



# City of Keizer

## Addendum to the Marion County Natural Hazards Mitigation Plan

### **Report for**

City of Keizer  
930 Chemawa Rd NE  
Keizer, OR 97303

### **Prepared by:**

Oregon Partnership for Disaster Resilience  
1209 University of Oregon  
Eugene, OR 97403-1209

**December, 2009**





**FEMA**

December 30, 2009

Honorable Sam Brentano  
Honorable Janet Carlson  
Honorable Patricia Milne  
Marion County Board of Commissioners  
P.O. Box 14500  
Salem, Oregon 97309

Dear Commissioners Brentano, Carlson, and Milne:

On January 27, 2006, the U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) approved the *Marion County Natural Hazard Mitigation Plan* as a multi-jurisdictional local plan as outlined in 44 CFR Part 201. With approval of this plan, the following entities are now eligible to apply for the Robert T. Stafford Disaster Relief and Emergency Assistance Act's hazard mitigation project grants through January 27, 2011:

**Marion County**

**City of Aurora**

**City of Keizer**

The list of approved jurisdictions has been updated to include the City of Keizer, which has recently adopted the City of Keizer Addendum to the Marion County Natural Hazard Mitigation Plan. To continue eligibility the plan must be reviewed, revised as appropriate, and resubmitted within five years of the original approval date.

If you have questions regarding your plan's approval or FEMA's mitigation grant programs, please contact our state counterpart, Oregon Emergency Management, which coordinates and administers these efforts for local entities.

Sincerely,

Mark Carey, Director  
Mitigation Division

cc: Dennis Sigrist, Oregon Emergency Management

KM:bb

1                                   **CITY COUNCIL, CITY OF KEIZER, STATE OF OREGON**

2   **Resolution R2009- 1999**

3                   **A RESOLUTION ADOPTING THE CITY OF KEIZER'S REPRESENTATION IN THE**  
4                   **MARION COUNTY MULTI-JURISDICTION HAZARD MITIGATION PLAN**

5  
6                   **WHEREAS**, the City of Keizer is vulnerable to the human and economic costs of  
7 natural, technological and societal disasters, and  
8

9                   **WHEREAS**, the City Council of the City of Keizer recognizes the importance of  
10 reducing or eliminating those vulnerabilities for the overall good and welfare of the  
11 community, and  
12

13                   **WHEREAS**, the City of Keizer has participated in the development of the Marion  
14 County Multi-Jurisdiction Natural Hazard Mitigation Plan, which has established a  
15 comprehensive, coordinated planning process to eliminate or minimize these  
16 vulnerabilities, and  
17

18                   **WHEREAS**, the City of Keizer's representatives and staff have identified natural  
19 hazard risks and prioritized a number of proposed actions and programs needed to  
20 mitigate the vulnerabilities of the City of Keizer to the impacts of future disasters, and  
21

22                   **WHEREAS**, these proposed projects and programs have been incorporated into  
23 the Marion County Multi-Jurisdiction Natural Hazard Mitigation Plan that has been  
24 prepared and promulgated for consideration and implementation by the cities of Marion  
25 County; NOW THEREFORE  
26

27                   **THE CITY COUNCIL OF THE CITY OF KEIZER RESOLVES AS FOLLOWS:**  
28

29                   **Section 1.** The City Council of the City of Keizer hereby accepts and approves of  
30 its section of the Marion County Multi-Jurisdiction Hazard Mitigation Plan as a  
31 reasonable process to identify and plan for potential hazards in the City of Keizer and  
32 Marion County,  
33

34                   **Section 2.** The personnel of the City of Keizer are requested and instructed to  
35 pursue available funding opportunities for implementation of the actions and proposals  
36 designated therein,  
37

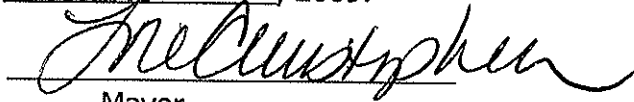
38                   **Section 3.** The City of Keizer will, upon receipt of such funding or other  
39 necessary resources, seek to implement the mitigation proposals identified by the  
40 Jurisdiction's Hazard Mitigation Planning Committee, and  
41

42                   **Section 4.** The City of Keizer will continue to participate in the updating and  
43 expansion of the Marion County Multi-Jurisdiction Hazard Mitigation Plan in the years  
44 ahead, and  
45

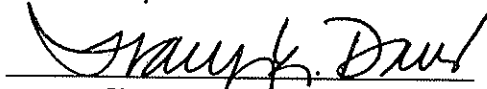
1           **Section 5.** The City of Keizer will further seek to encourage the businesses,  
2 industries and community groups operating within and/or for the benefit of the City of  
3 Keizer to also participate in the updating and expansion of the Marion County Multi-  
4 Jurisdiction Hazard Mitigation Plan in the years ahead.  
5

6           PASSED this 7th day of December, 2009.

7           SIGNED this 7th day of December, 2009.

8           

9           Mayor

10          

11          City Recorder  
12

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# Section 1: Planning Process

## Overview

Keizer developed this addendum to the Marion County multi-jurisdictional Natural Hazards Mitigation Plan in an effort to increase the community's resilience to natural hazards. The addendum focuses on the natural hazards that could affect the city of Keizer, Oregon, which include drought, flood, earthquake, landslide, volcano, wildfire, wind storm, and severe winter storm. It is impossible to predict exactly when disasters may occur, or the extent to which they will affect the city. 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.

The addendum provides a set of actions that aim to reduce the risks posed by natural hazards through education and outreach programs, the development of partnerships, and the implementation of preventative activities via the zoning code, public works strategic plan, water system master plan, and transportation systems plan. The actions described in the addendum are intended to be implemented through existing plans and programs within the city.

## Addendum Development Process

In the fall of 2006, the Oregon Partnership for Disaster Resilience (the Partnership / OPDR) at the University of Oregon's Community Service Center partnered with Oregon Emergency Management (OEM) to develop a Pre-Disaster Mitigation Planning Grant proposal to create natural hazards mitigation plan addenda for Oregon's Mid/Southern Willamette Valley cities. FEMA awarded the region with a Pre-Disaster Mitigation planning grant, and planning efforts with the cities of Aurora, Keizer, Silverton, and Woodburn began in the winter of 2009. The Partnership facilitated and documented each of the cities' planning processes.

The following representatives served as steering committee members for the city of Keizer's natural hazard mitigation planning process.

- Kevin Watson, *Assistant to the City Manager*, City of Keizer
- Rob Kissler, *Public Works Director*, City of Keizer
- Randy Jackson, *Deputy Fire Chief*, Keizer Fire District
- Pat Cody, *Risk Manager*, Salem/Keizer School District
- Sam Litke, *Senior Planner*, City of Keizer
- Bruce Anderson, *Community Affairs Manager*, Northwest Natural Gas

- Rod Conway, *Deputy Fire Marshal*, Keizer Fire District

The planning process and associated resources used to create Keizer's Addendum to the Marion County Natural Hazards Mitigation Plan were developed by the Partnership. To coordinate planning efforts, the steering committees from Aurora, Keizer, Silverton, and Woodburn participated in joint meetings facilitated by the Partnership. The planning process was designed to: (1) result in an addendum that is Disaster Mitigation Act 2000 compliant; (2) coordinate with the state's plan and activities of the Partnership; and (3) build a network of local organizations that can play an active role in plan implementation. The following is a summary of major activities included in the planning process including public outreach activities.

## **Plan Work Sessions**

### Project Kickoff (February – March, 2009)

On February 25, 2009, the Partnership hosted a kickoff meeting in Salem with representatives from the cities of Aurora, Keizer, Silverton, and Woodburn. The purpose of the meeting was: 1) to provide an overview of the Pre-Disaster Mitigation Program and the Oregon Partnership for Disaster Resilience; 2) to describe the four-phase mitigation planning process and schedule of meeting dates to occur; and 3) to provide instruction and guidance in developing community steering committees. One or two representatives from each city (i.e., "city leads") attended. Following the meeting, city leads were asked to develop full steering committees and to review and edit the community profile section of the city addendums.

### Risk Assessment (April – May, 2009)

On April 15, 2009, the Partnership facilitated a risk assessment training / work session with the cities of Aurora, Keizer, Silverton, and Woodburn. The training was developed and implemented by the Partnership, with assistance from Oregon Emergency Management, the United States Geological Survey, the Federal Emergency Management Agency (FEMA Region X), and City-County Insurance. Full steering committees from each city were present. The purpose of the work session was to: (1) explain the process and components of a risk assessment; (2) identify and discuss previous natural hazard events within each community; and (3) identify the cities' risks and vulnerabilities to natural hazards.

The Partnership facilitated and documented discussions within each community's steering committee, and subsequently developed Section 3 below for the city of Keizer. Work session materials and sign-in sheets for the April 15<sup>th</sup> meeting are located in Appendix A, Planning and Public Process.

### Action Item Development (June, 2009)

On June 10<sup>th</sup>, 2009, the Partnership facilitated an action item development training / work session with the cities of Aurora, Keizer, Silverton, and

Woodburn. The work session was developed and implemented by the Partnership, and full steering committees from each city were present. The purpose of the work session was to: 1) identify missions and goals for each city's addendum; and 2) select and develop mitigation action items. The Partnership facilitated and documented discussions within each community's steering committee, and subsequently developed Section 4 below for the city of Keizer. Work session materials and sign-in sheets for the June 10<sup>th</sup> meeting are located in Appendix A, Planning and Public Process.

#### Plan Implementation and Maintenance (July-August 2009)

On July 29<sup>th</sup>, 2009, the Partnership facilitated a plan implementation and maintenance training / work session with the cities of Aurora, Keizer, Silverton, and Woodburn. The work session was developed and implemented by the Partnership, with assistance from Oregon Emergency Management. With guidance and facilitative assistance from the Partnership, each steering committee identified plan 'conveners' and 'coordinating bodies.' Additionally, each committee established plan maintenance schedules, and strategies for continuing public involvement throughout the five-year plan implementation and maintenance cycle. Finally, the Partnership asked each community to identify opportunities or strategies for: 1) implementing mitigation actions via existing plans and policies; and 2) incorporating mitigation-related activities and responsibilities into city employees' work plans or job descriptions. Please see Section 5 below for information regarding Keizer's plan implementation and maintenance strategies.

Aside from community discussions, the Partnership presented information related to grant opportunities and founding resources. Additionally, Oregon Emergency Management provided a general overview of the benefit-cost analysis process that's required when developing applications for federal mitigation grant programs.

## **Public Involvement**

### Stakeholder Survey

As part of a regional public involvement effort, the Partnership developed and distributed an online survey to a select group of stakeholders in each community. Representatives from the following organizations were identified by Keizer's steering committee members, and contacted via email to participate.

- City of Keizer City Manager
- City of Keizer City Attorney, Lien & Johnson
- City of Keizer Finance Director
- Marion County Building Inspector
- City of Keizer Police Captain
- City of Keizer Community Development Director
- Owner, Shelter Management Inc.
- City of Keizer Chamber of Commerce Director



- Avamere Court Executive Director
- Salem/Keizer School District Planning Director
- Salem/Keizer School District Safety Officer
- General Manager, Loren's Sanitation Service
- Mid-Valley Garbage & Recycling Executive Director
- Mid-Valley Garbage & Recycling Office Manager
- City of Salem Wastewater Plant Manager
- Salem Electric Engineering & Operations Manager
- City of Keizer City Councilor
- City of Keizer Stormwater Manager
- Portland General Electric Key Customer Manager
- Manager, Emerald Point
- Owner, Keizer Times Newspaper
- Resident, West Keizer Neighborhood Association
- Marion Polk Food Share Assistant to the President
- Marion Polk Food Share President
- Resident, Gubser Neighborhood Association
- City of Keizer Public Works Superintendent
- City of Keizer Public Works Department (4 Representatives)
- EVAK Co-Coordinator (2)
- Salem Clinic

Results from the online survey were used to inform the city's risk assessment and mitigation actions. Please see Appendix A, Planning and Public Process for a complete list of organizations that were invited to participate, in addition to survey results.

#### Plan Review

The city's steering committee served as the primary plan reviewers. Upon completion of a final draft addendum, the city of Keizer posted a copy of the final draft on the city's website, and published a notice in the Keizer Times newspaper that described the planning process, and requested feedback on plan content. The following language was posted in the Keizer Times on September 25, 2009. Additionally, this language was placed on the Keizer 23 local television channel, and also distributed to all city employees via the city email system.

*"The City of Keizer is currently working on the Natural Hazards Mitigation Plan. This work is being performed in cooperation with the Oregon Partnership for Disaster Resilience and Marion County Emergency Management through a grant from the Federal Emergency Management Agency (FEMA) Pre-Disaster Mitigation Grant Program. Upon approval and adoption of the plan, the City will gain eligibility to apply for federal funding towards natural hazard mitigation projects. The local planning process includes representatives from the City, Fire District, School District and a member of the business community. The planning committee is seeking input and comments. Please visit the City of Keizer website, [www.keizer.org](http://www.keizer.org), for more details."*

The Keizer website posted the following information:

***For Immediate Release City of Keizer seeks public input on the Natural Hazards Mitigation Plan***

*(Keizer, OR) – The City of Keizer is currently working on the Natural Hazards Mitigation Plan. This work is being performed in cooperation with the Oregon Partnership for Disaster Resilience and Marion County Emergency Management through a grant from the Federal Emergency Management Agency (FEMA) Pre-Disaster Mitigation Grant Program. Upon approval and adoption of the plan, the City will gain eligibility to apply for federal funding towards natural hazard mitigation projects. The local planning process includes representatives from the City, Fire District, Salem/Keizer School District and a member of the business community.*

*The planning committee will be seeking input and comments from the public for two weeks via email. Please send all your comments to Kevin Watson, Emergency Manager with the City of Keizer. In addition if you have any questions regarding the plan or about the planning process in general, please call Kevin Watson at (503) 390-3700 or by email: [watsonk@keizer.org](mailto:watsonk@keizer.org)*

Additionally, four of the stakeholders that participated in the stakeholder survey also volunteered to review plan drafts. The steering committee contacted those persons during the final review process. The city also spoke about the opportunity for public input at the Keizer City Council Meetings and Keizer Emergency Planning Committee meetings.

All public outreach occurred between September 25 and October 9, 2009. The committee implemented public feedback / recommendations where appropriate.

The final adopted and approved addendum will be posted on the University of Oregon Libraries' Scholar's Bank Digital Archive. Upon completion, the city of Keizer will have the emergency manager implement the plan per direction of the city's Emergency Management Ordinance. The Keizer emergency manager will act as the convener and will work closely with stakeholders to ensure that all bodies are actively involved in the implementation process.

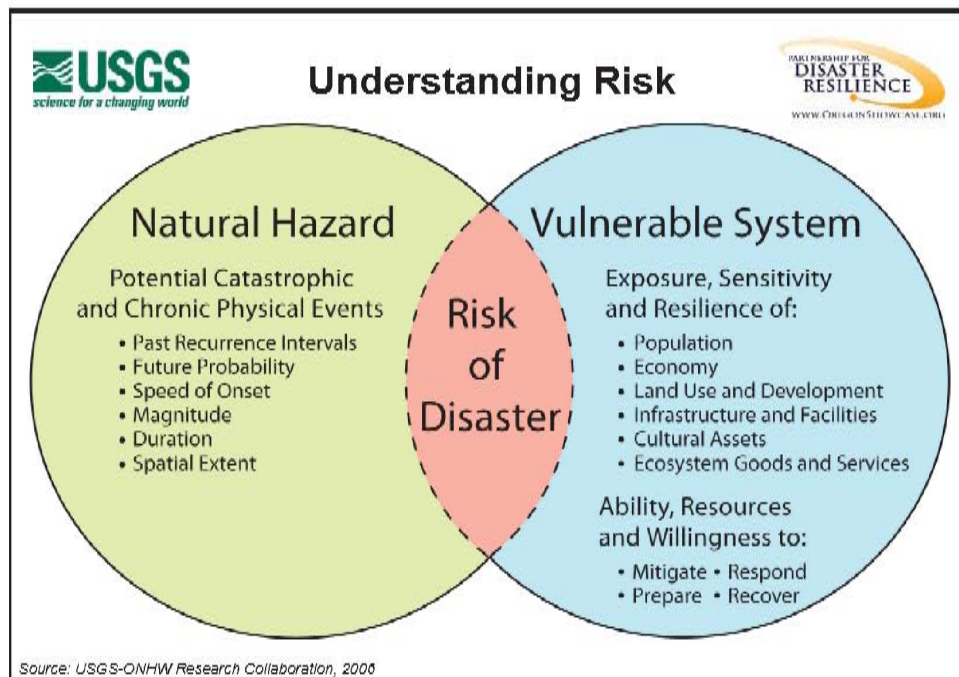
## **Adoption**

The city of Keizer adopted the Marion County Natural Hazards Mitigation Plan on December 7, 2009.

# Section 2: Community Profile

The following section describes the city of Keizer from a number of perspectives in order to help define and understand the city's sensitivity and resilience to natural hazards. 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 city when the plan was developed. The information documented here, along with the hazard assessments located below in Section 3, should be used as the local level rationale for the risk reduction actions identified at the end of this addendum. The identification of actions that reduce the city's sensitivity and increase its resilience assist in reducing overall risk, or the area of overlap in Figure 1 below.

**Figure 1. Understanding Risk<sup>i</sup>**



## Geography & Climate

The city of Keizer is located in Marion County, Oregon, immediately north of the city of Salem. The city is bordered to the west by the Willamette River and to the east by Highway 99 and Interstate 5. Keizer is located in

Oregon’s Willamette Valley which experiences a moderate climate. In August the average high temperature is 82 degrees and the average low temperature is 51 degrees. Wintertime temperatures in January range from an average high of 46 degrees to an average low of 33 degrees.<sup>ii</sup> The average annual precipitation is 39.9 inches.<sup>iii</sup> In addition to the Willamette River, other bodies of water that run through the city include Staats Lake, Claggett Creek, and Labish Ditch. Keizer is located on a relatively flat area, with a few steep slopes bordering the Willamette River.

## Population & Demographics

Keizer has grown significantly in population since it was incorporated in 1982. As shown in Table 1 below, the city’s population grew 49% from 1990 to 2000, and 11% from 2000 to 2008.

**Table 1. Keizer Population Change, 1990-2008**

<u>Year</u>	<u>Population</u>	<u>% Change</u>
1990	21,884	-
2000	32,515	49%
2008	36,150	11%

Source: Portland State University, Population Research Center<sup>iv</sup>

Disaster impacts (in terms of loss and the ability to recover) vary among population groups following a disaster. Historically, 80% of the disaster burden falls on the public. Of this number, a disproportionate burden is placed upon special needs groups, particularly children, the elderly, the disabled, minorities, and low income persons. Portions of the Keizer’s residents fall into these special needs populations. In 2000, 6.6% or 1,979 people, spoke English less than “very well.”<sup>v</sup> Table 2 below shows that in 2007, 11.9 % of families and 15.1% of individuals were living below the federal poverty level. In addition, Table 3 shows that 13%, or 4,644 people, are 65 years of age or older. Elderly individuals require special consideration due to their sensitivities to heat and cold, their reliance upon public transportation for medications, and their comparative difficulty in making home modifications that reduce risk to hazards.

**Table 2. Keizer Poverty Status, 2007**

<u>Type</u>	<u>% of Population</u>
Families	11.9%
Individuals	15.1%

Source: US Census, 2005-2007 American Community Survey<sup>vi</sup>

**Table 3. Keizer Population by Age, 2007**

<b>Age Range</b>	<b>Total Persons</b>	<b>% of Population</b>
Under 5 Years	2,906	8%
5-19 Years	7,792	22%
20-44 Years	12,452	34%
45-64 Years	8,431	23%
65+ Years	4,644	13%
<b>Total</b>	<b>36,225</b>	<b>100%</b>

Source: US Census, 2005-2007 American Community Survey.<sup>vii</sup>

## Employment & Economics

Historically, Keizer was an agricultural community, but in the 1960s and 70s, the city grew rapidly into a residential suburb of Salem along North River Road. Today, Keizer's employment sectors are focused around service, retail and public administration as shown in Table 4 below.

**Table 4. City of Keizer Employment by Major Industry**

<b>Industry</b>	<b>Total Persons Employed</b>	<b>% of Population</b>
Educational, health and social services	4,246	25.3%
Retail trade	2,247	13.4%
Public administration	1,923	11.5%
Manufacturing	1,807	10.8%
Arts, entertainment, recreation, accommodation and food services	1,336	8.0%
Finance, insurance, real estate, and rental and leasing	1,243	7.4%
Professional, scientific, management, administrative, and waste management services	1,008	6.0%
Construction	978	5.8%
Transportation and warehousing, and utilities	586	3.5%
Wholesale trade	505	3.0%
Other services (except public administration)	478	2.8%
Information	299	1.8%
Agriculture, forestry, fishing and hunting, and mining	134	0.8%
<b>Civilian employed population 16 years and over</b>	<b>16,790</b>	

Source: US Census, American Community Survey 2005-2007.<sup>viii</sup>

Median income can be used as an indicator of the strength of the region's economic stability. In 2007, the median household income for Keizer was \$51,617.<sup>ix</sup> This was \$6,127 more than the median household income for Marion County, and \$1,610 more than the national median household income.<sup>x</sup> Keizer's relatively high median income may not be reflective of all residents within the city. As noted in Table 2 above, a large percentage of the population is below poverty status. Low-income populations may have more difficulty recovering after a natural disaster event.

# Housing

Housing type and age are important factors in mitigation planning. Certain housing types tend to be less disaster resistant and warrant special attention: mobile homes, for example, are generally more prone to wind and water damage than standard stick-built homes. Generally the older the home is, the greater the risk of damage from natural disasters. This is because stricter building codes have been developed following improved scientific understanding of plate tectonics and earthquake risk. For example, structures built after the late 1960s in the Northwest and California use earthquake resistant designs and construction techniques. In addition, FEMA began assisting communities with floodplain mapping during the 1970s, and communities developed ordinances that required homes in the floodplain to be elevated to one foot above Base Flood Elevation.

In 2007, Keizer had 14,013 housing units. Of those, 97.5% were occupied (13,663), and 2.4% were vacant (350).<sup>xi</sup> Of the occupied housing units, 64% were owner occupied, and 36% were renter occupied.<sup>xii</sup> Studies have shown that renters are less likely than homeowners to prepare for catastrophic events.<sup>xiii</sup> Renters tend to have higher turnover rates that may limit their exposure to hazard information. Likewise, preparedness campaigns tend to pay less attention to renters. Renters typically have lower incomes and fewer resources to prepare for natural disasters, and renters may lack the motivation to invest in mitigation measures for rented property.<sup>xiv</sup>

Keizer also has a number of older housing structures that may be vulnerable to earthquakes. Nearly 55% of Keizer’s housing stock was built prior to 1980, before stronger seismic building codes were put into place (see Table 5 below).

**Table 5. Keizer Housing Structure Age, 2007**

<b>Year Built</b>	<b>Total Structures</b>	<b>% of Structures</b>
Built 2005 or later	131	0.9%
Built 2000 to 2004	819	5.8%
Built 1990 to 1999	3,531	25.2%
Built 1980 to 1989	1,814	12.9%
Built 1970 to 1979	3,731	26.6%
Built 1960 to 1969	2,079	14.8%
Built 1950 to 1959	1,337	9.5%
Built 1940 to 1949	524	3.7%
Built 1939 or earlier	47	0.3%
<b>Total Housing Units</b>	<b>14013</b>	<b>100%</b>

Source: US Census, American Community Survey.<sup>xv</sup>

Table 6 shows that approximately 70% of the homes in Keizer are single-family homes and the remaining units are multi-family structures.

**Table 6. Keizer Housing Type, 2007.**

<b>Housing Type</b>	<b>Total Structures</b>	<b>% of Structures</b>
Single-Family Unit	9,761	69.7%
Multi-Family 2 units	468	3.3%
Multi-Family 3 or 4 units	1,240	8.8%
Multi-Family 5 to 20 units	1,979	14.1%
Mobile home	565	4.0%
Boat, RV, van, etc.	0	0.0%
<b>Total Housing Units</b>	<b>14,013</b>	<b>100%</b>

Source: US Census, American Community Survey.<sup>xvi</sup>

## Land Use & Development

The land area within Keizer’s urban growth boundary (UGB) spans a total of 4,389 acres as of 1985.<sup>xvii</sup> Keizer contains the following general zones within its city limits: single family, duplex, multi-family, commercial, and industrial. Keizer also has a large amount of undevelopable land in the 100-year floodplain.<sup>xviii</sup>

The Keizer Comprehensive Plan states that Keizer will focus development on infill as well as development in vacant areas. Infill development and new improvements are to be emphasized for existing residential neighborhoods and commercial areas in the south and eastern sections of Keizer.<sup>xix</sup> Vacant land exists within the UGB to the west of the city, but beyond the UGB, the city is constrained by a 100-year floodplain. Vacant land in the center of the city south of Staats Lake is also constrained by a 100-year floodplain. Keizer also has a Willamette River Greenway Overlay zone which protects a portion of the riparian areas along the Willamette River in the city limits.

## Transportation

Several highways run through Keizer linking the city to Salem and other communities in the Willamette Valley. Highway 212, also known as River Road, is the major north-south arterial connecting Keizer with Salem and the surrounding countryside. Highway 99 forms the eastern boundary of Keizer and connects the city to Interstate 5. Chemewa Road is the major east-west arterial that crosses I-5 and connects the city with east Salem.

Transportation is also an important consideration when planning for emergency service provisions. Growth within the city will put pressure on the major and minor roads, especially if the main mode of travel is by single occupancy vehicles. How people travel to work is indicative of the prevalence of single occupancy vehicle travel, and can help predict the amount of traffic congestion and the potential for accidents. Table 7 represents the different methods Keizer residents use to travel to work. Figure 3 shows the major transportation networks that run through Keizer.

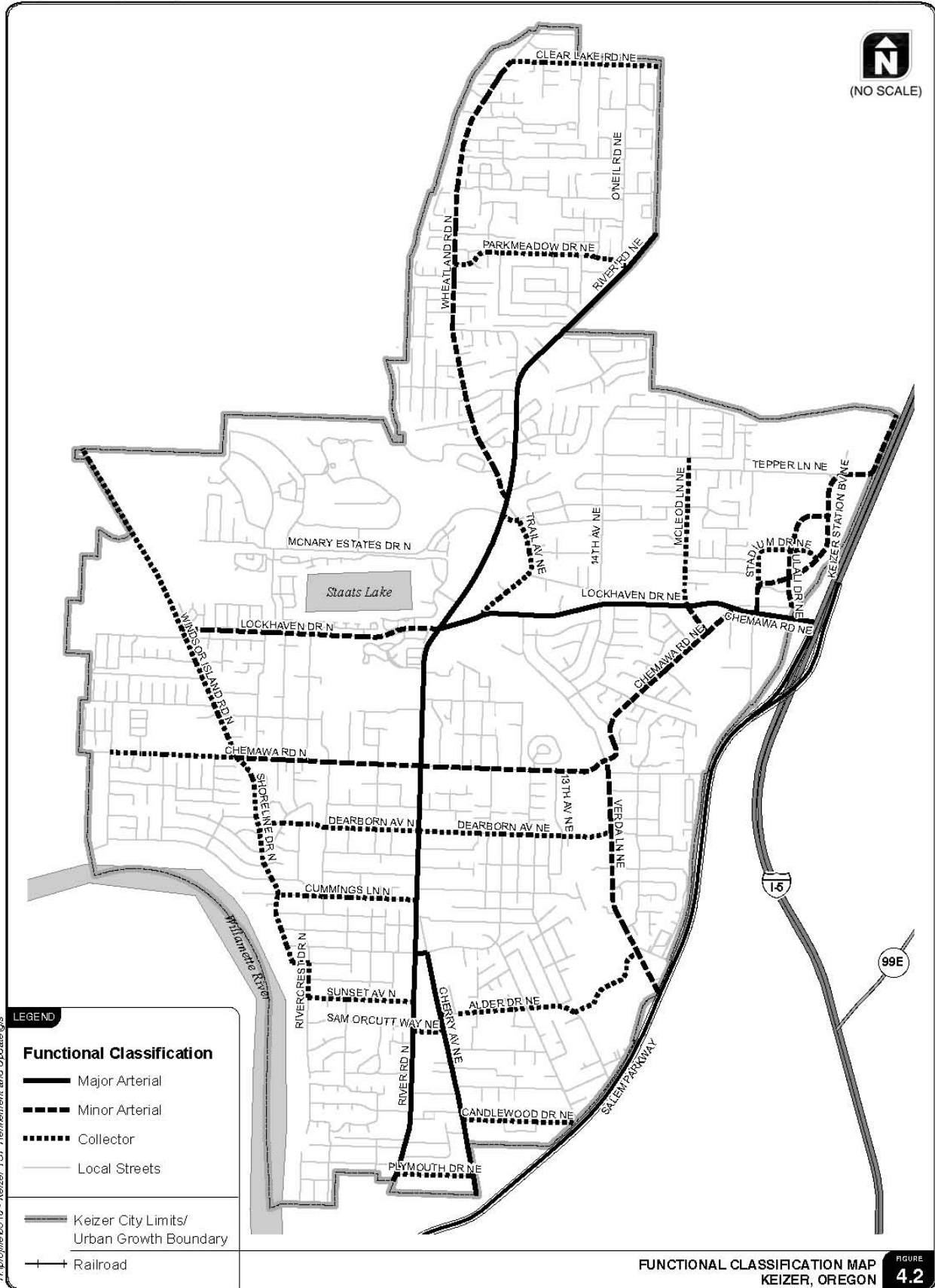
**Table 7. Transportation Mode Used to Commute to Work, Keizer, 2007.**

<b>Method of Commuting</b>	<b>Number of Residents</b>	<b>% of Residents</b>
Car, truck, or van -- drove alone	12,827	77.3%
Car, truck, or van -- carpoled	2,481	15.0%
Worked at home	476	2.9%
Other means	364	2.2%
Public transportation (excluding taxicab)	302	1.8%
Walked	143	0.9%
<b>Mean travel time to work (minutes)</b>	<b>20.8</b>	<b>-</b>

Source: US Census, American Community Survey, 2005-2007.<sup>xx</sup>



Figure 3. Keizer Transportation Map.



## **Critical Facilities & Infrastructure**

Critical facilities are those that support government and first responders' ability to take action in an emergency. They are a top priority in any comprehensive hazard mitigation plan. Individual communities should inventory their critical facilities to include locally designated shelters and other essential assets, such as fire stations, public works shops, and water and waste water treatment facilities.

Keizer contains a number of critical facilities that provide necessary services to the community. Keizer contains two fire stations: the Keizer Fire District station services most of the community, and the Marion County Fire District operates Clear Lake Station 6 in the Clear Lake area to the north of the city. The city of Keizer Police Department operates one police station that services the entire community. While Keizer does not have any hospitals in the city, the Salem Hospital and Kaiser Permanente in Salem provide the necessary medical services to the community. The Salem/Keizer School District also operates 10 public schools and one charter school in the city. There are more than 2000 students, faculty, and staff who work in the Salem/Keizer School District.

Keizer also contains the following critical infrastructure: one wastewater treatment facility operated by the city of Salem; three water storage facilities with a storage capacity of 2.75 million gallons; 15 groundwater wells; and a concrete river wall constructed along the east bank of the Willamette River in southwest Keizer. Electricity is provided through PGE and Salem Electric.

## **Historic & Cultural Resources**

Historic and cultural resources such as historic structures and landmarks can help to define a community and may also be sources of tourism dollars. Because of their role in defining and supporting the community, protecting these resources from the impact of disasters is important.

The Keizer Comprehensive Plan (amended 2003) notes that the city contains few significant historic resources due to the fact it was largely open agricultural land until the 1950s and 60s.<sup>xxi</sup> The only historic building in Keizer is the Keizer Heritage Community Center. Originally built in 1916 as a rural schoolhouse, the building now houses the Keizer Heritage Museum, the Keizer Art Association, the Chamber of Commerce, and the Community Library. With the variety of organizations located in the building, it serves as a strong focal point for the city.

