets that survey respondents felt would be vulnerable to natural hazards in the region. The section also describes citizens' priorities for planning for natural hazards and the community-wide strategies respondents support.

The survey asked respondents to rank categories of community assets in terms of their vulnerability. These questions were intended to help the Mid-Columbia region and surrounding communities determine citizen priorities when planning for natural hazards, by comparing the level of importance that they attach to specific community assets and risk reduction activities. Figure E-2 illustrates that respondents found human related assets to be by far the most vulnerable (50-percent), followed distantly by infrastructure (22-percent). Survey respondents found environmental assets to be the third most vulnerable (17-percent), followed closely by economic assets (13-percent), however economic assets made up a noticeably higher proportion than environmental assets in rankings 2-4. Cultural/historic assets (three-percent) received the lowest consistent ranking in terms of vulnerability, preceded somewhat closely by governance (eight-percent).

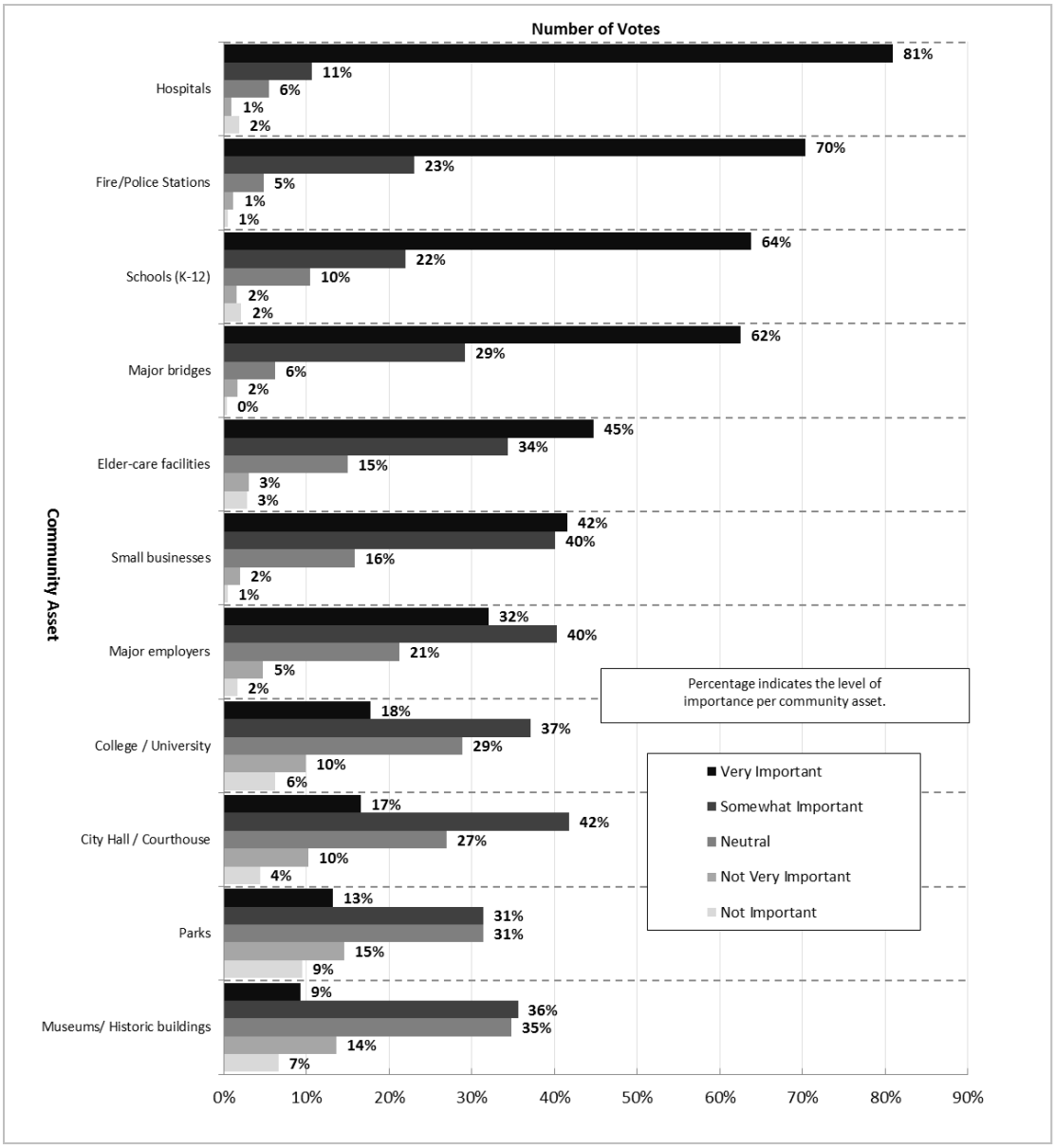
Figure E-2: Respondent Perceptions of Community Vulnerability



Source: 2011 NHMP Public Opinion Survey

Next, the survey asked respondents to indicate the importance that they attach to particular types of public and private community assets. As shown in Figure E-3, over 90-percent of respondents indicated that hospitals, major bridges and fire/police stations are very important or somewhat important to them. In addition, over 80-percent indicated that schools (K-12) and small businesses are very important or somewhat important to them. Parks were the least important to survey respondents, followed closely by museums/historical buildings, college/university, and city hall/courthouse.

Figure E-3: Respondent Community Asset Valuation



Source: 2011 NHMP Public Opinion Survey

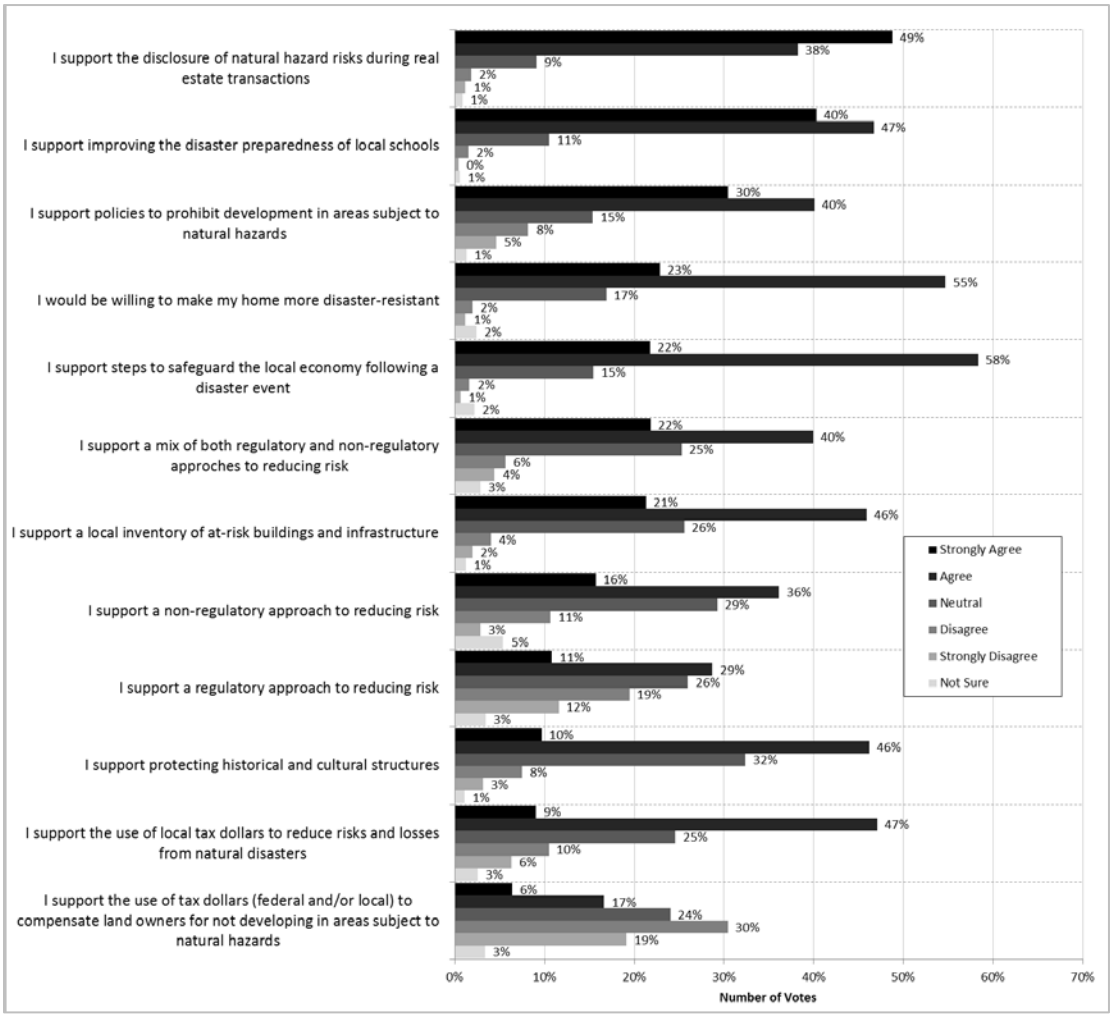
A number of activities can reduce your community's risk from natural hazards. These activities can be both regulatory and non-regulatory. Please check the box that best represents your opinion of the following strategies to reduce the risk and loss associated with natural disasters.

To gauge attitudes toward different types of mitigation strategies, the survey asked respondents to indicate their level of support for various risk reduction activities. Figure E-4 shows that while there is general support among survey respondents about protecting assets such as schools, homes, businesses and historic or cultural assets, respondents were somewhat mixed in their agreement about how to accomplish those protections.

With respect to specific asset types, 87-percent of the respondents strongly agree or agree that they support improving the disaster preparedness of local schools, over 80-percent of respondents strongly agree or agree that they support steps to safeguard the local economy, and over 77-percent strongly agree or agree that they would be willing to make their homes more disaster-resistant. In addition, 87-percent strongly agree or agree that they support disclosure of natural hazard risks during real estate transactions.

With respect to risk reduction strategies, respondents generally appear to support a mix of regulatory, non-regulatory and tax-dollar based approaches. For example, over 50-percent of respondents support the use of tax dollars to reduce risk and losses from natural hazards and over 60-percent indicate support for a mix of regulatory and non-regulatory approaches to reducing risk. That said, respondents overwhelmingly support the use policy strategies over the use of tax supported compensation strategies when specifically used to limit development in hazard areas. As Figure E-4 shows, fewer than 25-percent of respondents indicated support when specifically asked about the use of tax dollars to compensate property owners for not developing in hazard areas (with close to 50-percent disagreeing or strongly disagreeing with a compensations approach) while 70-percent of respondents indicated general or strong support for policies that prohibit development in areas subject to natural hazards (with only 13-percent in disagreement).

Figure E-4: Respondent Preferences for Community Risk Reduction Activities

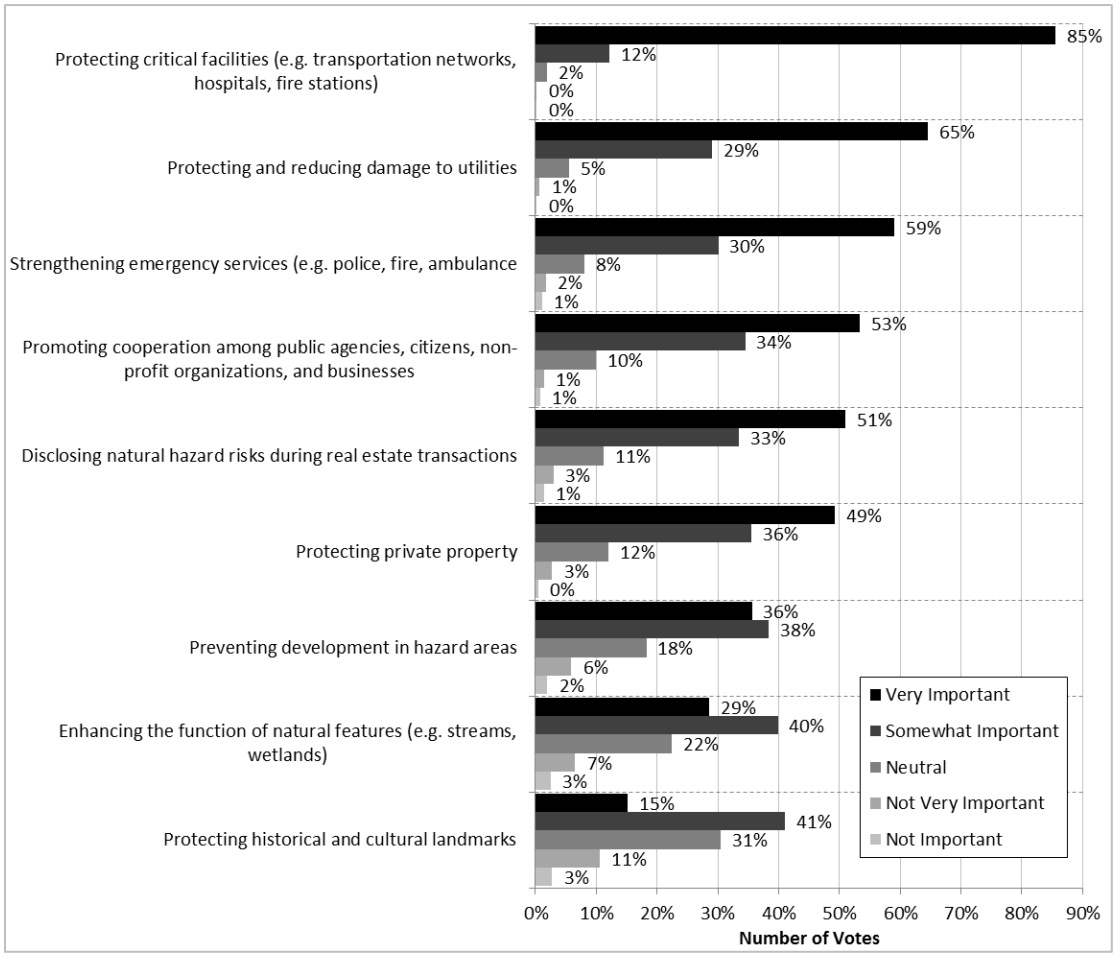


Source: 2011 NHMP Public Opinion Survey

The survey then asked respondents to indicate the level of importance they would place on a number of policies and priorities within their communities. The protection of critical facilities (e.g. transportation networks, hospitals, fire stations) received the strongest level of support with close to 100-percent of respondents finding it to be important or very important. Similarly, over 90-percent of survey respondents found protecting and reducing damage to utilities to be important or very important, with just under 90-percent who found strengthening emergency services (e.g. police, fire, ambulance) to be worthy of the same designation.

Roughly 50-percent of survey respondents felt that protecting private property and disclosing natural hazard risks during real estate transactions was important, as was promoting cooperation among public agencies, citizens, non-profit organizations, and businesses. Protecting historical and cultural landmarks was the lowest priority for survey respondents, followed by enhancing the function of natural features (e.g. streams, wetlands), and preventing development in hazard areas. Figure E-5 summarizes the results for priorities regarding planning for natural hazards in the region.

Figure E-5: Respondent Natural Hazard Planning Priorities



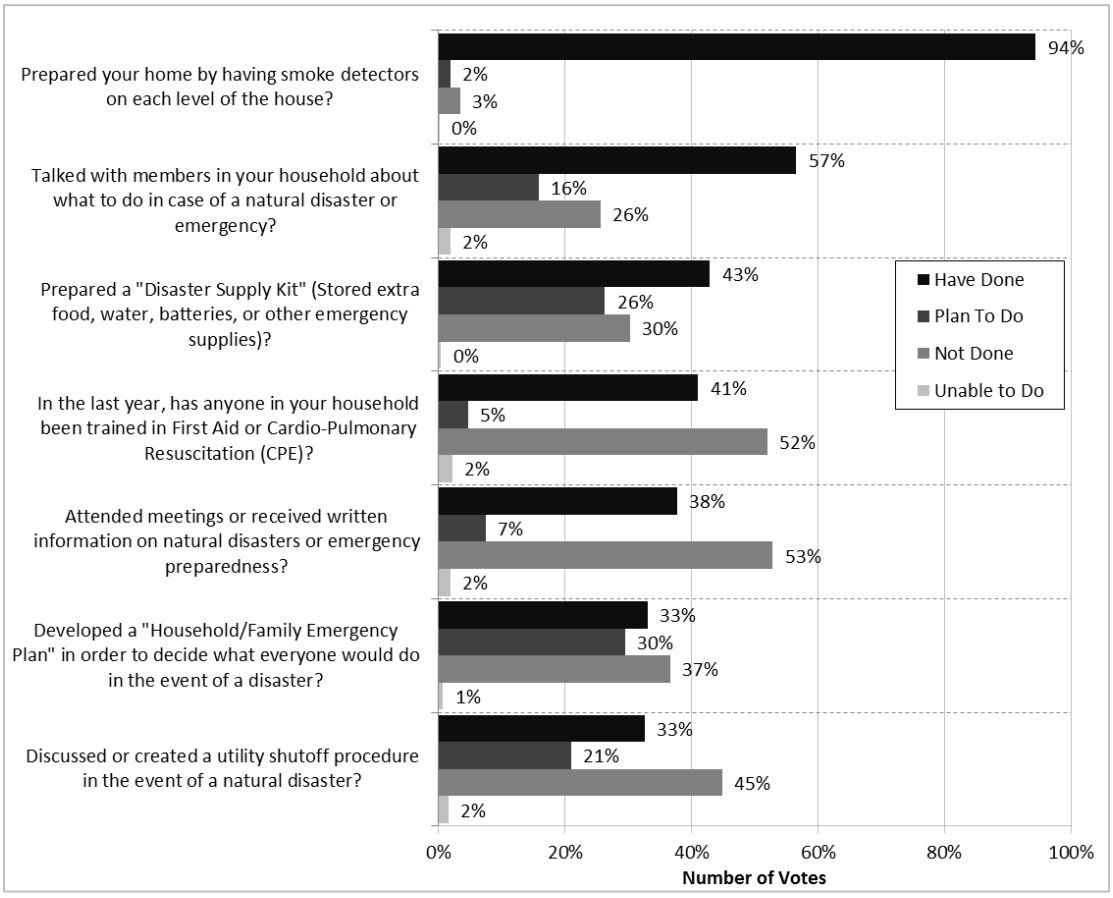
Source: 2011 NHMP Public Opinion Survey

Mitigation and Preparedness Activities in your Household

This section provides an overview of household level natural hazard mitigation and preparedness activities in the Mid-Columbia region.

Over 56-percent percent of respondents claimed to have talked with members of their households about what to do in the case of a natural disaster or emergency. In addition, 43-percent had prepared a "Disaster Supply Kit" which entails storing extra food, water, and other emergency supplies, while 41-percent were trained in first aid or CPR during the past year. Nearly 95-percent of respondents had placed smoke detectors on every level of the home while more than a third of respondents claimed to have attended meetings or received information on natural disasters or emergency preparedness, developed a "Household/Family Emergency Plan," and/or discussed/created a utility shutoff procedure in the event of a natural disaster. Figure E-5 summarizes all of the activities that respondents indicated they have done, plan to do, have not done, or were unable to do to prepare for natural disasters.

Figure E-5: Activities that Respondents Have Done, Plan to Do, Have Not Done, or are Unable to Do



Source: 2011 NHMP Public Opinion Survey

General Household Information

Demographic questions provide a statistical overview of the characteristics of the respondents. This section asked respondents about their age and gender, level of education, median income, race, ethnicity, and length of residence in the state of Oregon.

Age and Gender

Table E-9 shows the age range of survey respondents. The median age of survey respondents was 55-64 years old.

Table E-9: Age of Survey Respondents

Age	Percent	Number
<19	1%	5
20-24	2%	18
25-29	2%	19
30-34	3%	23
35-39	5%	43
40-44	6%	56
45-49	7%	65
50-54	12%	111
55-59	14%	127
60-64	15%	141
65-69	13%	121
70-74	8%	69
75-79	5%	47
80+	8%	73
Q-14 total	100%	918

Source: 2011 NHMP Public Opinion Survey

Table E-10 displays the gender of survey respondents, where women accounted for 54-percent of the sample.

Table E-10: Gender of Survey Respondents

Gender	Percent	Number
Female	46%	428
Male	54%	502
Q-15 total	100%	930

Source: 2011 NHMP Public Opinion Survey

Level of Education

In general, survey respondents were evenly distributed in terms of levels of education. About 16-percent of survey respondents specified they held a GED or were high school graduates, compared to over 31-percent who specified having attended some college or trade school. Just fewer than 35-percent of respondents had completed a college degree, while just over 16-percent of respondents had acquired a postgraduate degree.

Table E-11: Level of Education

Answer	Number	Percent
High School Grad/GED	147	16%
Some College/Trade School	291	31%
College degree	323	35%
Postgraduate degree	149	16%
Other	16	2%
Q-16 total	926	100%

Source: 2011 NHMP Public Opinion Survey

Household Income

Just under 22-percent of respondents had household incomes of $30,000 or less, over 32-percent had incomes from $30,000-$60,000, roughly 25-percent had incomes between $60,000-$99,999, while just over 21-percent had incomes of $100,000 or more.

Table E-12: Household Income

Household Income	Percent	Number
Less than $10,000	4%	33
$10,000-$19.999	9%	70
$20,000-$29,999	9%	74
$30,000-$39.999	10%	86
$40,000-$49,999	10%	86
$50,000-$59,999	11%	89
$60,000-$69,999	9%	71
$70,000-$79,999	7%	59
$80,000-$89,999	6%	46
$90,000-$99,999	4%	33
$100,000-$149,999	14%	119
More than $150,000	7%	56
Q-17 total	100%	822

Source: 2011 NHMP Public Opinion Survey

Regional Residency

Table E-13 lists the zip codes reported by survey respondents.

Table E-13: Respondent Zip Code

Answer	Percent	Number	Answer	Percent	Number
96086	0%	1	97063	3%	12
97001	0%	2	97065	3%	12
97002	0%	2	97067	1%	4
97004	0%	2	97068	6%	26
97009	2%	9	97070	2%	8
97013	3%	12	97071	0%	2
97014	2%	8	97081	0%	1
97015	2%	7	97086	1%	4
97017	0%	1	97089	2%	7
97021	3%	12	97140	0%	1
97022	1%	3	97206	1%	3
97023	2%	8	97219	0%	2
97027	1%	5	97222	4%	20
97028	0%	1	97267	6%	28
97029	0%	1	97750	4%	16
97031	22%	99	97756	0%	1
97033	1%	3	97801	7%	32
97034	2%	11	97812	4%	18
97035	3%	13	97813	0%	1
97037	2%	7	97818	1%	5
97038	3%	13	97823	1%	4
97039	4%	18	97830	6%	29
97040	2%	8	97835	0%	1
97041	4%	18	97836	1%	6
97042	0%	1	97838	8%	35
97044	0%	2	97843	0%	1
97045	8%	36	97844	1%	5
97049	1%	3	97862	4%	18
97050	1%	6	97868	0%	2
97051	0%	1	97874	2%	8
97055	2%	11	97875	1%	3
97056	0%	1	97880	0%	1
97058	28%	129	97882	1%	4
97062	0%	2	97886	1%	4
			Q-18 total	100%	456

Source: 2011 NHMP Public Opinion Survey

Of the seven counties the survey was mailed to, the most returned surveys came from residents of Clackamas County (31.8-percent). In Wasco County 201 surveys were returned, followed by 153 in Hood River County, and 122 in Umatilla County. Due to the survey distribution methodology, fewer surveys were distributed to Umatilla County than were to

Clackamas, Wasco or Hood River Counties, otherwise the return rate from the county may have more closely matched that of Clackamas County, which has a more comparable number of residents compared to the other counties in the region.

Table E-14: Percent of Surveys Received Per County

County	Percent	Number
Clackamas County	32%	297
Hood River County	16%	153
Gilliam County	3%	26
Morrow County	3%	25
Sherman County	5%	47
Umatilla County	13%	122
Wasco County	21%	201
Wheeler County	7%	64
Q-19 total	100%	935

Source: 2011 NHMP Public Opinion Survey

Over 80-percent of survey respondents have lived in Oregon for 20 years or more, roughly 10-percent have lived in Oregon for 10-19 years, and nearly 5-percent have for 5-9 years.

Table E-15: Length of Oregon Residency

Answer	Percent	Number
Less than 1 year	1%	5
1-5 years	4%	34
5-9 years	5%	44
10-19 years	10%	97
20 years or more	81%	754
Q-22 total	100%	934

Source: 2011 NHMP Public Opinion Survey

Housing Characteristics

Homeownership is an important variable in education and outreach programs, and knowledge of the percentage of homeowners in a community can help target the programs. Additionally, homeowners might be more willing to invest time and money in making their homes more disaster resistant. Over 87-percent of survey respondents are homeowners.

Table E-16: Home Ownership

Answer	Percent	Number
Rent	13%	119
Own	87%	808
Q-23 total	100%	927

Source: 2011 NHMP Public Opinion Survey

Nearly 79-percent of survey respondents live in single family homes, 12-percent live in manufactured homes, and five-percent in apartments; the other four-percent live in duplexes, condo/townhouses, or some other form of housing.

Table E-17: Housing Type

Answer	Percent	Number
Single-family home	79%	710
Duplex	1%	5
Apartment (3-4 units)	1%	8
Apartment (5 or more units	4%	35
Condo/townhouse	2%	16
Manufactured home	12%	112
Other	2%	18
Q-24 total	100%	904

Source: 2011 NHMP Public Opinion Survey

RACE AND ETHNICITY

Just under 97-percent of survey respondents specified white as their race; of those that replied, only 28 (roughly three-percent) specified a race other than white. Table E-18 presents the results.

Table E-18: Respondent Race

Race	Percent	Number
American Indian or Alaska Native	2%	16
Asian	1%	12
Black or African American	0%	3
Native Hawaiian or Other Pac Islander	0%	1
White	96%	879
Q-20 total	100%	911

Source: 2011 NHMP Public Opinion Survey

With respect to ethnicity, just under two-percent of survey respondents self identified as Hispanic or Latino, whereas US Census figures suggest that the number should be much higher for the region. For example, nearly 15-percent of the population in Wasco County is reported as Hispanic or Latino in origin, compared to nearly 24-percent in Umatilla County.

Table E-19: Respondent Ethnicity

Ethnicity	Percent	Number
Hispanic or Latino	2%	16
Not Hispanic or Latino	98%	826
Q-21 Total	100%	842

Source: 2011 NHMP Public Opinion Survey

Written Responses to Open-Ended Questions

This section includes the transcripts of respondent answers when checking the "other" option provided in some questions. In addition, we've included comments provided by respondents at the end of the survey.

Question 1: During the past five years in the county you currently reside in, have you or someone in your household directly experienced a natural disaster such as an earthquake, severe windstorm, flood, wildfire, or other type of natural disaster? Other:

- Electrical outage
- Excess air pollution related to coal-fired plant and/or coal transported through Wasco County
- Hurricane
- Large fallen trees
- Rainstorm – very heavy
- Solar flares (emergency pulse)
- Unseasonable freeze, crops killed
- Water spout
- Wild animal damage

Question 2: How concerned are you about the following natural disasters affecting your county? Other:

- Airborne pathogens
- Anarchy
- Animal/plant virus infection
- Asteroid annihilation
- Chemical spill
- Combinations of . . .
- Corona mass ejections
- Dam failure (3)
- Dangerous wild animals
- December 21, 2012
- Depression & hunger
- Electrical outage
- Fog
- Government exploding more
- Hail
- Human cause (fallout)
- Ice storm
- Incompetent government @ all levels
- Large fallen trees (2)
- Mt. Ranier erupting
- Nuclear meltdown/war
- One of dams break
- Radiation from Hanford
- Reservoir above us getting damaged & flooding downhill on top of us
- Severe rain storm
- The Dalles dam breaking
- Tornado (2)
- Tsunami
- Tsunami evacuation zone

Question 4: From whom did you last receive information about how to make members of your household and your home safer from natural disasters? Other:

- Books (2)
- Boy Scouts & school projects
- CERT Training through Fire Dept.
- Church (4)
- Coast to Coast - George Nory
- CSEP
- Discover Channel, OPB, History Channel
- Emergency department of some type
- Employer (15)

- Employer CERT team
- Family
- FEMA
- Fire Department (12)
- Fire department distributed "Fire Preparedness" brochure
- Forest service
- Internet (4)
- Internet blogs
- Local health fair, community events
- Magazine
- Myself, I'm a former combat sailor (Panama 89, Desert Shield, Desert Storm)
- Myself, I was in a flood in Ashland that ruined the water & sewage plant
- Never
- None
- Providence Health Fair (hospital)
- Reading
- Safety commission
- School (2)
- Self
- Self-Google search
- Senior center
- Talk radio conservative
- Training
- TV commercials
- TV Outdoor Channel
- Web
- Work on disaster control committee OHSU library

Question 5: Whom would you <u>most trust</u> to provide you with information about how to make your household and home safer from natural disasters? Other:

- Books (3)
- Churches (10)
- Coast to Coast – George Nory
- Common sense
- Community events
- Consumer Reports
- County sheriff
- Department of Forestry
- Depends on what kind of disaster
- Drinking water supply
- Fellow church members
- Fire department (4)
- Fire department/police (2)
- God
- Hospital
- Internet blogs
- Internet research
- Mortgage lender
- Multiple sources preferred
- Law offices
- Local government agencies
- Local police department
- None
- Not the government!
- Personal research/internet
- Police
- Self (3)
- Senior center
- Several sources – best
- Someone who has gone through disaster
- Talk radio conservative
- Utility services

Question 6: What is the <u>most effective</u> way for you to receive information about how to make your household and home safer from natural disasters? Other:

- Churches (9)
- Door-to-door "hangers"
- Fire department/police
- Government

- Internet blogs
- News podcasts
- Newspapers
- Online, institution info
- Online publications/websites
- Read book
- Sheriff's office
- Website

10. Next we would like to know what specific types of community assets are most important to you. *Other*

Rating	Community Asset
1	Active senior center
1	Active volunteer opportunities
1	Agriculture
1	Airports (2)
1	Ambulance
1	Animal shelters
1	Bridges
1	Broadband
1	Children!
2	Chamber of Commerce
1	Child abuse services/facility
1	Churches (12)
1	City maintenance
1	City works
1	Clean air
1	Columbia River (2)
1	Communications (3)
1	Community hall
1	Cultural arts
1	Dams (8)
1	Disaster plan
1	Dog & cat rescue
1	Ecological resources (2)
1	Education
1	Electrical substations
1	Electricity (6)
1	EMS
1	Evacuation routes
1	Family
1	Family farms
1	Farms (4)
1	Fire/ambulance
1	Food supplies/banks (19)
1	Forests
1	Foster care homes
1	Fuel availability (2)
1	Gas (3)
1	Geological study
1	Grain storage & shipping facilities
1	Hardware/lumber stores
1	Health Dept.
1	Highway/street maint. (2)
1	Highways/streets (17)
2	Highways/streets
1	Homes (2)
1	Humans
1	Individual property
1	Internet access (2)
1	Jobs
1	Lake

Rating	Community Asset
1	Laundromat
1	Livestock facilities
2	Library (9)
1	Local Catholic church
1	Local general practice MDs
1	Local medical clinic
2	Local rural veterinarian
2	Meals on Wheels
1	Local shopping
1	Medical clinic (7)
1	Mentally ill facilities
1	Mountains/trees/streams (2)
1	Movie theater
1	My apt.
1	National forest
1	NORCOR
1	Orchards
1	OSU Extension/4-H
1	People
1	Pharmacies (2)
1	Police/sheriff
2	Pool
1	Post Office (3)
1	Power infrastructure
1	Prisons
1	Public transportation (5)
1	Radio/CB
1	Range land
1	Recreation (3)
1	Red Cross (2)
1	River health
1	Scenic view
1	Security/safety (2)
1	Sewer
2	Sewer
1	Sheriff's Dept. (2)
1	Shopping areas
1	Sidewalks
1	Social services
1	Telephone (4)
1	Utilities (11)
1	Walking trails
1	Water sources (12)
1	Water for farming
2	Water supply
1	Water treatment
1	Wilderness areas (2)
2	Wildlife/fish
2	Wildlife
2	Wineries

Question 16: Please indicate your level of education. Other:

- 11th grade (2)
- Associates degree
- Automotive engineering, fire science degree, fire science instructor (retired)
- D.M.D., M.D., Ph.D.
- Dropped out of high school
- Extensive post-grad studies
- Half way through master's program online
- I got to the 9th grade, but did not finish
- JD, UO law school
- Masters in music
- Navy schools
- Nuclear medicine technology
- Post-master certification
- Quit high school to join the army
- Still in high school

Question 24: Do you own or rent your home? Other:

- 3 livable quarters, all separate
- 3,000 ft w/2 story garage
- Apartment (2)
- Apartment in single family home
- Retirement community
- Cracker box
- Farm (3)
- Farm w/outbuildings (2)
- Live with family
- Ranch (3)
- Ranch w/bunkhouses
- House
- Commercial property
- RV
- Travel trailer

Additional Comments

We received the following comments in response to the "Please feel free to provide any additional comments in the space provided" box at the end of the survey.

- You should be aware that I live in an apartment at Willamette View Retirement Community and preparedness is ever present in the general and overall planning in programs and printed word.
- Floods if all Columbia dams burst.
- Thanks for your interest in our community. U of O is positioned to use evidence-based science to evaluate/recommend/prioritize strategies to mitigate the disruptions of likely national disasters. Before acting, most citizens must be energized to prepare based upon credible & direct advice.
- Churches and schools are important for 1) comfort, 2) familiarity, 3) size for housing large groups, 4) willingness to be open for the public. I saw nothing suggesting the importance of churches.
- I thank God for your efforts to make us safe.
- 1) It would be very useful to discover locations of local community buildings that would provide emergency provisions. 2) Taking a quick seminar regarding emergency things-to-know.
- Income info should have NO effect on any questionnaire – there are stupid wealthy people and other very intelligent poor people, i.e. example – people running for elected offices – there sure are some "real sinners" out there!
- I feel there needs to be help for land owners to clear brush to prepare for wildfire in areas, also as land owners.
- The big earthquake is coming. Oregon must be ready.
- Building codes are too easy-going knowing that the sub-Cascadia fault line is waiting to happen. In other words, the prescriptive path for building is too lenient.
- My answers are based on the fact that I live in a disaster-free area, mostly.
- Due to my health and age I live in an assisted living facility.
- I neither trust nor rely on government for anything. I have ZERO confidence in the propaganda machine that is our current print and broadcast media. I trust only myself and my family. We will survive.
- I would not support any proposals for tax increases!
- Biggest threat is a major earthquake affecting the entire Pacific Northwest region. Public seems unaware of this threat from Cascadia Subduction Zone.
- I feel wildfire is by far the most problem in the Eastern Oregon area. Now that Ordnance is almost closed I would like to see "Oregon Emergency Management" set up to build fire guards now. It would put lots of people to work and we sure do need that and next summer is too late to start building them. We had lots of cleared areas many years ago. Now railroad and wheat farmers buy insurance and don't have fire guards.
- As I and my family only moved to Oregon in January 2008 from the U.K. I am still not familiar with many of the situations referred to in this survey. I am sorry I cannot be more helpful.
- As a geologist in OR & WA, earthquakes are the biggest concern facing our area in the near future. Our infrastructure and non-reinforced structures will not withstand even a moderate subduction zone quake. Geologic history has shown repeated 9+ magnitude earthquakes, most recently in the 1600s. Government will cease to function without our

bridges and roads. Serious effort needs to be dedicated to identifying vulnerable features and buildings.

- I applaud your efforts to improve and comply with disaster preparedness and its requirements.
- I own an adult foster home. I have emergency preparedness plan, maps, supplies, food, water, info on every single person in my home, and phone numbers of contacts in case of emergency. I and my staff are as prepared as anyone can be. A lot of survival depends on how quick you are at making decisions and right decisions under pressure. So have plans, practice procedures, and if it happens hopefully everyone reacts correctly based on practice.
- I lost faith in FEMA after Hurricane Katrina and in info given by top government officials ("duct tape"). But I think the government (Fed and local) should show leadership in these areas. Partnership with university may help with credibility. I also don't trust the media to report it accurately enough. These days they often seem to oversimplify or over-sentimentalize.
- Don't want to see implementation of disaster plans as reason to hire more government employees.
- Should ask type of social economic data for people 1) Do they work? 2) Do they work for a) emergency service, 2) critical infrastructure, 3) government, 4) disaster mitigation group, 5) school. 3) Do they have children? 4) Is there anyone in the household with disabilities? This will allow for more detailed trenching & more focus on community efforts.
- Due to cutbacks I'm not too confident Umatilla County can provide any realistic disaster plan or relief. Ensuring electrical utility service/restoration is most critical for disaster recovery in my area.
- Hope the time, effort, and expense of this survey results in information that will be used to plan for dealing with natural disasters. If not, this survey is a waste of time and expense.
- We have no school, hospital, or elder care facilities. Our daycare facilities are important. We have pre-school but no permanent site. Also, we did (5 to 6 years ago) have a county-wide power outage and I called everywhere to find fuel for stranded motorists – the only gas station in Sherman County that can still pump gas is the station (Texaco @ the time) at the east end of Rufus! Shaniko in Wasco County could not pump gas either. My husband is an EMT/firefighter and regional safety officer for ODOT. He will respond (either as ODOT or a volunteer) in the event of a natural disaster and I and extended family will do as he says if he's able to communicate with me. More planning and preparedness would be good though so I know exactly what to do, how to do it, and when to do it! Thank you for your survey!
- It's hard to relate to any natural disasters in our area as we've never had any real ones in my 80 years except strong winter storms. Our town is on a hill so is pretty immune to these.
- Thanks for doing this. My best to all in 2012.
- We would be interested in a disaster training – not via video or internet – from a line person.
- Several years ago I was involved in a severe dust storm traveling on I-84. In this dust storm a number of people were killed in highway accidents. It was really terrible. Since this time, not much, if anything, has been done to mitigate or regulate the high levels of

agricultural tillage adjacent to the interstate highway. I would suspect that the agricultural operators along this highway receive significant federal subsidies. Why not regulate this?

- I never had understood why people develop in possible high risk areas such as on rivers or bluffs, and expect someone else to pay for loss. I am not for regulatory action or policies to prohibit owners from doing what they want, however, I do believe people should be responsible for their actions.
- FEMA is bungling and incompetent at best and looks like a criminal dirty tricks outfit. Not only did they fail @ New Orleans, they attacked people who did help. Recommend disbanding of FEMA, prosecute FEMA. They have much to answer for and have done no good. The kind of emergency they want is to attack people and put them in slave labor camps.
- I would like to recommend that at least once a year the counties should do a Practice run just in case there is a natural disaster. That way people won't freak out and cause more problems if a disaster happens.
- Concern for seniors who retire in rural places. How will their residence be identified for providing assistance in a major disaster? The question applies to handicapped as well.
- My family has had some unhappy experiences with FEMA. A bridge over a creek built by the owners for approximately $1,200 was flooded and when they tried to borrow money to rebuild were told that they must have an engineer fly over inspection, etc. to the tune of approximately $10,000 in order to get a loan. Even though this was not a grant but a payable loan. Needless to say, they did not use FEMA loan and found it a big joke that FEMA was there to help in emergencies!
- Education on preparedness is essential (widespread). Community preparedness is key – community involvement, truth about regional hazards would help people to prepare. Government cannot be relied on for truth. Media cannot be relied on for truth. Possibly very proactive community education workshops through fire, police, schools for the entire area. Some people's emergency preparedness = a gun → they just take what they need by force instead of stocking up.
- We experience wildfires or a threat of one nearly every year. Our volunteer fire departments are a great comfort. They respond immediately and perform with unbelievable expertise.
- 1) We need more local first aid classes. 2) Posting notices in our Post Offices is a good way to communicate. 3) All of our local utilities need to be more involved in educating for disasters.
- Fuel (*e.g. dead wood) for wildfires in the forests is one of the main hazards in our area.
- We live in a remote area, in a canyon, crossing creeks, accessible from one direction only. We are extremely concerned about wildfire & flood due to our lack of accessibility. We have been instructed by a fire department visit how to make our area more fire safe.
- An earthquake near Spray would isolate (100-percent) the town from outside help or leaving for any reason. Surrounded by a lot of rock rims. One way in would be air!
- Good info, needs to be done. Good survey!
- Encouraging employers to train employees would be another outlet for learning. My employer, Mid Col Center for Living, has taken an upfront, prepared, and involved approach to emergency and/or disaster awareness. I think all employers should do the

same. I have taken my training home & shared w/my family & friends it is comforting to know we are prepared.

- The time taken for a federal agency to act/react places much undue strain on those most affected. The recent Nehalam flooding and the FEMA antics were an embarrassment to the citizens of Vernonia & surrounding area.
- About 7-8 years ago I attended a Red Cross Preparedness meeting to deal with the possibility of a chemical depot leak and its effects on the populace. Fortunately, we never had to find out how the plan worked!
- Fish & wildlife don't allow streams to be cleared to avoid flooding. Fish seem to be more important than people or property to them!! Not a good way to be.
- I live in a home for the elderly, about 100 people. I answered the questions about where I live.
- Some of the answers I gave are because I don't trust the people who would ultimately make the decisions – especially environmentalists. I think some are not in the majority of our population to realize the basic needs. In other words, they go overboard and only have their opinion. Thank you.
- Organize acts, curb disobedience. Could result in serious consequences & would refute an organized response.
- Wildfire, wind, & ice storms are our biggest concern here. Maintaining the farming lifestyle is more important than preserving buildings. Saving farms leads to continued support of the community as farms continue to generate income.
- Education is much stronger than regulation because you can achieve voluntary action; nobody has resources to enforce regulations after they are written.
- I am very concerned about the long-term detrimental effects of extensive pesticide use in this area on the many orchards here and the cross-contamination with the drinking water, both municipal and even individual wells that are privately owned. I see what appears to be a statistically larger developmentally challenged population here and wonder if there is a connection to the extensive pesticide use and water runoff.
- Resources need to be developed, determined, and maintained by local neighborhoods and communities because in the event of a large disaster outside resources will more than likely be strapped or not available.
- I have worked in hospitals in nuclear medicine, s-ray, and radiation therapy for 38 years. Have been involved in nuclear medicine disaster preparedness in Arkansas and Oregon and gone through training for dirty bomb response. Worked at Mid-Columbia Medical Center in The Dalles, Oregon, for 22½ years.
- Thanks to those of you who are devoted to smart safety strategies. We do what we can, also.
- I feel that the emphasis should be on individual preparedness. Too many people feel that the government should & will be at their doorstep in an emergency. I feel that the information should be aimed at citizens.
- 1) Need community information as to where to assemble in a disaster. 2) Need education as to how to prepare as a public employee to help others. 3) Is a staging area in place for children and animals?
- Homeowners/buyers should be aware of potential risk, but government should not ensure again (e.g. flood) it.
- Our county/city has never held a meeting to inform the public of any disaster plan. I don't even know where they have emergency shelter or supplies.

- Utilities, utilities, utilities.
- Thanks for the opportunity to participate in your survey.
- We do not have a hospital in our county. Roads and bridges are very important to reach a hospital if Air Link cannot fly. The John Day River floods often.
- We live in a secure community & have very few natural disasters and Mexicans help me out a lot!!
- With global climate change and natural disasters increasing in frequency and severity it is a good thing that you are undertaking this work! I became particularly frustrated while trying to honestly complete this survey, especially Questions 11 and 12 and almost threw it in the trash. Why? Lack of definitions, examples, explanations, implications of answers, etc. Some of the questions seemed to me could only be validly answered by someone fairly well versed in land use planning, disaster planning, and management. Please understand that I find almost all surveys of any type frustrating and I throw them away, however, I believe in what you are doing, so I am taking the time to offer my comments. The survey would probably have gotten a better feeling for citizen attitudes, ideas, and priorities and thus more accurate and meaningful results if there had been some type of **introductory "white paper"** document discussing the hazards and explaining the current principles of natural hazard mitigation and providing some of the information mentioned below. Q1: Minimizes the import by framing it only in the personal context – "…have you or someone in your household directly experienced…" The questions should have started with "Which natural disasters have your county experienced in the last 4 years?" Q6: The "Other methods" seemed to actually be sources of the information, not ways of receiving information. Q11: "… regulatory approach to reducing rick, "…non-regulatory approaches." Examples of regulations that might be used and examples of non-regulatory approaches would be helpful to know. "support policies to prohibit development in areas subject to natural hazards." Private property? Public lands? Examples of such policies. Use of local tax dollars to reduce risks and losses from natural disasters – examples. Steps to safeguard the local economy following a disaster – examples. Q12: Protecting private property? By whom? How? Who pays? I cannot accurately answer this question without knowing the context. In a "white paper," ODF's wildfire impact/protection self-certification program for Forestland-Urban Interface Lots would be a great example. What does "enhancing the function of natural features" mean? Q11 and 12: Disclosure of natural hazard risks during real estate transactions – Who is to be the official body to make these risk determinations including the probabilities of such occurrences? Will insurance companies be able to use this information to "cherry pick" clients offering to insure some clients/properties, both public and private, and not others?
- We believe successful disaster management depends on people working together in specific local neighborhood groups rather than depending on community-wide response by EMS. Help with organizing these groups on a community-wide scale is necessary.
- Thank you for bringing this to our attention. It lets us know what we need to be thinking about doing to prepare for a disaster.
- I received far more disaster info (i.e. hurricane) the few years I lived in Florida than I have ever received while living in Oregon.
- We have spent about $30,000 in the last two decades to flood-proof our residence. Our neighbors have paid/constructed similar amounts to control flood/debris flow problems!

- Because the questions were pretty general there was a need of more specific information (Q11). The survey was a good vehicle to have a discussion with our children and grandchildren. We did the survey at a family dinner.
- I do understand that government needs to be involved in mitigating/preventing natural disasters, but I also believe citizens and landowners have the same responsibility. I don't believe tax dollars should be used to pay landowners when they buy property and it has potential disaster areas, i.e. building a house on an ocean beach.
- We live near the Columbia River and experience windstorms frequently throughout the year. More information about "severe windstorms" would be beneficial.
- There are several homes and properties not occupied or bank-owned in the area. This is a hazard as well since they're not being maintained or kept up. These can be disasters waiting to happen. It's frustrating when the bank won't sell until prices are up.
- Wheeler County has a population of around 1200 – no radio, no newspaper! We have no way to communicate with residents in small communities that are 75 to 90 miles apart. Our officials are elderly and for the most part uneducated or unwilling to act on behalf of citizens. The best thing the U of O could do is provide us with a way to communicate. Cell towers, cable, radio stations, etc are all needed.
- I think people who live in cities are more likely to be unprepared. There is an assumption that the state, FEMA, or National Guard can take care of them. If the disaster is widespread this is not true. When a widespread disaster strikes, people have to rely upon themselves and assist others as possible. I've lived on a farm and in cities. Farm people know their neighbors. I believe community building and outreach are important aspects that are missing, especially in areas of population density. If a large disaster strikes Facebook & Twitter could go down – even if it doesn't it does not substitute for knowing one's immediate neighbors. We insulate ourselves – from neighbors and extreme possibilities.
- Both have had first aid training. One had CPR training, many hours of fire fighting. We have landscaped our property protecting in case of flooding.
- In the future you should define the "use of a regulatory approach." I don't think many "civilians" are familiar with the jargon. Jargon should be avoided when at all possible in public surveys.
- I feel people should be able to build where they want. However, if they choose to build in a natural disaster prone area and the natural disaster occurs, tax @ shouldn't go to help them. They knew!
- Small towns such as Pendleton are home to many intelligent, flexible, and self-sufficient people who I am confident, once they learn to communicate better, will make the changes necessary to weather any storm.
- Would be very excited to attend informational meetings on this subject. We as a family are not prepared for a disaster. This makes you think about the issue.
- RE: #20 & 21. Hispanic is no more white than Indian. Why isn't there a race for Hispanic? Just saying!
- In the event of a national disaster information on preparing for pets would also be appreciated.
- I want to thank all who are working with this organization. This survey has brought awareness to me and everyone around me that I have talked to about this matter. Thank you.

- As a small business owner I already filled out three sets of reports each year to BATF, Oregon Fire Marshall, and Fed DOT. Also pay $700-800 to file reports. Don't need any more paperwork to fill out or fees to pay.
- The Sheriff's Department employees do not understand or know local ordinances. Planning Commissions do not support environmental issues. All departments refuse to comply with ORS 192 preventing citizens from access to information.
- My husband and I took the time to fill out this questionnaire because we've been concerned about what would happen if we were to have a natural disaster occur in The Dalles-Hood River, Oregon area. To the best of our knowledge the two most devastating disasters that could occur in this area would be an earthquake and Mt. Hood could erupt. With the major fault line that we have in this area, along with the chance of Mt. Hood could erupt, we truly feel that the residents in this area have not been prepared properly for either of those disasters. If either of these were to occur, the entire area on both sides of the river would basically be shut off from the rest of the state on both sides of the Columbia River. We have been extremely fortunate for many years not to have incurred a disaster, but our day is coming. We truly feel that this area needs to be educated on what to do and where to go sometime in the near future, before it's too late.
- Mostly I'm concerned with wildfire. We have two homes, paid for. One is in the urban interface in Washington State. I keep my property clear of brush and downed trees, but it is only a matter of time until the west burns given all the bug kill.
- Earthquake is my biggest feat of property damage and possible loss of live.
- Thanks for asking! Good luck with your results.
- No mention of housing & feeding of victims. Don't wait for FEMA.
- See "Oregon At Risk" from OSSPAC.
- In future surveys, either allow "mixed" for race and ethnicity, or don't ask. It makes a mixed-ethnicity person like me have to choose one parentage over another. As for race, in addition to inter-'racial' marriage, there is no biological/scientific basis for the term. Also, this should be literacy-adjusted. Many of the words would stump many people. This is a very high-literacy level survey. Is this being made available in Spanish?
- Oregon residents who are not accustomed to earthquakes really need to be educated. News media needs to stop acting like they want a serious natural disaster to occur in Oregon. Education needed for everyone if there is a big earthquake on the Cascadia Subduction Zone.
- This is a wonderful idea. I look forward to receiving info on how to plan for disasters.
- 1) Every household needs to know the current route of evacuation! Need to teach this in the schools. 2) Need fire extinguishers or garden hoses ready to go in case of indoor/outdoor fires (burn barrel ban!). 3) Our hazard in Maupin is the railroad & tanks that haul chemicals. The general public <u>has not</u> been informed of any siren system & evacuation route.
- I live in a three-story apartment building built in the late 60s. If there is an earthquake it will all come down and I am on the bottom level. Also, I lived through Hurricane Andrew in Florida so I know exactly what preparedness can do.
- I'm worried about unsafe trees falling on our house.
- 1) I believe we have two major threats – windstorms, resulting in downed trees, damaged buildings, etc. This can happen any year. It should be a foundation from which

to build disaster preparedness. 2) The other threat is earthquake. When it finally does hit, it might be ugly – if we are practiced at one we will be better prepared for two.

- Police, fire, medical very important for us all. Thanks. Our gorge is most beautiful and loved by all. Recycling, peace, and harmony for all hopefully. Thanks.
- Sheriff's offices were not listed. While similar, they perform a more demanding service in rural counties than police. In Wasco County they cover almost 3,000 miles as opposed to less than 10. They have responsibility for search and rescue, marine, forest, animal control functions, and jails in addition to law enforcement duties, all of which are critical in emergencies.
- I think people in rural areas are generally more prepared because they experience power outages (along with water loss) more often and have become more self-reliant. I don't want a nanny state! We don't need government doing more things for us. We need government doing less things to us.
- We do not trust FEMA for anything!
- For me, as a senior citizen, it would be helpful to get a brief written summary of what I should do in my area of town for listed emergencies. Evacuating is not an easily accomplished option for many of us as senior citizens. Would buses (school?) be a possibility? Pets?
- Have lived in earthquake-prone areas. Also high wind areas. Always have disaster kit at ready.
- I believe in less government regulation and I do not think there is tax money available to pay for some of the things implied here. Our county is almost broke and so is our state & federal government. People need to take more care of themselves and not depend on the government to do so.
- We are very concerned about wildfires in our area. We are surrounded by wooded acreage with a large electrical line and a natural gas line to the east of our property.
- This county couldn't help anyone. They argue over everything. The government is in the way to progress. Red tape, no jobs, only stoppage from government. We had a diabetic visit who forgot their needles – no one had any available. Clinics or ambulance said it was not their job. In a disaster? Laughing out loud. You better look out for yourself if you visit here. Sheriff is 1 hour away. Better be packing a gun. Robbers get away with no consequences.
- I'm in a small town in Wheeler County. The need I see is how to care for these people in a natural disaster. In the rest of the state supplies of food would stop & they would come to this area. I think there should be stockpiles in each community.
- 1) Give homeowners more freedom to cut down very large trees near or around home, property, roads, infrastructures, etc. that they believe will cause major damage to these areas if trees should fall down from storms and/or natural or war acts. Permits and/or city requirements are to regulatory and leave dangerous trees in place. So please stop permits and regulations. We need to get these trees under control and away from private and public structures. 2) Every two to three days police, fire, and ambulance come down Hwy 43 in West Linn, Lake Oswego, etc. blaring their sirens. Could we have them train on highways outside city limits with sirens, and train in Hwy 43 with sirens off or maybe just once a month with them on. We don't know if it is something serious that they are going to or just training. This is also causing major noise pollution and disturbance during sleep hours with animals barking and we won't know when it is for real or not when something major happens such as disasters. Thank you so much.

- Might be a good idea to address special needs of rural landowners. These people have animals, livestock, and other features that may present unique circumstances in an emergency. Utilities are the primary asset I rely on, especially electricity which is important for heat, refrigeration, & well water. Earthquake or volcanic eruption is two major disasters I am concerned about that will have a major effect on Clackamas County. Special info, training, information, and survival kits would be valuable. Thanks for this opportunity!
- It is up to the owners of property to take care of themselves and their property, not the government. Neighbors and friends will take care of each other.
- As a survivor of an F-5 tornado in 1974 and then a blizzard in 1978 I strongly believe in disaster preparedness and possibly emergency exercises involving as many agencies as possible such as what Gary Brown did for Sioux City, Iowa, in 1989. They had an awesome response from police, fire, National Guard, volunteers, etc. resulting in lives saved after the crash of United 232. It would be great to have that kind of team ready to respond to any natural disaster!
- I don't know where to find the information needed to do the things listed in the household preparedness section.
- Community meetings are always on Saturday and I work. Evenings would be better.
- Stop spending money on light rail and use it to fortify road and utility infrastructure.
- Newspapers could print stories/maps, etc. occasionally to help inform the public of regular procedures, possible problems, escape routes, and who would be first responders to different types of events. So at least the public would have a "rough" idea in place.
- One area of disaster mitigation could be the promotion of PVSolar to offer a backup plan for electrical power should our utility grid breakdown.
- There needs to be more workshops or disaster meetings.
- The Native American, disregarding spiritual beliefs & customs, has more common sense than any other race/ethnicity. The Native American has always respected, preserved, and taken care of the land. They (American/Native Indian) take only what they need and preserve/protect what they don't need. The Native American is the best EPA ever. PUT THEM IN CHARGE OF ECOLOGY. They (Native Americans) don't rape the landscape. ASK THEM!!! Also, we need less, not more, federal government.
- We have very few instances of natural disasters. The worst have been freezing & destroying fruit trees and some destruction from high winds and dust.
- In Wasco County not enough information goes out to the public about preparedness programs. Can public access online a copy of programs?
- We had a large tree limb fall on cars and insurance wouldn't pay for anything because they say it was a natural disaster. And there was a flood once because the dam was full and the man who opened the gates of the dam was gone. Do you consider this a natural disaster or negligence?
- We have chemical facilities here with ammonia and weed & bug killers (all poisons) – most in large tanks. A disaster could trigger a second disaster. These tanks are located on the edge of town at a higher elevation than 98-percent of the town. The natural drainage would be into the town proper.
- I am a Red Cross volunteer and trainer.
- Brochure mailings explaining utility shutoff, emergency kit contents, quantity of food (days) to have on hand, good places for family members to meet if separated & why,

other issues regularly associated but not thought about during/concerning natural disasters. Have community information meetings made up of community citizens. If any of these exist make them more accessible/known about to community citizens. Thank you!

