



City of Salem

Natural Hazard Mitigation Plan



SALEM NATURAL HAZARDS MITIGATION PLAN



Source: Gary Halvorson, Oregon State Archives

Prepared by:

Oregon Partnership for Disaster Resilience

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The Salem Natural Hazard Mitigation Plan was developed by the Oregon Partnership for Disaster Resilience at the University of Oregon's Community Service Center.

Project Steering Committee:

- Roger Stevenson, Salem Emergency Management
- Joe Parrott, Salem Fire Department
- Cliff Sabin, Salem Hospital
- Charlie Crawford, Salem Hospital
- Lyle Gembala, City of Salem Police
- Sara Jondahl, City of Salem Public Works- Development Services Division
- Mike Gotterba, City of Salem Public Works – Emergency Preparedness Division
- Ken Roley, City of Salem Public Works – Operations Division
- Steve Downs, City of Salem Public Works – Utilities Planning Section
- Bryce Bishop, City of Salem Community Development – Planning Division
- John Vanderzanden, Marion County Emergency Management

Project Managers:

Krista Dillon, Associate Director, Oregon Partnership for Disaster Resilience

A. Gregoor Passchier, Research Intern, Oregon Partnership for Disaster Resilience

Nick Kraemer, Research Intern, Oregon Partnership for Disaster Resilience

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1.0 INTRODUCTION

Salem has experienced and is vulnerable to losses caused by natural hazards. These hazards include floods, landslides, earthquakes, severe wind and ice storms, urban-wildland interface fires, volcanic eruptions, drought, and hazardous materials incidents. All hazards are potential threats capable of causing significant future life and property losses. Some events may lead to “compound disasters,” such as earthquakes that trigger landslides and hazardous materials releases.

The City of Salem has benefited from its natural setting, situated in the heart of the valley with the Willamette River flowing through the center of the City and flanked by the Salem Hills and Eola Hills to the south and west.

It is a well-accepted tenet that natural activities, such as rain, cold and heat are by themselves beneficial or, at worst, benign. These activities are part of the natural functions of the ecosystem. Floods replenish floodplains with nutrients and recharge aquifers, and wildfires help preserve and restore appropriate plant life. These “hazards” do not cause problems except where humans are affected.

Disasters occur when natural hazards affect human development, especially in urban areas. We are recognizing the adverse consequences of occupying hazardous areas (such as floodplains and steep hillsides) and following construction practices that do not account for natural activities (such as earthquakes, erosion, wind, and wildfire). This lesson was brought home to Salem’s residents in February and November 1996 when floods and landslides caused extensive damage to homes, businesses, public utilities, and other infrastructure.

1.1 Purposes of This Plan

The general purposes of the Salem Natural Hazard Mitigation Plan are to:

- Define the scope of and experience with natural hazards affecting the community;
- Assess the ongoing hazard mitigation activities in the community, including approaches that the City is currently utilizing;
- Evaluate additional mitigation measures that should be undertaken;
- Define a strategy for implementation of mitigation projects and activities by all stakeholders (including cities, the County, citizens, businesses, others);
- Serve as a qualifying document for various hazard mitigation programs which are coordinated through the Office of Oregon Emergency Management (OEM); and
- Act as a resource document, subject to change, as the community refines hazard mitigation goals, strategies, and implementation.

1.2 Hazard Mitigation

The Federal Emergency Management Agency (FEMA) defines mitigation as “sustained action taken to reduce or eliminate long-term risk to people and their property from hazards and their effects.” Example strategies include policy changes, such as updated ordinances; projects, such as seismic retrofits to critical facilities; and education and outreach to targeted audiences, such as Spanish speaking residents, or the elderly. Mitigation is the responsibility of individuals, private businesses and industries, state and local governments, and the federal government.

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

The Disaster Mitigation Act of 2000 (DMA 2000) is the latest federal legislation addressing mitigation planning. It reinforces the importance of mitigation planning and emphasizes planning for natural hazards before they occur. As such, this Act established the Pre-Disaster Mitigation (PDM) grant program and new requirements for the national post-disaster Hazard Mitigation Grant Program (HMGP). Section 322 of the Act specifically addresses mitigation planning at the state and local levels. State and local jurisdictions must have approved mitigation plans in place in order to qualify to receive Pre-Disaster Mitigation and post-disaster Hazard Mitigation Grant Program funds. Mitigation plans must demonstrate that their proposed mitigation measures are based on a sound planning process that accounts for the risk to the individual and their capabilities. In addition, the plan must coordinate with floodplain management planning credit criteria for FEMA's Community Rating System (CRS), Flood Mitigation Assistance (FMA) program, and the Department of Land Conservation and Development's (DLCD) Statewide Planning Goal 7. Refer to Appendix A for updates on the Stafford Act and more information about federal and state mitigation activities, laws, and programs.

1.3 City of Salem

Local authority for hazard mitigation is principally derived from state law and local ordinances that are within the delegated powers of local government. Specific hazard mitigation plans and Interagency Hazard Mitigation Team reports often recommend local administrative and legislative actions, and other recommendations focusing on needed state legislative, regulatory, or administrative actions.

Within the City of Salem, the Salem Area Comprehensive Plan (SACP) and Map, Salem Revised Code (SRC), Oregon Model Flood Damage Prevention Ordinance (adopted by the City), and the City Public Works Department Design Standards and Standard Construction Specifications lend themselves to planning and implementation of hazard mitigation. In addition, a series of master plans and issue specific plans/studies have been developed and also apply to hazard mitigation.

- Comprehensive Plan & Map. The SACP is a long-range plan for guiding development in the Salem urban area and its relationship with the greater Salem/Keizer urban area. The plan was first adopted by Salem, Marion, and Polk Counties in 1973 through a process that involved broad-based participation by area citizens. The plan was revised in 1982 to conform to State Land Use Goals. A 1986 plan amendment reduced the urbanizable area, encompassed by the Urban Growth Boundary, (UGB) by 2,400 acres. The plan has been periodically reviewed and updated since 1988. The current SACP was adopted in 1992 and revised in March 1997, November 2000, July 2002, November 2003, April 2004, and January 2005. SACP Map designations include single family residential, multifamily residential, developing residential, commercial, Central Business District, mixed-use, industrial, industrial/commercial, employment center, parks, open space and outdoor recreation, community services, river-oriented mixed uses, and farming and resource management (applied to areas zoned "Exclusive Farm Use"). In the Comprehensive Plan, recognized "special conditions" that affect development are floodplains, geologic conditions, soils, aggregate resources, fish and wildlife, the Willamette Greenway Boundary, historic landmarks, and airspace obstructions (around McNary Field).

A 1977 report by the State of Oregon and site specific reports are referenced in the plan pertinent to geologic conditions. The State report addresses steep slopes, landslide topography, and high groundwater. Soil Conservation Service maps and a 1974 report by the State Soil Conservationist are referenced. A 1961 State report is referenced pertinent to aggregate resources. State jurisdiction over fish spawning streams (including Mill and Pringle Creeks, and Shelton Ditch), the State Fish & Wildlife Commission establishment of the Brown Island and Minto Island Wildlife Refuge, and the Audubon Society's maintenance of a 22-acre heron rookery on the north end of Minto Island are referenced as significant fish and wildlife habitat. The Willamette Greenway boundary was adopted in 1976 and delineated by the Oregon Department of Transportation (ODOT) on 1"=400 foot maps.

The Salem Revised Code (Chapter 120A) designates historic landmarks, including those on the National Historic Register, which the City may wish to protect from hazard impacts. The Salem Revised Code (Chapter 125) addresses airspace concerns.

- Salem Revised Code. Title I of the Code (Chapters 6 and 20) apply to the organization and implementation of the Salem Planning Commission and Design Review Board, respectively.

Title V (Community Development Standards) includes a long list of codes, of which Building Codes (Chapter 56), dangerous buildings (Chapter 56), comprehensive planning (Chapter 64) and urban growth management (Chapter 66) are a part. Chapter 64 details procedures for amending or otherwise changing the comprehensive plan and neighborhood plans, as well as lists of “detailed” plans adopted by the City. Such detailed plans pertain to master planning related to parks, water, wastewater, stormwater, the Willamette Greenway, transportation corridors, neighborhoods, and public facilities. Chapter 69 includes the Landslide Hazard Ordinance intended to guide the review of development in landslide hazard areas. Chapters within Title V also include sections on subdivisions, excavation and filling (including areas near or within designated waterways or a floodplain overlay zone), maintenance of brush that is a fire hazard, trees and vegetation.