## **Government Structure**

Keizer follows a council-manager form of government. City departments include: the city manager's office; the community development department which includes planning/zoning, building, and code

enforcement; finance department; human resources; municipal court; police; public works; and utility billing.

Several of these departments have responsibilities related to natural hazards and mitigating their impact. The planning/zoning division of the community development department is responsible for implementing the Keizer Zoning Ordinance, which contains a floodplain overlay zone designed to protect buildings from flooding events.<sup>xxii</sup> Marion County provides building code services and is responsible for implementing the state building code, which provides standards for building construction to resist natural hazard events such as windstorms or flooding. The public works department is responsible for maintaining Keizer's infrastructure to ensure that it is not impacted significantly by natural hazard events. This includes the dike constructed along the Willamette River in southwest Keizer.

## Existing Plans & Policies

Communities often have existing plans and policies that guide and influence land use, land development, and population growth. Such existing plans and policies can include comprehensive plans, zoning ordinances, and technical reports or studies. Plans and policies already in existence have support from local residents, businesses and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, and can adapt easily to changing conditions and needs.<sup>xxiii</sup>

The city of Keizer's Natural Hazards Mitigation Plan Addendum includes a range of recommended action items that, when implemented, will reduce the city's vulnerability to natural hazards. Many of these recommendations are consistent with the goals and objectives of the city's existing plans and policies. Linking existing plans and policies to the Natural Hazards Mitigation Plan helps identify what resources already exist that can be used to implement the action items identified in the plan. Implementing the plan's action items through existing plans and policies increases their likelihood of being supported and getting updated, and maximizes the city's resources.

The following table documents the plans and policies already in place in Keizer.

**Table 8. Keizer Existing Plans.**

Name	Date of Last Revision	Author/Owner	Description	Relation to Natural Hazard Mitigation
Keizer Comprehensive Plan	Amended 2003	City of Keizer	Establishes the city's authority to plan for and deal with issues related to the future development of Keizer.	<ul style="list-style-type: none"> <li>• Explains the flood and steep slope hazards found in Keizer</li> <li>• Provides policy guidelines for future development and land use in the city.</li> <li>• Policies and implementation actions addressing natural hazards and Goal 7 in the Comprehensive Plan can be linked with natural hazard action items.</li> </ul>
Keizer Zoning Code	Revised June 2007	City of Keizer	Provides regulations for future development in the city of Keizer.	<ul style="list-style-type: none"> <li>• The flood hazard zone (FH) provides guidance on development in the floodplain. Action items should be linked to regulations listed for this zone.</li> </ul>
Keizer Transportation Systems Plan	2000, Amended 2009	City of Keizer	The Transportation System Plan provides the city with the goals and policies to guide development of all its transportation modes (pedestrian, bicycle, motor vehicles, public transit, etc.). The TSP establishes an interconnected network of arterial and collector streets that improve the operation of the transportation systems. It also outlines a Capital Improvement Program (CIP) that shows the construction work necessary to meet the goals of the TSP.	<ul style="list-style-type: none"> <li>• Mitigation actions relating to improving transportation facilities should be linked with goals and policies found in the transportation system plan.</li> </ul>
Keizer Parks & Recreation Master Plan	January, 2008	City of Keizer	The Parks & Recreation Master Plan identifies a vision for Keizer's park system, and presents recommendations for achieving that vision.	<ul style="list-style-type: none"> <li>• Many of Keizer's parks are located in the 100-year floodplain. As such, the plan could incorporate mitigation action items for facilities located in the parks.</li> </ul>
Keizer Public Works Strategic Plan	2006	Keizer Public Works Department	The Public Works Strategic Plan positions Keizer Public Works to provide services to the community for the next 15-20 years.	<ul style="list-style-type: none"> <li>• Mitigation actions should be aligned with the goals and strategies outlined in the Keizer Public Works Strategic Plan.</li> </ul>
Keizer Water System Master Plan	1997, updated 2001	City of Keizer	The Keizer Water System Master Plan outlines Keizer's water system capacity and measures for water curtailment in the event of an emergency.	<ul style="list-style-type: none"> <li>• Mitigation actions should be aligned with the measures and policies found in the Water System Master Plan.</li> </ul>

## Community Organizations & Programs

Social systems can be defined as community organizations and programs that provide social and community-based services, such as health care or housing assistance, to the public. In planning for natural hazard mitigation, it is important to know what social systems exist within the community because of their existing connections to the public. Often, actions identified by the plan involve communicating with the public or specific subgroups within the population (e.g. elderly, children, low income). The city can use existing social systems as resources for implementing such communication-related activities because these service providers already work directly with the public on a number of issues, one of which could be natural hazard preparedness and mitigation.

Table 9 below highlights community organizations and programs within the city that may be potential partners for implementing mitigation actions. The table includes information on each organization or program's service area, types of services offered, populations served, and how the organization or program could be involved in natural hazard mitigation. The three involvement methods include:

Education and outreach: organization could partner with the community to educate the public or provide outreach assistance on natural hazard preparedness and mitigation.

Information dissemination: organization could partner with the community to provide hazard-related information to target audiences.

Plan/project implementation: organization may have plans and/or policies that may be used to implement mitigation activities or the organization could serve as the coordinating or partner organization to implement mitigation actions.

**Table 9. Keizer Community Organizations.**

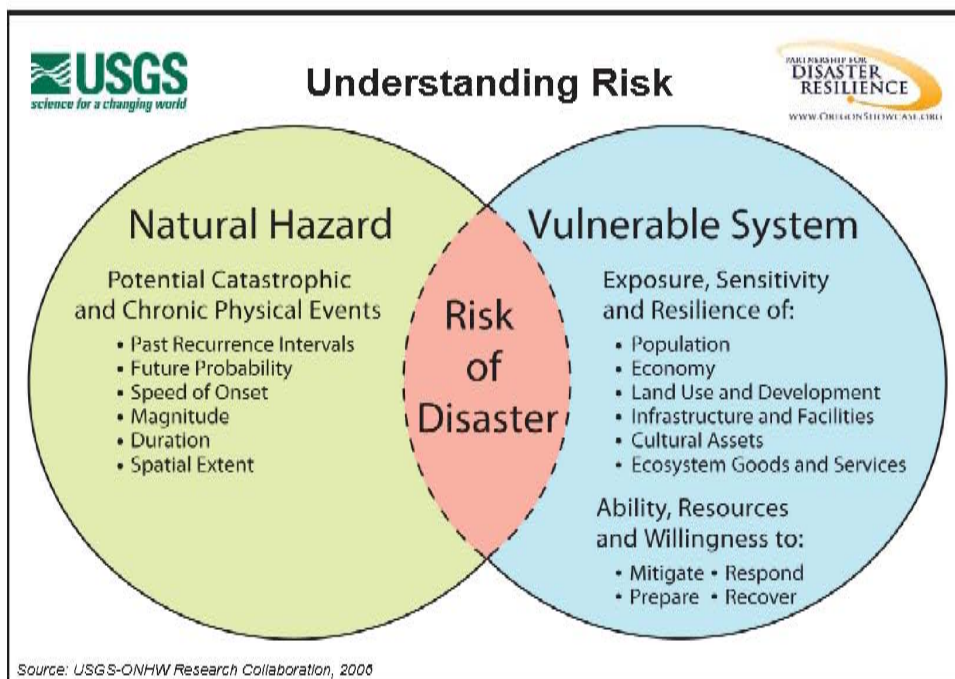
Name and Contact Information	Description	Service Area	Populations Served						Involvement with Natural Hazard Mitigation
			Businesses	Children	Disabled	Elders	Families	Low Income	
Abiding Charity 2498 Aldine Court NE Keizer, OR 97303 (503) 463-4493	Assisted living community	City of Keizer, Salem			✓	✓	✓	✓	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
Avamare Court Retirement Community 5210 River Road North Keizer, OR 97303	Continuing care retirement community with residential apartments and rehabilitation center.	City of Keizer, Salem			✓	✓	✓		<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
Creative Kids Learning Center 596 Evans Avenue North Keizer,OR,97303	Learning center for pre-school age children	City of Keizer		✓				✓	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
Family Resources 5436 Arcade Avenue NE Keizer, OR 97303 (503) 390-5437	Childcare	City of Keizer, Salem		✓				✓	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
Iris Valley Learning Center and Child Care LLC 530 Dietz Avenue NE Keizer, OR 97303 (503) 393-4337	Childcare	City of Keizer, Salem		✓				✓	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
Keizer Chamber of Commerce 980 Chemawa Rd NE Keizer, OR 97303 (503) 393-9111	Represents the local businesses and disseminates information to businesses and visitors.	City of Keizer	✓						<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
Keizer Happy Days Preschool & Childcare 481 Sunset Ave N Keizer, OR 97303 (503) 393-4542	Childcare	City of Keizer, Salem		✓				✓	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
Keizer Lions Club 5211 Arcade Ave NE Keizer, OR 97303 (503) 393-3540	Community organization	City of Keizer	✓	✓	✓	✓	✓	✓	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>

Keizer Parks Foundation P.O. Box 20373 Keizer, OR 97307-0373	Non-profit foundation to benefit the City of Keizer Parks and Recreation facilities and programs	City of Keizer	✓	✓	✓	✓	✓	✓	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
Keizer Retirement & Health Care Village 5210 River Road N Keizer, OR 97303 (503) 393-3624	Retirement and Health center for the elderly	City of Keizer			✓	✓	✓	✓	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
Keizer Rotary Club PO Box 21373 Keizer, OR 97303	Local business and community organization	City of Keizer	✓						<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
Keizer Salem Area Senior Center 930 Plymouth Dr NE Keizer, OR 97303 (503) 390-7441	Local community senior center	Cities of Keizer and Salem				✓	✓	✓	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
Kraus Adult Foster Home 6082 Bingtree Court NE Keizer, OR 97303 (503) 390-1156	Adult foster home for adults with disabilities and mentally ill patients.	Cities of Keizer and Salem			✓	✓		✓	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
River Road Assisted Living Community 592 Bever Dr. NE Keizer, OR 97303	Assisted living community for retirees	City of Keizer, Salem			✓	✓	✓	✓	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
Salem-Keizer School District 24J PO Box 12024 Salem, OR 97309 (503) 399-3001	Local school district.	Cities of Keizer and Salem		✓	✓		✓	✓	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
Sherwood Park Care Center 4062 Arleta Ave Keizer, OR 97303	Nursing Home	Cities of Keizer and Salem			✓	✓		✓	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
Willamette Lutheran Retirement Center 7693 Wheatland Road North Keizer, Oregon 97303	Local non-profit retirement community	City of Keizer, Salem			✓	✓	✓	✓	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>

# Section 3: Risk Assessment

This section expands on Marion County’s Natural Hazards Mitigation Plan by addressing Keizer’s unique risks to the following natural hazards: drought, earthquake, flood, landslide, volcano, wildfire, windstorm, and severe winter storm. The information in this section was paired with information from Section 2 Community Profile during the planning process in order to identify issues and develop actions aimed at reducing overall risk, or the area of overlap in Figure 4 below.

**Figure 4 Understanding Risk<sup>xxiv</sup>**



The following hazard assessments describe each hazard’s probability of future occurrence within Keizer, as well as the city’s overall vulnerability to each hazard. In order to facilitate connections with Marion County and the state of Oregon’s probability and vulnerability rating systems, the city of Keizer used the same rating scales as provided within Oregon Emergency Management’s Hazard Analysis Methodology template. (See Marion County’s Hazard Analysis scores in Appendix A. Rating scales are listed below). Note that the city did not complete a full hazard analysis. Probability estimates are based on the frequency of previous events, and vulnerability estimates are based on potential impacts that were discussed during the April 15<sup>th</sup> risk assessment workshop.



**Probability** scores address the likelihood of a future major emergency or disaster within a specific period of time as follows:

*High* = One incident likely within a 10-35 year period

*Moderate* = One incident likely within a 35-75 year period

*Low* = One incident likely within a 75-100 year period

**Vulnerability** scores address the percentage of population or region assets likely to be affected by a major emergency or disaster, as follows:

*High* = More than 10% affected

*Moderate* = 1-10% affected

*Low* = Less than 1% affected

Because Marion County's Natural Hazards Mitigation Plan (NHMP) does not provide probability and vulnerability estimates, all references to Marion County's probability and vulnerability rankings are referencing Marion County's 2006 Hazard Analysis document (see Appendix A). When Marion County's NHMP is updated in 2012, the county's steering committee will incorporate probability and vulnerability ratings in the NHMP.

## Drought

The Marion County Natural Hazards Mitigation Plan adequately identifies the causes and characteristics of drought within the region, as well as historical drought events. Drought can affect all segments of a jurisdiction, particularly those employed in water-dependent activities (e.g., agriculture, recreation, etc.). Additionally, public water providers can experience shortages. The extent (i.e., magnitude or severity) of a drought depends upon temperature and rainfall/snowfall over a period of time, as well as hydrological conditions and populations affected.

Keizer accesses water from the Troutdale Aquifer through 14 wells. According to the city's Water Management Plan, the current water system is designed to meet projected Urban Growth Boundary (UGB) build-out. This would serve a projected population of 37,617. Although the aquifer is currently expected to provide all of Keizer's future water needs, the city is looking at future water projects in case the need arises. Keizer maintains an emergency water agreement with the city of Salem. Additionally, Keizer employs water conservation measures, when needed, and encourages community participation through a variety of programs.<sup>xxv</sup>

Droughts are a relatively rare occurrence in Keizer, although they're possible if the region has a particularly dry winter season. The climate is typically mild with wet winters and dry summers, and rainfall averages about 40 inches a year.<sup>xxvi</sup> According to Marion County's Natural Hazards Mitigation Plan, two major droughts have occurred in the past 33 years. The period between 1976 and 1977 was the single driest year of the century. Similarly, February 2005 was the driest February on record since 1977. Keizer estimates a low probability that droughts will occur in the

future. (Note: Marion County does not estimate probability or vulnerability ratings for drought-related events. As such, Keizer is unable to say whether its vulnerability and probability estimates are greater than the county's.)

Because the city of Keizer has adequate water supplies, emergency agreements, and effective water curtailment plans, the city estimates a low vulnerability to drought events. Due to expected changes and unpredictability in climate patterns, the city acknowledges uncertainty in this estimate, and will re-evaluate conditions when this plan is updated.

Portions of a community that are typically affected by droughts include those that depend on agriculturally-based operations, water-dependent recreational activities, and water-borne transportation systems. Domestic water-users may also be subject to conservation measures and/or could be faced with significant increases in electricity or water rates. Additionally, droughts can have severe environmental consequences. A prolonged drought in forests promotes an increase of insect pests, which in turn damages trees that are already weakened by a lack of water. Likewise, a moisture-deficient forest constitutes a significant fire hazard.

## Earthquake

The Marion County Natural Hazards Mitigation Plan adequately describes the causes and characteristics of earthquake hazards for the region.

Earthquakes are fairly infrequent occurrences, but have affected Marion County and Keizer in the past. The city of Keizer agrees that the county's historical account is accurate. The most recent earthquake that Keizer experienced was the 2001 Nisqually earthquake which originated near Olympia, WA. The earthquake caused minor damage to residences in Keizer.<sup>xxvii</sup> Additionally, in 1993 the M 5.7 Scotts Mills earthquake caused \$28 million in damages to cities throughout Marion County.

Marion County's Natural Hazards Mitigation Plan adequately describes the location of potential earthquakes as well. The maps below on pages 21-23 illustrate the potential extent of earthquake hazards for Keizer. These maps were created for the city of Salem's Natural Hazards Mitigation Plan, but Keizer is shown on the maps as well. As illustrated below, Keizer has a relatively high risk of experiencing earthquake-induced amplification and liquefaction hazards. Earthquake-induced landslides, however, may be less likely to occur.

When determining the probability of earthquakes, it is difficult to estimate the recurrence intervals from available data. Paleoseismic studies along the Oregon coast indicate that the state has experienced seven Cascadia Subduction Zone (CSZ) events possibly as large as M9 in the last 3,500 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. Since Marion County's NHMP was developed in 2007, better earthquake probability estimates have surfaced.

Scientists now estimate that 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.<sup>xxviii</sup> Crustal and deep intraplate earthquakes remain difficult to predict.

Marion County estimates a high probability that earthquakes will occur in the future, as well as a high vulnerability to earthquake events. Both ratings are also true for the city of Keizer. The extent of structural damages, injuries and deaths will depend on the type of the earthquake, the city's proximity to the epicenter, and the magnitude and duration of the event. Potential earthquake-related impacts are well-documented in Marion County's NHMP, but buildings, dams, transportation systems, utility and communication networks, and lifelines including water, sewer, storm-water and gas lines are particularly at risk. Additionally, damages to roads and water systems will make it difficult to respond to post-earthquake fires. The following vulnerabilities / potential impacts were identified by the city's steering committee and stakeholders:

- Earthquake damage to roads and bridges can be particularly serious by hampering or cutting off the movement of people and goods and disrupting the provision of emergency response services. Such effects in turn can produce serious impacts to the local and regional economies by disconnecting people from work, home, food, school and needed commercial, medical and social services. A major earthquake can separate businesses and other employers from their employees, customers, and suppliers thereby further hurting the economy. Major roads include I-5, the Salem Parkway, River Road, and Lockhaven Drive.
- Keizer has two concrete box culverts located on River Road at Lockhaven Drive and at Wheatland Road that if damaged can disrupt evacuation of the community in an earthquake.
- Keizer has three bridges over Claggett Creek at Chemawa, Dearborn and Alder that if damaged can disrupt evacuation of the eastern half of the community. In addition, the Alder Bridge is one of only two access points to Claggett Creek Middle School and Weddle Elementary School.
- Keizer has one pedestrian bridge over Labish ditch and if damaged could disrupt access between neighborhoods and the Gubser Elementary School on the east side.
- Damage to the Marion County bridge at 35<sup>th</sup> and Labish Ditch could limit access to areas north of Keizer.
- As described in Table 5 above, 55% of Keizer's housing was built before 1980. The older the home is, the greater its risk of damage from an earthquake. Structures built after the late 1970s in the

Northwest used earthquake resistant designs and construction techniques.

- Keizer has a large population of elderly residents who live in five assisted living facilities, which vary in age. Research suggests that older populations may require assistance in evacuation due to potential mobility and health issues or a reluctance to evacuate. Elderly populations may also require special medical equipment at shelters,<sup>xxix</sup> and are more apt to lack social and economic resources to recover.<sup>xxx</sup>
- Damage to the Bonneville Power Administration (BPA) substation could limit essential power to the city.
- The Keizer steering committee estimated that most of Keizer's 600 small businesses lack any continuity planning, making these businesses vulnerable to long-term disruptions caused by earthquake hazards.
- Keizer has one historic structure in the city, the Keizer Heritage Community Center which houses the chamber of Commerce, the library, and the Keizer museum. As an older structure, it may be vulnerable to earthquakes.
- Keizer's drinking water comes from an underground aquifer beneath the city. Earthquake-induced chemical spills in the Willow Lake Wastewater Treatment Facility and from private facilities located southeast of the city can potentially contaminate Keizer's water source.
- Existing water reservoirs are built to withstand earthquakes; however the pipes that distribute the water may break in an earthquake.
- The Willow Lake Wastewater Treatment Facility and main lines are vulnerable to earthquakes, and could potentially contaminate groundwater aquifers.
- The Keizer Public Works building was built prior to earthquake standards, and is a facility that's necessary for repairing public infrastructure after an earthquake event.
- Keizer has a Qwest hub in the downtown area, several cell phone towers, and a Bonneville Power Administration (BPA) substation that provides power to the community and employment. All of these facilities may be damaged by an earthquake and could disrupt community functions.
- While not within Keizer, earthquake damage to the Detroit, Parkersville, and Lookout Point Dams could have significant impacts in Keizer, such as widespread flooding or road blockages,

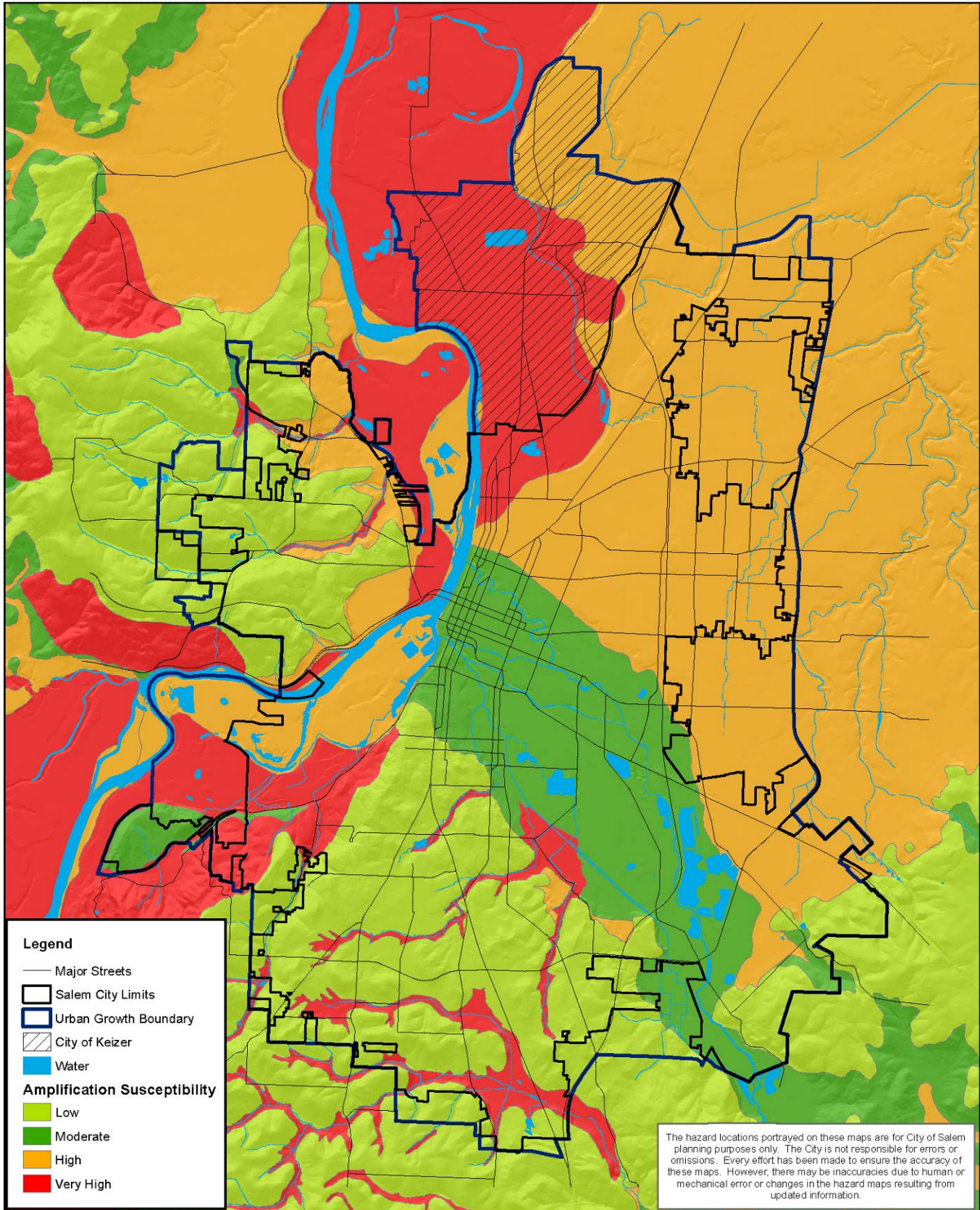
especially since there are few procedures for emergency notification in the event of a dam failure.

In 2007, the Department of Geology and Mineral Industries (DOGAMI) conducted a seismic needs assessment for public school buildings, acute inpatient care facilities, fire stations, police stations, sheriffs' offices, and other law enforcement agency buildings.<sup>xxxi</sup> Buildings were ranked for the "probability of collapse" due to the maximum possible earthquake for any given area. Within the city of Keizer, the following buildings were given a "moderate" or "high" probability of collapse:

- Cummings Elementary School: *high* (> 10%)
- Gubser Elementary School: *high* (> 10%)
- Kennedy Elementary School: *high* (> 10%)
- McNary High School: *high* (> 10%)
- Whiteaker Middle School: *moderate* (> 1%)

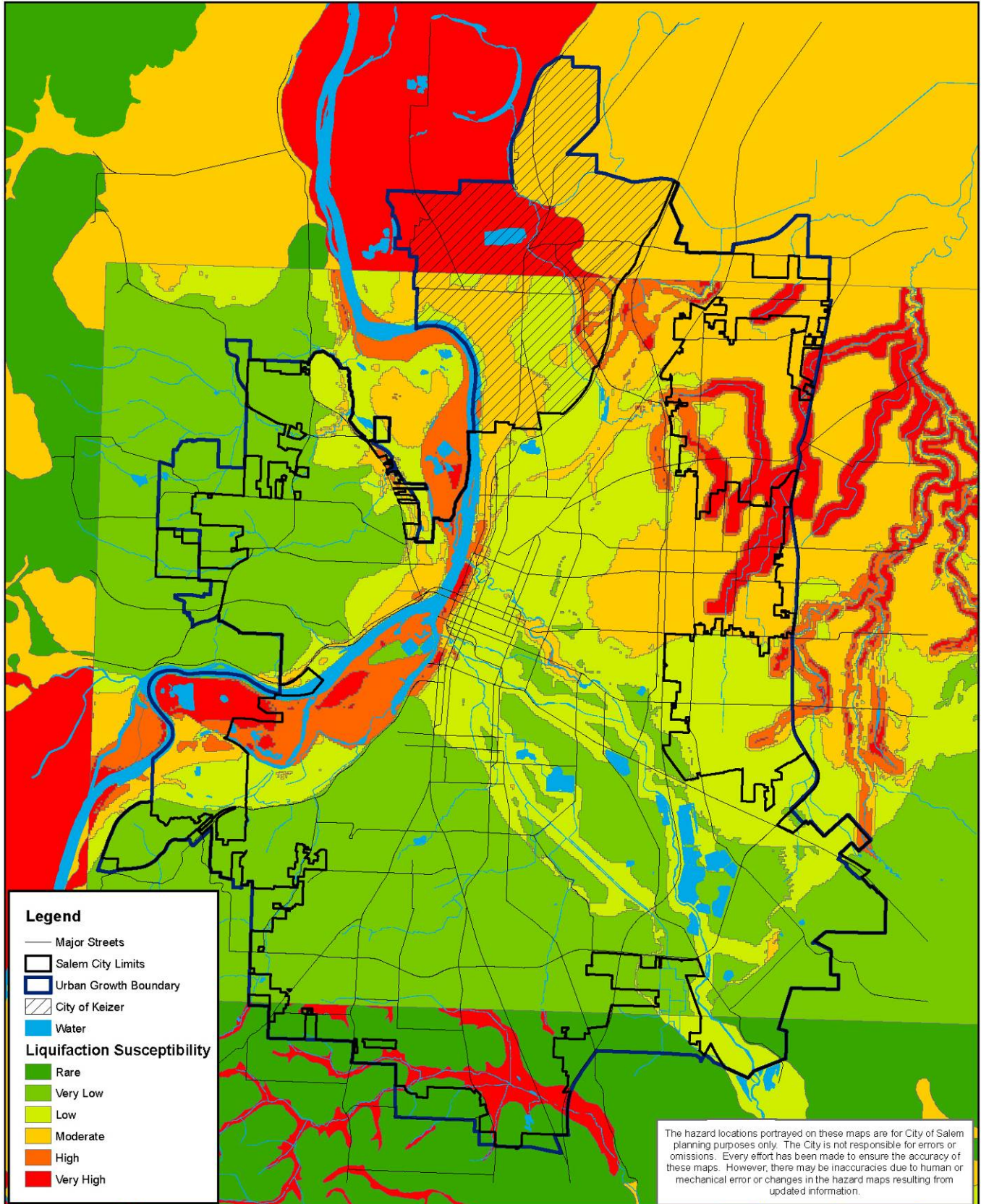
Please refer to Marion County's NHMP for more detail regarding earthquake-related hazards, issues, and estimated vulnerabilities and/or damages in given scenarios. Existing earthquake mitigation activities are also well-documented within Marion County's NHMP.

**Figure 5. Salem/Keizer Amplification Susceptibility.**



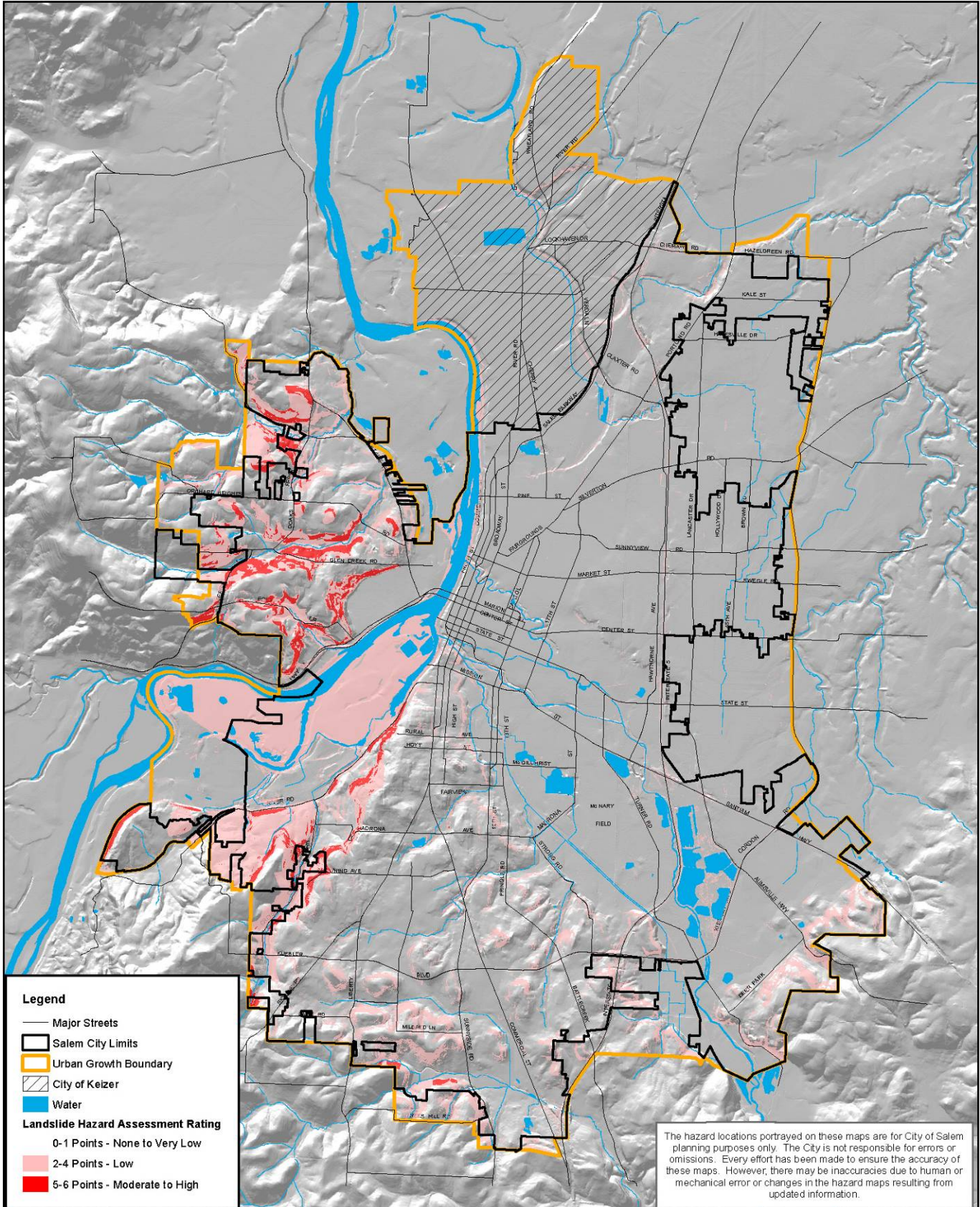
Source: City of Salem Natural Hazards Mitigation Plan, Map 2.1.2A

**Figure 6. Salem/Keizer Earthquake Liquefaction Susceptibility.**



Source: City of Salem Natural Hazards Mitigation Plan, Map 2.1.2B

Figure 7. Salem/Keizer Earthquake-Induced Landslide Susceptibility.