- In Wamic we are only concerned about flood because we are not allowed to clear the stream bed of three mile creek above and below town. We flood because the creek is forced to spread out because of overgrowth in the creek. The creek is dry for part of the year, yet we are not allowed to clean the creek. We flood only because of politics and nothing natural.
- Good idea – thank you for asking!
- I believe people should be advised on real estate documents if the home they are about to buy is built on an ancient landslide. As consumers we'd have no idea! I am shocked how few people carry earthquake insurance. To me, this is like a ticking time bomb situation like those who didn't insure in Louisiana before Katrina hit. Wish we'd help people understand the real quake danger here!
- This is a great thing to do. As a small community, a natural disaster would devastate our town.
- Thank you!!! Would be interested in the results. Number 9 was a little confusing … human life is most important to me but in our rural area it is not likely to impact people.
- My experience is that my local fire department & U.S. Forest Service office had little/limited info readily available about fire prevention in small acreage residential zones in upland forest ecosystem. This should change with staff and related kits/packets of info easily accessible/no fee.
- Like the concept of personal preparedness for natural disasters, etc. Personal responsibility and gathering of info, etc. Don't totally agree with government agencies mandating policies or spending money on things that should be individual responsibility, etc., i.e. government really does things half as good for twice the cost.
- I'm very concerned that our county's grotesquely incompetent "planning" department could be involved in any activities that could affect safety or emergency response.
- Would like to know if there is a community facility where people can go if their homes are damaged (i.e. school gym, etc.).
- We have a wood stove in case electricity goes out. We have also strapped water heaters to walls & reinforced beams to floor joists with gussets. We have thinned out many tr5ee limbs near house but still have more. Attending a meeting and receiving written info on preparedness would be very helpful.

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Appendix F: Vulnerability Analysis Tables

The following section describes the vulnerabilities that face Clackamas County residents. Table F-1 describes the number of potentially impacted areas and infrastructure in relation to each hazard. Table F-1 describes the number of economic locations located in potentially impacted areas. Both tables were developed by the Clackamas County GIS department.

The tables describe vulnerabilities from the following hazards: earthquakes, floods, wildfires, landslides, and volcano. The information illustrated in these tables will help the Hazard Mitigation Advisory Committee and a variety of Clackamas County departments develop mitigation projects that focus on reducing the loss of life and property from natural hazards.

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Table F-1: Vulnerability Analysis for Critical Infrastructure and Facilities

	Hazard Area		Potentially Impacted Parcels				Potentially Impacted Locations			Infrastructure						
Hazard	Acres	% of Total Acres	# of Parcels	% of Total Parcels	Market Value of Parcels	% of Total Market Value	Ctritical Facilities	Essential Facilities	Vulnerable Populations	Miles of Road	Miles of Water Lines	Miles of Sewer Lines	Bridges	Cell Towers	Sub Stations	Dams
County Total	1,205,681	Not Applicable	151,520	Not Applicable	49,776,355,593	Not Applicable	237	52	576	4902	No Data	324	520	17	48	58
Relative Earthquake Hazard																
Moderate	231,111	19%	37,151	25%	11,434,905,204	23%	53	5	143	1001	No Data	59	117	2	12	13
Moderate & High	Not Applicable	Not Applicable	16,404	11%	8,688,761,417	17%	20	9	52	363	No Data	11	171	9	12	21
High	311,767	26%	12,494	8%	4,003,308,909	8%	19	9	48	577	No Data	30	100	1	6	12
Flooding																
100 year Floodplain	23,036	2%	4,615	3%	1,574,157,749	3%	7	1	13	73	No Data	17	90	0	6	4
100 & 500 year Floodplain	Not Applicable	Not Applicable	4,173	3%	2,871,603,022	6%	0	3	4	26	No Data	4	96	0	4	3
500 year Floodplain	4,591	<1%	2,071	1%	684,363,136	1%	0	1	6	54	No Data	4	10	0	2	1
Overall Wildfire Risk																
Moderate	715,865	59%	47,711	31%	17,597,341,187	35%	82	18	139	2055	No Data	81	275	5	25	33
Moderate & High	Not Applicable	Not Applicable	1,383	1%	736,836,278	1%	1	0	3	239	No Data	1	37	4	6	7
High	179,535	15%	204	< 1%	53,862,429	<1%	0	0	2	239	No Data	1	1	4	2	0
Landslide Hazard																
Moderate	163,929	14%	12,458	8%	4,830,117,428	10%	3	2	38	466	No Data	16	87	1	6	18
Moderate & High	Not Applicable	Not Applicable	11,993	8%	5,244,927,899	11%	4	8	16	385	No Data	6	108	9	9	18
High	213,007	18%	197	<1%	102,779,561	<1%	1	0	0	44	No Data	1	0	0	0	0
Volcano																
Exposed	100,897	8%	7,634	5%	1,406,788,533	3%	7	2	2	273	No Data	21	55	1	4	1

Source: Clackamas County GIS

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Table F-2: Vulnerability Analysis for Economic Locations

	Economic Locations								
Hazard	Prof. Business Services	Wholesale Trade	Health Care	High Tech	Manufacturing	Transport. & Distribution	Food & Bev. Processing	Nurseries & Greenhouses	Ag. & Food Production
County Total	2526	1167	713	92	257	178	55	142	276
Relative Earthquake Hazard									
Moderate	690	274	209	20	31	30	8	12	37
Moderate & High	476	165	121	19	28	16	7	4	22
High	218	118	65	5	26	23	10	9	16
Flooding									
100 year Floodplain	53	25	11	1	13	5	0	2	3
100 & 500 year Floodplain	130	48	19	0	11	10	4	4	9
500 year Floodplain	52	28	9	3	4	3	1	2	3
Overall Wildfire Risk									
Moderate	824	304	221	23	61	50	19	34	63
Moderate & High	15	5	4	0	0	1	0	0	0
High	1	1	0	0	0	0	0	0	0
Landslide Hazard									
Moderate	247	89	51	7	15	15	5	8	22
Moderate & High	168	59	23	1	11	8	1	2	12
High	2	0	3	0	0	0	0	0	0
Volcano									
Exposed	16	9	4	0	0	3	0	1	4

Source: Clackamas County GIS

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Appendix G: Grant Programs

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 FY11 Hazard Mitigation Assistance Unified Guidance, available at, available at : https://www.fema.gov/library/viewRecord.do?id=4225

For Oregon 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- in come 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-HCFPGrants.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/

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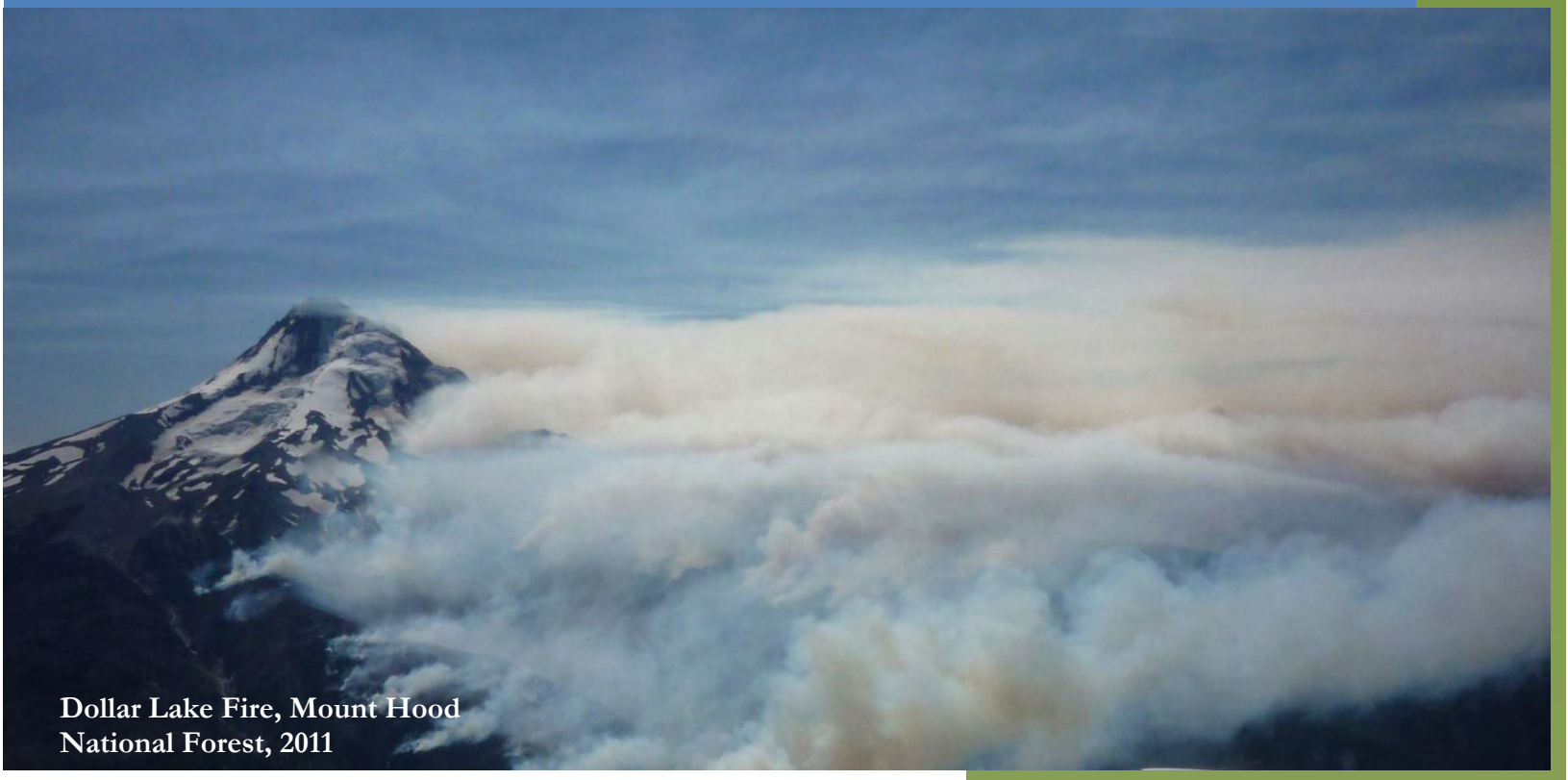
2012

Clackamas County
Community Wildfire Protection Plan

Update to the 2005 Edition

Are You Prepared?



Dollar Lake Fire, Mount Hood National Forest, 2011

CLACKAMAS COUNTY

Prepared in coordination with
Oregon Department of Forestry
August, 2012

Table of Contents

EXECUTIVE SUMMARY

Recent fires in Oregon and across the western United States have increased public awareness of the potential losses to life, property, and natural and cultural resources. In June of 2004, the Board of Clackamas County Commissioners (BCC) directed the County Departments to work with state and federal agencies, fire agencies, and community organizations to develop an integrated Community Wildfire Protection Plan. The BCC adopted this plan in 2005 in a commitment to reduce wildfire risk to citizens, the environment, and quality of life within Clackamas County. This 2012 Update was adopted in 2012 to ensure that the CCWPP remain an up-to-date and relevant document.

CCWPP Mission Statement

The mission of the Clackamas County Community Wildfire Protection Plan (CCWPP) is to provide a consolidated reference documenting wildfire hazards, prevention and response efforts, and resource-sharing information for all participating local, state, and federal fire agencies. The CCWPP improves upon historical fire planning efforts by providing a more localized and accurate approach for determining wildfire hazards and implementing best practices for wildfire protection in balance with sustainable ecological management and economic activities throughout Clackamas County.

2005-2012 CCWPP Accomplishments & Action Plan

The 2005 CWPP included an action plan to address the following focus areas: Risk Assessment, Fuels Reduction & Biomass Utilization, Emergency Operations, Education & Outreach and Structural Ignitability. The CCWPP Action Plan has been updated and revised to ensure that actions are clear, implementable and relevant (Table 1-1. 2012 CCWPP Action Plan).

The CCWPP enabled CCWPP partner agencies to be more competitive for grant funds to build capacity for implementing projects. These accomplishments are illustrated in Table 1-2. CCWPP Grant-Funded Projects 2005-2012. The total grant-funded accomplishments are as follows:

- Fuels Reduction: $1,710,968
- Education/Outreach: $982,013
- **Total Funding Generated from the CCWPP: $2.5 Million**

Fire District Coordination

The 2012 CWPP Update focused on taking a more localized approach to wildfire planning by creating individual CWPP's for each fire agency. *Chapter 10: Fire Agencies* has been expanded to include a brief description of wildfire hazards, emergency operations, structural ignitability, community outreach and education and fuels reduction priorities for each local fire agency. Local Communities at Risk were also identified. Each local CWPP is complete with an action plan to address wildfire issues specific to the community.

CCWPP Planning Process

A Wildfire Planning Executive Committee (WFPEC) guided the development of the CCWPP, identifying the primary issues to be addressed and assembling technical subcommittees to develop priorities for action. The CCWPP Action Plan includes over fifty actions that can be taken to reduce wildfire hazards and improve response efforts. The following chapters of the CCWPP document the objectives of the CCWPP and highest priority strategies for action:

CCWPP Focus Area	Priority Actions
Wildfire Risk Assessment (Chapter 4)	1.) Maintain and update the Fuels Reduction and Communities at Risk maps and databases. 2.) Continue to track structural vulnerability data throughout the County through structural triage assessments. 3.) Update the Overall Wildfire Risk Assessment as new data becomes available.
Hazardous Fuels Reduction and Biomass Utilization (Chapter 5)	1.)Develop and maintain and inventory of potential and successful FR projects by meeting with parks and natural lands managers quarterly. 2.)Continue securing funding to implement projects/ hire seasonal ODF staff. 3.) Coordinate a Fuels Reduction Project Tour.
Emergency Operations (Chapter 6)	1.) Include 12 hour operation period in FDB Fire Mutual Aid Agreement. 2.) Develop an FDB Communications Work Group. 3.) Conduct a Conflagration Exercise.
Education and Community Outreach (Chapter 7)	1.) Develop Firewise toolkit for CAR's. 2.) Create incentives for fuels reduction. 3.) Update and distribute the Burn Permitting and Fire Restrictions Brochure. 4.) Implement a Burn Barrel Program. 5.) Continue to improve address signage throughout the County.
Structural Ignitability Policies and Programs (Chapter 8)	1.) Identify a DTD representative for the WFEPC. 2.) Improve coordination with Rural Fire Agencies. 3.) Integrate WUI into Plan Map and include a public outreach strategy.

Community Involvement

The WFPEC partnered with the North Clackamas Parks and Recreation District Wildfire Management Plan team to engage the public in the 2012 CWPP Update process. A website was established to provide wildfire resources and two neighborhood workshops were conducted to educate the public about wildfire risk and provide an opportunity for citizens to give input on the 2012 CCWPP. The ODF also created the County's first Firewise Communities in Zig Zag Village and Government Camp in the Hoodland Corridor.

Sustaining Fire Plan Efforts

The Wildfire Planning Executive Committee (WFPEC) is responsible for guiding CCWPP implementation and is comprised of representatives from the Clackamas Fire Defense Board, Clackamas County, and public land management agencies. This oversight committee meets quarterly to facilitate a collaborative approach to CCWPP implementation.

CHAPTER 1: INTRODUCTION

The Board of Clackamas County Commissioners (BCC) is concerned with the risk that wildfires pose to citizens and valued forest resources. In May 2004, the BCC directed county departments to facilitate a collaborative community wildfire planning effort including local, state and federal agencies, community organizations, and individuals that have a vested interest in reducing wildfire hazard. The collaborative group identified wildfire risks, developed priorities for project funding, and developed programs to reduce the risk of wildfires to citizens and communities in Clackamas County. The first iteration of the Clackamas CWPP was adopted in 2005.

This 2012 CCWPP Update has been accomplished in accordance with the suggested 5-year update process outlined in Chapter 9: Sustaining Efforts, Monitoring and Evaluation. The update process requires staff and resources, which were made available through a 2011 Title III Grant.

CCWPP Mission, Goals and Objectives

The 2012 CCWPP Mission, Goals and Objectives remain consistent with the 2005 edition.

2005-2012 CCWPP Accomplishments & Action Plan

The 2005 CWPP included an action plan to address the following focus areas: Risk Assessment, Fuels Reduction & Biomass Utilization, Emergency Operations, Education & Outreach and Structural Ignitability. CCWPP Partners have made great progress toward implementing these actions, as shown in Table 1-1. 2012 CCWPP Action Plan. The CCWPP Action Plan has also been updated and revised to ensure that actions are clear, implementable, and relevant.

The CCWPP also enabled CCWPP partner agencies to be more competitive for grant funds to build capacity for implementing projects. These accomplishments are illustrated in Table 1-2. CCWPP Grant-Funded Projects 2005-2012. The total grant-funded accomplishments are as follows:

- Fuels Reduction: $1,710,968
- Education/Outreach: $982,013

Total Funding Generated from the CCWPP: $2.5 Million

2012 CCWPP Major Revisions

Although the 2005 CCWPP was an incredible success, the update process included a critical analysis of its effectiveness and relevance. The primary criticism of the 2005 CWPP was that fire agencies (Map 1. Clackamas Fire Agencies) did not have clear direction on actions to take within their service boundaries to reduce wildfire hazards.

Based on this guidance, the 2012 CWPP Update focused on taking a more localized approach to wildfire planning by creating individual CWPP's for each fire agency *Chapter 10: Clackamas County Fire Agencies* has been expanded to include a brief description of wildfire hazards, emergency operations, structural ignitability, community outreach and education and fuels reduction priorities for each local fire agency. Local Communities at Risk were also identified. Each CWPP is complete with an action plan to address wildfire.

Table 1-1. 2012 CCWPP Action Plan

Action Item	Details	Lead	Partners	Time	Priority	2005 Progress	2012 Progress
Risk Assessment							
1.) Maintain and Update the Fuels Reduction and Communities at Risk Maps and databases.		CC GIS	ODF, WFPEC	Annually	High	NA	New Action 2012
2.) Continue to track structural vulnerability data throughout the County through strucutral triage assessments.	a.) Work with fire districts to utilize the GPS units for obtaining home locations and structural vulnerability data.	Fire Districts, ODF	Fire Co-op	Ongoing	High	Hoodland Fire District is using the GPS units to obtain structural triage and home location data for the summer home area of the Highway 26 corridor. The Fire Co-op is housing a GPS unit that can be used by all partner agencies for collecting structural vulnerability data.	ODF has completed structural triage with home locational data for 10,000 homes in the ODF protection boundary. Hoodland completed 375 home assessments.
	b.) Provide local structural triage data and maps to all fire agencies.	Clackamas GIS	ODF	1 Year	High	NA	New Action 2012
3.) Update the Overall Wildfire Risk Assessment as new data is available.		Clackamas GIS	ODF	Long Term	High	NA	New Action 2012
4.) Utilize GPS technology to get accurate spatial and attribute data (e.g. size, access, water source volume, etc.) for fire suppression resources including.		ODF, USFS, BLM, Fire Districts	GIS	Ongoing	High	No Progress	ODF has GPS locations for all water sources. County GIS has data for some fire districts.
5.) Improve consistency in "wildland" fires ignition data.	a.) Develop a standard for reporting "wildland" and "natural cover" fires, communicate this standard to all fire districts, and promote reporting of fires.	FDB, ODF	ODF, USFS, SFMO	Long Term	Low	No Progress	The SFMO and ODF will need to come into alignment at the state level regarding categories used and consistency in reporting fires.
	b.) Research opportunities to incorporate a records management system into the Computer Aided Dispatch (CAD) system that is compatible with State Fire Marshal (SFM) Form 10 OR insert a line in the CAD database, indicating the SFM code associated with the CAD code for wildland/natural cover fires.	CCEM, SFMO	FDB	2 Year	Low	No Progress	SFMO created an online program for Fire Districts to submit fire ignition data.
6.) Work with local fire districts to develop more detailed risk assessments using local and community-derived data.		Fire Districts, ODF	GIS	Ongoing	Low	No Progress	All county fire agencies identified Communities at Risk and developed localized action plans to address risks. Maps of these areas as well as potential fuels reduction projects were provided to each fire agency.

Action Item	Details	Lead	Partners	Time	Priority	2005 Progress	2012 Progress
Fuels Reduction							
1.) Develop and maintain and inventory of potential and successful FR projects.	a.) Convene the Fuels Reduction Committee quarterly to share information.	ODF	City/County Parks & Metro	Ongoing	High	An initial listing of potential fuels reduction projects has been developed with input from fire districts and community members.	The risk assessment has been successfully used in grant applications to provide justification for fuels reduction projects.
	b.) Query all CWPP Fuels Reduction partners annually to get updates on completed and potential fuels reduction projects.	CCEM, ODF	ODF, Fire Districts, NRCS, USFS, BLM	Annually	High	No Progress	All fire agencies will be submitting priorities for communities at risk fuels reduction projects and an annual progress report will be used to keep this listing current. More coordination between Odf and Fire Districts is needed to identify willing landowners to participate.
	c.) Utilize public outreach meetings to identify willing landowners, high hazard areas, and community priorities in order to develop a prescription.	Fire Co-op, CPO's	ODF	Ongoing	High	No Progress	ODF has made presentations at the CCFFA Tree School, Home Owners Association Meetings, and Community Planning Organization Meetings to gain support for fuels reduction projects.
2.) Obtain funding to implement fuels reduction projects.		ODF,FR Committee,	ODF	Ongoing	High	ODF was awarded a Western State Fire Manager's grant to implement two model fuels reduction projects in '05.	CWPP Partners have received 1.7 million to implement fuels reduction projects on public and private land.
3.) Create an ODF Fuels Reduction Program for cost sharing opportunities designed to decrease the financial burden on the property owner.		ODF,FR Committee	Fire Districts	Ongoing	High	No Progress	ODF has received 4 WSFM grants to support a cost share program. SWCD has a cost share program for invasive species removal/ NRCS has a new forestry component in the EQIP Program.
4.) Develop a "Prescription Team" to implement projects that balance fuels reduction with habitat and ecosystem health and diversify funding sources.	a.) Engage local fire district in project planning and implementation.	ODF,FR Committee	USFS, BLM, Fire Districts, NRCS, CCFFA, OSU Ext.	Ongoing	High	No Progress	Clackamas County Parks is completing a fuels reduction project for park lands that included input from the SWCD, Metro, ODF, and consultants. ODF, the SWCD and NRCS are beginning to collaborate on projects to capitalize on the different expertise and cost share programs offered by these agencies.
	b.) Identify, opportunities for biomass utilization, and potential impacts on the community.						
5.) Develop a process to assist land owners with removing woody debris.	a.) Promote community clean-up days and utilize portable saw mills, chippers, etc. to assist land owners in removing hazardous vegetation.	ODF, Fire Districts	Fire Co-op, CCFFA	Ongoing	High	Government Camp has an annual Community Clean Up event.	Molalla Community Clean Day Spring 2006, 2007; Government Camp and Zig Zag Village Annual Community Clean Up Days
6.) Provide fire agencies and landowners with tools necessary for promoting fuels reduction as a management practice to reduce wildfire hazards and restore ecosystems.	a.) Coordinate a Fuels Reduction Project Tour to educate fire districts and natural resources managers.	ODF, OSU Extension, CCFFA	ODF	1 year	High	No Progress	ODF provides a class at Tree School to educate landowners about fuels reduction and defensible space. A Guide for fire agencies, natural resources managers and landowners is needed.
	b.) Provide landowners with a guide that can provide technical assistance in assessing and reducing wildfire hazards.	ODF,FR Committee	Fire Co-op	2 Years	High		
7.) Research partnership opportunities and strategies for adding value to extracted vegetation, and enhancing economic development.	a.) Develop an inventory of local businesses that use small diameter wood, and chips such as Estacada High School, Tillamook Forest Resources and other companies that want to purchase the fiber/raw materials. Utilize the Specialty Wood Products Website.	ODF, Clackamas County	SWCD, CCFA, OSU Ext.	Ongoing	High	Clackamas SWCD has submitted a Title III grant to identify local inventory and volumes, sort yard feasibility and market analysis and development of a business plan to recruit private investment dollars	A comprehensive Clackamas County Biomass Waste Utilization Economic Opportunity Strategy was completed in 2009.

Action Item	Details	Lead	Partners	Time	Priority	2005 Progress	2012 Progress
Fuels Reduction							
8.) Encourage Stewardship Foresters and Consulting Foresters to integrate fuels reduction into management plans and utilize cost share programs.	a.) Utilize stewardship to assist in being SB 360 compliant.	ODF	ODF	3 Years	High	No Progress (2005)	ODF Stewardship Foresters have begun integrating Fuels reduction and defensible space actions into stewardship management plans.
9.) Work with natural land managers and watershed managers to protect ecosystems and water quality in high risk natural areas and parks.	a.) Develop Bull Run Watershed forest management prescription to address heavy fuel load and high risk fire potential.	ODF, USFS, Portland Water Bureau, Sandy Fire	USFS/Sandy Fire	Ongoing	High	There is an annual meeting on the Bull Run to discuss wildfire prevention and response.	USFS, ODF, Portland Water Bureau and Portland Fire continue to have annual meetings.
	b.) Work with natural resources managers county-wide to improve forest health and resistance to wildfire in projects in critical watershed areas.	ODF	County Parks, City Parks, Metro, USFS, BLM	Ongoing	High	No Progress (2005)	The natural resources managers in the County identified fuels reduction projects in and around critical watershed areas for the 2012 Clackamas CWPP Update.
10.) Develop a map of small woodland owners (forest deferral) to identify potential project areas. Overlay harvest polygons for the past 10-15 years to show actively managed lands and those that may benefit from fuels reduction.		ODF, FR Committee	USFS, BLM, Fire Districts, NRCS, CCFFA, OSU Ext	Ongoing	Medium	Clackamas SWCD has submitted a Title III grant that will allow for consolidation of inventory volume data as well complete any data gaps.	An timber inventory volume analysis for Clackamas County was completed in 2007, but was not at a scale for identifying specific project areas.
11.) Identify opportunities to assist special needs populations in creating defensible space around homes and communities.		ODF	Social Service Agencies	Ongoing	Medium	ODF is currently using a Title III crew to assist in creating defensible space for property owners that are not able to do the work.	ODF is uses the Title III crew to assist in creating defensible space for landowners with special needs.
Completed Fuels Reduction Action Items							
Research opportunities to provide a county-wide sort yard or county-wide woody debris collection site in an effort to add value to the vegetation and enhance economic development.		SWCD, ODF	CCFFA	3 Years	High	No Progress	The Community Sort Yard feasibility analysis was completed in 2007 by Duck Creek Associates. A more comprehensive Biomass Waste Utilization Economic Opportunity Strategy was completed in 2009.

Action Item	Details	Lead	Partners	Time	Priority	2005 Progress	2012 Progress
Emergency Operations							
1.) Update the 2005 Fire Mutual Aid Agreement to include the "12 hour operational period." Include USFS as a signatory to this agreement. Continue reviewing and updating mutual aid agreements as necessary.		FDB	FDB, BIA, Multnomah County, USFS	6 Months	High	An Intracounty Mutual Aid Agreement has been adopted by FDB agencies. An intercounty mutual aid agreement is being developed. An amendment will be made to the 2005 Fire Agreement to clarify that operational periods are 12 hours.	The FDB members recall having included a 12-hour operational period to the 2005 agreement, but the documentation to support this change is missing. The FDB will complete this action. An Intra and Inter County Omnibus Agreement has been adopted.
2.) Develop a Communications Work Group to address communications needs and deficiencies.	a.) Create a list of communication needs and resources (radios, repeaters, etc.) and develop a deployment strategy that can be utilized during an event.	CC Fire Agencies, CCOM	Clackamas County	Ongoing	High	NA	New Action 2012
	b.) Identify and pursue funding sources to address communication deficiencies.	CC Fire Agencies	Clackamas County	Ongoing		No Progress	UASI and other Homeland Security grants have addressed regional communication needs, including Clackamas County. Clackamas County has implemented a reverse 9-11 system called: Clackamas County Emergency Notification System (CCENS)
3.) Provide exercises and training to build capacity for responding to wildfires.	a.) Conduct a conflagration exercise including dispatching of resources, staging, and coordination with Clackamas County Departments for potential evacuations and EOC activation.	CFOG, FDB	CC Fire Agencies	2 Years	High	A table top exercise was conducted in 2005. ODF will provided four sand tables (funded through a Western States Fire Manager's Grant) to structural fire agencies for training and fire analysis efforts.	No Progress
	b.) Clarify EOC/IMT roles and relationships.	CFOG, FDB	CC Fire Agencies	2 Years		NA	New Action 2012 Unified Command has been exercised and utilized regularly during emergencies since 2005.
	c.) Identify opportunities to provide Live Fire Training for CC Fire Agencies.	RFOG, FDB	Metro, City/County Parks	1 Year		NA	New Action 2012 NAFT is working on a Western Oregon Wildland School (to supplement Central Oregon Wildland School)
	d.) Work with RFOG to identify, develop and exercise protocol for Rural Water Supplies.	RFOG, FDB		1 Year		NA	New Action 2012
	e.) Work with natural resources managers to determine their role in responding to wildfires in parks and natural areas.					NA	New Action 2012
4.) Strengthen public education and agency coordination on evacuation procedures.	a.) Invite CCSO to FDB to discuss evacuation authority, limitation and opportunities to collaborate.	CFOG, FDB	CC Fire Agencies, Law Enforcement	Ongoing	High	No Progress	Emergency Management has an evacuation plan template and is developing an evacuation plan for Mount Hood.
	b.) Clarify roles and responsibilities for evacuation procedures based on different types of incidents (wildland, structural, Haz Mat) and ensure that all participating agencies are aware of roles.					No Progress	
5.) Develop a more efficient system for utilizing intra and intercounty resources.	a.) Work with Washington and Multnomah Counties to determine the best strategy for utilizing resources. Consider alternate dispatch run cards.	CFOG, FDB, Dispatch Centers	CC Fire Agencies	Summer 2005	High	During the July 7th, 2005 wildland exercise, the fire districts became more aware of the need to update run cards. Clackamas County FDB is participating in the RFOG group designed to enhance efficiency in utilization of resources in the Metro area.	Run cards have been updated; Unified Command is used consistently during incidents; there is a Tri-County Mutual Aid Agreement, but the group needs to develop and refine operational strategies for utilizing resources.
	b.) Consider creating structural and wildland strike teams for Clackamas County (including resources that are not in the Mob Plan).					NA	New Action 2012

Action Item	Details	Lead	Partners	Time	Priority	2005 Progress	2012 Progress
Emergency Operations							
6.) Encourage consistent application of and regular review/revision of the Open Burning Policy adopted by the Fire Defense Board.	a.) FDB Chief will work with ODF to analyze daily conditions using the Fire Severity Rating Matrix to determine open/closed burn days.	FDB Chief, ODF, CFOG	CC Fire Agencies	Ongoing	High	ODF currently provides daily analysis and forecasts to FDB Chief during fire season.	The Clackamas Fire Defense Board has improved the understanding of burning policies countywide and is wokring with ODF to determine burn days.
	b.) Continue to refine the Open Burning Policy; Develop consistent definitions for "campfires" and "designated sites."	FDB Chief, ODF, CFOG		1 Year/ Ongoing		No progress	The FDB updated the Open Burning Policy in 2010, and it should be evaluated and reviewed again in 2012-2013.
	c.) Consider using a single source website (ODF Dispatch) to update Fire Severity Rating and public use restrictions.	FDB, ODF		1 Year/ Ongoing		NA	New Action
	d.) Utilize ODF citation capabilities when CCOM is informed of an illegal burn.	FDB Chief, ODF, CFOG,		1 Year/ Ongoing		NA	New Action
7.) Develop and implement training standards for Fire Operations Center (FOC) positions.	a.) CFOG will identify classes/training specific to FOC positions and make recommendations to FDB for FOC training.	CWOG and FDB	CCEM, Public Works, RISK, Fire Districts, Law Enforcement,	2 Years /Ongoing	High	East County Fire Agencies have proposed a standard. The CWOG members would like to see the curriculum and time commitment of the ICS 300 and 400 classes before making a decision.	New Action All Fire Chiefs that staff the FOC are trained at least to theICS 300 level.
8.) Develop a consolidated document for reporting resource minimums on fire district, county-wide, and state-wide levels.	a.) The next iteration of the resource minimum document.	CWOG, FDB	CC Fire Agencies	Ongoing	Medium	The Clackamas County Fire Districts have updated the resource minimum list.	There is a resource minimum list for the County (but it does not include ODF). ODF can include theirs, but it varies throughout the year due to fire season.
	b.) ODF and USFS will provide morning resource status to the FDB via the CFOG website.						ODF uses Web EOC. USFS does not.
9.) Continue to work toward a more consistent system for credentialing wildland fire fighters by aligning DPSST and NWCG training standards.		Fire Defense Board	SFMO, PNWCG	Long-Term	Low	No Progress	The Clackamas FDB had representation on a state committee that made great headway in aligning DPSST and NWCG.
10.) Develop and implement a radio numbering system that reflects geographic area.		Radio Committee	FDB, ODF	Long Term	Low	No Progress	An attempt to do this was made in 2006, but did not generate adequate regional support. The Regional Fire Operations Group is tasked with this, although it may be a statewide issue.
11.) Encourage consistent resource typing among NIMS, NWCG,and the SFMO.	a.) FDB will provide recommendation to the State Fire Marshal's Office that the equipment and staff typing should be consistent in NIMS, NWCG, and the Mob Guide.	CWOG, FDB	CC Fire Agencies	Long Term	Low	CWOG has identified the differences in NIMS, NWCG, ODF, NFPA, and Mob Guide typing for equipment.	ODF follows the NWCG guidance for resource typing. The SFMO follows NIMS. Some progress has been made to bring NIMS and NWCG into alignment.
12.) Update the Integrated Interoperability Plan to provide a template for communications. Identify VHF and 800 MHz communications needs based on the templates.	a. Radio Committee will work with law enforcement, USFS, and other agencies to ensure interoperability when VHF template is complete.	Radio Committee, FDB	CC Fire Agencies	Sep-05	Low	VHF plan was adopted by the Clackamas District Fire Defense Board on Sept 1, 2005. Metro 800 MHZ Users group is developing a template with common terminology. 800 MHZ radios are being reflashed in Jan 2006, and all national interoperability channels will be included	Complete. The regional TICP is being updated; Bob Morrissey with Estacada Fire has survey results for radio needs.
	b.) Consider obtaining a cache of VHF and 800 MHZ radios to be used for response efforts.						The Fire Defense Board agreed to go to 800 MHZ countywide. Urban Agencies are well equipped with 800 and keep a few VHF for conflagration. Rural Agencies primarily continue to use VHF and have a few 800 MHZ for interoperability. Those Districts that need radios have included this in their Agency CWPP Action Plans.
Completed Emergency Operations Action Items							
Develop ICS training needs and a resources list for Clackamas County.	a). FDB will notify and encourage Fire Districts to use the standards developed to inventory training needs.	FDB	CCEM, Public Works, Fire Districts, Law	Ongoing	High	No Progress	Complete. Emergency Management has a current listing of needs and conducts training twice a year.
	b.) NAFT will use inventory of needs to develop/modify appropriate training schedules to bring CC Fire Districts into compliance.	FDB, NAFT	CC Fire Agencies		High	No Progress	Complete

Action Item	Details	Lead	Partners	Time	Priority	2005 Progress	2012 Progress
Education & Outreach							
1.) Develop a step by step process for outreach to Communities at Risk; including Firewise presentations.		ODF	Fire Co-op	Spring, 2012	High	New Action	Firewise presentations have been given at 15 Communities at Risk. ODF received grant funds to create 2 Firewise Communities in 2012.
2.) Develop relationships and incentives for a Fuels Reduction Program.		ODF, USFS, County/City Parks, Metro, SWCD	Fire Districts	Ongoing	High	New Action	Collectively, partners were awarded over $1 million to implement fuels reduction projects in Clackamas County; about half of which was an ODF a cost share program for removing hazardous fuels.
3.) Update the burning brochure and target areas for mailing based on the Communities at Risk.		Fire Co-op	Fire Defense Board	Spring 2014	High	New Action	Defensible Space and Debris Burning brochures were created and mailed to all WUI residents in 2006
4.) Develop and promote "Burn Barrel" program. Strengthen the relationship with the SFMO to build support for the burn barrel program.		Fire Co-op	SFMO	Spring 2013	High	New Action	The Fire Coop received a Burn barrel grant from KOG in 2007. The barrels need to be manufactured and advertised. $30 each
5.) Develop and distribute address signs for homes and potential water sites in the WUI.		Fire Co-op	Fire Districts	Ongoing	High	New Action	ODF received Title III funds to purchase and distribute address signs in the WUI.
Completed Education & Outreach Action Items							
Develop and Distribute Wildland Urban Interface Packet.	a. Include a WUI brochure detailing the Clackamas Community Wildfire Protection Plan, defensible space guidelines, and fire apparatus ingress and egress requirements. b. Include other educational materials such as a Wildfire Prevention DVD. This should be distributed to developers during the land use application process and mailed to residents in the WUI.	Fire Co-op, CC Fire Agencies	Clackamas County	March-May, 2006	Complete	Clackamas County and Oregon Department of Forestry are in the process of developing a brochure.	Complete The Fire Coop developed and distributed defensible space and debris burning brochures in 2005-2006. No DVDs were created.
Install Fire Danger Rating Boards.	a. Place the boards in strategic locations in the WUI and recreation corridors in forested lands to ensure that people are aware of fire danger. b. Utilize ODF summer crews for assembling the boards.	Fire Co-op, CC Fire Agencies	Clackamas County	March-May, 2007	Complete	ODF is researching the possibility of using adhesive labels for the boards.	Complete
Develop and Distribute Burn Permitting and Fire Restrictions Brochure.	a. Outline burn permit procedures, relevant agency contact information, Regulated Use Closure Proclamation instructions, and other restrictions associated with fire severity.	Fire Co-op, CC Fire Agencies	Clackamas County	March-May, 2008	Complete	ODF is in the process of developing a brochure.	Complete A debris burning brochure was created, but did not include Regulated Use.
Fire-Safety Messages on Safeway Grocery Bags.	a. Co-op will develop and design fire prevention graphics and messages that will be printed on paper bags at participating County Safeway grocery stores.	Fire Co-op, Safeway	Clackamas County	March-May, 2006	Complete	The Fire Coop abd Safeway have agreed to print these at no cost.	Complete

Action Item	Details	Lead	Partners	Time	Priority	2005 Progress	2012 Progress
Structural Ignitability							
1.) Continue to enhance coordination between Clackamas Fire Districts and County DTD.	a.) Identify a DTD representative to serve on the Wildfire Planning Executive Committee.	CCEM	WFPEC	6 Months	High	DTD was heavily engaged in the CWPP process to develop and implement the Strucutral Ignitability Action Plan.	
	b.) Develop and provide a residential construction checklist to identify those projects with access and water supply challenges.	Structural Ignitability Committee	DTD	1 Year	High	The checklist is complete and will be provided by DTD during the permit application process.	This was completed and is being used, but the last checkbox cannot be used because the WUI has not been loaded into Plan Map.
	c.) Promote an open dialogue between County DTD and fire agencies by utilizing the DTD website, monthly emails, and the Velocity Hall System.	SFMO	SFMO	Ongoing	High	SFMO met with all interested fire agencies to train them on Velocity Hall	Continues to be effective in most areas. Rural Fire Districts need Velocity Hall training and are nto receiving monthly emails.
2.) Work with Clackamas County Engineering to notify Fire Districts of new buildings on existing lots that have >150 ft. driveways.		CC Building Dept.	Fire Districts	2 Years	High	Notice is being sent by the Planning Division to the fire districts for all land use applications involving a new dwelling on existing lots of record in Natural Resource Zones. All other zones are outright buildable and are not in need of land use approvals to place a dwelling. These applications are administered through the building department and fire districts are notified for structures over 3,600 square feet.	New Action 2012 Clackamas County DTD is installing a new system that could facilitate this process.
3.) Encourage use of fire-resistant construction materials, compliance with access requirements, adequate water supply, and incorporation of fuel breaks in the Wildland Urban Interface.	a.) Consider flagging the lots that are in the designated WUI and send the applicant an educational packet that includes suggestions for fire-safe construction materials, access, water supply, and fuel breaks.	County DTD	County GIS, DTD Comp. Users Group	1-2 years	High	No Progress	No Progress
	b.) Utilize Section R324 of the Residential Specialty Code "Wildfire Hazard Mitigation," which requires at least Type C roofing for homes in the WUI.	County DTD, ODF, Fire Districts	FDB	1-2 years	High	NA	New Action 2012
4.) Research incentives for improving maintenance of fire breaks and defensible space.	a.) Consider potential resources and incentives associated with SB 360 implementation.	ODF, WFPEC	Fire Co-op	Long Term	High	No Progress	No Progress
5.) Enhance structural protection in unprotected areas and comply with the Governor's policy in unprotected areas to be eligible for conflagration resources.	a.) Support ODF in working with the County Tax Assessor to change the language on property tax statements for ODF assessment from "fire protection" to ODF "non-structural fire suppression" so homeowners and insurers are	ODF, County Tax Assessor	ODF	1 Year	Medium	No Progress	No Progress
	b.) Inform homeowners in unprotected areas of their unprotected status (using mailings) and provide them with information about options for enhancing structural protection.	ODF	Fire Co-op, Adjacent Landowners	Ongoing	Medium	No Progress	No Progress
	c.) Encourage communities in unprotected areas to develop local community wildfire	ODF	Fire Coop	1 Year	Medium	Outreach and fuels reduction work around homes has been in Wapinitia.	No Progress
	d.) Research opportunity to provide disclosure of unprotected status on lots through deed restrictions.	ODF	County	1 Year	Medium	No Progress	No Progress
	e.) Consider flagging the lots that are in unprotected areas to educate the property owners about the lack of structural protection and provide options for enhancing structural protection.	County DTD	County	Complete	Complete	No Progress	The County currently requires any new lot of record to have structural fire protection.

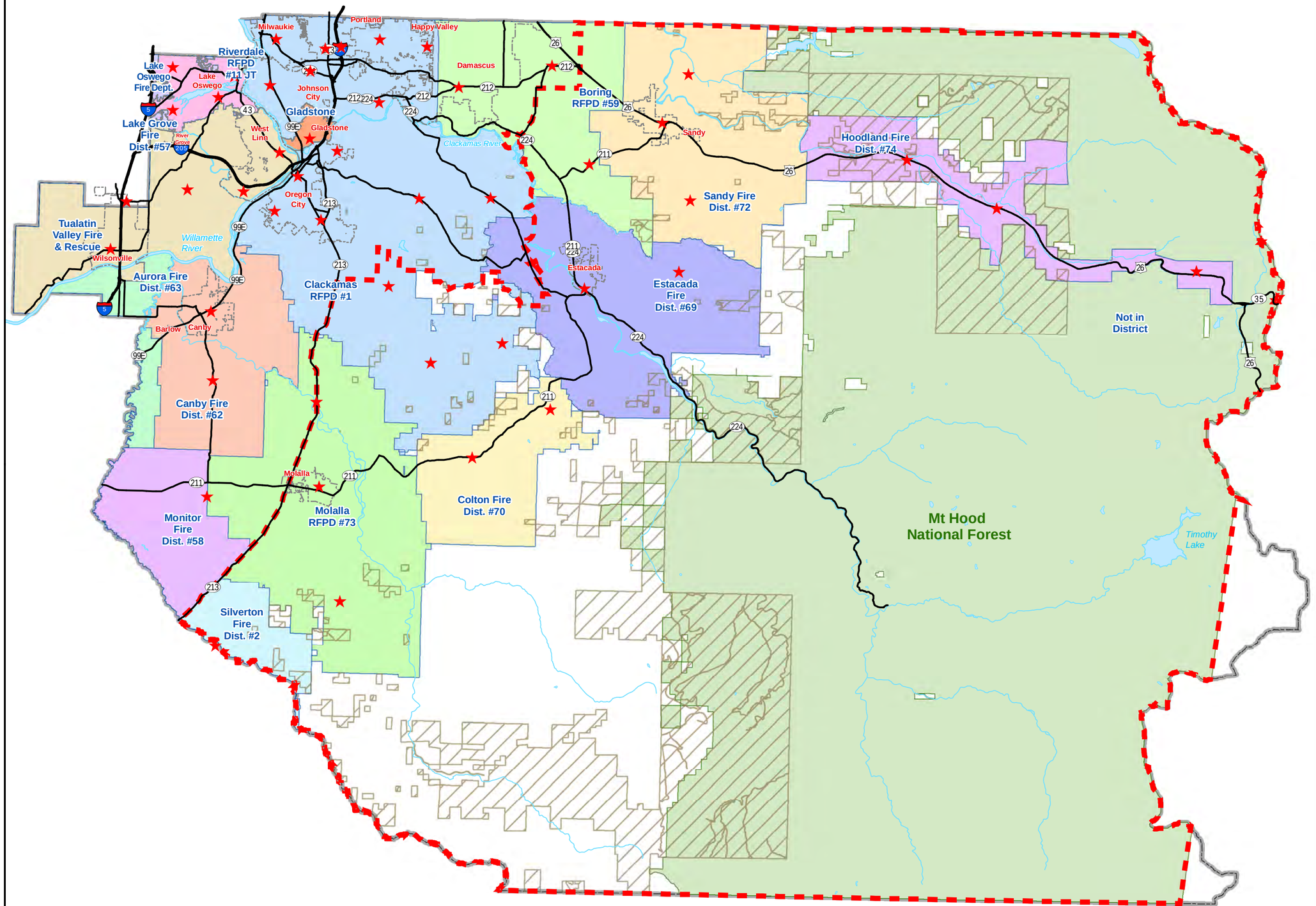
Action Item	Details	Lead	Partners	Time	Priority	2005 Progress	2012 Progress
Structural Ignitability							
6.) Work with insurance providers to improve their criteria to adequately represent level of structural fire protection in residential structures, especially in high-risk areas.	a.) Ensure that homes in rural settings have adequate access and water supply when considering insurance eligibility; especially homes > 3,600 ft^2.	FDB, SFMO, Insurance Providers	Regional Fire Operations Group	Ongoing	Medium	No Progress	Western States Fire Chiefs are currently working with ISO to recognize reduced fire risk through prevention activates and develop incentives for promoting creation and maintenance of defensible space.
	b.) Expand criteria used by insurance providers to include fire breaks, fuels reduction, and fire prevention activities.			Ongoing	Medium	No Progress	
	c.) Provide an educational component to developers/builders regarding fire insurance considerations of homes built without adequate access and water supply.			Ongoing	Medium	No Progress	
	b.) Work with insurance providers to encourage homeowners to be proactive in maintaining fire safe vegetation and reducing hazardous fuels.			Ongoing	Medium	No Progress	
7.) Improve upon current procedures for integrating fire codes into the regulatory process.	a.) All county fire agencies should come to consensus on the minimum fire code standards they will be enforcing and gain approval from the jurisdiction in which they serve.	FDB	BCC SFMO	January '05	Low	No Progress	FDB has adopted the State Fire Marshal's Metro Code Committee Fire Applications Guide. It is currently in the process of being revised to make it more user friendly.
	b.) Continue to make improvements on the Permits Plus Program to ensure that conditions for fire code compliance are translated from land use planning to building permitting.	County DTD	County Engineering, IS	November '05	Low	No Progress	Significant improvements have been made to the Plan Map system to ensure that all input given during the land use reviews is available to building officials.

Table 1-2. CCWPP Grant Funded Projects 2005-2012

Grant	Amount $	Acres Treated	Federal Acres	Accomplishments
Oregon Dept.of Forestry				
Title III 2004	$50,000.00	0	0	Brochures created and sent to all WUI residents; 5 Community meetings with over 500 attendees; Hired Resource Innovations to assist with CWPP development
Title III 2005	$16,090.88	10	5	Fuel reduction around 15 campsites in Molalla River Corridor Demonstration of fuels reduction around home w/ television crew in conjunction with Sandy Fire. Bull Run waterhole maintenance.
Title III 2006	$70,424.48	28	13	Defensible space around 55 homes. Fuel reduction work in County park. Fuel reduction around Horse Creek Weather Station (5 acres) and at Wildwood recreation area (8 acres)
TITLE III 2007 Crew 58	$50,000.00	33.5	7	Partners - Metro, BLM, Clackamas County and one subdivision. TV spot on AM news with Fuel Reduction crew.
TITLE III 2007	$24,000.00	0	0	Prevention shelter materials for outreach at Molalla Buckaroo, Clackamas County Fair and other events that reached over 5000 people.
TITLE III 2008 Crew 58	$39,644.28	34	4	BLM, County Parks and Private Communities. Hoodland Community Center project - Showcase for material disposal. East Rolling Green Neighborhood - Cost share - ODF labor and Private Homeowners paying Chipping Costs
TITLE III 2008 South County Grant	$12,300.00	0	0	CCSWCD award - Address signs on 225 homes as demo, Sort yard (10 Tons of material) and open house at Molalla Fire Sawtell Station. Worked with County Roads on outreach for vegetation removal along road ways. Paid for fuel break
WSFM 2005 (2005-2009)	$125,000.00	104	0	Over 10,000 CWPP, Living with Fire and Burn Brochures were distributed door to door and at multiple community events. 8,200 Homes were triaged.
WSFM 2007 (2007-2011)	$280,000.00	235	0	727 homes affected by treatment, 3,500 brochures distributed, 701 landowner contacts, 12 Firewise community presentations. 1611 homes triaged, Launched the fuels reduction Cost Share Program
TITLE III 2009 CREW 58	$41,111.00	16	0	6 Sites were treated to reduce fuels on city, county and private lands.
CCSWCD 2009 Crew 58	$37,951.70	10	0	King Rd demonstration project. County Forestland Fuel Reduction project adjacent to BPA power lines.
TITLE III 2010 Crew 58	$159,564.27	39.5	21.5	Fuels reduction work completed : King Road, • Hopkins Demonstration Forest• Timberline Rim Bureau of Land Management Rim Trail, Baty Road, Camp Onahlee.
TITLE III 2010-2012	$177,219.00	0	0	6 Events at retail outlets reached approx 200 people. 12 Firewise community presentations.
TARP/WSFM 2009 (Open)	$190,000.00	260	0	Cost Share Program to reduce hazardous fuels in East Clackamas County.
WSFM 2010 (Open)	$297,745.00	100	0	Cost Share Program to reduce hazardous fuels in Clackamas and Marion Counties.
Title III 2011	$107,141.00	0	0	1,500 Address signs in areas identified through Local Fire Agencies in conjunction with the CWPP.
Title III 2011 Crew 58	$124,151.00	15	0	2 Projects - Scott Mountain and Rose Creek.
Title III 2012 Crew 58	$130,000.00	25	0	Fuels reduction crew to reduce hazardous fuels in high priority areas.
Title III 2009-2012	$134,784.00	30	0	Outreach/education, address signs, prevention materials.
Subtotal	**$2,067,126.61**	**940**	**50.5**	

Grant	Amount $	Acres Treated	Federal Acres	Accomplishments
USFS				
Title II/TIFF 2006	$90,000.00	0	15	Government Camp Hazardous Fuels Reduction. Summit Meadows and Lige Road Units. Work completed 2007. Purchased Fuels Reduction Tools for the Community
Title II 2010	$62,000.00	0	75	West Leg Rd fuels reduction/hazard tree project. Work Completed 2010.
Subtotal	**$152,000.00**	**0**	**90**	
Clackamas County/NCPRD				
Title III 2009-2010	$39,000.00	0	0	Planning and data collection and outreach within the urban rural interface areas
Title III 2010-2011	$154,000.00	89	0	Project fliers, neighborhood letters, county fair, wildfire preparedness presentations. Over 800 hrs of planning, 200 hrs of NR field work, and 800 hrs of field tech implementation.
Subtotal	**$193,000.00**	**89**	**0**	
Hoodland Fire				
Title III 2005	$125,156.00	0	0	Zigzag Summer Home Access/Egress and address signing. USFS, Hoodland FD, Clackamas County Environmental Youth Corps. Worked done during 2005 and 2006
2006 AFG	$72,479.00	0	0	Purchased Wildland and Structural Fire PPE
Title III 2007-2008	$69,018.00	0	0	Complete Summer Home area work in partnership with Wolf Tree.
Title III 2009	$4,500.00	10	0	Government Camp Clean Up Day
2006 RFA (BLM)	$9,702.00	0	0	Purchased 40 new generation fire shelters.
Subtotal	**$155,699.00**	**10**	**0**	**Total Acres Treated: 1,180**
Grand Total	**$2,567,825.61**	**1,039**	**141**	

Clackamas County Fire Agencies 2012



- Fire Stations
- Oregon Department of Forestry
- Bureau of Land Management
- Mt Hood National Forest
- City Boundaries

Map #1

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CLACKAMAS COUNTY

GEOGRAPHIC INFORMATION SYSTEMS

DEPARTMENT OF INFORMATION SERVICES/GEOGRAPHIC INFORMATION SYSTEMS
121 LIBRARY COURT
OREGON CITY, OREGON 97045

CHAPTER 2: PLANNING PROCESS

Clackamas Community Wildfire Protection Plan 2012 Update Process

The 2012 Clackamas CWPP Update process was developed in collaboration with the Clackamas Fire Defense Board and the Clackamas Wildfire Executive Planning Committee. These collaborative groups evaluated the effectiveness of the plan with regard to oversight of the CWPP as well as the five focus areas: Risk Assessment, Fuels Reduction, and Emergency Operations, Education and Outreach and Structural Ignitability. The 2012 CCWPP also greatly improves upon local fire agency coordination to build capacity for plan implementation.

Wildfire Planning Executive Committee (WFPEC)

The Wildfire Planning Executive Committee was charged with oversight of the CWPP. Although the WFEPC continued to meet quarterly, the roles of the WFPEC member agencies were difficult to sustain over the last several years due to staffing and programmatic changes of partner agencies. The 2012 CCWPP Update process strengthened the WFPEC by providing more structure for meetings and creating a more realistic action plan. The WFPEC is also developing a series of bylaws for consistency in agency representation and participation.

Technical Subcommittees

Fuels Reduction and Biomass Utilization

The majority of fuels reduction projects implemented in the County have been led by the Oregon Dept. of Forestry, the North Clackamas Parks and Recreation District and the Clackamas Soil and Water Conservation District. In an effort to create a more comprehensive fuels reduction program for the 2012 CCWPP Update, City and State Parks, Metro and other natural land managers were invited to participate in the CCWPP by providing potential projects for consideration. This group has agreed to meet quarterly to share information and ideas for integrating fuels reduction strategies into natural resources management plans.

Emergency Operations

The Clackamas Fire Operations Group (CFOG) is a technical subcommittee of Clackamas District Fire Defense Board. The CFOG is responsible for coordinating fire operations issues and procedures for all fire districts in Clackamas County. The CFOG extended its membership to wildland fire agencies to address potential wildfire issues.

The CFOG has been focused on regional fire operations issues, and as such has not been meeting regularly to discuss local issues. The 2012 CCWPP Update engaged the CFOG to update the CWPP Emergency Operations Action Plan, and invigorated the group to continue meeting to address the high priority actions that need to be taken to improve wildland response efforts.

Education and Outreach

The Clackamas County Fire Prevention Cooperative (Co-op) is a consortium of structural and wildland fire agencies, and other fire prevention stakeholders. The Co-op has been successful in implementing the four highest priority actions identified in the Clackamas CWPP Action Plan (Table 1. Clackamas CWPP Action Plan 2012), and has made progress toward implementing additional actions listed in Table 7-2. Clackamas Fire Co-op Proposed CWPP Activities. The Fire Co-op meets

monthly and works collaboratively to seek grant funding to continue supporting projects identified in these action plans.

Structural Ignitability

In order to effectively reduce structural ignitability, there must be coordination and communication between fire professionals and regulatory agencies. Since 2005, a great deal of progress has been made to strengthen these relationships, which has resulted in more effective implementation of the Oregon Fire Code. The 2012 CCWPP Update process identified additional actions that will continue to enhance coordination and reduce structural ignitability.

Wildfire Risk Assessment

The Wildfire Risk Assessment was reviewed and updated by a small subcommittee comprised of representatives from County GIS, ODF and the Fire Defense Board. This group met monthly to refine the maps associated with the 2012 CCWPP Update. In an effort to be consistent with the 2005 CCWPP, maps that have been updated will retain their original numbers. The new maps that are being added to the CCWPP will continue in numerical sequence.