Chapters within Title X pertain to zoning, including the effect of other regulations (Chapter 110), setbacks and hillside lots (Chapter 130), all the various zoning designations, and special “overlay” zones for floodplains (Chapter 140), the Willamette Greenway (Chapter 141), and several areas/neighborhoods. The City adopted a new Erosion Prevention and Sediment Control Program (Chapter 75), effective September 2001.

- Oregon Model Flood Damage Prevention Ordinance. All Oregon cities utilized and adopted this model ordinance to comply with standards for participation in the National Flood Insurance Program (NFIP). This model includes standards and provisions that “encourage sound floodplain management and, if implemented, allows property owners to obtain flood insurance at a more affordable rate”. The model includes a minimum requirement for non-residential construction that the lowest floor is elevated one foot above the base flood or that the lowest floor is flood proofed.

The Salem Public Works Department published a post-flood report for the 1996 February floods that identified areas of inundation during the flood and compared the City data to FEMA Flood Insurance Rate Map (FIRM) data. There were significant differences between the City’s 1996 data and FIRM data. Compared with the plotted 100-year flood level on the FIRMs, 1996 flood levels documented by the City ranged from an equivalent 42 year (Willamette River at Salem)- to 143-year (Santiam River at Jefferson) flood recurrence interval. Revised FIRM data for Mill Creek was received from FEMA and review was completed in the Fall of 2002. City Council adopted the revised January 2, 2003 FIRM on March 3, 2003.

The most significant flooding occurred along Mill Creek. A 1990 draft US Army Corps of Engineers (COE) flood damage reduction study for Mill and Pringle Creeks and Shelton Ditch was inconclusive on the best option for mitigation. However, upstream storage and increasing conveyance capacity were the general solutions evaluated.

Several projects spun off of this study and principally the February 1996 flood event, including draft revisions of the FIRMs in 1998 and 2000, and the COE’s *Section 205 Flood Damage Reduction*

Study and associated Hydrologic and Hydraulic Analysis. The latter effort focused on developing an updated computer hydraulic model (UNET) of Mill Creek and its tributaries as part of the comprehensive Section 205 Flood Damage Reduction Study, completed in February 2002. A version of the model included some significant modifications of the floodway and floodplain, which were reflected by the revised January 2, 2003 FIRM.

- Public Works Department *Design Standards and Standard Construction Specifications*. A review of the Design Standards and Standard Construction specifications (two documents) suggests that, as intended, the documents are a guide for City permit/design review staff and design consultants during the permit/design review process. The Stormwater Management Design Standards are now being updated to reflect current industry-accepted and regulatory driven practices to control both stormwater quantity and quality.
- Master Plans. Several master plans exist and portions of these plans directly or indirectly apply to hazard mitigation. Master plans have been developed for the stormwater, water, wastewater, transportation, and parks systems within the City, and each is periodically reviewed and updated to ensure they remain current with respect to the City's current and future infrastructure needs
- Other Plans/Reports. Other plans and reports have been prepared including the *Seismic Vulnerability Evaluation of Existing Water and Wastewater Facilities, City of Salem, Oregon*. This 1996 report for Public Works identified areas of relative seismic hazard. In this report, thirteen known faults in the Willamette Valley were identified that could affect the City of Salem study area. The significant local faults in the study area include the Turner Fault, the Mill Creek Fault, and the Waldo Hills Frontal Range Fault. Earthquakes of magnitude greater than 6.5 are not expected from these features. Significant ground shaking could occur within the project area due to proximity of the faults. Also, the February 28, 2001 deep-seated "subduction zone" event near Olympia is a recent reminder of the potential for larger earthquakes. The report also identified many improvements the City could make to improve the survival of sewer and water facilities in the event of an earthquake.

HAZUS-MH: Earthquake Event Reports were completed in March 2005 to estimate potential losses from two different earthquake scenarios in Polk and Marion Counties. The primary purpose of HAZUS is to provide a methodology and software application to develop earthquake losses at a regional scale. These loss estimates would be used primarily by local, state, and regional officials to plan and stimulate efforts to reduce risks from earthquakes and to prepare emergency response and recovery.

1.4 Planning Process Summarized

Determining what mitigation strategies and measures are best for an area is done through a planning process. During this process, the various hazards are inventoried, the risks from each are judged, the full range of possible loss prevention measures are reviewed, current mitigation measures are identified, and the most appropriate and affordable new ones are recommended for implementation. The following is a description of how the Salem Natural Hazards Mitigation Plan was developed.

1.4.1 Development of the 2003 Salem Natural Hazard Mitigation Plan

In March of 1998, the City of Salem formed a Technical Advisory Committee led by the Community Development Department to guide development of the Natural Hazard Mitigation Plan. Participants in the Natural Hazard Mitigation Plan Technical Advisory Committee included:

- City of Salem Fire;
- City of Salem Public Works;
- City of Salem Human Resources;
- City of Salem Police;
- City of Salem Emergency Preparedness;
- City Manager's Office;
- City of Salem Legal Departments;
- Marion County;
- Polk County;
- Mid-Willamette Valley Council of Governments;
- City of Keizer;
- Salem/Keizer School District;
- State of Oregon Department of Geology and Mineral Industries;
- State of Oregon Department of Land Conservation and Development;
- Oregon State Police Office of Emergency Management (OEM);
- State of Oregon Administrative Services; and
- Federal Emergency Management Agency.

The Technical Advisory Committee held thirteen work sessions beginning in 1998 and ending in 2001.

There were several opportunities for public involvement throughout the planning process. A total of three open houses were held at various phases in the planning process to obtain citizen feedback and provide the public with an update on the development of the Plan. The first open house, held on December 15, 1999, provided the public with an opportunity to comment on the natural hazards inventory and to provide comments regarding the goals, objectives and direction the Plan should follow. The second open house, held on March 15, 2001, provided another opportunity to obtain citizen feedback and educate interested citizens on the Plan's progress. Comments and ideas regarding possible mitigation measures were also sought at this meeting. The final open house, held on May 2, 2001, provided the public an opportunity to review and provide comments on a completed draft of the Salem Natural Hazards Mitigation Plan. Handouts, maps/graphics and staff presentations were made available at these meetings. Surveys were also used to obtain additional public comments. An example of a public outreach announcement can be seen in Appendix E Public Process.

Other opportunities for public involvement included public meetings held before the City of Salem's Planning Commission and City Council. Public meetings and planning activities were announced through press releases to local radio stations, the Salem Statesman Journal newspaper, City newsletter (*Current Issues*), the City's web site, and staff reports to City Council and Planning Commission members.

The 2003 plan was adopted by the City Council in May 2003.

Since the adoption of the Natural Hazards Mitigation Plan, the Mitigation Coordinating Committee has met twice; September 9, 2005 and April 4, 2006. At the first meeting, the Mitigation Coordinating Committee reviewed the planning and maintenance process set forth in the Natural Hazards Mitigation Plan and discussed implementation of

the action items. During the second meeting, the Mitigation Coordinating Committee evaluated the progress of the seventeen action items and delegated tasks to support the completion of actions not yet addressed.

1.4.2 Development of the 2008 Salem Natural Hazard Mitigation Plan Update

In February 2008, the City of Salem contracted with the Oregon Partnership for Disaster Resilience (the Partnership) at the University of Oregon's Community Service Center to document and facilitate the five-year update of the Salem Natural Hazards Mitigation Plan. Salem Emergency Management re-convened the Mitigation Coordinating Committee (MCC) to guide the development of the 2008 plan update. During the plan update, the MCC's title changed to the Salem Natural Hazards Mitigation Committee (the Committee). The following organizations were represented and served on the Committee during the 2008 update of the Natural Hazards Mitigation Plan:

- Salem Emergency Management
- Salem Fire Department
- Salem Hospital
- City of Salem Police
- City of Salem Public Works- Development Services Division
- City of Salem Public Works – Emergency Preparedness Division
- City of Salem Public Works – Operations Division
- City of Salem Public Works – Utilities Planning Section
- City of Salem Community Development – Planning Division
- Marion County Emergency Management

A list of those organizations invited to participate on the Committee can be found in Appendix E Public Process.

The Partnership facilitated three Plan update meetings with the Committee on March 19th, April 30th, and May 22nd, 2008. On March 19, 2008 the Partnership met with the Committee to discuss the five-year update planning process and requirements. In addition, the Committee identified new hazard history events and mitigation activities that have occurred since 2003 when the plan was first adopted. Minutes to the meeting can be found in the Appendix E Public Process.