Source: City of Salem Natural Hazards Mitigation Plan, Map 2.1.3



# Flood

The Marion County Natural Hazards Mitigation Plan adequately describes the causes and characteristics of flooding for the region, as well as the history of major flooding events.<sup>xxxii</sup> Table 10 summarizes the major flooding events that have specifically occurred within the city of Keizer.

**Table 10. Keizer Historic Flooding Events**

<b>Date</b>	<b>Flooding Event</b>
<b>January 1997</b>	Flooding from heavy rains damaged homes in Northeast Keizer, and Keizer Rapids Park flooded. Parkersville flood control/irrigation structure failed, causing water to flow upstream into Keizer. State of Emergency declared in Marion County.
<b>November 1996</b>	Heavy rains caused the Salem-Keizer sewage system to overflow 18." A home in Keizer flooded.
<b>February 1996</b>	Heavy rains caused major flooding in the Willamette Valley. Three homes flooded in Keizer, and were later removed using FEMA funds. Damages reached \$4.2 million in Keizer. State of emergency declared in Marion County with 10,500 people evacuated, approximately one-third of Keizer's total population. The Parkersville flood control/irrigation structure failed, causing water to flow upstream into Keizer.
<b>December 1963- January 1964</b>	"Christmas Flood" on the Willamette River which inundated significant portions of Keizer, in spite of recently completed dams. More than 1,000 people evacuated.
<b>1861</b>	Willamette River flooded to its highest recorded level.

Source: Marion County Natural Hazards Mitigation Plan, 2005, April 15 Risk Assessment Meeting.

A number of homes within two 'newer' subdivisions along Labish Ditch experienced flood damage after the February 1996 floods. In November of 1996, some of the same homes that flooded in February experienced flood damages again. As a result, the Hazard Mitigation Grant Program (HMGP) funded the voluntary acquisition and relocation of two repetitively flooded homes. See Figures 8 and 9 below for more information.

Figure 8. Gabriel and White House Relocation, OEM



### Gabriel Home

**Keizer Flood Acquisition Project; HMGP 1099.0008.** As a result of the February 1996 disaster, two newer subdivisions along Labish Ditch in the City of Keizer experienced flood damage to a number of homes. Another (non-declared) flood event in November 1996 flooded some of the same homes that experienced damage earlier in the year. Although this project was originally intended to improve conveyance of flood water along Labish Ditch, subsequent engineering indicated the relief provided by an upgraded bridge crossing would not be substantial.

As the preferred alternative, this project involved the voluntary acquisition (buy-out) of two repetitively flooded homes. Both properties were inspected on October 6, 2000 by Julie Antilla, Judy Olson and Dennis Sigrist (OEM); the project was essentially completed with the acquired land returned to open space and the salvaged homes moved to a new location away from the floodplain ... hydro grass seeding was applied to stabilize the soil and minimize runoff from the winter rain.

### White Home



Figure 9. Whisper Creek Relocation, Keizer, Oregon Emergency Management



**City of Keizer Flood Hazard Acquisition Project, 1099.0008.** This residence on Whisper Creek Drive was auctioned as salvage property and relocated to another lot outside the mapped 100-year floodplain on August 31, 2000. To reduce the risk of any potential future flood damage, the home was further elevated so the first floor is one foot above the flood of record from 1996. Site inspection conducted on 8/31/2000 by Abby Kershaw and Dennis Sigrist.

Post move location.

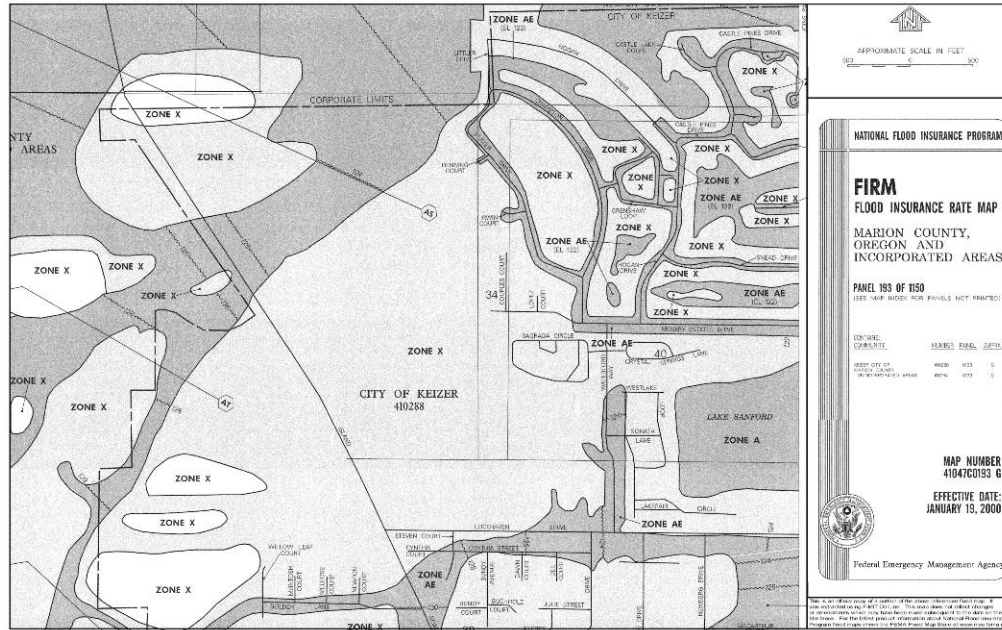


Vacated lot; Labish Ditch to the rear.

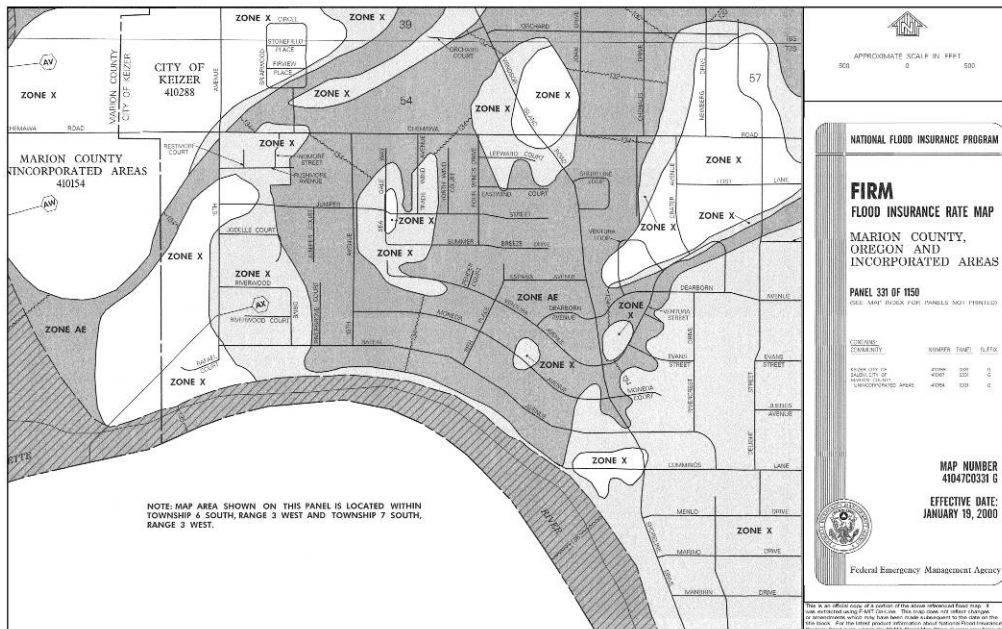


The location of Keizer's flooding hazard is best described within the city's 100-year floodplain maps, portions of which are shown below in Figures 10-11 below. Additionally, Keizer's 100-year floodplain is illustrated in entirety in Figure 12 below. The primary flood sources in Keizer are the Willamette River, Claggett Creek, and Labish Ditch. The extent of flooding hazards in Keizer primarily depends on climate and precipitation levels. Withdrawals for irrigation and drinking water, as well as stream and wetland modifications or vegetation removal can influence water flow as well.

**Figure 10. Keizer Flood Insurance Rate Map**



**Figure 11. Keizer Flood Insurance Rate Map**



**Figure 12. Keizer Hazard Mitigation Map.**

[Please contact the city to view Figure 12]

The city of Keizer has been a participant in the National Flood Insurance Program (NFIP) since August 1979, and the city's most recent effective map date is January 2003. As of January 31, 2009, there were 608 NFIP policies in force with a total insurance value of \$151,013,700. As of April 30, 2009, there have been a total of 27 losses. Twenty-three of these losses are closed and four have closed without payment. Total payments for these losses are \$420,238.<sup>xxxiii</sup> Zero [insured] properties have experienced repetitive flood losses in Keizer, and the city is currently not a participant in the Community Rating System.<sup>xxxiv</sup>

To mitigate the impacts of a future flood event, Keizer enforces a flood overlay zone.<sup>xxxv</sup> The purpose of the Floodplain Overlay Zone is to:

- A. Restrict or prohibit uses which are dangerous to health, safety, and property due to water or erosion hazards or which result in damaging increases in erosion or in flood heights or velocities.
- B. Minimize expenditure of public money for flood control projects, rescue and relief efforts in areas subject to flooding.
- C. Minimize flood damage to new construction by elevating or flood proofing all structures.
- D. Control the alteration of natural flood plains, stream channels, and natural protective barriers, which hold, accommodate or channel floodwaters.
- E. Control filling, grading, dredging and other development, which may be subject to or increase flood damage.
- F. Prevent or regulate the construction of flood barriers which may increase flood hazards in other areas.
- G. Comply with the requirements of the Federal Insurance Administration to qualify the City of Keizer for participation in the National Flood Insurance Program.
- H. Minimize flood insurance premiums paid by the citizens of the City of Keizer by reducing potential hazards due to flood damage.
- I. Implement the flood plain policies in the City of Keizer Comprehensive Plan.

The following is a short summary of the Floodplain Overlay Zone's general provisions:

- All subdivision proposals must have adequate drainage to reduce flood hazard;
- New residential construction must be confined to instances where lowest floor of houses is one foot above base flood level;
- Accessory structures must be placed on the building site so as to offer minimum resistance to the flow of floodwater, and shall be firmly anchored to prevent flotation.

- New construction and substantial improvements below base flood level shall be constructed with materials and utility equipment resistant to flood damage.
- All new and replacement water supply systems [and/or sanitary sewage systems] must be designed to minimize or eliminate infiltration of floodwaters into the system.

Keizer also has a floodwall along the east bank of the Willamette River and a cutoff dike in Keizer Rapids Park that help to control floodwaters from the Willamette River. Additionally, Keizer Rapids Park is located west of the city along the Willamette River and is mostly in the 100-year floodplain. Keizer has a Parks Master Plan that guides future development in the park in order to prevent future damage to park facilities.

Marion County estimates a high probability that flooding will occur in the future, and a moderate vulnerability to flood hazards. Both ratings are true for the city of Keizer as well.

A number of population groups are vulnerable to flooding hazards in Keizer. Neighborhoods located along Claggett Creek in southeast Keizer, west of River Road, and down Windsor Island Road are vulnerable to flooding. Specific neighborhoods that are potentially vulnerable include the McNary Golf Estates north of Staats Lake, the Rainbow Gardens manufactured dwelling park, and portions of the Hidden Creek and Country Glen subdivisions which flooded during the 1996 floods. Additionally, the Claggett Creek Middle School and Weddle Elementary School are located in Claggett Creek's 100-year floodplain. There are only two access points to both schools, putting students at risk to a rapidly advancing flood.

One retirement home, Avamere Court, is located in Claggett Creek's 500 year floodplain, which potentially puts elderly residents at risk. The elderly are especially vulnerable to floods because they may require assistance in evacuation due to mobility and health issues or reluctance to evacuate. Elderly populations may also require special medical equipment at shelters,<sup>xxxvi</sup> and are more apt to lack social and economic resources to recover.<sup>xxxvii</sup>

Floods can also infiltrate wells, contaminating drinking water. Keizer's water is pumped from an aquifer located below the city, and several wells are located in the floodplain, especially west of River Road. Additionally, the sewage treatment plant is located outside of the 100-year floodplain, but is surrounded by lower areas. Access to the sewage treatment plant in a major flood event may be compromised. Lastly, Keizer's public works facility is located in the 500-year floodplain, and the Salem Clinic Urgent Care facility at Inland Shores is built on fill, and located adjacent to a floodway and Staats Lake.

## Landslide

The Marion County NHMP adequately describes the causes, characteristics, location and extent of landslides for the region. Currently, there is no comprehensive list of landslide events and/or dates for Marion County<sup>xxxviii</sup>, and the same is true for the city of Keizer.

Keizer has a relatively flat topography. As shown in figure 10 above, Keizer's likelihood of experiencing earthquake-induced landslides is "none to very low." Additionally, Figure 7 shows one area with steep slopes along Claggett Creek. No homes or transportation routes are located along these slopes. To conduct a better risk assessment, more information would be needed regarding soils, material content, vegetative cover, and the nature of underlying materials.

Marion County does not estimate probability or vulnerability ratings for landslide hazards. Due to the city's flat topography, Keizer estimates a low probability that landslides will occur within city limits. Additionally, Keizer estimates a low vulnerability to landslide events, meaning less than 1% of Keizer's population or community assets are likely to be affected by a landslide event.

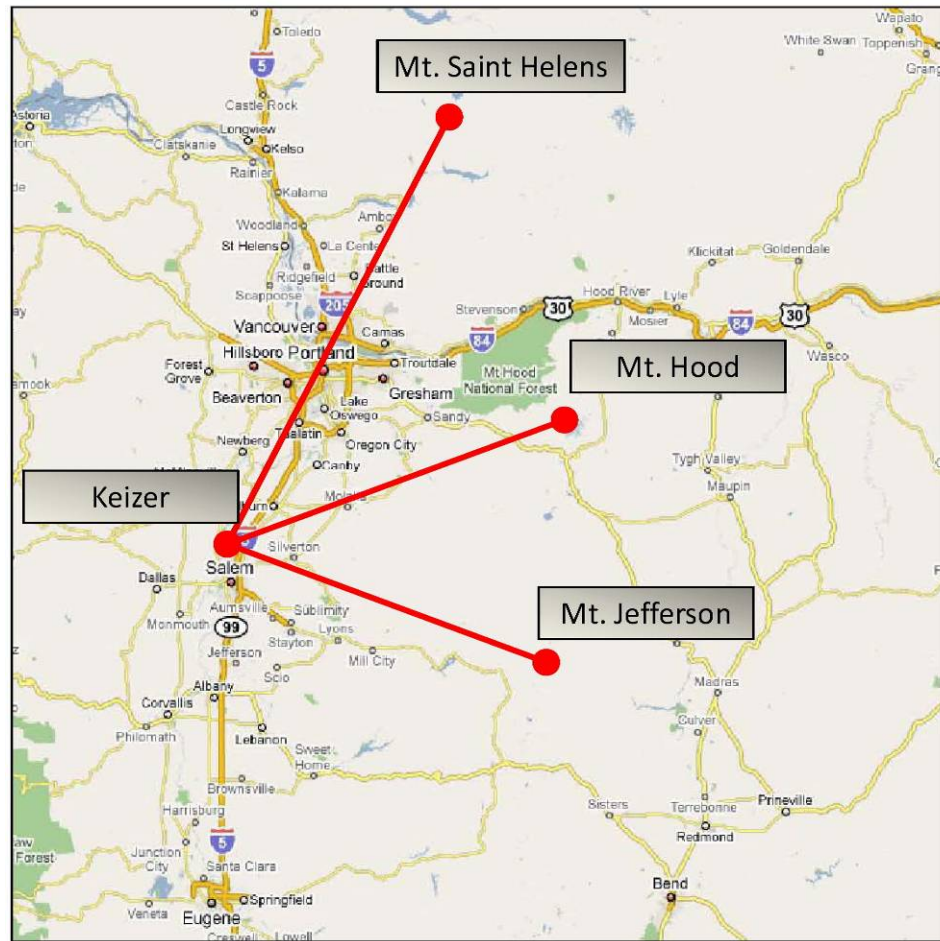
While landslides are not a particular concern for Keizer, there are landslide hazards in areas near the city. Studies completed in 1998 and 2000 for the Department of Geologic and Mineral Industries (DOGAMI) document the landslide hazards in the western portion of the Salem Hills, southwest of Salem, and the eastern portion of the Eola Hills in Polk County, located in West Salem.<sup>xxxix</sup> These areas are particularly vulnerable to landslide events, but they would have no direct impact on the city of Keizer because of the city's distance to these areas. However, an Eola Hills landslide blocking Highway 22 could have an indirect impact on Keizer because it would limit access to Polk County and the coast, making it more difficult for residents to reach these areas.

## Volcano

Marion County's NHMP adequately describes the causes and characteristics of volcano-related hazards, as well as the location of volcanic areas and the extent of potential damages. Immediate danger areas for volcanic eruptions lie within a 20-mile radius of the blast site,<sup>xl</sup> and ashfall is likely to affect communities downwind of the eruption. Mount Hood and Mount Jefferson are the closest of the cascade volcanoes to Keizer, and ashfall from Mount Saint Helens has reached Keizer in the past (see Figure 13 below). Additionally, Mount Adams is located north of Mount Hood, and the Three Sisters lie to the south of Mount Jefferson.



**Figure 13. Mt. Hood, Mt. Jefferson, and Mt. Saint Helens's Locations in Relation to the City of Keizer**



Due to Keizer's distance from volcanoes, the city is unlikely to experience the immediate effects that eruptions have on surrounding areas (i.e., mud and debris flows, or lahars). Depending on wind patterns, however, the city may experience ashfall. The eruption of Mount St. Helens in 1980, for example, coated the Willamette Valley with a fine layer of ash. According to the Marion County Natural Hazards Mitigation Plan, Plan, the communities that would be most affected by a volcanic eruption in Marion County are Detroit and Idanha, should Mount Jefferson erupt. The impacts to Keizer would be secondary, such as ash fall, or flooding due to lahars entering Detroit Lake and water overtopping the Detroit Lake Dam.<sup>xii</sup>

Mount Jefferson's last eruptive episode culminated about 15,000 years ago. The volcano is capable of large explosive eruptions, meaning areas downwind are at risk of experiencing ashfall. The largest eruption of Mount Jefferson occurred between 35,000 and 100,000 years ago, and caused ash to fall as far away as the present-day town of Arco in southeast Idaho. Although an event has not occurred in a long time, experience at

explosive volcanoes elsewhere suggests that Mount Jefferson cannot be regarded as extinct.<sup>xlii</sup>

Mount Hood's last eruption ended shortly before the arrival of Lewis and Clark in 1805. When Mount Hood erupts again, it will severely affect areas on its flanks and far downstream in the major river valleys that head on the volcano. Likewise, volcanic ash may fall on areas up to several hundred kilometers downwind.<sup>xliii</sup> Please see Marion County's NHMP for more details regarding Mt. Hood and Mt. Jefferson, as well as additional Cascade volcanoes.

Marion 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 Keizer as well.

Hazards related to volcanic eruptions (i.e., potential community impacts) are adequately described in the Marion County NHMP. Although the city of Keizer is unlikely to experience lahars or lava flows, tephra (sand-sized or finer particles of volcanic rock that is ejected rapidly into the air from volcanic vents) drifts downwind from explosions and can form a blanket-like deposit of ash. Tephra is a public health threat, and can damage agriculture and transportation systems (i.e., aircraft and on-the-ground vehicles). Tephra can also clog drainage systems and create major debris management problems. Within Keizer, public health would be a primary concern, and keeping transportation routes open/accessible would be important as well.

## Wildfire

The Marion County Natural Hazards Mitigation Plan accurately describes the causes and characteristics of wildfire in Marion County, as well as the history of wildfire events. As mentioned in the Marion County NHMP, the wildland-urban interface is not designated by geography alone, and certain conditions must be present for significant interface fires to occur (i.e., hot, dry, windy weather; inability of fire protection forces to contain or suppress the fire; the occurrence of multiple fires that overwhelm resources; and a large fuel load, or dense vegetation). Likewise, the severity of a wildfire is affected by the severity of these conditions.<sup>xliv</sup> Please see Marion County's NHMP for a more comprehensive description of the conditions that create and/or exacerbate wildfire events.

Within the Marion County Community Wildfire Protection Plan (CWPP), the city of Keizer is not listed as a "community at risk." Keizer is located on the far western side of Marion County, surrounded on all sides by open farmland. There are no forests within the city limits, and the closest forested area is Keizer Rapids Park, located half a mile west of the city. Due to its location, Keizer faces minimal risk of experiencing wildfires.

Figure 14 below is taken from Marion County's CWPP, and shows that Keizer is in an area of "lowest" risk. Likewise, Figure 15 shows locations in

the county that have been affected by wildfires in the past. The city of Keizer is fairly removed from these areas.

Marion County estimates a moderate probability that wildfires will occur in the future. Given Keizer's lack of past wildfire events, and distance from areas of concern, Keizer estimates a low probability that wildfires will occur in the future. Additionally, Marion County estimates a moderate vulnerability to wildfire events. Due to Keizer's isolation from the majority of at-risk areas, Keizer is unlikely to be affected directly by wildfires. Should they occur nearby, however, the city could be affected by smoke, impacting people with respiratory problems, and potentially the elderly or very young. As such, Keizer's vulnerability to wildfires is also moderate.

Community wildfire issues are adequately described in Marion County's NHMP, as well as conditions that generally increase an area's risk. Please see Marion County's NHMP for additional information regarding potential wildfire-related community impacts.

Figure 14. Wildfire Risk Areas in Marion County

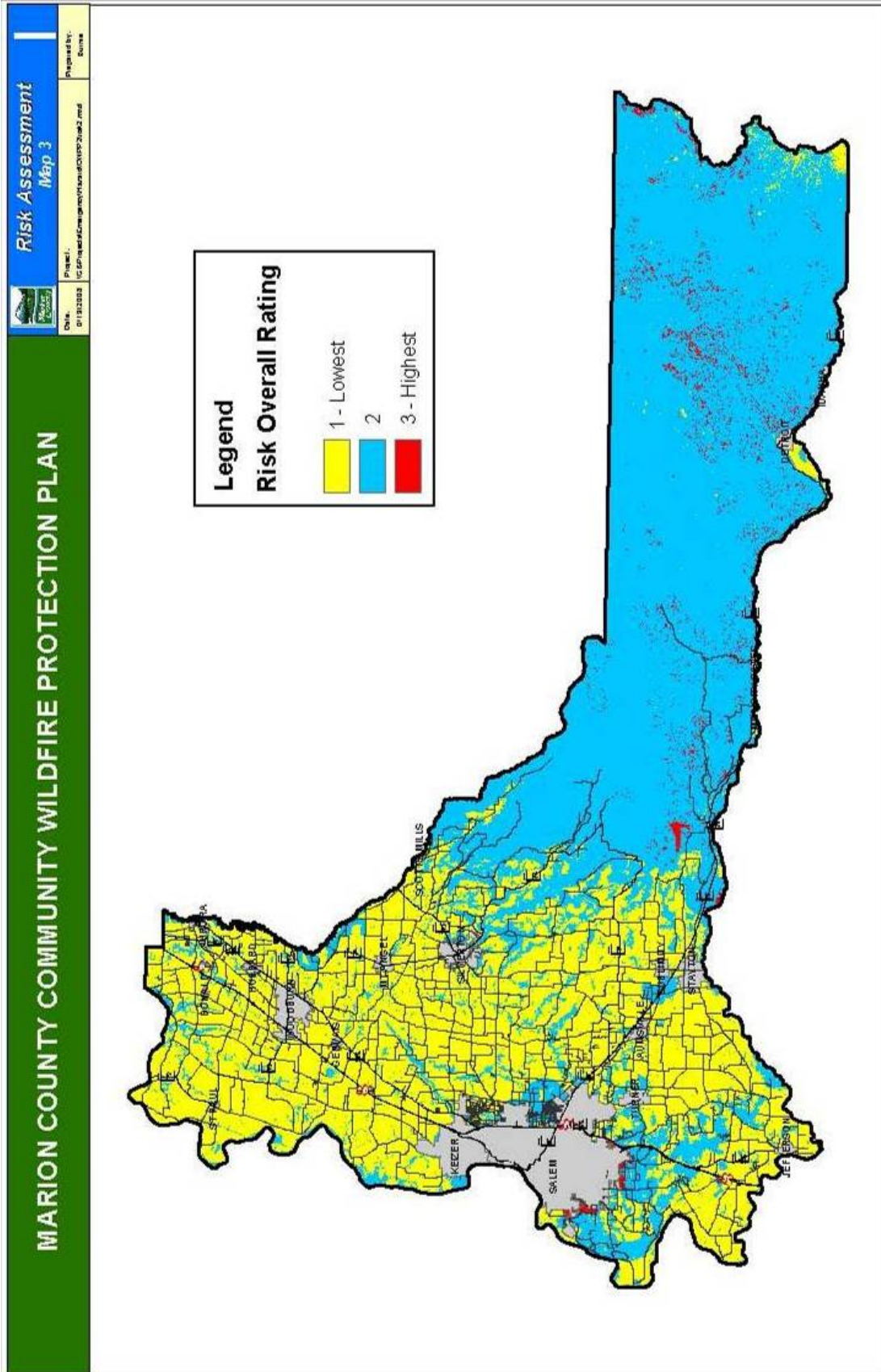
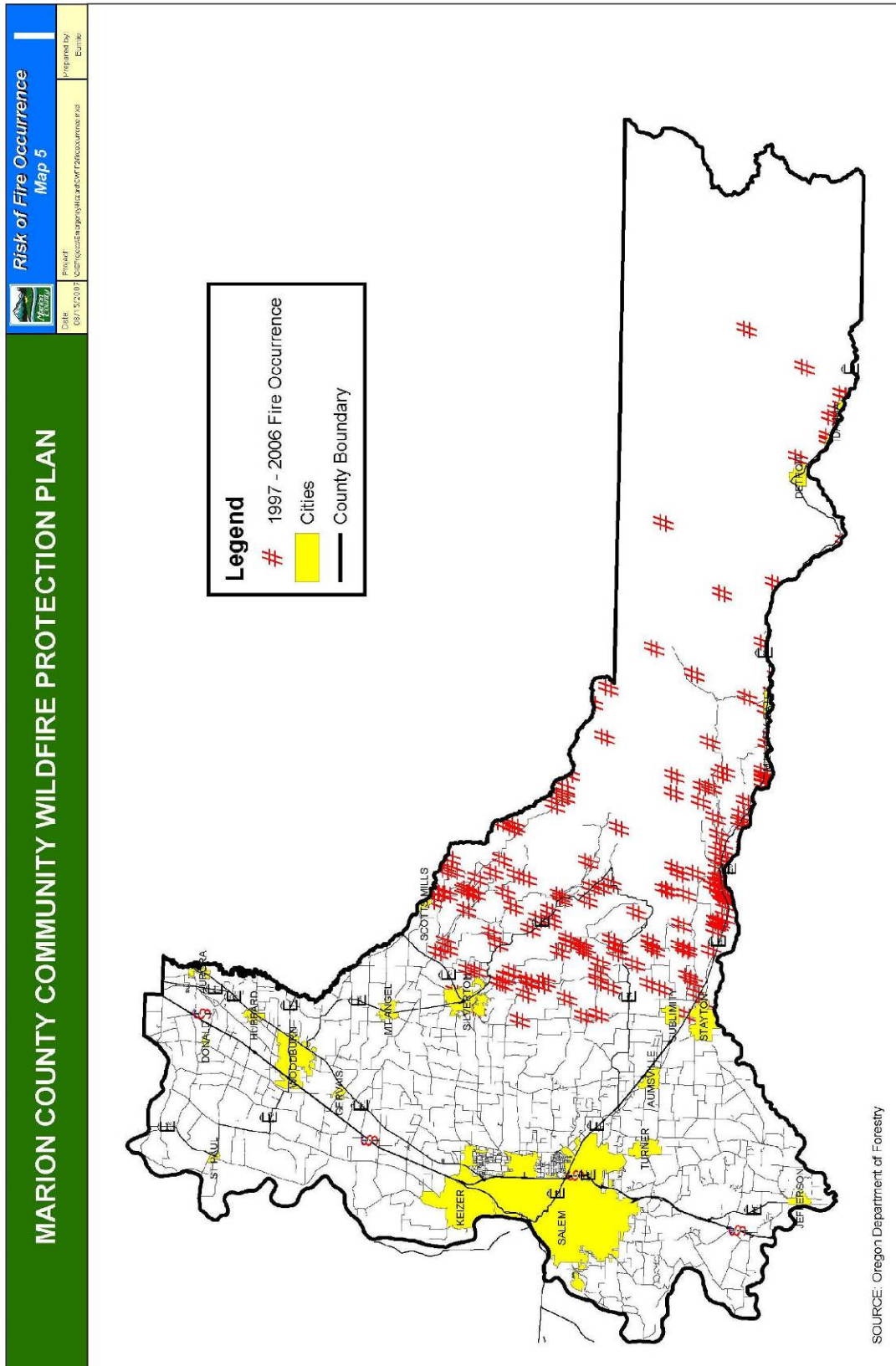


Figure 15. Locations of Past Wildfires in Marion County



# Windstorm

The Marion County NHMP adequately describes the causes, characteristics, location, and extent of the windstorm hazard. Marion County’s plan also describes historical wind storm events up to 2005. Significant recent events that have impacted Marion County, including Keizer, are described in Table 11 below.

**Table 11. Historical Wind Storm Events**

<b>Date</b>	<b>Wind Storm Event</b>
<b>March 2008</b>	Windstorm measured at 40 mph toppled trees in surrounding communities.
<b>February 2006</b>	Windstorms with gusts up to 77 mph cause \$227,000 in damages in Linn, Lane, Marion, Benton, Polk, and Yamhill Counties.
<b>January 2006</b>	Windstorm with winds up to 58 mph caused a total of \$500,000 in damages spread out over Yamhill, Marion and Polk Counties, as well as Clackamas, Columbia, Washington, and Multnomah Counties.
<b>January 2005</b>	Windstorms cause \$6000 of damage in Linn and Marion Counties. A storm total of \$15,000 in damages spread out among Linn, Marion, Clackamas, Multnomah, and Washington Counties.
<b>December 2004</b>	\$6,250 in property damage to Marion, Lane, and Polk Counties.
<b>February 2002</b>	Willamette Valley had wind gusts of 70 mph. Led to presidentially declared disaster in several western counties. (Marion County was not included in the disaster declaration, but still experienced significant impacts.
<b>December 1995</b>	Windstorm in Salem, caused \$500,000 in damage in Woodburn, 20,000 people in Silverton and Woodburn lost power. No specific damage estimates for Keizer.
<b>November 1981</b>	Winds in Salem at 52 mph, 23 power lines down on Silverton Road.
<b>March 1971</b>	50 mph winds in Marion County, caused damages in Hubbard, Scotts Mills, and Salem.
<b>October 1962</b>	Columbus Day Storm. Caused 4 injuries in Silverton, \$4 million damages in Salem, and \$8 million damages in Marion County as a whole.
<b>December 1951</b>	Winds at 57 mph with gusts measures at 76 mph, caused power outages in Silverton and closed north and south Santiam highways.

Source: Marion County Natural Hazards Mitigation Plan, 2005; National Climatic Data Center.

The Willamette Valley has also experienced occasional tornadoes, many of which have produced significant damage and occasionally injury or death. Since 1957, five reported tornadoes have struck Marion County, In May 1997, a tornado touched down near Keizer on Chemewa Road and Highway 99E. However, the tornado did not cause any damage.<sup>xlv</sup>

Marion County estimates a high probability that windstorms will occur, and a high vulnerability to windstorm events. Both ratings are true for the city of Keizer as well.

Windstorms can have significant impacts on life and property. Debris carried along by extreme winds can contribute directly to injury and loss of life and indirectly through the failure of protective structures (i.e., buildings) and infrastructure. Windstorms have the ability to cause damage more than 100 miles from the center of storm activity. High winds can topple trees and break limbs which in turn can result in power outages and disrupt telephone, computer, and TV and radio service.