Table 2.1 Clackamas Community Wildfire Protection Plan Maps

CCWPP Map	Changes 2012	CCWPP Edition
Map # 1Clackamas Fire Agencies	None	2005, 2012
Map # 2 Federal Register Communities at Risk	None	2005
Map # 3 Clackamas CWPP Communities at Risk	Yes	2012
Map # 4 Wildland Urban Interface	Yes	2012
Map # 5 Wildfire Hazard	None	2005
Map # 6 Wildfire History	None	2005
Map # 7 Values Protected	None	2005
Map # 8 Protection Capabilities	None	2005
Map # 9 Overall Wildfire Risk (State)	None	2005
Map # 10 Overall Wildfire Risk (County)	None	2005
Map # 11 Fuels Reduction Projects	Yes	2012
Map # 12 Summer Home Inventory	None	2005
Map # 13 Communities at Risk & Fuels Reduction Projects	New Map	2012
Map # 14 Structural Triage & Home Assessments	New Map	2012
Map # 15 Aurora Fire	New Map	2012
Map # 16 Boring Fire	New Map	2012
Map # 17 Canby Fire	New Map	2012
Map # 18 Clackamas Fire	New Map	2012
Map # 19 Colton Fire	New Map	2012
Map # 20 Estacada Fire	New Map	2012
Map # 21 Gladstone Fire	New Map	2012
Map # 22 Hoodland Fire	New Map	2012
Map # 23 Lake Oswego Fire	New Map	2012
Map # 24 Molalla Fire	New Map	2012
Map # 25 Monitor Fire	New Map	2012
Map # 26 Sandy Fire	New Map	2012
Map # 27 Silverton Fire	New Map	2012
Map # 28 Tualatin Valley Fire and Rescue	New Map	2012
Map # 29 Wildland and Unprotected Areas	New Map	2012

Fire Agency Coordination

Each fire agency (including ODF and USFS) was interviewed during the 2012 CCWPP process to receive feedback on countywide wildfire issues, assess local wildfire hazards, identify local Communities at Risk, and develop a series of action items to guide local wildfire prevention and response efforts. These interviews resulted in individual CWPP's for each fire agency.

Public Outreach Process

The WFPEC partnered with the North Clackamas Parks and Recreation District Wildfire Management Plan team to engage the public in the 2012 CWPP Update process. A website was established to provide wildfire resources and two neighborhood workshops were conducted to educate the public about wildfire risk and provide an opportunity for citizens to give input on the 2012 CCWPP.

Firewise Communities: Zig Zag Village &Government Camp

The National Fire Protection Agency's Firewise Communities/USA Recognition Program encourages and acknowledges citizen action to reduce wildfire risk. ODF received Title III funding to promote the Firewise Communities/USA Program, with the goal of creating certified communities in high priority Communities at Risk.

Zig Zag Village and Government Camp have been identified as local Communities at Risk (CAR) by the Hoodland Fire District. These proactive communities are aware of the risk of wildfire and are taking steps to mitigate this risk by participating in the National Firewise Recognition Program. These communities are located along Highway 26 and are bordered by the Mount Hood National Forest.

The Zig Zag Home Owners Association and Government Camp Community Planning Organization worked with the ODF, Hoodland Fire District and the USFS to assess wildfire hazards throughout the community and develop strategies to mitigate them. They also held Firewise Community Clean-Up Days to begin implementing the Firewise recommendations for becoming more wildfire resilient communities. Participation in the Firewise Communities/USA Program is an ongoing process of community commitment to wildfire safety.ODF and Hoodland Fire will continue working with Zig Zag Village and Government Camp to reduce wildfire hazards and retain Firewise/USA certification. For more information, please see *Chapter 10.8 Hoodland Rural Fire Protection District #74 CWPP*.

CHAPTER 3: FOREST CONDITIONS & WILDFIRE HISTORY

History of Wildfire in Clackamas County (since 2005)

Clackamas County has escaped the recent large fire occurrences of other western Oregon counties. However, weather, fuels buildup, and climatic changes have provided conditions conducive for a large fire event. Residential development in Clackamas County is heavily interwoven with forest land, so a relatively small fire of only a few hundred acres would pose a significant risk to many residents and their homes. Oregon Department of Forestry places the number of homes on forest land within ODF's boundary in Clackamas County at over 11,000.

Since 2005, there have been eight significant fires on USFS land in or affecting Clackamas County (Table 3.1). The majority of these had a wildland urban interface component, triggering voluntary and/or mandatory evacuations.

Table 3.1. Significant USFS Fires in the Clackamas County Area 2005-2012

Year	Name	Acres	Cause	Area
2011	Mother Lode	2,700	Lightning	Bull of the Woods Wilderness
2011	Nasty Fire	< 100	Lightning	Opal Creek Wilderness
2011	Dollar Lake	5,000	Lightning	Mount Hood
2010	View lake	2,900	Lightning	Ollalie Lake/ Bull of the Woods
2009	Microwave	2,100	Lightning	Mosier/Hood River
2008	Lake Lenore	450	Lightning	Bull of the Woods Wilderness
2008	Ruddy	47	Lightning	Ollalie Lake
2006	Blister	790	Lightning	North of Bagby Hot Springs
Total USFS Acres Burned		16,187		

ODF North Cascade District Fire Ignitions

In addition to the USFS fires reported below, ODF responded to a total of 582 wildfire ignitions since 2005, burning over 640 acres. These fires were controlled during initial attack, and thus did not result in significant loses. However, the number of ignitions underscores potential for a large scale wildland urban interface fire in the ODF protection boundary. Causes of these fires are tracked to assist in directing public outreach and prevention efforts:

- Debris Burning: 250
- Equipment Use: 98
- Miscellaneous: 69
- Arson: 36
- Smoking: 20
- Lightning: 16
- Railroad: 1

Total ODF Ignitions: 582

Forest Conditions

There have been no significant changes to forest conditions since 2005. The majority of forest lands in Clackamas County have a Moderate to High Severity Fire Regime in Condition Class 1.

CHAPTER 4: WILDFIRE RISK ASSESSMENT

One of the core elements of the Clackamas Community Wildfire Protection Plan is developing an understanding of the risk and potential losses to life, property, and natural resources during a wildfire in order to identify and implement the most effective strategies for preventing losses from fire, while allowing natural fires to take their course in shaping a more healthy and sustainable forest.

Risk Assessment Objectives

I. Develop and conduct a wildfire risk assessment to accurately portray vulnerable populations, property, and infrastructure.

II. Utilize fire district boundaries to identify Communities-at-Risk (CARs), and encourage the identification of more detailed CARs during local planning processes

III. Identify wildland-urban interface and forest-urban interface areas consistent with the state methodology and appropriate for future SB 360 development.

IV. Coordinate with fire districts to determine risk level of highly vulnerable and/or unprotected areas.

V. Develop a risk assessment at a level detailed enough to use in prioritizing fuels treatment and other fire prevention projects, but broad enough to encompass entire county.

VI. Develop a risk assessment that can be adapted to reflect changing forest conditions.

VII. Develop an appropriate point distribution system for risk assessment (protection capability, structural vulnerability, values, etc.) consistent with fire district priorities.

VIII. Utilize state, county, and local data to create a seamless risk assessment that can be used as a foundation for fire districts can build their own more localized risk assessments for their community fire plans.

Risk Assessment Accomplishments

The primary Risk Assessment Actions on which progress has been include:

1.) Improved the understanding of local wildfire risks.

- ✓ Local Communities at Risk Map (Map #3)
- ✓ Refined Wildland Urban Interface Map (Map#4)

2.) Improved structural ignitability data.

- ✓ Structural triage GPS units were used to create structural ignitability dataset (Map #14).

Risk Assessment Actions

The Risk Assessment Action Plan has been updated since 2005 to reflect accomplishments and ensure that the action plan remains relevant to current issues (Table 1-1.2012 CCWPP Action Plan). The high priority risk assessment actions to be addressed by the wildfire planning team will be to:

1) Maintain and Update the Fuels Reduction and Communities at Risk Maps and databases.
2) Continue to track structural vulnerability data throughout the County through structural triage assessments.
3) Update the Overall Wildfire Risk Assessment as new data becomes available.

Communities at Risk

Different scales of CAR's are necessary to direct large-scale State and Federal planning efforts as well as local outreach projects. For a listing of Federal and State CAR's, please see the 2005 CCWPP. The Clackamas CWPP addresses wildfire hazards county-wide (not just those areas in close proximity to state or federal lands) and as such, identified each local fire district or department as individual Communities at Risk.

Local Communities at Risk/ Strategic Planning Areas

CCWPP partners also recognize that there are smaller-scale Communities at Risk that have unique wildfire hazards to be addressed at the more local scale. These areas were referred to as Strategic Planning Areas in the 2005 iteration of the CWPP, but will now be referenced as Local Communities at Risk to be consistent with state and federal language. Communities that have been identified as being particularly vulnerable to wildfires are illustrated in Map # 3 CCWPP Communities at Risk and listed in Table 4-1. Fire professionals considered the following factors to determine the local CARs including:

- Need for defensible space
- Access limitations (narrow driveways, lack of address signage, one way in/one way out)
- Steep slopes that can hinder access and accelerate the spread of wildfire
- Lack of water available for wildland fire fighting
- Heavy fuels on adjacent public lands
- Potential ignition sources from recreationists and transients
- Agricultural and backyard burning
- Lack of community outreach/awareness
- Communication issues

Table 4-1. Local Communities at Risk in Clackamas County

Fire Agency	Priority	Community At Risk
Aurora Fire	High	Whiskey Hill
Aurora Fire	High	Eilers
Aurora Fire	High	Butteville
Boring Fire	High	Damascus Lava Domes
Boring Fire	High	Donna Court
Boring Fire	High	Hwy 224 Corridor
Boring Fire	High	Bartell Road
Boring Fire	High	Gold, Bronze, Nickel
Boring Fire	High	Mountain View
Boring Fire	Med	Amisigger Road
Boring Fire	Med	Tickle Creek
Boring Fire	Low	Eagle Fern Park
Canby Fire	High	Adkins Circle
Canby Fire	High	Sundowner
Canby Fire	Med	Public Works
Canby Fire	Med	Dutch Vista
Canby Fire	Med	N Side Molalla River
Canby Fire	Low	River Park
Canby Fire	Low	South End
Clackamas Fire	High	Canemah
Clackamas Fire	High	Mt Talbert
Clackamas Fire	High	Scouters Mountain
Clackamas Fire	High	Redland Area
Clackamas Fire	High	Beaver Lake
Clackamas Fire	High	Clarkes
Clackamas Fire	High	Leisure Woods
Clackamas Fire	Med	Holcomb
Clackamas Fire	Med	Three Creeks
Clackamas Fire	Med	Dianne/Shelly
Colton Fire	High	Boomer Springs
Colton Fire	High	Walton Road
Colton Fire	High	Deardorff Road
Colton Fire	Med	Elwood
Colton Fire	Med	Hunter Road
Colton Fire	Med	Holt
Colton Fire	Med	Dhooghe Road
Colton Fire	Med	Fernwood Road
Estacada Fire	High	Paradise Park
Estacada Fire	High	George
Estacada Fire	High	Garfield/Porter
Estacada Fire	High	Dodge Hillockburn
Estacada Fire	Med	Viola
Estacada Fire	Med	Ranger Woods
Estacada Fire	Med	McIver State Park
Estacada Fire	Med	Metzler Park
Estacada Fire	Low	Silver Fox RV Park
Gladstone Fire	High	Parkway Woods
Gladstone Fire	High	Billy Goat Island
Gladstone Fire	High	Dahl Beach
Gladstone Fire	Med	Risley Wetlands
Gladstone Fire	Low	Meldrum Bar
Hoodland Fire	High	Marmot Road
Hoodland Fire	High	Government Camp
Hoodland Fire	High	Summer Homes
Hoodland Fire	High	Rhododendron
Hoodland Fire	High	Lolo Pass
Hoodland Fire	High	Cherryville-Alder Creek
Hoodland Fire	Med	Trillium Lake
Hoodland Fire	Med	Welches-Wemme
Hoodland Fire	Med	Timberline Rim
Hoodland Fire	Med	Sleepy HolLow
Hoodland Fire	Med	Brightwood
Hoodland Fire	Med	Wildwood
Lake Oswego Fire	High	Iron Mountain
Lake Oswego Fire	High	Palisades
Lake Oswego Fire	High	Cooks Butte
Lake Oswego Fire	Med	Mountain Park Area
Lake Oswego Fire	Med	Tryon Creek
Lake Oswego Fire	Low	Waluga Park
Lake Oswego Fire	Low	Springbrook Park
Molalla Fire	High	Alder Creek
Molalla Fire	High	Rosewood
Molalla Fire	High	Sawtell
Molalla Fire	Med	Molalla Heights
Molalla Fire	Med	Fernwood Area
Molalla Fire	Med	Dickey Prairie
Molalla Fire	Low	Big Rock
Molalla Fire	Low	Salo Area
Molalla Fire	Low	Blue Road
ODF	High	Sawtell, Cooper Road
ODF	High	Elk Prairie & Family Camp
ODF	High	East Highland
ODF	Med	Butte Creek Unprotected
ODF	Med	Lais Rd & North Fork Rd
ODF	Med	Ramsby Rd Unprotected
ODF	Med	Lower Highland & Ridge
ODF	Med	Wapanitia
Sandy Fire	High	Cedar Creek
Sandy Fire	High	Firwood
Sandy Fire	High	Wildcat Mountain
Sandy Fire	Med	Bull Run
Sandy Fire	Med	Bluff Road

Table 4.1. Local Communities at Risk in Clackamas County *(continued)*

Fire Agency	Priority	Community At Risk
Silverton Fire	High	Maple Grove
Silverton Fire	High	Boy Scout Camp
Silverton Fire	High	Butte Creek Rd
Silverton Fire	Med	S Wildcat
Silverton Fire	Med	Meadow Ct/Marquam
Silverton Fire	Low	Prospect
Silverton Fire	Low	Groshong Rd
TVF&R	High	Skye Parkway Area
TVF&R	High	Wilderness Park
TVF&R	High	I 205 Corridor
TVF&R	High	Ladd Hill Area
TVF&R	Med	Prosperity Park
TVF&R	Med	Palomino Loop
TVF&R	Med	Rosemont
TVF&R	Med	Wisteria
TVF&R	Med	Frobase
TVF&R	Med	Wheatland
TVF&R	Med	Frogpond
TVF&R	Med	Pete's Mountain Area
USFS	High	Ripplebrook
USFS	Med	Joe Graham
USFS	Med	Timberlake
USFS	Med	Three Lynx

Wildland Urban Interface (Map #4)

The CCWPP risk assessment subcommittee used the federal register and HFRA's guidance for determining the WUI. In an effort to identify the areas where "humans and their development intermix with wildland fuel," we identified the areas that have an urban density of at least one structure per forty acres *and* have hazardous fuels (Fuel Type III: tall flammable grass, heavy flammable brush, or heavy timber).

The 2005 iteration of the WUI included a larger-scale, *Primary WUI* that would be used for planning larger-scale fuels modification work (the Intermix Community). In addition, the committee determined that a smaller scale, *Secondary WUI* will be used to target property owners for educational efforts for reducing wildfire hazards around the home (the Interface Community). The difference in the Primary and Secondary WUI is the buffer associated with the original overlay of housing density and hazardous fuels (Map #4: Primary and Secondary Wildland Urban Interface).

Although the idea of 2 separate scales of the WUI worked well theoretically, it did not provide the level of detail or include local knowledge to truly make a distinction between high risk and low risk areas. In addition, there were many "outliers" that showed small areas of WUI in extremely rural areas with no development.

The 2012 WUI improves upon the 2005 WUI be creating a more realistic Wildland Urban Interface Boundary that includes all of the Communities at Risk identified by fire agencies. It also eliminates the outliers. Specifically, the analysis used a density indicator of 4 structures per 40 acres (as opposed to 1strucutre per 40 acres used in the 2005 edition) to identify clusters of residences. Areas meeting the density requirement were over laid with Fuel Type III (tall flammable grass, heavy flammable brush, or heavy timber) to determine where hazardous vegetation is adjacent to communities. To reduce the number of outliers, communities had to be larger than 5 acres to be included. The resulting areas were buffered to 660' and some areas were expanded to include Communities at Risk (CARs) identified by local fire professionals.

Overall Wildfire Risk

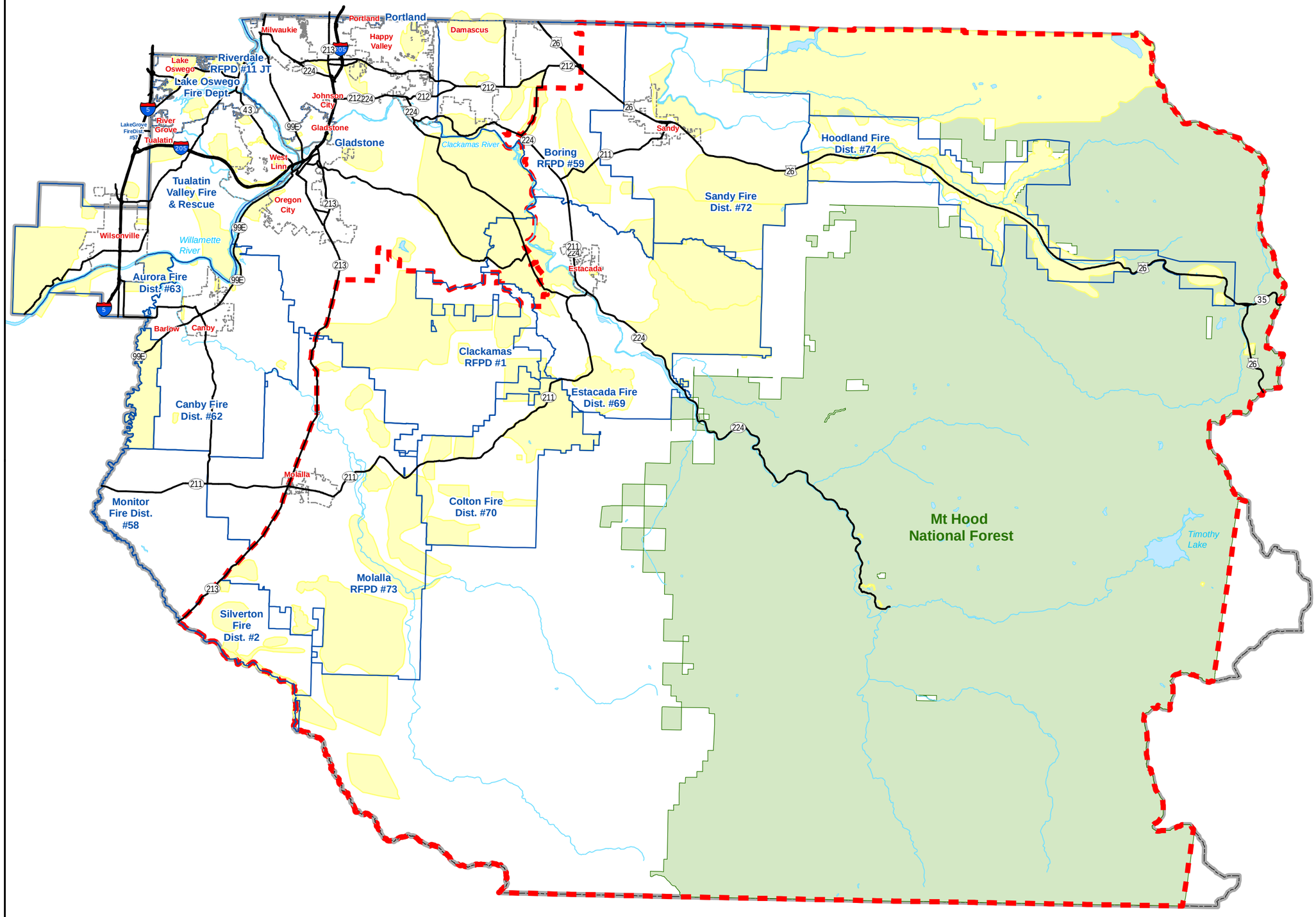
There have been no significant changes to the data included in the 2005 Overall Wildfire Risk Assessment (Map # 10). The primary landscape-level change would be additional development in the WUI, which is captured in the 2012 Wildland Urban Interface Map. The data used to determine the Overall Wildfire Risk Assessment are described in Table 4-2.

Table 4-2. Risk Assessment Elements

The Assessment considers four categories in determining the relative severity of fire risk. Structural Vulnerability is a fifth category that will be examined in local plans but is not considered at the state or county level due to limited available data.

Assessment Categories	Elements	Score
Hazard	Fuels (developed from vegetation information), Slope, Aspect, Elevation, Weather	0-80
Risk	Historic Fire Occurrence (derived from state and federal fire agency databases) and an estimation of ignition risk based on expert opinion and home density	5-40
Values	Life/Property as determined by home density (homes per 10 acres) and community infrastructure	0-50
Protection Capability	Fire Response Time (determined from fire district boundaries and district-reported response times) and Community Preparedness	0-40
Structural Vulnerability	Roof type, Defensible space, and Access	No Data

CCWPP Communities at Risk 2012



Communities at Risk
Fire Districts
Oregon Department of Forestry
Mt Hood National Forest
City Boundaries

Fire agencies identified local Communities at Risk as those being particularly vulnerable to wildfires due to access, water, communications, terrain, ignition sources, public awareness and heavy vegetation.

Map #3

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Miles

CLACKAMAS COUNTY

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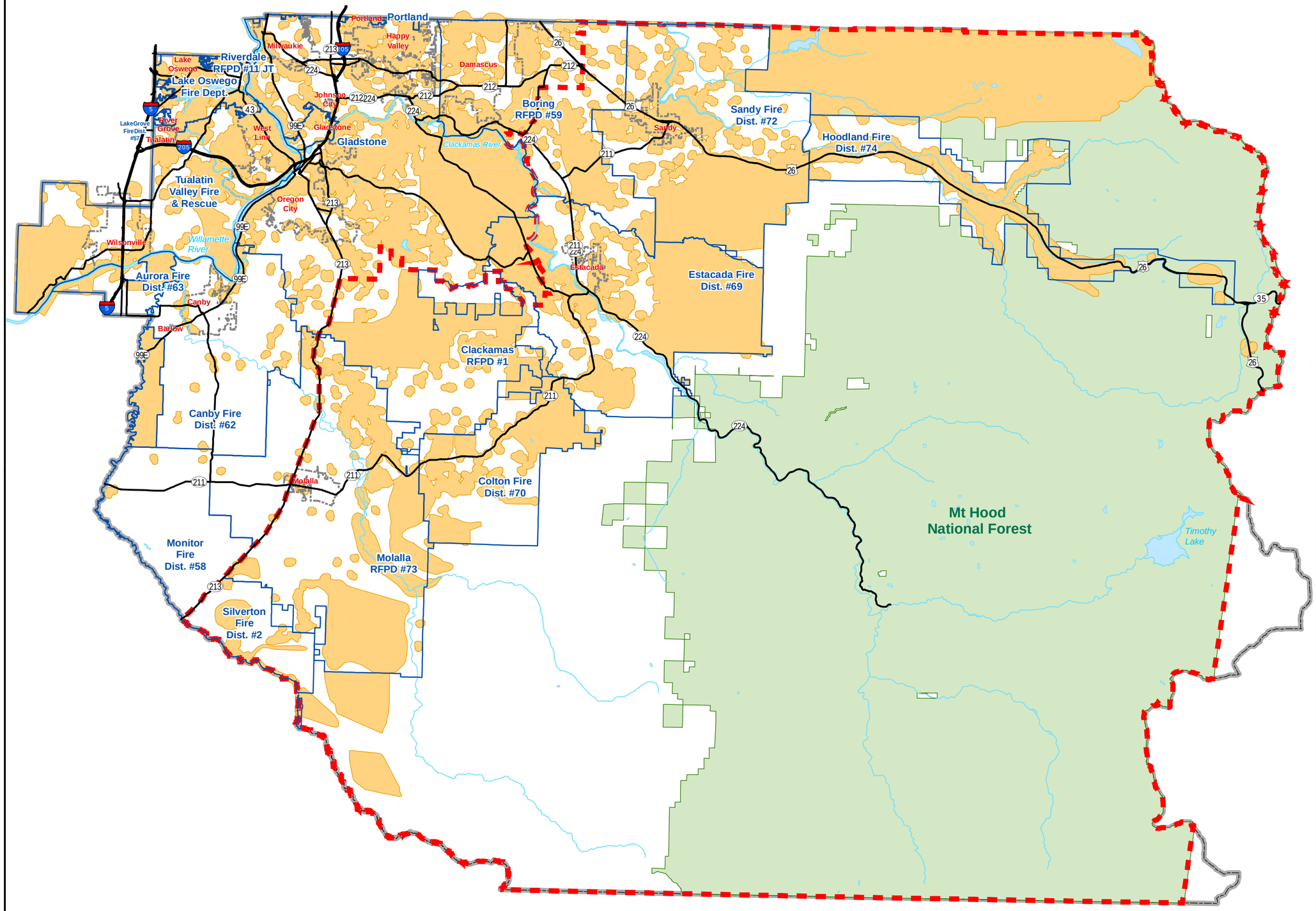

Wildland Urban Interface (WUI) 2012

- WUI
- Fire Districts
- Oregon Department of Forestry
- Mt Hood National Forest
- City Boundaries

WUI areas contain 4 structures per 40 acres and are within Fuel Type III (tall flammable grass, heavy flammable brush, or heavy timber). Each area meeting these criteria had to be larger than 5 acres to be included. The resulting areas were buffered to 660' and some areas were expanded to include entire locally-defined Communities at Risk (CARs).

Map #4

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W E
S

0 1 2 4 6 8
Miles

CLACKAMAS COUNTY

GEOGRAPHIC INFORMATION SYSTEMS

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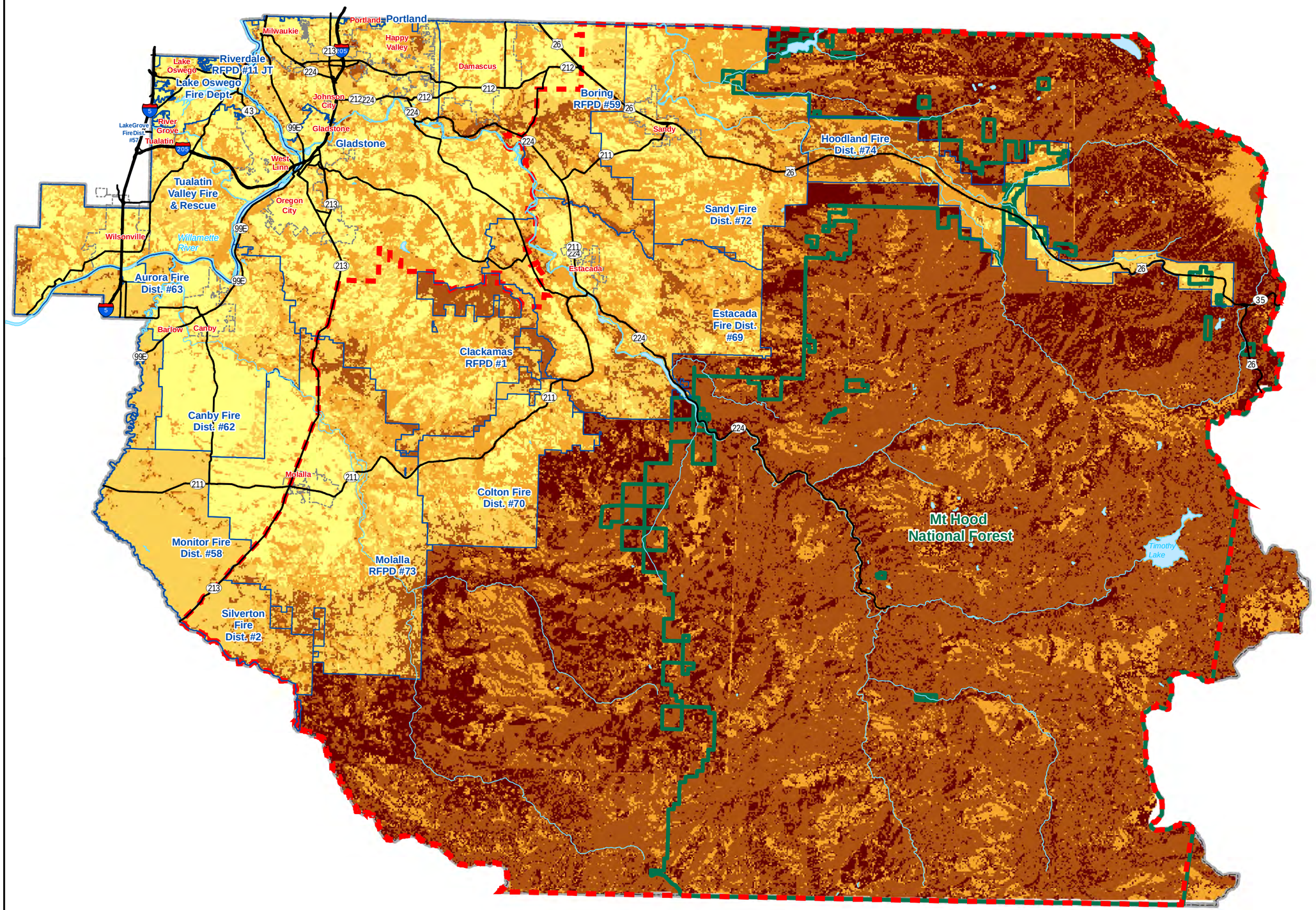
Overall Risk of Wildfire in Clackamas County



Legend

- Fire Districts
- Oregon Department of Forestry
- Mt Hood National Forest
- City Boundaries

Overall Wildfire Risk

Value

- Low
- Low - Moderate
- Moderate
- Moderate - High
- High

Overall Risk of Wildfire in Clackamas County determined from state-wide risk assessment model outlined in 2004 by the Oregon Department of Forestry using topography, weather, fuels, historic fire and ignition risk, community values and protection capabilities. Overall risk was not updated in 2012 due to lack of significant data changes.

Map #10

N W E S

0 1 2 4 6 8 Miles

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CHAPTER 5: HAZARDOUS FUELS REDUCTION & BIOMASS UTILIZATION

Fuels Reduction and Biomass Utilization in Clackamas County

Reducing hazardous fuels around homes, along transportation corridors and at a landscape scale can significantly minimize losses to life, property and natural resources from wildfire, which is a core focus of the Clackamas Community Wildfire Protection Plan.

Fuels Reduction Objectives (Revised 2012)

I. Implement fuels reduction projects in high-risk areas.

II. Coordinate administration of a county-wide fuels reduction program.

III. Consider opportunities for biomass utilization and adding value to extracted vegetation.

IV. Integrate fuels reduction into natural resources management plans to balance public safety with sustainable ecological management and economic activities.

Fuels Reduction & Biomass Utilization Accomplishments

The 2005 CCWPP served as a tool to enable partners to be highly competitive for grant funds to implement fuels reduction projects in communities at risk and adjacent public and private forest lands. In fact, over 1.7 million dollars has been procured to support fuels reduction projects, accounting for about 67% of the total grant funds received since 2005. The majority of fuels reduction projects implemented in the County have been led by the ODF, the North Clackamas Parks and Recreation District and the Clackamas Soil and Water Conservation District, using Title III and Western States Fire Manager's grant programs. Below please find the total funds received and fuels reduction acreage treated since 2005. For more information regarding the specific grants and project components, please see Table 1-2. CCWPP grant Funded Projects 2005-2012.

- Fuels Reduction Dollars: $1,710,968
  - ✓ Federal Acres: 141
  - ✓ Public/Private Acres: 1,039

    Total Treated Acres: 1,180

ODF Cost Share Program

Clackamas County is home to over 10,000 small woodland owners, and is rich in forest resources. However, many of these forest land owners have limited budgets for implementing fuels reduction projects. In addition, there is a compelling need to educate landowners about wildfire potential on their forest lands how to mitigate for fire while protecting and enhancing forest stands.

For this reason, the Molalla Unit of the Oregon Department of Forestry procured grant funds to support a fuels reduction program to provide technical and financial assistance to individuals and communities that have significant risk to wildfires.

The current grant programs encompass three scopes of interest: the promotion of healthy forests across the landscape, the development of defensible space around individual homes near forested lands, and the provision of support services to help communities near the forest become Firewise Communities. The cost share program is designed to offset the costs associated with forest

health and defensible space projects, and are typically paid using a 75% (ODF), 25% (landowner)ratio.

ODF Fuels Reduction Crew

The ODF Fuels Reduction Crew (Crew#58) is an eight to twelve-member seasonal crew responsible for implementing fuels reduction projects on public land or in community common areas. Crew#58 supplements the cost share program, which targets individual landowners. The crew is also trained in initial wildland fire response tactics, providing them with professional skills and enhancing ODF's ability to respond to local fire ignitions. Crew#58 has been funded by Title III grants for more than ten years and has become an essential element in fire prevention and response for the Molalla Unit of ODF. The reduction in funding levels and eventual sunset of the Secure Rural Schools and Self-Determination Act (Title III) jeopardizes ODF's ability to continue supporting the Fuels Reduction Crew.

Clackamas Parks Wildfire Management Plan

The *Clackamas Parks Wildfire Management Plan*[1] provides direction for reducing wildfire risk in parks managed by Clackamas County Parks (CCP) and North Clackamas Parks and Recreation District (NCPRD). Both agencies will use this plan to guide park management activities and help make park ecosystems more fire resilient, fire resistant, and where appropriate, fire adapted.

The Wildfire Management Plan provides a county wide assessment of park fire risk, with descriptions, maps and recommendations to manage wildfire risk. The project was initiated in response to findings from the 2005 CCWPP, which found that some parks, such as Mt. Talbert Nature Park, had potentially high concentrations of natural fuels near developed residential areas. As a result, the current planning effort was undertaken to provide fire management planning for parks with the highest risk for wildfire.

The project team assessed fire risk for all 89 CCP Parks and NCPRD parks and open spaces. The list was narrowed to 50 priority parks that were divided into high, moderate and low fire risk categories. Wildfire management strategies were developed for each of these sites, and park managers began implementing these recommendations for the highest priority parks in the Spring, Summer and Fall of 2012. For more information, please see the *Clackamas Parks Wildfire Management Plan.*

Fuels Reduction Actions

The Fuels Reduction Action Plan has been updated since 2005 to reflect accomplishments and ensure that the action plan remains relevant to current issues (Table 1-1.2012 CCWPP Action Plan). The high priority risk assessment actions to be addressed by the wildfire planning team will be to:

1) Develop and maintain and inventory of potential and successful FR projects by meeting with parks and natural lands managers quarterly.
2) Continue securing funding to implement projects/ hire seasonal ODF staff.
3) Coordinate a Fuels Reduction Project Tour.

[1] http://www.clackamasparkswildfire.org/

Sustaining Efforts: Collaboration & Biomass Utilization

Although CCWPP partners have been successful in securing funding for fuels reduction projects, the current economic climate and shifting governmental priorities could reduce grant allocations for this type of work. This underscores the need to develop innovative partnerships and identify revenue-generating biomass utilization opportunities in order to continue to reduce wildfire hazards throughout the county.

In an effort to create a more coordinated county-wide fuels reduction program, the 2012 CCWPP update included input from City and State Parks, Metro and other natural land managers regarding potential projects for consideration (Table 5-1). Map #11 illustrates the areas throughout the county that would benefit from fuels reduction work. Map #13 displays these areas in conjunction with Communities at Risk identified by local fire agencies to assist in project prioritization and planning. The county-wide fuels reduction partners have agreed to meet quarterly to share information and ideas for integrating fuels reduction strategies into natural resources management plans as a sustained, programmatic element.

Despite efforts to identify biomass utilization opportunities, the fuels reduction program in Clackamas County has not been able to access this market. In 2005, the Clackamas SWCD received a Title III grant to identify local inventory and volumes, sort yard feasibility and market analysis and development of a business plan to recruit private investment dollars. The market analysis resulted in a negative projection for a local sort yard due to the state of the log and chip market at the time.

Several attempts have also been made to access biomass markets working directly with nearby co-gen facilities, but there hasn't been sufficient material to offset the cost of transportation. However, the biomass industry continues to grow and new opportunities are developing. For example, Estacada High School currently uses a wood-fired boiler, Sustainable Northwest continues to work with rural communities to support biomass utilization for economic growth, and the Specialty Wood Products Website is connecting timber operators to biomass markets.

In addition, *Clackamas County's Agriculture Investment Plan* (2009)[2] includes a detailed Biomass Waste Utilization Economic Opportunity Strategy to grow markets for agriculture and timber producers. CCWPP Partners will continue to use biomass utilization as a tool to promote local economic development, reduce hazardous fuels and enhance the use of renewable energy locally and regionally.

[2] Clackamas County Business and Economic Development (2012). *Clackamas County Agricultural Investment Plan*.

Table 5-1. Proposed Fuels Reduction Projects (2012)

Project Name	Project Manager	Land Owner	Land Manager	Priority	Vegetation Management Goals					Data Collected	Land Cover	Project Status	Funding
					Fuels Reduction	Invasive Species	Oak Restoration	Defensible Space	Critical Watershed				
BARTON PARK	County Parks	County Parks	County Parks	High	Yes	Yes	No	No	No	No	Open Space	Maint/Monit	Agency Funded
BILLY GOAT ISLAND	County Parks	County Parks	County Parks	Medium	Yes	Yes	No	No	No	No	Open Space	Maint/Monit	Funding Needed
HEBB PARK	County Parks	County Parks	County Parks	High	Yes	Yes	No	No	No	No	Open Space	Maint/Monit	Agency Funded
MADRONE WALL	County Parks	County Parks	County Parks	High	Yes	Yes	No	No	No	No	Open Space	In Process	Funding Needed
METZLER PARK	County Parks	County Parks	County Parks	High	Yes	Yes	No	No	No	No	Open Space	Maint/Monit	Agency Funded
THREE CREEKS	County Parks	County Parks	County Parks	High	Yes	Yes	Yes	No	No	No	Open Space	Maint/Monit	Agency Funded
BARLOWTRAIL	County Parks	County Parks	County Parks	Low	Yes	Yes	No	Yes	No	Yes	OTHER	Proposed	Funding Needed
MCIVER	County Parks	County Parks	Private	High	Yes	Yes	No	Yes	Yes	Yes	Forest Residential	Proposed	Funding Needed
EAGLE FERN CAMP	County Parks	County Parks	County Parks	Low	No	Yes	No	No	No	Yes	Open Space	Planned	Funding Needed
SPRING PARK	County Parks	County Parks	County Parks	High	Yes	Yes	No	Yes	No	No	Open Space	Proposed	Funding Needed
FOREST CREEK	County Parks	County Parks	County Parks	High	Yes	Yes	No	Yes	No	No	Open Space	Proposed	Funding Needed
PARKWAY WOODS	Gladstone	Private	Private	High	Yes	Yes	No	Yes	No	No	Forest Residential	Proposed	Funding Needed
HAPPY VALLEY NATURE TRAIL	Happy Valley	Happy Valley	NCPRD	High	Yes	Yes	No	Yes	No	No	Forest Residential	Maint/Monit	Agency Funded
HighLAND SUMMIT	Happy Valley	Happy Valley	NCPRD	Medium	Yes	Yes	No	Yes	No	No	Open Space	In Process	Agency Funded
COOKS BUTTE PARK	Lake Oswego	Lake Oswego	Lake Oswego	High	Yes	No	No	Yes	No	No	Public Park	Proposed	Funding Needed
EAST WALUGA	Lake Oswego	Lake Oswego	Lake Oswego	Medium	Yes	Yes	No	Yes	Yes	No	Public Park	Proposed	Funding Needed
IRON MOUNTAIN	Lake Oswego	Lake Oswego	Lake Oswego	High	Yes	Yes	No	Yes	No	No	Open Space	Proposed	Funding Needed
HOLT	Local Fire Agency	Private	Private	High	Yes	Yes	No	Yes	No	No	Forest Residential	Proposed	Funding Needed
DHOOGHE RD	Local Fire Agency	Private	Private	High	Yes	Yes	No	Yes	No	No	Forest Residential	Proposed	Funding Needed
FERNWOOD RD	Local Fire Agency	Private	Private	High	Yes	Yes	No	Yes	No	No	Forest Residential	Proposed	Funding Needed
WHISKEY HILL	Local Fire Agency	Private	Private	High	Yes	Yes	No	Yes	No	No	Forest Residential	Proposed	Funding Needed
EILERS	Local Fire Agency	Private	Private	High	Yes	Yes	No	Yes	No	No	Forest Residential	Proposed	Funding Needed
BUTTEVILLE	Local Fire Agency	Private	Private	High	Yes	Yes	No	Yes	No	No	Forest Residential	Proposed	Funding Needed
SUNDOWNER	Local Fire Agency	Private	Private	High	Yes	Yes	No	Yes	No	No	Forest Residential	Proposed	Funding Needed
BARTELL	Local Fire Agency	Private	Private	High	Yes	Yes	No	Yes	No	No	Forest Residential	Proposed	Funding Needed
GOLD,BRONZE, NICKEL	Local Fire Agency	Private	Private	High	Yes	Yes	No	Yes	No	No	Forest Residential	Proposed	Funding Needed
LOLO PASS	Local Fire Agency	Private	Private	High	Yes	Yes	No	Yes	Yes	No	Forest Residential	Proposed	Funding Needed
SALO	Local Fire Agency	Private	Private	High	Yes	Yes	No	Yes	No	Yes	Forest Residential	Proposed	Funding Needed
BLUE	Local Fire Agency	Private	Private	High	Yes	Yes	No	Yes	No	Yes	Forest Residential	Proposed	Funding Needed
SAWTELL	Local Fire Agency	Private	Private	High	Yes	Yes	No	Yes	No	Yes	Forest Residential	Proposed	Funding Needed
SOUTH MAPLE GROVE	Local Fire Agency	Private	Private	High	Yes	Yes	No	Yes	No	Yes	Forest Residential	Proposed	Funding Needed
BOY SCOUT CAMP	Local Fire Agency	Private	Private	High	Yes	Yes	No	Yes	No	Yes	Forest Residential	Proposed	Funding Needed
GROSHUNG	Local Fire Agency	Private	Private	High	Yes	Yes	No	Yes	No	Yes	Forest Residential	Proposed	Funding Needed
SOUTH BUTTE CREEK	Local Fire Agency	Private	Private	High	Yes	Yes	No	Yes	No	Yes	Forest Residential	Proposed	Funding Needed
RANGER WOODS	Local Fire Agency	Private	Private	High	Yes	Yes	No	Yes	No	Yes	Forest Residential	Proposed	Funding Needed

Project Name	Project Manager	Land Owner	Land Manager	Priority	Vegetation Management Goals					Data Collected	Land Cover	Project Status	Funding
					Fuels Reduction	Invasive Species	Oak Restoration	Defensible Space	Critical Watershed				
WILLAMETTE NARROWS	Metro	Metro	Metro	High	Yes	Yes	Yes	Yes	No	No	Forest Residential	In Process	Agency Funded
WILLAMETTE NARROWS PHASE 2	Metro	Private	Private	Medium	Yes	Yes	Yes	Yes	No	No	Forest Residential	Proposed	Funding Needed
CANEMAH INVASIVES	Metro	Oregon City	Metro	High	Yes	Yes	No	No	No	No	Public Park	Proposed	Funding Needed
CANEMAH OAK	Metro	Metro	Metro	High	Yes	Yes	Yes	No	No	No	Public Park	In Process	Grant Funded
CLEAR CREEK PRAIRIE	Metro	Metro	Metro	Medium	Yes	Yes	Yes	No	No	No	Open Space	In Process	Grant Funded
CLEAR CREEK THINNING	Metro	Metro	Metro	Medium	Yes	Yes	No	No	No	No	Forest Residential	In Process	Agency Funded
GRAHAM OAKS	Metro	Metro	Metro	High	Yes	Yes	Yes	No	No	Yes	Open Space	In Process	Funding Needed
NEWELL INVASIVES	Metro	Metro	Metro	High	Yes	Yes	No	No	Yes	No	Open Space	Proposed	Funding Needed
SCOUTER MOUNTAIN STABILIZATION	Metro	Metro	Metro	High	Yes	Yes	No	No	No	No	Open Space	Planned	Grant Funded
SPRINGBROOK PARK	Metro	Lake Oswego	Lake Oswego	Medium	Yes	Yes	No	Yes	Yes	No	Public Park	Proposed	Funding Needed
ELLA V. OSTERMAN	NCPRD	Happy Valley	NCPRD	Medium	Yes	Yes	No	Yes	No	No	Open Space	Maint/Monit	Agency Funded
MT TALBERT NATURAL AREA	NCPRD	NCPRD	NCPRD	High	Yes	Yes	Yes	Yes	No	No	Forest Residential	Maint/Monit	Agency Funded
SAWTELL & COOPERS ROADS	ODF	Private	Private	High	Yes	Yes	No	Yes	No	No	Forest Residential	Proposed	Funding Needed
ELK PRARIE FAMILY CAMP	ODF	Private	Private	High	Yes	Yes	No	Yes	No	No	Forest Residential	Proposed	Funding Needed
BUTTE CREEK	ODF	Private	Private	High	Yes	Yes	No	Yes	No	No	Forest Residential	Proposed	Funding Needed
LAIS ROAD & NORTH FORK	ODF	Private	Private	High	Yes	Yes	No	Yes	No	No	Forest Residential	Proposed	Funding Needed
RAMSBY UNPROTECTED	ODF	Private	Private	High	Yes	Yes	No	Yes	No	No	Forest Residential	Proposed	Funding Needed
LOWER HIGHLAND & RIDGE	ODF	Private	Private	High	Yes	Yes	No	Yes	No	No	Forest Residential	Proposed	Funding Needed
EAST HIGHLAND	ODF	Private	Private	High	Yes	Yes	No	Yes	No	No	Forest Residential	Proposed	Funding Needed
WAPANITIA	ODF	Private	Private	High	Yes	Yes	No	Yes	No	No	Forest Residential	Proposed	Funding Needed
MOLALLA RIVER STATE PARK	OPRD	OPRD	Private	High	Yes	Yes	No	Yes	No	No	Forest Residential	Proposed	Funding Needed
MOUNTAIN VIEW CEMETERY	Oregon City	Oregon City	Oregon City	High	Yes	Yes	No	No	No	No	Open Space	Proposed	Funding Needed
SINGER CREEK PARK	Oregon City	Oregon City	Oregon City	Medium	Yes	Yes	No	Yes	No	No	Open Space	Proposed	Funding Needed
ATKINSON PARK	Oregon City	Oregon City	Oregon City	High	Yes	Yes	No	Yes	No	No	Open Space	Proposed	Funding Needed
WATERBOARD PARK	Oregon City	Oregon City	Oregon City	High	Yes	Yes	No	Yes	No	No	Open Space	Proposed	Funding Needed
I -205 ROW	OTHER	OTHER	OTHER	High	Yes	Yes	No	Yes	Yes	No	ROW	Proposed	Funding Needed
SANDY RIVER PARK	Sandy	Sandy	Sandy	High	Yes	Yes	No	No	No	No	Open Space	Proposed	Funding Needed
GOVERNMENT CAMP	USFS	OTHER	USFS	Medium	Yes	No	No	Yes	No	No	USFS	Proposed	Funding Needed
KIWANIS CAMP	USFS	OTHER	USFS	Medium	Yes	No	No	Yes	No	No	USFS	Proposed	Funding Needed
SUMMER HOMES	USFS	USFS	USFS	Medium	Yes	No	No	Yes	No	No	USFS	Proposed	Funding Needed
TRILLIUM	USFS	USFS	USFS	Medium	Yes	No	No	Yes	No	No	USFS	Proposed	Funding Needed
WAPINITIA	USFS	OTHER	USFS	Medium	Yes	No	No	Yes	No	No	USFS	Proposed	Funding Needed
JOE GRAHAM	USFS	USFS	USFS	Medium	Yes	No	No	Yes	No	No	USFS	Proposed	Funding Needed
SISI	USFS	USFS	USFS	Medium	Yes	No	No	Yes	No	No	USFS	Proposed	Funding Needed

Project Name	Project Manager	Land Owner	Land Manager	Priority	Vegetation Management Goals					Data Collected	Land Cover	Project Status	Funding
					Fuels Reduction	Invasive Species	Oak Restoration	Defensible Space	Critical Watershed				
RIPPLEBROOK	USFS	USFS	USFS	Medium	Yes	No	No	Yes	No	No	USFS	Proposed	Funding Needed
TIMBER LAKE	USFS	USFS	USFS	Medium	Yes	No	No	Yes	No	No	USFS	Proposed	Funding Needed
THREE LYNX	USFS	USFS	USFS	Medium	Yes	No	No	Yes	Yes	No	USFS	Proposed	Funding Needed
SANDY WS	USFS	Sandy	USFS	Medium	Yes	No	No	Yes	No	No	USFS	Proposed	Funding Needed
POWERLINE	USFS	OTHER	USFS	Medium	Yes	No	No	Yes	No	No	USFS	Proposed	Funding Needed
NF BEDFORD	USFS	USFS	OTHER	Medium	Yes	No	No	Yes	Yes	No	USFS	Proposed	Funding Needed
ZIG ZAG RANGER STN	USFS	USFS	USFS	Medium	Yes	Yes	No	Yes	No	No	USFS	Proposed	Funding Needed
BURNSIDE/MADDOX	West Linn	West Linn	West Linn	High	Yes	Yes	No	Yes	Yes	No	Open Space	In Process	Funding Needed
WILDERNESS PARK,	West Linn	West Linn	West Linn	High	Yes	Yes	No	Yes	No	No	Open Space	Proposed	Funding Needed
HIDDEN SPRINGS	West Linn	West Linn	West Linn	Medium	Yes	Yes	No	Yes	No	No	Open Space	In Process	Funding Needed
INTERSTATE TRACTOR	West Linn	West Linn	West Linn	Medium	Yes	Yes	No	Yes	Yes	No	Open Space	Proposed	Funding Needed
MARY S YOUNG PARK	West Linn	OPRD	West Linn	High	Yes	Yes	No	No	Yes	No	Open Space	In Process	Funding Needed
ROBINWOOD PARK	West Linn	West Linn	West Linn	Medium	Yes	Yes	No	Yes	No	No	Open Space	Proposed	Funding Needed
THE WHITE OAK SAVANNA	West Linn	West Linn	West Linn	High	Yes	Yes	Yes	Yes	Yes	No	Open Space	Proposed	Funding Needed
TROON OPEN SPACE	West Linn	West Linn	West Linn	Medium	Yes	Yes	No	Yes	Yes	No	Open Space	Proposed	Funding Needed
BUCK/BARLow	West Linn	West Linn	West Linn	Low	Yes	Yes	No	No	Yes	No	Open Space	Proposed	Funding Needed
WILDWOOD OPEN SPACE	West Linn	West Linn	West Linn	Medium	Yes	Yes	No	Yes	No	No	Open Space	Proposed	Funding Needed
WEST LINN High SCHOOL	West Linn	OTHER	West Linn	High	Yes	Yes	No	Yes	No	No	Open Space	Proposed	Funding Needed
CAMASSIA	West Linn	OTHER	West Linn	High	Yes	Yes	No	Yes	No	No	Open Space	Proposed	Funding Needed
TUALATIN WETLANDS	West Linn	West Linn	West Linn	High	Yes	Yes	No	No	No	No	Open Space	Proposed	Funding Needed
WILSONVILLE SROZ 1	Wilsonville	Wilsonville	Wilsonville	High	Yes	Yes	Yes	Yes	Yes	Yes	Open Space	Proposed	Funding Needed
WILSONVILLE SROZ 2	Wilsonville	Wilsonville	Wilsonville	High	Yes	Yes	Yes	Yes	Yes	Yes	Open Space	Proposed	Funding Needed
WILSONVILLE SROZ 3	Wilsonville	Wilsonville	Wilsonville	High	Yes	Yes	Yes	Yes	Yes	Yes	Open Space	Proposed	Funding Needed
WILSONVILLE SROZ 4	Wilsonville	Wilsonville	Wilsonville	High	Yes	Yes	Yes	Yes	Yes	Yes	Open Space	Proposed	Funding Needed
WILSONVILLE SROZ 5	Wilsonville	Wilsonville	Wilsonville	High	Yes	Yes	Yes	Yes	Yes	Yes	Open Space	Proposed	Funding Needed
WILSONVILLE SROZ 6	Wilsonville	Wilsonville	Wilsonville	High	Yes	Yes	Yes	Yes	Yes	Yes	Open Space	Proposed	Funding Needed
WILSONVILLE SROZ 7	Wilsonville	Wilsonville	Wilsonville	High	Yes	Yes	Yes	Yes	Yes	Yes	Open Space	Proposed	Funding Needed
WILSONVILLE SROZ 8	Wilsonville	Wilsonville	Wilsonville	High	Yes	Yes	Yes	Yes	Yes	Yes	Open Space	Proposed	Funding Needed
WILSONVILLE SROZ 9	Wilsonville	Wilsonville	Wilsonville	High	Yes	Yes	Yes	Yes	No	Yes	Open Space	Proposed	Funding Needed

Fuels Reduction Projects 2012

Fuels Reduction Projects
Fire Districts
Oregon Department
Mt Hood National Forest
City Boundaries

Fuels reduction projects were identified with input from City, County and State Parks, Metro, USFS, ODF and other natural land managers to reduce hazardous fuels and create wildfire resilient landscapes. Projects represented here range from proposed to completed.

Map #11

N
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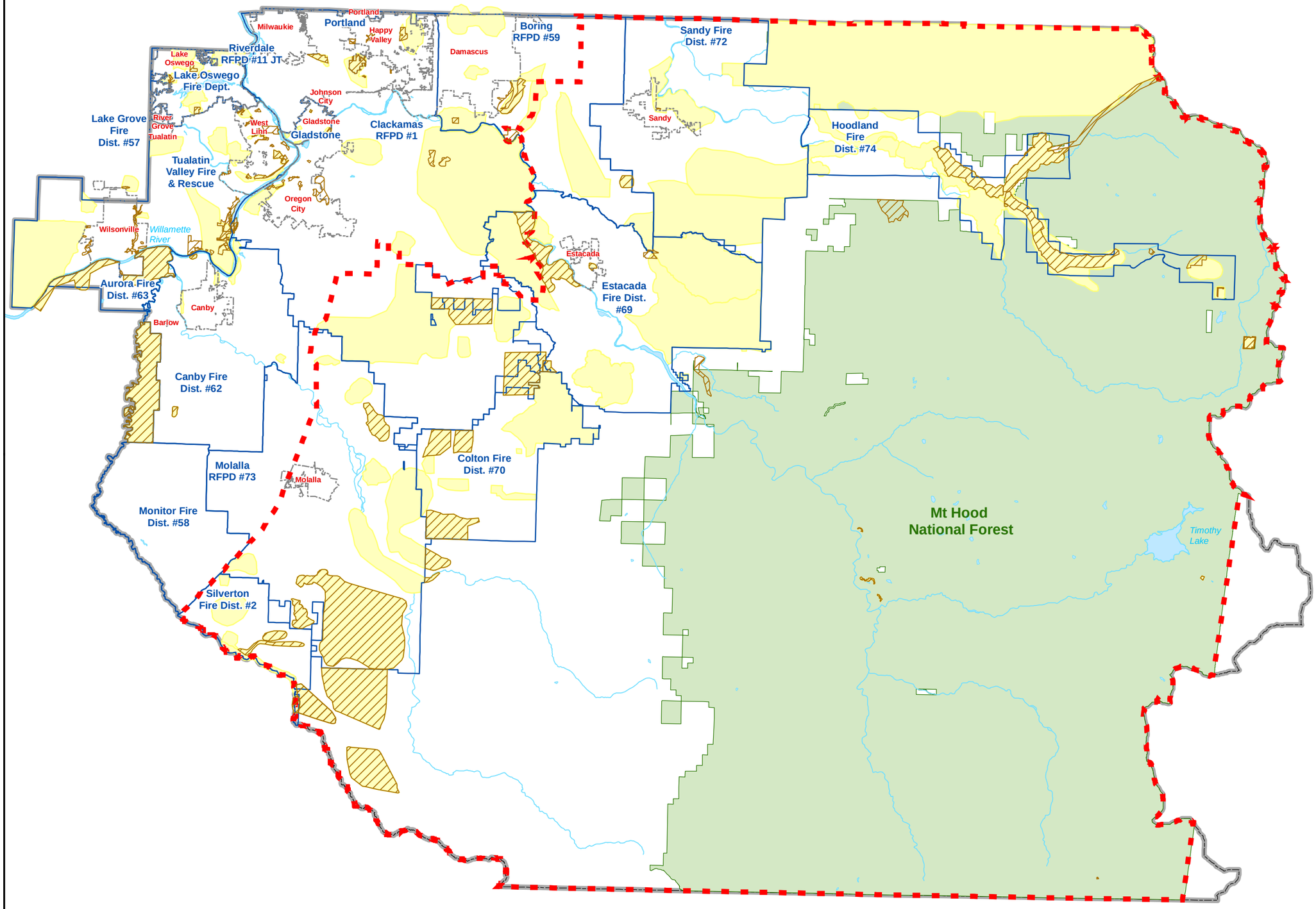
0 1 2 4 6 8
Miles

CLACKAMAS COUNTY
GEOGRAPHIC INFORMATION SYSTEMS

DEPARTMENT OF INFORMATION SERVICES/GEOGRAPHIC INFORMATION SYSTEMS
121 LIBRARY COURT
OREGON CITY, OREGON 97045

CCWPP Communities at Risk and Fuels Reduction Projects 2012



Fuels Reduction Projects
Communities at Risk
Fire Districts
Oregon Department of Forestry
Mt Hood National Forest
City Boundaries

Map #13

N
W E
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Miles

CLACKAMAS COUNTY

GEOGRAPHIC INFORMATION SYSTEMS

DEPARTMENT OF INFORMATION SERVICES/GEOGRAPHIC INFORMATION SYSTEMS
121 LIBRARY COURT
OREGON CITY, OREGON 97045

CHAPTER 6: EMERGENCY OPERATIONS

Clackamas Fire Operations Group (CFOG)

The Clackamas Fire Operations Group (CFOG) is a technical subcommittee of Clackamas District Fire Defense Board. The CFOG is responsible for coordinating fire operations issues and procedures for all fire districts in Clackamas County. The CFOG extended its membership to wildland fire agencies to address potential wildfire issues.