On April 30, 2008 the Partnership facilitated the second meeting with the Committee to discuss and revise the goals and objectives of the current plan. The Committee also discussed the status of the 2003 Mitigation Plan action items and identified new action items that addressed hazards and vulnerabilities identified at the March 19, 2008 meeting. The Partnership documented the status of each of the 2003 action item, noting whether it had been completed or not completed, and why. Among the action items that had not been completed, the Committee identified several actions that should be continued in the 2008 Mitigation Plan. The Partnership revised these actions and included them with the new action items developed by the Committee and the Partnership. The new action items, together with the 2003 action items and their status, can be found in Section 5 of this plan. The 2003 actions along with status updates can be found in Appendix D.

The Partnership facilitated a third meeting with the Committee on May 22, 2008 to discuss the changes made to the 2003 Mitigation Plan and present a final draft of the 2008 Salem Natural Hazards Mitigation Plan Update. The Partnership compiled all suggestions made by the Committee and incorporated final edits into the final version of the 2008 Salem Natural Hazards Mitigation Plan Update.

On June 20, 2008, the Committee submitted the plan to the Oregon Office of Emergency Management to in turn submit to FEMA for pre-approval. The City of Salem City Council subsequently adopted the 2008 plan update on August 25, 2008.

1.4.3 Development of the 2013 Salem Natural Hazard Mitigation Plan Update

1.5 Plan Implementation

This section details the formal process that will ensure that the Salem 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 semi-annually, as well as producing an updated plan every five years. This section also describes how the City will integrate public participation throughout the plan maintenance and implementation process.

1.5.1 Convener

The Salem Natural Hazards Mitigation Committee identified Salem Emergency Management as the convener organization for the Salem Natural Hazards Mitigation Plan. Responsibilities of the convener include the following:

- Coordinate Committee meeting dates, times, locations, agendas, and member notification;
- Document outcomes of the Committee meetings;
- Serve as a communication conduit between the Committee and key plan stakeholders; and
- Identify emergency management-related funding sources for natural hazard mitigation projects.

1.5.2 Coordinating Body

The Salem Natural Hazards Mitigation Committee serves as the coordinating body for the Salem Natural Hazards Mitigation Plan. The Committee roles and responsibilities include:

- Coordinate the implementation of the Salem Natural Hazards Mitigation Plan;
- Monitor progress in implementing the Plan;
- Set priorities among competing action items;
- Work with lead agencies/departments identified in action items to develop implementation strategies;
- Coordinate the Plan and its implementation with relevant city, county and state plans;
- Submit an annual progress report to the Planning Commission and City Council;
- Recommend changes needed to this Plan as community needs and experiences dictate;
- Incorporate hazard assessment/mitigation goals into all City activities; and
- Utilize the Risk Assessment as a tool for prioritizing proposed natural hazard risk reduction projects.

1.5.2.1 Coordinating Body Members

The Salem Natural Hazards Mitigation Committee is composed of the following Organizations and City Departments:

- Salem Emergency Management
- Salem Fire Department
- Salem Hospital
- City of Salem Police
- City of Salem Public Works – Development Services Division
- City of Salem Public Works – Emergency Preparedness Division
- City of Salem Public Works – Operations Division
- City of Salem Public Works – Administrative Division
- City of Salem Planning Division
- Marion County Emergency Management

To make the coordination and review of the Salem Natural Hazards Mitigation Plan as broad and useful as possible, the Committee will engage additional stakeholders and other relevant hazard mitigation organizations and agencies to implement the identified action items. These organizations may include: City of Salem Public Works – Urban Development Department, City of Salem Public Works – Building and Safety Division, Salem-Keizer Public School District (24J), Polk County Emergency Management and the State Department of Administrative Services. Specific organizations have been identified as either internal or external partners on the individual action item forms found in Section 5.

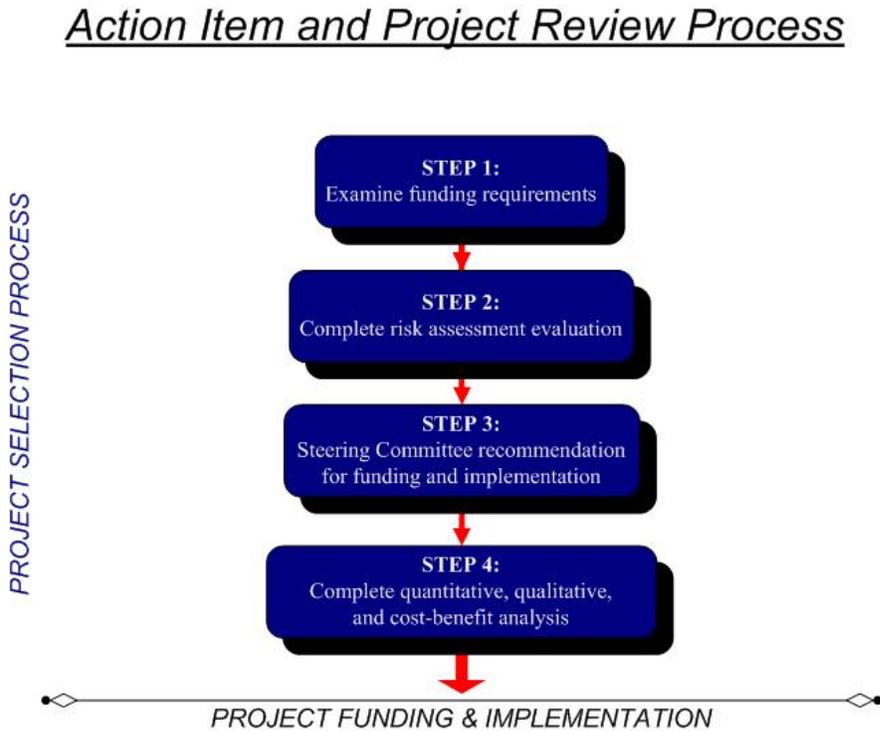
The process the Committee will use to prioritize mitigation projects is detailed in the section below. The plan’s format allows the City to review and update sections when new data becomes available. New data can be easily incorporated, resulting in a Natural Hazards Mitigation Plan that remains current and relevant to the participating jurisdictions.

1.5.3 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 the Committee members, local government staff, other planning documents, or the risk assessment.

Depending on the potential project’s intent and implementation methods, several funding sources may be appropriate. Examples of mitigation funding sources include, but are not limited to: FEMA’s Pre-Disaster Mitigation competitive grant program (PDM), Flood Mitigation Assistance program (FMA), National Fire Plan (NFP), Community Development Block Grants (CDBG), local general or enterprise funds, and private foundations. For projects being funded locally, (i.e., through Capital Improvement Program), the project prioritization process for that particular program will be utilized. Figure 1.1 on the next page illustrates the project development and prioritization process for projects that will utilize non-local and federal funding sources.

Figure 1.1 Action Item and Project Review Process for Federally Funded Projects



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

Step 1: Examine funding requirements

The Committee will identify how best to implement individual actions within the appropriate plans, policies, or programs that currently exist within the City of Salem. The Committee will examine the selected funding stream's requirements to ensure that the mitigation activity would be eligible through the funding source. The Committee may consult with the funding entity, Oregon Emergency Management, or other appropriate state or regional organizations about the project's eligibility.

Step 2: Complete risk assessment evaluation

The second step in prioritizing the plan's action items is to examine which hazards they are associated with and where these hazards rank in terms of community risk. The Committee will determine whether or not the plan's risk assessment supports the implementation of the mitigation activity. This determination will be based on the location of the potential activity and the proximity to known hazard areas, historic hazard occurrences, vulnerable community assets at risk, and the probability of future occurrences documented in the plan. Figure 1.2 shows the probability and vulnerability scores for the natural hazards addressed in this plan. Figure 1.2 also shows the City's hazard ranking score for each of the natural hazards. The higher the ranking score, the higher the priority. See Section 4.0, All Hazards Risk Assessment for an explanation of ranking methodology.