In addition to the immediate effects of wind damage, the loss of power due to windstorms can have widespread impacts on business and economic activity. Downed trees can block roads and railways, disrupting access to businesses. Likewise, a sustained loss of power can seriously strain provision of emergency services and the operation of water and sewer facilities and transportation systems.

Please see Marion County's NHMP for a comprehensive description of potential windstorm-related impacts, including the effects that are likely to occur at varying wind speeds.

## **Severe Winter Storm**

Marion County's NHMP adequately describes the causes and characteristics of severe winter storms for the entire planning area, including the city of Keizer. Snow and ice are relatively rare in western Oregon, but cold air can occasionally be funneled through the Cascades between the Gorge and Portland. If a Pacific storm happens to reach the area at the same time that the cold air is present, larger than average snow events may result.<sup>xlvi</sup> Winter storms can happen throughout Marion County, including the city of Keizer, and the extent of the storms will depend upon precipitation levels, temperatures, and the effects of the storm system on the built environment.

Marion County's NHMP accurately describes the history of severe winter storm events for the county as well as Keizer. The most relevant historic winter storm events for the city of Keizer are described in Table 12 below.

**Table 12. Historic Winter Storm Events**

<b>Date</b>	<b>Winter Storm Event</b>
<b>December 2008- January 2009</b>	Winter storm throughout Willamette Valley, heavy snow and ice, state of emergency declared.
<b>January- February 2008</b>	Record setting snowstorms in Marion County, state of emergency declared.
<b>Winter 2003/04</b>	Extreme cold, snow
<b>February 2002</b>	Heavy rain, 0.89" in Aurora in 2 hrs.
<b>February 1996</b>	Ice storms cause 100-car pileup along I-5.
<b>February 1993</b>	12" snowfall in Salem, 2,100 residents lost power in Silverton.
<b>February 1989</b>	7" of snow in Marion County, 0° F. Accidents in Woodburn and in Silverton due to ice and snow.
<b>January 1978</b>	Ice storm in Willamette Valley and Marion County.
<b>March 1960</b>	Snow in Marion County, 8.5" fell in Salem.
<b>January 1950</b>	Severe winter storm cut telephone service in Silverton and Mount Angel. Over the month, 37" fell in Salem.
<b>January 1937</b>	Heavy snow, 27" fell in Salem, causing damage to buildings from the weight of the snow.

Source: Marion County Natural Hazards Mitigation Plan, 2005.

Marion County estimates a high probability that severe winter storms will occur in the future, as well as a high vulnerability to such events. Both ratings are also true for the city of Keizer.

Winter storms can bring snow, ice, and high winds that can cause significant damage to property and people. Downed trees and limbs caused by ice storms can become major hazards for houses, cars, utilities and other property. Residents and visitors are vulnerable to winter storms because icy roads can make it difficult to drive, and prolonged exposure to the cold can cause hypothermia. The temporary loss of home heating can be particularly hard on the elderly, young children, and other vulnerable populations. Icy roads can also limit the mobility of the elderly and very young if they need to be evacuated.

Severe winter weather can temporarily close key roads and highways, businesses, schools, government offices and other important community services. Long-term closure of Interstate 5, the Salem Parkway, or arterial roads such as River Road and Lockhaven Drive can be problematic for Keizer's businesses which rely on the city's access to major transportation routes. Below freezing temperatures can also lead to breaks in uninsulated



water lines. Ice on tree limbs and power lines can cause power failures as well. All of these effects, if they last more than several days, can create significant economic impacts for Keizer as well for the surrounding region. Please see Marion County's NHMP for a more comprehensive description of potential winter storm-related community impacts.

# Section 4: Mission, Goals, and Action Items

## Mission

The mission of Keizer's Natural Hazards Mitigation Plan Addendum is **to create a disaster resilient and sustainable city**. The mission statement was decided by the city's steering committee at the Action Item Development Workshop on June 10<sup>th</sup> (see Appendix A for details).

## Goals

The plan goals help guide the direction of future activities aimed at reducing risk and preventing loss from natural hazards. The goals listed here serve as checkpoints as agencies and organizations begin implementing mitigation action items.

The city of Keizer reviewed Marion County's goals on June 10<sup>th</sup>, 2009 and adopts the county's goals with modification.

### Goal #1: PUBLIC AWARENESS

Goal Statement: Increase public awareness of natural hazard risks, emergency notification and response, and resources for citizen preparedness.

### Goal #2: EDUCATION

Goal Statement: Educate the public on how to successfully prepare for a natural disaster with minimal property damages and loss of life.

### Goal #3: PREVENTATIVE

Goal Statement: Minimize risks to life, property, the environment, and the economy from natural hazards.

### Goal #4: FUNDING AND IMPLEMENTATION

Goal Statement: Identify potential funding sources and implement potential mitigation projects.

### Goal #5: PARTNERSHIPS AND COORDINATION

Goal Statement: Enhance partnerships with adjacent jurisdictions and public/private agencies' risk management activities.

### Goal #6: NATURAL RESOURCES UTILIZATION

Goal Statement: Promote the use of natural systems and features, storm water planning, and open space parks planning for natural hazard mitigation whenever possible to reduce long-term costs to the city and maximize effectiveness.

### Goal #7: EMERGENCY SERVICES

Goal Statement: Coordinate and integrate natural hazard mitigation activities, where appropriate, with emergency operations plans and procedures, and continuity of operation plans.

## **Mitigation Action Items**

Short and long-term action items identified through the planning process are an important part of the mitigation plan. Action items are detailed recommendations for activities that local departments, citizens and others could engage in to reduce risk. Each action item has a corresponding action item worksheet describing the activity, the project's rationale, potential ideas for implementation, and coordinating / partner organizations. The action item worksheets can assist the community in pre-packaging potential projects for grant funding. Full action item worksheets are located in Appendix D.

### **Drought**

1. Review and update Keizer's water management plan to include new information and revisit emergency water agreements with the city of Salem.

### **Earthquake**

1. Encourage reduction of nonstructural and structural earthquake hazards in homes, schools, businesses, and government offices through public education.
2. Seek funding to further assess the "probability of collapse" for Cummings Elementary, Gubser Elementary, Kennedy Elementary, and McNary High School and structurally reinforce vulnerable school buildings to prevent loss of life to students.
3. Work with Marion County to develop emergency procedures and alert systems in the event of a dam breach upstream, along the Detroit and Lookout Point Dams.
4. Conduct seismic evaluations of critical facilities and infrastructure, including Keizer's Public Works building and water pipes. Encourage and assist the city of Salem to conduct similar evaluations on the Willow Lake Waste Water Treatment Plant.
5. Encourage earthquake safety promotion and drills by community groups.
6. Train employees in Rapid Visual Assessment (RVA) techniques to conduct building safety evaluations.

### **Flood**

1. Encourage the city of Salem to secure or remove hazardous materials at the waste water treatment plant where possible to prevent contamination of groundwater resources.

2. Explore steps needed to qualify Keizer for participation in the National Flood Insurance Program's (NFIP) Community Rating System (CRS).
3. Continue compliance with the National Flood Insurance Program through the enforcement of local floodplain ordinances.
4. Improve water quality and water flow through wetland vegetation restoration and stream cleanup, especially along Claggett Creek.
5. Partner with the county to conduct workshops for target audiences on National Flood Insurance Programs, mitigation activities, and potential assistance from FEMA's Flood Mitigation Assistance and Hazard Mitigation Grant Programs.

### **Windstorm**

1. Educate the public about windstorm-resistant trees and landscaping practices and the role of proper tree pruning and care in preventing damage during windstorms.
2. Ensure that all critical facilities have backup power and/or emergency operations plans to deal with power outages.

### **Severe Winter Storm**

1. Consider upgrading lines and poles to improve wind/ice loading, and underground critical lines.
2. Educate citizens about ways to weatherize their homes, as well as safe emergency heating equipment.

### **Multi-Hazard**

1. Further develop risk assessment maps to show areas at risk for all hazards.
2. Establish mutual aid agreements between government agencies and commercial businesses in the event of an emergency (e.g. fuel, heavy equipment, food, etc).
3. Develop a registry of populations that may need particular assistance in an emergency situation.
4. Encourage citizens to prepare and maintain 72-hour kits.
5. Develop a post-disaster redevelopment plan.
6. Continue development of CERT teams to ease the load on emergency services following a disaster.
7. Develop and equip emergency shelters to take care of residents and vulnerable populations such as the elderly, the very young, or visitors.
8. Educate businesses and governmental organizations about the importance of developing continuity of operations plans.
9. Further assess the potential implications of various transportation route closures.

*Note: Due to Keizer's isolation from wildfire, volcano, and landslide risk areas, Keizer's steering committee believes that implementing wildfire, volcano, and/or landslide-related mitigation actions would not be cost-effective at this time. As such, the city has not identified wildfire, volcano, or landslide mitigation action items. Keizer will partner with Marion County, however, on the implementation of mitigation strategies that benefit both jurisdictions.*

# Section 5: Plan Implementation and Maintenance

This section details the formal process that will ensure that Keizer's Addendum to the Marion County 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. Because this addendum lives within the Marion County Natural Hazard Mitigation Plan, the city will coordinate with the county's five-year plan update schedule.

Finally, this section describes how the city will integrate public participation throughout the plan maintenance and implementation process.

## Plan Adoption

After the addendum is locally reviewed and deemed complete, Keizer's Assistant City Manager submits it to the State Hazard Mitigation Officer at Oregon Emergency Management. Oregon Emergency Management submits 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 city will adopt the plan via resolution. At that point the city will gain eligibility for the Pre-Disaster Mitigation Grant Program, the Hazard Mitigation Grant Program, and the Flood Mitigation Assistance program.

The City Council will be responsible for adopting the city of Keizer's Natural Hazard Mitigation Plan Addendum. This governing body has the authority to promote sound public policy regarding natural hazards.

## Convener

On July 29<sup>th</sup>, 2009, Keizer's steering committee identified the Keizer emergency manager as the convener for Keizer's Addendum to the Marion County Natural Hazards Mitigation Plan. The convener's responsibilities include:

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

- Identifying emergency management-related funding sources for natural hazards mitigation projects;
- Coordinating plan update processes;
- Submitting future plan updates to Oregon Emergency Management for review; and
- Coordinating local adoption processes.

## Coordinating Body

On July 29, 2009, the Keizer Steering Committee identified the following organizations to serve as the coordinating body for the city's addendum.

- Keizer Public Works, Director
- Community Development, Director
- Keizer Fire District, Fire Chief
- Keizer Police Department, Police Chief
- Chamber of Commerce Representative
- Keizer City Councilor
- Neighborhood Association, Representative
- Citizen Member
- Finance Department, Director
- Marion County Emergency Management, Representative

The coordinating body's roles and responsibilities include:

- Attending future plan maintenance and plan update meetings (or designating a representative to serve in your place);
- Serving as the local evaluation committee for funding programs like the Pre-Disaster Mitigation Grant Program, the Hazard Mitigation Grant Program, and the Flood Mitigation Assistance Program;
- Prioritizing and recommending funding for natural hazard risk reduction projects;
- Updating the natural hazards mitigation plan in accordance with the county's five-year plan update schedule;
- Developing and coordinating ad hoc and/or standing subcommittees as needed; and
- Coordinating public involvement activities.

To make the coordination and review of the Keizer Addendum as broad and useful as possible, the coordinating body will engage additional stakeholders and other relevant hazard mitigation organizations and agencies to implement the identified action items. Specific organizations have been identified as either internal or external partners on the individual action item forms located in Appendix D.

# 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 city's efforts to reduce the risks posed by natural hazards. This section includes a process to ensure that a regular review and update of the plan occurs. The convener and coordinating body 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. Where possible, the schedule of these meetings will coincide with the annual grant cycle deadlines to allow for enough time to apply for funding. During the first meeting of the year, the coordinating body will:

- Discuss available (or soon-to-be available) funding streams, and which mitigation actions should be implemented within the coming year. All departments and/or organizations that are responsible for mitigation actions should be invited to attend (in addition to the regular coordinating body).
- Review existing action items to determine appropriateness for funding, and prioritize potential projects using the methodology described below;
- Educate and train new members on the plan and mitigation in general; and
- Document the meeting by saving the agenda, sign-in sheet, and meeting minutes. This will be of benefit to the coordinating body when conducting the plan update.

During the second meeting of the year the committee will:

- Come prepared to discuss any new risk assessment data (i.e., from the Department of Geology and Mineral Industries or otherwise);
- Review the plan update toolkit and determine whether any ongoing plan update tasks can be accomplished at this meeting. New data should be incorporated when available, resulting in a hazards mitigation plan that remains current and up-to-date;
- Discuss any opportunities for continued public involvement (if needed); and
- Document successes and lessons learned during the year. Likewise, the convener should document this meeting by saving the agenda, sign-in sheet, and meeting minutes. This will be of benefit to the coordinating body when conducting the plan update.



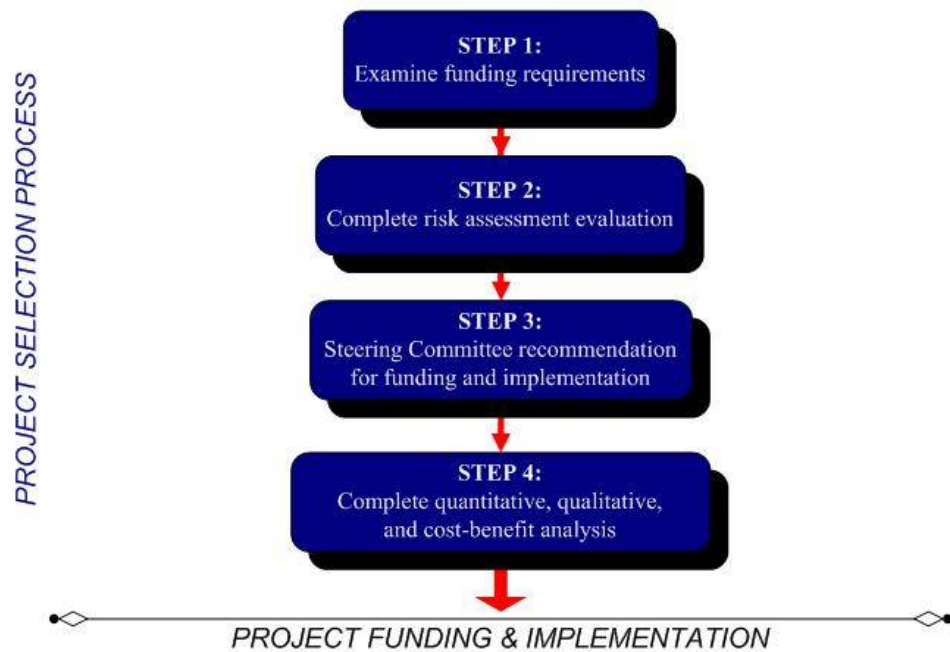
The convener will be responsible for documenting the outcome of the semi-annual meetings. The process the committee will use to prioritize mitigation projects is detailed in the section below. The plan's format allows the city to review and update sections when new data becomes available. New data can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

## Project Prioritization Process

The Disaster Mitigation Act of 2000 (via the Pre-Disaster Mitigation Program) requires that jurisdictions identify a process for prioritizing potential actions. Potential mitigation activities often come from a variety of sources; therefore the project prioritization process needs to be flexible. Projects may be identified by coordinating body members, local government staff, other planning documents, or the risk assessment. Figure 16 illustrates the project prioritization process.

**Figure 16. Project Prioritization Process**

### Action Item and Project Review 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 city'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 B 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: Coordinating body recommendation**

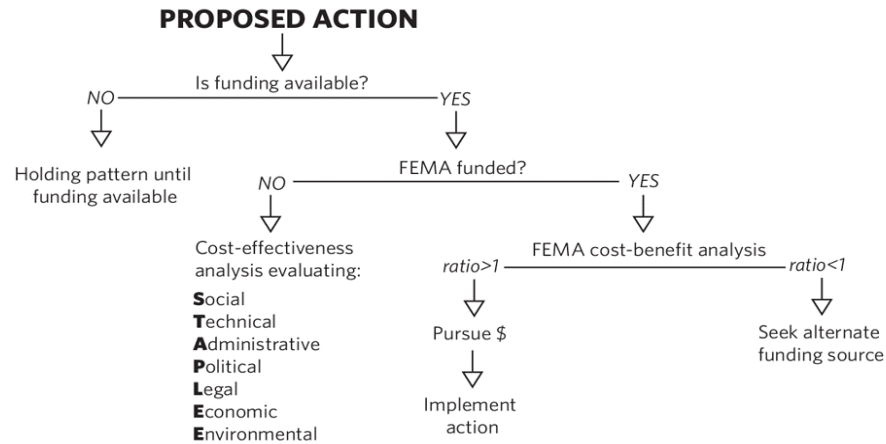
Based on the steps above, the coordinating body will recommend which mitigation activities should be moved forward. If the coordinating body decides to move forward with an action, the coordinating organization designated on the action item form will be responsible for taking further action and, if applicable,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

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

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

understanding of the potential benefits and costs of an activity, as well as a basis upon which to compare alternative projects. Figure 17 shows decision criteria for selecting the appropriate method of analysis.

**Figure 17. Benefit Cost Decision Criteria**



Source: Community Service Center’s Partnership for Disaster Resilience at the University of Oregon, 2006.

If the activity requires federal funding for a structural project, the coordinating body 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 coordinating body will use a multivariable assessment technique called STAPLE/E to prioritize these actions. STAPLE/E stands for Social, Technical, Administrative, Political, Legal, Economic, and Environmental. Assessing projects based upon these seven variables can help define a project’s qualitative cost effectiveness. 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 for a description of the STAPLE/E evaluation methodology.

### Implementation through Existing Programs

The city of Keizer currently addresses statewide planning goals and legislative requirements through its comprehensive land use plan, a capital improvement program, transportation systems plan, water system master plan, mandated standards, and building codes. To the extent possible, Keizer will work to incorporate the recommended mitigation action items into existing plans, programs and policies. Keizer periodically updates its land use, comprehensive and strategic plans and policies. Implementing the Natural Hazards Mitigation Plan Addendum’s actions items through

existing plans, programs and policies increases the likelihood of action items being supported and increases the likelihood that the plan gets updated to remain current and efficiently utilize the county's existing resources.

## Continued Public Involvement & Participation

The city of Keizer is dedicated to involving the public directly in the continual reshaping and updating of the Keizer Natural Hazard Mitigation Plan Addendum. Although members of the coordinating body represent the public to some extent, the public will also have the opportunity to continue to provide feedback about the plan.

To ensure continued public involvement and participation in the city's plan update processes, the city of Keizer will:

- Keep a copy of the plan on the city's website at all times. Any changes to the plan will be noted, and contact information will be provided on the plan as well (to facilitate public feedback).
- Contact the newspaper to release articles that detail significant plan revisions.
- Continue to conduct stakeholder interviews for input on plan content.
- Publicly announce coordinating body meetings to the public, when needed.
- Distribute information via the city email system, when needed.
- Post information with the Chamber of Commerce, when needed.

Additionally, the Partnership, with a commitment from the Institute for Business & Home Safety (IBHS) will provide individuals in the region with access to, and use of, the IBHS interactive, web-based *Open for Business* property protection and disaster recovery planning tool. The purpose of the planning tool is to: (1) create understanding of the importance of disaster planning; (2) teach local businesses how to navigate the interactive, web-based *Open for Business* property protection and disaster recovery planning tool; (3) assist small businesses in developing their own plans during the training; and (4) teach businesses how to communicate the importance of developing and utilizing plans for property protection and recovery from business interruption. An *Open for Business* workshop will be held in Marion County in October, 2009.

Lastly, the city's natural hazard mitigation plan addendum has been archived and posted on the University of Oregon Libraries' Scholar's Bank Digital Archive. Contact information for the plan's convener is listed on the plan to facilitate comments and/or feedback.

## **Five-Year Review of Plan**

This plan will be updated every five years in conjunction with the Marion County Natural Hazard Mitigation Plan. The following 'toolkit' can assist the convener in determining what plan update activities need to occur. Likewise, the 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 Toolkit

<i>Question</i>	Yes	No	<i>Plan Update Action</i>
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
<i>Have development patterns changed? Is there more development in hazard prone areas?</i>			
<i>Do future annexations include hazard prone areas?</i>			
<i>Are there new high risk populations?</i>			
<i>Are there completed mitigation actions that have decreased overall vulnerability?</i>			

### Mitigation Plan Update Toolkit

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

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- i Source: USGS - Partnership for Disaster Resilience Research Collaborative, 2006.
- ii Weatherbase.com, "Salem Oregon," <http://www.weatherbase.com>, accessed February 3, 2009.
- iii Ibid.
- iv Portland State University: Population Research Center, *2007 Oregon Population Report*, <http://www.pdx.edu/prc/annualorpopulation.html>, (March 2008), 12.
- v US Census, "Profile of Selected Social Characteristics: 2000," Fact Sheet, Keizer, OR, [www.census.gov](http://www.census.gov).
- vi US Census, "Selected Economic Characteristics, 2005-2007," 2005-2007 American Community Survey 3-Year Estimates, Keizer, OR, [www.census.gov](http://www.census.gov).
- vii US Census, "Selected Social Characteristics, 2005-2007," 2005-2007 American Community Survey 3-Year Estimates, Keizer, OR, [www.census.gov](http://www.census.gov).
- viii US Census, "Selected Economic Characteristics, 2005-2007," 2005-2007 American Community Survey 3-Year Estimates, Keizer, OR, [www.census.gov](http://www.census.gov).
- ix Ibid.
- x US Census, "Selected Economic Characteristics, 2005-2007," 2005-2007 American Community Survey 3-Year Estimates, Keizer, OR, United States, [www.census.gov](http://www.census.gov).
- xi US Census, "Selected Housing Characteristics, 2005-2007," 2005-2007 American Community Survey 3-Year Estimates, Keizer, OR, [www.census.gov](http://www.census.gov).
- xii Ibid.
- xiii Morrow, 1999; Burby and others, 2003.
- xiv Burby and others, 2003.
- xv Ibid.
- xvi Ibid.
- xvii City of Keizer *Comprehensive Plan (1987)*, amended February 2003, available at UO Scholars Bank, 9.
- xviii Ibid.
- xix Ibid, 16.
- xx US Census, "Selected Economic Characteristics, 2005-2007," 2005-2007 American Community Survey 3-Year Estimates, Keizer, OR, United States, [www.census.gov](http://www.census.gov).
- xxi City of Keizer *Comprehensive Plan (1987)*, amended February 2003, available at UO Scholars Bank, 21.
- xxii City of Keizer, *Zoning Ordinance*, <http://www.keizer.org/commdev/Publications/code-web.pdf>, accessed February 11, 2009, 2.122.01.



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

xxiv Source: USGS - Partnership for Disaster Resilience Research Collaborative, 2006.

xxv City of Keizer Water Management Plan.

<http://www.keizer.org/publicworks/Water%20Management%20Plan.pdf>

xxvi Weatherbase.com, "Salem Oregon," <http://www.weatherbase.com>, accessed February 3, 2009.

xxvii Peggy Savage, "Quake Rattles Keizer House, Breaks Glass," *Keizer Times*, 3/8/2001.

xxviii NOAA, 1993. Tsunamis affecting the West Coast of the United States: 1806-1992.

xxix McGuire, L., Ford, E., and Okoro, C., 2007, Natural disasters and older US adults with disabilities – implications for evacuation: *Disasters*, v. 31, no. 1, p. 49-56.

xxx Morrow, B., 1999, Identifying and mapping community vulnerability: *Disasters*, v. 23, no. 1, p. 1-18; Ngo, E., 2003, When disasters and age collide – reviewing vulnerability of the elderly: *Natural Hazards Review*, v. 2, no. 2, p. 80-89.

xxxi McConnell, Vicki S. Department of Geology and Mineral Industries. *Statewide Seismic Needs Assessment: Implementation of Oregon 2005 Senate Bill 2 Relating to Public Safety, Earthquakes, and Seismic Rehabilitation of Public Buildings.* 2007. <http://www.oregongeology.com/sub/projects/rvs/OFR-O07-02-SNAA-onscreen.pdf>.

xxxii Marion County, *Marion County Natural Hazards Mitigation Plan*, (Salem, OR, 2005), p. 6-6 to 6-10.

xxxiii Oregon Department of Land Conservation and Development, Federal Emergency Management Agency Repetitive Losses / BCX Claims, Oregon. May 26, 2009.

xxxiv Federal Emergency Management Agency; Community Rating System Eligible Communities. <http://www.fema.gov/library/viewRecord.do?id=3629>

xxxv City of Keizer Development Code, Section 22 Flood Plan Overlay Zone (FPO). <http://www.keizer.org/commdev/devcode/2.122.htm>

xxxvi McGuire, L., Ford, E., and Okoro, C., 2007, Natural disasters and older US adults with disabilities – implications for evacuation: *Disasters*, v. 31, no. 1, p. 49-56.

xxxvii Morrow, B., 1999, Identifying and mapping community vulnerability: *Disasters*, v. 23, no. 1, p. 1-18; Ngo, E., 2003, When disasters and age collide – reviewing vulnerability of the elderly: *Natural Hazards Review*, v. 2, no. 2, p. 80-89.

xxxviii Marion County Natural Hazards Mitigation Plan, Landslide Chapter.

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<sup>xxxix</sup> Andrew F. Harvey and Gary L. Peterson, Squier Associates. *Water-induced landslide hazards, western portion of the Salem Hills, Marion County, Oregon*. Portland, OR: Oregon Department of Geology and Mineral Industries, 1998.

Andrew F. Harvey and Gary L. Peterson, Squier Associates. *Water-induced landslide hazards, eastern portion of the Eola Hills, Polk County, Oregon*. Portland, OR: Oregon Department of Geology and Mineral Industries, 2000.

<sup>xi</sup> *Marion County Natural Hazards Mitigation Plan*, Volcanic Eruptions Chapter.

<sup>li</sup> *Marion County Natural Hazards Mitigation Plan*, p. 13-10.

<sup>liii</sup> United States Geological Survey, Cascades Volcano Observatory. Vancouver, Washington. <http://vulcan.wr.usgs.gov/>

<sup>liiii</sup> United States Geological Survey, Cascades Volcano Observatory. Vancouver, Washington. <http://vulcan.wr.usgs.gov/>

<sup>liiv</sup> *Marion County Natural Hazards Mitigation Plan*, Wildfire Chapter.

<sup>liv</sup> *Marion County Natural Hazards Mitigation Plan*, Windstorm Chapter.

<sup>livi</sup> *Marion County Natural Hazards Mitigation Plan*, Severe Winter Storm Chapter.

# Appendix A: Planning and Public Process

The following appendix documents Keizer’s natural hazards mitigation planning and public involvement processes.

## Work Sessions

Informational Meeting Agenda .....	A2
Kickoff Meeting Agenda .....	A3
Kickoff Meeting Sign-In .....	A4
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Risk Assessment Meeting Sign-In.....	A20
Marion County Hazard Analysis .....	A25
Goals & Action Item Meeting Agenda.....	A26
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## Stakeholder Interviews

Interview Questions.....	A47
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Stakeholder Survey Results .....	A53

**Meeting:** Region 3 City Mitigation Plans  
**Date:** September 16, 2008  
**Time:** 10:00 am – 12:00 pm  
**Location:** Marion County Public Works

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## AGENDA

1. Welcome & Introductions **(5 minutes)**
  - Krista Dillon, OPDR
2. Partnership Overview **(20 minutes)**
  - Krista Dillon
3. Pre-Disaster Mitigation Planning Grant **(15 minutes)**
  - Krista Dillon
4. City Mitigation Planning Process & Timeline **(30 minutes)**
  - Megan Findley, OPDR
5. Next Steps **(20 minutes)**
  - Krista Dillon
6. Questions??? **(20 minutes)**

**Meeting:** Region 3 Cities Kickoff

**Date:** February 25, 2009

**Time:** 2:00 pm – 5:00 pm

**Location:** Marion County Public Works Building, 5155 Silverton Rd NE, Salem, OR

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## AGENDA

1. Welcome & Introductions **(20 minutes)**  
- Megan Findley

2. OPDR Overview **(40 minutes)**  
- Andre LeDuc

3. Pre-Disaster Mitigation Program Overview **(30 minutes)**  
- Megan Findley

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*Break (15 minutes)*  
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4. 4-Phased Planning Process **(45 minutes)**  
• Steering Committee & Stakeholder Selection Exercise  
- Gregoor Passchier

5. Public Involvement Opportunities Discussion **(30 minutes)**  
- Megan Findley

6. Admin & Next Steps **(15 minutes)**  
- Megan Findley & Gregoor Passchier

## Meeting Sign-In

Region 3 Cities 'Kickoff' Work Session. February 25<sup>th</sup>, 2009; 2-5pm  
Marion County Public Works Building. Courthouse Square 555 Court Street N.E., Salem, OR.

Name	Representing	Email	Roundtrip mileage (if applicable)
Rich Boerstal	City of Silverton - PW	rboerstal@silverton.or.us	
DARREL MATHEWS	CITY OF SILVERTON, SDF	bangsandburns@pngus.net	
Rick Lewis	City of Silverton - PD	rlewis@Silverton.or.us	
John VANDERZANDEW	Marion County EM	Jvanderzanden@co.marion.or.us	
Dan Brown	City of Woodburn	Dan.Brown@ci.woodburn.or.us	
NATALIE LABOSSIERE	City of Woodburn	Natalie.Labossiere@ci.woodburn.or.us	
Kaurie Boyce	City of Aurora	recorder@ci.aurora.or.us	
Carrie Brennecke	City of Woodburn	Carrie.brennecke@ci.woodburn.or.us	

Name	Representing	Email	Roundtrip mileage (if applicable)
Krista Rowland	Marion County Emergency mgmt	krowland@ coignarion.sv.	
Julie Amicci	Tigard PETS PET EMERGENCY PROGRAM	Juliepdx@hotmail.com	
Kevin Watson	City of Keizer	watsonk@keizer.org	



# Memo

**To:** Cities Developing Mitigation Plan Addenda (Keizer, Woodburn, Aurora, Silverton)  
**From:** Oregon Partnership for Disaster Resilience at the University of Oregon's Community Service Center  
**Date:** February 25, 2009  
**Re:** **Natural Hazards Mitigation Plans- Developing a City Addendum**

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## Purpose

The purpose of this memo is to inform communities about the process for developing a city addendum to their county's natural hazards mitigation plan. This memo outlines the federal requirements for city addenda and summarizes the planning process cities will follow in developing their addenda. The planning process includes: 1) developing a steering committee of local constituents to guide the planning process; 2) conducting an issue identification and hazard identification workshop to determine the city's vulnerability to natural hazards; and 3) developing action items to reduce the impact of natural hazard events.

## City Specific Addendum and Multi-jurisdictional Planning Requirements

A natural hazards mitigation plan identifies long and short-term strategies that can permanently reduce or alleviate the loss of life, property, and injuries resulting from natural hazards. A FEMA-approved natural hazards mitigation plan gives a jurisdiction access to three types of grant funding: the Pre-Disaster Mitigation Grant Program (PDM); the Hazard Mitigation Grant Program (HMGP); and the Flood Mitigation Assistance Grant Program (FMA).<sup>1</sup> Without a FEMA-approved natural hazards mitigation plan, a jurisdiction is *not* eligible to apply for these federal mitigation grant funds.

In order to access the federal mitigation grants described above, a city may either: 1) create a stand-alone natural hazards mitigation plan that is not tied to the county's plan; or 2) create an addendum to the county's plan. As outlined by the Disaster Mitigation Action of 2000 (DMA2K), a stand-alone plan must meet 20 FEMA requirements whereas an addendum must meet 4.<sup>2</sup> Creating an addendum is a much simpler process than creating a stand-alone plan. City addendum requirements are as follows:

1. Multi-jurisdictional Participation - *§201.6(a)(3) Multi-jurisdictional plans (e.g., watershed plans) may be accepted, as appropriate, as long as each jurisdiction has participated in the process*
  - a. Does the plan identify how each jurisdiction participated in the plan's development?<sup>2</sup>
2. Multi-jurisdictional Risk Assessment - *§201.6(c)(2) (iii): For multi-jurisdictional plans, the risk assessment must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.*
  - a. Does the plan include a risk assessment for each participating jurisdiction as needed to reflect unique or varied risks?