The CFOG has been focused on regional fire operations issues, and as such has not been meeting regularly to discuss local issues. The 2012 CCWPP Update engaged the CFOG to update the CWPP Emergency Operations Action Plan, and invigorated the group to continue meeting to address the high priority actions that need to be taken to improve wildland response efforts.

Emergency Operations Objectives

I. Enhance interoperability of fire districts, USFS, ODF, and neighboring jurisdictions.

II. Improve upon current system for utilizing fire resources within the county and neighboring jurisdictions.

III. Clarify and exercise policies and procedures from the Fire Operations Center (FOC) and Emergency Operations Center (EOC).

The following Objective has been completed and thereby removed from the list because ICS is now integrated pragmatically into training standards.
Strengthen Incident Command Systems and improve efficiency in wildfire response efforts by setting and implementing consistent, all-hazard training standards.

Emergency Operations Accomplishments

Many of the action items pertaining to integration of the National Incident Management System and Incident Command System revised training standards into training programs have been accomplished. In addition, the Department of Public Safety Standards and Training (DPSST) and National Wildland Coordinating Group (NWCG) have made progress in aligning training standards for wildland and structural firefighters.

The Clackamas County Fire Prevention Cooperative procured $100,000 in funding to purchase and post address signs in the highest priority areas throughout the County. Each Fire Agency provided high priority areas for signage (Table 6-1. Address Signage)

Emergency Operations Actions

The Emergency Operations Action Plan has been updated since 2005 to reflect accomplishments and ensure that the action plan remains relevant to current issues (Table 1-1.2012 CCWPP Action Plan). The high priority risk assessment actions to be addressed by the wildfire planning team will be to:

1) Include 12 hour operation period in FDB Fire Mutual Aid Agreement.
2) Develop an FDB Communications Work Group.
3) Conduct a Conflagration Exercise.

Table 6-1. Priority Roads for Address Signage

Molalla Fire District	Colton Fire District	Estacada Fire District	Hoodland Fire District	Monitor Fire District	Canby Fire District	Boring Fire District	Clackamas Fire District	Silverton Fire District
Wright Rd	Bitner Mill Rd	Hillockburn Rd	Bailey Rd	Hwy 211	Central Point Rd	Gold Rd	Unger Rd	Blair Rd
Ramsby Rd	Cox Rd	Springwater Rd	Cottonwood Rd	Barlow Rd	Union Hall Rd	Bronze Rd	Lewellen Rd	Butte Creek Rd
Fernwood Rd	elwood Rd	Benjamin Rd	Country Club Lp	Meridian Rd	Bremer Rd	Iron Rd	Butte Rd	Evergreen St
Callahan Rd	Log House Rd	Habelt Rd	Little River Rd	Kropf Rd	New Era Rd	Nickel Rd	Viola Welch Rd	Groshong Rd
Wilhoit Rd	Look Rd	Horner Rd	Minikahda Ave	**$5,424.00**	**$4,271.40**	Land Rd	Fellows Rd	Maple Grove Rd
Ball Rd	Mountain View Rd	Morgan Rd	Mountain Dr			Eagle View Dr	Leisure Ln	Marquam Cir
Kuban Rd	Shibley Rd	Pederson Rd	Shadow Ln			**$710.50**	Forest Park Rd	Meadow Ct
$4,645.60	Uphill Rd	Sparky Ln	Twin Bridges Ln				Woodview Ln	Nowlens Bridge Rd
	Upper Highland Rd	**$4,756.80**	Wildwood Ave				Mountain Ter	Prospect Dr
	Wilcken Rd		Yellow Brick Rd				Schockley Rd	Wildcat Rd
	Bonney Rd		Arthur Hailey Rd				Mosier Creek Ln	**$6,267.60**
	Engstrom Rd		Faubion Lp				Dianne Dr	
	schieffer Rd		Hemlock Dr				Shelly Ln	
	$4,002.00		Hillview Dr				Alberta Rd	
			Hofeldt Dr				Cate Ln	
			Jennie Ln				Schuebel Ln	
			McFarland Rd				Jean Way	
			Old Smokey Rd				Redfir Dr	
			Pinner Rd				Hayfield Rd	
			Salmonberry Rd				**$4,625.50**	
			Section Line Rd					
			Spring St					
			Thimbleberry St					
			Tigerlilly Dr					
			$2,523.00					

CHAPTER 7: EDUCATION AND COMMUNITY OUTREACH

Clackamas County Fire Prevention Cooperative

The Clackamas County Fire Prevention Cooperative is a consortium of structural and wildland fire agencies, as well as other public interest groups with a vested interest in fire prevention. The Clackamas County Fire Co-op addresses both structural and wildland fire prevention, and has incorporated the CCWPP educational and outreach effort into its program.

Clackamas County Fire Prevention Co-op Objectives

I. To unite those agencies engaged in fire prevention, safety, and public education in the Clackamas County area.

II. To promote an interagency exchange of ideas, programs, and resources in the area of fire prevention, safety, and public education.

III. To promote, coordinate, and actively support interagency participation in fire prevention activities.

IV. To act as a point of contact for the exchange of professional information among its members and the public.

V. To promote a reduction in the number of human-caused fires and preventable injuries within the jurisdiction of the Co-op through a program of public education.

Fire Prevention Cooperative CWPP Accomplishments

The Clackamas CWPP provided the catalyst for a great deal of wildfire prevention and outreach activities throughout the County. The Co-op has been successful in obtaining grant funds to implement the four highest priority actions identified in the Clackamas CWPP Action Plan:

1) Developed and distributed Wildland Urban Interface packet.
2) Installed fire danger rating boards in key viewing areas throughout the County.
3) Developed and distributed Burn Permitting and Fire Restrictions Brochure.
4) Incorporated fire-safety messages on Safeway grocery bags.

Education & Community Outreach Actions

The Education & Community Outreach Action plan has been updated since 2005 to reflect accomplishments and ensure that the action plan remains relevant to current issues (Table 1-1.2012 CCWPP Action Plan). The high priority risk assessment actions to be addressed by the wildfire planning team will be to:

1) Develop Firewise toolkit for CAR's.
2) Create incentives for fuels reduction.
3) Update and distribute the Burn Permitting and Fire Restrictions Brochure.
4) Implement a Burn Barrel Program.
5) Continue to improve address signage throughout the County.

2012 CWPP Public Outreach Process

In an effort to align public outreach processes, the WFPEC partnered with the North Clackamas Parks and Recreation District Wildfire Management Plan team to use a variety of forums for engaging and educating the public about wildfire hazards. Flyers and notifications were sent to homes in the WUI area adjacent to County Parks for which fuels reduction activities were planned. A website was also established to provide wildfire resources for the public and participating agencies.

In addition, two neighborhood workshops were conducted to educate the public about wildfire risk, provide an opportunity for citizens to give input on plan recommendations and proposed projects; and learn about ways to reduce risk on their own property. Feedback from the public helped either confirm or change the planning process, outcomes, and individual park management plans as well as CCWPP action items. The first workshop, February 7th, 2012 at the Carver School focused on the Madrone Wall fuels reduction project. For details regarding these workshops, please see the *Clackamas Parks Wildfire Management Plan.*

Firewise Community/USA Success Stories

ODF received Title III funding to promote the Firewise Communities/USA Program, with the goal of creating certified communities in high priority Communities at Risk. The five steps to become a Firewise Community are as follows:

- Obtain a wildfire risk assessment as a written document from your state forestry agency or fire department.
- Form a board or committee, and create an action plan based on the assessment.
- Conduct a "Firewise Day" event.
- Invest a minimum of $2 per house in local Firewise actions for the year.
- Submit an application to your state Firewise liaison.

Zig Zag Village & Government Camp

Zig Zag Village and Government Camp have been identified as Communities at Risk (CAR) by the Hoodland Fire District. These communities are aware of the risk of wildfire and are taking steps to mitigate this risk by participating in the National Firewise Recognition Program. Zig Zag Village and Government Camp located just off of Highway 26 on Mount Hood. There are approximately 75 homes in Zig Zag and over 400 in Government Camp. These communities are excellent examples of the Wildland Urban Interface because they are characterized by residential homes surrounded by heavy fuels, limited access, steep slopes and limited protection capability. In addition, the majority of homes in these areas are vacation homes, making it more difficult to engage homeowners in wildfire risk reduction.

The Zig Zag Home Owners Association and Government Camp Community Planning Organization worked with the ODF and Hoodland Fire to assess wildfire hazards throughout the community and develop strategies to mitigate them. Firewise Community Clean-Up Day were held to begin implementing the Firewise recommendations for becoming more wildfire resilient. Participation in the Firewise Communities/USA Program is an ongoing process of community commitment to wildfire safety. ODF and Hoodland Fire will continue working with the Zig Zag Village HOA to reduce wildfire hazards and retain Firewise/USA certification.

Table 7-1. 2012 Clackamas Fire Prevention Co-op Activities

Current Activities	Lead Agency	Effectiveness	Cause Type
All Year			
Chimney Brush Program	Estacada, Sandy, Hoodland	High	General
CERT Program in Highschools	Silverton, Estacada	High	General
Address Sign Program	TVF&R, ODF, Silverton, Hoodland	High	General
Fuels Reduction Cost Share	ODF	High	Debris Burning
JFIN Fire Safe Children and Families Programs	All Fire Co-op Members	High	Juveniles
Free smoke alarm programin high risk areas.	SFMO, TVF&R	High	General
Senior Fire and Fall Prevention and Train-the-Trainer Safety Program	SFMO, TVF&R	High	General
Burn Permitting	All Fire Co-op Members	High	Debris Burning
Raids on Smoke shops /Retail Stores	All Fire Co-op Members	High	Smoking
Education Events with Grade School	All Fire Co-op Members	High	Juveniles
Safety Fairs, Community Preparedness	All Fire Co-op Members	High	General
Sparky's Hazard House	All Fire Co-op Members	High	General
Firewise Hand Outs	Fire Co-op	Moderate	Smoking
Defensible Space Presentations	Fire Co-op	Moderate	General
Wood Cutter Program	Molalla, ODF, Hoodland	Moderate	Equipment Use
SFMO has Juvenile arson outreach materials: Measure 11	SFMO	Moderate	Juveniles
Respond to burn complaints	Fire Co-op	Low	Recreation
Spring			
Tree School	ODF	High	General
K-12 Team Teaching North & South	All Fire Co-op Members	High	General
Spark Arrester	All Fire Co-op Members	High	Equipment Use
Station Tours and Pub Ed Requests	Fire Co-op	Moderate	Juveniles
PNW Sportsman Show	USFS	Moderate	Recreation
Molalla Sportsman Show	ODF	Moderate	Recreation
Annual ODF operators dinner industrial fire prevention.	ODF	Moderate	Equipment Use
Articles in local papers	Fire Co-op	Moderate	General
School Arson Prevention Program	Fire Co-op	Moderate	Arson
Summer			
Daily & Weekly Patrol, Post Signs	ODF	High	Debris Burning, Equipment Use
RUCP Articles in news paper	ODF	High	Equipment Use
Fly-in Cruise-in	ODF	Moderate	General
Fall			
PTA and Grades K-2,	All Fire Co-op Members	High	Juveniles
World Forestry Center	USFS, ODF	High	General
Score One For Safety (PGE Park)	USFS, ODF	High	General
Annually			
JFIN School Arson	All Fire Co-op Members	High	Arson
Hazard House at Estacada Fire Station	Estacada	High	Juveniles
OSP, CCSO Safety Curriculum	Molalla	Moderate	Recreation
Molalla Town Hall Meeting	Molalla, ODF	Moderate	General
After an Incident			
Work with media after an incident to promote fire prevention.	All Fire Co-op Members	High	General

Table 7-2. Clackamas County Fire Prevention Cooperative Action Plan

Cause	Proposed Activities	Rank	Resources Needed	Potential Funding/Resource Sources	Lead Agency	Timeline	Schedule for Distribution	Cost Estimate	Progress 2012
Debris Burning	Develop a step by step process for outreach to Communities at Risk; including Firewise presentations.	1	Coordination	None Needed	Fire Co-op (with direction from Fire Defense Board)	Long-Term Ongoing	Spring/Fall	$25,000	Firewise presentations have been given at 12 communities at risk. ODF received grant funds to create 2 Firewise Communities before Sept. 30 2012.
Debris Burning	Develop relationships and incentives for a Fuels Reduction Program.	2	Coordination, Staffing, Funding	WFSM, Title III, NFP	ODF, USFS, County/City Parks, Metro, SWCD	Ongoing	All Year	Varies	Collectively, partners were awarded over $1 million to implement fuels reduction projects in Clackamas County; about half of which was an ODF a cost share program for removing hazardous fuels.
Debris Burning	Update the burning brochure and target areas for mailing based on the Communities at Risk.	3	Coordination, Staffing, Funding	NFP, Title III, other grant sources, Fire Districts	Fire Co-op	Short-Term Ongoing	All Year	Received $1,000	The Fire Coop received a Burn barrel grant from KOG in 2007. The barrels need to be manufactured and advertised. $30 each
Debris Burning	Develop and promote "Burn Barrel" program. Strengthen the relationship with the SFMO to build support for the burn barrel program.	4	Coordination, Funding	NFP, Title III, other grant sources	Fire Co-op	Short-Term Ongoing	Could use different videos throughout the year . Could use County Cable.	FREE!	Defensible Space and Debris Burning brochures were created and mailed to all WUI residents in 2006
General	Develop and distribute address signs for homes and potential water sites in the WUI.	1	Coordination, Staffing, Funding	Title III	Fire Co-op	Ongoing	All Year		ODF received Title III funds to purchase and distribute address signs in the WUI.
General	Support home sprinkler campaign	2	Funding	NFP, Title III, other grant sources, Fire Districts	Fire Co-op	Short-Term	All Year	Materials: $150 each Labor: ODF-FREE!	ODF received $$$$ for building and installing Fire Danger rating signs in high priority areas in 2006 and will continue to seek funding.
General	Purchase Fire Danger Rating Signs for all Fire Stations	3	Coordination, Staffing, Funding	NFP, Title III, other grant sources	Fire Co-op	Short-Term	NA	Unknown	Completed in 2006
General	Collect all brochures, handouts, videos; select most effective ones, purchase new materials where needed.	4	Funding and Staffing	NFP, Title III, other grant sources	Fire Co-op	Short-Term Ongoing	Spring/Summer	$30,000	USFS does press releases; ODF provides buckets with fire safety message
General	Work with Law enforcement to implement a firework safety program. Target distributers.	5	Coordination, Staffing, Funding	NFP, Title III, other grant sources, Fire Districts	Fire Co-op	Short-Term Ongoing	All Year	Staff $5,000-$10,000	
General	Promote CERT in schools or other programs that incorporate fire safety into school curriculum.	6	Coordination, Staffing, Funding	Fire Districts	Fire Co-op	Short-Term Ongoing	All Year	$2,000	
Smoking	Distribute smoking-related fire prevention materials.	1	Coordination, Funding	NFP, Title III, other grant sources	Fire Co-op	Short-Term Ongoing	All Year	$5,000	Percentage remains fairly constant even after the Fire Safe cigarette legislation was passed in 2009. Ban on novelty lighters in 2009
Smoking	Work with SFMO to target retailers for messaging.	2	Coordination, Funding	NFP	Fire Co-op	Short-Term Ongoing	Annually	$1,000	

Cause	Proposed Activities	Rank	Resources Needed	Potential Funding/Resource Sources	Lead Agency	Timeline	Schedule for Distribution	Cost Estimate	Progress 2012
Recreation	Request contact information for all licensed hunters from ODFW, and provide fire safety information to them via targeted mailing.	1	Funding	NFP, Title III, other grant sources	ODF, USFS	Short-Term Ongoing	August & Winter	$20,000	
Recreation	Utilize Oregon Equestrian Trail Club Association for Public Outreach	2	Coordination	USFS will provide coordination	Fire Co-op	Ongoing	All Year	NA	
Recreation	ATV Club- Incorporate regulated use in annual meetings- frame this as an opportunity for boots on the ground to keep an eye out for illegal and suspicious activities.	3	Coordination	No funding needed; DMV has listing of ATV clubs.	Fire Co-op	Short-Term Ongoing	Forest Service will get annual meeting schedule	NA	Posting regulated use in motorcycle shops.
Recreation	Obtain funding for and distribute buckets with fire safety message	4	Funding and Staffing	NFP, Title III, other grant sources	ODF	Short-Term	Summer: Zig Zag & Clackamas Ranger Station and ODF in	$3,000	Ongoing-began in 2006 using Title III funds. ODF still has buckets that are taken to fire works stands.
Recreation	Develop and post signage for gun and ammunition shops.	5	Coordination	No funding needed	Fire Co-op	Short-Term Ongoing	All Year	NA	Currently posting regulated use and other fire danger information in gun & ammunition stores
Recreation	Distribute grocery bags with fire safety message.	6	Funding and Staffing	NFP, Title III, other grant sources	ODF, USFS, Regional Fire Co-ops	Short-Term	Summer: Zig Zag & Clackamas Ranger Station	$5,000	Done 2006/ continue to seek funding
Juveniles	Provide intervention services to juveniles who misuse fire or as requested.	1	Current funding through 2012	FEMA, Other grant programs for youth programs	Fire Safe Children and Families		All Year	None	Received FEMA Assistance to firefighters grant in 2011 through 2012 to implement program.
Juveniles	Provide handouts to teachers and parents regarding "first signs of fire interest"; learning to respect fire	2	Coordination, Funding	NFP, other grant sources,	Fire Co-op	Short-Term Ongoing	Beginning of school year	$5,000	Using the "school fires" SFMO materials …get these materials to the administrators when we do team teaching
Juveniles	Obtain middle school fire prevention curriculum and train instructors.	3	Coordination, Staffing, Funding	NFP, Title III, other grant sources, Fire Districts	Fire Co-op	Short-Term Ongoing	Annually	$1,000	SFMO has a full curriculum look into this for training in Clackamas County- a way to look at team teaching
Juveniles	Encourage "Keep Oregon Green" to be more involved in poster and other programs.	4	Coordination	Invite KOG to be a Co-op member	Fire Co-op	Short-Term Ongoing	NA	NA	

CHAPTER 8: STRUCTURAL IGNITABILITY POLICIES AND PROGRAMS

Structural Ignitability Policies and Programs

Structural Ignitability deals with the home itself and its immediate surroundings; also known as the "Home Ignition Zone." The Home Ignition Zone includes the home and an area surrounding the home within 100-200 feet. Important factors that either deter or promote Structural Ignitability include:

- **The Structure Itself:** roofing, roofing assembly, building materials and building setbacks on slopes
- **Defensible Space**: Distances 30-100 feet or more of fire resistant vegetation around homes
- **Fire Access:** Road, driveway and bridge width and condition

Structural Ignitability Objectives

I. Review rules/laws/guidance pertaining to wildfire planning, prevention, protection, and develop recommendations for improvements.

II. Coordinate and facilitate communication between County Planning and Building and the fire districts.

III. Identify incentives for property owners to participate in fire prevention activities, including maintenance of defensible space, use of fire-resistant building materials, etc.

IV. Inform public about codes and ordinances related to wildfire prevention and solicit feedback from the public regarding recommended improvements.

Structural Ignitability Action Items

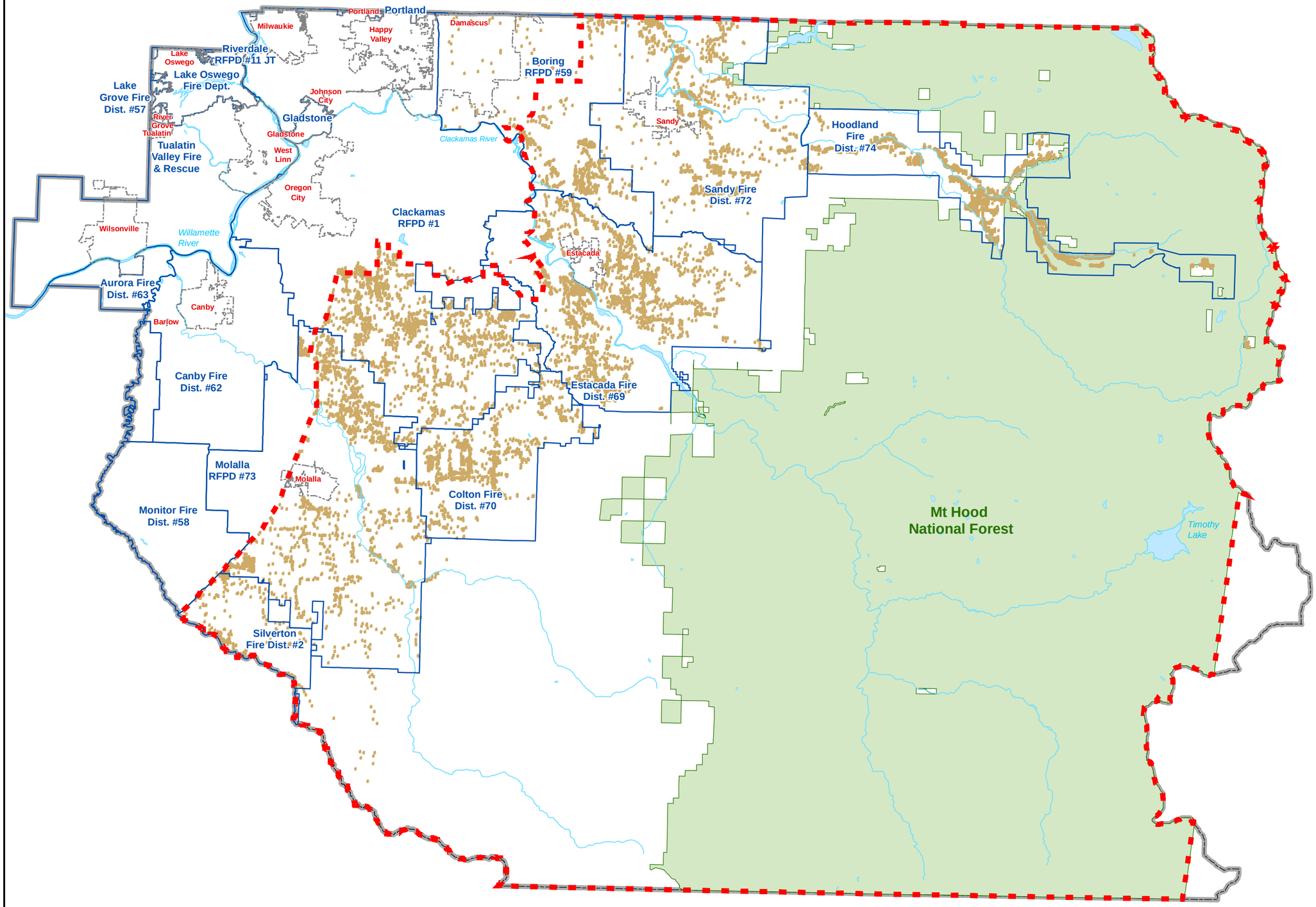
In order to effectively reduce structural ignitability, there must be coordination and communication between fire professionals and regulatory agencies including the State Fire Marshal's Office, the Clackamas County Land Use Planning Division and the Clackamas County Building Division. The 2005 CCWPP included a series of Structural Ignitability Action Items designed to provide direction and facilitate improved coordination among these agencies. Since 2005, a great deal of progress has been made to strengthen these relationships, which has resulted in more effective implementation of the Oregon Fire Code. For a complete listing of progress made since 2005, please see Table.1-1. CCWPP 2012 Action Plan. The 2012 CCWPP Update process identified the following priorities for implementation:

1) Identify a DTD representative for the WFPEC.
2) Improve coordination with Rural Fire Agencies.
3) Integrate WUI into Plan Map and include a public outreach strategy.

Data Collection and Assessment of Structural Ignitability (Map #14)

In 2005, ODF used Title III funds to purchase Global Positioning System (GPS) units (purchased using Title III grant funds) equipped with structural triage software in an effort to improve the mapping of structures and other features important for wildland firefighting within the ODF Protection District. Over 10,000 homes have been assessed. This effort expanded upon the 2005 pilot project which focused on the Summer Homes area in the Hoodland Corridor.

Clackamas County Structural Triage Inventory 2012



- Triaged Structures since 2004
- Fire Districts
- Oregon Department of Forestry
- Mt Hood National Forest
- City Boundaries

Structural triage data was captured by multiple fire agencies and Clackamas County from 2004-2011. ODF and others used GPS units equipped with structural triage software to improve the mapping of structures and other features important for wildland firefighting predominantly within the ODF Protection District. Over 10,000 homes have been assessed.

Map #14

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CLACKAMAS COUNTY

GEOGRAPHIC INFORMATION SYSTEMS

DEPARTMENT OF INFORMATION SERVICES/GEOGRAPHIC INFORMATION SYSTEMS
121 LIBRARY COURT
OREGON CITY, OREGON 97045

CHAPTER 9: SUSTAINING EFFORTS, MONITORING AND EVALUATION

Wildfire Planning Executive Committee (WFPEC)

The Wildfire Planning Executive Committee was charged with oversight of the CWPP. Although the WFEPC continued to meet quarterly, the roles of the WFPEC member agencies were difficult to sustain over the last several years due to staffing and programmatic changes of partner agencies. The 2012 CCWPP Update process strengthened the WFPEC by providing more structure for meetings and creating a more realistic action plan. The WFPEC is also developing a series of bylaws for consistency in agency representation and participation.

Mission Statement

The Wildfire Planning Executive Committee (WFPEC) will continue to foster a collaborative and cooperative environment between members, the wider community, and interested stakeholders to understand and mitigate the risks of wildfire.

Membership, Roles and Responsibilities

The WFPEC will be composed of representatives from the following agencies.

- Clackamas County Emergency Management
  - ✓ Serve as Committee Chair (duties described below)
  - ✓ Liaison for County EOC
  - ✓ Liaison for Natural Hazard Mitigation Plan
- Oregon Department of Forestry
  - ✓ Liaison for Clackamas Fire Prevention Cooperative
  - ✓ Fuels reduction project funding, selection and implementation
  - ✓ Liaison for Clackamas Fire Operations Group
- United States Forest Service
  - ✓ Fuels reduction on USFS land
  - ✓ Secondary liaison to Clackamas Fire Prevention Cooperative
  - ✓ Secondary liaison for Clackamas Fire Operations Group
- Clackamas County Parks
  - ✓ Liaison for County Parks Program
  - ✓ Fuels reduction project funding, selection and implementation
- Clackamas County Fire Defense Board
  - ✓ Liaison for Fire Defense Board
- Clackamas County Forestry
  - ✓ Liaison for County Forests program
- Clackamas County Geographic Information Systems
  - ✓ Lead hazard assessment process
- Clackamas Department of Transportation and Development
  - ✓ Liaison for Land Use Planning and Building Divisions
  - ✓ Coordinate efforts with State Fire Marshal's Office

The CCWPP articulates the need to extend WFPEC membership to other stakeholders such as but not limited to insurance companies, local businesses and citizen representatives. Technical advisors including but not limited to the following agencies may be called upon to offer specific expertise for project development and implementation:

- Bureau of Land Management
- Oregon State Fire Marshal
- Clackamas Soil and Water Conservation District
- Keep Oregon Green

Officers

Committee Chair – Facilitate the activities of the WFPEC. Responsibilities include convening the committee, developing agendas, coordinate subcommittees as necessary, acting as a liaison for fire districts, and facilitating the annual review. The incumbent of this position will be from Clackamas County Emergency Management.

Administrative Chair – Provide administrative support to the committee. Responsibilities include the taking of and distribution of minutes and the provision of assistance with other reporting and updates. The incumbent of this position will be identified annually.

WFPEC Meeting Schedule & Structure

The WFEPC will meet on a quarterly basis. Designated WFEPC Members will provide quarterly progress reports on the following action plans, and will convene Technical Committees as needed. Technical Committee membership will be made up of representation proper to address the need(s) at hand.

- Risk Assessment : County GIS
- Hazardous Fuels Reduction : ODF, CC Parks, CC Forestry, USFS
- Reducing Structural Ignitability: County DTD (or Emergency Management in lieu of)
- Emergency Operations: ODF, USFS, FDB Representative
- Education and Outreach: ODF

Monitoring /Reporting

The WFPEC will monitor activities undertaken in support of and coordination with the CCWPP through regular meetings and annual progress reports. Member agencies will provide individual activity reports during regularly scheduled committee meetings. The Committee Chair will request a Progress Report from each member agency each January. Progress Reports must be completed within one month. The Administrative Chair will incorporate the progress reports into the CCWPP. The following meeting will be dedicated to sharing member activities and the developing of a collective report. Highlights will be to identify exemplary project successes, procedural difficulties, and lessons learned to guide future activities.

CCWPP Updates

The WFPEC will assess the need to update the CCWPP as part of its monitoring, project identification and reporting activities. Material changes to the CCWPP of a major and consequential nature will trigger a full reprint every 5 years. Alterations of a more transactional nature will be accomplished through memorandum or pen and ink in a fashion commensurate with the nature of the given update. In general, the WFPEC will keep the CCWPP current in consideration of ongoing activities, changing needs and available resources.

CHAPTER 10. CLACKAMAS COUNTY FIRE AGENCIES

Introduction

There are 14 local structural fire agencies and two wildland fire agencies in Clackamas County that have been identified as Communities at Risk in the 2005 CWPP. These organizations provide essential public services in the communities they serve, and their duties go beyond extinguishing fires. Most also provide emergency medical services (EMS), search and rescue, and fire prevention education.

Wildfire prevention and response efforts are most effective at the local level. One of the primary goals of the 2005 CCWPP was to create the foundation and build capacity for local fire agencies to create Community Wildfire Protection Plans that reflect the localized hazards, needs and mitigation strategies. However, the majority of fire agencies have not had the time or resources to invest towards this effort.

For this reason, the 2012 CWPP Update focused on taking a more localized approach to wildfire planning by creating individual CWPP's for each fire agency. Each fire agency was interviewed by ODF to identify and document issues regarding wildfire hazards, emergency operations, structural ignitability, community outreach and education and fuels reduction priorities. Fire agency representatives were also asked to identify Local Communities at Risk, or areas that are particularly vulnerable to wildfires. Fire agencies also provided input on larger county-wide issues to be addressed by the 2012 CCWPP.

Local CWPP Content

Each CWPP includes a brief description of the issues identified during fire agency interviews, and are complete with action plans to address wildfire issues specific to the agency and the Local Communities at Risk. Maps illustrating the locations of the Local Communities at Risk and Fuels Reduction priorities have been included as well. The goal of the CWPP's is to provide a guide for fire agencies to address wildfire hazards as staff and funding are available. The information gleaned from the following pages can also be used to identify commonalities/discrepancies between fire agencies, which can help direct wildfire mitigation efforts at the county level.

Components of Local CWPP's

- Fire Agency Description
- WUI Description & Map
- Hazard Assessment (Map #10: Overall Wildfire Risk in Clackamas County)
- Description of Wildfire Issues: Emergency Operations, Structural Ignitability, Community Outreach and Education and Fuels Reduction
- Local Communities at Risk Description and Map
- CWPP Action Plan & Fuels Reduction Priorities

Maintenance and Monitoring

In order to have a comprehensive and effective wildfire plan, it is critical to address county-wide and local issues simultaneously. Fire agencies will provide updates to the Wildfire Planning Executive Committee as actions and projects are completed or identified to ensure that these efforts are being coordinated and that partners are aware of potential opportunities for collaboration.

10.1 Community at Risk: Aurora Rural Fire Protection District #63

The Aurora Fire District has been identified as a Community at Risk (CAR) by Oregon Department of Forestry. The District has participated in the Clackamas County CWPP planning process to evaluate capabilities to prevent, prepare for and respond to potential wildfire events.

Aurora Fire District Description

The Aurora Rural Fire Protection District #63 is a full-service fire and rescue agency with a force of 4 career employees, 42 volunteer firefighters and 6 resident student firefighters who serve the District's 6,000 citizens from 2 fire stations. The District organized on May 4, 1948 with 26 volunteer firefighters. It is a special service district that serves residents of Marion County and Clackamas County and is governed by a board of five publicly elected officials.

Wildland Urban Interface (WUI)

The Aurora Fire District has areas that are excellent examples of the Wildland Urban Interface (WUI). These areas are characterized by residential homes surrounded by heavy fuels and steep slopes. In addition, many of the neighborhoods here have only one way in and one way out with narrow, steep driveways and poor address signage. Heavy and continuous fuels dominate this area, so fires that begin on public land or on smaller private residential lots can quickly threaten the communities and natural resources that thrive in the Aurora Fire District.

Aurora Fire District Wildfire Hazards

The Clackamas County CWPP wildfire hazard assessment assisted Aurora Fire in identifying areas that may be at higher risk to potential wildfires. Map #10 illustrates the overall wildfire hazard risk in the Aurora Fire District and will be used to help target areas for wildfire prevention activities.

Structural Ignitability

Aurora Fire promotes the creation of defensible space, use of fire-resistant roofing and building materials, and community preparedness in the WUI. However, the District does not always have the opportunity to provide input regarding access and water supply for new development. Using the State Fire Code as a regulatory tool in establishing adequate access and water supply is critical to reducing structural ignitability. The need for Aurora Fire to increase capacity for participating in land use reviews to provide input of new development is identified as an action item in the Aurora CWPP Action Plan.

Emergency Response

A major wildland urban interface fire in Aurora would quickly exceed the resources and capabilities of the District. For this reason, Aurora Fire has Mutual Aid agreements in place which allows for the sharing of resources across the county in the event of a large scale disaster including wildfires. Aurora Fire employees and volunteers receive somewhat regular wildfire training. The District would like to work with ODF to support regular the S-130 and S-190 training.

In the event of a large widlland fire, evacuations may be necessary. Evacuating this rural area safely does present some safety challenges due to the large number of one way in and one way out roads and bridges. Burning of agricultural waste and yard debris is a very common occurrence in this area that is dominated by agriculture. Aurora residents would benefit from periodic reminders of safe burning practices and techniques to ensure that debris burns do not escape.

Community Outreach &Education

Aurora Fire is dedicated to fire prevention, and uses a variety of forums to promote residential fire safety, defensible space, and safe burning practices. The community is very supportive of the Fire District and participates in activities throughout the year, some of which include smoke detector, fire prevention and other programs. Aurora Fire is also an active member of the Clackamas County Fire Prevention Cooperative which is a consortium of structural and wildland fire protection professionals that work together to deliver programs such as team teaching in the grade school fire safety programs, safety fairs with car seat inspections and community and school programs.

Local Communities at Risk (Strategic Planning Areas)

Aurora Fire recognizes that there are smaller-scale Communities at Risk that have unique wildfire hazards to be addressed at the more local level. These areas were referred to as Strategic Planning Areas in the 2005 iteration of the CWPP, but will now be referenced as Local Communities at Risk to be consistent with state and federal language. Communities that have been identified as being particularly vulnerable to wildfires are illustrated in Map#14 and are listed in Table 10.1-1. Aurora Fire professionals considered the following factors to determine the local CARs including:

- Need for defensible space
- Access limitations (narrow driveways, lack of address signage, one way in/one way out)
- Steep slopes that can hinder access and accelerate the spread of wildfire
- Lack of water available for wildland fire fighting
- Heavy fuels on adjacent public lands
- Potential ignition sources from recreationists and transients
- Agricultural and backyard burning
- Lack of community outreach programs to promote wildfire awareness
- Communications difficulties

Fuels Reduction

Effective fuels reduction projects include the creation of defensible space around homes as well as vegetation treatments (shaded fuels creaks, thinning, limbing) onto adjacent forested land and natural areas. To ensure that landscape-level treatments are paired with projects to create defensible space around vulnerable communities, priority fuels reduction projects have been overlaid with the Communities at Risk Identified by Aurora Fire (Map #15).

Fuels Reduction Priorities include:

Champoeg State Park	Whiskey Hill
Eilers Road Area	Butteville Road

Aurora Fire District Action Plan

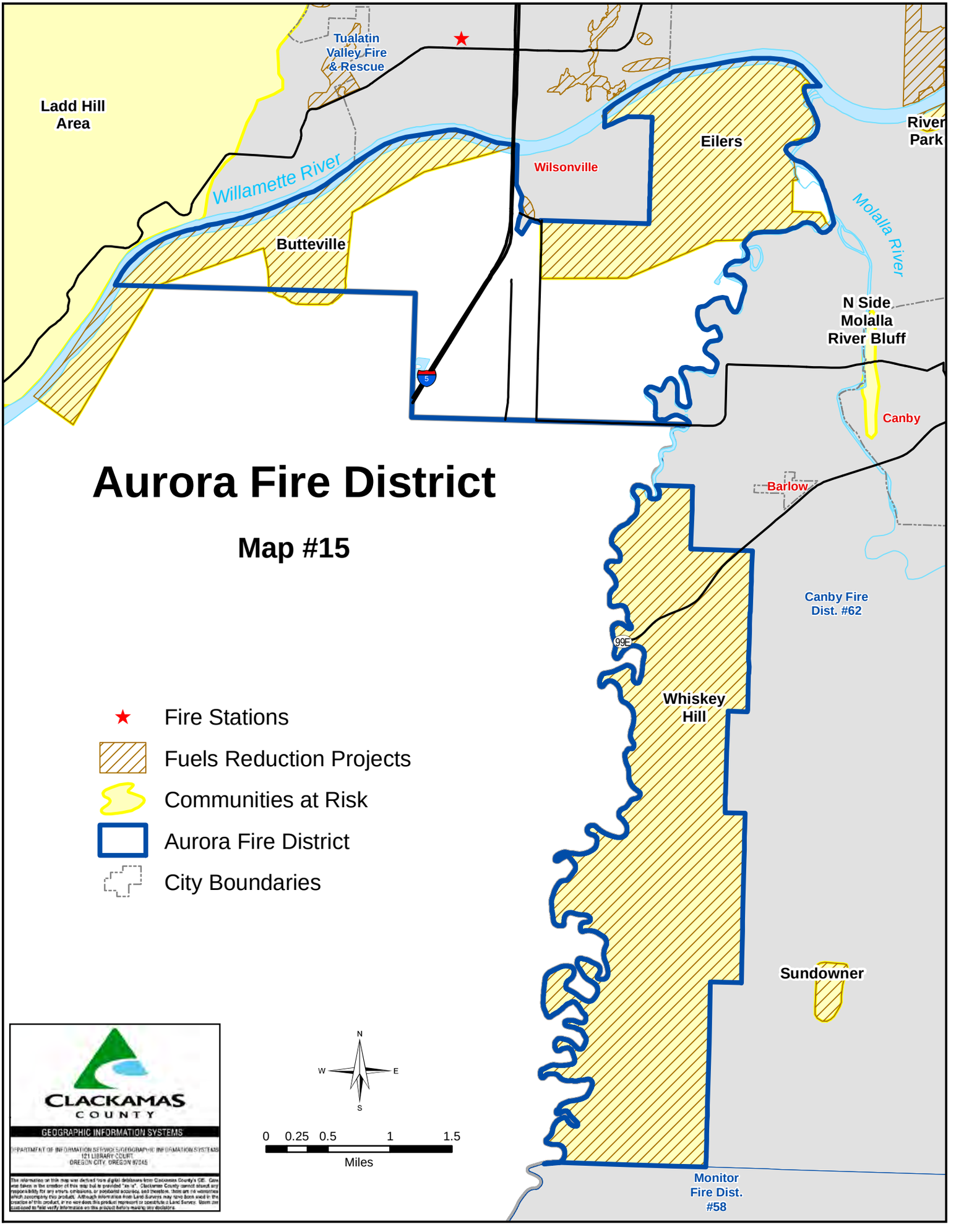
Aurora Fire has developed a list of actions to build capacity at the Department scale and has identified actions that can help to make the local CARS more resilient to potential wildfires. The action plan for Aurora Fire and the Local CARs therein is provided in Table 10.1-2.

Table 10.1-1 Aurora Fire Local Communities at Risk

Community At Risk	CAR Priority	Defensible Space	Access	Water	Public Forest Lands	Private Forest Lands	Recreators/ Transients	Protection Capabilities	Burning	Preparedness	Communications	Steep Slopes	Description
Aurora Fire Communities at Risk													
Eilers Road/ Myley Road near Charbonneau, Brownsdale Farm Road, Glass and Beck Roads	High	X	X	X						X		X	This community is characterized by many homes surrounded by heavy timber, poor access, and limited water supply. Brownsdale Farm Road and Mylee Road are very difficult for emergency service vehicles to access. This area also needs to be targeted for address signs.
Butteville Road	High	X		X						X		X	This is a fairly new community that has a high concentration of homes adjacent to heavy timber, and steep slopes. Access is good, but water supplies are limited. Defensible space is needed.
Whiskey Hill/ Meridian Rd.	High	X	X	X						X		X	Whiskey Hill is a high priority community at risk because there are homes adjacent to heavy timber, there are steep slopes, little water and access is extremely limited.
Cedarbrook Lane	High	X		X						X		X	Cedarbrook Lane is in a gully, which means that a fire here can carry upslope very quickly. Although access is good, address signs are needed here. Water supplies are also limited.

Table 10.1-2. Aurora Fire Action Plan

Action Item	Timeframe	Partners	CAR
Aurora Fire Action Plan			
Develop relationships with Clackamas County Sheriffs office for potential evacuations.	Short term	CCSO, CCEM	Aurora Fire District
Increase capacity for communicating with other fire agencies by obtaining 3-4 portable 800 MHz radios.	Short term	CCEM, CCFDB	Aurora Fire District
Work with Marion County to update map numbers.	Long Term	Marion County	Aurora Fire District
Work with Clackamas County Land Use Planning and Building Depts. to provide input on access and water requirements in new development.	Short Term	CCDTD	Aurora Fire District
Partner with ODF to assist training staff and volunteers in wildland fire initial attack (S-130 and S-190).	Short Term	ODF	Aurora Fire District
Aurora Fire Local Communities at Risk Action Plan			
Conduct a Community Meeting to educate the community and solicit feedback on wildfire prevention projects the community would support.	Ongoing	ODF	Eilers Road Area, Buttevile Road, Whiskey Hill,Cedarbrook Lane
Complete home addressing in Communities at Risk.		ODF, Fire Co-op	All; Eilers Road and Meridian Road
Partner with the Fire Co-op to create and distribute outreach materials that promote responsible burning, defensible space and reduction of structural ignitability within the Home Ignition Zone.	Ongoing	Fire Co-op	All CAR's
Promote legal, safe and responsible debris burning through public outreach and education.	Short-Term	ODF, DEQ, Fire Co-op	All CAR's
Reduce hazardous fuels in the ROW of potential evacuation routes. Engage residents adjacent to primary evacuations routes to extend treatments onto private land.	Ongoing	ODOT, Clackamas County Roads	All CAR's
Obtain structural ignitability data by conducting structural triage assessment data collection (including GPS points) for homes in Communities at Risk.	Ongoing	ODF	All CAR's
Develop a community-driven pre-disaster plan including evacuation routes, telephone call down trees, and other strategies for strengthening community response.	Ongoing	CCEM, CCFDB	All CAR's
Implement road addressing (including length of driveways) and other signage for emergency response.	Ongoing	ODF	All CAR's
Seek grant funding to support fuels reduction and creation of defensible space around homes.	Ongoing	ODF	All CAR's
Conduct Community Clean Up Days to reduce hazardous fuels. Identify opportunities to recycle or compost vegetative material instead of burning.	Ongoing	ODF	All CAR's


Tualatin Valley Fire & Rescue
Ladd Hill Area
Willamette River
Wilsonville
Eilers
River Park
Molalla River
Butteville
N Side Molalla River Bluff
Canby
Barlow
Canby Fire Dist. #62
99E
Whiskey Hill
Sundowner
Monitor Fire Dist. #58
Aurora Fire District
Map #15
Fire Stations
Fuels Reduction Projects
Communities at Risk
Aurora Fire District
City Boundaries
CLACKAMAS COUNTY
GEOGRAPHIC INFORMATION SYSTEMS
DEPARTMENT OF INFORMATION SERVICES/GEOGRAPHIC INFORMATION SYSTEMS
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10.2. Community at Risk: Boring Rural Fire Protection District # 59

The Boring Fire District has been identified as a Community at Risk (CAR) by Oregon Department of Forestry. The District has participated in the Clackamas County CWPP planning process to evaluate capabilities to prevent, prepare for and respond to potential wildfire events.

Boring Fire District Description

The Boring Fire District is a special service district that provides fire, rescue, and prevention services to the City of Damascus, as well as the unincorporated areas of Boring, Kelso, Hillsview, Barton and Eagle Creek. Over 20,000 people live within the 64 square miles that the District serves. Currently, the Fire District has 83 members, consisting of 18 career, 55 volunteer, 8 support, and 2 administrative personnel.

Boring Fire District encompasses over 64 square miles in northern Clackamas County. There are three stations located in the District: the Boring Station, Damascus Station and the Eagle Creek Station. These stations are equipped with combinations of engines, water tenders, brush trucks, squad, and several staff vehicles that enable Boring Fire to respond to calls, which averages approximately 1600, annually.

Wildland Urban Interface (WUI)

Some areas in the Boring Fire District are excellent examples of the Wildland Urban Interface (WUI). These areas are characterized by residential homes surrounded by heavy fuels and steep slopes. In addition, many of the neighborhoods here have only one way in and one way out with narrow, steep driveways and poor address signage. Heavy and continuous fuels dominate this area, so fires that begin on public land or on smaller private residential lots can quickly threaten the communities and natural resources that thrive in the Boring Fire District.

Metro and Clackamas County have a few heavily forested landholdings adjacent to homes in the WUI. The County has managed the forestland adjacent to Madrone Wall for many years. However, the community has expressed concern over timber management in this natural area and it is now slated to be converted to a County Park. The County Parks Wildfire Management Plan identified Madrone Wall as a priority for fuels reduction work which was completed in Spring of 2012.

Metro owns forested land adjacent to the Damascus Lava Domes and Bartell Road communities. As Boring Fire targets these areas for creating defensible space, there is an opportunity to engage Metro in reducing fuels on this adjacent public land. This has been identified as an action item.

Tourism and recreation are also major influences here, as thousands of Portland area residents travel along Highway 26 to access the Mount Hood National Forest. Campers, hikers, hunters and other visitors to this area can potentially start wildfires that could carry from public land to the residential communities.

Boring Fire District Wildfire Hazards

The Clackamas County CWPP wildfire hazard assessment assisted Boring Fire in identifying areas that may be at higher risk to potential wildfires. Map #10 illustrates the overall wildfire hazard risk in the Boring Fire District and will be used to help target areas for wildfire prevention activities.

Structural Ignitability

Boring Fire promotes the creation of defensible space, use of fire-resistant roofing and building materials, and community preparedness in the WUI. Boring Fire works well with the City of Damascus and Clackamas County to integrate these concepts at the regulatory level. For example,

the City of Damascus has an Urban Tree Ordinance which includes exemptions for removing trees that threaten or are within 30 feet of structures. Boring Fire participates in land use reviews for new development to provide input on access and water supply.

Emergency Response

A major wildland urban interface fire in Boring would quickly exceed the resources and capabilities of the District. For this reason, Boring Fire has Mutual Aid agreements in place which allows for the sharing of resources across the county in the event of a large scale disaster including wildfires.

In the event of a large widlland fire, evacuations may be necessary. Although Boring Fire has been working with Damascus to plan for potential evacuations, this rural area presents some difficulties due to the large number of one way in and one way out roads.

Burning of yard waste and debris is challenging in the Boring Fire District because the agencies that have regulatory authority over burning (DEQ and ODF) dissect the District, so different rules apply to residents throughout the District. Backyard burning is allowed in all areas. Boring Fire adheres to the Open Burn Policy adopted by the Fire Defense Board and tries to be consistent with neighboring jurisdictions in regulating the Backyard Burning program.

Boring Fire employs 18 career and 55 volunteer firefighters who receive regular wildland fire training to remain current on qualifications. Although the District is able to support the S-130 and S-190 training, lack of hands-on fire experience makes it difficult to retain wildland qualifications. Boring Fire would like to work more directly with the USFS and ODF to have opportunities to participate in live fires, and this is noted in the action plan.

Community Outreach & Education

Boring Fire is dedicated to fire prevention, and uses a variety of forums to promote residential fire safety, defensible space, and safe burning practices. The community is very supportive of the Fire District and participates in activities throughout the year, some of which include smoke detector, fire prevention, car seat, and Christmas Basket programs. Boring Fire is also an active member of the Clackamas County Fire Prevention Cooperative which is a consortium of structural and wildland fire protection professionals that work together to deliver programs such as team teaching in the grade school fire safety programs, safety fairs with car seat inspections, community and school programs, and fire safety house displays.

Boring Fire worked with Clackamas County Parks and Oregon Department of Forestry to hold a public meeting regarding the CWPP and wildfire issues in the Madrone Wall Area Community at Risk. The purpose of this meeting was to educate local area residents about the upcoming fuels reduction project planned for the County-owned forest land north of Madrone Wall and to educate them about how to protect their homes from potential wildfires. Sixteen people attended, including many who live outside of the boring Fire District. People were generally supportive of the fuels reduction project and suggested that the surrounding homeowners be contacted to create defensible space around their homes.

Local Communities at Risk (Strategic Planning Areas)

Boring Fire also recognizes that there are smaller-scale Communities at Risk that have unique wildfire hazards to be addressed at the more local scale. These areas were referred to as Strategic Planning Areas in the 2005 iteration of the CWPP, but will now be referenced as local Communities at Risk to be consistent with state and federal language. Communities that have been identified as

being particularly vulnerable to wildfires are illustrated in Map #16 and listed in Table A-2.1. Boring Fire professionals considered the following factors to determine the local CARs including:

- Need for defensible space
- Access limitations (narrow driveways, lack of address signage, one way in/one way out)
- Steep slopes that can hinder access and accelerate the spread of wildfire
- Lack of water available for wildland fire fighting
- Heavy fuels on adjacent public lands
- Potential ignition sources from recreationists and transients
- Agricultural and backyard burning
- Lack of community outreach programs to promote wildfire awareness
- Communications difficulties

Fuels Reduction

Effective fuels reduction projects include the creation of defensible space around homes as well as vegetation treatments (shaded fuels creaks, thinning, limbing) onto adjacent forested land and natural areas. Boring Fire will facilitate cooperation between public and private organizations to ensure that fuels reduction work occurs strategically and benefits homeowners as well as adjacent public and private lands.

To ensure that landscape-level treatments are paired with projects to create defensible space around vulnerable communities, priority fuels reduction projects have been overlaid with the Communities at Risk Identified by Boring Fire (Map #16).

Fuels Reduction Priorities include:

Hwy 224 Corridor/Madrone Wall Area	Tickle Creek Road
Amisgger Road	Bartell Road
Gold, Bronze, Nickel Creek	Eagle Fern Park

Boring Fire District Action Plan

Boring Fire has developed a list of actions to build capacity at the District scale and has identified actions that can help to make the local CARS more resilient to potential wildfires. The action plan for Boring Fire and the local CARs therein is provided in Table10.2-2.

Table 10.2-1. Boring Fire District Local Communities at Risk

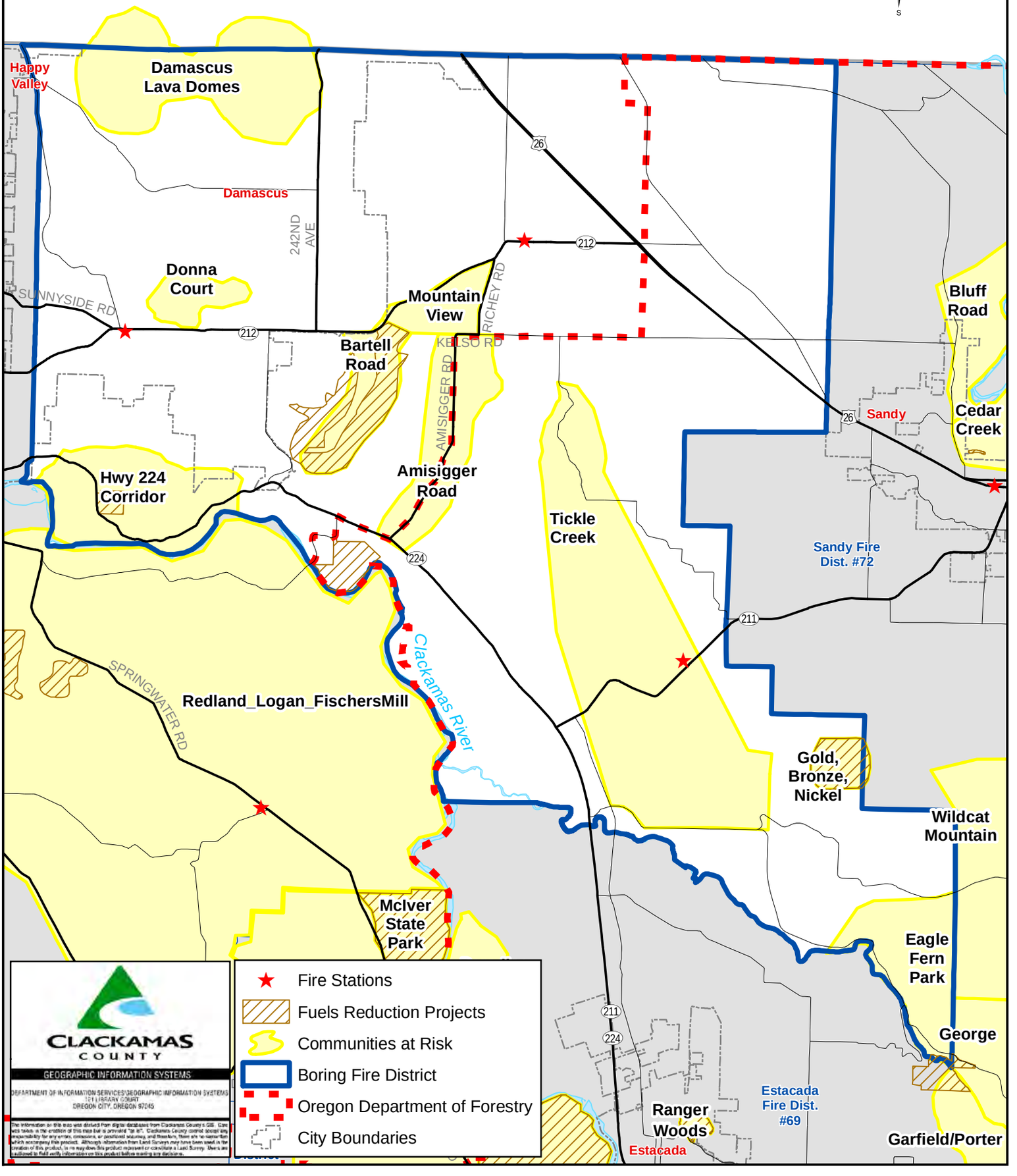
Community At Risk	CAR Priority	Defensible Space	Access	Water	Public Forest Lands	Private Forest Lands	Recreators/ Transients	Protection Capabilities	Burning	Preparedness	Communications	Steep Slopes	Description
Boring Fire Communities at Risk													
Eagle Creek	**High**	X	X	X		X		X	X	X	X	X	The Eagle Creek area is a steep forested ravine which make access, communication and potential firefighting operations difficult. Boring Fire has a volunteer station closely and Sandy Fire is also close, but there will likely be a delay in response time.
Damascus Lava Domes	**High**	X	X	X	X	X		X	X	X	X	X	There are two lava domes on the north end of Damascus, which present a variety of wildfire issues. The western dome is home to the Wooded Hills Court residential community, and the eastern dome is the Kingswood Heights community. Both are characterized by large homes adjacent to dense vegetation along steep slopes. There is only one way in/out here, the driveways are long and narrow, and hydrants are on a private system that will provide water only for the short term. Metro owns part of the natural area that extends to the north into neighboring Multnomah County. This area has also been identified at a CAR in the Multnomah County CWPP.
Gold, Bronze, Nickel Area	**High**	X	X	X	X	X		X	X	X	X	X	This CAR has about 20-30 homes with steep, narrow, gravel driveways. The area is bordered by BLM forested land. There is no garbage service in this area, so many people burn garbage as well as woody debris. Wagner Lake is a potential water source here and ODF is currently working on a draft site here.
Eagle Fern Park	**Low**		X		X		X	X			X	X	This County park is a mature fir forest exhibiting desirable conditions. There are no homes nearby, it is north-facing and remains wet throughout the year.
Amisigger Road	**Medium**	X	X						X	X	X	X	The Amisigger Road area is home to a number of nurseries and other agricultural operations. Many of the ag operators burn their agricultural waste as well as dead and dying trees on their land. Tree Rot seems to be a big problem here. This road connects Hwy 212 and Hwy 224, so it could serve as a critical transportation route and fire break in the event of a wildfire.
Tickle Creek Road	**Medium**	X		X		X		X	X	X		X	Tickle Creek Road has quite a few homes. Many homes are surrounded by dense vegetation, and there are some actively managed forest lands here, which can provide an ignition source. The area is surrounded by agriculture and burning is an issue here.
Hwy 224 Corridor (232nd to Madrone Wall)	**High**	X	X	X	X	X	X	X	X	X	X	X	There have been many fires along Hwy 224 from power line ignitions, escaped debris burns and lightning. Madrone Wall and the surrounding forestland is owned by the County as in the process of transitioning from managed forestland to a park. Dense young and mature Doug Fir dominates the landscape. There are a couple of homes at the top of the slope above the forest. the County has developed a wildfire management plan for this area and plans to complete some fuels reduction work here by Sept. 2012.
Mountain View	**High**	X	X	X				X	X	X		X	This community is on the slope of Noyer Creek. Access and water are limited here. A primary issue in this community is that there are many decadent trees that fall, but the residents must adhere to the residential burning restrictions.
Bartell Road	**High**	X	X	X	X	X	X	X	X	X		X	Bartell Road had a significant wildfire in 1952. It is along the ridge of two steep, heavily vegetated ravines. There is only one way in and out and there are no available water sources. Metro has a trail in this area.
Donna Court	**High**	X	X	X	X	X		X	X	X		X	This community is on a lava dome with access limited to one way in and out. Burning is an issue here, with a history of escaped debris burns.