Figure 1.2. City of Salem Hazard Probability and Vulnerability Assessments

Hazard	Probability	Vulnerability	Hazard Ranking
Flood	High	High	9
Severe Wind & Ice Storms	High	High	9
Earthquake	High	High	9
Landslide	High	Moderate	6
Hazardous Materials Incidents	Moderate	High	6
Urban-Wildland Interface Fires	Moderate	Moderate	4
Drought	Moderate	Moderate	4
Volcanic Eruptions	Moderate	Low	2

Step 3: Committee recommendation

Based on steps one and two above, the Committee will recommend whether or not the mitigation activity should move forward. If the Committee decides to move forward with an action, the Lead Agency designated on the action item form will be responsible for taking further action and documenting success upon project completion. The Committee will convene a meeting to review the issues surrounding grant applications and to share knowledge and/or resources. This process will afford greater coordination and less competition for limited funds.

The Committee and the community’s leadership have the option to implement any of the action items at any time, (regardless of the prioritized order). This allows the Committee to consider mitigation strategies as new opportunities arise, such as funding for action items that may not be of the highest priority. This methodology is used by the Committee to prioritize the Salem Natural Hazard Mitigation Plan’s action items during the annual review and update process.

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

The fourth step is to identify the costs and benefits associated with 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 a 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. A 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. See Appendix C for more information.

If the activity requires federal funding for a structural project, the Committee will use a Federal Emergency Management Agency-approved benefit-cost 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, the Committee will defer to the process identified within the appropriate plans, policies, or programs that currently exist within the City of Salem. This way, the Committee can utilize established forms of project development and prioritization processes in order to incorporate natural hazard mitigation activities into the existing framework of the City of Salem.

1.6 Plan Maintenance

Plan maintenance is a critical component of the Salem Natural Hazards 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 Committee and local staff are responsible for implementing this process, in addition to maintaining and updating the plan through a series of meetings outlined in the maintenance schedule below.

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

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

During the second meeting of the year the Committee will:

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

The convener will be responsible for documenting the outcome of the semi-annual meetings and including records in Appendix E Public Process. The process the Committee will use to prioritize mitigation projects is detailed in the section above. 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.

1.6.1 Continued Public Involvement

The City of Salem is dedicated to involving the public directly in the reshaping and updating of the Salem Natural Hazard Mitigation Plan. Although members of the Salem Natural Hazards Mitigation Committee represent the public to some extent, the public has had and will continue to have the opportunity to provide feedback about the Plan. The City will ensure continued public involvement by posting the Salem Natural Hazards Mitigation Plan on the City's website at www.salem.or.us and www.cityofsalem.net. The plan will also be archived and posted on the University of Oregon Libraries' Scholar's Bank Digital Archive at the following address:

<https://scholarsbank.uoregon.edu/dspace/handle/1794/1930/browse-title>.

1.6.2 Five-Year Review process

This plan will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. During this plan update, the following questions will be asked to determine what actions are necessary to update the plan. The convener will be responsible for convening the Committee to address the questions outlined below.

- Are the plan's goals still applicable?
- Do the plan's priorities align with State priorities?
- Are there new partners that should be brought to the table?
- Are there new local, regional, state or federal policies influencing natural hazards that should be addressed?
- Has the community successfully implemented any mitigation activities since the plan was last updated?
- Have new issues or problems related to hazards been identified in the community?
- Do existing actions need to be reprioritized for implementation?
- Are the actions still appropriate, given current resources, community needs, and priorities?
- Have there been any changes in development patterns that could influence the effects of hazards?
- Are there new studies or data available that would enhance the risk assessment?
- Has the community been affected by any disasters?
- Did the plan accurately address the impacts of this event?

The questions above will help the Committee determine what components of the Mitigation Plan need updating. The Committee will be responsible for updating any deficiencies found in the plan as needed.

1.7 Natural Hazard Mitigation Plan Components

This Mitigation Plan consists of four more sections and supporting appendices. Section 2.0 provides further information about natural hazards of concern to the City of Salem. Section 3.0 defines mitigation goals and objectives. Section 4.0 contains the risk assessment for the Salem Natural Hazards Mitigation Plan. Section 5.0 focuses on which actions should be taken, the rationale for why they should be taken, who the lead agency and partners will be, and a timeline for implementation. The actions in Section 5.0 include some actions found in the 2003 Mitigation Plan and new actions developed during the 2008 update process.

2.0 NATURAL HAZARDS

2.1 Principal Natural Hazard Descriptions

This plan addresses multiple natural hazards that have or could affect portions of the State of Oregon and the City of Salem. The State of Oregon shares multiple hazards with its neighboring states, and has experienced several presidentially declared disasters in recent years. While some hazards present different risks in terms of their frequency and potential impacts, the full range of hazards includes floods, earthquakes, landslides, severe weather hazards, urban-wildland interface fires, volcanic eruptions, drought, and hazardous material releases.

Lost lives, injuries, property damages, service interruptions, and extraordinary costs have been the hallmarks of several recent Oregon disasters. Most of these have resulted in presidential disaster declarations, but other more frequent smaller scale losses occur which might result in local or state declarations of emergencies. While difficult to estimate, total aggregate losses state-wide due to the occurrence of natural hazards have amounted to hundreds of millions of dollars during the last decade. For example, nearly \$222 million was provided to Oregon by several federal programs for three flood disasters in the last decade (1996/7). This plan is designed to help reduce such losses and their costs to the public and private sectors.

The following is a brief summary of the hazards affecting the City of Salem. Several of the natural hazards concerns have been mapped by the City of Salem. These include floodways, floodplains, areas inundated during the 1996 floods, and areas of high landslide hazard. While preparing the Natural Hazards Mitigation Plan, several other map “overlays” of information from State sources were added to the City’s map base. Such information includes mapped areas of relative vulnerability to an earthquake (e.g., soil liquefaction, relative earthquake hazard, and earthquake amplification hazard). The maps are included in this section and follow the corresponding hazard.

The maps in this section identify the location and extent of the majority of the hazards. For more detailed information on the history, probability, vulnerability and impacts of these hazards, see Section 4.3 Risk Assessment Table.

2.1.1 Flood Hazard

Flooding results when rain or snowmelt creates water flows that exceed the carrying capacity of rivers, streams, channels, ditches, and other watercourses. In Oregon, flooding is most common from October through April when storms from the Pacific Ocean bring intense rainfall. Flooding can be aggravated when rain is accompanied by snowmelt and frozen ground. In general, Oregon is subject to two principal types of flooding: riverine and local drainage. Riverine flooding on the larger rivers and streams usually results from large storms or prolonged wet periods. Local drainage flooding occurs along the smaller streams, creeks, and drainage ways, and is more likely to result from heavy local storms and debris-clogged storm drainage systems. The areas subject to riverine flooding have been mapped by the Federal Emergency Management Agency (FEMA) for the National Flood Insurance Program (NFIP). The national and state flood mapping standard is the 100-year or base floodplain.

In May of 2008, NFIP’s Community Rating System (CRS) improved the City of Salem’s rating to a Class 8. The NFIP’s CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. The CRS program looks at these different activities and rates those compared to a national standard. As a result of the City of Salem improving to a Class 8 rating in the CRS, flood insurance premium rates for Salem residents are discounted 10% to reflect the reduced flood risk resulting from the City’s flood hazard mitigation actions. For CRS participating communities, flood insurance premium rates are

discounted in increments of 5%; i.e., a Class 1 community would receive a 45% premium discount, while a Class 9 community would receive a 5% discount.

Riverine flooding is the most common type of flooding in Salem. The most significant of the FEMA-determined floodplains and floodways either surround the southern side of the Willamette River west of Salem, or are within the greater Mill Creek/Pringle Creek watershed. The Mill Creek area includes residential and commercial/industrial developments to the southeast of downtown. Please see Map 2: Flood Information on the following page. Localized flooding is also a hazard, especially in Keizer which is located adjacent to Salem on the north and downstream from Salem within the Claggett Creek watershed. The City of Salem has a total of 3 repetitive flood loss properties within City boundaries. The City has also identified the number of structures located in the various floodplains by land use zone, as shown in Figure 2.1.1.