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<sup>1</sup> Eligibility for FMA funds is dependent on the plan meeting several flood specific planning requirements.

<sup>2</sup> Cities only need to meet 4 requirements if the county's plan meets the remaining 16 on the city's behalf.



3. Multi-jurisdictional Mitigation Strategy - **§201.6(c)(3) (iv)**: *For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.*
  - a. Does the plan include separate, identifiable action items for each jurisdiction requesting FEMA approval of the plan?
4. Multi-jurisdictional Plan Adoption - **§201.6(c)(5)** *For multi-jurisdictional plans, each jurisdiction requesting approval of the plan **must** document that it has been formally adopted.*
  - a. Does the plan indicate the specific jurisdictions represented in the plan?
  - b. For each jurisdiction, has the local governing body approved the plan?
  - c. Are supporting documents, such as resolutions, included?

## Planning Process

In an effort to assist each city in their addendum development process, the Oregon Partnership for Disaster Resilience (OPDR) will facilitate a series of four work-sessions. OPDR will be responsible for developing city addenda based on input from each work session. City representatives must attend work sessions in order to facilitate the plan development process.

Although work-sessions will have a strong information-gathering component, they will also be treated as opportunities to train communities in the plan development process. OPDR's intention with the work sessions is therefore twofold; in addition to developing effective and purposeful mitigation plans for each participating community, the Partnership will equip communities the tools and resources necessary for maintaining, implementing, and updating their plans in accordance with the Disaster Mitigation Act of 2000.

The following 'steps' outline the planning process that will occur between February 2009 and September 2009.

### Step 1: Getting Started

OPDR will develop and facilitate a 'kick-off' work session with communities on February 25<sup>th</sup>, 2009. Meeting topics will include an overview of OPDR's programs and activities; a discussion of mitigation planning requirements; and exercises in identifying stakeholders, potential steering committee members, and public involvement strategies. Following the work session, cities will be asked to develop a steering committee that's composed of members from various sectors of the community. Steering committee members often include representatives from the city, such as public works staff, planners, and local emergency managers; representatives from the business community; representatives of neighborhood organizations that could be affected by natural hazards; and other concerned citizens. Steering committees for city addenda range from 4 to 8 members, but it is up to the community to decide the total number of committee members and who would be most knowledgeable about natural hazard events. Each city should additionally identify a 'point of contact' that can identify and invite committee members to the table.

All steering committee members should be prepared to attend 3 meetings between April and August, 2009. At each meeting, committee members should be able to provide OPDR with local knowledge about community processes, risks, and hazards. Additionally, the committee will be asked to review plan drafts, and to document the time they spend developing the plan (since the grant that funds this effort requires local in-kind match.) Lastly, a representative from the city's steering committee should inform the city's local governing body (i.e. city council) about the work the steering committee is doing to keep them informed of the planning process.

Following the first work session, OPDR will conduct interviews with stakeholders from each community. Interviews will serve as a public outreach component for the cities' planning processes, in the hopes that greater outreach will better inform each city's risk assessment and natural hazard mitigation strategies.

### Step 2: Assessing Local Risks

A central component to any natural hazards mitigation plan is the risk assessment. OPDR will develop and facilitate a risk assessment workshop on April 15 in partnership with the U.S. Geological Survey and Oregon Emergency Management. Each city's full steering committee must be present at this workshop, which will last from 9am-5pm. Cities will be asked to review their county's mitigation plan, and to describe how the city's risks

are greater than (or simply differ from) the county's. Information gathered from these workshops will assist the city in developing mitigation, or risk reduction strategies.

### **Step 3: Developing City-Specific Action Items**

Based on information gathered at the April risk assessment workshop, and information gathered from stakeholder interviews, OPDR will develop a set of proposed mitigation strategies (or 'action items') for each city. Action items are detailed recommendations for activities that local departments, citizens and others could engage in to reduce risk. Example actions 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. Steering committee members will be contacted for input in drafting actions as well.

In June (date TBD), steering committees will convene for an 'Action Item' workshop with OPDR. Steering committees will discuss OPDR's proposed mitigation strategies, and will develop a final set of actions for their city addenda.

### **Step 4: Adopting, Implementing, and Maintaining the Plan**

In July (date TBD), OPDR will host a final work session to discuss strategies for implementing, maintaining, and updating the plan. Additionally, OPDR will be responsible for drafting a final addendum for each city. Committee members will be expected to review OPDR's final drafts, and provide comments and edits on the final document. On behalf of each city, OPDR will send final drafts to Oregon Emergency Management and FEMA for review.

FEMA review can take up to 45 business days. The plan will either be approved pending adoption, or require additional revisions, and OPDR will work with each city to identify how to meet the required revisions (if needed). If the city addendum is approved pending adoption, the city will need to adopt the plan via resolution. OPDR will support each city throughout the review process, and will provide the city with guidance and materials to begin the local adoption process.

Once approved at the local level, OPDR will send proof of local adoption to FEMA. FEMA will then send a final approval letter to Oregon Emergency Management and OPDR, who will then send the final letter to the city. The final approval letter acknowledges the community's eligibility for the Pre-Disaster Mitigation Grant Program, the Hazard Mitigation Grant Program, and the Flood Mitigation Assistance Grant Program.

Note: The approval letter will show that the city's addendum needs to be updated along with the county's plan by December, 2010.

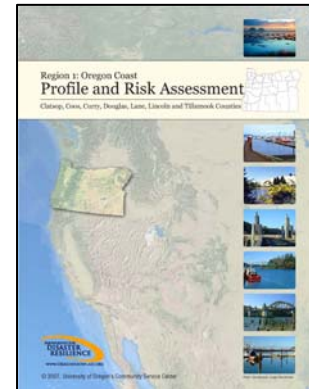
For more information, please contact Megan Findley, OPDR *Pre-Disaster Mitigation Program Manager*, at 541.346.2305 or [mfindley@uoregon.edu](mailto:mfindley@uoregon.edu).

## Hazard Resources

The following resources can help you locate information regarding natural hazards that may impact your community.

### All Hazards

- State of Oregon Enhanced Natural Hazard Mitigation Plan  
The State plan organizes the state into eight regions and it includes a Natural Hazard Risk Profile specific to each region. One component of the regional profile is the Natural Hazard Risk Assessments. The Hazard Risk Assessments provides the following information for each natural hazard: characteristics and a brief history, recurrence, and vulnerability. The State's Regional Natural Hazard Risk Assessments are a good starting place for identifying and profiling the hazards that are relevant to your community's risk assessment. The Regional Risk Assessments are available on the Partnership webpage ([www.oregonshowcase.org](http://www.oregonshowcase.org)).



- Hazard Analysis Matrix  
Each county in Oregon has developed and is required to maintain a hazard analysis that includes risk scores for the hazards they face. These scores range from 24 (low) to 240 (high), and reflect the county's analysis for each particular hazard. By using this methodology consistently throughout the state one can compare the risk posed by a particular hazard from one county to the next, and each local jurisdiction can compare one hazard against others to establish priorities for planning, hazard mitigation, and capability development. Contact a County Emergency Manager to receive a copy of this document.

SAMPLE HAZARD ANALYSIS MATRIX

Hazards		History WF = 2	Vulnerability WF = 5	Maximum Threat WF = 10	Probability WF = 7	Total Score
FLOOD	WF X SR Subscore = 20	2 X 10 = 20	5 X 9 = 45	10 X 7 = 70	7 X 10 = 70	206
WILDFIRE	WF X SR Subscore = 20	2 X 10 = 20	5 X 8 = 40	10 X 5 = 50	7 X 10 = 70	190
EARTHQUAKE	WF X SR Subscore = 4	2 X 2 = 4	5 X 10 = 50	10 X 10 = 100	7 X 3 = 21	175
WINDSTORM	WF X SR Subscore = 18	2 X 8 = 18	5 X 6 = 30	10 X 6 = 60	7 X 8 = 56	162
HAZMAT	WF X SR Subscore = 14	2 X 7 = 14	5 X 5 = 25	10 X 6 = 60	7 X 6 = 42	141
LANDSLIDE	WF X SR Subscore = 20	2 X 10 = 20	5 X 4 = 20	10 X 3 = 30	7 X 9 = 63	133
DAM FAILURE	WF X SR Subscore = 2	2 X 1 = 2	5 X 5 = 25	10 X 2 = 20	7 X 2 = 14	61

- Technical Resource Guide  
The Technical Resource Guide was developed by the Oregon Partnership for Disaster Resistance, with the assistance of the DLCD. The resource guide is a tool that can assist Oregon cities and counties in planning for, and limiting the effects of, threats posed by natural hazards. The TRG is available online at [http://www.oregonshowcase.org/downloads/pdf/projects/UO-ONHW\\_Hazard\\_TRG\\_full\\_1999.pdf](http://www.oregonshowcase.org/downloads/pdf/projects/UO-ONHW_Hazard_TRG_full_1999.pdf).



- Oregon's Regional Hazard Viewer:  
[http://mtjune.uoregon.edu/website/hazardmaps/webapp/hazardsViewer\\_content.html](http://mtjune.uoregon.edu/website/hazardmaps/webapp/hazardsViewer_content.html)  
 The interactive viewer visually displays perceived vulnerability per hazard for each county in Oregon, which allows communities and the state to compare the vulnerability of hazards across regions.
- Newspapers  
 Local news stories often provide details on where and how past hazard events have impacted the community.
- Local Historical Society  
 A visit to the local historical society can assist you in gathering hazard history data. Oftentimes, historical societies maintain information about past hazard events.
- DLCD Natural Hazard Minisite:  
<http://www.lcd.state.or.us/LCD/HAZ/index.shtml>
- Hazard Maps  
 All communities have Flood Insurance Rate Maps (FIRMs) that detail where the floodplain is. Your community may also have other localized hazard maps (e.g. slope/landslide risk). These maps highlight the areas within the community that are most at risk from a hazard event.
- FEMA
  - Federal Disaster Declarations: <http://www.fema.gov/news/disasters.fema>. Search for declared disasters by year and/or state.
  - Mapping information:  
[https://hazards.fema.gov/femaportal/wps/portal!/ut/p/.cmd/cs/.ce/7\\_0\\_A/.s/7\\_0\\_CM9/\\_s.7\\_0\\_A/7\\_0\\_CM9](https://hazards.fema.gov/femaportal/wps/portal!/ut/p/.cmd/cs/.ce/7_0_A/.s/7_0_CM9/_s.7_0_A/7_0_CM9)
  - Types of Disasters (hazard descriptions):  
<http://www.fema.gov/hazard/types.shtm>
  - HAZUS: <http://www.fema.gov/plan/prevent/hazus/>. HAZUS-MH is a powerful risk assessment software program for analyzing potential losses from floods, hurricane winds and earthquakes. In HAZUS-MH, current scientific and engineering knowledge is coupled with the latest geographic information systems (GIS) technology to produce estimates of hazard-related damage before, or after, a disaster occurs.
- National Climatic Data Center: <http://www.ncdc.noaa.gov>. NCDC is the world's largest active archive of weather data. Under "Data and Products: Free Data," you can access climate maps, storm data, wind data, historic significant events, and freeze/frost data. Most links will open a PDF document; you will need to search (Control: F) for "Oregon" to find locally-relevant information.

## Base Maps

- Oregon Coastal Atlas: [www.coastalatlantlas.net](http://www.coastalatlantlas.net). Click on the ‘maps’ toolbar to create a map of your community. Explore the “tools” and “learn” tabs for additional information.
- Oregon Department of Transportation: <http://www.oregon.gov/ODOT/maps.shtml>
- U.S. Geological Survey:
  - Digital Data: <http://edc2.usgs.gov/geodata/index.php>  
[These data files are for use in geographical information systems (GIS) for analysis and integration with other geospatial data. The USGS offers free software for viewing some digital cartographic products.]
  - Geologic hazard maps: <http://geomaps.wr.usgs.gov/pacnw/map.html>
  - The National Map: <http://nmviewogc.cr.usgs.gov/viewer.htm>
  - To visualize available GIS data, ESRI offers a free GIS reader called “ArcExplorer” that may be helpful. <http://www.esri.com/software/arcexplorer/index.html>

## Hazard-Specific Resources

- Coastal Erosion
  - Coastal Erosion Chapter, State Plan:  
[http://www.oregonshowcase.org/downloads/pdf/stateplan/OR-SNHMP\\_coastal-erosion\\_chapter.pdf](http://www.oregonshowcase.org/downloads/pdf/stateplan/OR-SNHMP_coastal-erosion_chapter.pdf). The coastal erosion chapter of the state Natural Hazards Mitigation Plan provides a characterization of the coastal erosion hazard in Oregon. Additionally, the chapter describes current state programs and strategies, highlights successes in mitigation, and proposes short and long-term actions for future mitigation in the state.
  - Oregon Coastal Management Program:  
<http://www.oregon.gov/LCD/OCMP/index.shtml>
  - State of the Coast:  
[http://oceanservice.noaa.gov/websites/retiredsites/supp\\_sotc\\_retired.html](http://oceanservice.noaa.gov/websites/retiredsites/supp_sotc_retired.html)  
Includes a series of essays related to human-induced pressures on the environment and societal responses to environmental degradation. The essays are factual presentations; inferences are minimal.
  - HazNet, Sea Grant Natural Hazards Theme Team: <http://www.haznet.org/>. HazNet is the place to find out how Sea Grant programs nationwide are working together to better understand coastal natural hazards and develop ways to reduce their impacts on lives, property and coastal economies.
- Drought
  - Water Resources Department: Drought Page:  
<http://www.wrd.state.or.us/OWRD/WR/drought.shtml>. On this page and associated links you will find data and other information concerning the availability of water in Oregon for the current year. During dry times there is information from watermasters concerning their specific districts, as well as links to other agencies and local governments. "Near real time" links provide water levels and flow data for particular streams and rivers.

- Drought Impact Reporter: <http://droughtreporter.unl.edu/>  
Drought impacts are inherently hard to quantify, therefore there has not been a comprehensive and consistent methodology for quantifying drought impacts and economic losses in the United States. The Drought Impact Reporter is intended to be the initial step in creating a comprehensive database. The principal goal of the Drought Impact Reporter is to collect, quantify, and map reported drought impacts for the United States and provide access to the reports through interactive search tools.  
Click on “Oregon” visual to access state information. Select a time period (you may search from 1850 to present day). Choose all “impact categories” and click “submit” to view reports.
  - National Drought Mitigation Center:  
<http://www.drought.unl.edu/dm/index.html>
  - Drought Chapter, State Plan:  
[http://www.oregonshowcase.org/downloads/pdf/stateplan/OR-SNHMP\\_drought\\_chapter.pdf](http://www.oregonshowcase.org/downloads/pdf/stateplan/OR-SNHMP_drought_chapter.pdf). The Drought chapter of the state Natural Hazards Mitigation Plan provides a characterization of the drought hazard in Oregon. Additionally, the chapter describes current state programs and strategies, highlights successes in mitigation, and proposes short and long-term actions for future mitigation in the state.
  - USGS Water Use in the United States: <http://water.usgs.gov/watuse/>
  - National Drought Mitigation Center: <http://www.drought.unl.edu/index.htm>. The National Drought Mitigation Center (NDMC) helps people and institutions develop and implement measures to reduce societal vulnerability to drought. The NDMC, based at the University of Nebraska – Lincoln, stresses preparation and risk management rather than crisis management.
  - NOAA’s Drought Information Center: <http://www.drought.noaa.gov/>
- Earthquake
    - Seismic Monitor: <http://www.iris.edu/seismon/>. Seismic Monitor allows you to monitor global earthquakes in near real-time, visit seismic stations around the world, and search the web for earthquake or region-related information.
    - USGS
      - Earthquake Hazards Program: <http://earthquake.usgs.gov>. Provides historic and up-to-date information on earthquakes around the world.
      - ‘Earthquakes:’ <http://pubs.usgs.gov/gip/earthq1/>
    - Cascadia Region Earthquake Workgroup: <http://www.crew.org/index.html>
    - DOGAMI: <http://www.oregongeology.com/sub/default.htm>. The mission of the Department of Geology and Mineral Industries is to serve a broad public by providing a cost-effective source of geologic information for Oregonians and to use that information in partnership to reduce the future loss of life and property due to potentially devastating earthquakes, tsunamis, landslides, floods, and other geologic hazards.
      - Geologic Hazards on the Oregon Coast  
<http://www.oregon.gov/DOGAMI/earthquakes/Coastal/CoastalHazards>

Main.shtml: includes information about coastal landslides, tsunamis, and earthquakes.

- Earthquake Hazards Program: <http://earthquake.usgs.gov/>
  - National Earthquake Information Center: <http://earthquake.usgs.gov/regional/neic/>
  - Relative earthquake hazard maps for selected urban areas in western Oregon: <http://nwdata.geol.pdx.edu/DOGAMI/ims.html>
  - Earthquake Damage in Oregon: Preliminary estimates of future earthquake losses (HAZUS) <http://www.oregongeology.com/sub/earthquakes/SP29SUMMARY.pdf>
  - Oregon Seismic Safety Policy Advisory Commission: <http://www.wsspc.org/Members/OSSPAC/index.html>. The Oregon Seismic Safety Policy Advisory Commission (OSSPAC), otherwise known as the Earthquake Commission, has the unique task of promoting earthquake awareness and preparedness through education, research, and legislation. The mission of OSSPAC is to positively influence decisions and policies regarding pre-disaster mitigation of earthquake and tsunami hazards, increase public understanding of hazard, risk, exposure, and vulnerability through education seminars, etc., and be responsive to the new studies and/or issues raised around earthquakes and tsunamis.
  - Oregon Department of Consumer & Business Services – Building Codes Division: <http://www.cbs.state.or.us/bcd/>. The Building Codes Division (BCD) sets statewide standards for design, construction and alteration of buildings that include resistance to seismic forces. BCD is active on several earthquake committees and funds construction related continuing-education programs. BCD registers persons qualified to inspect buildings as safe or unsafe to occupy following an earthquake and works with OEM to assign inspection teams where they are needed.
  - Earthquake Chapter, State Plan: [http://www.oregonshowcase.org/downloads/pdf/stateplan/OR-SNHMP\\_earthquake\\_chapter.pdf](http://www.oregonshowcase.org/downloads/pdf/stateplan/OR-SNHMP_earthquake_chapter.pdf). The Earthquake chapter of the state Natural Hazards Mitigation Plan provides a characterization of the earthquake hazard in Oregon. Additionally, the chapter describes current state programs and strategies, highlights successes in mitigation, and proposes short and long-term actions for future mitigation in the state.
  - The Pacific Northwest Seismic Network: [http://www.geophys.washington.edu/SEIS/PNSN/INFO\\_GENERAL/eqhazard.s.html](http://www.geophys.washington.edu/SEIS/PNSN/INFO_GENERAL/eqhazard.s.html). (All about earthquakes and geologic hazards of the Pacific Northwest).
  - The Seismic Retrofit of Historic Buildings: <http://www.nps.gov/history/hps/tps/briefs/brief41.htm>
- Flood
    - Department of Land Conservation and Development (DLCD): <http://www.lcd.state.or.us/>. DLCD administers the State's Land Use Planning Program. The program is based on 19 Statewide Planning Goals,

including Goal 7, related to natural hazards. DLCD also serves as Oregon's federally designated agency to coordinate floodplain management in Oregon. DLCD maintains contact with flood prone communities throughout the state in order to help them meet the requirements of the NFIP and to ensure that they are prepared in case of flood. DLCD offers information on the NFIP, CRS and other FEMA - related programs. They also offer training courses on various flood mitigation programs.

\*\*Contact DLCD to request NFIP repetitive loss information (an FMA requirement of the natural hazard mitigation plan).

- FEMA Q3 Flood Data:  
<http://www.esri.com/data/download/fema/description.html>. The Q3 Flood Data is developed by electronically scanning the current effective map panels of existing paper Flood Insurance Rate Maps (FIRMs). Certain key features are digitally captured and then converted into area features, such as floodplain boundaries. Using GIS software such as ArcGIS and ArcExplorer (Java Edition, ESRI's free data viewer) you can overlay the Q3 Flood Data with your own information (street networks, land parcels, customer addresses, etc.) to display potential flood risk zones and identify future marketing opportunities.
- Oregon Water Resources Department – Estimation of Peak Discharges:  
[http://www.wrd.state.or.us/OWRD/SW/peak\\_flow.shtml](http://www.wrd.state.or.us/OWRD/SW/peak_flow.shtml). A study of the magnitude and frequency of floods in Oregon has been completed by the Oregon Water Resources Department (OWRD) with financial assistance from the Federal Emergency Management Agency, Oregon Department of Transportation, and the Association of Oregon Counties and with the cooperation of the U.S. Geological Survey. The study was undertaken to provide engineers and land managers with the information needed to make informed decisions about development in or near watercourses.
- Oregon Emergency Management (OEM): <http://egov.oregon.gov/OOHS/OEM/>. OEM administers FEMA's Hazard Mitigation Grant Program, which provides monies for acquisition, elevation, relocation, and demolition of structures located in the floodplain. OEM also administers FEMA's Flood Mitigation Assistance Program. This program provides assistance for NFIP insured structures only. OEM also helps local jurisdictions to develop local hazard mitigation plans. OEM is heavily involved in flood damage assessment and works mainly with disaster recovery and hazard mitigation programs. OEM provides training for local governments through workshops on recovery and mitigation. OEM also helps implement and manage federal disaster recovery programs.
- Flood Chapter, State Plan:  
[http://www.oregonshowcase.org/downloads/pdf/stateplan/OR-SNHMP\\_flood\\_chapter.pdf](http://www.oregonshowcase.org/downloads/pdf/stateplan/OR-SNHMP_flood_chapter.pdf). The Flood chapter of the state Natural Hazards Mitigation Plan provides a characterization of the flood hazard in Oregon. Additionally, the chapter describes current state programs and strategies, highlights successes in mitigation, and proposes short and long-term actions for future mitigation in the state.



- Association of State Floodplain Managers:  
<http://www.floods.org/home/default.asp>
  - Flood Damage in the United States:  
<http://www.flooddamagedata.org/index.html>
  - National Association of Flood & Stormwater Management Agencies:  
<http://www.nafisma.org/>
  - National Flood Determination Association: <http://www.nfdaflood.com/>
  - Association of State Dam Safety Officials: <http://www.damsafety.org>
  - River Management Society: <http://www.river-management.org/index.asp>
  - River Network: <http://www.rivernetnetwork.org/>
- Landslide
    - DOGAMI: Geologic Hazards on the Oregon Coast  
<http://www.oregon.gov/DOGAMI/earthquakes/Coastal/CoastalHazardsMain.shtml>: includes information about coastal landslides, tsunamis, and earthquakes.
    - Landslide and Debris Flow Chapter, State Plan:  
[http://www.oregonshowcase.org/downloads/pdf/stateplan/OR-SNHMP\\_landslide\\_chapter.pdf](http://www.oregonshowcase.org/downloads/pdf/stateplan/OR-SNHMP_landslide_chapter.pdf). The Landslide and Debris Flow chapter of the state Natural Hazards Mitigation Plan provides a characterization of the landslide and debris flow hazard in Oregon. Additionally, the chapter describes current state programs and strategies, highlights successes in mitigation, and proposes short and long-term actions for future mitigation in the state.
    - USGS: Landslides <http://www.usgs.gov/hazards/landslides/>
    - American Planning Association, Landslide Research:  
<http://www.planning.org/landslides/docs/main.html>. Although a number of successful techniques for identifying and mitigating landslide hazards have been developed through federal programs at USGS and FEMA, little of this information has reached planners and other public officials at the city, town, county, or regional levels who's incremental development decisions shape the landscape. The APA's research department embarked on a program to bring together solutions from multiple disciplines into a single source. It will help serve local planning efforts in identifying landslide hazards sufficiently early in the planning process so as to minimize exposure to landslide risks.
    - FEMA: Landslide and Debris Flows: <http://www.fema.gov/hazard/landslide/>
  - Tsunami
    - USGS: <http://pubs.usgs.gov/sir/2007/5283/>. Wood, N., 2007, Variations in city exposure and sensitivity to tsunami hazards in Oregon: Reston, Va., USGS Scientific Investigations Report 2007-5283.
    - DOGAMI: Geologic Hazards on the Oregon Coast  
<http://www.oregon.gov/DOGAMI/earthquakes/Coastal/CoastalHazardsMain.shtml>

html: includes information about coastal landslides, tsunamis, and earthquakes.

- DOGAMI: Tsunami Evacuation Maps  
<http://www.oregongeology.com/sub/earthquakes/Coastal/Tsubrochures.htm>
  - NOAA Center for Tsunami Research: <http://nctr.pmel.noaa.gov/index.html>
  - National Tsunami Hazard Mitigation Program: <http://nthmp.tsunami.gov/>
  - West Coast and Alaska Tsunami Warning Center:  
<http://wcatwc.arh.noaa.gov/>
  - Tsunami Chapter, State Plan:  
[http://www.oregonshowcase.org/downloads/pdf/stateplan/OR-SNHMP\\_tsunami\\_chapter.pdf](http://www.oregonshowcase.org/downloads/pdf/stateplan/OR-SNHMP_tsunami_chapter.pdf). The Tsunami chapter of the state Natural Hazards Mitigation Plan provides a characterization of the tsunami hazard in Oregon. Additionally, the chapter describes current state programs and strategies, highlights successes in mitigation, and proposes short and long-term actions for future mitigation in the state.
- Volcano
    - USGS
      - Cascades Volcano Observatory: <http://vulcan.wr.usgs.gov/>
      - Volcano Hazards Program: <http://volcanoes.usgs.gov/> , and <http://www.usgs.gov/hazards/volcanoes/>
      - Volcano-Monitoring Techniques  
<http://volcanoes.usgs.gov/About/What/Monitor/monitor.html>
      - USGS Open-File Reports:
        - Crater Lake:  
<http://vulcan.wr.usgs.gov/Volcanoes/CraterLake/Hazards/OFR97-7-487/framework.html>
        - Mt. Hood:  
<http://vulcan.wr.usgs.gov/Volcanoes/Hood/Hazards/OFR97-89/framework.html>
        - Mt. Jefferson:  
<http://vulcan.wr.usgs.gov/Volcanoes/Jefferson/Hazards/OFR99-24/framework.html>
        - Newberry Volcano:  
<http://vulcan.wr.usgs.gov/Volcanoes/Newberry/Hazards/OFR97-513/framework.html>
        - Three Sisters Region:  
<http://vulcan.wr.usgs.gov/Volcanoes/Sisters/Hazards/OFR99-437/framework.html>
    - Volcanic Hazards Chapter, State Plan:  
[http://www.oregonshowcase.org/downloads/pdf/stateplan/OR-SNHMP\\_volcanic\\_chapter.pdf](http://www.oregonshowcase.org/downloads/pdf/stateplan/OR-SNHMP_volcanic_chapter.pdf)

- Wildfire
  - Oregon Department of Forestry: Oregon Department of Forestry seeks to promote environmental, economic, and community sustainability through the responsible management of Oregon's forests. <http://egov.oregon.gov/ODF/>
    - National Fire Plan Implementation in Oregon: Community Wildfire Protection Plans.  
[http://www.oregon.gov/ODF/FIRE/FirePlans.shtml#Community\\_Wildfire\\_Protection\\_Plans\\_CWPP\\_](http://www.oregon.gov/ODF/FIRE/FirePlans.shtml#Community_Wildfire_Protection_Plans_CWPP_). See “Current CWPP Efforts in Oregon.”
  - InciWeb (Incident Information System): <http://www.inciweb.org/>  
This website provides information about current (or very recent) wildfire incidents. It can provide information on past wildfire events, but only if you know the wildfire's name.
  - Oregon State Fire Marshal: <http://egov.oregon.gov/OSP/SFM/>. The Office of the State Fire Marshall seeks to protect people, their property and the environment from fires and hazardous materials.
  - Keep Oregon Green: <http://www.keepporengreen.org/>. Keep Oregon Green strives to prevent human-caused wildfires by educating the public about preventative measures.
  - WUI – Fire Chapter, State Plan:  
[http://www.oregonshowcase.org/downloads/pdf/stateplan/OR-SNHMP\\_fire-wui\\_chapter.pdf](http://www.oregonshowcase.org/downloads/pdf/stateplan/OR-SNHMP_fire-wui_chapter.pdf). The WUI - Fire chapter of the state Natural Hazards Mitigation Plan provides a characterization of the wui - fire hazard in Oregon. Additionally, the chapter describes current state programs and strategies, highlights successes in mitigation, and proposes short and long-term actions for future mitigation in the state.
  - Firewise: <http://www.firewise.org/>
  - Pacific Northwest National Fire Plan: <http://www.nwfireplan.gov/>
  - National Interagency Fire Center: <http://www.nifc.gov/>
  - National Database of State and Local Wildfire Mitigation Projects:  
<http://www.wildfireprograms.com/index.html>
  
- Windstorm / Winter Storm
  - Windstorms Chapter, State Plan:  
[http://www.oregonshowcase.org/downloads/pdf/stateplan/OR-SNHMP\\_windstorms\\_chapter.pdf](http://www.oregonshowcase.org/downloads/pdf/stateplan/OR-SNHMP_windstorms_chapter.pdf). The Windstorms chapter of the state Natural Hazards Mitigation Plan provides a characterization of windstorms in Oregon. Additionally, the chapter describes current state programs and strategies, highlights successes in mitigation, and proposes short and long-term actions for future mitigation in the state.
  - Pacific Northwest Chapter ISA Hazard Tree Prevention:  
<http://www.pnwisa.org/http/index.html>
  - FEMA – Taking Shelter From the Storm: Building a Safe Room Inside Your House: <http://www.fema.gov/plan/prevent/saferoom/fema320.shtm>

- Texas Tech University – Wind Engineering Research Center:  
<http://www.wind.ttu.edu/>
  - The Oregon Weather Book, A State of Extremes:  
[http://ocs.orst.edu/page\\_links/publications/weather\\_book/weather%20events/windstorms.pdf](http://ocs.orst.edu/page_links/publications/weather_book/weather%20events/windstorms.pdf)
  - Winter Storms Chapter, State Plan:  
[http://www.oregonshowcase.org/downloads/pdf/stateplan/OR-SNHMP\\_winterstorm\\_chapter.pdf](http://www.oregonshowcase.org/downloads/pdf/stateplan/OR-SNHMP_winterstorm_chapter.pdf). The Winter Storms chapter of the state Natural Hazards Mitigation Plan provides a characterization of winter storms in Oregon. Additionally, the chapter describes current state programs and strategies, highlights successes in mitigation, and proposes short and long-term actions for future mitigation in the state.
  - FEMA: Winter Storms and Extreme Cold:  
<http://www.fema.gov/hazard/winter/index.shtm>
  - FEMA: During a Winter Storm:  
[http://www.fema.gov/hazard/winter/wi\\_during.shtm](http://www.fema.gov/hazard/winter/wi_during.shtm)
  - NOAA's Winter Weather Internet References:  
<http://www.noaanews.noaa.gov/stories/s300e.htm>
  - NOAA's National Weather Service: Winter Weather Safety and Awareness  
<http://www.nws.noaa.gov/om/winter/index.shtml>
- Other
    - National Assessment of Coastal Vulnerability to Sea-Level Rise: Preliminary Results for the U.S. Pacific Coast: <http://pubs.usgs.gov/of/2000/of00-178/>
    - Oregon Office of State Fire Marshall Community Right-to-Know Hazardous Substance Information Search: <http://159.121.82.250/CR2k/cr2k.htm>

**Meeting:** Region 3 Cities Risk Assessment  
**Date:** April 15, 2009  
**Time:** 9:00 am – 5:00 pm  
**Location:** Marion County Public Works Building, 5155 Silverton Rd NE, Salem, OR

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## AGENDA

1. Overview of Workshop Agenda **(10 minutes)**
    - *Megan Findley, OPDR*
  2. What is a Risk Assessment? **(30 minutes)**
    - *Andre LeDuc, OPDR*
  3. What Does FEMA Expect in Plans Regarding Vulnerability? **(20 minutes)**
    - *Kristen Meyers, FEMA*
  4. Assessing Natural Hazards & Community Vulnerability **(1 hour)**
    - *Nate Wood, USGS & Andre LeDuc, OPDR & Valerie Saiki, CIS*
- 
- Break, 20 minutes*
- 
5. Natural Hazards Overview & Discussion **(30 minutes)**
    - *Gregoor Passchier, OPDR*
  6. Exercise: Identifying Community Assets & Vulnerabilities **(4 hours + 1hr Lunch)**
    - *Nate Wood, USGS & Andre LeDuc, OPDR*
      - a. human population
      - b. economy, cultural & historic resources
      - c. environment
      - d. land use & development
      - e. infrastructure & critical facilities
  7. Mitigation Actions & Next Steps **(30 minutes)**
    - *Megan Findley, OPDR*

**Meeting Sign-In**

Region 3 Cities Risk Assessment Workshop. April 15, 2009; 9 am-5 pm  
 Marion County Public Works Building. 5155 Silvertown Rd NE, Salem, OR.