Table 10.2-2. Boring Fire District Action Plan

Action Item	Timeframe	Partners	CAR
Boring Fire Action Plan			
Develop a working relationship with Metro, USFS and the BLM to address wildfire hazards and potential response capabilities for public lands adjacent to Communities at Risk.	Short-Term	Metro, USFS, BLM	Boring Fire District
Work with the City of Damascus, and Clackamas County Emergency Management and Sherriff's Office to discuss evacuation planning especially in communities with only one way in and out.	Long Term	City of Damascus, and Clackamas County Emergency Management Sherriff's Office	Boring Fire District
Work with Clackamas County Building Dept. to include line items for access and fire flow in occupancy permit checklist.	Short-Term	Clackamas FDB, DTD	Boring Fire District
Boring Fire Local Communities at Risk Action Plan			
Conduct a Community Meeting to educate community on defensible space, and measures that can be taken to reduce structural ignitability. Solicit feedback on wildfire prevention projects the community would support.	Spring 2012/ Ongoing	ODF, Clackamas County Parks	Madrone Wall/ Hwy 224 Corridor
Partner with the Fire Co-op to create and distribute outreach materials that promote responsible burning, defensible space and reduction of structural ignitability within the Home Ignition Zone.	Ongoing	Fire Co-op	All CAR's
Promote legal, safe and responsible debris burning through public outreach and education.	Short-Term	ODF, DEQ, Fire Co-op	All CAR's
Reduce hazardous fuels in the ROW of potential evacuation routes. Engage residents adjacent to primary evacuations routes to extend treatments onto private land.	Ongoing	ODOT, Damascus Roads Dept., Clackamas County Roads	Tickle Creek Rd., Amisigger Road, Hwy 224, Bartell Road
Obtain structural ignitability data by conducting structural triage assessment data collection (including GPS points) for homes in Communities at Risk.	Ongoing	ODF	All CAR's
Develop a community-driven pre-disaster plan including evacuation routes, telephone call down trees, and other strategies for strengthening community response.	Ongoing	Clackamas County Emergency Management	All CAR's
Implement road addressing (including length of driveways) and other signage for emergency response.	Ongoing	ODF	All CAR's
Seek grant funding to support fuels reduction and creation of defensible space around homes.	Ongoing	ODF	All CAR's
Work with Metro to reduce fuels adjacent to CAR's.	Ongoing	Metro	Damascus Lava Domes, Bartell Road
Work with BLM to reduce hazardous fuels adjacent to CAR's.	Ongoing	BLM	Gold, Bronze Area
Work with Clackamas County to reduce hazardous fuels in parks and forested areas adjacent to CAR's.	Ongoing	Clackamas County Parks & Forestry	Madrone Wall, Eagle Fern
Conduct Community Clean Up Days to reduce hazardous fuels. Identify opportunities to recycle or compost vegetative material instead of burning.	Ongoing	ODF, Metro	All CAR's
Partner with ODF and the SWCD to provide education to agricultural landowners regarding sick and/or dying tress and potential methods of disposal such as chipping and composting.	Ongoing	ODF, SWCD	Amisigger Road, Mountain View

Boring Fire District

Map #16



10.3. Community at Risk: Canby Rural Fire Protection District # 62

The Canby Fire District has been identified as a Community at Risk (CAR) by Oregon Department of Forestry. The District has participated in the Clackamas County CWPP planning process to evaluate capabilities to prevent, prepare for and respond to potential wildfire events.

Canby Fire District Description

The Canby Fire District is a special service district that provides fire, rescue, and prevention services to the Cities of Canby and Barlow as well as the rural areas around those cities. Canby Fire is also the ambulance service provider for the service area, providing emergency advanced life support transport to its citizens. Over 30,000 people live within the 54 square miles that the District serves. Currently the Fire District has 50 members who consist of 18 career, 30 volunteer, and 2 administrative personnel.

Wildland Urban Interface (WUI)

Some areas in the Canby Fire District are excellent examples of the Wildland Urban Interface (WUI). These areas are characterized by residential homes surrounded by heavy fuels and steep slopes. In addition, many of the neighborhoods here have only one way in and one way out with narrow, steep driveways and poor address signage. Canby has a heavy agricultural influence, so there is a great deal of controlled field burning, but there is not a significant history of large wildfires.

Canby Fire District Wildfire Hazards

The Clackamas County CWPP wildfire hazard assessment assisted Canby Fire in identifying areas that may be at higher risk to potential wildfires. Map # 10 illustrates the overall wildfire hazard risk in the Canby Fire District and will be used to help target areas for wildfire prevention activities.

Structural Ignitability

Canby Fire promotes adequate access and water supply, the creation of defensible space, use of fire-resistant roofing and building materials, and community preparedness in the WUI. Although the City of Canby has a Planning Department, it now contracts with Clackamas County for land use planning and building permit services. Canby Fire has an excellent working relationship with Clackamas County and integrates fire-safety concepts at the regulatory level by participating in land use reviews for new development to provide input on access and water supply.

Emergency Response

A major wildland urban interface fire in Canby would quickly exceed the resources and capabilities of the District. For this reason, Canby Fire has mutual aid agreements in place which allows for the sharing of resources across the county during a large scale disaster such as a wildfire.

Burning of yard waste and debris is challenging in the Canby Fire District, as the majority of wildfire ignitions are the result of escaped debris burns from agricultural lands. Agricultural burning is regulated by the Oregon Dept. of Agriculture, and fire districts may only ban burning if certain humidity, temperature and wind conditions are met. Agricultural operations may burn all year, which makes enforcement of the backyard burning program difficult because local area residents do not understand why they cannot burn while others can. The majority of Canby is within the DEQ boundary, so there is a burning season, but response from DEQ for violations is inconsistent.

Radio communications is good throughout Canby, although there are some gaps in coverage across the District. Canby Fire recently received an AFG large grant to address communication issues in these areas. Canby Fire would rely on two primary water supplies for wildfire response: one on Dryland Road; and one on Elisha Road. The Canby Ferry also has a fire pump that could be utilized in an emergency. Canby Fire would like to continue developing rural water supply sources for the rural areas to in order to be recognized water supply by ISO.

The District employs 18 career and 30 volunteer firefighters who receive regular wildland fire training to remain current on qualifications. Although the District is able to support the S-130 and S-190 training, lack of live fire experience makes it difficult to retain wildland qualifications. Canby Fire is working with NAFT and WFTA to conduct a live fire exercise (potentially in Molalla area) to address fire component of wildland task books. Canby Fire recently received grant for purchasing wildland PPE, and received a Fire Act FEMA grant for structural and wildland PPE five years ago, but likely will need additional wildland gear (turnouts and footwear) due to volunteer turnover.

Community Outreach & Education

Canby Fire is dedicated to fire prevention, and uses a variety of forums to promote residential fire safety, defensible space, and safe burning practices. The community is very supportive of the Fire District and participates in activities throughout the year, some of which include in-classroom school programs , public presentations, fire station tours , media events, and safety fairs. Canby Fire is also a member of the Clackamas County Fire Prevention Cooperative which is a consortium of structural and wildland fire protection professionals that work together to deliver programs such as team teaching in the grade school fire safety programs, safety fairs with car seat inspections, and fire safety house displays.

Local Communities at Risk (Strategic Planning Areas)

Canby Fire also recognizes that there are smaller-scale Communities at Risk that have unique wildfire hazards to be addressed at the more local scale. These areas were referred to as Strategic Planning Areas in the 2005 iteration of the CWPP, but will now be referenced as local Communities at Risk to be consistent with state and federal language. Communities that have been identified as being particularly vulnerable to wildfires are illustrated in Map #17 and listed in Table 10-3.1. Canby Fire professionals considered the following factors to determine the local CARs including:

- Need for defensible space
- Access limitations (narrow driveways, lack of address signage, one way in/one way out)
- Steep slopes that can hinder access and accelerate the spread of wildfire
- Lack of water available for wildland fire fighting
- Heavy fuels on adjacent public lands
- Potential ignition sources from recreationists and transients
- Agricultural and backyard burning
- Lack of community outreach programs to promote wildfire awareness
- Communications difficulties

Fuels Reduction

Fuels reduction projects can and should be accomplished at the local scale, which is the creation of defensible space around homes, as well as the landscape scale to extend vegetation treatments onto adjacent forested land and natural areas. Canby Fire will assist in facilitating cooperation between public and private organizations to ensure that fuels reduction work occurs strategically and benefits homeowners as well as adjacent public and private lands.

To ensure that landscape-level treatments are paired with projects to create defensible space around vulnerable communities, priority fuels reduction projects have been overlaid with the Communities at Risk Identified by Boring Fire (Map #17).

Fuels Reduction Priorities include:

Sundowner
Molalla River State Park

Canby Fire District Action Plan

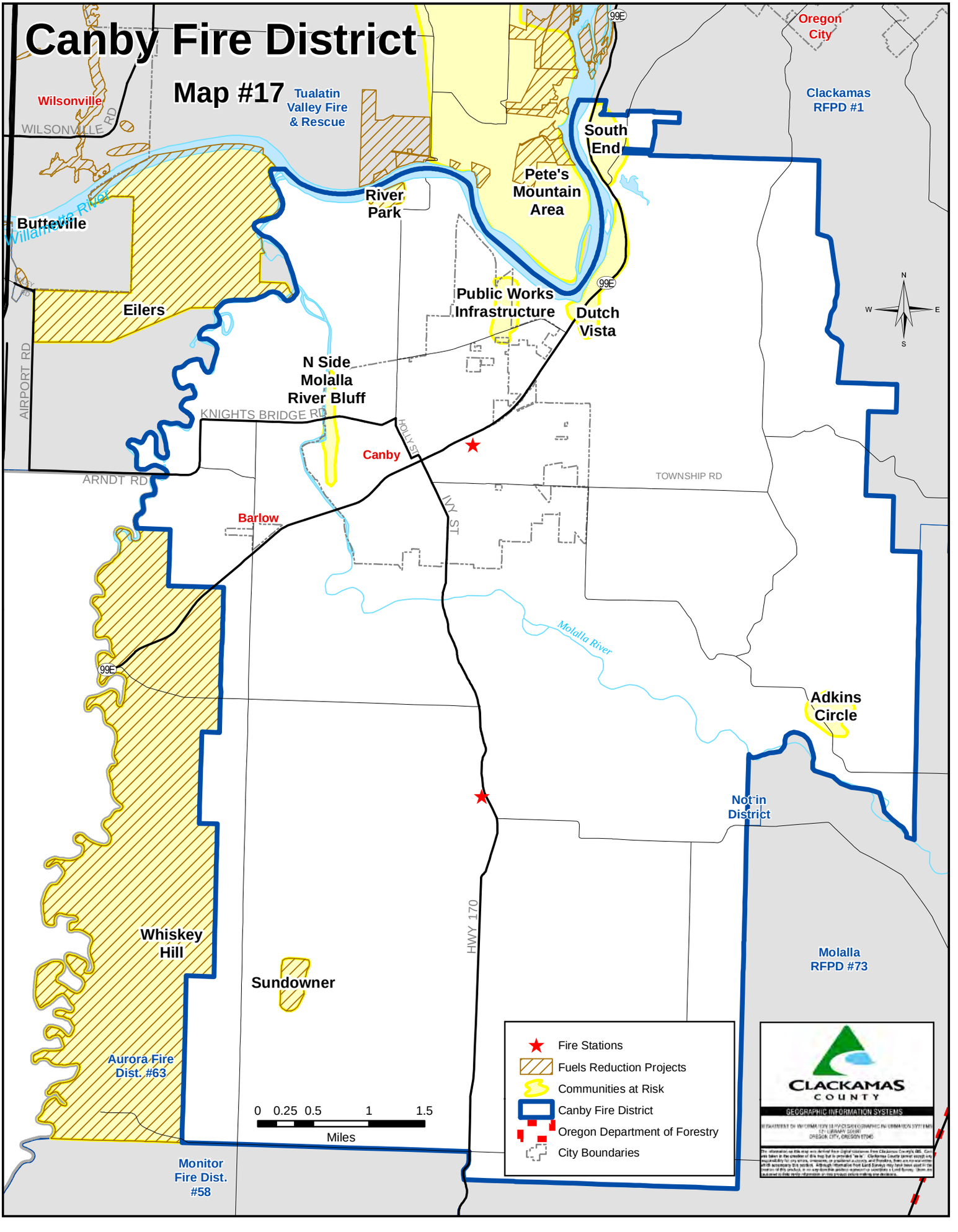
Canby Fire has developed a list of actions to build capacity at the District scale and has identified actions that can help to make the local CARS more resilient to potential wildfires. The action plan for Canby Fire and the local CARs therein is provided in Table 10.3-2.

Table 10.3-1. Canby Fire District Local Communities at Risk

Community At Risk	CAR Priority	Defensible Space	Access	Water	Public Forest Lands	Private Forest Lands	Recreators/ Transients	Protection Capabilities	Burning	Preparedness	Communications	Steep Slopes	Description
Canby Fire Communities at Risk													
Adkins Circle	High	X	X	X		X			X	X		X	Adkins Circle is a community of about 11 homes that have a single access bridge which is one way in and out . The community is adjacent to managed private timberlands. The area has steep slopes and residents regularly burn yard debris.
Sundowner	High	X	X	X				X	X	X			The Sundowner community is very rural and it would take over 10 minutes to respond, making it very important for landowners to be prepared for potential emergencies such as wildfires. There is only one way in and out. The homes here are relatively new and have heavy vegetation leading up to the homes. Residents regularly burn yard debris in this community.
Dutch Vista / Madrona	High	X	X	X			X	X	X	X		X	The Dutch Vista One has limited access with a steep, one way in and out road. The homes are on the bluff of the river, which is accessed by recreators and fishermen who could serve as ignition sources. There is also a railroad here, which is a potential ignition source. Water supply is very limited.
Public Works Infrastructure	High	X	X	X	X								The City of Canby Public Works buildings and other infrastructure are adjacent to city owned forest that would benefit from fuels reduction. Access is limited to one way in and out.
North Side Molalla River Bluff	Medium	X		X					X	X		X	The homes on the North Side of the Willamette River Bluff are at the top of a heavily vegetated slope. There are good potential evacuation routes in this area because there many points of entry, However, this increased access to the area also increases the number of recreators and fishermen that could serve as ignition sources.
South End	Medium	X		X			X	X		X		X	South End Road has adequate access, but a limited water supply. CCFD#1 has a few hydrants here. Vegetation and steep slopes are the primary concerns here. Fire response would have to be staged off the main hwy, so there would be disruption, and traffic management to consider. The railroad runs through here, which increases ignition potential. Anglers, transients, and recreators frequent the area and are potential ignitions sources.
Molalla River State Park	Medium	X	X		X					X		X	The Molalla River State Park draws many recereators, and anglers to the area. The primary risk here is the heavy fuels loading throughout the park.

Table 10.3-2. Canby Fire Action Plan

Action Item	Timeframe	Partners	CAR
Canby Fire Action Plan			
Pursue grant funding to purchase Wildland PPE to replace outdated PPE.	2 Years	FDB, ODF	Canby Fire District
Develop rural water supply sources to a standard that will be recognized by ISO.	Long-Term	ODF, FDB	Canby Fire District
Work with the ODA to educate local area residents about the differences in agricultural burning in and backyard burning. .	Long-Term	ODF, DEQ, Fire Co-op	Canby Fire District
Work with the DEQ to achieve consistent responses for burning violations.	Long-Term	DEQ	Canby Fire District
Identify and pursue opportunities to participate in prescribed burns and live fire training to update and maintain wildfire certifications.	Ongoing	FDB, NAFT, WFTA	Canby Fire District
Continue to foster partnerships with natural resources managers to assess and implement potential fuels reduction projects in natural areas adjacent to Communities at Risk.	Ongoing	BLM,ODF, Parks	Canby Fire District
Partner with the Clackamas County Fire Defense Board to participate in a WUI conflagration exercise.	2 Years	Clackamas Fire Defense Board	Canby Fire District
Canby Fire Local Communities at Risk Action Plan			
Conduct a Community Meeting to educate community on defensible space, and measures that can be taken to reduce structural ignitability.	2 Years	ODF	Adkins Circle
Improve address signage for emergency response.	Ongoing	Fire Co-op	All CAR's
Partner with the Fire Co-op to create and distribute outreach materials that promote responsible burning, defensible space and reduction of structural ignitability within the Home Ignition Zone.	Ongoing	Fire Co-op	All CAR's
Promote legal, safe and responsible debris burning through public outreach and education.	Ongoing	ODF, DEQ,ODA, Fire Co-op	All CAR's
Encourage communities to develop a community-driven pre-disaster plan including evacuation routes, telephone call down trees, and other strategies for strengthening community response.	Ongoing	Clackamas County Emergency Management	All CAR's


Canby Fire District
Map #17
Tualatin Valley Fire & Rescue
Wilsonville
WILSONVILLE RD
Willamette River
Butteville
Eilers
AIRPORT RD
River Park
Pete's Mountain Area
South End
99E
Oregon City
Clackamas RFPD #1
Public Works Infrastructure
Dutch Vista
N Side Molalla River Bluff
KNIGHTS BRIDGE RD
HOLLYS
Canby
ARNDT RD
TOWNSHIP RD
ST NAV
Barlow
Molalla River
Adkins Circle
Not in District
HWY 170
Whiskey Hill
Sundowner
Molalla RFPD #73
Aurora Fire Dist. #63
Monitor Fire Dist. #58
N
W
E
S
0 0.25 0.5 1 1.5
Miles
Fire Stations
Fuels Reduction Projects
Communities at Risk
Canby Fire District
Oregon Department of Forestry
City Boundaries
CLACKAMAS COUNTY
GEOGRAPHIC INFORMATION SYSTEMS

10.4. Community at Risk: Clackamas Fire District #1

Clackamas Fire District #1 (CFD#1) has been identified as a Community at Risk (CAR) by Oregon Department of Forestry. The District has participated in the Clackamas County CWPP planning process to evaluate capabilities to prevent, prepare for and respond to potential wildfire events.

Clackamas Fire District #1 Description

Clackamas Fire District #1 (CFD#1) is one of the largest fire protection districts in Oregon, proudly serving over 179,000 citizens in an area covering nearly 200 square miles. The District provides fire, rescue, and emergency medical services to the cities of Milwaukie, Oregon City, Happy Valley, and Johnson City, and the unincorporated areas of Oak Lodge, Clackamas, Sunnyside, Redland, Carver, Beavercreek, Highland and Clarkes.

CFD#1 has 17 fire stations strategically located throughout Clackamas County with a workforce of more than 200 employees & 70 volunteers and is the second largest fire protection district in Oregon, serving over 179,000 citizens in an area covering nearly 200 square miles. CFD#1 firefighters/paramedics respond to over 16,500 incidents annually throughout the fire district. Clackamas Fire District #1 is an internationally accredited agency meeting the highest standards in emergency service delivery.

Wildland Urban Interface (WUI)

Many areas covered by CCFD#1 excellent examples of the Wildland Urban Interface (WUI). They are characterized by suburban communities and rural residential homes surrounded by heavy fuels and steep slopes. In addition, many of the neighborhoods here have only one way in and one way out with narrow, steep driveways and poor water supply.

The more rural wildland urban interface areas exist in the Fire District's southeast protection service areas. These rural interface areas are best defined as a mixed interface in which small to medium sized neighborhoods have been built on lands formerly used for a variety of farm use applications.

In the more urban areas, heavy and continuous fuels dominate many of the parks and natural areas surrounding the communities, so fires that begin on public land or on smaller private residential lots can quickly threaten the communities and natural resources that thrive in the cities of Clackamas, Milwaukie, Oak Lodge, Happy Valley and Oregon City. In addition, response times from rural fire stations could be delayed, which underscores the need for community preparedness in the wildland urban interface.

Clackamas Fire District Wildfire Hazards

The Clackamas County CWPP wildfire hazard assessment assisted Clackamas Fire in identifying areas that may be at higher risk to potential wildfires. Map #10 illustrates the overall wildfire hazard risk in the Clackamas Fire District and will be used to help target areas for wildfire prevention activities.

Structural Ignitability

CFD#1 promotes the creation of defensible space, use of fire-resistant roofing and building materials, and community preparedness in the WUI. CFD#1 works well with the Cities of Milwaukie, Oregon City, Happy Valley, and Johnson City and Clackamas County to integrate these concepts at the regulatory level by participating in land use reviews for new development to provide input on access and water supply.

The area served by CCFD#1 has a great deal of development in urban areas, making it difficult to make specific recommendations and make site visits to confirm compliance with the guidelines set forth in the ZDO. This need to build capacity for rural development is included in the CFD#1 Action Plan.

Emergency Response

A major wildland urban interface fire in CFD#1 may exceed the immediate resources and capabilities of the District. For this reason, CFD#1 has mutual aid agreements in place to allow for the sharing of resources across the county in the event of a large scale disaster including wildfires.

In the event of a large widlland fire, evacuations may be necessary. The rural residential areas present some challenges for evacuations due to access constraints including long, narrow and steep driveways with poor addressing. CCFD#1 has been working with ODF to improve address signage in vulnerable areas, and will continue to work with the Clackamas County Fire Co-op to implement address signage in the Communities at Risk. Many of the identified communities at risk have only one point of egress, making it difficult to manage incoming and outgoing traffic during an emergency.

CFD#1 follows DEQ burning policies for backyard burning. The majority of the cities covered by CFD#1 are within the DEQ burn ban area, which does not allow backyard burning at any time of the year. In the more rural areas that allow burning, CFD#1 tries to be consistent with debris burning policies set forth by the Fire Defense Board during fire season.

Clackamas Fire employs over 200 career and70 volunteer firefighters who receive regular wildland fire training to remain current on qualifications. Although the District is able to support classroom training, lack of live- fire experience makes it difficult to maintain wildland qualifications. New staff members have little to no live-fire experience have difficulty completing task books without being deployed. For this reason, CCFD#1 has been working with NAFT to identify opportunities for prescribed burns in Clackamas County that would benefit native ecosystems while providing live-fire experience to CFD#1 staff.

Community Outreach & Education

Clackamas County Fire District #1's Fire Prevention Division's mission is to protect and preserve life and property through education, engineering, and enforcement which requires proactive community interaction. Education opportunities include; school programs, public presentations, media events, and safety fairs. Engineering activities include; pre-construction plans review, fire protection system review, consumer product data collection, and fire code development. Enforcement activities include; commercial fire code inspections, open burning regulation enforcement, fire cause determination and arson investigation, and juvenile fire setter counseling and follow-up.

CCFD#1 is also a member of the Clackamas County Fire Prevention Cooperative which is a consortium of structural and wildland fire protection professionals that work together to deliver programs such as team teaching in the grade school fire safety programs, safety fairs with car seat inspections, community and school programs, and fire safety house displays.

In addition, Clackamas Fire worked with Clackamas County (North Clackamas Parks and recreation District) to hold a community meeting in conjunction with the Clackamas County Parks Wildfire Management and Implementation Plan on February 7th, 2012. More information can be found in the *Clackamas County Parks Wildfire Management Plan*.

Local Communities at Risk (Strategic Planning Areas)

Clackamas Fire also recognizes that there are smaller-scale Communities at Risk that have unique wildfire hazards to be addressed at the more local scale. These areas were referred to as Strategic Planning Areas in the 2005 iteration of the CWPP, but will now be referenced as local Communities at Risk to be consistent with state and federal language. Communities that have been identified as being particularly vulnerable to wildfires are illustrated in Map #18 and listed in Table 10.4-1. Clackamas Fire professionals considered the following factors to determine the local CARs including:

- Need for defensible space
- Access limitations (narrow driveways, lack of address signage, one way in/one way out)
- Steep slopes that can hinder access and accelerate the spread of wildfire
- Lack of water available for wildland fire fighting
- Heavy fuels on adjacent public lands
- Potential ignition sources from recreationists and transients
- Agricultural and backyard burning
- Lack of community outreach programs to promote wildfire awareness
- Communications difficulties

Fuels Reduction

The Bureau of Land Management, private industrial landowners and small woodland owners have many heavily forested landholdings that are adjacent to homes in the WUI. As CFD#1 targets the residential communities for creating defensible space, there is an opportunity to engage private, state and federal partners in reducing fuels on this adjacent public land.

To ensure that landscape-level treatments are paired with projects to create defensible space around vulnerable communities, priority fuels reduction projects have been overlaid with the Communities at Risk Identified by Clackamas Fire (Map #18). Fuels Reduction Priorities include:

Billy Goat Island	Ella V. Osterman
Happy Valley nature Trail	Highland Summit
Mt Talbert	Three Creeks
Willamette Narrows	Mtn. View Cemetery
Singer Creek Park	Atkinson Park
Waterboard Park	Canemah Bluff
Clear Creek	Newell Invasives
Scouter Mountain	Mciver Park
Lower Highland & Ridge	East Highland
Spring Park	Forest Creek

Clackamas Fire District Action Plan

Clackamas Fire has developed a list of actions to build capacity at the Department scale and has identified actions that can help to make the local CARS more resilient to potential wildfires. The action plan for Clackamas Fire and the local CARs therein is provided in Table 10-4.2.

Table 10.4-1. Clackamas Fire District #1 Local Communities at Risk

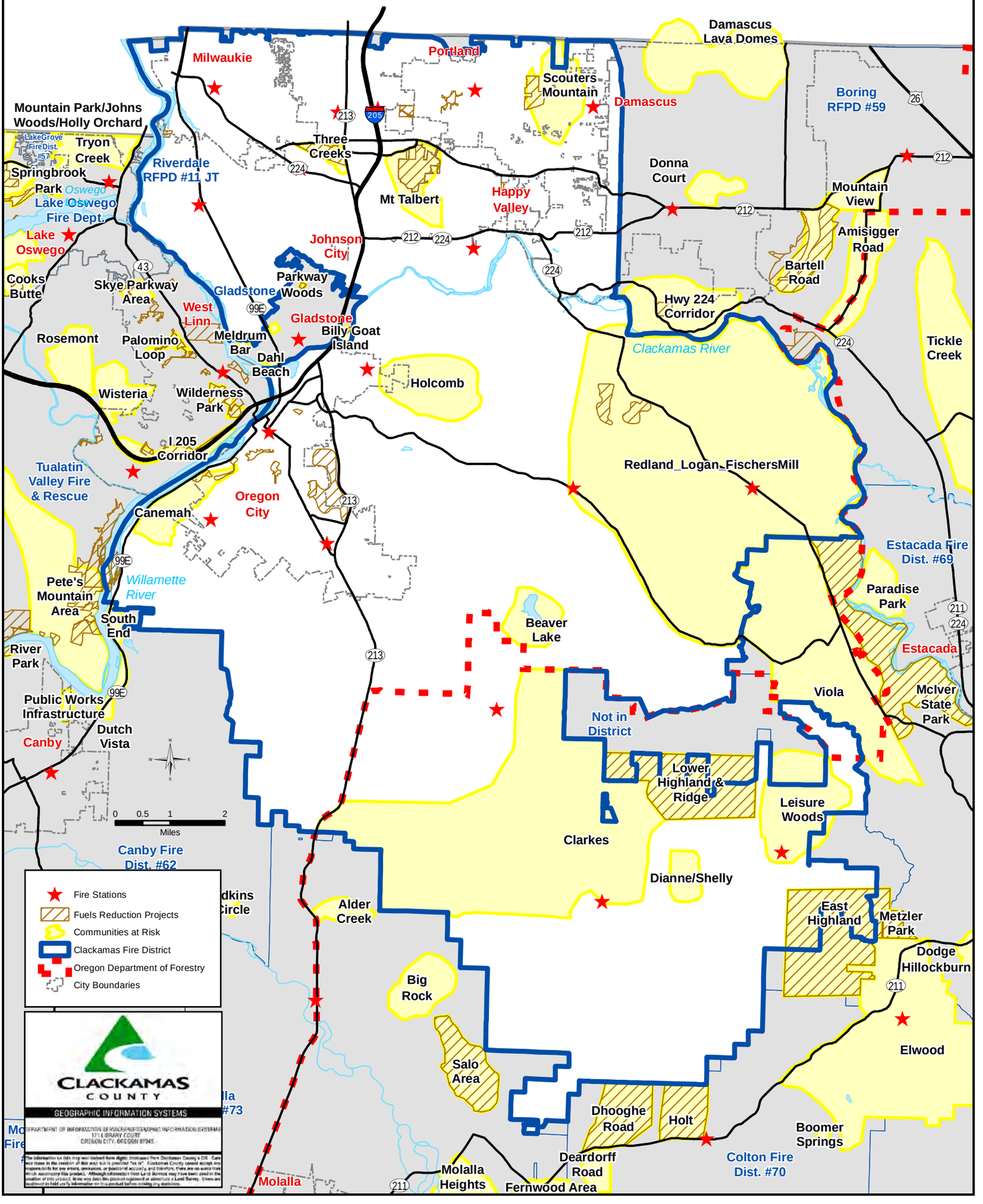
Community At Risk	CAR Priority	Defensible Space	Access	Water	Public Forest Lands	Private Forest Lands	Recreators/ Transients	Protection Capabilities	Burning	Preparedness	Communications	Steep Slopes	Description
Clackamas Fire District #1 Communities at Risk													
Forest Park/ Leisure Woods	High	X	X	X		X	X		X		X	X	This community is a high priority for CCFD#1 because it has only one way in one way out, it is surrounded by managed timberlands (Port Blakely and BLM), there is poor access into the forested areas and it is heavily used by bicycles in the summer. Access for response is extremely limited. Burning on residential and forested lands is an issue. The is a strong need for community awareness and preparedness as many homes have cedar shake roofs. . There is very poor cell coverage, limited water, and delayed response times.
Diane Drive Shelly Road	High	X		X		X		X	X		X	X	There are large homes adjacent to commercial timber operation in this community. Active timber management can provide ignition sources. Some of the homes have defensible space, and most of construction is good with fire resistive roofing. However, it is steep, and there are many slash piles surrounding the community, so embers encroaching would be an issue. There is no water here and the closest station is volunteer, so response times would be delayed.
Redland Road/Fishers Mill area/Logan	High	X	X	X		X	X		X	X		X	Logan Road is characterized by many logging operations than include burning of material. CCFD#1 has had many responses to fire ignitions here. Access is very poor access off of Eden. Water is limited to draft sites.
Clarkes/Beavercreek	High	X	X	X		X			X	X	X	X	There is a long history of larger and many widlfire ignitions in the Clarkes/Beavercreek area. The area now is densely populated with homes, but only about half have hydrants (towards Oregon City). Response times would be longer to this area and communications may being to be an issue . The community is also adjacent to Port Blakely forests that have heavy fuels loading ,
Beaver lake	High	X	X			X		X				X	Beaver Lake is a gated community adjacent to Port Blakely forest land The rear access is not accessible, so it is one way in and out. The community has heavy timber surrounding it and is on the top of a steep slope. CCFD#1 is in contact with the Port Blakely forester in case need to use their roads or need a key to unlock forest road gates.
Canemah Bluffs	High	X	X		X		X			X		X	Canemah Bluffs is very steep and has homes at the bottom and at the top of the slope. The homes at the bottom are surrounded by fine, flashy fuels. Access is limited here to one way in and out. A fuels reduction/oak restoration was implemented here.
Scouters Mountain	High	X	X	X	X	X	X		X	X	X	X	Scouters Mountain has a series of natural areas adjacent to homes and infrastructure. This has been identified in the Clackamas Parks Wildfire Management Plan as a priority for fuels reduction.
Mount Talbert	High	X	X	X	X		X			X		X	Mount Talbert Nature Park is a 242-acre property, co-owned by North Clackamas Parks and Recreation District and Portland Metro. The site is located east of I-205 and south of Sunnyside Road. The park has urban development at its edges on three sides. Surrounding properties are mostly medium density residential, with higher density residential and commercial uses to the north. It has steep slopes and has transient camps.
Holcomb	Medium	X				X			X				The primary issue with the Holcomb area is that there is a history of juvenile fire setters here. This ignition source coupled with steep slopes, heavy vegetation and lighter fuels in the open spaces could result in a rapidly spreading wildland fire.
3 Creeks	Medium	X	X	X	X		X			X			Three Creeks is a Clackamas County Park area that has heavy fuels adjacent to homes and infrastructure. This is a priority for fuels reduction and has been identified in the Clackamas County Parks Wildfire Management Plan.

Table 10.4-2. Clackamas Fire District # 1 Action Plan

Action Item	Timeframe	Partners	CAR
Clackamas Fire District #1 Action Plan			
Identify and pursue opportunities to participate in prescribed burns and live fire training to update and maintain wildfire certifications.	Ongoing	Metro, City of Wilsonville, City of West Linn, Clean Water Services, ODF	CCFD#1
Continue to foster partnerships with natural resources managers to assess and implement potential fuels reduction projects in natural areas adjacent to Communities at Risk.	Ongoing	Metro, City of Wilsonville, City of West Linn, Clean Water Services, ODF	CCFD#1
Partner with the Clackamas County Fire Defense Board to participate in a WUI conflagration exercise.	2 Years	Clackamas Fire Defense Board	CCFD#1
Build capacity to increase participation in lad use reviews of residential structures in the Timber/Agriculture Zone.	Long-Term	Clackamas DTD	CCFD#1
Use this CWPP to update the 2001 Clackamas County Fire District #1 Wildland/Urban Interface Fire Protection Plan	2 Years	ODF	CCFD#1
Clackamas Fire District #1 Local Communities at Risk Action Plan			
Conduct a Community Meeting to educate community on defensible space, and measures that can be taken to reduce structural ignitability. Consider creating Firewise/USA Communities here.	2 years	ODF	Forest Park/ Leisure Woods, Diane Drive Shelly Road
Partner with the Fire Co-op to create and distribute outreach materials that promote responsible burning, defensible space and reduction of structural ignitability within the Home Ignition Zone.	2 Years	Fire Co-op	All CAR's
Promote legal, safe and responsible debris burning through public outreach and education.	Short-Term	ODF, DEQ, Fire Co-op	All CAR's
Reduce hazardous fuels in the ROW of potential evacuation routes. Engage residents adjacent to primary evacuations routes to extend treatments onto private land.	Ongoing	ODOT, Clackamas County Roads	All CAR's
Obtain structural ignitability data by conducting structural triage assessment data collection (including GPS points) for homes in Communities at Risk.	Ongoing	ODF	All CAR's
Develop a community-driven pre-disaster plan including evacuation routes, telephone call down trees, and other strategies for strengthening community response.	Ongoing	Clackamas County Emergency Management	All CAR's
Implement road addressing (including length of driveways) and other signage for emergency response.	Ongoing	ODF, Clackamas County Fire Co-op	All CAR's
Seek grant funding to support fuels reduction and creation of defensible space around homes.	Ongoing	ODF, Clackamas County Fire Co-op	All CAR's
Work with Clackamas County to reduce hazardous fuels in parks and forested areas adjacent to CAR's.	Ongoing	Clackamas County North Clackamas Parks and Recreation District	Scouters Mountain, Mount Talbert
Conduct Community Clean Up Days to reduce hazardous fuels. Identify opportunities to recycle or compost vegetative material instead of burning.	Ongoing	ODF, Metro	All CAR's

Clackamas Fire District

Map #18



10.5. Community at Risk: Colton Rural Fire Protection District #70

Colton Rural Fire Protection District #70 has been identified as a Community at Risk (CAR) by the Oregon Department of Forestry. The District has participated in the Clackamas County CWPP planning process to evaluate capabilities to prevent, prepare for and respond to potential wildfire events.

Colton Fire District Description

With over 50 years of tradition, the Colton Rural Fire District is made up of men and women (primarily volunteers), who serve the citizens of Colton. The Colton Rural Fire District was established in1956 and covers 46 square miles between Molalla and Estacada. Colton Rural Fire District protects the community with both Fire Service and Emergency Medical Care.

Wildland Urban Interface (WUI)

This area is an excellent example of the Wildland Urban Interface (WUI) because it is characterized by steep slopes with residential homes surrounded by heavy fuels. In addition, many of the neighborhoods here have only one way in and one way out with narrow, steep driveways and poor address signage. Water is limited throughout the District, especially in the Communities at Risk.

Heavy and continuous fuels dominate this area, and forests are actively managed for lumber and Christmas trees. Land ownership includes a variety of rural residential, private forest land, large industrial forests and public lands (Bureau of Land management). There are also many small woodlands that are not actively managed that are littered with dead and dying trees and ladder fuels that could take a fire from the ground into the crowns of the trees. Many local youth illegally access these forest landholdings to build campfires, use All Terrain Vehicles (ATV's) which increases the likelihood of potential ignitions. Fires that begin on public land or on smaller private residential lots can quickly threaten the communities and natural resources that thrive in the Colton Fire District.

Colton Fire District Wildfire Hazards

The Clackamas County CWPP wildfire hazard assessment assisted Colton Fire in identifying areas that may be at higher risk to potential wildfires. Map #10 illustrates the overall wildfire hazard risk in the Colton area and will be used to help target areas for wildfire prevention activities.

Structural Ignitability

Colton Fire promotes the creation of defensible space, use of fire-resistant roofing and building materials, and community preparedness in the WUI. Colton Fire works with the Clackamas County Department of Transportation and Development to provide input on access and water supply for new lots of record. Colton Fire provides alternatives to property owners who cannot meet the requirements for access and water supply. There are some opportunities to improvements coordination between Clackamas County and Colton Fire. First, Colton Fire is not notified of development that occurs on existing roads and/or lots of record. Second, Colton Fire is not being notified of homes that are being remodeled that require new access and water requirements.

In addition, Colton Fire is not receiving notification of occupancy permits through monthly emails and does not have access/training in using the Velocity Hall system. Colton Fire is particularly concerned with about new developments such as the one on Rolliewood Road. As new homes are built, the District should be notified because no parking signs are required to be posted on all narrow roads.

Emergency Response

Emergency response is challenging in the Colton Fire District because staff are almost entirely volunteer, 1.5 paid staff. A major wildland urban interface fire in Colton would quickly exceed the resources and capabilities of the District. For this reason, Colton Fire has Mutual Aid agreements in place which allows for the sharing of resources across the county in the event of a large scale disaster including wildfires.

Although the District is able to support annual wildland fire training (S-130 and S-190), the lack of live fire experience makes it difficult to retain wildland qualifications. Colton Fire would like to work more directly with the USFS and ODF and other land mangers to take advantage of opportunities to participate in live fires.

Burning of yard waste and debris is unique in the Colton Fire District because it is outside of the DEQ boundary, which means that residents can burn throughout the winter. Colton Fire adheres to the Open Burn Policy adopted by the Fire Defense Board and tries to be consistent with neighboring jurisdictions in regulating the Backyard Burning program, but lack staff and resources make it difficult to catch every illegal fire.

Radio coverage is generally good throughout the District using VHF, but the equipment CCOM has for VHF is antiquated. It is not likely that CCOM will update their equipment because the federal deadline for county-wide narrowband by Jan. 1st 2013. Also, there is a county-wide migration to 800 MHz, which presents issues in rural areas where VHF works much better than 800 MHz. (county-wide issue).

Colton Fire has not been successful in acquiring RFA and VFA grants to purchase widland PPE (nomex shirts, pants and fire shelters), and is in need of new PPE including the new fire shelters.

Because Colton Fire has does not have an extensive hydrant system, it is important to begin identifying and improving potential water sites. This is especially important for homes that have long narrow driveways that will not support water tenders. ODF has been working with Colton Fire to improve address signage in the many of the most vulnerable areas and potential water sites could be added to these signs.

Community Outreach & Education

Colton Fire is dedicated to fire prevention, and uses a variety of forums to promote defensible space, fire-resistant building materials, and safe burning practices. Colton Fire partners with ODF to have wildfire prevention programs in local area schools. The District also holds annual events at the main fire station that are paired with prevention messages. The District would like to be more proactive about educating the public about the need for access, water and defensible space and plans to partner with the Molalla Pioneer to create a driveway outreach program designed to advise people about lack of access and promote creation of turn-around space.

Local Communities at Risk (Strategic Planning Areas)

Colton Fire also recognizes that there are smaller-scale Communities at Risk or Strategic Planning Areas (per the 2005 CWPP) that have unique wildfire hazards to be addressed at the more local scale. Communities that have been identified as being particularly vulnerable to wildfires are illustrated in Map # 19 and listed in Table 10.5-1. Colton Fire Professionals considered the following factors to determine the local CARs including:

- Need for defensible space

- Access limitations (narrow driveways, lack of address signage, one way in/one way out)
- Steep slopes that can hinder access and accelerate the spread of wildfire
- Lack of water available for wildland fire fighting
- Heavy fuels on adjacent public lands
- Potential ignition sources from recreationists and transients
- Agricultural and backyard burning
- Lack of community outreach programs to promote wildfire awareness
- Communications difficulties

Fuels Reduction

Fuels reduction projects can and should be accomplished at the local scale, which is the creation of defensible space around homes, as well as the landscape scale to extend vegetation treatments onto adjacent forested land and natural areas. Colton Fire will continue to facilitate cooperation between public and private organizations and local area residents to ensure that fuels reduction work occurs strategically and benefits homeowners as well as adjacent public and private lands.

To ensure that landscape-level treatments are paired with projects to create defensible space around vulnerable communities, priority fuels reduction projects have been overlaid with the Communities at Risk Identified by Colton Fire (Map #19).

Fuels Reduction Priorities include:

Fernwood/Young Road Area	Hult Road
Dhooghe Road	Hunter Road

Colton Fire District Action Plan

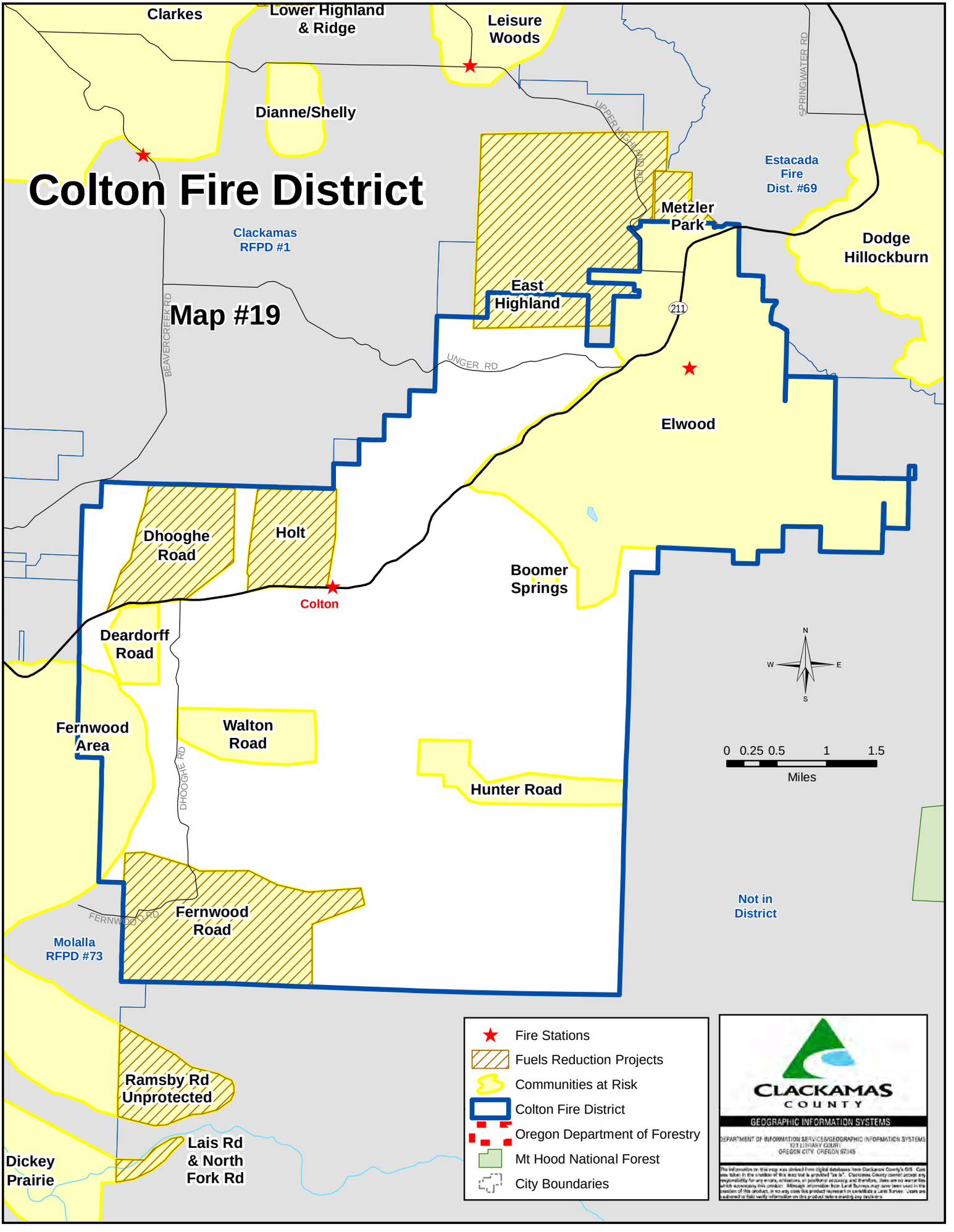
Colton Fire has developed a list of actions to build capacity at the Department scale and has identified actions that can help to make the local CARS more resilient to potential wildfires. The action plan for Colton Fire and the local CARs therein is provided in Table 10.5-2.

Table 10.5-1 Colton Fire District Local Communities at Risk

Community At Risk	CAR Priority	Defensible Space	Access	Water	Public Forest Lands	Private Forest Lands	Recreators/ Transients	Protection Capabilities	Burning	Preparedness	Communications	Steep Slopes	Description
Colton Fire Local Communities at Risk													
Deardorf	High	X	X	X				X	X	X		X	This community has only one way in and out with very narrow, steep roads and driveways. There are many homes in this area that have dense vegetation and need defensible space. There is no water here. People in this community are not aware of the high wildfire risk here.
Boomer Springs/Schieffer	High	X	X					X	X	X		X	There are not many homes in this community, but those that are located here have long, narrow driveways with no turn-around. There is no water here and there are very steep slopes.
Walton/Tiffany	High	X	X	X	X	X	X	X	X	X		X	This community has many have long, narrow driveways with trees overhanging and encroaching. There is no water here and homes are in great need of defensible space . Industrial forest lands surround the community and could be potential ignition sources.
Fernwood/Young Road Area	High	X	X	X		X	X	X	X	X		X	This Community has very limited access with many roads being one way in and out and access is very narrow. Rounds Road is a very narrow, gravel road. Water is limited. There is a creek with a pond but they are difficult to access. The community is adjacent to Port Blakey and Weyerhaeuser industrial forest operations. ATV's illegally access the Weyerhaeuser land where there is a great deal of slash from previous timber operations. Residents here burn all year, so they a great deal of fuel around homes is removed during the winter and spring, but there are some people who wait until summer to burn. OSU also has a managed forest here. ODF crews plan to brush out end of Odeen.
Dhooghe	Medium	X	X	X		X		X	X	X			This area is relatively flat, but access is still difficult because many homes have long, narrow driveways. There is also a very narrow bridge that is one way in and out. Frank Road is in very poor condition. There is no water here. There is active logging in the heavily managed, private forest lands adjacent to the community. This forested area has a lot of ladder fuels on the western portion and could be targeted for Fuels Reduction.
Holt Road	Medium	X	X			X			X	X		X	The access in this community is extremely limited because Holt Road is now closed, making it one way in and out. It is also very steep. There is a good creek at the bottom, and about half of this community has hydrants. There are small, private forest lands surrounding the community. The managed woodlands look good, but the unmanaged woodlands have heavy fuels loading.
Hunter Road	Medium	X	X	X	X	X	X	X	X	X		X	This community only has one way in and out and it is very steep. There is a cluster of homes that need defensible space. Port Blakely and Weyerhaeuser own industrial forest lands that surround the community. Many local youth illegally access these areas to hang out, smoke cigarettes and start campfires.
Ellwood Engstrom/Area	Medium	X	X			X		X	X	X		X	This community has good water with creeks and ponds from which pumps can draw. There are many homes here with narrow driveways. there is also a small bridge that fire apparatus cannot access. Gillet is a one way road that has no turn-around which is a very big issue. Port Blakely manages industrial forest land adjacent to this community.

Table 10.5-2. Colton Fire District Action Plan

Action Item	Timeframe	Partners	CAR
Colton Fire Action Plan			
Pursue grant funding to purchase Wildland PPE to replace outdated PPE (fire shelters)	2 Years	ODF	Colton Fire
Work with Clackamas County to ensure coordination regarding the new development on Rolliewood Road. As new homes are built, the District should be notified because no parking signs are required to be posted on all legal roads.	6 Months	Clackamas DTD	Colton Fire
Work with Clackamas County to ensure coordination regarding development on existing lots and roads of record.	2-3 Years	FDB, SFMO	Colton Fire
Work with Clackamas County to use the total square footage of the home including any remodel expansion as the threshold for contacting Fire Agencies for access and water requirements.	2-3 Years	FDB, SFMO	Colton Fire
Work with ODF, USFS and other land managers to identify opportunities to participate in Live Fire Training.	Ongoing	ODF, USFS, BLM	Colton Fire
Partner with the Molalla Pioneer to create a driveway outreach program designed to advise people about lack of access and promote creation of turn-around space.	1 year	Molalla Pioneer	Colton Fire
Work with Clackamas County to receive notification of occupancy permits through monthly emails and request access/training to use the Velocity Hall System.	6 Months	Clackamas County, SFMO	Colton Fire
Colton Fire Local Communities at Risk Action Plan			
Conduct a Community Meeting to educate the community and solicit feedback on wildfire prevention projects the community would support.	Ongoing	ODF	Deardorf
Work with CCFD#1 to educate residents of Holt road about the importance of being prepared since response time is increased with the closure of the road.	Ongoing	CCFDF#1	Holt Road
Begin identifying and improving potential water sites in Communities at Risk.	Long-Term	ODF	All Car's
Work with Port Blakely and Weyerhaeuser to post signage and develop additional strategies to discourage illegal trespassing on forest land.	Ongoing	Port Blakely, Weyerhaeuser	Walton/Tiffany, Fernwood/Young Road Area, Hunter Road
Complete home addressing in Communities at Risk.	Ongoing	ODF	All CAR's
Partner with the Fire Co-op to create and distribute outreach materials that promote responsible burning, defensible space and reduction of structural ignitability within the Home Ignition Zone.	Ongoing	Fire Co-op	All CAR's
Promote legal, safe and responsible debris burning through public outreach and education.	Short-Term	ODF, Fire Co-op	All CAR's
Reduce hazardous fuels in the ROW of potential evacuation routes. Engage residents adjacent to primary evacuations routes to extend treatments onto private land.	Ongoing	ODOT, Clackamas County Roads	All CAR's
Seek grant funding to support fuels reduction and creation of defensible space around homes.	Ongoing	ODF	All CAR's


Colton Fire District
Map #19
Clarkes
Lower Highland & Ridge
Leisure Woods
Dianne/Shelly
Clackamas RFPD #1
Estacada Fire Dist. #69
Metzler Park
Dodge Hillockburn
East Highland
Elwood
Dhooghe Road
Holt
Colton
Boomer Springs
Deardorff Road
Fernwood Area
Walton Road
Hunter Road
Fernwood Road
Molalla RFPD #73
Ramsby Rd Unprotected
Lais Rd & North Fork Rd
Dickey Prairie
Not in District
UNGER RD
BEAVERCREEK RD
DHOOGHE RD
FERNWOOD RD
UPPER HIGHLAND RD
SPRINGWATER RD
211
N
W
E
S
0 0.25 0.5 1 1.5
Miles
Fire Stations
Fuels Reduction Projects
Communities at Risk
Colton Fire District
Oregon Department of Forestry
Mt Hood National Forest
City Boundaries
CLACKAMAS COUNTY
GEOGRAPHIC INFORMATION SYSTEMS

10.6. Community at Risk: Estacada Rural Fire Protection District #69

The Estacada Fire District has been identified as a Community at Risk (CAR) by Oregon Department of Forestry. The District has participated in the Clackamas County CWPP planning process to evaluate capabilities to prevent, prepare for and respond to potential wildfire events.

Estacada Fire District Description

The Estacada Fire District is a special service district that provides fire, rescue, and prevention services to the City of Estacada and surrounding unincorporated areas. The mission of the Estacada Rural Fire District is to minimize the loss of life and property resulting from fires, medical emergencies and other disasters by providing the highest level, most cost efficient fire and life safety services possible to every person within our boundaries.

The Estacada Rural Fire District protects 88 square miles from two fire stations. There are 10 career and 40 volunteer firefighters that respond to approximately 1,300 alarms annually. About 70% of the alarms are medical responses.

Wildland Urban Interface (WUI)

Estacada's Fire District is a rural area on the eastern edge of Clackamas County adjacent to large tracts of federal and private forests. The terrain is steep, causing access and communication limitations. The Clackamas River bisects the District and continues to the Mount Hood National Forest, attracting thousands of recreators every year. Campers, hikers, hunters and other visitors to this area can potentially start wildfires that could carry from public land to the residential communities.

This area is characterized by rural residential homes surrounded by heavy fuels and steep slopes. In addition, many of the neighborhoods here have only one way in and one way out with narrow, steep driveways and poor address signage. Heavy and continuous fuels dominate this area, so fires that begin on public land or on smaller private residential lots can quickly threaten the communities and natural resources that thrive in the Estacada Fire District.

Oregon State Parks, the Bureau of Land Management and the United States Forest Service have a few heavily forested landholdings that are adjacent to homes in the Wildland Urban Interface. As Estacada Fire targets the residential communities for creating defensible space, there is an opportunity to engage state and federal partners in reducing fuels on this adjacent public land.

Estacada Fire District Wildfire Hazards

The Clackamas County CWPP wildfire hazard assessment assisted Estacada Fire in identifying areas that may be at higher risk to potential wildfires. Map #10 illustrates the overall wildfire hazard risk in the Estacada Fire District and will be used to help target areas for wildfire prevention activities.

Structural Ignitability

Estacada Fire promotes the creation of defensible space, use of fire-resistant roofing and building materials, and community preparedness in the WUI. Estacada Fire works with the City of Estacada and Clackamas County to integrate these concepts at the regulatory level by providing input on access and water requirements for new development. The City of Estacada uses a consulting firm for land use planning services. This presents some difficulties for the Fire District because the consulting firm does not always contact the District for input on fire flow and access. Even when the Fire District does provide input, the fire flow and access requirements are not always

communicated to the Clackamas County Building Department. These issues have been identified in the Estacada CWPP Action Plan.

Emergency Response

A major wildland urban interface fire in Estacada would quickly exceed the resources and capabilities of the District. For this reason, Estacada Fire has Mutual Aid agreements in place which allows for the sharing of resources across the county in the event of a large scale disaster including wildfires.