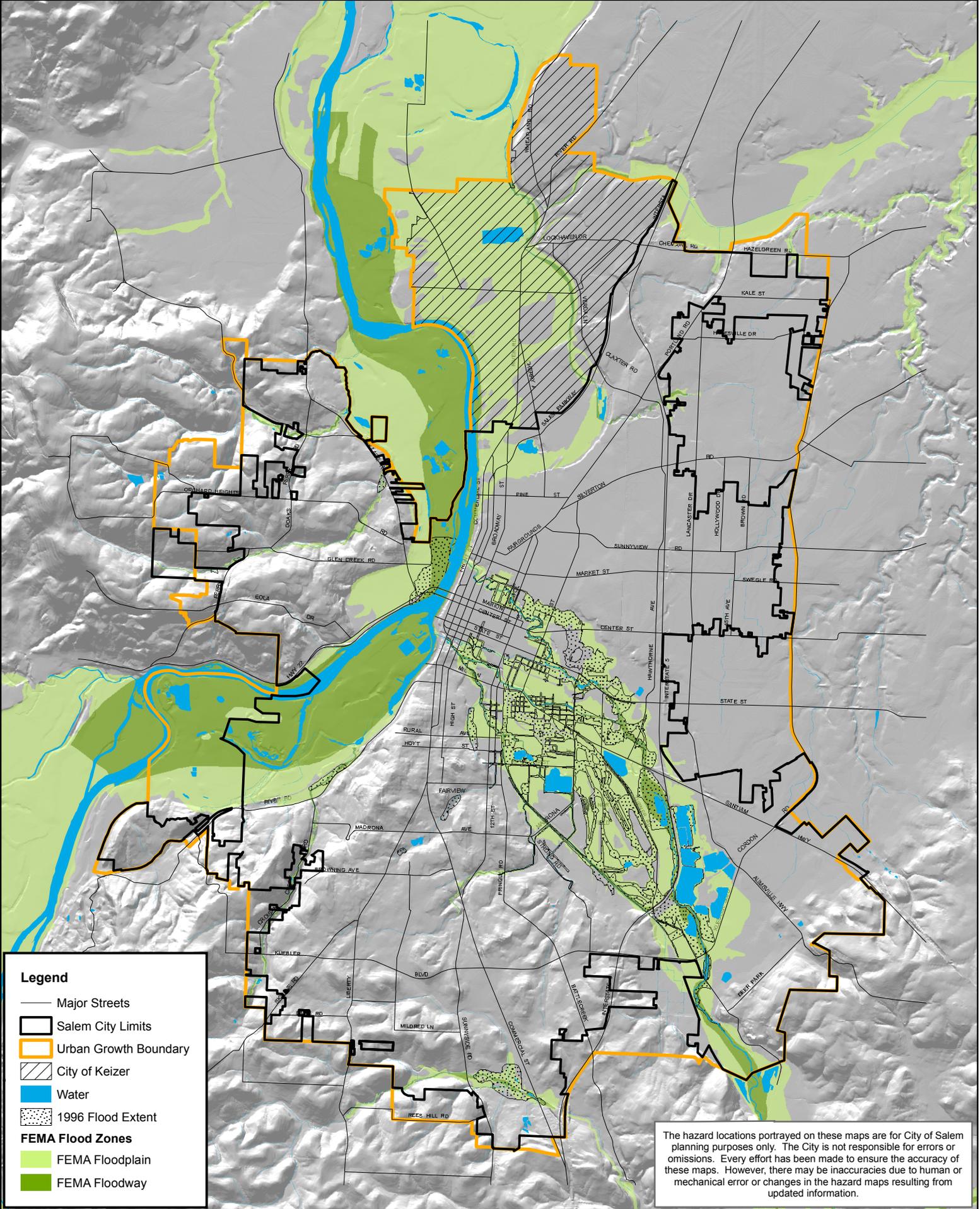
Figure 2.1.1. Number of Structures in Floodplain by Land Use Zone.

Zone	Zone Name	Count of Structures
CB	Central Business District	24
CG	General Commercial	122
CO	Commercial Office	25
CR	Retail Commercial	103
FMU	Fairview Mixed Use	1
IBC	Industrial Business Campus	3
IC	Industrial Commercial	201
IG	General Industrial	351
IP	Industrial Park	36
PA	Public Amusement	39
PE	Public and Private Educational Services	31
PH	Public and Private Health Services	23
PM	Capitol Mall	4
PS	Public Service	111
RA	Residential Agriculture	39
RD	Duplex Residential	141
RH	Multiple Family High-Rise Residential	36
RM1	Multiple Family Residential 1	3
RM2	Multiple Family Residential 2	1406
RS	Single Family Residential	842
Total		3541

Source: City of Salem Public Works – GIS, 2008.

CITY OF SALEM NATURAL HAZARD MITIGATION PLAN

MAP 2.1.1: FLOOD INFORMATION



Legend

- Major Streets
- ▭ Salem City Limits
- ▭ Urban Growth Boundary
- ▨ City of Keizer
- Water
- ▨ 1996 Flood Extent
- FEMA Flood Zones**
- FEMA Floodplain
- FEMA Floodway

The hazard locations portrayed on these maps are for City of Salem planning purposes only. The City is not responsible for errors or omissions. Every effort has been made to ensure the accuracy of these maps. However, there may be inaccuracies due to human or mechanical error or changes in the hazard maps resulting from updated information.

2.1.2 Earthquake Hazard

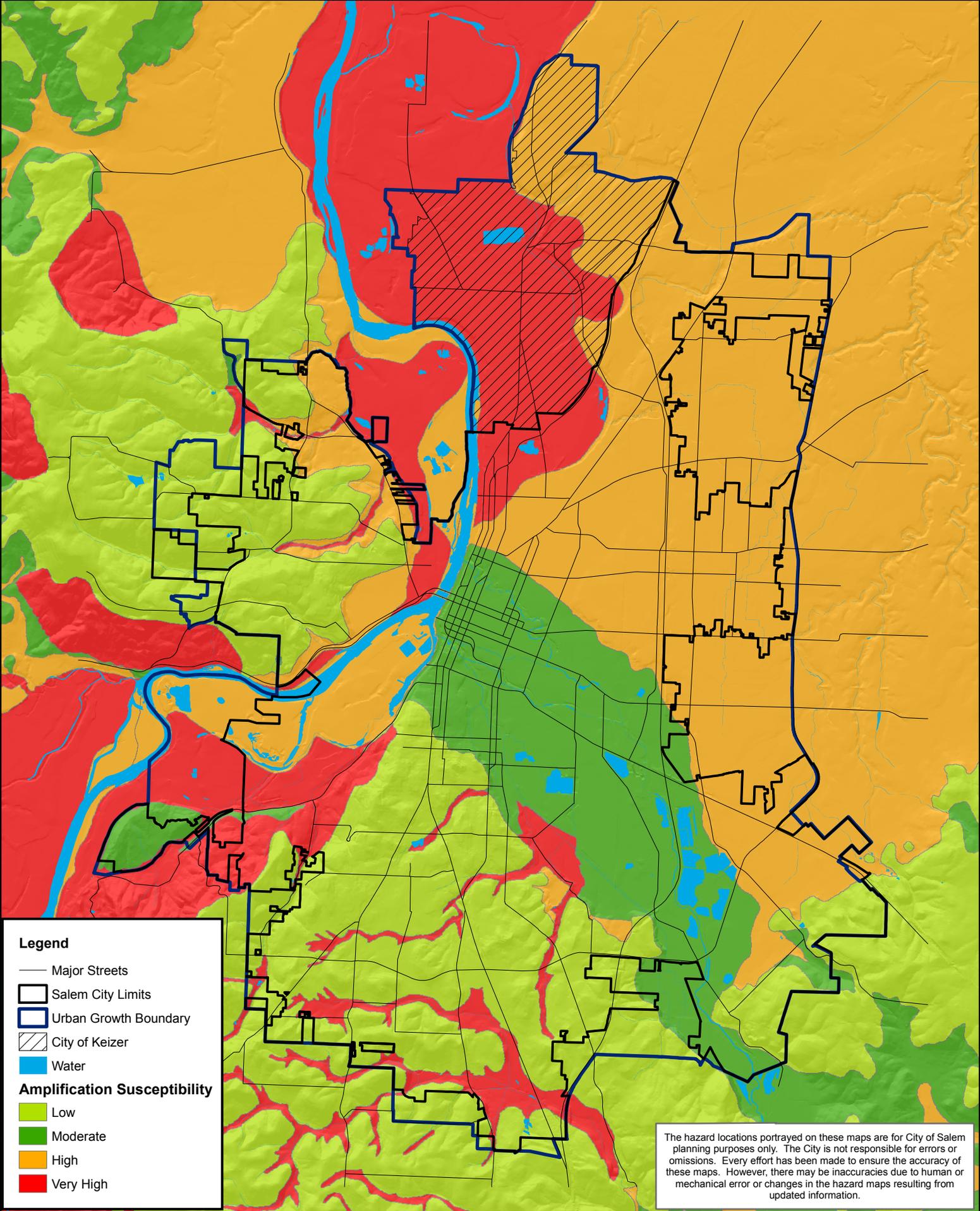
Oregon sits on the Cascadia Subduction Zone where the Juan de Fuca Plate is sliding under the North American Plate. While earthquakes along this zone occur infrequently, plate movement can produce major earthquakes. In addition, the western part of Oregon is underlain by a large and complex system of faults (e.g., Portland Hills) that can produce damaging earthquakes. There is a direct relationship between a fault's length and its ability to generate damaging ground motions: smaller nearby faults produce lower magnitude events, but their ground shaking can be strong and damage can be high because of the fault's proximity. In contrast, offshore subduction zone events can generate earthquakes with great magnitudes, but because of their distance and depth may result in only moderate shaking in western Oregon. Earthquakes can trigger other geologic and soils failures that contribute to damage.