Name	Representing	Email	Roundtrip mileage (if applicable)
Kaurie Boyce	City of Aurora	recorder@ci.aurora.or.us	
Kelly Richardson	City of Aurora	clerk@ci.aurora.or.us	52 round trip
Joseph MURRAY	OMS, OREGON EMERGENCY MNGT.	j.murray@oem.state.or.us	N/A (ALREADY 50% FED. FUNDED)
Bill Duvus	DDG AUST		

Name	Representing	Email	Roundtrip mileage (if applicable)
Sam Litke	City of Keizer	litkes@keizer.org	15
Kevin Watson	City of Keizer	watsonk@keizer.org	15
Julie Amicci	Tigard PETS	Julie.pdx@hotmail.com	50
Bruce Anderson	Keizer Chamber of Commerce - NW Natural	bruce.anderson@nwnatural.com	10

Name	Representing	Email	Roundtrip mileage (if applicable)
WILLIS HILL	CITY OF ALBANY	willis.hill@cityofalbany.net	
ROD CONWAY	Keizer Fire District	rconway@keizerfire.com	
Prof Frederick	City of Keizer	KISSLER R@KEIZER.ORG	
Laurel Reimer	Resource Assistance for Rural Environments - Clackamas County	lreimer@co.clackamas.or.us	80
NATE WOOD	U.S. Geological Survey	nwood@usgs.gov	
Louise Kubo	University of Hawaii National Disaster Preparedness Training Center	kubol@hawaii.edu	
Vaderine Saiki	City County Insurance	USAIKE@ccisources.com	16
KRISTEN MEYERS	FEMA RX	KRISTEN.MEYERS@DHS.GOV	



Name	Representing	Email	Roundtrip mileage (if applicable)
DAN DOLENE	CITY OF WOODBURN	dan.dolene@ci.woodburn.or.us	
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Dan Brown	CITY OF WOODBURN	DAN.BROWN@CI.WOODBURN.OR.US	
Jim Hendryx	City of Woodburn	jim.hendryx@ci.woodburn.or.us	

Name	Representing	Email	Roundtrip mileage (if applicable)
Doreen Kelly	Silverton Together City of Silverton	dk@silverfalls.k12.or.us	
Ed Grambusch	Silverton FIRE DISTRICT	edgrambusch@silvertonfire.com	
Genie Stoll	Silverton Beverage Business	dstoll@verizon.net	
Rick Lewis	Silver Police Dept	News@Silverton.or.us	
Bryan Cosgrave	Silverton	bcosgrave@silverton.or.us	
Steve Kay	CITY OF SILVERTON	skay@silverton.or.us	
JAREZ MATHEWS	SILVERTON SMALL BUSINESS	bangsandburns@pngusa.net	
Rich Barstard	City of Silverton	barstard@silverton.or.us	

NITA MARR Woodburn Police/City of Union nita.marr@ci.woodburn.or.us

## ANNEX TO MARION COUNTY BASIC EMERGENCY OPERATIONS PLAN

### HAZARD ANALYSIS

#### I. PURPOSE

The purpose of this annex is to examine the range of hazards Marion County is subject to and makes an assessment to determine the relative risks associated with those hazards. It will also identify those hazards that would likely tax the ability of the County's emergency responders, "quantifying" them compared to one another to assist in establishing emergency planning priorities.

#### II. HAZARD ANALYSIS MATRIX

The hazards listed in the matrix below are the most likely to result in a disaster. This matrix is based on a hazard analysis system used nationally. It compiles a score for each of the identified hazards, and an explanation of the factors used in the scoring system. These scores indicate where the hazard should be ranked in emergency planning priorities. Following the table is a guide to the values used in the matrix.

HAZARD	HISTORY (WF=2)	VULNERABILITY (WF=5)	MAX THREAT (WF=10)	PROBABILITY (WF=7)	TOTAL
EARTHQUAKE	2 X 10 (H) 20	5 X 10 (H) 50	10 X 10 (H) 100	7 X 10 (H) 70	240
FLOOD	2 X 10 (H) 20	5 X 5 (M) 25	10 X 10 (H) 100	7 X 10 (H) 70	215
SEVERE WEATHER	2 X 10 (H) 20	5 X 10 (H) 50	10 X 10 (H) 100	7 X 10 (H) 70	240
CIVIL DISORDER/TERRORISM	2 X 1 (L) 2	5 X 10 (H) 50	10 X 10 (H) 100	7 X 5 (M) 35	187
DAM FAILURE	2 X 1 (L) 2	5 X 10 (H) 50	10 X 10 (H) 100	7 X 1 (L) 7	159
TRANSPORTATION. ACCIDENT HAZMAT	2 X 1 (L) 2	5 X 5 (M) 25	10 X 5 (M) 50	7 X 10 (H) 70	147
WILDLAND INTERFACE FIRE	2 X 1 (L) 2	5 X 5 (M) 25	10 X 5 (M) 50	7 X 5 (M) 35	112
VOLCANIC ERUPTION	2 X 1 (L) 2	5 X 5 (M) 25	10 X 5 (M) 50	7 X 1 (L) 7	84

**Meeting:** Goals & Action Item Work Session  
**Date:** June 10, 2009  
**Time:** 1:00 – 5:00 PM  
**Location:** Marion County Public Works Building, 5155 Silverton Rd NE, Salem, OR

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## AGENDA

1. Overview of Day (15 minutes)
  - Megan Findley, OPDR
  
2. Mission & Goals (30 minutes)
  - Gregoor Passchier, OPDR
  
3. Actions Item Overview & Selection (1 hour)
  - Megan Findley, OPDR & Group Discussions
  
- *Break, 15 minutes*  
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4. Action Item Development (1.5 hours)
  - Megan Findley, OPDR & Group Discussions
  
5. Conclusion & Next Steps (30 minutes)
  - Megan Findley, OPDR

Meeting Sign-In

Region 3 Cities Action Item Development Workshop. June 10, 2009; 1 pm-5 pm  
 Marion County Public Works Building. 5155 Silverton Rd NE, Salem, OR.

Name	Representing	Email	Roundtrip mileage (if applicable)
Mauree Boyce	City of Aurora	records@ci.aurora.or.us	
Kelly Richardson	City of Aurora	clerk@ci.aurora.or.us	52 miles
JASON FLUSTY	WOODBURN P.D.	jason.flusty@ci.woodburn.or.us	
Natalie LABOSSIERE	WOODBURN Planning	natalie.labossiere@ci.woodburn.or.us	
DARREZ MATTHEWS	SILVERTON	bangsandburns@ingusand	
Nida Mann	Woodburn P.D.	nida.marreci.woodburn.or.us	34mi. R.T.
Bryon Cosgrove	City of Silverton	bcosgrove@silverton.or.us	24

Name	Representing	Email	Roundtrip mileage (if applicable)
Riot Lewis	City of Silverton	news@silverton.or.us	N/A
Spire Stoll	City of Silverton	dstoll@uairizon.net	N/A
Doreen Kelly	Silverton Together	doreen@silvertontogether.com	
Ed Grambusch	SILVERTON FIRE DISTRICT	edgrambusch@silvertonfire.com	- N/A -
DARREZ MATHEWS	SILVERTON SMALL BUSINESS	bangsawburns@pugusa.net	N/A
Rich Barstad	City of Silverton	rbarstad@silverton.or.us	N/A

Name	Representing	Email	Roundtrip mileage (if applicable)
Kevin Watson	City of Keizer	watsouk@keizer.org	20
Sam Litke	City of Keizer	litkes@keizer.org	20

## Eligible and Ineligible Mitigation Projects

(The following language is taken from the Federal Emergency Management Agency's FY2010 Hazard Mitigation Assistance (HMA) Unified Guidance. This is the guidance document for HMA applications submitted during the FY 2010 grant cycle and for disasters occurring on or after June 1, 2009). Please see the following link for more information: <http://www.fema.gov/library/viewRecord.do?id=3649>

### D.1.1 [Eligible] Mitigation Projects

◆ **Property Acquisition and Structure Demolition** - The acquisition of an existing at-risk structure and, typically, the underlying land, and conversion of the land to open space through the demolition of the structure. The property must be deed-restricted in perpetuity to open space uses to restore and/or conserve the natural floodplain functions. For property acquisition and structure demolition projects, see Part IX A.

◆ **Property Acquisition and Structure Relocation** - The physical relocation of an existing structure to an area outside of a hazard-prone area, such as the Special Flood Hazard Area (SFHA) or a regulatory erosion zone and, typically, the acquisition of the underlying land. Relocation must conform to all applicable State and local regulations. The property must be deed-restricted in perpetuity to open space uses to restore and/or conserve the natural floodplain functions. For property acquisition and structure relocation projects, see Part IX A.

◆ **Structure Elevation** - Physically raising an existing structure to an elevation at or above the Base Flood Elevation (BFE) or higher if required by FEMA or local ordinance. Structure elevation may be achieved through a variety of methods, including elevating on continuous foundation walls; elevating on open foundations, such as piles, piers, posts, or columns; and elevating on fill. Foundations must be designed to properly address all loads, be appropriately connected to the floor structure above, and utilities must be properly elevated as well. FEMA encourages Applicants and subapplicants to design all structure elevation projects in accordance with the American Society of Civil Engineers (ASCE) 24-05 *Flood Resistant Design and Construction*. For additional information about the NFIP and structure elevation projects, see Part X C.1.

◆ **Mitigation Reconstruction** - The construction of an improved, elevated building on the same site where an existing building and/or foundation has been partially or completely demolished or destroyed. Mitigation reconstruction is only permitted if traditional structure elevation cannot be implemented and for structures outside of the regulatory floodway or coastal high hazard area (Zone V) as identified by the existing best available flood hazard data. Activities that result in the construction of new living space at or above the BFE will only be considered when consistent with the Mitigation Reconstruction requirements. Such activities are only eligible under the **SRL** Pilot program. For additional information about mitigation reconstruction projects, see Part IX D.

◆ **Dry Floodproofing** - Techniques applied to keep structures dry by sealing the structure to keep floodwaters out. For all dry floodproofing activities, FEMA



encourages Applicants and sub-applicants to design all dry floodproofing projects in accordance with ASCE 24-05 *Flood Resistant Design and Construction*.

- **Dry Floodproofing of Historic Residential Structures** is permissible only when other techniques that would mitigate to the BFE would cause the structure to lose its status as defined a Historic Structure in 44 CFR Part 59.1.
- **Dry Floodproofing of Non-residential Structures** must be performed in accordance with NFIP Technical Bulletin 3-93, *Non-Residential Floodproofing – Requirements and Certification*, and the requirements pertaining to dry floodproofing of nonresidential structures found in 44 CFR Parts 60.3(b)(5) and (c)(4).

◆ **Minor Localized Flood Reduction Projects** – These projects may include the installation or modification of culverts and floodgates, minor floodwall systems that generally protect an individual structure or facility, stormwater management activities such as creating retention and detention basins, and the upgrade of culverts to bridges. These projects must not duplicate the flood prevention activities of other Federal agencies and may not constitute a section of a larger flood control system.

- For **FMA**, **RFC**, and **SRL** at least 50 percent of the structures directly benefiting from this mitigation activity must be NFIP-insured. For **RFC** and **SRL**, these projects must primarily benefit RFC or SRL structures, respectively. Documentation must be provided in the sub-application that identifies all structures that will benefit from this mitigation activity.

◆ **Structural Retrofitting of Existing Buildings** – Modifications to the structural elements of a building to reduce or eliminate the risk of future damage and to protect inhabitants. The structural elements of a building that are essential to protect in order to prevent damage include foundations, load-bearing walls, beams, columns, structural floors and roofs, and the connections between these elements.

◆ **Non-structural Retrofitting of Existing Buildings and Facilities** – Modifications to the non-structural elements of a building or facility to reduce or eliminate the risk of future damage and to protect inhabitants. Non-structural retrofits may include bracing of building contents to prevent earthquake damage or the elevation of heating and ventilation systems.

◆ **Safe Room Construction** – Safe room construction projects are designed to provide immediate live safety protection for people in public and private structures from tornado and severe wind events, including hurricanes. For HMA, the term “safe room” only applies to extreme wind (combined tornado and hurricane) residential, non-residential, and community safe rooms; tornado community safe rooms; and hurricane community safe room. This type of project includes retrofits of existing facilities or new safe room construction projects, and applies to both single and multi-use facilities. For additional information, see Part IX C.

◆ **Infrastructure Retrofit** – Measures to reduce risk to existing utility systems, roads, and bridges.

◆ **Soil Stabilization** – Projects to reduce risk to structures or infrastructure from erosion and landslides, including installing geo-textiles, sod stabilization, installing vegetative buffer strips, preserving mature vegetation, decreasing slope angles, and stabilizing with rip rap and other means of slope anchoring. These projects must not duplicate the activities of other Federal agencies.

◆ **Wildfire Mitigation** – Projects to mitigate the risk to at-risk structures and associated loss of life from the threat of future wildfire through:

- **Defensible Space for Wildfire** – Projects creating perimeters around homes, structures, and critical facilities through the removal or reduction of flammable vegetation. For additional information, see Part IX B.3.1.

- **Application of Ignition-resistant Construction** – Projects that apply ignition resistant techniques and/or non-combustible materials on new and existing homes, structures, and critical facilities. For additional information, see Part IX B.3.2.

- **Hazardous Fuels Reduction** – Projects that remove vegetative fuels proximate to the at-risk structure that, if ignited, pose significant threat to human life and property, especially critical facilities. For additional information, see Part IX B.3.3.

◆ **Post-Disaster Code Enforcement** – Projects designed to support the post-disaster rebuilding effort by ensuring that sufficient expertise is on hand to ensure appropriate codes and standards, including NFIP local ordinance requirements, are utilized and enforced. For additional information, see Part VIII A.8.

◆ **5% Initiative Projects** – These projects provide an opportunity to fund mitigation actions that are consistent with the goals and objectives of the State and local Hazard Mitigation Plans and meet all HMGP program requirements, but for which it may be difficult to conduct a standard BCA to prove cost effectiveness. For additional information, see Part VIII A.10.

## **D.2 Ineligible Activities**

- ◆ Projects that do not reduce the risk to people, homes, neighborhoods, structures, or infrastructure;
- ◆ Projects that are dependent on another phase of a project(s) in order to be effective and/or feasible (i.e., not a stand-alone mitigation project that solves a problem independently or constitutes a functional portion of a solution.);
- ◆ Projects for which actual physical work such as groundbreaking, demolition, or construction of a raised foundation has occurred prior to award. Projects for which demolition and debris removal related to structures proposed for acquisition or mitigation reconstruction has already occurred may be eligible when such activities were initiated or completed under the FEMA Public Assistance program to alleviate a health or safety hazard as a result of a disaster;
- ◆ Projects constructing new buildings or facilities with the exception of safe room construction and SRL mitigation reconstruction;
- ◆ Projects that create revolving loan funds;
- ◆ Activities required as a result of negligence or intentional actions, or the reimbursement of legal obligations such as those imposed by a legal settlement, court order, or State law;
- ◆ Projects located in a Coastal Barrier Resource System (CBRS) Unit, or in an Otherwise Protected Area;
- ◆ Activities on Federal lands or associated with facilities owned by another Federal entity;
- ◆ Major flood control projects related to the construction, demolition, or repair of dams, dikes, levees, floodwalls, seawalls, groins, jetties, breakwaters, and erosion projects related to beach nourishment or re-nourishment;
- ◆ Projects for hazardous fuels reduction in excess of 2 miles from structures;
- ◆ Projects that address unmet needs from a disaster that are not related to mitigation;
- ◆ Retrofitting facilities primarily used for religious purposes, such as places of worship (or other projects that solely benefit religious organizations). A place of worship may, however, be included in a property acquisition and structure demolition or relocation project provided that the project benefits the entire community, such as when the whole neighborhood or community is being removed from the hazard area;
- ◆ Projects that only address man-made hazards;
- ◆ Projects that address operation, deferred or future maintenance, repairs, or replacement (without a change in the level of protection provided) of existing structures, facilities, or infrastructure (e.g., dredging, debris removal, replacement of obsolete utility systems, bridges, and facility repair/rehabilitation);

- ◆ Projects to do the following:
  - Landscaping for ornamentation (trees, shrubs, etc);
  - Site remediation of hazardous materials (with the exception eligible activities such as, the abatement of asbestos and/or lead-based paint and the removal of household hazardous wastes to an approved landfill);
  - Water quality infrastructure;
  - Address ecological or agricultural issues;
  - Protection of the environment and/or watersheds;
  - Forest management;
  - Prescribed burning or clear-cutting;
  - Creation and maintenance of fire breaks, access roads, or staging areas; and
  - Irrigation systems;
- ◆ Mapping, flood studies, and planning activities, such as plan revisions/amendments or risk assessments, when they do not result in a FEMA-approved hazard mitigation plan;
- ◆ Studies not directly related to the design and implementation of a proposed mitigation project; and
- ◆ Preparedness measures and response equipment (e.g., response training, electronic evacuation road signs, interoperable communications equipment).

**Meeting:** Plan Implementation & Maintenance Work Session  
**Date:** July 29, 2009  
**Time:** 1:00 – 5:00 PM  
**Location:** Marion County Public Works Building, 5155 Silverton Rd NE, Salem, OR

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## AGENDA

1. Workshop Overview (10 minutes)
    - Megan Findley, OPDR
  2. Grant Opportunities & Resources Overview (15 minutes)
    - Gregoor Passchier, OPDR
  3. Identifying Conveners & Members of the Coordinating Body (30 minutes)
    - Megan Findley, OPDR & Group Discussions
  4. Project Prioritization Process (30 minutes)
    - Megan Findley, OPDR
- 
- Break, 15 minutes*
- 
5. Plan Maintenance Scheduling & Five Year Updates (45 minutes)
    - Krista Dillon, OPDR & Group Discussions
  6. Continued Public Involvement (30 minutes)
    - Gregoor Passchier, OPDR & Group Discussions
  7. Moving Projects Forward (20 minutes)
    - Krista Dillon, OPDR
  8. Benefit Cost Analysis (45 minutes)
    - Dennis Sigrist, OEM

## Meeting Sign-In

Region 3 Cities Plan Implementation and Maintenance Workshop. July 29, 2009; 1 pm-5 pm  
Marion County Public Works Building. 5155 Silverton Rd NE, Salem, OR.

Name	Representing	Email	Roundtrip mileage (if applicable)
Laurie Boyce	City of Aurora	records@ci.aurora.or.us	
Kelly Richardson	City of Aurora	clerk@ci.aurora.or.us	52
Bryan Cozme	City of Silverton	bcozme@silverton.or.us	30
STEVE KAY	CITY OF SILVERTON	skay@silverton.or.us	30
DARREZ MATHews	CITY/SILVERTON	N/A	N/A
Natalie Labossiere	Woodburn	natalie.labossiere@ci.woodburn.or.us	40
Genie Stoll	Silverton	dstoll@verizon.net	30

Name	Representing	Email	Roundtrip mileage (if applicable)
Rich Berzfoel	City of Silverton	rberzfoel@silverton.or.us	
Rick Lewis	City of Silverton	rlewis@silverton.or.us	
Nita Marr	City of Woodburn	nita.marr@ci.woodburn.or.us	34mi.
Ed Grambusch	Silverton Fire Dist.	edgrambusch@silvertonfire.com	
Sam Little	City of Keizer	Slittle@keizer.org	

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## **benefit/cost analysis**

**Dennis Sigrist**  
**OMD-Oregon Emergency Management**

**July 29, 2009**



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## **What is benefit/cost analysis?**





## What is benefit/cost analysis?

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**Benefit/cost analysis is a way of determining if the anticipated benefits being computed on a net present value basis are greater than the cost of a project.**

FEMA provides benefit/cost analysis software (standalone software application) for the following hazards: earthquake, flood, wildfire, wind and other.



## factors to consider during a BCA

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- **total project cost**
- **life of the project**
- **maintenance costs**
- **displacement costs**
- **value of the property being protected**
- **Specific, documented past damages**
- **event frequency and severity/magnitude**
- **level of protection provided**



## **benefit/cost analysis**

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**a cost-effective project will have a  
benefit/cost ratio > 1.0**

**benefit/cost = bc ratio (BCR)**



## **Why conduct benefit/cost analysis?**

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- **meet statutory eligibility requirements required for federal grant funding**
- **determine whether or not a project is “worth” doing**
- **have a common basis on which to compare projects**
- **show that mitigation works (post-disaster loss avoidance studies)**



## **statutory and regulatory documents**

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**Some of the legal and regulatory documents for benefit/cost analysis are:**

**OMB Circular A-94 – Benefit/Cost Analysis of Federal Programs**

**Federal Disaster Assistance – Stafford Act**

**Unified Hazard Mitigation Assistance (HMA)**

– **All hazard: PDM and for flood: FMA, SRL and RFC**

– **Hazard Mitigation Grant Program - 44 CFR Part 206**



## **definition**

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**benefits – Are the expected avoided damages and avoided losses over the lifetime of the mitigation project.**



## **mitigation project benefits**

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**The project benefit calculation is based on four key elements:**

- **event frequency and severity**
- **damages and losses before mitigation**
- **damages and losses after mitigation**
- **economic factors including the discount rate and the mitigation project useful lifetime**



## **project benefits: direct damages and losses avoided**

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- **avoided damages to buildings and other facilities or infrastructure**
- **avoided damages to contents**
- **avoided loss of function costs**
- **avoided emergency response costs**



## mitigation project costs

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- **governed by OMB A-87, *Cost Principles for State, Local, and Indian Tribal Governments***
- **cost of entire project (not just the costs represented in the federal share of the application budget) must be considered in b/c analysis**



## project costs

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- **engineering/design fees and structural analysis**
- **construction/retrofit costs**
- **construction management costs**
- **project management costs**
- **property acquisition costs**
- **relocation expenses (URA)**
- **permit fees**



## **the benefit/cost model**

### **economics terminology and concepts**

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- **net present value – Is the value today of money that you will receive in the future.**
  
- **discount rate – Is an interest rate used to determine the time value of money. For federally funded mitigation projects, the discount rate is established by the U.S. Office of Management and Budget (OMB) to be 7%. This number has not changed for some time.**



## **definitions**

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**project useful lifetime – Is the estimated time period over which the mitigation project will maintain its effectiveness in preventing or reducing damages and losses from future disasters, e.g., 30, 50 or 100 years.**

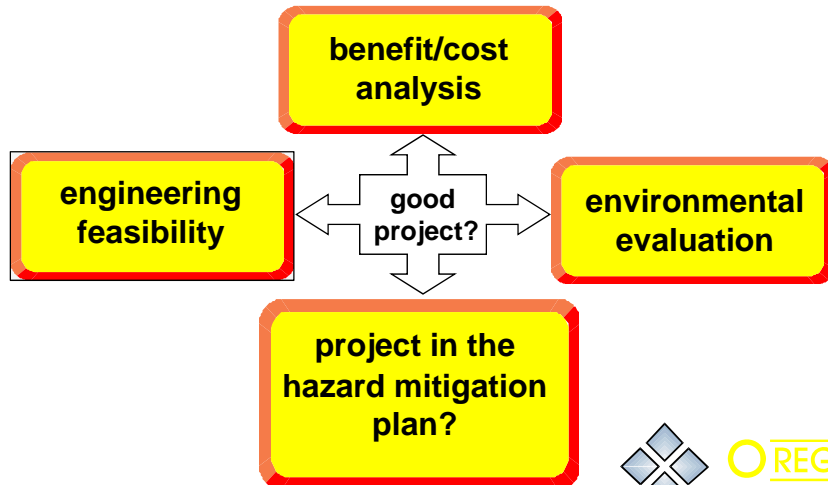
**present value coefficient – The PVC expresses the combined effect of the discount rate and the project useful lifetime on the net present value of future benefits.**



## benefit/cost analysis example

Flood Depth (feet)	Expected Annual Damages <i>Before</i> Mitigation	Expected Annual Damages <i>After</i> Mitigation	Expected Annual Avoided Damages and Losses
0	\$1,312	\$ 0	\$1,312
1	\$1,765	\$ 0	\$1,765
2	\$2,124	\$ 0	\$2,124
3	\$ 673	\$ 0	\$ 673
4	\$ 315	\$63	\$ 252
5	\$ 123	\$49	\$ 74
<b>Totals</b>	<b>\$6,312</b>	<b>\$112</b>	<b>\$6,200</b>
			PVC (7% Discount Rate, 30 years) 12.41
			Net Present Value of Future Benefits \$76,942
			Costs \$20,000
			<b>Benefit-Cost Ratio 3.85</b>

## project development



## sources of information

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- contractor support
- FEMA Internet  
<http://www.bchelpline.com/BCAToolkit/>
- **BCA Toolkit version 4.5, which includes:** NEW
  - Downloadable software from FEMA
  - Runs under Windows XP/Vista
  - Standalone Application
  - Built-in Help/Guidance
  - Construction cost estimator
  - Damage-Frequency Assessment
  - Export/Import Capability
  - Project Portfolios

available free of charge via:  
866-222-3580 or  
web: [www.bchelpline.com](http://www.bchelpline.com)



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## questions or comments?





# Survey Monkey Stakeholder Interview Questions

Greetings:

You have been selected to participate in a survey that will assist in your community's development of a natural hazards mitigation\* plan. This survey is being distributed to a select group of stakeholders in the cities of Aurora, Keizer, Silverton and Woodburn. Your contributions will be reflected in your community's mitigation plan where possible. Please take a moment to review the information below, and to complete 8 questions on the following pages. This survey should take about 15 minutes to complete.

The questions that you will see on the following pages will ask about the natural hazards in your community, and natural hazards mitigation activities that you would like to see implemented. This survey was developed by the Oregon Partnership for Disaster Resilience at the University of Oregon. Please visit the Partnership's website ([www.oregonshowcase.org](http://www.oregonshowcase.org)) for more information regarding natural hazards mitigation in your community.

If you have any questions or concerns, please contact Megan Findley, Pre-Disaster Mitigation Program Manager, at [mfindley@uoregon.edu](mailto:mfindley@uoregon.edu) or 541.346.2305.

\*Natural hazards mitigation is defined as permanently reducing or alleviating the losses of life, property and injuries resulting from natural hazards through long and short-term strategies. 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. The natural hazards that will be addressed in the community mitigation plans include droughts, floods, wildfires, landslides, earthquakes, wind storms, winter storms, and volcanoes.

## Questions

1. Please identify the organization that you represent.
  - Include a box for no organization and/or citizen representative
2. What is the primary mission and/or purpose of your organization?
  - Include a "does not apply" box
3. From your perspective, what hazard(s) pose the greatest threat to your community?
  - Give Matrix
4. What natural hazard events have affected your community in the past? Please explain the impacts and/or damages sustained from those events.
5. Does your organization have a plan in place to respond to/recover from natural hazards?
6. Natural hazard mitigation is the act of reducing or eliminating future loss of life, property, or injuries resulting from hazards through short term and long-term activities.  
Mitigation actions can be grouped into the following six types:

- Prevention: government administrative or regulatory actions or processes that influence the way land and buildings are developed and built.
- Property Protection: actions that involve the modification of existing buildings or structures to protect them from a hazard or removal from the hazard area.
- Public Education & Awareness: actions to inform and educate citizens, elected officials and property owners about hazards and mitigation strategies.
- Natural Resource Protection: actions that minimize hazard losses and also preserve or restore the functions of natural systems.
- Emergency Services: actions that protect people and property during and immediately after a disaster or hazard event.
- Structural Projects: actions that involve the construction of structures to reduce the impact of a hazard.

What types of mitigation activities would you like to see happen within your community? Please provide examples if you have specific projects in mind:

7. Any interested persons, groups and/or organizations can assist in building the community's resilience to natural hazards. For example, neighborhood groups can teach residents in forested areas about how to reduce risk from wildfires by installing metal roofs or eliminating combustible materials around buildings.

Is your organization able and/or willing to assist with any of the following? Please check all that apply.