In the event of a large widlland fire, evacuations may be necessary. This rural area presents some difficulties due to the large number of one way in and one way out roads. More coordination and outreach is needed to ensure that evacuation procedures are developed and understood. This has been included the Estacada CWPP Action Plan.

Burning of yard waste and debris is challenging in the Estacada Fire District because backyard burning is allowed in all areas. Estacada Fire tries to be consistent with neighboring jurisdictions' Backyard Burning programs but does not have staff or resources to regulate burning in Estacada. The need for a more structured Backyard Burning Program is indicated in the Estacada CWPP Action Plan.

Estacada Fire employs 10 career and 44 volunteer firefighters who receive regular wildland fire training to remain current on qualifications. Although the District is able to support the S-130 and S-190 training, lack of hands-on fire experience makes it difficult to retain wildland qualifications. Estacada Fire would like to work more directly with the USFS and ODF to have opportunities to participate in live fires.

Community Outreach & Education

Estacada Fire is dedicated to fire prevention, and uses a variety of forums to promote residential fire safety, defensible space, and safe burning practices. The District has programs designed to empower community members to take a more active role in being prepared for any emergency. These include the Map Your Neighborhood Program, Community Emergency Response Teams, Citizen Ride-Alongs, discounted address signs and station tours. Estacada Fire is also an active member of the Clackamas County Fire Prevention Cooperative which is a consortium of structural and wildland fire protection professionals that work together to deliver programs such as team teaching in the grade school fire safety programs, safety fairs with car seat inspections, community and school programs, and fire safety house displays. Estacada Fire would like to update its fire prevention program by taking advantage of cost effective social media outlets and engaging youth groups from Estacada High School and Timberlake Job Corps.

Local Communities at Risk (Strategic Planning Areas)

Estacada Fire also recognizes that there are smaller-scale Communities at Risk that have unique wildfire hazards to be addressed at the more local scale. These areas were referred to as Strategic Planning Areas in the 2005 iteration of the CWPP, but will now be referenced as local Communities at Risk to be consistent with state and federal language. Communities that have been identified as being particularly vulnerable to wildfires are illustrated in Map#20 and listed in Table 10.6-1. Estacada Fire professionals considered the following factors to determine the local CARs including:

- Need for defensible space
- Access limitations (narrow driveways, lack of address signage, one way in/one way out)

- Steep slopes that can hinder access and accelerate the spread of wildfire
- Lack of water available for wildland fire fighting
- Heavy fuels on adjacent public lands
- Potential ignition sources from recreationists and transients
- Agricultural and backyard burning
- Lack of community outreach programs to promote wildfire awareness
- Communications difficulties

Fuels Reduction

Fuels reduction projects can and should be accomplished at the local scale, which is the creation of defensible space around homes, as well as the landscape scale to extend vegetation treatments onto adjacent forested land and natural areas. Estacada Fire will facilitate cooperation between public and private organizations to ensure that fuels reduction work occurs strategically and benefits homeowners as well as adjacent public and private lands.

To ensure that landscape-level treatments are paired with projects to create defensible space around vulnerable communities, priority fuels reduction projects have been overlaid with the Communities at Risk Identified by Estacada Fire (Map 20).

Fuels Reduction Priorities include:

Eagle Creek Youth Camp
Paradise Park
Redland Road Area
McIver Park
Metzler park
Ranger Woods
Silver Fox RV Park

Estacada Fire District Action Plan

Estacada Fire has developed a list of actions to build capacity at the Department scale and has identified actions that can help to make the local CARS more resilient to potential wildfires. The action plan for Estacada Fire and the local CARs therein is provided in Table 10.6-2.

Table 10.6-1. Estacada Fire District Local Communities at Risk

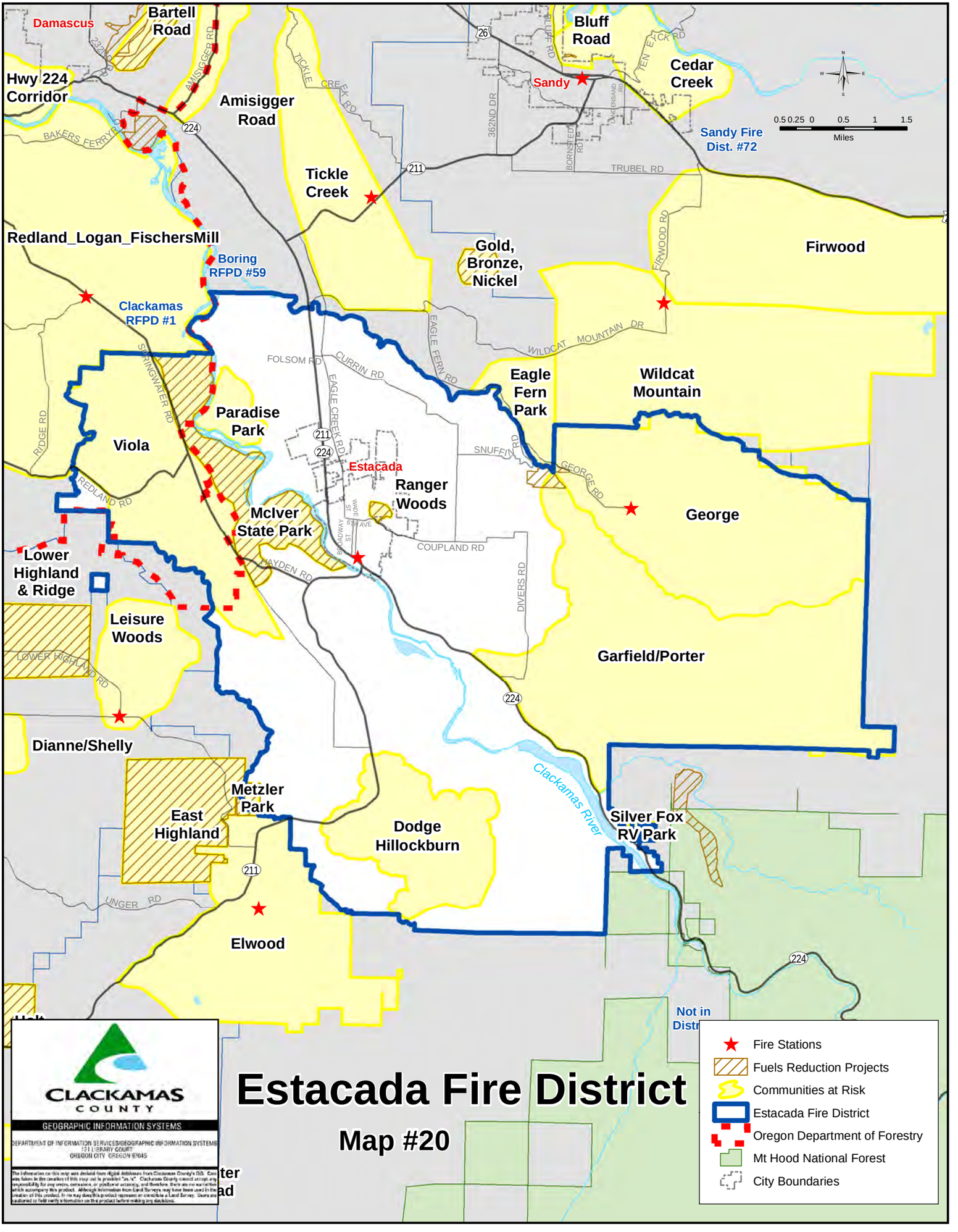
Community At Risk	CAR Priority	Defensible Space	Access	Water	Public Forest Lands	Private Forest Lands	Recreators/ Transients	Protection Capabilities	Burning	Preparedness	Communications	Steep Slopes	Description
Estacada Fire Communities at Risk													
Garfield/Porter Community/Eagle Creek Youth Camp	High	X	X	X	X	X	X	X	X	X	X	X	Access in this community is a big loop. There has been conflagrations in this area, which turns the loop into one way in and out. There are unique events that occur in this area including a nudist colony that holds events and there have also been music festivals here which bring many people. There is inadequate access and water for the number of people these events can bring in. It would be very beneficial to identify an alternate water source here because it is also adjacent to Federal and private forests. There are also many environmental activists here. Protection capabilities are compromised because it takes about 25 minutes, which can be even longer depending on the weather. Eagle Creek Youth Camp is an area of particular concern because of heavy vegetation, and you must access the camp through home driveways and private roads that likely cannot support apparatus. Water supply is improving because the camp is putting in hydrants in to get bldg permits. Access to the camp is one way in and out, and there are cabins throughout the woods. There is one open field that could be used for staging- life flight area, safety zone. Camp is a Fuels Reduction priority.
Dodge- Hillock Burn Area	High	X	X	X	X	X	X	X	X	X	X	X	Access in this community is particularly challenging on one way roads including: McQueen, Peterson, Horner and Benjamin. There is no water available here, so water would be brought in for fire fighting. The community is surrounded by BLM, USFS and private forest land. Recreates bring ATVs here despite the fact that there are there are gates. There are many old logging roads that attract recreators. There have also been law enforcement issues in this area. Also, response times would be longer because the Hwy 211 bridge is only access so if there is an issue there, the community could be inaccessible. Communications are limited for 800 MHz in area (50%) , but VHF is good.
George Community	High	X	X	X		X	X	X	X	X	X	X	This community has heavy fuels next to homes, steep slopes and poor access. There are many one way in and out roads and response professionals would likely enter from the Boring Fire District. There is a fire station up there but Estacada Fire has had difficulty recruiting and retaining volunteers in this area. There are also many back roads people take with can be potential ignition sources.
Paradise Park, Twin Island, Star Road	High	X	X	X			X	X	X	X	X	X	All three of these areas have neighborhood associations, so they would be great to target for community clean up events. Access here is one way in and out, there is heavy vegetation, steep slopes, and you cannot draft out of the river so water will be hauled in. There is a great deal of recreation on the river, which people access illegally through private property and on the little islands. Protection of this area is difficult because the road is susceptible to landslides and it is one way in and out. There is a secondary way in and out, but it cannot support emergency vehicles. Communications can be an issue because it is a canyon. Paradise Park is a fuels reduction priority.

Table 10.6-1. Estacada Fire District Local Communities at Risk

Community At Risk	CAR Priority	Defensible Space	Access	Water	Public Forest Lands	Private Forest Lands	Recreators/ Transients	Protection Capabilities	Burning	Preparedness	Communications	Steep Slopes	Description
Redland Rd Area- Viola Area, Fellows road	Medium	X		X	X	X	X		X	X	X	X	This interface community has heavy vegetation adjacent to homes which extends into adjacent forest land. Some adjacent forest land is BLM and some is private industrial. The access is fair, but there are a number of one way roads that could make response and evacuation challenging. There is a potential water supply up on the hill, but it hasn't been developed very well. CCFD#1 has a volunteer fire station in this area, so protection capabilities should be acceptable. Communications are at about 75% coverage in this area and cell coverage is even available in the canyon.
McIver Park & Parkview & Riverlake Community	Medium	X	X	X	X	X	X	X	X	X	X	X	ODF used seasonal crews to reduce fuels in did some fuels reduction in McIver State Park, and identified additional work to be done to make the park more fire resistant. There are two neighborhoods adjacent to the Park with heavy fuels leading directly to the homes. The river can be accessed for drafting. Access is one way in and out in all these areas, with very steep terrain which goes almost vertical near Feldheimer Road. Despite being able to draft from the river, some areas would require hauling water in to the site. There is river access for boat launching at the State Park and Feldheimer road also has a public boat launch. Transients are often sighted on Riverlake Road. This area is a priority for fuels reduction.
Metzler Park	Medium		X	X	X		X	X			X	X	This State Park is a good candidate for fuels reduction. It has one way in and out, and many recreators use this facility. Water is limited here. There is a creek which could serve as a potential water source, and this needs to be explored further.
Ranger Woods	Medium	X			X				X	X	X	X	Ranger Woods is owned by Estacada Schools and is adjacent to neighborhoods in northeast portion of town. Defensible space around the homes and the school is needed. This wooded area is particularly vulnerable because young adults coming from the school like to congregate here and sometimes light fires, smoke cigarettes, and engage in other activities that could serve as an ignition source. There is also a high concentration of invasive species here. This area is a high priority for fuels reduction.
Silver Fox RV Park- USFS	Low	X	X	X	X		X	X	X	X			This RV park gets extremely busy during the wildfire season. There is dense vegetation near the camping spots that the RVs and campfires could ignite easily. This is a priority for fuels reduction.

Table 10.6-2. Estacada Fire District Action Plan

Action Item	Timeframe	Partners	CAR
Estacada Fire Action Plan			
Promote improvements to the 800 MHz system throughout Estacada to enhance coverage throughout the District.	Long-Term	UASI, CCSO, CCEM, FDB	Estacada Fire District
Identify and pursue opportunities to provide Incident Management Training for firefighters that will be Incident Commanders on larger scale emergencies.	Ongoing	FDB, CCEM, NAFT	Estacada Fire District
Work with the City Manager to ensure that the contracted land use planner for the City consults Estacada Fire for access and fire flow requirements. Improve coordination between the contracted planner and Clackamas County Building Department to ensure that all fire flow and access requirements are met.	6 Months	City of Estacada, Clackamas County	Estacada Fire District
Invigorate the District's Outreach and Education Program by partnering with ODF to incorporate wildfire prevention into the annual Open House and Safety Fair.	1 Year	ODF	Estacada Fire District
Pursue grant funding to purchase Wildland PPE to replace outdated PPE.	2 Years	FDB, ODF	Estacada Fire District
Develop a marketing campaign that utilizes social media outlets to build support and capacity for the Estacada Fire District (volunteer recruitment, community support, fund raising).	3 Years	Fire Co-op	Estacada Fire District
Identify opportunities to engage young adults in community service and wildfire prevention projects.	2 years	Estacada High School, Timberlake Job Corps	Estacada Fire District
Build capacity and support for a more involved backyard burning program including staff to educate local residents and regulate the Backyard Burning Program.	Long-Term	ODF, DEQ, Fire Co-op	Estacada Fire District
Estacada Fire Local Communities at Risk Action Plan			
Conduct a Community Meeting to educate community on defensible space, and measures that can be taken to reduce structural ignitability. Solicit feedback on wildfire prevention projects the community would support.	2 Years	ODF	Garfield/Porter Community
Partner with the Fire Co-op to create and distribute outreach materials that promote responsible burning, defensible space and reduction of structural ignitability within the Home Ignition Zone.	2 Years	Fire Co-op	All CAR's
Promote legal, safe and responsible debris burning through public outreach and education.	2 Years	ODF, DEQ, Fire Co-op	All CAR's
Reduce hazardous fuels in the ROW of potential evacuation routes. Engage residents adjacent to primary evacuations routes to extend treatments onto private land.	Ongoing	ODOT, Clackamas County Roads	All CAR's
Obtain structural ignitability data by conducting structural triage assessment data collection (including GPS points) for homes in Communities at Risk.	2 Years	ODF	All CAR's
Promote the District's Map Your Neighborhood and CERT programs to generate community-driven pre-disaster plans including evacuation routes, telephone call down trees, and other strategies for strengthening community response.	Ongoing	Clackamas County Emergency Management	All CAR's
Implement road addressing (including length of driveways) and other signage for emergency response.	2 Years	ODF	All CAR's
Work with partner agencies such as ODF, SWCD and Ford Institute to procure funding and technical assistance for reduce fuels in and around priority CAR's.	2 years	ODF, SWCD, Grant Funders	All CAR's
Work with State Parks to reduce hazardous fuels in their parks and provide signage to educate recreators about wildfire prevention.	3 years	State Parks, ODF	McIver Park, Metzler Park
Work with USFS and BLM to reduce fuels on federal land adjacent to CAR's.	3 years	USFS, BLM, Silver Fox RV Park	Silver Fox RV Park, Redland Road
Conduct Community Clean Up Days to reduce hazardous fuels. Identify opportunities to recycle or compost vegetative material instead of burning.	2 Years	ODF	All CAR's



Estacada Fire District

Map #20

10.7. Community at Risk: Gladstone Fire Department

The Gladstone Fire Department has been identified as a Community at Risk (CAR) by the Oregon Department of Forestry. The District has participated in the Clackamas County CWPP planning process to evaluate capabilities to prevent, prepare for and respond to potential wildfire events.

Gladstone Fire

The Gladstone Fire Department provides fire, rescue, and prevention services to the City of Gladstone. The Gladstone Fire Department is primarily staffed by volunteers and is supported by a paid Fire Marshal and a Volunteer Coordinator.

Wildland Urban Interface (WUI)

Despite being primarily urban, some areas in the Gladstone are excellent examples of the Wildland Urban Interface. They are characterized by residential homes surrounded by heavy fuels and steep slopes. Some communities have only one way in and one way out with narrow, steep driveways and poor address signage. Heavy and continuous fuels are present in some natural areas and parks adjacent to neighborhoods, so fires that begin on public land or on smaller private residential lots can quickly threaten the communities and natural resources that thrive in the City of Gladstone.

Gladstone Fire District Wildfire Hazards

The Clackamas County CWPP wildfire hazard assessment assisted Gladstone Fire in identifying areas that may be at higher risk to potential wildfires. Map #10 illustrates the overall wildfire hazard risk in the City of Gladstone and will be used to help target areas for wildfire prevention activities.

Structural Ignitability

The City of Gladstone contracts with Clackamas County for land use planning and building permit services, and has a local planning commission to help guide development. Gladstone Fire promotes the creation of defensible space, use of fire-resistant roofing and building materials, and community preparedness in the WUI by working with Clackamas County to integrate these concepts at the regulatory level. Gladstone Fire participates in land use reviews for new development to provide input on access and water supply.

Emergency Response

A major wildland urban interface fire in Gladstone would quickly exceed the resources and capabilities of the Department. For this reason, Gladstone has mutual aid agreements in place which allows for the sharing of resources across the county in the event of a large scale disaster including wildfires. Gladstone's primary mutual aid partner is Clackamas Fire District #1, which completely surrounds the City of Gladstone. Burning of yard waste and debris is prohibited in Gladstone, as it is located within the DEQ Burn Ban Boundary.

Gladstone Fire employs 2 career and many volunteer firefighters. Historically, Gladstone Fire participated on state mobilization strike teams, but has opted out of this partnership in recent years due to diminished capacity to support training and maintain qualifications necessary to participate. Gladstone Fire provides annual refresher training to all staff, and will send new staff to Clackamas County Community College to receive S-130 and S-190. The Department would like to improve its capacity in developing and retaining wildland fire certifications, and this is noted in the action plan.

Community Outreach & Education

Gladstone Fire supports fire prevention, but has a limited capacity to develop and implement public outreach programs. Gladstone Fire is a member of the Clackamas County Fire Prevention Cooperative which is a consortium of structural and wildland fire protection professionals that work together to deliver programs such as team teaching in the grade school fire safety programs and safety fairs. Gladstone Fire would like to be a more active member of the Coop to increase their capacity for providing structural and wildland fire prevention programs in the City.

Local Communities at Risk (Strategic Planning Areas)

Gladstone Fire recognizes that there are smaller-scale Communities at Risk that have unique wildfire hazards to be addressed at the more local scale. These areas were referred to as Strategic Planning Areas in the 2005 iteration of the CWPP, but will now be referenced as local Communities at Risk to be consistent with state and federal language. Communities that have been identified as being particularly vulnerable to wildfires are illustrated in Map #21 and listed in Table 10.7-1. Gladstone Fire professionals considered the following factors to determine the local CARs including:

- Need for defensible space
- Access limitations (narrow driveways, lack of address signage, one way in/one way out)
- Steep slopes that can hinder access and accelerate the spread of wildfire
- Lack of water available for wildland fire fighting
- Heavy fuels on adjacent public lands
- Potential ignition sources from recreationists and transients
- Agricultural and backyard burning
- Lack of community outreach programs to promote wildfire awareness
- Communications difficulties

Fuels Reduction

Fuels reduction projects can and should be accomplished at the local scale, which is the creation of defensible space around homes, as well as the landscape scale to extend vegetation treatments onto adjacent forested land and natural areas. Gladstone Fire will help to facilitate cooperation between public and private organizations to ensure that fuels reduction work occurs strategically and benefits homeowners as well as adjacent public and private lands.

To ensure that landscape-level treatments are paired with projects to create defensible space around vulnerable communities, priority fuels reduction projects have been overlaid with the Communities at Risk Identified by Gladstone Fire (Map #21).

Fuels Reduction Priorities include:

Parkway Woods	Billy Goat Island

Gladstone Fire Action Plan

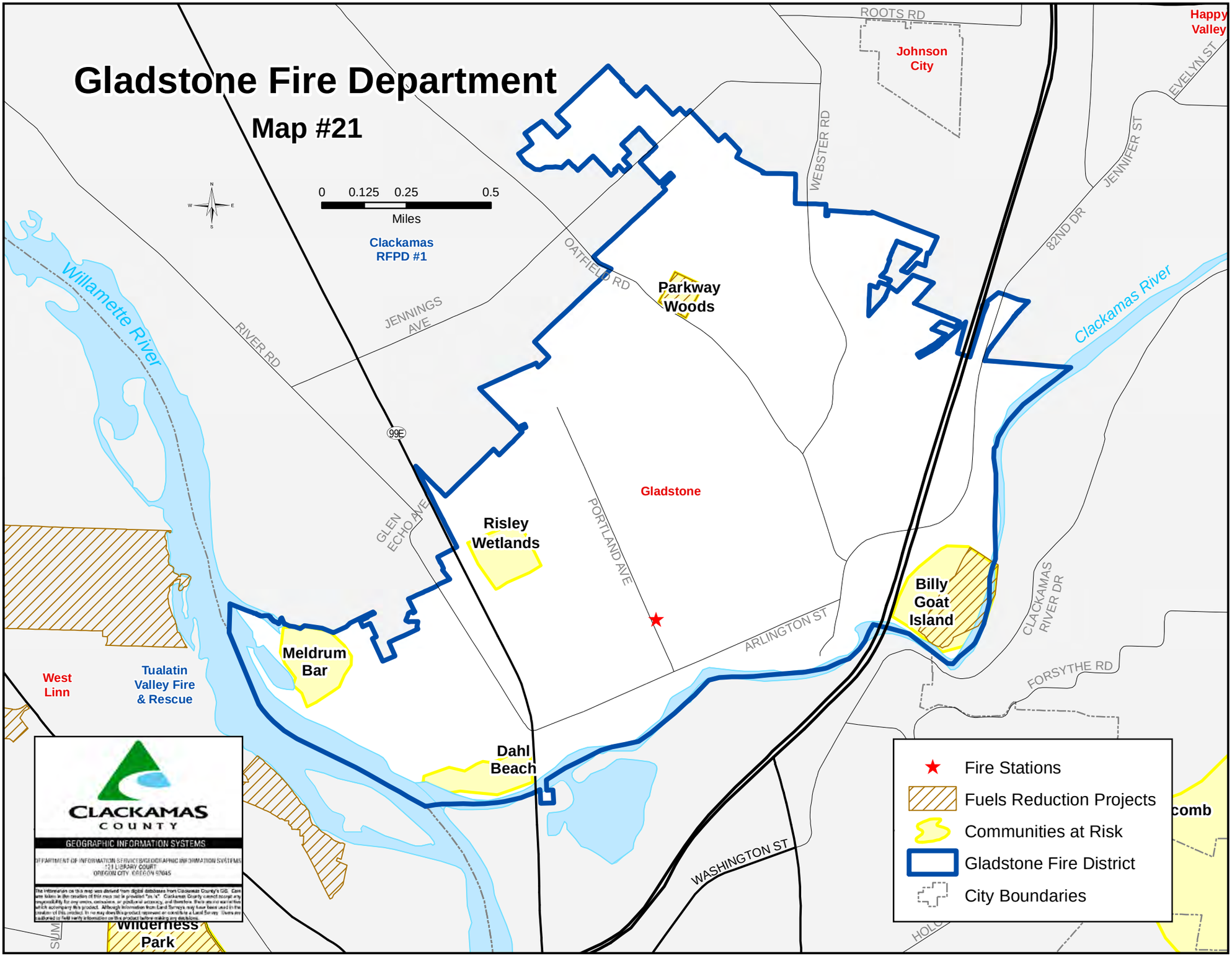
Gladstone Fire has developed a list of actions to build capacity at the Department scale and has identified actions that can help to make the local CARS more resilient to potential wildfires. The action plan for Gladstone Fire and the local CARs therein is provided in Table 10.7-2.

Table 10.7-1. Gladstone Fire Department Local Communities at Risk

Community At Risk	CAR Priority	Defensible Space	Access	Water	Public Forest Lands	Private Forest Lands	Recreators/ Transients	Protection Capabilities	Burning	Preparedness	Communications	Steep Slopes	Description
Gladstone Fire Local Communities at Risk													
Parkway Woods	High	X	X		X					X		X	Parkway and Windfeild court are adjacent to this natural wooded area. There is no access into the wooded area and it has very steep and difficult terrain to navigate. There is water on Oatfield and Parkway. The biggest issue is access and vegetation. This is a common are for the Parkway community and is choked with ladder fuels and invasive. this is a high priority for fuels reduction. A city councilor lives here and could be a champion for a community clean up event.
Billy Goat Island	High	X	X	X	X		X	X	X				This island is a popular place for recreators and transients. A wildfire occurred here in 1995, and response efforts were extremely challenging because access is very poor. There is a transient camp that has cause problems in the past, so Gladstone Fire has been working with the Gladstone Police Department and ODOT to remove it. There is a great deal of heavy vegetation adjacent to homes in this area, making it a priority for fuels reduction. A fire break is needed as well as a fire lane. There is a very expensive home with a very long driveway in this area as well that of cause for concern.
Dahl Beach	High	X	X	X	X		X		X				This is a very popular area for recreators and transients, Many people using Dahl Beach will make campfires which serve as potential ignition sources. There have been fires here in the past and access was extremely difficult.
Risley Wetlands	Medium	X	X	X	X			X		X			Access is poor throughout this community. There also is no access into the natural wooded area which is adjacent to a subdivision, and is likely where a fire would begin. The homes here are very close to the vegetation from the wooded area.
Meldrum Bar Park	Low		X	X			X		X				Meldrum Bar Park has no residences, but is a heavily populated during the summer months. This would be a priority for fuels reduction and community education.

Table 10.7-2. Gladstone Fire Department Action Plan

Action Item	Timeframe	Partners	CAR
Gladstone Fire Action Plan			
Work with ODF and the USFS and other partners to identify opportunities to train staff in S-130 and S-190.	Ongoing	USFS, ODF, Fire Defense Board	Gladstone Fire
Schedule periodic meetings with local building officials, land use planners and fire marshals to build relationships and encourage cooperation.	Ongoing	Building Officials, Land Use Planners, Fire Marshals	Gladstone Fire
Invigorate the Dept's Outreach and Education Program by partnering with ODF to incorporate wildfire prevention into current outreach programs including local school programs.	1 Year	Fire Co-op	Gladstone Fire
Gladstone Fire Local Communities at Risk Action Plan			
Conduct a Community Meeting to educate community on defensible space, and measures that can be taken to reduce structural ignitability. Solicit feedback on wildfire prevention projects the community would support.	2 Years	ODF	Parkway Woods
Partner with the Fire Co-op to create and distribute outreach materials that promote responsible burning, defensible space and reduction of structural ignitability within the Home Ignition Zone.	2 Years	Fire Co-op	All CAR's
Post signage that explain fire restrictions in natural areas.	1 Year	County Parks	Meldrum Bar, Billy Goat Island, Dahl Beach


Gladstone Fire Department
Map #21
0 0.125 0.25 0.5
Miles
Clackamas RFPD #1
Willamette River
Clackamas River
ROOTS RD
Johnson City
Happy Valley
EVELYN ST
WEBSTER RD
JENNIFER ST
82ND DR
OATFIELD RD
Parkway Woods
JENNINGS AVE
RIVER RD
99E
Gladstone
GLEN ECHO AVE
Risley Wetlands
PORTLAND AVE
ARLINGTON ST
Billy Goat Island
CLACKAMAS RIVER DR
FORSYTHE RD
Meldrum Bar
West Linn
Tualatin Valley Fire & Rescue
Dahl Beach
WASHINGTON ST
Wilderness Park
CLACKAMAS COUNTY
GEOGRAPHIC INFORMATION SYSTEMS
Fire Stations
Fuels Reduction Projects
Communities at Risk
Gladstone Fire District
City Boundaries

10.8. Community at Risk: Hoodland Fire Protection District #74

Hoodland Rural Fire Protection District #74 (Hoodland Fire) has been identified as a Community at Risk (CAR) by Oregon Department of Forestry. The District has participated in the Clackamas County CWPP planning process to evaluate capabilities to prevent, prepare for and respond to potential wildfire events.

Hoodland Fire District Description

Hoodland Fire covers 45 square miles of rugged foothills southwest of Mt Hood, along Highway 26, between Sandy and Government Camp, in historic East Clackamas County. Hoodland Fire protects the rural communities of Marmot, Cherryville, Brightwood, Wemme, Welches, Zig Zag, Rhododendron and Government Camp from three fire stations. This rural area depends on a staff of 10 career and 30-40 volunteer firefighters that are dedicated to respond and provide quality fire and life safety protection to the community. In 2010, Hoodland Fire responded to 700 emergency calls for assistance from our 6,000 permanent and 15,000 seasonal residents.

Wildland Urban Interface

This area is an excellent example of the Wildland Urban Interface because it is characterized by steep slopes with residential homes surrounded by heavy fuels. In addition, the Mount Hood National Forest surrounds many of the communities as well as industrial timber management operations, and some Bureau of Land Management land. Many of the neighborhoods here have only one way in and one way out with narrow, steep driveways and poor address signage. Heavy and continuous fuels dominate this area, so fires that begin on public land or on smaller private residential lots can quickly threaten the communities and natural resources that thrive in the Hoodland corridor.

Tourism and recreation are also major influences here, with thousands of Portland area residents travelling along Highway 26 to access the Mount Hood National Forest. Campers, hikers, hunters and other visitors to this area can potentially start wildfires that could carry from Forest service land to the residential communities. Industrial and Federal forest operations are also potential ignition sources.

Hoodland Fire District Wildfire Hazards

The Clackamas County CWPP wildfire hazard assessment assisted Hoodland Fire in identifying areas that may be at higher risk to potential wildfires. Map #10 illustrates the overall wildfire hazard risk in the Hoodland area and will be used to help target areas for wildfire prevention activities.

Structural Ignitability

Hoodland Fire promotes the creation of defensible space, use of fire-resistant roofing and building materials and community preparedness in the WUI. Hoodland Fire participates in land use reviews for new development to provide input on access and water supply. The Clackamas County Planning Dept. uses a WUI checklist developed in 2005 to ensure that Fire Marshals are contacted when potential issues may arise for new development. In areas zoned Forest/Agriculture, the County's Zoning Development Ordinance (ZDO) has guidelines for fire-resistant building materials and defensible space and fuel breaks.

Emergency Response

Hoodland Fire professionals have experience in structural and wildland fire response tactics, with a large percentage of staff having spent years as wildland firefighters. Hoodland Fire works closely

with the United States Forest Service and Oregon Department of Forestry and neighboring Sandy Fire District to prevent and provide quick response to fires in this area. Hoodland is a signatory to the Clackamas Fire Defense Board Mutual Aid Agreement, which allows for the sharing of resources across the county in the event of a large scale disaster including wildfires. Although Hood River County is along the eastern border of Clackamas County, USFS land separates these two counties in this location. This has created a barrier to Hoodland Fire's ability to participate in the Hood River County Fire Defense Board Mutual Aid Agreement. This need has been identified and prioritized in the Hoodland Fire District Action Plan.

Community Outreach & Education

Hoodland Fire is dedicated to fire prevention, and uses a variety of forums to promote defensible space, fire-resistant building materials, and safe burning practices. The community of Government Camp has an Annual Community Clean Up event to create defensible for six years running. Hoodland Fire supports this effort by providing technical assistance to landowners in determining how and why to create defensible space. In addition, Hoodland Fire has provided an incentive to participate by paying for the chipping costs associated with the clean up. The Fire District also attends Home Owners' Association meetings to discuss structural and wildland fire safety three to four times a year. The District also completed structural triage surveys at 375 homes in 2011 during the Dollar Lake Fire, which generated a great deal of interest and increased homeowners' awareness of the risk to their homes from heavy vegetation and poor access.

Local Communities at Risk (CAR's)

Hoodland Fire also recognizes that there are smaller-scale Communities at Risk or Strategic planning Areas that have unique wildfire hazards to be addressed at the more local level. Communities that have been identified as being particularly vulnerable to wildfires are illustrated in Map #22 and listed in Table 10.8-1. Hoodland Fire Professionals considered the following factors to determine the local CARs including:

- Need for defensible space
- Access limitations (narrow driveways, lack of address signage, one way in/one way out)
- Steep slopes that can hinder access and accelerate the spread of wildfire
- Lack of water available for wildland fire fighting
- Heavy fuels on adjacent public lands
- Potential ignition sources from recreationists and transients
- Agricultural and backyard burning
- Lack of community outreach programs to promote wildfire awareness
- Communications difficulties

Fuels Reduction

Fuels reduction projects can and should be accomplished at the local scale, which is the creation of defensible space around homes, as well as the landscape scale to extend vegetation treatments onto adjacent forested land and natural areas. Hoodland Fire will continue to facilitate cooperation between public and private organizations to ensure that fuels reduction work occurs strategically and benefits homeowners as well as adjacent public and private lands.

To ensure that landscape-level treatments are paired with projects to create defensible space around vulnerable communities, priority fuels reduction projects have been overlaid with the Communities at Risk Identified by Hoodland Fire (Map #22).

Fuels Reduction Priorities include:

Lolo Pass	Brightwood
Marmot	Government Camp
Barlow Trail	Cherryville/Alder Creek

Hoodland Fire District Action Plan

Hoodland Fire has developed a list of actions to build capacity at the Department scale and has identified actions that can help to make the local CARS more resilient to potential wildfires. The action plan for Hoodland Fire and the local CARs therein is provided in Table 10.8-.2.

Firewise USA Communities

The National Fire Protection Agency's Firewise Communities/USA Recognition Program encourages and acknowledges citizen action to reduce wildfire risk. ODF received Title III funding to promote the Firewise Communities/USA Program, with the goal of creating certified communities in high priority Communities at Risk. ODF worked with Hoodland Fire to create two certified Firewise Communities. Participation in the Firewise Communities/USA Program is an ongoing process of community commitment to wildfire safety.ODF and Hoodland Fire will continue working with Zig Zag Village and Government Camp to reduce wildfire hazards and retain Firewise/USA certification.

Zig Zag Village, Rhododendron, OR

Zig Zag Village has been identified as a Community at Risk (CAR) by the Hoodland Fire District because it is surrounded by forest land, has heavy fuels adjacent to homes, has only one way in and out, and is in a high wildfire danger area. In addition, there are many vacation homes and undeveloped lots that are overgrown with ladder fuels. The Zig Zag Home Owner's Association worked with the ODF, Hoodland Fire District and the USFS to assess wildfire hazards throughout the community and develop strategies to mitigate them. Zig Zag Village held a Firewise Community Clean-Up Day to begin implementing the Firewise recommendations for becoming more wildfire resilient communities. The ODF used seasonal hand crews to create a Firewise demonstration area to illustrate measures that can be taken to reduce wildfire risks.

Government Camp, OR

The Government Camp Community Planning Organization includes a number of smaller Home Owner's Associations in Government Camp. This is a destination community for winter and summer sports that draws many recreators throughout the year. The majority of homes in Government Camp are vacation homes, and there are also a number of multifamily dwellings that are used to house snow board camps. There are also two large condominium communities here.

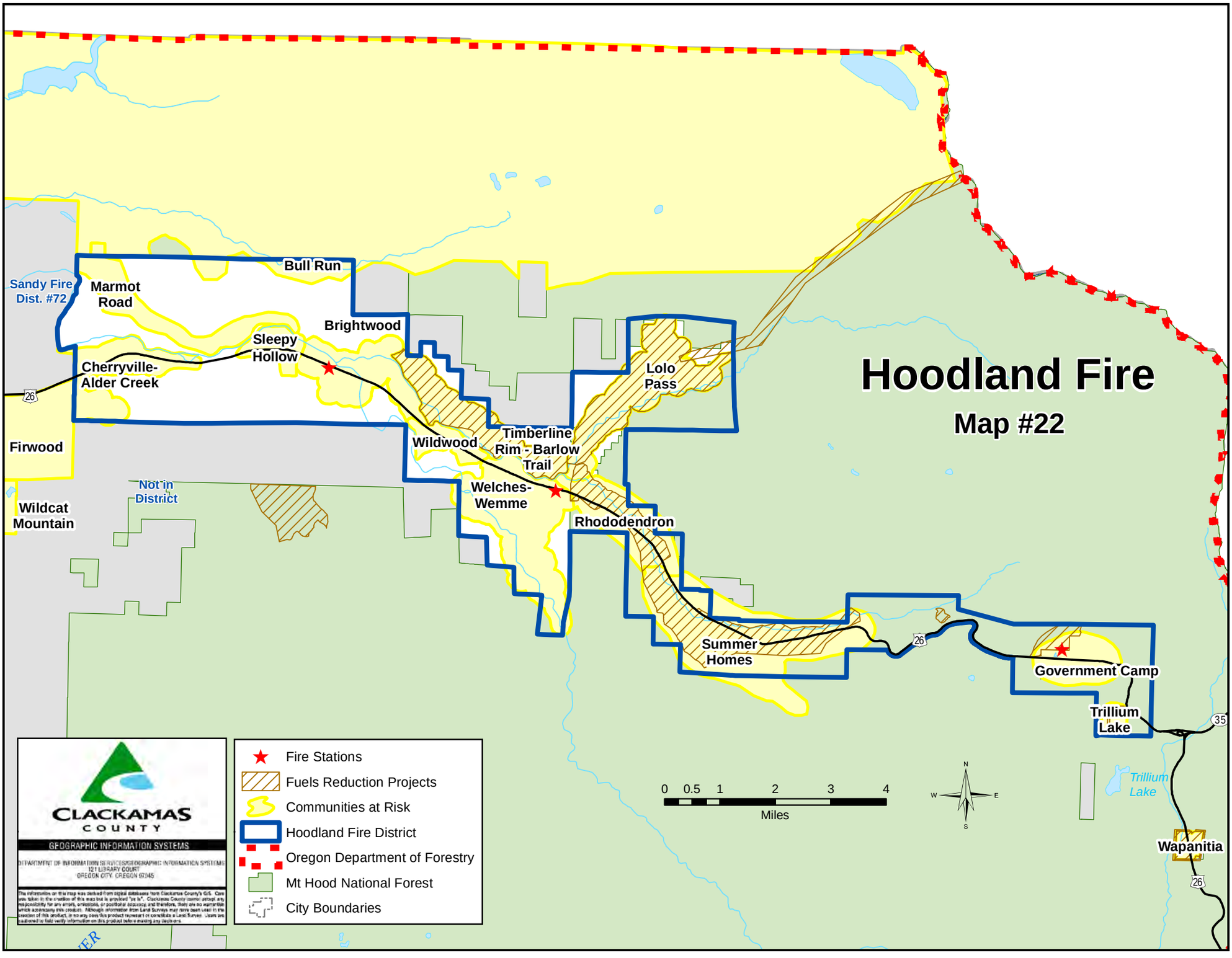
Government camp is surrounded by the Mount Hood National Forest. Heavy fuels and decadent Lodge Pole Pine stands are present adjacent to homes as well as USFS land. Government Camp worked with the ODF, Hoodland Fire District and the USFS to assess wildfire hazards throughout the community and develop strategies to mitigate them. Government Camp held a Firewise Community Clean-Up Day to begin implementing the Firewise recommendations for becoming more wildfire resilient communities. The ODF used seasonal hand crews to create a Firewise demonstration area around the volunteer fire station and the Ski Club to illustrate measures that can be taken to reduce wildfire risks.

Table 10.8-1. Hoodland Fire District Local Communities at Risk

Community At Risk	CAR Priority	Defensible Space	Access	Water	Public Forest Lands	Private Forest Lands	Recreators/ Transients	Protection Capabilities	Burning	Preparedness	Communications	Steep Slopes	Description
Hoodland Fire & Rescue Local Communities at Risk													
Government Camp/ Summit Meadows	High	X	X	X	X		X	X		X	X	X	The communities of Government Camp and Summit Meadows are particularly vulnerable to wildfires because they are located along a ridge top that has very steep slopes, poor access, and heavy fuels. These communities are located on Mount Hood along Highway 26 a heavily travelled road that provides access to forested areas used for recreation which increases potential ignition sources and fuels. The area is completely surrounded by USFS land, access is limited to 1-way in and out with narrow roads and no turnarounds. Due to its location, response times are greater than 10 minutes, and response efforts will prove difficult as the roads are steep, driveways are narrow and are not well marked, and there are no known alternative water sources for the ridgeline. The terrain also limits radio communication to VHF.
USFS Summer Homes	High	X	X	X	X		X		X	X		X	The USFS Summer Homes are a unique community at risk as the USFS owns the land, but residents own the houses here. Because the USFS must be in compliance with State and Federal environmental protection laws, it is more difficult to reduce hazardous fuels here. In addition, many of the homeowners are absentee, so public education is challenging. The majority of roads in this area are narrow, not well-maintained and do not provide adequate turn arounds for emergency service vehicles. Hoodland Fire and ODF have completed address signage for the homes in this CAR.
Rhododendron/Zig Zag/Woodland	High	X	X	X	X	X	X		X	X	X	X	Rhododendron is characterized by narrow roads, heavy fuels, and limited access. Public and private industrial forest land operations surrounding this community provide potential ignition sources. Water would need to be brought in to fight fire here. Address signage is needed. The Zig Zag and Woodland communities are surrounded by heavy fuels and have very poor access. There is no water available here and address signs are needed. However, the community has a great network for notifications during emergencies that could potentially be used for preparedness efforts.
Lolo Pass	High	X	X	X	X	X	X		X	X	X	X	Lolo Pass is surrounded by heavy vegetation on both residential lands as well as forest service and private woodlands. The access here is limited to one way in and out, and water would need to be brought in to fight fire. Some homes in this CAR are second homes, making it more difficult to work with landowners.
Marmot	High	X	X	X	X	X	X		X	X	X		The Marmont community is comprised of farms and ranches that have large BPA power lines overhead. These power lines serve as ignition sources when the heavy brush below become tinder in the summer months. Access is limited to one way in and one way out. This area is adjacent to the Bull Run Watershed, which provides drinking water for the City of Portland.
Cherryville/Alder Creek	High	X	X	X	X		X	X	X	X		X	This Community has very steep terrain which limits access and communication. Hoodland Fire sometimes has to access the area by going into the Sandy Fire District. Land uses here include agriculture and timber operations and well as USFS lands. This CAR is a community asset as well because it includes the water source for the City of Sandy.
Welches/Wemme	Medium	X	X	X	X	X	X		X	X	X	X	The Welches/Wemme area has very poor access with only about 255 of homes having address signs. There is water here, but the roads are extremely narrow. Public and private industrial forest operations on lands adjacent to homes provide potential ignition sources.
Barlow Trail (Timberline Rim Division 1-4)	Medium	X	X	X	X	X	X		X	X		X	Barlow Trail has very poor access, with many roads having only one way in and out. About 255 of homes have address signs, and some of these are incorrect. The community is adjacent to the Bull Run Watershed, which has heavy fuels. Escaped and/or illegal burns is a major issue in this CAR.
Brightwood/ Sleepy Hollow (Timberline Rim Division 5)	Medium	X	X		X	X	X		X	X		X	This community is adjacent to USFS, industrial forest lands and the Bull Run Watershed. It has a good water supply and access is fair. Address signs are needed here.
Summit Meadows	Medium	X	X	X	X		X	X	X	X			Summit Meadows is a recreational area with many wooden cabins that house people throughout the year. There is also a ski camp here. The area has extremely steep slopes and heavy fuels surrounding access roads and structures.

Table 10.8-2. Hoodland Fire District Action Plan

Action Item	Timeframe	Partners	CAR
Hoodland Fire Action Plan			
Develop a volunteer recruitment and retention program.	Ongoing	HART Teams	Hoodland Fire
Work with DPSST, USFS and ODF to participate in wildfire response efforts to keep fire certifications current.	Ongoing	DPSST, USFS and ODF	Hoodland Fire
Work with Hood River County Fire Defense Board to develop mutual aid agreements.	2 Years	Hood River County Fire Defense Board	Hoodland Fire
Cultivate partnerships with Parkdale, Dee, Odell and Hood River County to encourage effective communication and coordination.	2 Years	Parkdale, Dee, Odell and Hood River County	Hoodland Fire
Encourage USFS to extend fuels reduction treatments beyond the mountain bike track to the power lines.	4 Years	USFS	Hoodland Fire
Develop and distribute newsletter to educate community on defensible space, and measures that can be taken to reduce structural ignitability.	Annually	HOA's, ODF	Hoodland Fire
Work with Clackamas County Land Use Planning to encourage wildfire resistant building materials and home sprinkler systems through incentive programs (e.g. reduced permit fees).	Ongoing	Clackamas DTD, WFPEC	Hoodland Fire
Hoodland Fire Local Communities at Risk Action Plan			
Conduct a Community Meeting to educate the community and solicit feedback on wildfire prevention projects the community would support.	Spring 2013	ODF, USFS	Zig Zag Village, Timberline Rim
Complete home addressing in all Communities at Risk.		ODF, Fire Co-op	All
Continue the annual community clean up event at Government Camp and encourage other Communities at Risk to participate.	Ongoing	ODF, USFS	All
Work with USFS, ODOT and other land owners to extend vegetation treatments from defensible space to reduce fuels in common areas, right of ways, and other public and private land.	Ongoing	USFS, ODOT, Clackamas County, Private Landowners	Govt. Camp, Timberline Rim, Summer Homes, Marmont Road, Salmon River and Lolo Pass Roads
Seek grant funding to support fuels reduction and creation of defensible space around homes.	Ongoing	ODF, Wildfire Technical Committee	All
Continue to promote wildfire preparedness preparedness at Home Owners Association meetings in 3-4 Communities at Risk each year.	Ongoing	ODF	All
Continue structural triage assessment data collection for structural ignitability and defensible space. Utilize this information to target areas for outreach and fuels reduction programs.	Ongoing	ODF	All
Develop a community-driven pre-disaster plan including evacuation routes, telephone call down trees, and other strategies for strengthening community response.	Ongoing	HART Teams	All
Develop clear and effective signage for emergency response that includes alternative routes.	5 Years	ODF,Clackamas County, ODOT	All
Inventory existing water resources and identify alternative water sources to support potential wildfire fighting efforts. Provide signage for these sources.	3 Years	ODF, USFS	All


Hoodland Fire
Map #22
Bull Run
Sandy Fire Dist. #72
Marmot Road
Brightwood
Sleepy Hollow
Cherryville-Alder Creek
Lolo Pass
Firwood
Wildwood
Timberline Rim - Barlow Trail
Welches-Wemme
Not in District
Wildcat Mountain
Rhododendron
Summer Homes
Government Camp
Trillium Lake
Trillium Lake
Wapanitia
26
35
CLACKAMAS COUNTY
GEOGRAPHIC INFORMATION SYSTEMS
Fire Stations
Fuels Reduction Projects
Communities at Risk
Hoodland Fire District
Oregon Department of Forestry
Mt Hood National Forest
City Boundaries
0 0.5 1 2 3 4
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10.9. Community at Risk: Lake Oswego Fire Department

The Lake Oswego Fire Department has been identified as a Community at Risk (CAR) by Oregon Department of Forestry. The Department has participated in the Clackamas County CWPP planning process to evaluate capabilities to prevent, prepare for and respond to potential wildfire events.

Lake Oswego Fire Department Description

The Lake Oswego Fire Department provides emergency response to nearly 50,000 citizens within the City of Lake Oswego and three adjoining contract districts (Lake Grove Rural Fire District, Riverdale/Dunthorpe Fire District, and Alto Park Water District).

Four fire stations are strategically located throughout Lake Oswego to provide rapid emergency service to citizens in need 24 hours a day. Emergency services include fire suppression, emergency medical response, hospital ambulance transportation, water & dive rescue, technical rescue operations, hazardous materials incidents, and disaster response.

Along with protecting citizens within the city and contract districts, the Lake Oswego Fire Department has mutual aid agreements with the Portland Fire and Life Safety Bureau, Tualatin Valley Fire & Rescue and is a signatory to the Clackamas Fire Defense Board.

Wildland Urban Interface (WUI)

Growth and development in forested areas is popular within the City of Lake Oswego. Wildfire has an effect on development, yet development can also influence wildfire. Owners often prefer homes that are private, have scenic views, are nestled in vegetation, and use natural materials. A private setting may be distant from public roads, or hidden behind a narrow, curving driveway. These conditions however, make evacuation and firefighting difficult. The scenic views found along Iron Mountain Bluff, Palisades, Mountain Park and around the lakes rim can also mean areas of dangerous topography. Natural vegetation contributes to scenic beauty, but it may also provide a ready trail of fuel leading a fire directly to the combustible fuels of the home itself.

The forested hills surrounding Lake Oswego are considered to be interface areas. The interface neighborhoods are characterized by a diverse mixture of varying housing structures, development patterns, ornamental and natural vegetation, and natural fuels.

Lake Oswego Fire Department Wildfire Hazards

The Clackamas County CWPP wildfire hazard assessment assisted the Lake Oswego Fire Department in identifying areas that may be at higher risk to potential wildfires. Map #10 illustrates the overall wildfire hazard risk in the Lake Oswego Fire Department and will be used to help target areas for wildfire prevention activities.

Structural Ignitability

The Lake Oswego Fire Department promotes the creation of defensible space, use of fire-resistant roofing and building materials, and community preparedness in the WUI. Lake Oswego Fire works well with other City of Lake Oswego Departments to integrate these concepts at the regulatory level by participating in land use reviews for new development to provide input on access and water supply. When they are deficient in access or water the Fire Marshal's Office can offer alternative measure such as residential sprinklers. Lake Oswego Fire also approves all occupancy permits to ensure that recommendations regarding access and water supply are implemented.

However, the wildfire hazard remains high in many residential developments. Some conditions exiting in these areas include large houses on small lots, cedar shake roofing, open wooden decks adjacent to heavy fuels, and homes built on steep slopes with wooden stilts as support.

One of the most problematic issues is highly flammable cedar shake roofing. Roofs are the most vulnerable part of the home, as the majority of homes lost to wildland fires are ignited from embers landing on roofs and gutters. Despite this threat, some Home Owners Associations (HOA's) in Lake Oswego still require cedar shake roofs. Lake Oswego Fire would like to reduce the structural ignitability of roofs by educating these HOA's about the risks associated with cedar shake and the viable, attractive alternatives. Lake Oswego Fire would also like to work with the City of Lake Oswego Building Department and Oregon Department of Forestry to adopt a Wildland Urban Interface area which would disallow cedar shake roofs in areas particularly vulnerable to wildfire.

Road access is a major issue for all emergency service providers. Firefighters are particularly challenged by narrow roads, with limited access because the fire trucks are large, and the equipment needed to fight fires is located on the trucks. When there is doubt concerning the stability of residential accesses, or adequate turn around space, the fire fighters can only work to remove the occupants, but saving the structure is difficult. Many of the Communities At Risk (CAR's)to wildfire in Lake Oswego exhibit a combination of these issues that limit access.

Although the City of Lake Oswego has comparatively a good water system, additional hydrants could be installed in the Iron Mt. Bluff area and in other communities at risk to assist with fire suppression efforts should they be needed. This and the other issues listed here are addressed in the Lake Oswego Fire Department Action Plan.

Emergency Response

Lake Oswego Fire Professionals are trained for wildland fires with an annual training regime that supports the S-130 and S-190 with a goal of training staff to S-290. Certification through DPSST is voluntary.

Lake Oswego Fire officials are most concerned with potential wildfires igniting in late summer during and east wind event. A major wildland urban interface fire in Lake Oswego would quickly exceed the resources and capabilities of the Department. For this reason, LO Fire has Mutual Aid agreements in place which allow for the sharing of resources across the county in the event of a large scale disaster including wildfires. Due to its location, Tualatin Valley Fire and Rescue or Portland Fire and Rescue in neighboring Washington and Multnomah Counties would likely be the first to provide mutual aid during an event.

Community Outreach & Education

Lake Oswego Fire is dedicated to fire prevention, and uses a variety of forums to promote residential fire safety, defensible space, and emergency preparedness. Lake Oswego Fire developed an educational hand-out focusing on defensible space and distributed this and other Firewise materials through mass mailings. Lake Oswego Fire has been focused on fire alarms and sprinklers in new construction and emergency preparedness. Fire professionals are invited to speak and provide training in emergency preparedness at Home Owners Association meetings on a regular basis.

Local Communities at Risk (CAR's)

The Lake Oswego Fire Department also recognizes that there are smaller-scale Communities at Risk that have unique wildfire hazards to be addressed at the more local scale. These areas were referred

to as Strategic Planning Areas in the 2005 iteration of the CWPP, but will now be referenced as local Communities at Risk to be consistent with state and federal language. Communities that have been identified as being particularly vulnerable to wildfires are illustrated in Map #23 and listed in Table 10.9-1. Lake Oswego professionals considered the following factors to determine the local CARs including:

- Need for defensible space
- Access limitations (narrow driveways, lack of address signage, one way in/one way out)
- Steep slopes that can hinder access and accelerate the spread of wildfire
- Lack of water available for wildland fire fighting
- Heavy fuels on adjacent public lands
- Potential ignition sources from recreationists and transients
- Agricultural and backyard burning
- Lack of community outreach programs to promote wildfire awareness
- Communications difficulties

Fuels Reduction

Lake Oswego has a very restrictive tree ordinance designed to retain urban canopy for environmental and aesthetic benefits. Currently, homeowners can trim trees and can treat ladder fuels, but cannot cut any trees that are 5 inches or great in diameter. Lake Oswego Fire has worked with the City to consider expanding these provisions for the creation of defensible space on residential properties as well as the natural areas managed by the City adjacent to CAR's. For example, in 2003 a fuels reduction demonstration project was implemented in Cooks Butte Park and the adjacent community. The Spring Brook Park HOA has also been successful in creating defensible space around homes.

Since that time, the City has acquired many more natural areas, but very little has been done to mitigate wildfire hazards in these areas. Lake Oswego Fire recognizes the need to work with the City Planning Department in amending the Tree Ordinance to balance the benefits of urban canopy with the risk to life and property from wildfires.To ensure that landscape-level treatments are paired with projects to create defensible space around vulnerable communities, priority fuels reduction projects have been overlaid with the Communities at Risk Identified by Lake Oswego Fire (Map #23).

Fuels Reduction Priorities include:

Iron Mountain Bluff
Spring Brook Park
Waluga Park
Cooks Butte Park
Tryon Creek

Lake Oswego Fire Department Action Plan

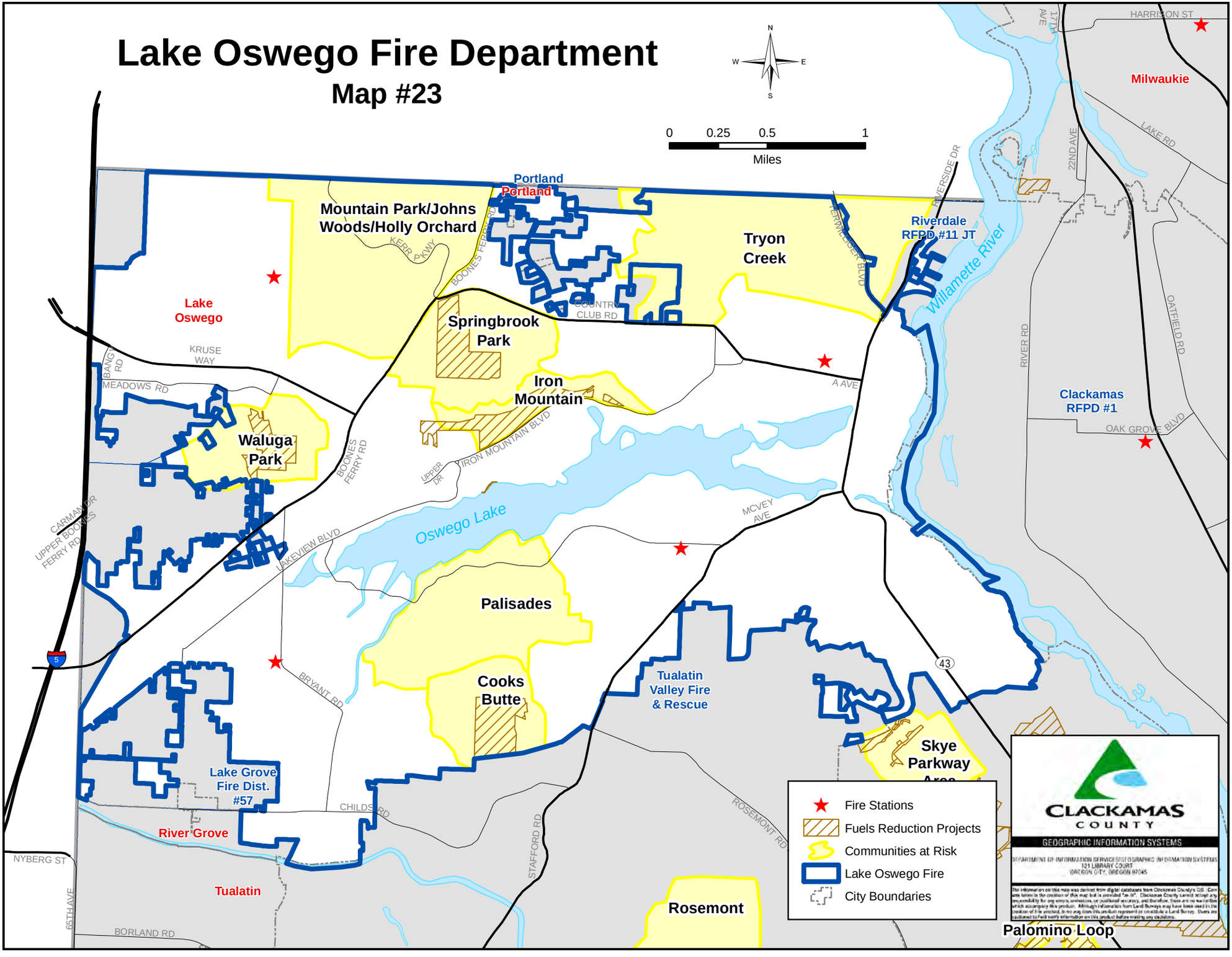
Lake Oswego Fire has developed a list of actions to build capacity at the Department scale and has identified actions that can help to make the local CARS more resilient to potential wildfires. The action plan for Lake Oswego Fire and the local CARs therein is provided in Table 10.9-2.