The Oregon Department of Geology and Mineral Industries (DOGAMI) has mapped earthquake hazards in much of the Salem area. The maps show liquefaction, ground motion amplification, landslide susceptibility, and relative earthquake hazards. As a result of the 1996 study completed by Dames and Moore, the City has completed retrofits to all their pump stations and steel water reservoirs. The City has also installed seismic activated valves on most of the City's water reservoirs which will automatically close in the event of an earthquake.

Within the Salem Urban Growth Boundary (UGB), the area south of the Willamette River and west of River Road has the highest risk of earthquakes. Other small areas with high earthquake risk exist to the east of the city. More information about earthquake risk in Salem can be seen in Map 3A: Earthquake Hazard – Amplification Susceptibility and Map 3B: Earthquake Hazard – Liquefaction Susceptibility on the following pages.

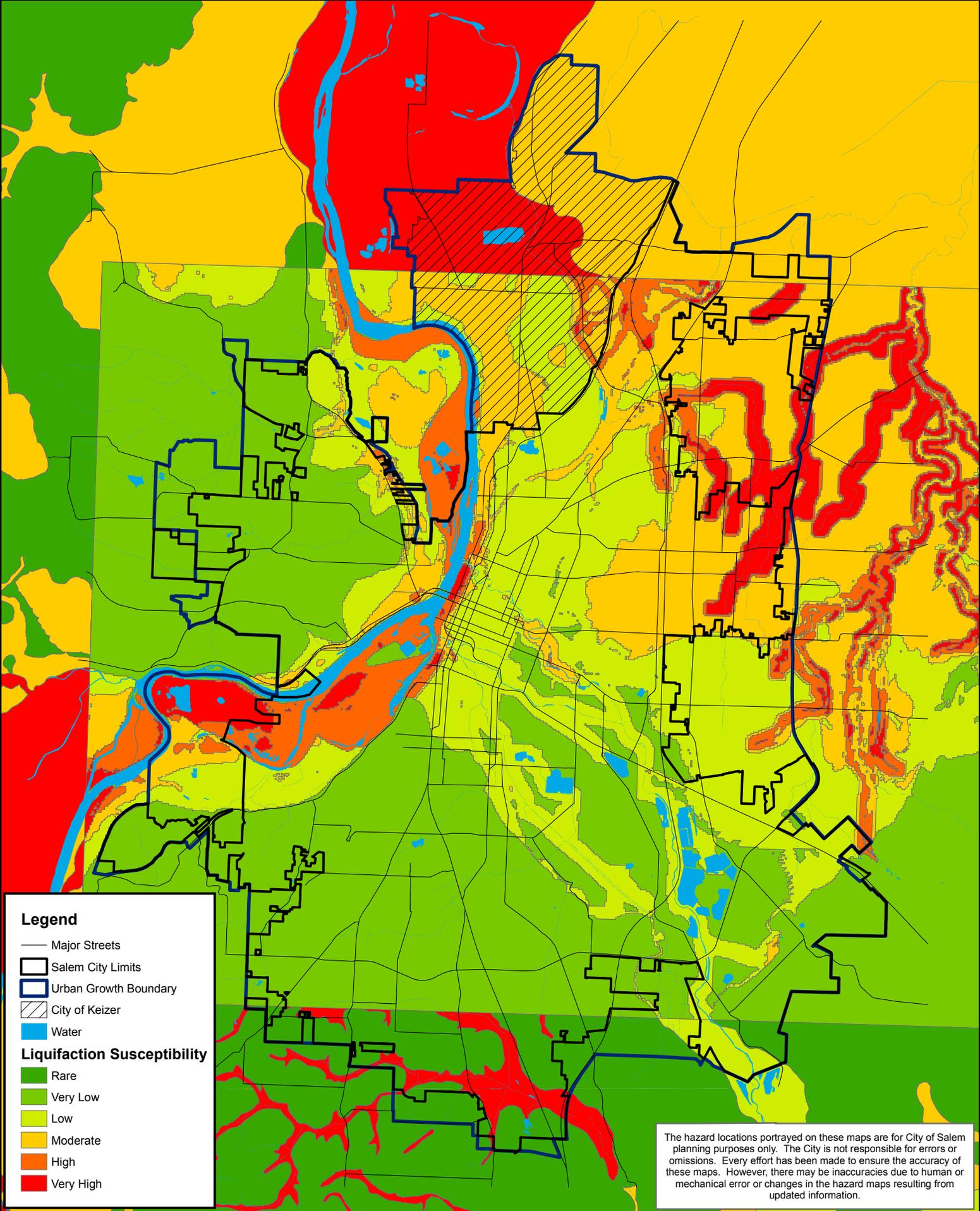
CITY OF SALEM NATURAL HAZARD MITIGATION PLAN

MAP 2.1.2A: EARTHQUAKE HAZARD - AMPLIFICATION SUSCEPTIBILITY



CITY OF SALEM NATURAL HAZARD MITIGATION PLAN

MAP 2.1.2B: EARTHQUAKE HAZARD - LIQUIFACTION SUSCEPTIBILITY



2.1.3 Landslide Hazard

Many hillsides, especially in Western Oregon, are unstable and vulnerable to landslides, debris, and mudflows. These can result from ground saturation, runoff, improper or poorly designed or maintained drainage systems or earthquakes.

Landslides are natural processes that tend to reduce the height and slope of mountains and ridges, and are part of the normal ongoing process of smoothing topographical high points. Slides occur in natural materials and in placed fill materials. The process is simple: a mass of earth slides when the forces from the weight of the slide mass exceed the strength of the material holding it in place. Determining when and where sliding will occur is difficult. Landslides and mudflows are especially prevalent when prolonged heavy rainfall saturates the soil and rock, and when human activities steepen the slopes, remove the toes, or add weight or water to the slopes.