- Education and outreach
  - Information dissemination
  - Plan/Project Implementation
  - Other \_\_\_\_\_
8. Would you like to be contacted in the future to review plan drafts?
    - No, thanks
    - Yes, please
  9. Would you like to be contacted for further discussion?
    - No, thanks
    - Yes, please

## **Aurora Community Stakeholders**

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### **Organization**

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City of Aurora

Marion County

City of Aurora

Aurora Rural Fire Protection District

City of Aurora

City of Aurora

Chamber of Commerce/Aurora Colony Visitors Association

Aurora Colony Historical Society

Pudding River Watershed Council/Cascadia Planners

North Marion School District-Public/Private Schools K-12

Marion County

Aurora State Airport

Builders, Developers, and Realtors

Associated Press

KATU Channel 2

KGW Channel 8

KOIN Channel 6

KPTV Channel 12

Canby Herald

## Keizer Community Stakeholders

Name	Job Title	Organization
Chris Eppley	City Manager	City of Keizer
Shannon Johnson	City Attorney	Lien & Johnson
Susan Gahlsdorf	Finance Director	City of Keizer
Jim Trussel	Building Inspector	Marion County
John Teague	Captain	City of Keizer Police
Nate Brown	Community Development Director	City of Keizer
Cathy Miles	Owner	Shelter Management Inc.
Christine Dierker	Director	Chamber of Commerce
Cheryl Lacom-Anderson	Executive Dir.	Avamere Court
David Fridenmaker	Planning Director	Salem/Keizer School District
Gene Bloom	Safety Officer	Salem/Keizer School District
John Sullivan	General Manager	Loren's Sanitation Service
Mary Kanz	Executive Dir.	Mid-Valley Garbage & Recycling
Jamie Pedersen	Office Manager	Mid-Valley Garbage & Recycling
Francis Kessler	Plant Manager	City of Salem Wastewater
Roger Kuhlman	Engineering & Operations Manager	Salem Electric
John Werst	Associate Pastor	Dayspring Fellowship Church
Mark Caillier	City Councilor	City of Keizer
Elizabeth Sagmiller	Stormwater Manager	City of Keizer
Ron Comcast	Key Customer Manager	Portland General Electric
Doug Wells	Manager	Emerald Pointe
Lyndon Zaitz	Owner	Keizer Times Newspaper West Keizer Neighborhood Association
Rhonda Rich		
Nancy	Assistant to the President	Marion Polk Food Share
Ron Hays	President	Marion Polk Food Share Gubser Neighborhood Association
Allen Prell		
Bill Lawyer	PW Superintendent	City of Keizer
Pat Taylor	Public Works	City of Keizer
Mike Griffin	Public Works	City of Keizer
Matt Reyes	Public Works	City of Keizer
Jenniffer Warner	Public Works	City of Keizer
Ray Hansen	Co-Coordinator	EVAK
Jacque Moir	Co-Coordinator	EVAK
Erica		Salem Clinic

## Silverton Community Stakeholders

Name	Organization
Pete Paradis - Maintenance	Silverton School District
Craig Roessler - Superintendent	
Jamie Baxter - Emergency Man.	Silverton Hospital
Brian Van Smoorenburg	NW Natural Gas
Bill Burns	State Geology Dept
Rock Sander	PGE
Robyn Murbach	Allied Waste
Jeff Kresner	Red Cross
Stacy Palmer - Director	Chamber of Commerce
Ray Hunter	Historical Society
Steve Starnier - Sewer Plant	Watershed Council
Brenda Sturdevant - Director	Silverton Together
	Hispanis Unidas
	SACA
	Head Start
Pete Larson (Bruce Pac)	Large Business
Bill Cummins (also City Council)	Large Business
Darren Rybloom (Roths)	Large Business
Dixon Bledsoe	Realtor
Mason Branstetter	Realtor
Dennis Downey	Builder
Maurice Leach - SCAN Tv	Media
Gus Frederick	Silverton Grange
Stu Rasmussen	Mayor
	Service Club - Rotary
	Service Club - Kiwanis
	Service Club - Zenith Women
	Service Club - Lions
	Service Club - Elks
Oregon Garden	Community Organization
	Faith Community
Ken Hector	General Public
Michael Jesse	Small Business
Sam Sloper	Financial Institution
Capt. Appt - National Guard	State of Oregon

## Woodburn Community Stakeholders

<b>Name</b>	<b>Job Title</b>	<b>Organization</b>
Charlie Blevins	Police Captian	City of Woodburn
Christine Vistica	Business Manager	St. Lukes Catholic Church
Deb Yager	Member	Woodburn Chamber of Commerce
Elias Villegas	Director	Chemeketa Community College- Woodburn
Eric Liljequist	Assistant City Engineer	City of Woodburn
Jim Row	Community Services Director	City of Woodburn
Kathy Figley	Mayor	City of Woodburn
Kevin Hendricks	Fire Chief	Woodburn Fire District
Matt Gwynn	Public Works Division Manger - Maintenance	City of Woodburn
Natalie Labossiere	Senior Planner	City of Woodburn
Randy Scott	Public Works Division Manger - Water Resources	City of Woodburn
Scott Derickson	City Administator	City of Woodburn
Shawn K. Baird	President	Woodburn Ambulance Services

Please identify the organization that you represent.	
Answer Options	Response Count
	10
<i>answered question</i>	10
<i>skipped question</i>	0
Number	Response Text
1	City of Salem Willow Lake Water Pollution Control Facility
2	Loren's Sanitation
3	Salem/Keizer School District (24J)
4	Mid-Valley Garbage & Recycling Association
5	Emerald Pointe Retirement
6	City of Keizer / Public Works Department
7	myself
8	City of Keizer
9	EVAK [Emergency Volunteers Assisting Keizer]
10	City of Keizer

What is the primary mission and/or purpose of your organization?	
Answer Options	Response Count
	10
<i>answered question</i>	10
<i>skipped question</i>	0
Number	Response Text
1	Wastewater Treatment
2	Solid waste and Recycling
3	To promote the learning well being of our students
4	Garbage haulers association.
5	Senior Retirement housing
6	Local Government
7	n/a
8	Keep city government costs and services to a minimum by providing city services to the community in a coordinated, efficient and least cost fashion.
9	We are organized to help the City of Keizer and the Keizer Fire Department in the following areas - answering phones, amateur radios [ARES], any assistance areas, helping in the EOC [Emergency Operations Center], transportation, and animal shelter.
10	Local Government



In which city is your organization located?		
Answer Options	Response Frequency	Response Count
Aurora	0.0%	0
Keizer	100.0%	10
Silverton	0.0%	0
Woodburn	0.0%	0
Other (please specify)		3
<i>answered question</i>		10
<i>skipped question</i>		0

Number	Other (please specify)
1	Regional Facility Serving Salem, Keizer, Turner
2	Salem
3	Main office is: Brooks

The following natural hazards are included within your community's natural hazards mitigation plan. Please estimate the level of risk that you think each hazard poses to your community.						
Answer Options	Extreme Risk	Some Risk	Little Risk	No Risk	Do Not Know	Response Count
Drought	0	1	6	2	1	10
Earthquake	3	7	0	0	0	10
Flood	7	3	0	0	0	10
Landslide / Debris Flow	0	1	6	3	0	10
Wildfire	0	5	3	2	0	10
Volcanic Eruption	3	4	3	0	0	10
Wind Storm	3	7	0	0	0	10
Severe Winter Storm	3	7	0	0	0	10
<i>answered question</i>						10
<i>skipped question</i>						0

Do you recall any instances in which the following natural hazards affected your community?			
Answer Options	Yes	No	Response Count
Drought	1	7	8
Earthquake	5	3	8
Flood	9	0	9
Landslide / Debris Flow	0	8	8
Volcanic Eruption	7	1	8
Wildfire	0	8	8
Wind Storm	8	1	9
Severe Winter Storm	8	1	9
<i>answered question</i>			9
<i>skipped question</i>			1

If you answered 'yes' to any of the hazards above, please describe the events that occurred (i.e., dates of events and/or a description of community impacts that occurred).		
Answer Options	Response Frequency	Response Count
Drought	22.2%	2
Flood	88.9%	8
Earthquake	66.7%	6
Landslide / Debris Flow	22.2%	2
Volcanic Eruption	66.7%	6
Wildfire	22.2%	2
Wind Storm	88.9%	8
Severe Winter Storm	88.9%	8
<i>answered question</i>		9
<i>skipped question</i>		1

Number	Drought	Flood	Earthquake	Landslide / Debris Flow	Volcanic Eruption	Wildfire	Wind Storm	Severe Winter Storm
1		1996 Flood shut down plant when PGE disconnected power to prevent electrical hazards from flooding large electrical gear.	Several small earthquakes over the years have caused minor structural issues.		Mt St. Helens eruption deposited ash which caused minor equipment issues related to wear and tear on exposed equipment and air filtering units.		Numerous over the years causing power interruptions/outages.	Numerous over the years have resulted in power interruptions/outages and process disruptions.
2		Keizer floods a few years back						
3	Summer July/August about 2000 water rationing suggested. Asked not to wash car in driveway, water lawn even/odd days, reduce shower time	Feb 1996, road closures, business and a few homes damaged with flood water, people evacuated in some areas.	Mt. Angel EQ, morning around 6am, some structural damage to some older buildings, Mt. Angel abby had some damage, caused folks to think about EQ preparedness		Mt. St. Helens eruption--1981?		Multiple times in the past ten years, many trees down, power lines, debris scattered	Dec. 2008 silver freeze caused a lot of tree damage, limbs falling on structures, fences
4			several earthquakes in past several decades, minor to medium damage		mt. st. helens 1980, severe ash problem		hurricane level a few times, medium to severe damage	medium to severe damage

Number	Drought	Flood	Earthquake	Landslide / Debris Flow	Volcanic Eruption	Wildfire	Wind Storm	Severe Winter Storm
5		Mid 90's extreme rain...river couldn't handle it including our drainage which got backed up					Handful of times over the last 10 yrs. heavy winds brought down trees...lost power.	Heavy snow combined with freezing rain shut the community down for a few days. Lost power.
6	n/a	1964, 1996, 1997 and before	mild ones nothing big YET!	only during flood events	St. Helens eruption and the ash that followed	n/a	Columbus day storm	Past winter snow storm caused some problems to community
7		1996, west Keizer and little pudding river	spring break quake		1980		winter 2008, winter 2007	winter 2008
8		Western half of city evacuated [1996], not present but city flooded to River Road in 1964.	90's quake in Scott Mills caused significant damage to nearby cities	None recorded - but areas of Keizer do set on hillsides	Mt. St Helens	Could happen - next to trees and farmland	Frequently	About once in every 5 or 6 years.
9		1996, localized flooding, property damage					Windstorms are common - exact dates unknown. Trees down, power interruption, property damage	Last event in December 2008. Roads blocked, trees down, combination of ice and snow, prolonged power outages. Freezing rain event in 2004

Does your organization have a plan in place to respond to / recover from natural disasters?		
Answer Options	Response Frequency	Response Count
Yes	66.7%	6
No	11.1%	1
Don't know	22.2%	2
<i>answered question</i>		9
<i>skipped question</i>		1

**Any interested persons, groups and/or organizations can assist in building the community's resilience to natural hazards. For example, neighborhood groups can teach residents in forested areas about how to reduce risk from wildfires by installing metal roofs or eliminating combustible materials around buildings. Is your organization able and/or willing to assist with any of the following? Please check all that apply.**

Answer Options	Response Frequency	Response Count
Education and outreach	83.3%	5
Information dissemination	100.0%	6
Plan/project implementation	50.0%	3
Other (please specify)		4
<i>answered question</i>		6
<i>skipped question</i>		4

Number	Other (please specify)
1	Clean up
2	get info to appropriate folks
3	We have an adopted emergency operations plan
4	We are reaching out to the Business and Retirement Communities.

**Natural hazard mitigation is the act of reducing or eliminating future loss of life, property, or injuries resulting from hazards through short term and long-term activities. Mitigation actions can be grouped into the following six categories. Please tell us how important each one is to you.**

<b>Answer Options</b>	<b>Very Important</b>	<b>Somewhat Important</b>	<b>Neither Important nor Unimportant</b>	<b>Not Very Important</b>	<b>Not Important</b>	<b>Response Count</b>
Prevention (Government administrative or regulatory actions or processes that influence the way land and buildings are developed and built)	2	4	1	0	0	7
Property Protection (Actions that involve the modification of existing buildings or structures to protect them from a hazard or removal from the hazard area)	1	5	1	0	0	7
Public Education & Awareness (Actions to inform and educate citizens, elected officials and property owners about hazards and mitigation strategies)	6	0	1	0	0	7
Natural Resource Protection (Actions that minimize hazard losses and also preserve or restore the functions of natural systems.)	3	3	1	0	0	7
Emergency Services (Actions that protect people and property during and immediately after a disaster or hazard event)	6	1	0	0	0	7
Structural Projects (Actions that involve the construction of structures to reduce the impact of a hazard.)	2	4	1	0	0	7
<i>answered question</i>						<b>7</b>
<i>skipped question</i>						<b>3</b>

Please provide examples of mitigation activities that you would like to see implemented within your community.	
Answer Options	Response Count
	4
<i>answered question</i>	4
<i>skipped question</i>	6
Number	Response Text
1	While in the military I was involved with disaster preparedness...I saw how extremely important it was. Without the properly trained personnel to respond to these disasters a community will be in dire straits. I'd like to see our personnel receive ample training yearly to insure they're ready to respond.
2	Continued clean up of Claggett Creek to ensure good water flow during flood events and improve water quality through wetland vegetation restoration. Inclusion of groundwater and aquifer underground flow maps to ensure protection of those sources.
3	Keizer needs to implement Emergency Services [especially for retirement centers and nursing homes.] Locations, populations and procedures all need to be identified.  Also needed is Public Education and Awareness with the business community, and the public in general. What is available to them, what is not, and what can be done together.
4	The City of Keizer coordinates with some volunteer groups for emergency response. To the best of my knowledge, the Public Works Department has a limited formal response plan and does not conduct regular drills to train personnel in proper response.

Would you like to be contacted in the future to review plan drafts?		
Answer Options	Response Frequency	Response Count
Yes	57.1%	4
No	42.9%	3
<i>answered question</i>		7
<i>skipped question</i>		3

Is there any additional information you would like to provide?	
Answer Options	Response Count
	2
<i>answered question</i>	2
<i>skipped question</i>	8
Number	Response Text
1	EVAK is a volunteer group trained to assist the city of Keizer during a declared emergency.
2	I have only been in the mid Willamette Valley for about 9 years so my perspective on historic events is somewhat limited. The Keizer area would be impacted by an earthquake although that has not occurred in recent years. In addition, a catastrophic volcanic eruption could also be a hazard to the community given the proximity of the volcanic range in the northwest



# Appendix B: Grant Programs

## Hazard Mitigation 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/government/grant/hmgp/>
- 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/services/disasterassistance/index.html>

### 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/government/grant/pdm/index.shtm>
- 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/government/grant/fma/index.shtm>

Detailed program and application information for federal post-disaster and pre-disaster programs can be found in the FY10 Hazard Mitigation Assistance Unified Guidance, available at <http://www.fema.gov/library/viewRecord.do?id=3649>

**For Oregon Emergency Management grant guidance on Federal Hazard Mitigation Assistance, visit: [http://www.oregon.gov/OMD/OEM/plans\\_train/grant\\_info/hma.pdf](http://www.oregon.gov/OMD/OEM/plans_train/grant_info/hma.pdf)**

**OEM contact: Dennis Sigrist, [dsigrist@oem.state.or.us](mailto:dsigrist@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://www.hud.gov/offices/cpd/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.oweb.state.or.us/>

### **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&org=SES](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5423&org=SES)

### *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/plan/prevent/fhm/index.shtm>
- 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/ncgmpstandards/>
- 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/>

### *Project Support*

- Coastal Zone Management Program, NOAA. Provides grants for planning and implementation of non-structural coastal flood and hurricane hazard mitigation projects and coastal wetlands restoration. <http://coastalmanagement.noaa.gov/>
- Community Development Block Grant Entitlement Communities Program, HUD. Provides grants to entitled cities and urban counties to develop viable communities (e.g., decent housing, a suitable living environment, expanded economic opportunities), principally for low- and moderate- income persons. <http://www.hud.gov/offices/cpd/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/NFP/index.shtml>
- 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.firegrantsupport.com/>
- 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/programs/EWP/>
- Rural Development Assistance – Utilities, USDA. Direct and guaranteed rural economic loans and business enterprise grants to address utility issues and development needs. <http://www.usda.gov/rus/>
- 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/rhs/>
- 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/government/grant/pa/index.shtm>

- 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/business/nfip/>
- 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://www.hud.gov/offices/cpd/communitydevelopment/programs/dri/driquickfacts.cfm>
- Emergency Management Performance Grants, FEMA. Helps state and local governments to sustain and enhance their all-hazards emergency management programs.  
<http://www.fema.gov/government/grant/empg/index.shtm#0>
- 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.doi.gov/partnerships/wetlands.html>
- 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/flp\\_questions.html](http://www.nps.gov/ncrc/programs/flp/flp_questions.html)
- Wetlands Reserve program, USDA-NCRS. Financial and technical assistance to protect and restore wetlands through easements and restoration agreements.  
<http://www.nrcs.usda.gov/Programs/WRP/>

More resources at: <http://www.oregonshowcase.org/stateplan/part4>

(Click on Appendix 5 of the State's Enhanced Natural Hazard Mitigation Plan: Hazard Mitigation Funding Programs)

# Appendix C:

## 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.

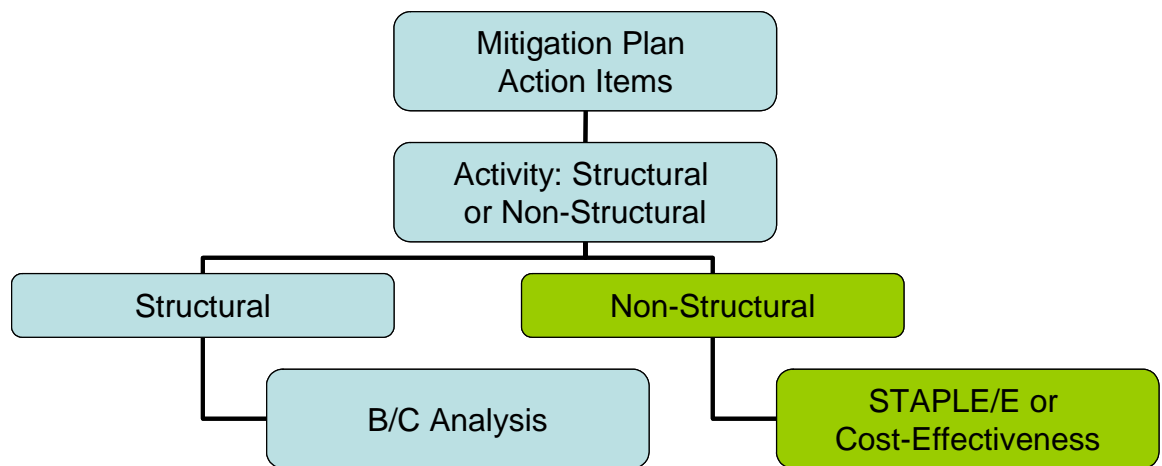
- How will the action impact the environment?
- Will the action need environmental regulatory approvals?
- Will it meet local and state regulatory requirements?
- Are endangered or threatened species likely to be affected?

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 A.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

Federal Emergency Management Agency, *Report on the Costs and Benefits of Natural Hazard Mitigation*. Publication 331, 1996.

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, October 25, 1995.

Horner, Gerald, *Benefit/Cost Methodologies for Use in Evaluating the Cost Effectiveness of Proposed Hazard Mitigation Measures*, Robert Olsen Associates, Prepared for Oregon State Police, Office of Emergency Management, July 1999.

Interagency Hazards Mitigation Team, *State Hazard Mitigation Plan*, (Oregon State Police - Office of Emergency Management, 2000.)

Risk Management Solutions, Inc., *Development of a Standardized Earthquake Loss Estimation Methodology*, National Institute of Building Sciences, Volume I and II, 1994.

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.

# **Appendix D: Action Item Worksheets**

## Drought #1

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
Review and update Keizer's water management plan to include new information and revisit emergency water agreements with the city of Salem.		Goal 5: Partnerships and Coordination Goal 6: Natural Resources Utilization	
<b>Rationale for Proposed Action Item:</b>			
The Keizer Water Management Plan, last updated around 2005, details Keizer's water capacity and includes procedures for water curtailment during drought periods. It also includes a copy of the Salem Emergency Water Agreement, adopted in 1987 and amended in 2001. Keizer's population has grown 65% over the past 18 years (from 21,884 in 1990 to 36,150 in 2008), and the Water Management Plan should be reviewed and updated to ensure the plan reflects Keizer's population needs. In addition, the Salem Emergency Water Agreement should be reviewed to make sure that it reflects current water needs of Keizer's population.			
<b>Ideas for Implementation:</b>			
Identify groundwater supply and major sources and develop strategies for protecting these sources.			
Review the Emergency Water Agreement with the city of Salem to determine whether the agreement is still valid given Keizer's size.			
<b>Coordinating Organization:</b>		Public Works	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Community Development-Planning		City of Salem, Marion County	
<b>Timeline:</b>		<b>If available, estimated cost:</b>	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
2 years			
<b>Form Submitted by:</b>		Keizer Steering Committee	
<b>Status:</b>		New Action, 2009	

# Earthquake # 1

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
Encourage reduction of nonstructural and structural earthquake hazards in homes, schools, businesses, and government offices through public education.		<i>Goal 1: Public Awareness</i> <i>Goal 2: Education</i> <i>Goal 3: Preventative</i>	
<b>Rationale for Proposed Action Item:</b>			
<p>Seismic hazards pose a real and serious threat to many communities in Oregon, requiring local governments, planners, and engineers to consider their community’s safety. Earthquake damage occurs because we have built structures that cannot withstand severe shaking. Buildings, ports, and lifelines (highways, telephone lines, gas, water, etc.) suffer damage in earthquakes. Damage and loss of life can be very severe if structures are not designed to withstand shaking, are on ground that amplifies shaking, or ground which liquefies due to shaking.<sup>1</sup></p> <p>Nonstructural retrofits protect building contents with little cost and effort. Examples of retrofits include:</p> <ul style="list-style-type: none"> <li>• Securing water heaters, large appliances, bookcases, pictures and bulletin boards;</li> <li>• Latching cabinet doors; and</li> <li>• Using safety film on windows</li> </ul> <p>The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Encouraging reduction of nonstructural and structural earthquake hazards will prevent damage to existing buildings and infrastructure.</p>			
<b>Ideas for Implementation:</b>			
Encourage the purchase of earthquake insurance to help reduce the financial loss of earthquake events in homes, schools, businesses and government offices.			
Develop informational brochures about individual mitigation opportunities and post on the city’s website, include in the water bill, and make available on the front counters at the police, public works, and building counters. Include recommendations regarding non-structural retrofits in these brochures.			
Distribute the Institute for Business Home and Safety Homeowner Booklet on Structural and Non-Structural retrofits.			
Implement non-structural retrofit of City Hall offices and/or work spaces.			
Distribute a “Homeowner’s Guide to Non-Structural Retrofit” (or something similar) found here: <a href="http://www.seattle.gov/DPD/cms/groups/pan/@pan/@emergprep/documents/web_informational/dpds_005877.pdf">http://www.seattle.gov/DPD/cms/groups/pan/@pan/@emergprep/documents/web_informational/dpds_005877.pdf</a>			
<b>Coordinating Organization:</b>		Community Development-Planning	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Community Planning-Building		Marion Co., building supply/home improvement businesses, Salem-Keizer Public Schools, Chamber of Commerce	
<b>Timeline:</b>		<b>If available, estimated cost:</b>	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
ongoing			
<b>Form Submitted by:</b>	Keizer Steering Committee		
<b>Status:</b>	New Action, 2009		

<sup>1</sup> State of Oregon Enhanced Natural Hazards Mitigation Plan, Earthquake Chapter.



## Earthquake #2

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
Seek funding to further assess the “probability of collapse” for Cummings Elementary, Gubser Elementary, Kennedy Elementary, and McNary High School and structurally reinforce vulnerable school buildings to prevent loss of life to students.		<i>Goal 3: Preventative</i> <i>Goal 4: Funding and Implementation</i> <i>Goal 7: Emergency Services</i>	
<b>Rationale for Proposed Action Item:</b>			
<p>In 2007, the Department of Geology and Mineral Industries (DOGAMI) conducted a seismic needs assessment for public school buildings, acute inpatient care facilities, fire stations, police stations, sheriffs’ offices, and other law enforcement agency buildings. <sup>2</sup> Buildings were ranked for their “probability of collapse” due to the maximum possible earthquake for any given area. Keizer schools noted in the report include: Cummings, Gubser, and Kennedy Elementary Schools (High); Whiteaker Middle School (Moderate); and McNary High School (High).</p> <p>All schools house hundreds of children and several schools can serve as emergency shelters. Verifying a school’s “probability of collapse” will help to develop mitigation strategies that can prevent injuries and identify appropriate buildings to serve as community shelters.</p> <p>The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Further assessing the probability of collapse will help to address the vulnerability of existing school buildings.</p>			
<b>Ideas for Implementation:</b>			
<p>Develop a bond measure to conduct structural integrity assessments and structurally reinforce vulnerable school buildings. Contract with an engineer to assess and produce a report for each of the buildings.</p> <p>Publicize and improve awareness of the earthquake risk using existing education and outreach efforts.</p> <p>Use FEMA’s procedures document for developing scopes of work for seismic structural and non-structural retrofit projects.</p>			
<b>Coordinating Organization:</b>		Salem-Keizer Public Schools	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Keizer Emergency Management, Public Works		Marion County Building Department, OEM, DOGAMI	
<b>Timeline:</b>		<b>If available, estimated cost:</b>	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
	3-5 years		
<b>Form Submitted by:</b>		Keizer Steering Committee	
<b>Status:</b>		New Action, 2009	

<sup>2</sup> McConnell, Vicki S. Department of Geology and Mineral Industries. *Statewide Seismic Needs Assessment: Implementation of Oregon 2005 Senate Bill 2 Relating to Public Safety, Earthquakes, and Seismic Rehabilitation of Public Buildings.* 2007. <http://www.oregongeology.com/sub/projects/rvs/OFR-O07-02-SNAA-onscreen.pdf>.

### Earthquake #3

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
Work with Marion County to develop emergency procedures and alert systems in the event of a dam breach upstream, along the Detroit and Lookout Point Dams.		<i>Goal 7: Emergency Services</i>	
<b>Rationale for Proposed Action Item:</b>			
<p>The Detroit Dam, located along the North Santiam River, and Lookout Point Dam on the Willamette River are upstream from the city of Keizer. While the probability of a dam collapse is highly unlikely for either dam, in the event of a dam collapse, portions of Keizer could be inundated, damaging homes and blocking roads, and potentially leading to a loss of life. The Marion County Emergency Operations Plan includes procedures for responding to a dam failure, however, the city of Keizer does not. Developing emergency procedures and alert systems in the event of a dam breach upstream can help to save lives and prevent damage to property. Coordinating emergency procedures and systems with Marion County's Emergency Operations Plan and any Dam Emergency Action Plans can help to develop an effective emergency response and warning system.</p> <p>Large portions of the city of Keizer are located in the 100-year floodplain, and could be inundated in the event of a dam breach upstream. Developing emergency procedures and alert systems in the event of a dam breach can save lives and reduce damage to property.</p>			
<b>Ideas for Implementation:</b>			
<p>Contact the agencies that own dams upstream from Keizer to determine response procedures in the event of a dam breach. Coordinate emergency procedures and alert systems with the agencies.</p> <p>Coordinate with Marion County Emergency Management to develop emergency procedures and alert systems.</p> <p>Assist the Salem-Keizer Public Schools in developing a dam breach notification/evacuation plan for Weddle Elementary School and Claggett Creek Middle School.</p> <p>Consult with the Oregon Water Resources Department to develop emergency procedures</p>			
<b>Coordinating Organization:</b>		Keizer Emergency Management	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Community Development, Police, Fire		Marion County Emergency Management, OEM, Water Resources Department, Corps of Engineers, Salem-Keizer Public Schools	
<b>Timeline:</b>		<b>If available, estimated cost:</b>	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
	Ongoing		
<b>Form Submitted by:</b>		Keizer Steering Committee	
<b>Status:</b>		New Action, 2009	

## Earthquake #4

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
Conduct seismic evaluations of critical facilities and infrastructure, including Keizer's Public Works building and water pipes. Encourage and assist the city of Salem to conduct similar evaluations on the Willow Lake Waste Water Treatment Plant.		<i>Goal 3: Preventative</i>	
<b>Rationale for Proposed Action Item:</b>			
<p>The City of Keizer steering committee identified several critical facilities and infrastructure that are vulnerable to earthquakes, which include Keizer's Public Works Building, city water lines, and the Willow Lake Waste Water Treatment Plant. Earthquake damage to these facilities and infrastructure could disrupt a response effort or lead to contaminated water resources. Conducting seismic evaluations of these facilities and infrastructure will inform mitigation actions that can reduce damage in an earthquake.</p> <p>The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Conducting seismic evaluations of critical facilities and infrastructure, especially Keizer's Public Works building, water lines, and the Willow Lake Wastewater Treatment Facility, will help identify potential vulnerabilities that should be mitigated.</p>			
<b>Ideas for Implementation:</b>			
<p>Seek funding to hire an engineer to conduct seismic evaluations of critical facilities. Use the results of this evaluation to develop appropriate mitigation actions.</p> <p>Seek funding for critical facilities considered a high risk of collapse. Use FEMA's procedures document for developing scopes of work for seismic structural &amp; non-structural retrofit projects.</p> <p>If a building is in the urban renewal area, make UR funding available for retrofit.</p>			
<b>Coordinating Organization:</b>		Emergency Management	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Public Works		Salem Public Works, Marion County	
<b>Timeline:</b>		<b>If available, estimated cost:</b>	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
	3 years		
<b>Form Submitted by:</b>		Keizer Steering Committee	
<b>Status:</b>		New Action, 2009	

## Earthquake #5

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
Encourage earthquake safety promotion and drills by community groups.		<i>Goal 1: Public Awareness</i> <i>Goal 2: Education</i> <i>Goal 3: Preventative</i>	
<b>Rationale for Proposed Action Item:</b>			
<p>Earthquake safety promotion and drills educate the public about procedures for preventing risk to life and property from earthquakes. Using community groups to conduct earthquake safety promotion and drills will educate community groups and the general public about the importance of earthquake safety.</p> <p>The city of Keizer’s risk assessment rates Keizer as having a high probability and high vulnerability to earthquake events. Encouraging earthquake safety and conducting drills can help to reduce the city’s vulnerability to earthquakes.</p> <p>The Disaster Mitigation Act of 2000 requires that communities continue to involve the public beyond the original planning process [201.6(c)(4)(ii)]. Involving community groups to promote earthquake safety and conduct earthquake drills will help to involve the public in measures they can take to reduce risk to life and property.</p>			
<b>Ideas for Implementation:</b>			
<p>FEMA contains a number of publications about earthquake safety, such as Earthquake Safety Activities for Children and Teachers (FEMA 527) and FEMA’s “Are You Ready?” guides available at: <a href="http://www.fema.gov/areyouready/earthquakes.shtm">http://www.fema.gov/areyouready/earthquakes.shtm</a></p> <p>Assure that all county residents, regardless of income, disability, or ethnic group, receive information about earthquakes and have the opportunity to mitigate earthquake hazards in their home;</p> <p>Conduct safety seminars with community groups to describe earthquake dangers, and steps that can be taken to reduce their impact;</p> <p>Develop and distribute educational materials in appropriate languages including: Spanish, Russian, and Vietnamese;</p> <p>Encourage County schools to promote earthquake safety education.</p>			
<b>Coordinating Organization:</b>		Keizer Emergency Management	
<b>Internal Partners:</b>		<b>External Partners:</b>	
City Human Resources, Police, Fire		CERT Program, Marion County, FEMA, Salem-Keizer Public Schools, Assisted Living Facilities	
<b>Timeline:</b>		<b>If available, estimated cost:</b>	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
	Long Term		
<b>Form Submitted by:</b>		Keizer Steering Committee	
<b>Status:</b>		New Action, 2009	

## Earthquake #6

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
Train employees in Rapid Visual Assessment (RVA) techniques to conduct building safety evaluations		<i>Goal 7: Emergency Services</i>	
<b>Rationale for Proposed Action Item:</b>			
After an earthquake, windstorm, flood or fire, the city needs to quickly assess the structural integrity of compromised buildings. Training employees to conduct rapid visual assessments will assist in this effort.			
<b>Ideas for Implementation:</b>			
Send public works, code enforcement, and police staff to Applied Technology Council (ATC) – 20 and ATC – 45 trainings. Additionally, the city of Keizer should encourage representatives from the Salem/Keizer School District and Keizer Fire District to attend these trainings.			
The Keizer Steering Committee should assess the value of hosting one of these trainings as well.			
<b>Coordinating Organization:</b>		Keizer Emergency Management	
<b>Internal Partners:</b>		<b>External Partners:</b>	
City Human Resources, Police, Fire		Salem-Keizer Public Schools, Keizer fire District	
<b>Timeline:</b>		<b>If available, estimated cost:</b>	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
Short Term			
<b>Form Submitted by:</b>	Keizer Steering Committee		
<b>Status:</b>	New Action, 2009		

## Flood # 1

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
Encourage the city of Salem to secure or remove hazardous materials at the waste water treatment plant where possible to prevent contamination of groundwater resources.		<i>Goal 3: Preventative</i> <i>Goal 6: Natural Resources Utilization</i>	
<b>Rationale for Proposed Action Item:</b>			
<p>While the waste water treatment plant is not in the 100 year floodplain, it is surrounded by a floodplain and is vulnerable to a 500-year flood event. The waste water treatment plant also contains hazardous materials. Hazardous materials when inundated by a flood event can be released into the environment and harm community members as well as wildlife. Once released into the environment, hazardous materials can also contaminate groundwater resources. Keizer receives all of its water from underground aquifers, and contamination could seriously compromise the city's water supply. Encouraging the waste water treatment plant to secure or remove hazardous materials can prevent contamination during a flood event, protecting humans, wildlife, and groundwater resources.</p>			
<b>Ideas for Implementation:</b>			
<p>Inventory the hazardous materials found at the waste water treatment plant and identify a more secure location for their storage or remove them altogether.</p> <p>Consider a ban on storing hazardous materials in the 100-year floodplain, which would apply to the city as well as residents and businesses.</p>			
<b>Coordinating Organization:</b>		Public Works	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Community Development-Planning, Emergency Management		FEMA, Occupational Safety and Health Administration (OSHA), Salem Public Works, Salem Emergency Management	
<b>Timeline:</b>		<b>If available, estimated cost:</b>	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
<u>2 year</u>			
<b>Form Submitted by:</b>	Keizer Steering Committee		
<b>Status:</b>	New Action, 2009		

## Flood # 2

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
Explore steps needed to qualify Keizer for participation in the National Flood Insurance Program's (NFIP) Community Rating System (CRS).		<i>Goal 3: Preventative</i> <i>Goal 4: Funding and Implementation</i> <i>Goal 6: Natural Resources Utilization</i>	
<b>Rationale for Proposed Action Item:</b>			
<p>The Community Rating System (CRS) is operated under the National Flood Insurance Program (NFIP). The NFIP provides flood insurance to homes and businesses located in a floodplain at a reasonable cost, and encourages the movement of development away from the floodplain. The program is based upon mapping areas of flood risk, and requiring local implementation to reduce that risk, primarily through restrictions on new development in floodplains. CRS recognizes community efforts that go beyond the minimum standards of the NFIP. This recognition is in the form of reduced flood insurance premiums for communities that adopt such standards. CRS encourages community activities that reduce flood losses, facilitate accurate insurance rating, and promote flood insurance awareness<sup>3</sup>.</p> <p>The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Joining the CRS program will further protect existing buildings in Keizer from flooding events by mitigating homes beyond the minimum standards of the NFIP.</p>			
<b>Ideas for Implementation:</b>			
<p>Visit the CRS website to find out specifics on what Keizer can do to apply to the CRS program and improve their CRS scores. <a href="http://training.fema.gov/EMIWeb/CRS/">http://training.fema.gov/EMIWeb/CRS/</a></p> <p>Do a Benefit-Cost analysis of becoming a member of the Community Rating System.</p> <p>Discuss the CRS program with Marion and Clackamas Counties, both of which are members of the CRS.</p>			
<b>Coordinating Organization:</b>		Keizer Community Development-Planning	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Keizer Emergency Management, Public Works		DLCD, Clackamas County, Marion County	
<b>Timeline:</b>		<b>If available, estimated cost:</b>	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
2 years			
<b>Form Submitted by:</b>		Keizer Steering Committee	
<b>Status:</b>		New Action, 2009	

<sup>3</sup> Source: Oregon Technical Resource Guide. July 2000. Community Planning Workshop. Eugene, OR: University of Oregon. p. 4-34.