Table 10.9-1. Lake Oswego Local Communities at Risk

Community At Risk	CAR Priority	Defensible Space	Access	Water	Public Forest Lands	Private Forest Lands	Recreators/ Transients	Protection Capabilities	Burning	Preparedness	Communications	Steep Slopes	Description
Lake Oswego Fire Local Communities at Risk													
Iron Mountain Bluff	**High**	X	X	X	X		X	X		X	X	X	The residential area at the top of a Iron Mountain bluff is at risk to wildfire because it there is heavy vegetation and steep slopes which will drive a fire toward the homes. There are a few one way in and out roads in the neighborhood, while, the only roads that would be used for firefighting are one way in and out. The homes need defensible space, and the adjacent city-owned park would benefit from fuels reduction as would the piece that is owned by the Hunt Club . There is a good hydrant system up top and Iron Mtn Blvd. An above ground water main and wildland detectors have been discussed in the past, but no progress has been made toward these efforts. The adjacent parks lands, have had a few ignitions here but LO's effective initial attack has halted major damage here. Protection capabilities are compromised because it is quite a hike and it is steep for response. LO has done a lot of outreach and some residents have expressed interest in reducing wildfire hazards. There has not been a community meeting, but individuals have been concerned about parking and limiting access. Communications by radio is good, but cell phones are spotty.
Palisades	**High**	X								X		X	The homes in this community are close together, are surrounded by heavy vegetation and are on very steep slopes. There is good access, good water and good communications. A focus here is on preparedness and education because this HOA still requires Cedar Shake roofs.
Cooks Butte	**High**	X	X	X	X		X	X		X	X	X	This is the most remote park in LO. It is steep, has poor access on a couple roads, and if a fire were to start here, there is no early notification so response times could be an issue. The community is on the periphery of the Park. Recreators light campfires in the park so it has previously been closed during fire season, but now they just post no burning and let people in during fire season so that there are eyes on the ground. The area has southern exposure, steep slopes and heavy fuels so the park would benefit from FR but not as high a priority as Iron Mountain. There are 2 water reservoirs in the park, and there is a hydrant but it has no pressure. A demonstration project was done here to remove fuels. There are drier flashy fuels on the periphery with a mature forest in the center. The lighter fuels are in interface. There is also a big grass field that the Parks Dept. mows. The residents adjacent to Cooks Butte are not very prepared and people have a perception that it isn't going to burn. Shared fire protection with TVFR.
Mountain Park	**High**	X	X		X		X	X		X		X	The homes in this community are close together, are surrounded by heavy vegetation and are on very steep slopes, ranging from 100 ft to 1000 ft. There are some green belt trails that would provide some limited access for firefighting. A few years ago, the City cleared some of these trails for brush truck access. Priorities for this community are preparedness and defensible space.
Tryon Creek State Park	**Medium**	X	X	X	X		X			X		X	There is a residential area surrounding this State Park. The park has an older stand of mature trees, but defensible space around homes is needed. Access and water are limited here and it is visited by many recreators, which presents some outreach opportunities. Transients also use this park. Lake Oswego Fire shares protection with Portland Fire and they review response strategies annually.
Spring Brook Park	**Medium**	X	X		X		X			X			This community was targeted for a community meeting because LO and Parks thinned the parks property adjacent to the community. Some training on emergency preparedness was done here. Defensible space around the homes is needed. There are lots of trails in the park that could be used for firefighting, but LO doesn't have a lot of equipment for that type of response. Roads aren't bad in this area, slope is gentle and protection capabilities are good. There is a junior high very close which could serve as a staging area.
Waluga Park	**Medium**	X	X	X	X					X		X	There is a residential community adjacent to this city park, which has heavy vegetation and some slope steep slopes near the top. The area is characterized by flashy fuels and ladder fuels leading to heavier fuels.

Table 10.9-2. Lake Oswego Action Plan

Action Item	Timeframe	Partners	CAR
Lake Oswego Fire Action Plan			
Work with City of Lake Oswego to allow exemptions under the Tree Ordinance for creation of defensible space around homes as well as fuels reduction into parks adjacent to Communities at Risk.	Short-Term	City of Lake Oswego, ODF	Lake Oswego Fire
Work with the City of Lake Oswego Building Department to adopt a WUI area in which cedar shake roofing is disallowed.	Short-Term	City of Lake Oswego, ODF	Lake Oswego Fire
Continue annual wildland fire training for Lake Oswego Fire professionals.	Ongoing	ODF	Lake Oswego Fire
Lake Oswego Fire Local Communities at Risk Action Plan			
Conduct a Community Meeting to educate community on defensible space, and measures that can be taken to reduce structural ignitability. Solicit feedback on wildfire prevention projects the community would support.	Ongoing	ODF, Lake Oswego Parks	All CAR's
Work with Lake Oswego Parks to reduce hazardous fuels in City Parks adjacent to Communities at Risk.	Ongoing	Lake Oswego parks, ODF	Iron Mtn. Bluff, Cooks Butte, Spring Brook Park, Waluga Park, Mountain Park
Distribute outreach materials that promote responsible burning, defensible space and reduction of structural ignitability within the Home Ignition Zone.	Ongoing	Fire Co-op	All CAR's
Reduce hazardous fuels in the ROW of potential evacuation routes. Engage residents adjacent to primary evacuations routes to extend treatments onto private land.	Ongoing	City of Lake Oswego	All CAR's
Obtain structural ignitability data by conducting structural triage assessment data collection (including GPS points) for homes in strategic planning areas.	Ongoing	ODF	All CAR's
Develop a community-driven pre-disaster plan including evacuation routes, telephone call down trees, and other strategies for strengthening community response.	Ongoing	Clackamas County Emergency Management	All CAR's
Implement road addressing (including length of driveways) and other signage for emergency response.	Ongoing	ODF	All CAR's
Seek grant funding to support fuels reduction and creation of defensible space around homes.	Ongoing	ODF	All CAR's


Lake Oswego Fire Department
Map #23
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Miles
Portland
Portland
Mountain Park/Johns Woods/Holly Orchard
Tryon Creek
Riverdale RFPD #11 JT
Willamette River
Milwaukie
Lake Oswego
Springbrook Park
Iron Mountain
Waluga Park
Clackamas RFPD #1
Oswego Lake
Palisades
Cooks Butte
Tualatin Valley Fire & Rescue
Skye Parkway Area
Lake Grove Fire Dist. #57
River Grove
Tualatin
Rosemont
Palomino Loop
KERR PKWY
BOONES FERRY RD
COUNTRY CLUB RD
TERWILLEGER BLVD
RIVERSIDE DR
HARRISON ST
LAKE RD
22ND AVE
17TH AVE
RIVER RD
OATFIELD RD
OAK GROVE BLVD
A AVE
KRUSE WAY
BANGS RD
MEADOWS RD
IRON MOUNTAIN BLVD
UPPER DR
CARMANDR
UPPER BOONES FERRY RD
LAKEVIEW BLVD
MCVEY AVE
BRYANT RD
CHILDS RD
STAFFORD RD
ROSEMONT RD
NYBERG ST
65TH AVE
BORLAND RD
5
43
Fire Stations
Fuels Reduction Projects
Communities at Risk
Lake Oswego Fire
City Boundaries
CLACKAMAS COUNTY
GEOGRAPHIC INFORMATION SYSTEMS

10.10. Community at Risk: Molalla Rural Fire Protection District #73

The Molalla Fire District has been identified as a Community at Risk (CAR) by Oregon Department of Forestry. The District has participated in the Clackamas County CWPP planning process to evaluate capabilities to prevent, prepare for and respond to potential wildfire events.

Molalla Fire District Description

Molalla Rural Fire Protection District #73 (MRFPD #73) is an Oregon special service district that provides fire suppression, prevention, investigation, public education, rescue, and ambulance transport services. (MRFPD #73) is approximately 101 square miles with an ambulance service area (ASA) of 350 square miles covering a portion of the neighboring fire agencies and the unprotected wilderness area.

The District operates from three stations: Station 82, the headquarter station in the city of Molalla; Station 81, four miles to the north on Highway 213 near the small community of Mulino; and Station 85, five miles south on Sawtell Road. Both the Sawtell and Mulino stations are served by volunteers living in those areas.

Wildland Urban Interface (WUI)

Molalla's Fire District is a rural area on the eastern edge of Clackamas County adjacent to large tracts of federal, state and private forests. The terrain is steep, causing access and communication limitations. The Molalla River Corridor attracts thousands of recreators every year. Campers, hikers, anglers, ATV users, hunters and other visitors to this area can potentially start wildfires that could carry from public land to the residential communities.

This area is characterized by rural residential homes surrounded by heavy fuels and steep slopes. In addition, many of the neighborhoods here have only one way in and one way out with narrow, steep driveways and poor address signage. Heavy and continuous fuels dominate this area, so fires that begin on public land or on smaller private residential lots can quickly threaten the communities and natural resources that thrive in the Molalla Fire District.

The Bureau of Land Management, private industrial landowners and small woodland owners have many heavily forested landholdings that are adjacent to homes in the Wildland Urban Interface. As Molalla Fire targets the residential communities for creating defensible space, there is an opportunity to engage private, state and federal partners in reducing fuels on this adjacent public land. This has been identified as an action item.

Molalla Fire District Wildfire Hazards

The Clackamas County CWPP wildfire hazard assessment assisted Molalla Fire in identifying areas that may be at higher risk to potential wildfires. Map #10 illustrates the overall wildfire hazard risk in the Molalla Fire District and will be used to help target areas for wildfire prevention activities.

Structural Ignitability

Molalla Fire promotes the creation of defensible space, use of fire-resistant roofing and building materials, and community preparedness in the WUI. Molalla Fire works with the City of Molalla and Clackamas County to integrate these concepts at the regulatory level by providing input on access and water requirements for new development.

The City of Molalla contracts with Clackamas County for land use planning and building permit services. This presents some difficulties for the Fire District because the County does not always contact the District for input on fire flow and access for new lots of record. Molalla Fire also does

not have access to the County's Velocity Hall System which catalogues pending and approved building permits. The need for enhanced communication between Clackamas County and Molalla Fire has been noted in the Molalla Fire CWPP Action Plan.

Emergency Response

Emergency response is challenging in the Molalla Fire District because staff are almost entirely volunteer (36), with only 5 paid staff. A major wildland urban interface fire in Molalla would quickly exceed the resources and capabilities of the District. For this reason, Molalla Fire has mutual aid agreements in place which allows for the sharing of resources across the county in the event of a large scale disaster including wildfires.

Although the District is able to support annual wildland fire training (S-130 and S-190), it would like to offer S-215 and S-290 to senior staff. Also, the lack of live fire experience makes it difficult to retain wildland qualifications. Molalla Fire is working directly with NAFT, USFS and ODF and other land mangers to identify and take advantage of opportunities to participate in live fires.

Because Molalla Fire has does not have a hydrant system that extends to rural areas, it is important to begin identifying and improving potential water sites. This is especially important for homes that have long narrow driveways that will not support water tenders. ODF has been working with Molalla Fire to improve address signage in the many of the most vulnerable areas and potential water sites could be added to these signs.

In the event of a large widlland fire, evacuations may be necessary. This rural area presents some difficulties due to the large number of one way in and one way out roads with poor addressing. Molalla Fire has been working with ODF to improve address signage in vulnerable areas, and will continue to work with the Clackamas County Fire Co-op to implement address signage in the Communities at Risk. There have also been changes to the road system that are not currently reflected in County maps such as Boyles and Iromer Roads. More coordination and outreach is also needed to ensure that evacuation procedures are developed and understood.

Burning of yard waste and debris is challenging in the Molalla Fire District because backyard burning is allowed in all areas. Molalla Fire tries to be consistent with neighboring jurisdictions' Backyard Burning programs but does not have staff or resources to strictly regulate burning in Molalla. The District is also home to many Christmas tree operations that have authority to burn an incredible amount of material all year long regardless of fire severity or air quality restrictions. Molalla Fire would like to work with ODF to develop a better strategy for dealing with Christmas tree waste such as a chipper cooperative.

Community Outreach & Education

Molalla Fire is dedicated to fire prevention, but has limited staff and capacity for a widland fire outreach program. Molalla Fire is a member of the Clackamas County Fire Prevention Cooperative which is a consortium of structural and wildland fire protection professionals that work together to deliver programs such as team teaching in the grade school fire safety programs, safety fairs with car seat inspections, community and school programs, and fire safety house displays. Molalla Fire would like to increase capacity in its outreach program for fire prevention and for recruiting potential volunteers.

Local Communities at Risk (CAR's)

Molalla Fire also recognizes that there are smaller-scale Communities at Risk that have unique wildfire hazards to be addressed at the more local scale. These areas were referred to as Strategic

Planning Areas in the 2005 iteration of the CWPP, but will now be referenced as local Communities at Risk to be consistent with state and federal language. Communities that have been identified as being particularly vulnerable to wildfires are illustrated in Map#24 and listed in Table 10.10-1. Molalla Fire professionals considered the following factors to determine the local CARs including:

- Need for defensible space
- Access limitations (narrow driveways, lack of address signage, one way in/one way out)
- Steep slopes that can hinder access and accelerate the spread of wildfire
- Lack of water available for wildland fire fighting
- Heavy fuels on adjacent public lands
- Potential ignition sources from recreationists and transients
- Agricultural and backyard burning
- Lack of community outreach programs to promote wildfire awareness
- Communications difficulties

Fuels Reduction

Fuels reduction projects can and should be accomplished at the local scale, which is the creation of defensible space around homes, as well as the landscape scale to extend vegetation treatments onto adjacent forested land and natural areas. Molalla Fire will facilitate cooperation between public and private organizations to ensure that fuels reduction work occurs strategically and benefits homeowners as well as adjacent public and private lands.

To ensure that landscape-level treatments are paired with projects to create defensible space around vulnerable communities, priority fuels reduction projects have been overlaid with the Communities at Risk Identified by Molalla Fire (Map# 24).

Fuels Reduction Priorities include:

Sawtell Road
Blue Road
Salo Oaks

Molalla Fire District Action Plan

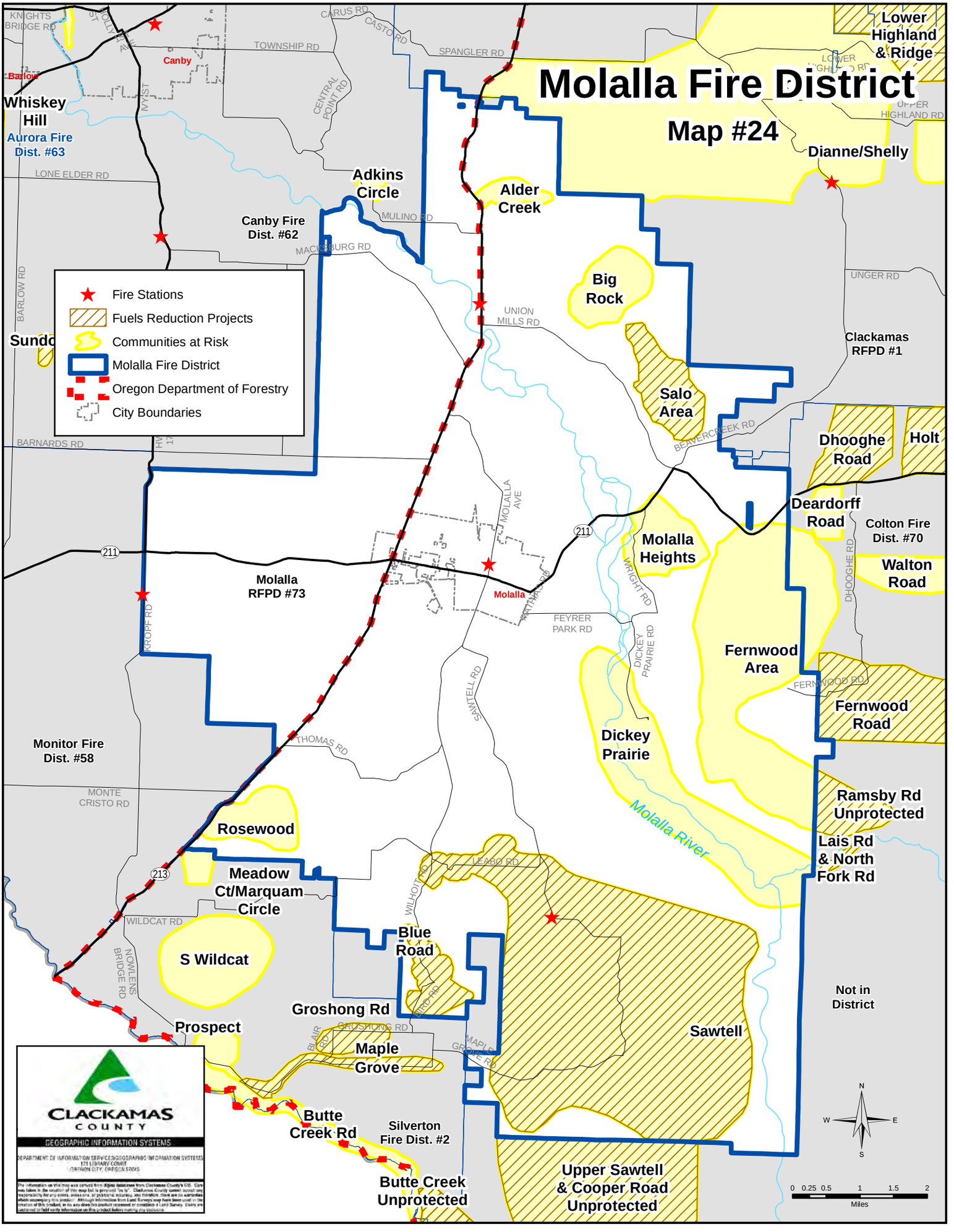
Molalla Fire has developed a list of actions to build capacity at the District scale and has identified actions that can help to make the local CARS more resilient to potential wildfires. The action plan for Molalla Fire and the local CARs therein is provided in Table 10.10-2.

Table 10.10-1. Molalla Fire District Local Communities at Risk

Community At Risk	CAR Priority	Defensible Space	Access	Water	Public Forest Lands	Private Forest Lands	Recreators/ Transients	Protection Capabilities	Burning	Preparedness	Communications	Steep Slopes	Description
Molalla Fire Communities at Risk													
Rosewood	High	X	X	X	X		X	X	X	X	X	X	The Rosewood Community is densely populated with homes located at the top of a very steep, vegetated slope. There are major access limitations here, as Colmer Creek does is no longer a through road. There is a lot of poison oak on private lands as well as the adjacent heavily forested BLM land. Many local residents use ATV's here and there have been instances of teenagers starting fires. There are also homemade saunas that tend to burn down. Residents of this community burn yard debris all year long,
Alder Creek	High	X	X	X	X	X		X	X	X	X	X	The Alder Creek Community is on a steep, very narrow dirt road. There are water limitations here and the landscape is heavily forested. Burning is an issue here and the community is not aware of the high wildfire hazards.
Sawtell Trout creek/Lebo/Novak/ Hardy. Maplegrove Road	High	X	X	X	X	X	X	X	X	X	X	X	This is a large community in eastern Molalla that extends beyond the Molalla RFPD boundary, so some homes are actually unprotected. Access is limited throughout this area, as Hardy, Leabo, Hibbard,Appleman and Maple Grove Road are one way in and out. Steiner's Pond is a draft site and Deardorf has a huge lake that could be used as a watering site. Trout Creek and Hardy Roads have interrupted radio coverage. ATV users, transients, and other recreators accessing the Molalla River Corridor are potential ignition sources. Also, it takes 30 minutes to get to the end of it, so protection capabilities are compromised.
Dickey Prairie Road	High	X	X	X	X	X	X	X	X	X	X	X	The Dickey Prairie area is characterized by dense homes, heavy timber, and limited access and water supply. The forest road between Adams road and Dickey Prairie is in very poor condition, The City's Water Works Plant intake is also located here. Weyerhaeuser industrial first land is adjacent to Dickey Prairie.
Molalla Heights	High	X	X	X	X	X		X	X	X	X	X	The Molalla Heights Community has limited access and the closest water draft site is at the bridge which is difficult to get to. Homes are in need of defensible space. The rock pit here is very active which provides potential ignition sources.
Fernwood Road/Ramsby/ Munson/Callahan	Medium	X	X	X		X	X	X	X	X	X	X	The Fernwood Area is a steep canyon that drives fire up the steep slope towards homes. There was a fire here about 10 years ago that did just this and was very difficult to fight. There is heavy vegetation and limited access with tight windy driveways and lots of foliage overhanging. It is about 20 minutes from a fire station. Recreators and transients use this area frequently because it is near a forest road.
Blue Road	Medium	X	X	X	X	X		X	X	X	X	X	Blue Road has very limited access and heavy vegetation. There are only a few homes here, but that are overgrown and are adjacent to private and public forest land. Water is an issue here and it would require a longer response time.
Big Rock Loop	Medium	X	X		X	X	X	X	X	X	X	X	Big Rock Loop is vulnerable because there is heavy vegetation and no defensible space around homes. There is a potential water source, but accessing the water source is an issue. Many recreators use this area for ATV's , shooting, campfires and other activities that could provide an ignition source. It is also adjacent to steep BLM forest land.
Salo Royal Oaks	Medium	X	X	X		X		X	X	X	X	X	Salo Royal Oaks has steep, narrow access with very little defensible space around homes. There is poison oak here as well, and no water supply.

Table 10.10-2. Molalla Fire District Action Plan

Action Item	Timeframe	Partners	CAR
Molalla Fire Action Plan			
Secure funding to develop a marketing campaign that utilizes social media outlets to build support and capacity for the Molalla Fire District (volunteer recruitment, community support, fund raising).	3-5 years	Fire Co-op	Molalla Fire District
Identify opportunities to engage young adults in community service and wildfire prevention projects.	2 years	Molalla High School	Molalla Fire District
Pursue grant funding to purchase Wildland PPE to replace outdated PPE.	2 Years	FDB, ODF	Molalla Fire District
Identify and pursue opportunities to provide Incident Management Training for firefighters that will be Incident Commanders on larger scale emergencies.	Ongoing	FDB, CCEM, NAFT	Molalla Fire District
Identify and pursue opportunities to participate in prescribed burns and live fire training to update and maintain wildfire certifications.	Ongoing	ODF, BLM	Molalla Fire District
Partner with the Clackamas County Fire Defense Board to participate in a WUI conflagration exercise.	2 Years	Clackamas Fire Defense Board	Molalla Fire District
Work more closely with Clackamas County DTD to ensure input on access and water is requested and received in a timely manner, including access to the velocity hall system.	Ongoing	SFMO, Clackamas DTD	Molalla Fire District
Develop rural water supplies and in areas that do not have hydrants and are difficult to access.	3-5 Years	ODF	Molalla Fire District
Work with local Christmas Tree growers to develop and implement a chipper program to reduce excessive burning of woody material.	2 Years	ODF, CCFA	Molalla Fire District
Work with Clackamas County to develop accurate maps for roads in the District that have significantly changed, including Boyles and Cromer Roads.	3-5 Years	County DTD	Molalla Fire District
Molalla Fire Local Communities at Risk Action Plan			
Conduct a Community Meeting to educate community on defensible space, and measures that can be taken to reduce structural ignitability. Solicit feedback on wildfire prevention projects the community would support.	2 Years	ODF	Rosewood
Partner with the Fire Co-op to create and distribute outreach materials that promote responsible burning, defensible space and reduction of structural ignitability within the Home Ignition Zone.	2 Years	Fire Co-op	All CAR's
Reduce hazardous fuels in the ROW of potential evacuation routes. Engage residents adjacent to primary evacuations routes to extend treatments onto private land.	Ongoing	ODOT, Clackamas County Roads	All CAR's
Obtain structural ignitability data by conducting structural triage assessment data collection (including GPS points) for homes in Communities at Risk.	2 Years	ODF	All CAR's
Implement road addressing (including length of driveways) and other signage for emergency response.	2 Years	ODF	All CAR's
Work with industrial and public forest land holders to reduce fuels on private and federal land adjacent to CAR's.	3 years	ODF, BLM, Weyerhaeuser, Port Blakely	All CAR's
Conduct Community Clean Up Days to reduce hazardous fuels. Identify opportunities to recycle or compost vegetative material instead of burning.	2 Years	ODF	All CAR's


Molalla Fire District
Map #24
Fire Stations
Fuels Reduction Projects
Communities at Risk
Molalla Fire District
Oregon Department of Forestry
City Boundaries
Whiskey Hill
Aurora Fire Dist. #63
Canby
Barlow
Adkins Circle
Alder Creek
Canby Fire Dist. #62
Lower Highland & Ridge
Dianne/Shelly
Big Rock
Salo Area
Clackamas RFPD #1
Dhooghe Road
Holt
Deardorff Road
Colton Fire Dist. #70
Walton Road
Molalla Heights
Molalla RFPD #73
Molalla
Fernwood Area
Fernwood Road
Dickey Prairie
Monitor Fire Dist. #58
Rosewood
Meadow Ct/Marquam Circle
S Wildcat
Blue Road
Groshong Rd
Prospect
Maple Grove
Butte Creek Rd
Silverton Fire Dist. #2
Butte Creek Unprotected
Upper Sawtell & Cooper Road Unprotected
Sawtell
Not in District
Ramsby Rd Unprotected
Lais Rd & North Fork Rd
Molalla River
KNIGHTS BRIDGE RD
TOWNSHIP RD
CARUS RD
CASTO RD
SPANGLER RD
LONE ELDER RD
MULINO RD
MACKSBURG RD
UNION MILLS RD
BARNARDS RD
BEAVERCREEK RD
UNGER RD
LOWER HIGHLAND RD
UPPER HIGHLAND RD
MOLALLA AVE
WRIGHT RD
FEYRER PARK RD
DICKEY PRAIRIE RD
DHOOGHE RD
FERNWOOD RD
SAWTELL RD
THOMAS RD
MONTE CRISTO RD
WILDCAT RD
LEABO RD
WILHOIT RD
NOWLENS BRIDGE RD
BIRD RD
BLAIR RD
GROSHONG RD
MAPLE GROVE RD
KROPF RD
BARLOW RD
CENTRAL POINT RD
211
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CLACKAMAS COUNTY
GEOGRAPHIC INFORMATION SYSTEMS
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Miles

10.11. Community at Risk: Monitor Rural Fire Protection District #58

The Monitor Fire District has been identified as a Community at Risk (CAR) by Oregon Department of Forestry. The District has participated in the Clackamas County CWPP planning process to evaluate capabilities to prevent, prepare for and respond to potential wildfire events.

Monitor Fire District Description

The Monitor Fire District is a very rural, primarily agricultural area. The District is completely volunteer, so response times are dependent on the availability of volunteers (many of whom are not available during the work day). The community is very supportive of the Fire District, as demonstrated by the five-year Local Option Levy that recently purchased two new engines. The District also has two retired forest service vehicles that are used as brush trucks. Monitor Fire averages about 200 calls a year and operates from two stations on Kropff Road and Woodburn Monitor Road.

Wildland Urban Interface (WUI)

Monitor's Fire District is an agricultural area in southern Clackamas County. It is a relatively flat area, with good access and radio coverage. There is not much of a wildland urban interface in Monitor, because the majority of heavy fuels occurring along the rivers and streams and there are very few homes located in these areas. The homes that are near wooded riparian areas and wetlands have typically have defensible space around them. The primary threat of wildland fire ignition would be from an escaped agricultural burn. The Elliot Prairie area is the highest concentration of homes, but fuels are not heavy enough to warrant a Community at Risk designation.

Clackamas County developed a Wildland Urban Interface Map based on housing density and fuel types. Although there is not a great deal of localized wildfire hazard in Monitor, there are some areas that met the criteria for being including in the Countywide Wildand Urban Interface as illustrated by Map #25 Monitor Fire District Wildland Urban Interface.

Monitor Fire District Wildfire Hazards

The Clackamas County CWPP wildfire hazard assessment assisted Monitor Fire in identifying areas that may be at higher risk to potential wildfires. Map #10 of the Clackamas CWPP illustrates the overall wildfire hazard risk in the Monitor Fire District and can be used to help target areas for wildfire prevention activities.

Structural Ignitability

Monitor Fire promotes the creation of defensible space, use of fire-resistant roofing and building materials, and community preparedness as much as possible. However, with very limited staffing, there is very little communication with the Clackamas Department of Transportation and Development, which provides land use planning and building services in this area. Because protection capabilities are so limited here, Monitor Fire promotes home sprinkler systems, especially in homes that are greater than 3,600 square feet in area. Monitor Fire does not participate in land use reviews, and currently works with individual homeowner or contractors during development to ensure adequate access and fire flow. The District does not receive monthly notifications of new building permits and has not been trained on velocity hall. This has been noted in the Monitor Fire CWPP Action Plan.

Emergency Response

Emergency response is challenging in the Monitor Fire District because staff is entirely volunteer and ranges from 26 to 32 firefighters, depending on turnover. A major wildland urban interface fire in Monitor would quickly exceed the resources and capabilities of the District. For this reason, Monitor Fire has mutual aid agreements in place which allows for the sharing of resources across the county in the event of a large scale disaster including wildfires.

Monitor Fire has an excellent training program for a volunteer Fire District, and the majority of volunteers are DPSST certified as Wildand Urban Interface Firefighters. Turnover is always an issue, so training new volunteers can be challenging. Monitor Fire would like to strengthen its relationship with the ODF by attending training (S-130, S-190) to assist in maintaining wildfire qualifications. The District is also in need of new wildland Personal Protective Equipment including Nomex pants, shirts and new generation live fire shelters.

Address signage is an issue throughout the District. ODF is assisting by addressing the highest priority roads in the Summer of 2012, and will continue to work with Monitor Fire to improve address signage.

Although there is a great deal of agricultural burning in this area, the majority of farmers are well-versed in safe burning practices. Access is good throughout the District, with very few single access roads. Radio and cell phone communication is also good. The District just received six used 800 MHz radios from Canby Fire, which improves interoperability with other mutual aid partners. Each vehicle is now equipped with an 800 MHz and a VHF radio. As the County moves toward narrow banding and higher frequencies, overall the coverage and quality of communication in rural areas such as Monitor capabilities are diminished and in more repeaters may be needed.

Community Outreach & Education

Monitor Fire is dedicated to fire prevention, but has limited staff and capacity for a fire prevention program. The District incorporates fire prevention messaging into all outreach programs including fire station open house, pancake breakfasts and national night out. Currently, the prevention messages target youth, and presentations are given at Butte Creek School and Canby Elementary on Whiskey Hill annually. Monitor Fire would like to increase capacity in its outreach program for fire prevention and for recruiting potential volunteers.

Local Communities at Risk (Strategic Planning Areas)

Monitor Fire has not identified any Communities at Risk to wildfire. Elliot Prairie is the only concentration of homes, but fuels here do not constitute a high wildfire risk.

Fuels Reduction

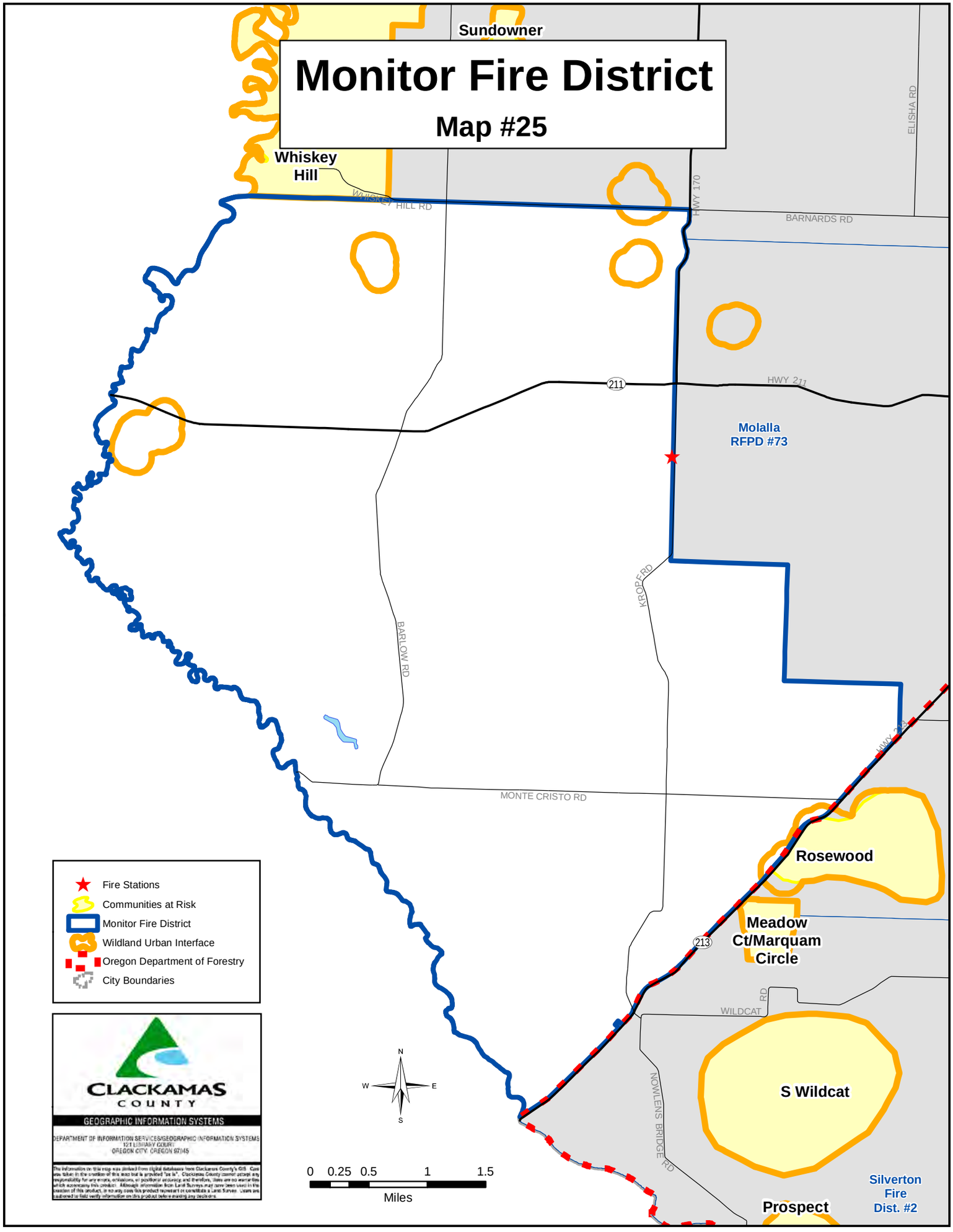
A core focus of the Clackamas County Community Wildfire Protection Plan (CCWPP) reducing hazardous fuels around homes, along transportation corridors and in surrounding forested lands can significantly minimize losses to life, property, and natural resources from wildfire. Heavy Fuels in the Monitor Fire District are concentrated along wetland and riparian areas, but there are very few homes or infrastructure at risk. There have been no areas identified as potential fuels reduction project sites.

MonitorFire District Action Plan

Monitor Fire has developed a list of actions to build capacity for potential widlland fires at the District scale. The action plan for Monitor Fire is provided in Table 10.11-1.

Table 10.11-1. Monitor Fire District Action Plan

Action Item	Timeframe	Partners	CAR
Monitor Fire Action Plan			
Pursue grant funding to purchase Wildland PPE to replace outdated PPE.	2 Years	FDB, ODF	Monitor Fire District
Work more closely with Clackamas County DTD to ensure input on access and water is requested and received in a timely manner, including access to the velocity hall system.	Ongoing	SFMO, Clackamas DTD	Monitor Fire District
Partner with ODF to receive wildland fire training training (S-130, S-190)for maintaining wildfire qualifications.	2 Years	ODF	Monitor Fire District
Continue to improve address signage throughout the District.	2 Years	ODF,Fire Co-op	Monitor Fire District
Partner with ODF and the Clackamas County Fire Cooperative to increase capacity in the fire prevention and outreach program.	Ongoing	Fire Co-op	Monitor Fire District


Monitor Fire District
Map #25
Sundowner
Whiskey Hill
WHISKEY HILL RD
HWY 170
ELISHA RD
BARNARDS RD
211
HWY 211
Molalla RFPD #73
KROPF RD
BARLOW RD
MONTE CRISTO RD
HWY 213
Rosewood
Meadow Ct/Marquam Circle
213
WILDCAT RD
S Wildcat
NOWLENS BRIDGE RD
Prospect
Silverton Fire Dist. #2
Fire Stations
Communities at Risk
Monitor Fire District
Wildland Urban Interface
Oregon Department of Forestry
City Boundaries
CLACKAMAS COUNTY
GEOGRAPHIC INFORMATION SYSTEMS
DEPARTMENT OF INFORMATION SERVICES/GEOGRAPHIC INFORMATION SYSTEMS
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10.12. Community at Risk: Sandy Rural Fire Protection District #72

The Sandy Fire District has been identified as a Community at Risk (CAR) by Oregon Department of Forestry. The District has participated in the Clackamas County CWPP planning process to evaluate capabilities to prevent, prepare for and respond to potential wildfire events.

Sandy Fire District Description

Sandy is a scenic community with beautiful mountain views, the Sandy and Bull Run Rivers, and is home to a major portion of the historic Barlow Road of the Oregon Trail. Residents enjoy a mild climate, clean air, good water and advantages of living in a small town while living only 45 minutes from downtown Portland. The community is largely built in the Wildland Urban Interface (WUI).

Sandy's heritage is logging and sawmilling. There are several nurseries and berry farms with millions of dollars of assets and inventory, and many jobs. There are several light industries including construction and steel work, plastic injection molding, auto sales and service, and fuel facilities. The Oregon Trail School District operates seven facilities within the fire district that are major assets for the community as well as being, perhaps, the largest single employer in the area.

Sandy Fire District #72 protects a 77 square mile district with a population of approximately 17,000 including the City of Sandy, which is just over 2 square miles and a population of approximately 6500. It serves the community with 15 career personnel and 50 volunteers. The District is a rural fire district governed by an elected board of directors and is well supported by its patrons.

Sandy is adjacent to federal, state, and local recreational lands. The rivers in the area are well known for their fishing and boating, and the surrounding forest lands offer a variety of recreational possibilities.

The Bull Run Watershed is accessed through the fire district. Sandy Fire provides mutual aid to the City of Portland as first-in responders into the Bull Run. US Highway 26 bisects the district and is a major transportation route between the Portland area and central/eastern Oregon. 31,000 vehicles travel through Sandy each day.

Wildland Urban Interface (WUI)

The topography of the Sandy Fire District, like most areas in Oregon, is quite diverse. The southern and eastern borders of the District are mostly forested land and the southwest border is the Deep Creek canyon. The Sandy River canyon, which is quite steep and picturesque, dissects the center of the District, and creates an access problem for the Northern area of the District as well as an interface problem with the steep southern bluffs bordering city residential areas. All of these canyons are forested and have homes built sporadically throughout. This combination of homes, steep grades and trees pose a significant wildland interface problem. This topography also impacts communication systems because of slopes and mountains that can block radio and cellular telephone signals.

The remainder of the District ranges from gentle hills to relatively flat areas. These areas consist of a combination of farms, homes and businesses. The nursery business is a major part of local agriculture. There is also a variety of forest lands and natural areas; from thick stands of second growth timber to open grass lands. In addition, public and private management of the surrounding timber lands creates a patchwork of various stages of growth which includes dealing with clean up of slash of logged timber land and re-seeding projects.

Tourism and recreation are also huge influences here, with thousands of Portland area residents travelling along Highway 26 to access the Mount Hood National Forest. Campers, hikers, hunters and other visitors to this area can potentially start wildfires that could carry from public land to the residential communities.

Sandy Fire District Wildfire Hazards

The Clackamas County CWPP wildfire hazard assessment assisted Sandy Fire in identifying areas that may be at higher risk to potential wildfires. Map #10 illustrates the overall wildfire hazard risk in the Sandy Fire District and will be used to help target areas for wildfire prevention activities.

Structural Ignitability

Sandy Fire promotes the creation of defensible space, use of fire-resistant roofing and building materials, and community preparedness in the WUI. Sandy Fire works well with the City of Sandy and Clackamas County to integrate these concepts at the regulatory level. Also, Sandy Fire participates in land use reviews for new development to provide input on access and water supply.

Since the adoption of the county-wide driveway standard, private driveways are being installed that are designed to allow fire engine access. There are several pre-existing private driveways that pose access difficulties. These difficulties include inadequate turning radiuses, steep grades, inadequate vegetation clearance, inadequately designed bridges and driveways that will not withstand the weight of a fire engine, especially during the wet season. In most of these cases response times are increased.

Approximately 30% of the District is served by public water systems. There are 7 water districts serving the District. The major district is the City of Sandy. Other smaller districts include Skyview Acres Water District, Pleasant Home Water District, and Latigo Hills Water District.

Fire flows in the City of Sandy have improved tremendously over the past decade. The City has added another water reservoir, for a total storage capacity of 3.75 million gallons, and has added larger distribution mains to increase available fire flow for much of the City. Its water sources are capable of producing 3 million gallons per day. The City has also identified how the system will grow with new development.

The remaining water districts serve primarily rural residential communities and for the most part are inadequate for providing fire flow. The remaining 70% of the District uses well water for domestic use. Fire District water tenders provide fire flow for these areas. The water tenders also augment fire flow in hydrated areas if fire flow is inadequate.

The District has developed strategically located static water sources (ponds and cisterns) in rural areas of the District to assist in fire flow requirements. These drafting locations are documented in fire apparatus in a book with a description and photos of the site.

For the most part, the transportation system in the District is adequate. Typically, there are few problems that can be directed towards transportation inadequacy, though congestion on Hwy 26 through downtown Sandy is becoming an ever increasing problem at certain times of the day and days of the week. Hwy 26 is a corridor for recreational activities on Mt. Hood and in Central Oregon. Funding for maintenance and improvements has shown to be inadequate for the past few years and will continue to be inadequate if sources of funding are not addressed. The City of Sandy recently passed a penny per gallon gas tax that has proven to provide a modest but reliable revenue source to the City for local street repair. Clackamas County has undertaken a project called

"Concurrency" to further address these issues. Should this trend continue, congestion or the quality of some roads might be an obstacle to emergency response times.

Emergency Response

Sandy Fire Professionals are very well-trained for wildland fires with an annual training regime that supports task forces and strike teams which are called upon to respond to local wildfires as well as conflagrations. Although the District is able to support the S-130 and S-190 training, lack of hands-on fire experience makes it difficult to retain wildland qualifications. Sandy Fire would like to work more directly with the USFS and ODF to have opportunities to participate in live fires, and this is noted in the action plan.

The District has two dedicated brush engines; one of which will need replacing in next 5 years. The District is in need of fire shelters and has other equipment needs, which are documented in the Sandy CWPP Action Plan. The population is dispersed, which can result in increased response times to outer reaches of the District.

Because Sandy Fire is a relatively small fire district, a major wildland urban interface fire in Sandy would quickly exceed the resources and capabilities of the District. For this reason, Sandy Fire has Mutual Aid agreements in place which allows for the sharing of resources across the county in the event of a large scale disaster including wildfires.

In the event of a large widlland fire, evacuations may be necessary. This rural area presents some difficulties due to the number of residential properties that can only be accessed by one way in and one way out roads. Also, there are many private bridges in the area that may not be able to support emergency service vehicles.

Burning of yard waste and debris is challenging in the Sandy Fire District because burning is allowed in all areas. Sandy Fire adheres to the Open Burn Policy adopted by the Fire Defense Board and tries to be consistent with neighboring jurisdictions in regulating the Backyard Burning program.

Community Outreach & Education

Sandy Fire is dedicated to fire prevention, and uses a variety of forums to promote residential fire safety, defensible space, and safe burning practices. The community is very supportive of the Fire District and participates in activities throughout the year, some of which include smoke detector, fire prevention, car seat, and other programs. Sandy Fire is also an active member of the Clackamas County Fire Prevention Cooperative which is a consortium of structural and wildland fire protection professionals that work together to deliver programs such as team teaching in the grade school fire safety programs, safety fairs with car seat inspections, community and school programs, and fire safety house displays.

Several community members participated in the meeting for the 2005 iteration of the CCWPP and are committed to implementing its goals and objectives. Two additional community meetings have been held since 2005 to discuss community volunteers helping with address confirmation, assessing driveway conditions and risk assessments of homes in the Bull Run CPO. Our CERT team members commit to several hours of training and will also be active participants in the implementation of the Sandy CWPP.

Local Communities at Risk (CAR's)

Sandy Fire also recognizes that there are smaller-scale Communities at Risk that have unique wildfire hazards to be addressed at the more local scale. These areas were referred to as Strategic Planning Areas in the 2005 iteration of the CWPP, but will now be referenced as local Communities at Risk to be consistent with state and federal language. Communities that have been identified as being particularly vulnerable to wildfires are illustrated in Map #26 and listed in Table 10.12-1. Sandy Fire professionals considered the following factors to determine the local CARs including:

- Need for defensible space
- Access limitations (narrow driveways, lack of address signage, one way in/one way out)
- Steep slopes that can hinder access and accelerate the spread of wildfire
- Lack of water available for wildland fire fighting
- Heavy fuels on adjacent public lands
- Potential ignition sources from recreationists and transients
- Agricultural and backyard burning
- Lack of community outreach programs to promote wildfire awareness
- Communications difficulties

Fuels Reduction

Fuels reduction projects can and should be accomplished at the local scale, which is the creation of defensible space around homes, as well as the landscape scale to extend vegetation treatments onto adjacent forested land and natural areas. Sandy Fire will facilitate cooperation between public and private organizations to ensure that fuels reduction work occurs strategically and benefits homeowners as well as adjacent public and private lands.

To ensure that landscape-level treatments are paired with projects to create defensible space around vulnerable communities, priority fuels reduction projects have been overlaid with the Communities at Risk Identified by Sandy Fire (Map #26).

Fuels Reduction Priorities include:

Cedar Creek
Bull Run Watershed
Wildcat Mountain
Sandy River Park Area

Sandy Fire District Action Plan

Sandy Fire has developed a list of actions to build capacity at the District scale and has identified actions that can help to make the local CARS more resilient to potential wildfires. The action plan for Sandy Fire and the local CARs therein is provided in Table 10.12-2.

Table 10.12-1. Sandy Fire District Local Communities at Risk

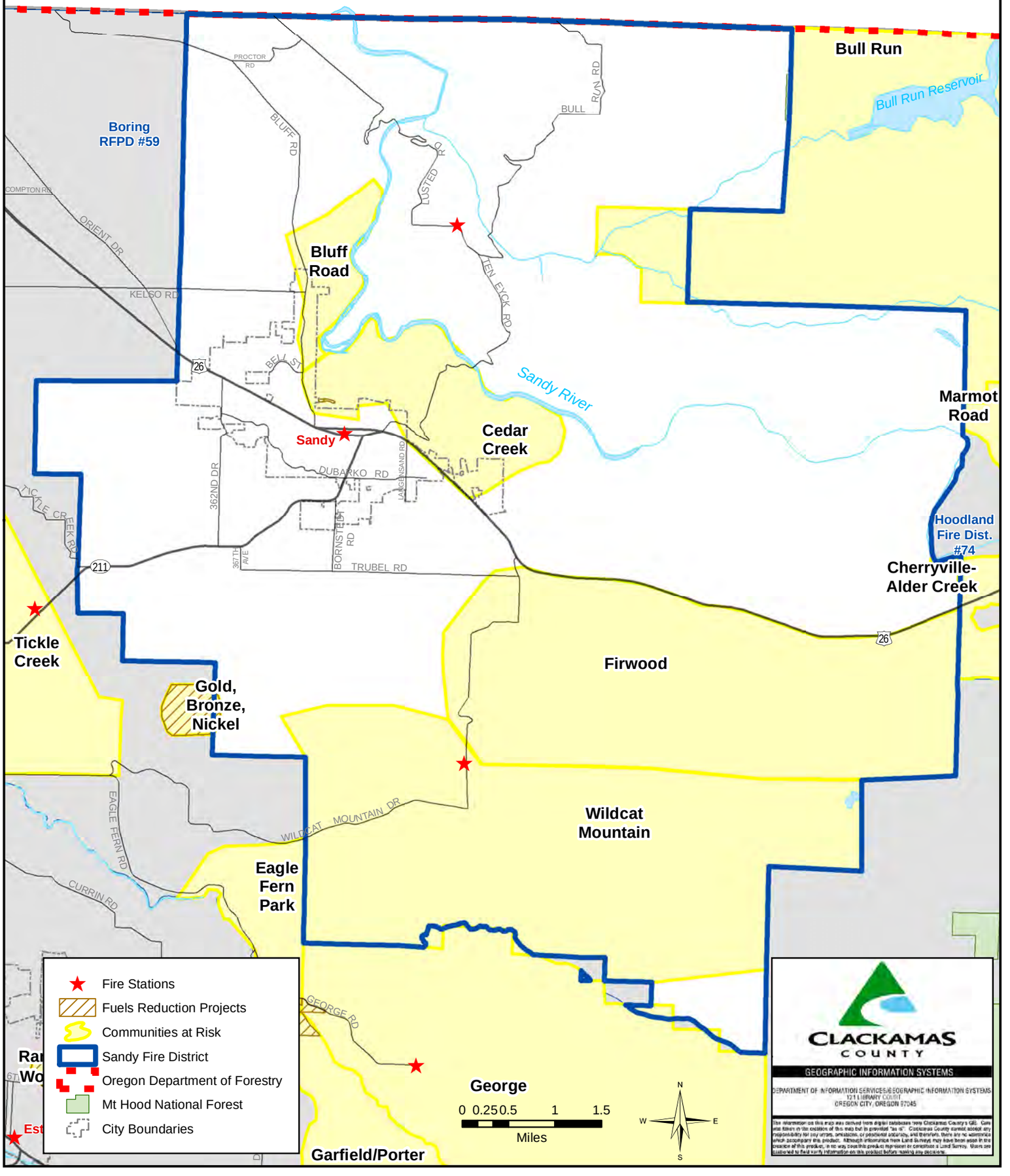
Community At Risk	CAR Priority	Defensible Space	Access	Water	Public Forest Lands	Private Forest Lands	Recreators/ Transients	Protection Capabilities	Burning	Preparedness	Communications	Steep Slopes	Description
Sandy Fire District Communities at Risk													
Wildcat Mountain	**High**	X	X	X	X	X	X	X	X	X		X	This community borders BLM, USFS, and industrial forestland on the southern end of the District. Access is very limited only here to one way in and out. Residents are interested in another access point to get from Wildcat Mtn. Road to Paugh road; opportunities include either gating a road through private property or potentially using a Frères logging road. There are also some very narrow and overgrown roads. Outreach, defensible space and outreach are priorities here.
Cedar Creek	**High**	X	X	X	X	X	X	X	X	X	X	X	This residential area is in a heavily forested area on a steep slope on the northern edge of the City. The residential area is adjacent to a City Park that was logged and now is second growth; the old high school is also located here and owns a small portion of adjacent forest land while the remainder is and private forest land. The majority of homes, the High school and the heart of the City of Sandy are all located at top of this steep slope. Access is generally good to the residential areas, but poor to the forest. There is an ATV road in the forest but response here would require a great deal of footwork to get crews. Bridges over Cedar Creek are not engineered for tenders. However, one bridge that served 3 homes served was engineered to withstand 60,000 pounds at the request of Sandy Fire. All water would have to be brought in and Cedar Creek could also be a potential water source. Home addressing is not consistent here. Communications are somewhat poor for 800 here, but VHF and 800 Simplex are good. Residents do burn here, but there have not been very many escapements.
Fir Wood	**High**	X	X	X		X		X		X		X	This agricultural community is comprised of nurseries, berry farms and tree farms. The access is not bad, but the topography does present challenges in some areas. Generally, this community is not as steep as the other CARS. There is a great need for defensible space here. There is a 30,000 gallon tank at the Firwood fire station, and some ponds throughout the area that could potentially be used as helicopter dip spots, but water would probably need to be brought in by truck. Firwood is an all volunteer station so the main station would likely be first on scene. There is a lot of burning here, but very little problems resulting from it. Communications are good because nearby Linhart Butte Road is a C-800 transmitter site.
Bull Run Area	**High**	X	X	X	X	X	X	X		X		X	This watershed is a large forested area owned by USFS but managed by the Portland Water Bureau that straddles Sandy fire and Corbett Fire in adjacent Multnomah County. This area is also identified as a CAR in the Multnomah County CWPP. The head works and other infrastructure is served by the Sandy Fire District via a direct mutual aid agreement with the City of Portland. Sandy fire is also the first responder on medical calls here. One of the issues here is protection capability because public access is prohibited so early detection is difficult, and once notified, it takes Sandy about 15 minutes to arrive. There was a fire here in 2009 and the 2011 Dollar Lake Fire on the Mt Hood National Forest also made it within 2 miles of the Bull Run. Camps Namanu and Camp Howard are private camps here; Camp Howard was treated for Fuels in 2011. The evacuation route out of Namanuis overgrown and could use fire break as well as fuels reduction around the camp structures. The Bull Run watershed would benefit greatly from fuels reduction throughout the watershed to protect this valuable resource from catastrophic wildfire. Access fairly good but it takes a while to respond because they are narrow and curved. Some residential neighborhoods have gravel roads. Communication is good here. Recreators may be an issue in the summer months. Community members have some awareness because firefighters completed structural triage in some locations, but this needs to be done again. Camp Howard has good water supply and the Aims Community Church has good water, but water would need to be carried everywhere else.
Bluff Road	**High**	X	X		X	X	X	X		X		X	The Bluff Road area is extremely steep, nearly vertical, with dense vegetation connecting the canyon to upper Bluff Road. There is a scenic viewpoint at the top so there is heavy traffic here. There are homes at the bottom of the canyon and at the top. There is the potential for big fire from the large trees there that can make a run up toward the homes. The topography would make response efforts challenging. The topography runs to the west from the Sandy River to Bluff Road. There is water here and hydrants are going to be improved by purchasing water from Bull Run. Addressing here is good.