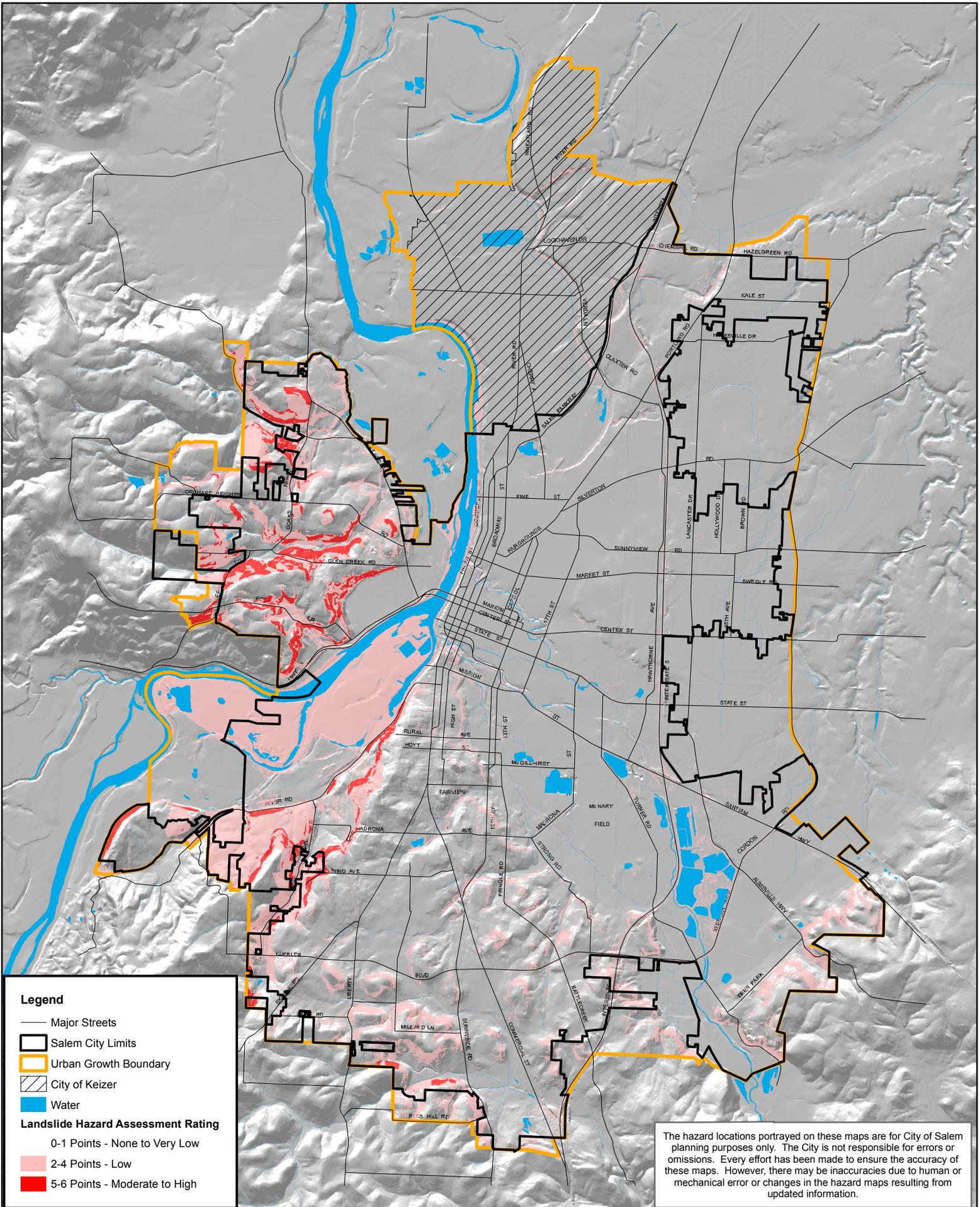
Landslides and mudslides in the City of Salem's drinking water supply watershed have negatively impacted the surface water quality of the North Santiam River, which prevented the use of the City's slow sand filters for drinking water treatment. The City installed a new pre-treatment facility in 1998 to reduce the potential impact of surface water quality, and coordination efforts for activities within the North Santiam watershed have been greatly improved among affected stakeholders (USFS, BLM, Oregon Department of Forestry, North Santiam communities, and private parties).

All areas having a medium to high landslide susceptibility rating are located to the west of downtown Salem in two main locations. The first area is in West Salem and is bounded to the south by the Willamette River, east by Wallace Rd and north and west by the City's Urban Growth Boundary (UGB). The majority of the landslide risks occur around Gibson Creek and Turnage Brook. To the south of the river, the highest landslide risk is around Croisan Creek and westward in the hills south of South River Road. Various areas of low risk are located south of Salem along the southern boundary of the UGB. Please see Map 4: Landslide Susceptibility Study Information on the following page.

In 2005, a landslide occurred along South River Road, near South Owen Street, which blocked off traffic to the city, but did not damage any homes. The City has undertaken several projects along South River Road to divert water away from the top of the slope, screen and contain falling debris, reduce vegetation, and remove hazardous trees to decrease the vulnerability of landslide hazards in the area.

CITY OF SALEM NATURAL HAZARD MITIGATION PLAN

MAP 2.1.3: LANDSLIDE SUSCEPTIBILITY STUDY INFORMATION



2.1.4 Severe Weather Hazards

This broadly defined hazard category includes windstorms, severe winter hazards (e.g., snow, ice, extended cold periods), thunderstorms, and tornadoes that disrupt vital systems and threaten lives and property. Wind and ice storms are caused by severe weather conditions. Windstorms can occur at any time of the year while ice storms are confined to the winter months. Wind storms, occasionally associated with Pacific Coast hurricanes migrating north, usually do not exceed 90 miles per hour, but wind speeds of 119 miles per hour were recorded in Portland during the October 1962 Columbus Day storm. Ice storms can be accompanied by high winds, and they have similar impacts, especially to trees, power lines, and residential utility services. These events can affect many areas. Severe ice storms occur more frequently in areas exposed to east wind patterns through the Columbia River Gorge, particularly eastern Multnomah and Clackamas Counties.

The mid-Willamette Valley area has had several wind and winter storm-related events that have affected Salem over the past five years. Funnel clouds occurred in the area in 2001, 2002, 2003, and 2006. Major hail storms occurred in 2003 and 2007. Salem has also been affected by windstorms (2002) and snow and ice storms (2003-2004). Severe weather patterns do not remain stagnant over Salem and are therefore usually short events. The location and extent of severe weather hazards depends on the event. They can impact the entire city, or just portions.

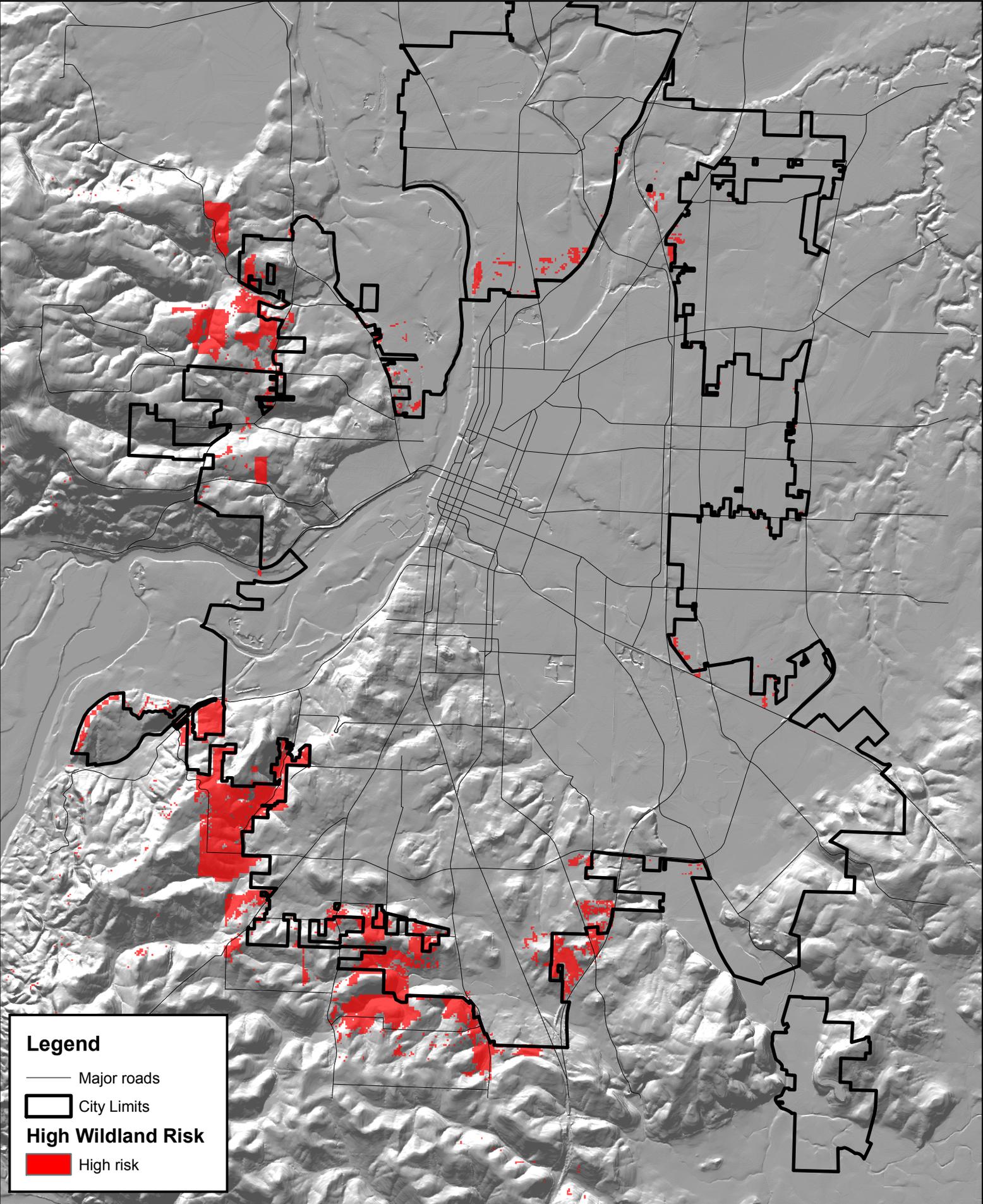
2.1.5 Urban-Wildland Interface Fire Hazard

While more common to the arid areas of central and eastern Oregon, the potential for losses due to urban-wildland interface fires in the urbanized region should not be ignored. Numerous residences are located in the heavily wooded hillsides around Salem and the trend of people locating in or near forested lands continues. Frequently occurring fires in such heavily wooded areas are not a natural occurrence, but the threat increases when subject to more human activity. The State of Oregon has noted that such interfaces really are an intermingling of homes and other structures at various densities and complexity within areas of heavy natural cover or forestlands. When buildings burn in or close to areas of heavy vegetation, especially during the dry months, the risk increases. Areas where structures are built in proximity to dense vegetation may be vulnerable to urban-wildland interface fire. Of particular concern are areas with narrow roadways and few routes of egress and ingress.