### Flood # 3

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
Continue compliance with the National Flood Insurance Program through the enforcement of local floodplain ordinances.		<i>Goal 3: Preventative</i> <i>Goal 5: Partnerships and Coordination</i> <i>Goal 6: Natural Resources Utilization</i>	
<b>Rationale for Proposed Action Item:</b>			
<p>The National Flood Insurance Program provides communities with federally backed flood insurance to homeowners, renters, and business owners, provided that communities develop and enforce adequate floodplain management ordinances. The benefits of adopting NFIP standards for communities are a reduced level of flood damage in the community and stronger buildings that can withstand floods. According to the NFIP, buildings constructed in compliance with NFIP building standards suffer approximately 80 percent less damage annually than those not built in compliance.</p> <p>The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Continued participation in the NFIP will help reduce the level of flood damage to new and existing buildings in communities while providing homeowners, renters and business owners additional flood insurance protection.</p>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>• Update the city's Flood Insurance Rate Maps (FIRM) as funding becomes available.</li> <li>• Community Assistance Visits (CAV) are scheduled visits to communities participating in the NFIP for the purpose of: 1) conducting a comprehensive assessment of the community's floodplain management program; 2) assisting the community and its staff in understanding the NFIP and its requirements; and 3) assisting the community in implementing effective flood loss reduction measures when program deficiencies or violations are discovered. Actively participate with DLCD and FEMA during Community Assistance Visits.</li> <li>• Conduct an assessment of the floodplain ordinances to ensure they reflect current flood hazards and situations, and meet NFIP requirements.</li> <li>• Coordinate with the county to ensure that floodplain ordinances and NFIP regulations are maintained and enforced. Continue to assess the need for updated ordinances.</li> <li>• Mitigate areas that are prone to flooding and/or have the potential to flood.</li> </ul>			
<b>Coordinating Organization:</b>		Community Development-Planning	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Public Works, Emergency Management		DLCD, FEMA, Marion County Planning	
<b>Timeline:</b>		<b>If available, estimated cost:</b>	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
	Ongoing		
<b>Form Submitted by:</b>	Keizer Steering Committee		
<b>Status:</b>	New Action, 2009		



## Flood #4

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
Improve water quality and water flow through wetland vegetation restoration and stream cleanup, especially along Claggett Creek.		<i>Goal 6: Natural Resources Utilization</i>	
<b>Rationale for Proposed Action Item:</b>			
<p>Community stakeholders interviewed during the mitigation planning process identified wetland restoration and stream cleanup as important priorities for Keizer to improve water quality and stream flow to reduce the overall impact of floods. Wetlands serve as natural filters for pollutants and can improve the water quality in Keizer's streams. Removing debris in streams such as Claggett Creek can also improve stream flow during flood events, reducing the severity of future floods.</p> <p>The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Improving water quality and water flow through wetland restoration and stream cleanup can reduce the severity of flood events, reducing the impact on existing homes and businesses in the floodplain.</p>			
<b>Ideas for Implementation:</b>			
<p>Consult with the Oregon Department of State Lands to gather information regarding wetlands restoration and organizations Keizer can work with to restore wetlands.  <a href="http://www.puc.state.or.us/DSL/WETLAND/wetland_restoration.shtml">http://www.puc.state.or.us/DSL/WETLAND/wetland_restoration.shtml</a></p> <p>Work with local community organizations, such as watershed councils and volunteer organizations, to help clean up debris in Claggett Creek.</p>			
<b>Coordinating Organization:</b>		Public Works	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Community Development-Planning, Emergency Management		Community Organizations, Oregon Department of State Lands, Watershed Council	
<b>Timeline:</b>		<b>If available, estimated cost:</b>	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
	Ongoing		
<b>Form Submitted by:</b>	Keizer Steering Committee		
<b>Status:</b>	New Action, 2009		

## Flood #5

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
Partner with the county to conduct workshops for target audiences on National Flood Insurance Programs, mitigation activities, and potential assistance from FEMA's Flood Mitigation Assistance and Hazard Mitigation Grant Programs.		<i>Goal 1: Public Awareness</i> <i>Goal 2: Education</i> <i>Goal 3: Funding and Implementation</i> <i>Goal 5: Partnerships and Coordination</i>	
<b>Rationale for Proposed Action Item:</b>			
<p>The National Flood Insurance Program (NFIP), Flood Mitigation Assistance (FMA) Program, and Hazard Mitigation Grant Program (HMGP) provide financial assistance to property owners for reducing the impact of floods. The NFIP provides flood insurance to property owners, and the FMA and HMGP provide funding for flood mitigation projects. Partnering with Marion County to conduct workshops for target audiences on these programs will provide a coordinated county-wide effort to raise awareness of the flood hazard, and educate the public on mitigation strategies that will reduce the impact of floods. Partnering with Marion County can also reduce the cost involved in hosting these workshops.</p> <p>The city of Keizer has 608 flood insurance policy holders and has experienced 27 property losses due to flooding as of February 28, 2009. The claims for these three property losses totaled \$420,238. Furthermore, the city of Keizer has a high probability of flood recurring and a moderate vulnerability to floods. Conducting workshops together with Marion County on the NFIP, FMA, and HMGP programs can further reduce property losses due to flooding in Keizer and reduce the city's vulnerability.</p>			
<b>Ideas for Implementation:</b>			
Put press releases into the paper to disseminate information to residents, property owners, and businesses.			
Include information about the financial aspects of building (and rebuilding) in the floodplain;			
Include information on using low-impact development standards on private property;			
Present information on how other communities have addressed building in the floodplain.			
Selected target audiences can include: realtors, lending institutions, surveyors, engineers, and government agencies.			
<b>Coordinating Organization:</b>		Community Development-Planning	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Public Works, Emergency Management		Marion County, OEM, FEMA	
<b>Timeline:</b>		<b>If available, estimated cost:</b>	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
2 years			
<b>Form Submitted by:</b>		Keizer Steering Committee	
<b>Status:</b>		New Action, 2009	

## Wind Storm #1

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
Educate the public about windstorm-resistant trees and landscaping practices and the role of proper tree pruning and care in preventing damage during windstorms.		<i>Goal 1: Public Awareness</i> <i>Goal 2: Education</i> <i>Goal 3: Preventative</i>	
<b>Rationale for Proposed Action Item:</b>			
<p>High winds can topple trees and break limbs which in turn can result in power outages and disrupt telephone, computer, and TV and radio service. Educating property owners about planting windstorm-resistant trees and the role of proper tree pruning to prevent damage and power outages on property can help reduce overall impacts of windstorms.</p> <p>Keizer's windstorm risk assessment notes that Keizer has a high probability of a windstorm recurring and a high vulnerability to windstorms. Educating the public about windstorm resistant trees and the benefits of proper tree pruning and care will help to reduce windstorm damage caused by trees and reduce the city's vulnerability to windstorms.</p> <p>The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address existing buildings and infrastructure [201.6(c)(3)(ii)]. Educating the public about windstorm resistance trees and the benefits of proper tree pruning and care will help to reduce windstorm damage caused by trees and reduce the city's vulnerability to windstorms.</p>			
<b>Ideas for Implementation:</b>			
<p>Post information about windstorm resistant trees and proper tree pruning activities on the city's website.</p> <p>Develop brochures about windstorm resistant trees and proper tree pruning practices and disseminate in mailings or leave in public spaces at city offices.</p> <p>Partner with nurseries and garden businesses to help educate people about windstorm resistant trees and proper tree pruning practices.</p>			
<b>Coordinating Organization:</b>		Public Works	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Community Development-Planning, Emergency Management		Gardening/nursery businesses	
<b>Timeline:</b>		<b>If available, estimated cost:</b>	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
2 years			
<b>Form Submitted by:</b>		Keizer Steering Committee	
<b>Status:</b>		New Action, 2009	

## Wind Storm #2

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
Ensure that all critical facilities have backup power and/or emergency operations plans to deal with power outages.		<i>Goal 7: Emergency Services</i>	
<b>Rationale for Proposed Action Item:</b>			
<p>High winds can topple trees and break limbs which in turn can result in power outages and disrupt telephone, computer, and TV and radio service. Furthermore, Keizer's windstorm risk assessment notes that Keizer has a high probability of a windstorm recurring and a high vulnerability to windstorms. Ensuring that all critical facilities have backup power and/or emergency operations plans to deal with power outages will allow for continuous service.</p> <p>After Hurricane Katrina, Harrison County Mississippi noted that "It is important that critical facilities function during and after disasters. Local units of government want to insure continuous service by strengthening essential facilities such as fire stations, city halls, shelters, and police stations. In addition, emergency backup generators should be provided to each critical facility."<sup>4</sup> Ensuring that all critical facilities have backup power and/or emergency operations plans to deal with power outages will assist residents in recovering from a natural disaster as well as make the process easier.</p> <p>The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Ensuring that all critical facilities have backup power and/or emergency operations plans to deal with power outages will help protect existing buildings and infrastructure and allow for continuous service.</p>			
<b>Ideas for Implementation:</b>			
<p>Conduct an assessment of critical facilities to determine their priority in an emergency and whether they should have backup generators and/or emergency operations plans.</p> <p>Seek funding from Federal and state resources to obtain generators and to develop emergency operations plans.</p> <p>Coordinate obtaining generators with actions and polices found in Keizer Emergency Operations Plan.</p>			
<b>Coordinating Organization:</b>		Keizer Emergency Management	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Public Works		Marion County, FEMA, Salem-Keizer Public Schools	
<b>Timeline:</b>		<b>If available, estimated cost:</b>	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
	Ongoing		
<b>Form Submitted by:</b>	Keizer Steering Committee		
<b>Status:</b>	New Action, 2009		

<sup>4</sup> Source: Harrison County Community Recovery Plan. August 2006. FEMA ESF-14 in support of the state of Mississippi. p. 61.

## Severe Winter Storm #1

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
Consider upgrading lines and poles to improve wind/ice loading, and underground critical lines.		<i>Goal 3: Preventative</i>	
<b>Rationale for Proposed Action Item:</b>			
<p>The Keizer risk assessment for severe winter storm notes that Keizer has a high probability and high vulnerability to winter storms. The most recent major winter storms occurred in January/February 2008 and in December 2008/January 2009. During both winter storms, the governor declared a state of emergency in Marion County and in surrounding counties. Severe winter storms can bring extreme cold, snow, and ice, causing power lines to break due to ice buildup. Upgrading lines and poles to improve wind and ice loading and undergrounding critical lines can prevent damage to power lines and reduce the number of power outages due to ice storms.</p> <p>The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Upgrading lines and poles to improve wind and ice loading and undergrounding critical lines can prevent damage to power lines.</p>			
<b>Ideas for Implementation:</b>			
<p>Talk to the utility companies that provide power to Keizer about upgrading lines and poles to improve wind/ice loading and underground critical lines.</p> <p>Seek funding for upgrades to lines and poles and for undergrounding critical lines.</p>			
<b>Coordinating Organization:</b>		Public Works	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Emergency Management		Salem Electric, Portland General Electric	
<b>Timeline:</b>		<b>If available, estimated cost:</b>	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
	Ongoing		
<b>Form Submitted by:</b>		Keizer Steering Committee	
<b>Status:</b>		New Action, 2009	

## Severe Winter Storm #2

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
Educate citizens about ways to weatherize their homes, as well as safe emergency heating equipment.		<i>Goal 1: Public Awareness</i> <i>Goal 2: Education</i> <i>Goal 3: Preventative</i>	
<b>Rationale for Proposed Action Item:</b>			
<p>The Keizer risk assessment for severe winter storm notes that Keizer has a high probability and high vulnerability to winter storm events. The most recent major winter storms occurred in January/February 2008 and in December 2008/January 2009. During both winter storms, the governor declared a state of emergency in Marion County and in surrounding counties. Severe winter storms can bring extreme cold, snow, and ice, causing power lines to break due to ice buildup. Power outages can lead to heat loss, potentially harming citizens. Educating citizens about ways to weatherize their homes, as well as safe emergency heating equipment, can reduce the effects of extreme cold and inform residents of how to heat their homes in the event of a power outage.</p> <p>The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Educating citizens about ways to weatherize their homes, as well as safe emergency heating equipment will improve the safety of community members but also protect existing buildings from damage due to severe winter storms.</p> <p>Keizer has a large number of youth and elderly populations, many of whom are especially vulnerable to power outages and lack backup sources of heat and water. Educating these citizens about ways to weatherize their homes and safe emergency heating equipment they can use will reduce the vulnerability of these populations.</p>			
<b>Ideas for Implementation:</b>			
<p>Coordinate efforts with home improvement businesses to educate citizens about weatherizing homes and providing safe emergency heating equipment.</p> <p>Coordinate education efforts with Northwest Natural gas to education citizens about weatherization.</p> <p>Coordinate with the Keizer Fire District to develop a list of emergency heating information.</p> <p>Advertize weatherization tax credits to serve as an incentive for people to weatherize their homes and reduce their heating bills.</p>			
<b>Coordinating Organization:</b>		Emergency Management	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Keizer Fire District, Community Development-Planning		Chamber of Commerce, local building supply, lumber businesses, Oregon Department of Energy, Civic Groups, Salem Electric, PGE, NW Natural Gas	
<b>Timeline:</b>		<b>If available, estimated cost:</b>	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
1 year (and ongoing)			
<b>Form Submitted by:</b>	Keizer Steering Committee		
<b>Status:</b>	New Action, 2009		

## Multi-Hazard #1

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
Further develop risk assessment maps to show areas at risk for all hazards.		<i>Goal 3: Preventative</i> <i>Goal 6: Natural Resources Utilization</i>	
<b>Rationale for Proposed Action Item:</b>			
<p>Developing risk assessment maps that show areas at risk for all hazards can improve land use planning efforts in the city of Keizer and can prevent future damage to property caused by natural hazard events. Keizer is vulnerable to a number of hazards, including floods and earthquakes, and developing risk assessment maps for these hazards will prevent damage to buildings and infrastructure in the city.</p> <p>The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address new buildings and infrastructure [201.6(c)(3)(ii)]. Developing risk assessment maps showing the hazard risk for all hazards can reduce the impact to new buildings and infrastructure.</p>			
<b>Ideas for Implementation:</b>			
Coordinate with the Department of Geologic and Mineral Industries (DOGAMI), the Federal Emergency Management Agency (FEMA), and Oregon Emergency Management (OEM) to develop risk assessment maps.			
<b>Coordinating Organization:</b>		Community Development-Planning	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Emergency Management, Public Works		Council of Governments, DOGAMI, FEMA, OEM	
<b>Timeline:</b>		<b>If available, estimated cost:</b>	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
	4 years		
<b>Form Submitted by:</b>	Keizer Steering Committee		
<b>Status:</b>	New Action, 2009		

## Multi-Hazard #2

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
Establish mutual aid agreements between government agencies and commercial businesses in the event of an emergency (e.g., fuel, heavy equipment, food, etc.)		<i>Goal 5: Partnerships and Coordination</i>	
<b>Rationale for Proposed Action Item:</b>			
<p>Mutual aid agreements and assistance agreements are agreements between agencies, organizations, and jurisdictions that provide a mechanism to quickly obtain emergency assistance in the form of personnel, equipment, materials, and other associated services. The primary objective is to facilitate rapid, short-term deployment of emergency support prior to, during, and after an incident. (Source: FEMA NIMS Resource Center)</p> <p>Developing formal agreements with internal and external partners could assist the partners in collaborating and sharing the responsibility of natural hazard mitigation. Such actions to form collaborative partnerships and commitments to mitigation can assist the city in reducing its risk to the natural hazards addressed by the NHMP.</p>			
<b>Ideas for Implementation:</b>			
<p>Develop a continuity of operations plan for city functions. Identify opportunities for mutual-aid where needed.</p> <p>Develop formal agreements (such as Memorandums of Understanding, MOUs) with internal (departments) and external partners (e.g. non-profit organizations, cities, and state agencies) to work together on risk reduction efforts in the County.</p>			
<b>Coordinating Organization:</b>		Emergency Management	
<b>Internal Partners:</b>		<b>External Partners:</b>	
City Manager, Keizer Police, Keizer Fire		Cities of Salem, Woodburn, West Salem, Regional grocery providers (e.g., Winco)	
<b>Timeline:</b>		<b>If available, estimated cost:</b>	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
	3 years		
<b>Form Submitted by:</b>		Keizer Steering Committee	
<b>Status:</b>		New Action, 2009	



### Multi-Hazard #3

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
Develop a registry of populations that may need particular assistance in an emergency situation.		<i>Goal 1: Preventative</i> <i>Goal 7: Emergency Services</i>	
<b>Rationale for Proposed Action Item:</b>			
<p>Keizer has a large population of senior citizens, the very young, and Hispanics, all of which may need special assistance in an emergency situation or require additional outreach efforts. Developing a voluntary registry of populations that may need particular assistance in an emergency will help in outreach and mitigation efforts for a variety of natural hazards. Furthermore, a registry would assist in communications between emergency responders.</p> <p>Keizer is vulnerable to a number of natural hazards. According to the city's risk assessment, Keizer has a high probability and high vulnerability to earthquakes, windstorms, and severe winter storms; a high probability and moderate vulnerability to floods. Developing a registry of vulnerable populations can help to mitigate the impacts of these hazards on these populations and provide assistance in responding to these hazards.</p>			
<b>Ideas for Implementation:</b>			
<p>Develop maps to identify key areas where vulnerable populations are located, such as assisted living facilities, etc.</p> <p>Work with churches, schools, health clinics, and retirement homes/assisted living communities to identify people for the registry.</p>			
<b>Coordinating Organization:</b>		Keizer Fire District	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Keizer Emergency Management		Marion County Fire District, Salem-Keizer Public Schools	
<b>Timeline:</b>		<b>If available, estimated cost:</b>	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
2 years			
<b>Form Submitted by:</b>		Keizer Steering Committee	
<b>Status:</b>		New Action, 2009	

## Multi-Hazard #4

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
Encourage citizens to prepare and maintain 72-hour kits.		<i>Goal 1: Public Awareness</i> <i>Goal 2: Education</i> <i>Goal 3: Preventative</i>	
<b>Rationale for Proposed Action Item:</b>			
<p>Keizer is vulnerable to a number of natural hazards that could disrupt services. According to the city's risk assessment, Keizer has a high probability and high vulnerability to earthquakes, windstorms, and severe winter storms; a high probability and moderate vulnerability to floods. In a major disaster, utilities transportation networks, and businesses could be disrupted, and it may take days until vital services are restored. Preparing a 72 hour kit can help community members survive on their own while vital services are unavailable.</p> <p>The Disaster Mitigation Act of 2000 requires that communities continue to involve the public beyond the original planning process [201.6(c)(4)(ii)]. Developing public education programs for hazard risk mitigation and preparedness would be a way to keep the public informed of, and involved in, the city's actions to mitigate and prepare for hazards.</p>			
<b>Ideas for Implementation:</b>			
<p>Provide educational material and examples of how to assemble 72 hour kits to residents of the city and employees. Outreach and awareness campaigns need to be carefully organized and developed to ensure that residents receive critical information. Distribute information through the city's newsletter, which is sent out every 2 months with water bills. Alternatively, post information about 72 hour kits on the city's website.</p> <p>Information on preparing 72 hour kits can be found at <a href="http://www.72hours.org">www.72hours.org</a></p>			
<b>Coordinating Organization:</b>		Keizer Fire District	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Police Department, Community Development-Planning Division		FEMA, OEM, Salem-Keizer Public Schools	
<b>Timeline:</b>		<b>If available, estimated cost:</b>	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
1 year			
<b>Form Submitted by:</b>		Keizer Steering Committee	
<b>Status:</b>		New Action, 2009	

## Multi-Hazard #5

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
Develop a post-disaster redevelopment plan.		<i>Goal 7: Emergency Services</i>	
<b>Rationale for Proposed Action Item:</b>			
<p>Achieving sustainability, which, in a disaster-related context, means the ability to survive future natural disasters with minimum loss of life and property, is the overarching goal of planning for post-disaster reconstruction. (Source: FEMA, “Policies for Guiding Planning for Post-Disaster Recovery and Reconstruction”)</p> <p>Public decisions taken in the heat of the emergency period immediately following a disaster often compromise significant opportunities to rebuild a safer community for the future. The pressure exerted by residents and property owners to have their disaster-stricken community rebuilt to its pre-disaster form and condition as quickly as possible remains a powerful factor in local, state, and federal emergency management to this day. There are ways to restrain such pressures and maintain mitigation and other post-disaster goals as high priorities during the process of long-term reconstruction even as the ashes, the rubble, and the water are receding or being cleared away. The secret lies in identifying in advance those decisions that will need to be made after a disaster that are most likely to have long-term repercussions for hazard mitigation. (Source: FEMA, “Policies for Guiding Planning for Post-Disaster Recovery and Reconstruction”)</p> <p>Pre-disaster and post-disaster mitigation should be two parts of a seamless whole in a sound plan for post-disaster recovery and reconstruction. The only difference, although it is often a major difference, is one of scale, of accelerating the pace with which existing mitigation plans are implemented, as a result of the influx of outside assistance. What is important about planning for post-disaster hazard mitigation is that the additional resources that facilitate local hazard mitigation in the aftermath of a disaster do not materialize by accident. Local governments manage to secure such resources in large part because they have planned to do so. (Source: FEMA, “Policies for Guiding Planning for Post-Disaster Recovery and Reconstruction”)</p>			
<b>Ideas for Implementation:</b>			
<p>Utilize the city’s natural hazards mitigation plan as a starting point for developing a long-term post-disaster recovery plan. Both plans should work from the same information, mission, and goals.</p> <p>Designate a recovery management team that is empowered to monitor the process and implement the community’s post-disaster recovery policies. This team should also serve as the post-disaster recovery planning team, and can/should include persons involved in pre-disaster mitigation planning efforts. Involve a wide range of stakeholders and community leaders/volunteers. Discuss post-disaster recovery planning at future mitigation plan meetings, including the 5-year update that’s scheduled to occur in conjunction with Marion County.</p> <p>Seek funding sources and/or outside assistance to help facilitate this process and the development of a post-disaster recovery plan.</p>			
<b>Coordinating Organization:</b>		Keizer Natural Hazard Mitigation Steering Committee	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Public Works, Community Development-Planning, Police Department, Fire District		FEMA, Oregon Emergency Management, Oregon Partnership for Disaster Resilience, Salem-Keizer Public Schools	
<b>Timeline:</b>		<b>If available, estimated cost:</b>	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
	Ongoing		
<b>Form Submitted by:</b>		Keizer Steering Committee	
<b>Status:</b>		New Action, 2009	

## Multi-Hazard #6

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
Continue development of CERT teams to ease the load on emergency services following a disaster.		Goal 5: Partnerships and Coordination Goal 7: Emergency Services	
<b>Rationale for Proposed Action Item:</b>			
<p>The Community Emergency Response Team (CERT) Program educates people about disaster preparedness for hazards that may impact their area and trains them in basic disaster response skills, such as fire safety, light search and rescue, team organization, and disaster medical operations. Using the training learned in the classroom and during exercises, CERT members can assist others in their neighborhood or workplace following an event when professional responders are not immediately available to help. CERT members also are encouraged to support emergency response agencies by taking a more active role in emergency preparedness projects in their community. (Source: CERT website, <a href="http://www.citizencorps.gov/cert/">http://www.citizencorps.gov/cert/</a>). Keizer has an active CERT program and further developing CERT teams can significantly ease the burden on emergency responders.</p> <p>Continuing the development of CERT teams, and coordinating these efforts with other mitigation, preparedness, and response efforts can lead to a more holistic emergency management approach that will make Keizer more resilient to natural hazards.</p>			
<b>Ideas for Implementation:</b>			
<p>Seek funding to continue the development of CERT teams.</p> <p>Continue to distribute information about CERT through the city website, and post public announcements in newspapers.</p>			
<b>Coordinating Organization:</b>		Keizer Fire District	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Keizer Police, Community Development-Planning Division		FEMA, OEM, CERT Program	
<b>Timeline:</b>		<b>If available, estimated cost:</b>	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
2 years			
<b>Form Submitted by:</b>		Keizer Steering Committee	
<b>Status:</b>		New Action, 2009	

## Multi-Hazard #7

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
Develop and equip emergency shelters to take care of residents and vulnerable populations such as the elderly, the very young, or visitors.		<i>Goal 3: Preventative</i> <i>Goal 7: Emergency Services</i>	
<b>Rationale for Proposed Action Item:</b>			
<p>In the event of a natural hazard emergency, residents as well as vulnerable populations, such as the very young, the elderly, and tourists, may need to seek shelter. The elderly, the very young, and tourists that visit the city are particularly vulnerable because they may require special accommodations. Developing and equipping emergency shelters for these populations are important to accommodate the broad range of populations found in Keizer.</p> <p>Keizer is vulnerable to a number of natural hazards that could disrupt services. According to the city's risk assessment, Keizer has a high probability and high vulnerability to earthquakes, windstorms, and severe winter storms; a high probability and moderate vulnerability to floods. Any of these natural hazard events could prompt residents and visitors to seek emergency shelter. Appropriately equipping emergency shelters for these populations is important to accommodate Keizer's broad range of population.</p>			
<b>Ideas for Implementation:</b>			
<p>Develop a list of emergency shelter needs for residents and vulnerable populations. Identify emergency shelters in the city and inventory the existing equipment and supplies in each shelter. Pre-position supplies at each City-owned public shelter, either within the structure or in a shipping container.</p> <p>To ensure a reliable power supply, provide an emergency generator and fuel tank at each public shelter.</p> <p>Coordinate efforts with the Red Cross.</p>			
<b>Coordinating Organization:</b>		Keizer Police Department	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Keizer Fire District, City Manager, Public Works, Community Development-Planning		Salem-Keizer Public Schools, Oregon Emergency Management, FEMA, Red Cross	
<b>Timeline:</b>		<b>If available, estimated cost:</b>	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
	4 years		
<b>Form Submitted by:</b>		Keizer Steering Committee	
<b>Status:</b>		New Action, 2009	

## Multi-Hazard #8

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
Educate businesses and governmental organizations about the importance of developing continuity of operations plans.		<i>Goal 3: Preventative</i> <i>Goal 5: Partnerships and Coordination</i>	
<b>Rationale for Proposed Action Item:</b>			
<p>Keizer is vulnerable to a number of natural hazards that could disrupt businesses. According to the city's risk assessment, Keizer has a high probability and high vulnerability to earthquakes, windstorms, and severe winter storms; a high probability and moderate vulnerability to floods. Any of these natural hazard events could disrupt business services. Educating businesses and governmental organizations about the importance of continuity of operations plans will encourage their development and assist in making local governments and businesses more disaster resilient.</p> <p>Research conducted by Richard Wilson has shown that staff turnover is likely to occur after a disaster. Veteran staff is critical after a disaster. It is important to prevent turnover so that existing personnel do not have to take on extra responsibilities during an already stressful time. Continuity planning can also help lessen turnover by ensuring competitive salaries and benefits and by reducing the amount of stress staff will have to endure.</p> <p>The Disaster Mitigation Act of 2000 requires communities to develop actions that reduce the impact of a natural hazard [201.6(c)(3)(ii)]. Educating businesses and governmental organizations about the importance of continuity of operations plans can encourage the development of plans and make businesses and governmental organizations more resilient to natural hazards.</p>			
<b>Ideas for Implementation:</b>			
<p>Host an Open for Business training workshop, developed by the Institute for Business and Home Safety (IBHS), to educate businesses on the importance of continuity of operations plans and how to develop a plan for their business.</p> <p>For governmental organizations, research and review completed continuity of operations plans to provide a foundation of expected content and issues to review.</p> <p>The COOP should ensure shelter housing for critical staff and family members such as County officials, public works employees, emergency response, and others.</p> <p>Assess and prioritize critical positions and resources vital to the continuance of important County functions.</p> <p>Incorporate COOP into the existing Emergency Operations Plans where applicable.</p>			
<b>Coordinating Organization:</b>		Emergency Management	
<b>Internal Partners:</b>		<b>External Partners:</b>	
City Manager, all city departments, Keizer Fire District		FEMA, IBHS, Oregon Partnership for Disaster Resilience	
<b>Timeline:</b>		<b>If available, estimated cost:</b>	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
	3 years		
<b>Form Submitted by:</b>	Keizer Steering Committee		
<b>Status:</b>	New Action, 2009		

## Multi-Hazard #9

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
Further assess the potential implications of various transportation route closures.		<i>Goal 1: Public Awareness</i> <i>Goal 3: Preventative</i> <i>Goal 7: Emergency Services</i>	
<b>Rationale for Proposed Action Item:</b>			
<p>Keizer has two bridges, one on River Road and one on Wheatland Road, that serve as primary access to northwest and northern neighborhoods. If either bridge collapsed due to flood or earthquake, evacuation of these neighborhoods could be compromised. In addition, Chemewa Road provides the only direct access to I-5, and should this road close, redirecting traffic through Keizer to get to I-5 could be challenging. Further assessing the potential implications of various transportation route closures could help Keizer prepare for multiple closure scenarios.</p> <p>Keizer is vulnerable to a number of natural hazards that could potentially close major transportation routes. According to the city's risk assessment, Keizer has a high probability and high vulnerability to earthquakes, windstorms, and severe winter storms; a high probability and moderate vulnerability to floods. Further assessing the potential implications of various transportation route closures could help Keizer to prioritize mitigation and/or response activities.</p>			
<b>Ideas for Implementation:</b>			
<p>Identify essential routes in the city of Keizer, potential vulnerabilities to these routes that could block access, and develop alternative transportation options.</p> <p>Map alternative route scenarios.</p> <p>Coordinate efforts with Police, Public Works, and Fire Districts.</p>			
<b>Coordinating Organization:</b>		Community Development-Planning	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Public Works, Keizer Emergency Management, Police, Keizer Fire		City of Salem, Marion County	
<b>Timeline:</b>		<b>If available, estimated cost:</b>	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
	2 years		
<b>Form Submitted by:</b>		Keizer Steering Committee	
<b>Status:</b>		New Action, 2009	