Table 10.12-2. Sandy Fire District Action Plan

Action Item	Timeframe	Partners	CAR
Sandy Fire Action Plan			
Inventor private bridges to determine whether or not they have had an engineer certification and encourage landowners to upgrade them to	Long-Term	Clackamas County, CCEM	Sandy Fire District
Develop a working relationship with natural land managers including Sandy Parks, USFS, and the BLM to address wildfire hazards and	Short-Term	Sandy Parks, USFS, BLM	Sandy Fire District
Work with Clackamas County Emergency Management and the Sherriff's Office to discuss evacuation planning especially in	Short-Term	CCSO, CCEM	Sandy Fire District
Develop and implement a driveway program to ensure that driveways are wide enough with adequate clearance for emergency service vehicles.	Long-Term	CCEM, DTD	Sandy Fire District
Replace the one of Sandy Fire's brush engines in 5 year.	Long-Term	ODF, USFS	Sandy Fire District
Procure fire shelters and other wildland PPE for staff and volunteers.	Ongoing	ODF	Sandy Fire District
Sandy Fire Local Communities at Risk Action Plan			
Conduct a Community Meeting to educate community on defensible space, and measures that can be taken to reduce structural	Ongoing	ODF	Wildcat Mtn/ All
Work with the City of Portland Water Bureau to create fire breaks along roads, shaded fuel breaks and other fuels reduction strategies	Short-Term	City of Portland Water Bureau, ODF, USFS, Corbett	Bull Run
Develop a working relationship with natural land managers including Sandy Parks, USFS, BLM and the Portland Water Bureau to address	Short-Term	Sandy Parks, USFS, BLM	Cedar Creek, Wildcat Man, Bull Run
Implement road addressing (including length of driveways) and other signage for emergency response.	Ongoing	ODF	Firwood Cedar Creek Wildcat Mtn.
Partner with the Fire Co-op to create and distribute outreach materials that promote responsible burning, defensible space and	Ongoing	Fire Co-op	All
Reduce hazardous fuels in the ROW of potential evacuation routes. Engage residents adjacent to primary evacuations routes to extend	Ongoing	ODOT, Clackamas County Roads	All
Obtain structural ignitability data by conducting structural triage assessment data collection (including GPS points) for homes in	Ongoing	ODF	All
Develop a community-driven pre-disaster plan including evacuation routes, telephone call down trees, and other strategies for	Ongoing	Clackamas County Emergency Management	All
Seek grant funding to support fuels reduction and creation of defensible space around homes.	Ongoing	ODF	All
Conduct Community Clean Up Days to reduce hazardous fuels.	Ongoing	ODF, Metro	All

Sandy Fire District

Map #26



10.13. Community at Risk: Silverton Rural Fire Protection District #2

The Silverton Fire District has been identified as a Community at Risk (CAR) by Oregon Department of Forestry. The District has participated in the Clackamas County Community Wildfire Protection Plan (CWPP) planning process to evaluate capabilities to prevent, prepare for and respond to potential wildfire events.

Silverton Fire District Description

The Silverton Rural Fire Protection District #2 is a nearly all volunteer District that provides emergency medical services as well as fire services to an area of about 106 square miles and serves a population of over 18,880 from five stations. The current staff consists of seven full time employees, and over seventy volunteers. Both volunteers and paid staff work under the direction of the Fire Chief.

Wildland Urban Interface (WUI)

Silverton is the location of the largest widlland fire in Oregon's history, burning over 1 million acres of timber in 1865. There have been few large fires since then, which has led to heavy fuel loading that could cause another large fire to ignite.

Silverton's Fire District is a rural area on the eastern edge of Clackamas County adjacent to large tracts of federal, state and private forests. The terrain is steep, causing access and communication limitations. The area attracts campers, hikers, anglers, ATV users, hunters and other visitors the diverse use of the area which can potentially start wildfires that could carry from public land to the residential communities.

The area is characterized by rural residential homes surrounded by heavy fuels and steep slopes. In addition, many of the neighborhoods here have only single access (one way in and one way out) with narrow, steep driveways and poor address signage. Heavy and continuous fuels dominate this area, so fires that begin on public land or on smaller private residential lots can quickly threaten the communities and natural resources that thrive in the Silverton Fire District.

Silverton Fire District Wildfire Hazards

The Clackamas County CWPP wildfire hazard assessment assisted Silverton Fire in identifying areas that may be at higher risk to potential wildfires. Map #10 illustrates the overall wildfire hazard risk in the Silverton Fire District and will be used to help target areas for wildfire prevention activities.

Structural Ignitability

Silverton Fire District promotes the creation of defensible space, use of fire-resistant roofing and building materials, and community preparedness in the WUI. The Silverton Fire District works with the City of Silverton, the City of Scotts Mills and Clackamas County to integrate these concepts at the regulatory level by providing input on access and water requirements for new development.

The City of Silverton provides land use planning and building permit services within the city. Coordination with the City is excellent, as the City Planner is also a volunteer firefighter. Unincorporated areas are served by Clackamas County Land Use Planning and Building Depts. Silverton Fire has experienced some difficulties coordinating with the County, and is not always notified to provide information on fire flow and access for new lots of record. Additionally, many homes are being built on existing lots of record with no input from the Fire District on access and water. This issue has been identified as a County-wide issue and therefore is articulated as a need in the Clackamas CWPP Action Plan. Silverton Fire also does not have access to the County's Velocity

Hall System which catalogues pending and approved building permits. The need for enhanced communication between Clackamas County and Silverton Fire has been noted in the Silverton Fire CWPP Action Plan.

Emergency Response

Emergency response is challenging in the Silverton Fire District because staff are almost entirely volunteer, with only 7 paid staff. A major wildland urban interface fire in Silverton would quickly exceed the resources and capabilities of the District. For this reason, Silverton Fire has mutual aid agreements in place which allows for the sharing of resources across the county in the event of a large scale disaster including wildfires.

The Silverton Fire District is able to support annual wildland fire training (S-130, S-190, S-13 as well as all others required for engine boss), and works with local farmers to implement prescribed burns that provide the live fire experience critical to retaining wildland qualifications.

During a multi-agency response, interoperability is going to be an issue for Silverton Fire because their used 800 MHz radios are poor quality; many of which do not display radio frequencies. The District is also in need of 85 new generation fire shelters. Silverton Fire has applied for VFA and RFA grants multiple times to fill District need, but has not yet been successful.

Because Silverton Fire District does not have a hydrant system that extends to rural areas, it is important to begin identifying and improving potential water sites. This is especially important for homes that have long narrow driveways that will not support water tenders.

In the event of a large widlland fire, evacuations may be necessary. This rural area presents some difficulties due to the large number of single access roads with poor addressing. There are also a significant number of private bridges with unknown load capacity, especially along South Butte Creek Road. Silverton Fire has been working with ODF to improve address signage in vulnerable areas, and will continue to work with the Clackamas County Fire Co-op to implement address signage in the Communities at Risk (CAR).

Burning of yard waste, agricultural and other debris is challenging in the Silverton Fire District because backyard burning is allowed in all areas. Silverton Fire District tries to be consistent with neighboring jurisdictions' backyard burning programs but does not have staff or resources to regulate burning in Silverton. The District is also home to many Christmas tree operations that have authority to burn an incredible amount of material all year long regardless of the severity of fire danger or air quality restrictions. Silverton Fire would like to work with ODF to develop a better strategy for dealing with Christmas tree waste such as a chipper cooperative. This has been identified in the Silverton CWPP Action Plan.

Community Outreach & Education

One of the Missions of the Silverton Fire District is to provide Public Education in Fire Prevention. Some of the ways that we provide this is to visit classrooms to talk with students and Station tours for school and youth groups. The Fire Silverton District also participates in activities throughout the area which include Healthy Kids Day, First Fridays, July 3rd Fireworks Display, Homer Davenport Days Festival, Food & Toy Drive and many other Community events.

Silverton Fire is also a member of the Clackamas County Fire Prevention Cooperative which is a consortium of structural and wildland fire protection professionals that work together to deliver programs such as team teaching in the grade school fire safety programs, safety fairs with car seat inspections, fire safety house displays, community and school programs.

Local Communities at Risk (Strategic Planning Areas)

Silverton Fire also recognizes that there are smaller-scale Communities at Risk that have unique wildfire hazards to be addressed at the more local level. These areas were referred to as Strategic Planning Areas in the 2005 iteration of the CWPP, but will now be referenced as local Communities at Risk to be consistent with state and federal language. Communities that have been identified as being particularly vulnerable to wildfires are illustrated in Map #27 and listed in Table 10.13-1. Silverton Fire officials considered the following factors to determine the local CARs including:

- Need for defensible space
- Access limitations (narrow driveways, lack of address signage, single access
- Steep slopes that can hinder access and accelerate the spread of wildfire
- Lack of water available for wildland fire fighting
- Heavy fuels on adjacent public lands
- Potential ignition sources from recreationists and transients
- Agricultural and backyard burning
- Lack of community outreach programs to promote wildfire awareness
- Communications difficulties

Fuels Reduction

Fuels reduction projects can and should be accomplished at the local scale, which is the creation of defensible space around homes, as well as the landscape scale to extend vegetation treatments onto adjacent forested land and natural areas. Silverton Fire District will facilitate cooperation between public and private organizations to ensure that fuels reduction work occurs strategically to benefit homeowners as well as adjacent public and private lands.

The Bureau of Land Management, private industrial landowners and small woodland owners have many heavily forested landholdings that are adjacent to homes in the Wildland Urban Interface. As Silverton Fire District targets the residential communities for creating defensible space, there is an opportunity to engage private, state and federal partners in reducing fuels on this adjacent public land. This has been identified as an action item.

To ensure that landscape-level treatments are paired with projects to create defensible space around vulnerable communities, priority fuels reduction projects have been overlaid with the Communities at Risk Identified by Silverton Fire (Map # 27).

Fuels Reduction Priorities include:

Boy Scout Camp
South Butte Road
South Maple Grove Road
Groshong Road

Silverton Fire District Action Plan

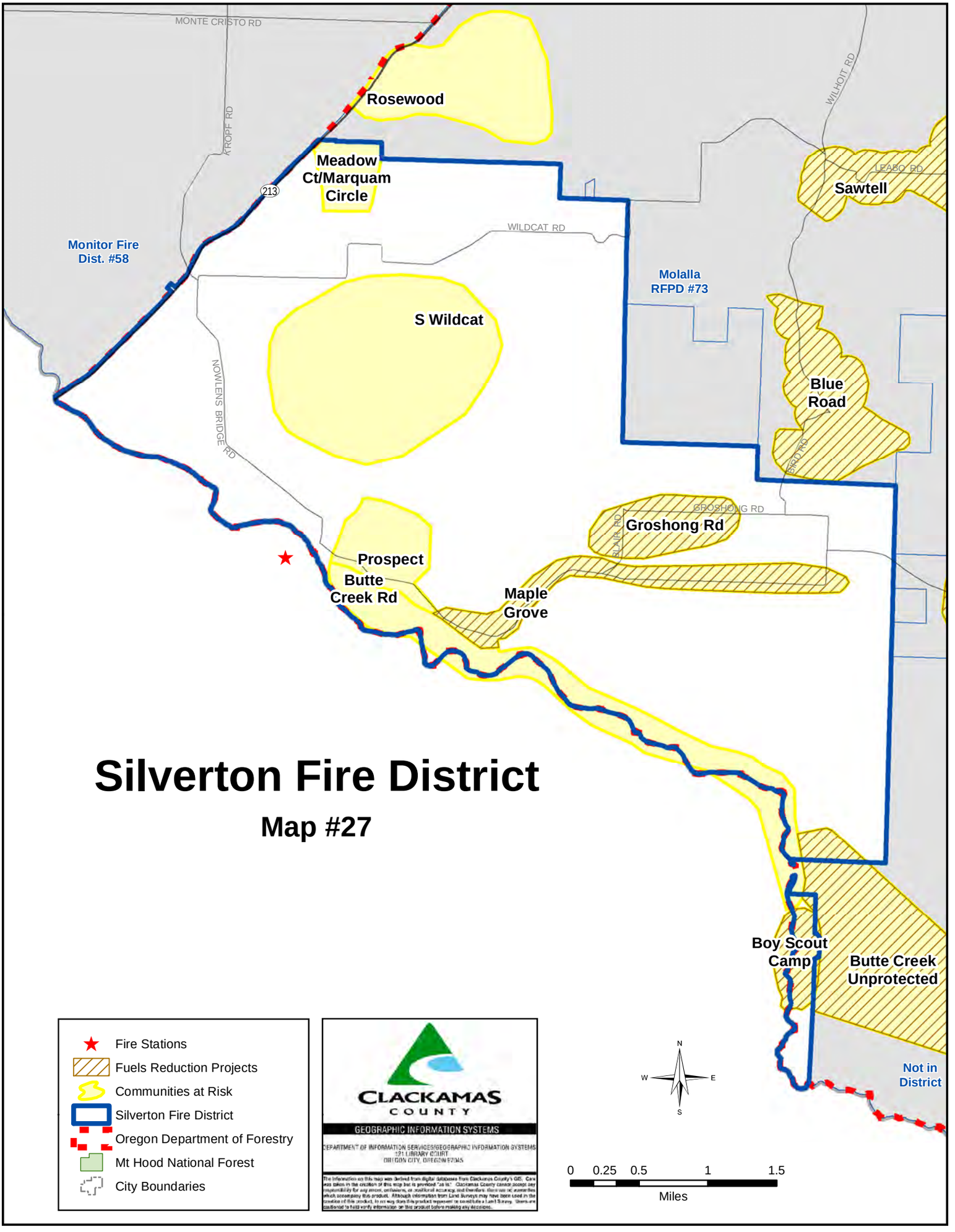
Silverton Fire District has developed a list of actions to build capacity at the Department level and has identified actions that can help to make the local CARs more resilient to potential wildfires. The action plan for Silverton Fire and the local CARs therein is provided in Table 10.13-2.

Table 10.13-1. Silverton Fire District Communities at Risk

Community At Risk	CAR Priority	Defensible Space	Access	Water	Public Forest Lands	Private Forest Lands	Recreators/ Transients	Protection Capabilities	Burning	Preparedness	Communications	Steep Slopes	Description
Silverton Fire Communities at Risk													
Boy Scout Camp	**High**	X	X	X	X	X	X		X	X	X	X	The Boy Scout Camp is an area of concern because it is heavily vegetated, has limited access and water, and is densely populated in the summer months. The canyon going into the camp reduces radio coverage. This is also an excellent location for community outreach.
South Butte Creek Road	**High**	X	X	X	X	X	X		X	X	X	X	South Butte Creek Road has many homes in heavily forested areas. Access here is impaired by private bridges, one way in and out roads that are steep and narrow, sharp curves and blind corners. There are very few address markers here, and Silverton is working with ODF to install some in 2012. Butte Creek Road is a dead end road. The canyon area presents communication issues, and is also conducive for sever fire behavior as well as landslides. Public education and outreach is needed here to work with traditionally adversarial homeowners and to reach teenagers that recreate on BLM and Private forest lands.
South Maple Grove	**High**	X	X	X	X	X	X		X	X	X	X	The Maple Grove area has very steep terrain with canyon areas, farmland, tree farms and residential properties. Access is limited with narrow driveways, private bridges, and one way in and out roads. Communications are good here and although there are a couple of ponds and swimming pools, water will still be an issue, so response would require water from monitor and Molalla. Cooper Lake is a great fill site.
South Wildcat Road	**High**	X			X	X			X	X			South Wildcat Mountain road is characterized by managed farm lands with a great deal of field burning. Brand from these large scale field burns threaten nearby forest lands. There are not many homes in this area, but those that are located here have long narrow driveways.
Marquam Circle Area	**Medium**	X	X	X					X	X		X	Marquam Circle has a high concentration of homes, with fuels consisting of tall overgrown brush blackberries and other flashy fuels. Meadow Court is one way in and out and turns into gravel. Water is the biggest issue besides defensible space.
Groshong Road	**Medium**	X	X	X					X	X		X	Groshong Road is a high priority for fuels reduction in heavily forested areas. Access is good but water is an issue.
Prospect	**Medium**	X	X	X					X	X		X	Prospect has very limited access because it has only one way in and out and is a narrow road. It would be difficult to get a type one engine into this area. There are many homes at the top of the slope where a fire could potentially run.

Table 10.13-2. Silverton Fire District Action Plan

Action Item	Timeframe	Partners	CAR
Silverton Fire Action Plan			
Inventory private bridges to determine whether or not they have had an engineer certification and encourage landowners to upgrade them to meet the 60,000 pound requirement for emergency service vehicles.	Long-Term	Clackamas County, CCEM	Silverton Fire
Build capacity and support for a more involved Burning Program including staff to educate local residents and regulate the Burning Program.	Long-Term	ODF, DEQ, Fire Co-op	Silverton Fire
Work with local Christmas Tree growers to develop and implement a chipper program to reduce excessive burning of woody material.	2 Years	ODF, CCFA	Silverton Fire
Work with Clackamas County Emergency Management and the Sherriff's Office to discuss evacuation planning especially in communities with only one way in and out.	Short-Term	CCSO, CCEM	Silverton Fire
Develop and implement a driveway program to ensure that driveways are wide enough with adequate clearance for emergency service vehicles.	Long-Term	CCSO, CCEM	Silverton Fire
Work with the Clackamas Fire Defense Board to replace outdated 800 MHz radios with newer equipment.	Short-Term	FDB	Silverton Fire
Procure 85 new generation fire shelters and other wildland PPE for staff and volunteers.	Ongoing	ODF	Silverton Fire
Work with Clackamas County Land Use Planning and Building Depts. to provide input on access and water requirements in new development.	Short Term	CCDTD	Silverton Fire
Utilize Silverton's First Friday event as a venue for public education.	Ongoing	ODF	Silverton Fire
Continue to work with ODF and other partner fire agencies to maintain wildland fire training credentials and work with local area farmers to develop opportunities to participate in live fire exercises.	Ongoing	ODF, FDB	Silverton Fire
Silverton Fire Local Communities at Risk Action Plan			
Conduct a Community Meeting to educate community on defensible space, safe burning practices, and required access for emergency response vehicles.	Ongoing	ODF	All
Develop working relationships with natural land managers including USFS and the BLM to address wildfire hazards and potential response capabilities for public lands adjacent to Communities at Risk.	Short-Term	USFS, BLM	Boy Scout Camp, S. Butte Creek Rd., S. Maple Grove Rd., S. Wildcat Rd.
Implement road addressing (including length of driveways) and other signage for emergency response.	Ongoing	ODF	All
Partner with the Fire Co-op to create and distribute outreach materials that promote responsible burning, defensible space and reduction of structural ignitability within the Home Ignition Zone.	Ongoing	Fire Co-op	All
Reduce hazardous fuels in the ROW of potential evacuation routes. Engage residents adjacent to primary evacuations routes to extend treatments onto private land.	Ongoing	ODOT, Clackamas County Roads	All
Seek grant funding to support fuels reduction and creation of defensible space around homes.	Ongoing	ODF	All
Conduct Community Clean Up Days to reduce hazardous fuels. Identify opportunities to recycle or compost vegetative material instead of burning.	Ongoing	ODF, OAN	All


MONTE CRISTO RD
KROPF RD
213
Rosewood
Meadow Ct/Marquam Circle
WILKHOIT RD
LEABO RD
Sawtell
WILDCAT RD
Monitor Fire Dist. #58
Molalla RFPD #73
S Wildcat
NOWLENS BRIDGE RD
Blue Road
BIRD RD
GROSHONG RD
BLAIR RD
Groshong Rd
Prospect Butte Creek Rd
Maple Grove
Boy Scout Camp
Butte Creek Unprotected
Not in District
Silverton Fire District
Map #27
Fire Stations
Fuels Reduction Projects
Communities at Risk
Silverton Fire District
Oregon Department of Forestry
Mt Hood National Forest
City Boundaries
CLACKAMAS COUNTY
GEOGRAPHIC INFORMATION SYSTEMS
DEPARTMENT OF INFORMATION SERVICES/GEOGRAPHIC INFORMATION SYSTEMS
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10.14. Community at Risk: Tualatin Valley Fire and Rescue

Tualatin Valley Fire and Rescue (TVF&R) has been identified as a Community at Risk (CAR) by the Oregon Department of Forestry. The District has participated in the Clackamas County CWPP planning process to evaluate capabilities to prevent, prepare for and respond to potential wildfire events.

Tualatin Valley Fire and Rescue Description

Tualatin Valley Fire & Rescue provides fire protection and emergency medical services to approximately 440,000 citizens in one of the fastest growing regions in Oregon. The 210 square mile service area includes nine cities and unincorporated portions of Clackamas, Multnomah, and Washington County. The cities covered by TVF&R in Clackamas County include West Linn and Wilsonville. TVF&R employs a full paid staff of 325 employees and 62 volunteers.

Wildland Urban Interface (WUI)

The Wildland Urban Interface areas in the Clackamas County portion of TVF&R's District are characterized by suburban communities and rural residential homes surrounded by heavy fuels and steep slopes. In addition, many of the neighborhoods here have only one way in and one way out with narrow, steep driveways and poor water supply.

Heavy and continuous fuels dominate many of the parks and natural areas surrounding the communities here, so fires that begin on public land or on smaller private residential lots can quickly threaten the communities and natural resources that thrive in the cities of West Linn and Wilsonville. In addition, response times from rural fire stations could be delayed, which underscores the need for community preparedness in the wildland urban interface.

TVF&R Wildfire Hazards

The Clackamas County CWPP wildfire hazard assessment assisted TVF&R in identifying areas that may be at higher risk to potential wildfires. Map #10 illustrates the overall wildfire hazard risk in TVF&R and will be used to help target areas for wildfire prevention activities.

Structural Ignitability

TVF&R promotes the creation of defensible space, use of fire-resistant roofing and building materials, and community preparedness in the WUI. TVF&R works well with Clackamas County and the cities of Wilsonville and West Linn to integrate these concepts at the regulatory level by providing input on access and water supply during land use reviews for new residential development.

Emergency Response

A major wildland urban interface fire in West Linn or Wilsonville may exceed the immediate resources and capabilities of TVF&R. For this reason, TVF&R has mutual aid agreements in place to allow for the sharing of resources across the county in the event of a large scale disaster including wildfires.

In the event of a large widlland fire, evacuations may be necessary. This rural residential area presents some challenges for evacuations due to access constraints including long, narrow and steep driveways. Many of the identified communities at risk have only one point of egress, making it difficult to manage incoming and outgoing traffic during an emergency.

TVF&R follows DEQ burning policies for backyard burning. The majority of West Linn is within the DEQ burn ban area, which does not allow backyard burning at any time of the year. Wilsonville residents are permitted only during designated burn seasons and on DEQ approved burn days.

TVF&R employs 325 career and 62 volunteer firefighters who receive regular wildland fire training to remain current on qualifications. Although the District is able to support classroom training, lack of live- fire experience makes it difficult to maintain wildland qualifications. New staff members have little to no live-fire experience and many Battalion Chiefs assigned to task forces have difficulty completing task books without being deployed. TVF&R has been working with Metro, Tualatin Hills Park and Recreation District and Clean Water Services to identify opportunities for prescribed burns in Washington County that would benefit native ecosystems while providing live-fire experience to TVF&R staff (e.g. Cooper Mountain and Gardner Prairie). TVF&R would like to expand this partnership to the Clackamas County area by building relationships with Metro, Wilsonville, West Linn and County Parks staff.

Community Outreach & Education

TVF&R is dedicated to fire prevention, public safety and community wellness and uses a variety of forums to promote residential fire safety, defensible space, and safe burning practices. The community is very supportive of the TVF&R and participates in activities throughout the year, some of which include smoke detector, fire prevention, car seat, and community safety programs. TVF&R is also an active member of the Clackamas County Fire Prevention Cooperative which is a consortium of structural and wildland fire protection professionals that work together to deliver programs such as team teaching in the grade school fire safety programs, safety fairs with car seat inspections, community and school programs, and fire safety house displays. TVF&R has a "Wildfire Can Happen Here" program that promotes wildfire awareness in high hazard areas. To date, the majority of the areas targeted for this program have been in Washington and Multnomah Counties. TVF&R would like to expand this effort to the Clackamas CAR's.

Local Communities at Risk (Strategic Planning Areas)

TVF&R recognizes that there are smaller-scale Communities at Risk that have unique wildfire hazards to be addressed at the more local scale. These areas were referred to as Strategic Planning Areas in the 2005 iteration of the CWPP, but will now be referenced as local Communities at Risk to be consistent with state and federal language. Communities that have been identified as being particularly vulnerable to wildfires are illustrated in Map #28 and listed in Table 10.14-1. TVF&R professionals considered the following factors to determine the local CARs including:

- Need for defensible space
- Access limitations (narrow driveways, lack of address signage, one way in/one way out)
- Steep slopes that can hinder access and accelerate the spread of wildfire
- Lack of water available for wildland fire fighting
- Heavy fuels on adjacent public lands
- Potential ignition sources from recreationists and transients
- Agricultural and backyard burning
- Lack of community outreach programs to promote wildfire awareness
- Communications difficulties

Fuels Reduction

Fuels reduction projects can and should be accomplished at the local scale, which is the creation of defensible space around homes, as well as the landscape scale to extend vegetation treatments onto adjacent forested land and natural areas. TVF&R will help top facilitate cooperation between public and private organizations to ensure that fuels reduction work occurs strategically and benefits homeowners as well as adjacent public and private lands.

To ensure that landscape-level treatments are paired with projects to create defensible space around vulnerable communities, priority fuels reduction projects have been overlaid with the Communities at Risk Identified by TVF&R (Map #28).

The following areas have been identified as potential fuels reduction projects by TVF&R, the cities of West Linn and Wilsonville, Clackamas County and Metro:

- Willamette Narrows Phase I
- Willamette Narrows Phase II
- Burnside Park/Maddox Woods
- Hidden Springs
- 1-205 Corridor
- Open Space @ Buck/Barlow
- Wildwood Open Space
- Interstate Tractor Open Space
- Mary S. Young Park
- Robinwood park
- The White Oak Savannah
- Troon Open Space
- GONP Burn
- Boeckman Creek

TVF&R Wildfire Action Plan

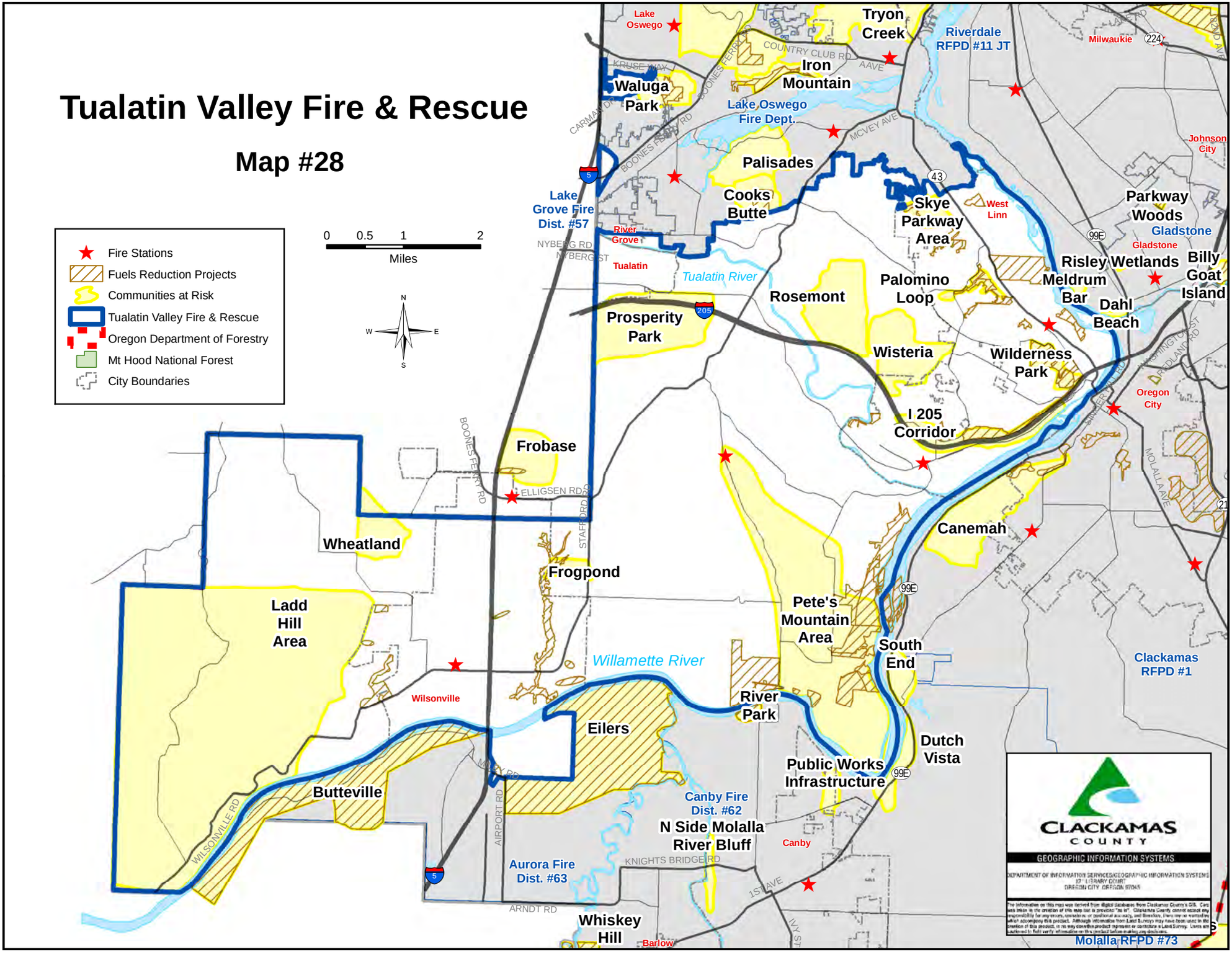
TVF&R has developed a list of actions to build capacity at the District scale and has identified actions that can help to make the local CARS more resilient to potential wildfires. The action plan for TVF&R and the local CARs therein is provided in Table 10.14-2.

Table 10.14-1. Tualatin Valley Fire and Rescue Local Communities at Risk

Community At Risk	CAR Priority	Defensible Space	Access	Water	Public Forest Lands	Private Forest Lands	Recreators/ Transients	Protection Capabilities	Burning	Preparedness	Communications	Steep Slopes	Description
TVF&R Communities at Risk													
205 Corridor (3 steep south facing slopes)	High	X	X	X			X		X	X		X	This area has the highest occurrence of wildfire ignitions because the hillside is covered with light flashy fuels and is adjacent to Hwy 205. It is a south facing slope with the potential of rapid fire spread toward homes at the tope of the slope. This area should be considered fire fuels reduction.
Ladd Hill	High	X	X	X	X	X			X	X		X	This area has south facing slopes, limited access and long response times. Access is also poor to many of the homes in this community, there is no water available, it is heavily forested poor defensible space and poor addressing. There is a mixture of public and private forest land. Coral Creek is a wetland area.
Wilderness Park/Camassia Park	High	X	X	X	X		X	X	X	X		X	This community as a stand pipe system but limited access. The area of concern is a NE facing slope. There is usually at least one fire ignition a year in late May, early June. This area has a high potential for an interface fire because homes are on top of a heavily vegetated, steep slope . High school kids like to recreate here and the park has an elaborate trail system that brings many visitors. This foot traffic increases the potential of ignition sources.
Skye Park Way	High	X	X	X					X	X		X	This area is steep with heavy vegetation but has a north facing slope. Access is limited due to slopes.
Frog Pond Lane	Med	X	X	X	X				X	X		X	This community is in the northeast area of the Boeckman Creek drainage area. There are ladder fuels, invasive species and heavy fuels. This area should be considered for fuels reduction.
Petes Mountain Area	Medium	X	X	X	X		X		X	X		X	This community is particularly vulnerable because it has a south-facing aspect . Metro owns some land here and has been working withTVF&R to implement a fuels reduction and habitat improvement project. The terrain is very steep along the river, so access is an issue . It is very densely vegetated with scrub oak and oak trees, 6 ft tall grasses and blackberries. The north facing slope is steep with access challenges.
Palomino Loop Trail	Medium	X	X	X					X	X		X	The Hidden Springs Community is characterized by steep slopes, heavy vegetation, and limited access and water supply. It has a north-facing aspect. Homes here are in need of defensible space.
Rosemont Area	Medium	X	X	X				X	X	X		X	Rosemont has many steep slopes with a southern aspect. Access and water are limited here. Homes are in need of defensible space. Protection capabilities are somewhat diminished because it is in a more rural area, so homeowners need to be more prepared.
Wysteria	Medium	X	X	X				X	X	X		X	This community has a south-facing steep slope, it is heavily forested, and has residential homes on 3 sides that would benefit from defensible space.
Frobase Road	Medium	X	X	X				X	X	X		X	Frobase Road is one way in and out, is fairly steep, and has heavy vegetation adjacent o homes. Communications are good here, but there is little water.
Prosperity Park/Borland Rd.	Medium	X	X	X	X		X	X	X	X		X	Prosperity park has very poor access and water supply. It is heavily forested, and homes in need of defensible space. The area between Hwy 205 and Borland Road has a south-facing slope with a mix of light flashy fuels and heavy vegetation. There is a neighborhood to the northwest and church to the east. Hwy 205 provides potential ignition
Wheatland Road Area	Medium - Low	X	X	X		X			X	X		X	This is a large rural area with many residents, heavily forested with no hydrants.

Table 10.14-2. Tualatin Valley Fire and Rescue Action Plan

Action Item	Timeframe	Partners	CAR
TVF&R Action Plan			
Identify and pursue opportunities to participate in prescribed burns and live fire tranining to update and maintain wildfire certifications.	Ongoing	Metro, City of Wilsonville, City of West Linn, Clean Water Services, ODF	TVF&R
Continue to foster partnerships with natural resrouces managers to assess and implement potential fuels reduction projects in natural areas adjacent to Communities at Risk.	Ongoing	Metro, City of Wilsonville, City of West Linn, Clean Water Services, ODF	TVF&R
Partner with the Clackamas County Fire Defense Board to particpate in a WUI conflagration exercise.	2 Years	Clackamas Fire Defense Board	TVF&R
TVF&R Local Communities at Risk Action Plan			
Utilize TVF&R's "Wildfire Can Happen Here" public outreach campaign in the high-priorty CARS identified in Clackamas County.	Ongoing	Fire Co-op	205 Corridor, Ladd Hill, Camissa Park
Incorporate Wildfire awarenss and risk reduction strategies into TVF&R's Community Safety & Wellness Program.	Ongoing	HOA's	All CAR's
Improve address signage for emergency response.	Ongoing	Fire Co-op	All CAR's
Partner with the Fire Co-op to create and distribute outreach materials that promote responsible burning, defensible space and reduction of structural ignitability within the Home Ignition Zone.	Ongoing	Fire Co-op	All CAR's
Promote legal, safe and responsible debris burning through public outreach and education.	Ongoing	ODF, DEQ, Fire Co-op	All CAR's
Encourage communities to develop a community-driven pre-disaster plan including evacuation routes, telephone call down trees, and other strategies for strengthening community response.	Ongoing	Clackamas County Emergency Management	All CAR's


Tualatin Valley Fire & Rescue
Map #28
Fire Stations
Fuels Reduction Projects
Communities at Risk
Tualatin Valley Fire & Rescue
Oregon Department of Forestry
Mt Hood National Forest
City Boundaries
0 0.5 1 2
Miles
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E
S
Lake Oswego
Tryon Creek
Riverdale RFPD #11 JT
Milwaukie
Waluga Park
Iron Mountain
Lake Oswego Fire Dept.
Palisades
Johnson City
Lake Grove Fire Dist. #57
Cooks Butte
Skye Parkway Area
West Linn
Parkway Woods
Gladstone
River Grove
Tualatin
Tualatin River
Palomino Loop
Risley Wetlands
Billy Goat Island
Rosemont
Meldrum Bar
Dahl Beach
Prosperity Park
Wisteria
Wilderness Park
Oregon City
I 205 Corridor
Frobase
Canemah
Wheatland
Frogpond
Ladd Hill Area
Pete's Mountain Area
South End
Clackamas RFPD #1
Willamette River
Wilsonville
River Park
Eilers
Dutch Vista
Public Works Infrastructure
Butteville
Canby Fire Dist. #62
N Side Molalla River Bluff
Canby
Aurora Fire Dist. #63
Whiskey Hill
Barlow
Molalla RFPD #73
CLACKAMAS COUNTY
GEOGRAPHIC INFORMATION SYSTEMS

10.15. Community at Risk: Wildland Agencies and Unprotected Areas

The communities in Clackamas County that are not covered by a structural fire agency are considered Communities at Risk (CAR) by Oregon Department of Forestry. The majority of these areas are within wildland agency protection boundaries (ODF and USFS). The widland agencies provide fire suppression for forest land only and do not provide structural fire protection. The ODF and USFS have participated in the Clackamas County CWPP planning process to identify opportunities to prevent, prepare for and respond to potential wildfire events in unprotected areas.

Unprotected Areas Description

In 2004, the Governor's Fire Service Policy Council convened a task force to discuss the issue of areas that are vulnerable to wildfire but are without publicly-funded structural fire protection. This is a major issue throughout the state because the number of unprotected homes in the Wildland Urban Interface (WUI) continues to grow. State firefighting actions on these lands are made possible only after the Governor invokes the Conflagration Act. The task force agreed that protection should be provided only if the county is 1) completing a community wildfire protection plan; 2) has adopted the Department of Land Conservation and Development's Goal 4 requiring fire defense standards for new construction in forest zones; and 3) is changing property tax statement language for ODF assessment from "fire protection" to ODF "non-structural fire suppression" so homeowners and insurers are not lead to believe they have structural fire protection. This section of the Clackamas County CWPP addresses the unprotected areas, thereby meeting the provisions set forth by the task force.

There are approximately 722,799 acres of structurally unprotected lands in Clackamas County. The majority of this acreage is Mount Hood National Forest land, private industrial forest land, or undeveloped land. Some small pockets of land do contain a few residences, buildings and infrastructure that would require protection. These are the areas addressed here.

Wildland Urban Interface (WUI)

The majority of communities, buildings and infrastructure in structurally unprotected areas are very rural examples of the Wildland Urban Interface. They are characterized by residential homes surrounded by heavy fuels and steep slopes, very limited access and potential communication issues. These factors, combined with the lack of structural fire protection make unprotected communities extremely vulnerable.

Wildland Agency and Unprotected Areat Wildfire Hazards

The Clackamas County CWPP wildfire hazard assessment assisted the ODF and USFS in identifying areas that may be at higher risk to potential wildfires. Map #10 illustrates the overall wildfire hazard risk in the unprotected areas and will be used to help target areas for wildfire prevention activities.

Structural Ignitability

The Clackamas County Department of Transportation (DTD) notifies local deputy fire marshals of new lots of record to receive input on access and water requirements. In areas that are not in a structural fire agency's boundary, these requirements may not be adequately incorporated into new development. In an effort to reduce structural ignitability, DTD now requires that any new construction must either annex into a structural fire agency's boundary or contract for structural protection. Lots zoned for Agriculture/ Forestland are required to have fuel breaks, emergency access and turn-arounds and adequate water supply.

Emergency Response

A major wildland urban interface fire in the unprotected areas of Clackamas County would likely require a multi-agency response. The Oregon Dept. of Forestry and the USFS are the wildland protection agencies, while local structural fire districts protect homes. The USFS and ODF have a mutual aid agreement that allows for the sharing of resources, The Clackamas Fire Defense Board also has a Fire Mutual Aid Agreement that is the vehicle through which resources can be shared across jurisdictional boundaries throughout the County. The USFS is not a signatory on this agreement, so any assistance from structural fire agencies would have to come through the ODF agreement. The USFS has identified the need to be a signatory on the Clackamas Fire Defense Boar Mutual Aid Agreement in the USFS CWPP Action Plan.

Burning of yard waste and debris a major issue in unprotected communities because backyard burning is usually regulated by structural fire agencies. The majority of communities that are unprotected are outside of the DEQ boundary, and will burn all year long. ODF only issues burn permits for slash burning or other operations associated with timber harvesting, so backyard burning in unprotected areas is largely unregulated.

The majority of acreage outside of structural fire protection boundaries is in the eastern portion of the county, where VHF is more effective than 800 MHz. Radio communications in unprotected areas can be challenging because 800 MHz is the primary system for structural fire agencies. ODF, the USFS and the majority of rural structural fire agencies use VHF, so interoperability for a larger scale mutual aid event may become an issue. ODF has a few portable 800 MHz radios, but the USFS does not. In addition, the USFS does not routinely communicate with structural fire agencies, so there may be confusion regarding communication protocol during a large scale event. The USFS has identified the need to coordinate radio communications with structural fire agencies in the USFS CWPP Action Plan.

Water supply is usually an issue in rural, unprotected areas. ODF and USFS are accustomed to drafting from existing water bodies and sources to supplement water that is brought on scene, and having water sources identified and developed in rural unprotected areas can be critical to response tactics. This has been identified as a need in the County CWPP action plan.

The ODF and USFS utilize permanent and seasonal staff to respond to wildfires. Wildfire training and refreshers are provided annually to remain current on qualifications. Although the wildland agencies are able to provide classroom training, the lack of live fire experience makes it difficult to retain some wildland qualifications. ODF and USFS is working with the Clackamas Fire Defense Board to identify opportunities to provide live fire training and prescribed burns to address the fire component of wildland task books.

Community Outreach & Education

ODF and USFS are committed to fire prevention, and use a variety of forums to promote residential fire safety, defensible space, and safe burning practices. Outreach activities include school programs, public presentations, media events and safety fairs. The USFS and ODF use fire severity rating signs placed in strategic areas to inform the public about wildfire danger. These wildland agencies are active members of the Clackamas County Fire Prevention Cooperative which is a consortium of structural and wildland fire protection professionals that work together to deliver programs.

Local Communities at Risk (CAR's)

ODF and USFS have identified Communities at Risk that have unique wildfire hazards to be addressed at the more local scale. These areas were referred to as Strategic Planning Areas in the 2005 iteration of the CWPP, but will now be referenced as local Communities at Risk to be consistent with state and federal language. Communities that have been identified as being particularly vulnerable to wildfires are illustrated in Map #29 and listed in Table 10.15-1. Wildland Fire professionals considered the following factors to determine the local CARs including:

- Need for defensible space
- Access limitations (narrow driveways, lack of address signage, one way in/one way out)
- Steep slopes that can hinder access and accelerate the spread of wildfire
- Lack of water available for wildland fire fighting
- Heavy fuels on adjacent public lands
- Potential ignition sources from recreationists and transients
- Agricultural and backyard burning
- Lack of community outreach programs to promote wildfire awareness
- Communications difficulties

Fuels Reduction

The Oregon Dept. of Forestry has been successful in receiving numerous grants to encourage homeowners and small woodland owners to reduce hazardous fuels through a cost share program. Fuels Reduction projects on federal land require an in-depth National Environmental Protection Act analysis that can be costly and time consuming, so completing fuels reduction projects in a timely manner can be challenging. However, the USFS has identified priorities for fuels reduction on federal lands adjacent to communities at risk.

To ensure that landscape-level treatments are paired with projects to create defensible space around vulnerable communities, priority fuels reduction projects have been overlaid with the Communities at Risk Identified by Widland Agency and Unprotected Areas (Map #29).

Fuels Reduction Priorities include:

Sandy Watershed
NF Bedford
USFS Summer Homes
Kiwanas Camp
Trillium Lake
Wapinitia
Sisi Butte Lookout and Electronic Site
Powerlines near Govt. Camp
Timberlake CCC Job Corps
Ripplebrook Guard Station
Joe Graham Guard Station
3 Lynx
Zig Zag Guard Station

Wildland Agency and Unprotected Area Action Plan

The ODF and USFS have developed a list of actions to build capacity at the District scale and has identified actions that can help to make the local CARS more resilient to potential wildfires. The action plan for Canby Fire and the local CARs therein is provided in Table 10.15-2.

Table 10.15-1 Structurally Unprotected Communities at Risk

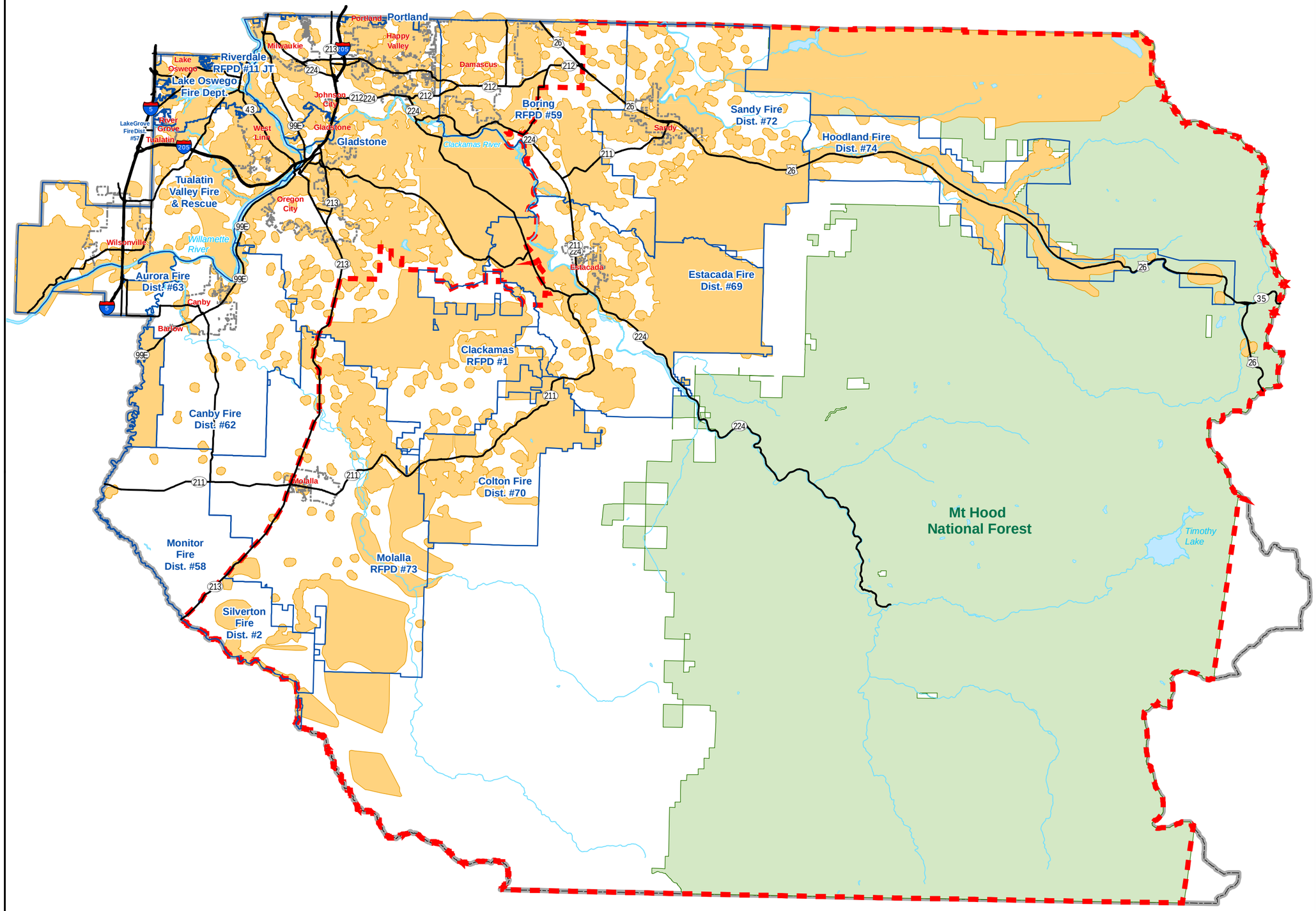
Community At Risk	CAR Priority	Defensible Space	Access	Water	Public Forest Lands	Private Forest Lands	Recreators/ Transients	Protection Capabilities	Burning	Preparedness	Communications	Steep Slopes	Description
Clackamas County Unprotected Communities at Risk (USFS CARs that are in both districts, but protected by USFS)													
Ripplebrook Guard Station	**High**	X			X		X	X	X	X	X	X	The USFS Ripplebrook Guard Station houses many Job Corps instructors. There are at least 20 structures behind the station, and 4 buildings associated with the station. There is a helibase with structures to be protected as well. Farther upslope, there are 2 bunk houses with 6 units. Access is generally good, and there is an improved gravel road to hellibase and bunk house tied to water system from job corps and hydrants, radio comms is good there is no cell service.
Timberlake Job Corps	**Medium**	X			X		X	X	X	X	X	X	The Timberlake Job Corps is a United States Department of Labor program that provides housing and curriculum to students from 18-25. It is located on USFS land and uses USFS buildings. The big problem here is protection capability. The Job Corps is about 30 minutes from Estacada Fire, which is the closest structural protection district. Currently, there is no contract in place to provide structural protection and the Job Corps is considering a Fire Brigade that would help with initial attack until Estacada arrives. They do have a hydrant system. Radio communications are adequate because the Whalehead repeater is nearby, but there is no cell service here. Burning is accomplished through burn permits and they is generally not an issue. Shaded fuel breaks leading into job corps boundary are needed. There is great opportunity for youth engagement, potentially integrating structural fire protection into curriculum (although turn over is problematic).
3 Lynx	**Medium**	X		X	X		X	X	X	X	X	X	The 3 Lynx community was established as hydropower was being developed on the Clackamas River. It used to be a thriving community, but there are many empty structures now, This community of about 15 homes contracts with Estacada fire for structural fire protection. There is adequate water here, but communications may be compromised and response times will be greater than 10 minutes.
Joe Graham /Clackamas Lake Guard Station	**Medium**	X			X		X	X		X	X	X	The Joe Graham/Clackamas Lake Guard Station was once a ranger district, so there are many historic structures here. It has water system and there is a huge lake nearby. There was a fire here in 02-03, The visitor's center is typically occupied on a rotating basis.

Community At Risk	CAR Priority	Defensible Space	Access	Water	Public Forest Lands	Private Forest Lands	Recreators/ Transients	Protection Capabilities	Burning	Preparedness	Communications	Steep Slopes	Description
Clackamas County Unprotected Communities at Risk (CARs that are in the ODF protection boundary only)													
Elk Prairie	**High**	X	X	X	X	X		X	X	X		X	Elk Prairie is a community of many residential homes that are surrounded by private forest land. Access here is poor and there is no hydranted system in the area. There are [ponds that may be used for fire suppression.
Upper Sawtell Unprotected	**High**	X		X	X	X		X	X	X		X	This community includes everything above Maple Grove and North of Elk Prairie. The area has very poor access and a great deal of debris burning. It is surrounded by BLM and private forest land, and has steep slopes. ODF has done some canvassing in this area and would like to partner with local fire agencies to inform the landowners of their unprotected status.
East Highland	**High**	X		X	X	X	X	X	X	X	X	X	East Highland Road has about 7 homes surrounded by 3 fire districts, but is unprotected. Water and access are major issues here. This community includes the BLM seed orchard.
Wapinitia	**Medium**	X	X	X	X	X	X	X	X	X	X	X	The Wapinitia community is highly vulnerable,. It is a few miles east of the Hoodland Fire District on Hwy 26. ODF and USFS have made attempts to work with the community in the past but it has been difficult to achieve and sustain progress because many homeowners are not engaged. There is a stand pipe and a pump house but it doesn't have much volume. There was a house fire recently, and the home owners used the standpipe and local hose to help with fire. The HOA Board is not supportive of defensible space, but some individual owners have done some work on their own. There is little support for fuels reduction on common areas. The community is surrounded b y USFS land. The USFS attempted to create a 300 foot defensible space buffer, but the community was not supportive. Access is extremely limited, and radio and cell communications are limited.
Lower Highland	**Medium**	X		X		X		X	X	X		X	Lower Highland Road is a good example of the Wildland Urban Interface as it has heavy fuels adjacent to unprotected homes. The homes are surrounded by managed forest land which could serve as an ignition source. Access and communications are good. There are no hydrants, but there are ponds nearby.
Ramsbey Unprotected	**Medium**	X		X		X		X	X	X		X	The unprotected portion of Ramsbey Road has a history of arson fires. There are managed private forest lands surrounding the area which also can serve as an ignition and fuel source. Communications and protection capabilities are the most challenging aspects for this community.
Lais Road	**Medium**	X	X	X		X		X	X	X		X	Lais Road has serious access constraints as it is one way in and out and many homes have steep and narrow driveways with poor turnarounds. There are a series of cabins along the river that are access through Weyerhaeuser industrial forest land. Although it is close to the river, water will be an issue here because it is difficult to access the river.
Butte Creek Unprotected	**Medium**	X	X	X	X	X		X	X	X	X	X	The unprotected portion of Butte Creek Road is highly vulnerable because there is no water, access limited to one way in and out, and there is managed BLM and private forest land. Communication is limited here and Butte Creek is one way in and out all the way into Scotts Mills.

Table 10.15-2 Wildland Agency (ODF & USFS) Action Plans

Action Item	Timeframe	Partners	CAR
ODF CWPP Action Plan			
Work with the County Tax Assessor to change the language on property tax statements for ODF assessment from "fire protection" to ODF "non-structural fire suppression" so homeowners and insurers are not led to believe they have structural fire protection.	1 year	ODF, County Tax Assessor	ODF-Unprotected Areas
Clarify roles and responsibilities for fire suppression and prescribed burns on State Park lands and Metro-owned properties.	2 Years	State Parks, Metro	ODF
Continue to seek funding to support the fuels reduction cost share assistance program.	Ongoing	WSFM, SFA	ODF
Continue to seek funding to support the seasonal Fuels/Fire Crew	Ongoing	Clackamas County, WSFM, SFA	ODF
Work with local fire agencies and natural resources managers to identify opportunities for live fire exercises.	Ongoing	Metro, City Parks Depts., FDB	ODF
USFS CWPP Action Plan			
Work with the Clackamas Fire Operations Group to enhance capabilities for interoperability. Consider having a cache of at least five 800 MHz portable radios available for USFS use. Work with mutual aid partners to determine best communications strategies (consistent frequency, VHF and 800 MHz).	2 Years	CFOG, Fire Districts	USFS
Work with the Clackamas Fire Defense Board to become a signatory on the County's Mutual Aid Fire Agreement.	1 Year	FDB	USFS
Clarify relationships, roles and financial responsibility for responding to fires in unprotected areas (currently there is no mechanism for reimbursement in unprotected areas).	Long Term	FDB	USFS
Conduct and operations meeting with adjacent RFPD's to discuss how we will operational response tactics.	2 Years	Local Fire Districts	USFS
Work with AMR to develop an understanding of resources available for emergencies and protocol for response.	1 Year	AMR	USFS
Work with CCOM, BOEC and Sandy Fire to include USFS as a resource on run cards associated with events in the Bull Run Watershed.	1 year	CCOM, BOEC, Sandy Fire	USFS

Table 10.15-3 Unprotected Area Action Plans			
Unprotected Areas Action Plan (ODF and USFS)			
Inform homeowners in unprotected areas of their unprotected status (using mailings) and provide them with information about options for enhancing structural protection	2 Years	Fire Co-op, USFS	All Unprotected Areas
Encourage communities in unprotected areas to develop local community wildfire protection plans & become Firewise/USA Communities.	Ongoing	Clackamas County,ODF, USFS	All Unprotected Areas
Research opportunity to provide disclosure of unprotected status on lots through deed restrictions. County currently requires all new homes to be in a fire District or contract for services.	2 Years	Clackamas County	All Unprotected Areas
Partner with the Fire Co-op to create and distribute outreach materials that promote responsible burning, defensible space and reduction of structural ignitability within the Home Ignition Zone.	Ongoing	Fire Co-op	All Unprotected Areas
Promote legal, safe and responsible debris burning through public outreach and education.	2 Years	ODF, DEQ, Fire Co-op	All Unprotected Areas
Reduce hazardous fuels in the ROW of potential evacuation routes. Engage residents adjacent to primary evacuations routes to extend treatments onto private land.	Ongoing	ODOT, Clackamas County Roads	All Unprotected Areas
Continue to collect structural ignitability data by conducting structural triage assessment data collection (including GPS points) for homes in Communities at Risk.	Ongoing	ODF	All Unprotected Areas
Develop a community-driven pre-disaster plan including evacuation routes, telephone call down trees, and other strategies for strengthening community response.	Ongoing	Clackamas County Emergency Management	All Unprotected Areas
Implement road addressing (including length of driveways) and other signage for emergency response.	Ongoing	ODF	All Unprotected Areas
Seek grant funding to support fuels reduction and creation of defensible space around homes.	Ongoing	ODF	All Unprotected Areas
Work with private forest landowners to reduce fuels adjacent to CAR's.	Ongoing	CCFA	All Unprotected Areas
Work with BLM and USFS to reduce hazardous fuels adjacent to CAR's.	Ongoing	BLM, USFS	All Unprotected Areas



Wildland Urban Interface (WUI) 2012

- WUI
- Fire Districts
- Oregon Department of Forestry
- Mt Hood National Forest
- City Boundaries

WUI areas contain 4 structures per 40 acres and are within Fuel Type III (tall flammable grass, heavy flammable brush, or heavy timber). Each area meeting these criteria had to be larger than 5 acres to be included. The resulting areas were buffered to 660' and some areas were expanded to include entire locally-defined Communities at Risk (CARs).

Map #4

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0 1 2 4 6 8
Miles

CLACKAMAS COUNTY

GEOGRAPHIC INFORMATION SYSTEMS

DEPARTMENT OF INFORMATION SERVICES/GEOGRAPHIC INFORMATION SYSTEMS
121 LIBRARY COURT
OREGON CITY, OREGON 97045