In Salem, the areas with the highest risk are characterized by steep slopes, combustible fuels, and values at risk (meaning valuable property adjacent to wildland areas). The majority of the high risk area is along the southern boundary of the UGB, with additional interface risks at the northwestern UGB boundary and in Keizer. Please see Map 5: Wildfire Risk Areas on the following page. Most wildland urban interface areas are adjacent to the Salem Suburban Fire Department's jurisdiction.

CITY OF SALEM NATURAL HAZARD MITIGATION PLAN

MAP 2.1.5: WILDFIRE RISK AREAS



2.1.6 Volcano Eruption Hazard

Evaluation of the volcano eruption hazard is primarily that of predicting lahars (mud flow) paths based on topography and ash fall patterns based on prevailing wind patterns. Prediction of eruptions has only recently become a reality in some cases where a volcano is instrumented and magma movement can be detected by seismic activity.

Salem could be affected by volcanic activity from Mt. St. Helens, Mt. Hood, or Mt. Jefferson. If any of these volcanoes erupted, there would be a possibility of ash that could affect air quality and/or the water quality. Specifically, Salem's North Santiam watershed could be severely impacted by mudflows and volcanic ash falls derived from regional volcanic activity.

2.1.7 Drought

Drought is frequently an "incremental" hazard, the onset and end are often difficult to determine. Also, its effects may accumulate slowly over a considerable period of time and may linger for years after termination of the event. Droughts are not just a summer-time phenomenon in Oregon; winter droughts can have a profound impact on agriculture, particularly east of the Cascade Mountains. Also, below average snowfall in higher elevations has far-reaching affects, especially in terms of hydro-electric power, municipal water supply, irrigation, recreational opportunities and a variety of industrial uses.

Although Salem is spared from most droughts because of its location east of the ocean and west of the Cascades, it has been affected by droughts in the past. Between 1928 and 1941, there was a statewide drought. Low stream flows prevailed in western Oregon during the period from 1976-81, with 1976-77 being the driest year of the century. The 1985-94 drought was not as severe as the 1976-77 drought in any single year, but the cumulative effect of ten consecutive years with mostly dry conditions caused statewide problems. The peak year of the drought was 1992, when a drought emergency was declared for all of Oregon.

The City of Salem Public Works Department has a Water Management and Conservation Plan that addresses drought and sets forth a plan of action to reduce the negative impacts from a drought. The drought hazard's location and extent includes the entire community as drought typically has community wide impacts.

2.1.8 Hazardous Materials Release Hazard

Chemical and other man-made disaster/hazard issues are generally handled through the local Fire Department, and the City of Salem is no exception. For the purposes of the Natural Hazards Mitigation Plan, hazardous materials releases are considered a secondary hazard derived from the impact of a natural hazard event (e.g., flooding in a chemical storage area could result in toxic levels of chemicals in water or air).

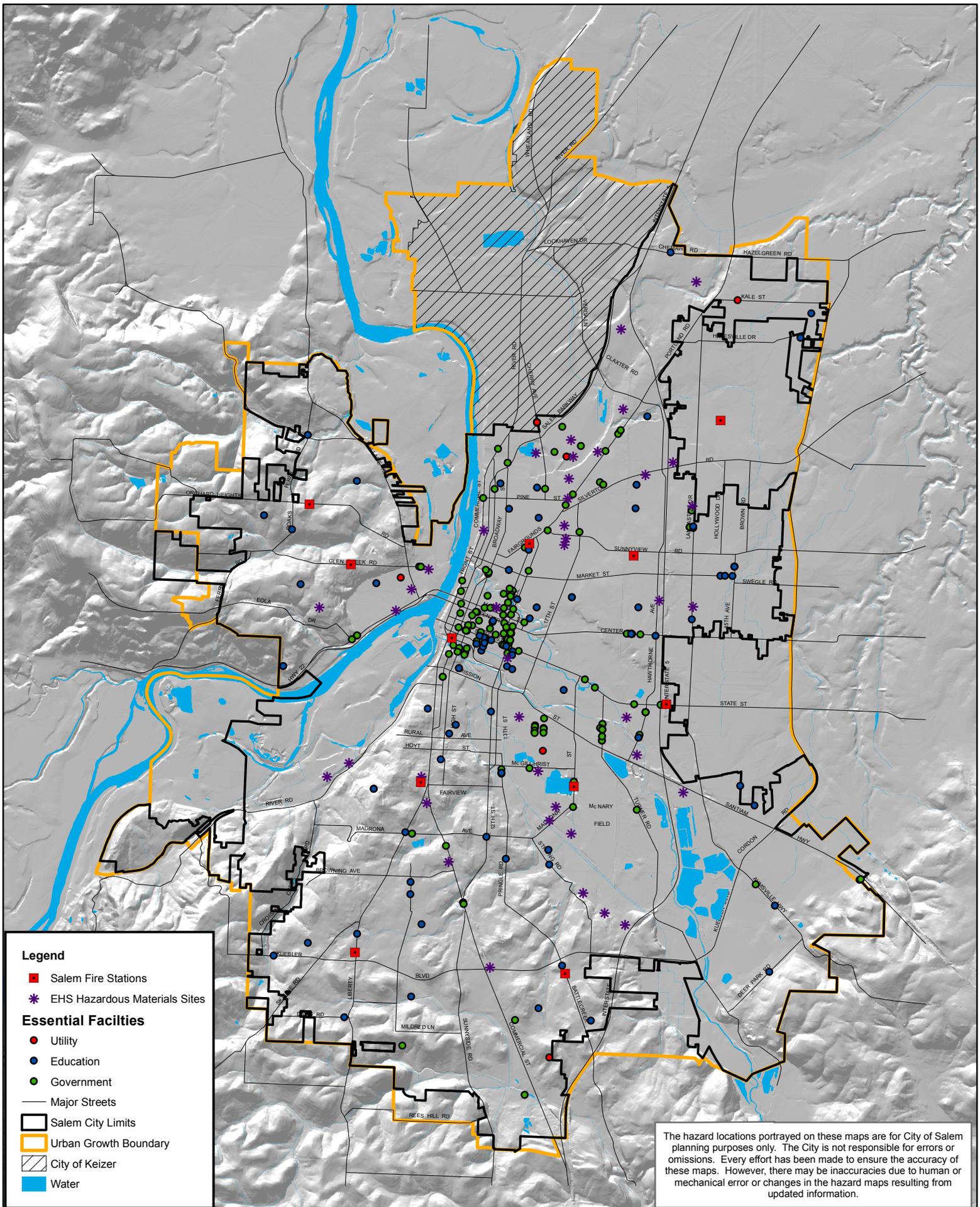
The Office of State Fire Marshal utilizes a hazardous materials database and providing it to local fire departments. This database includes information on chemicals stored by address with name/phone of a contact person. The sites shown on Map 1 are the more intense uses hazardous materials facilities. The City of Salem Environmental Services Section also maintains a vast database (e.g., underground fuel tanks, waste generators, contaminated properties, etc.). These and other databases are linked to addresses of sites that use/generate hazardous materials/waste.

In Salem, specific places have higher than average risks for hazardous material releases. In particular, trucking routes along I-5 and Highway 22 that run through Salem are vulnerable because of the quantity of materials transported along these routes. Also, the railroad lines that run through downtown Salem near the Capital area are a concern because they carry significant quantities of hazardous materials transported through Salem each year.

The City of Salem Fire Department and Public Works have utilized the information in these databases and have a full-capacity hazmat response team to respond to hazardous materials incidents.

CITY OF SALEM NATURAL HAZARD MITIGATION PLAN

MAP 2.1.8: IMPORTANT FACILITIES AND HAZARDOUS MATERIALS LOCATIONS CLASSIFIED EHS



3.0 GOALS AND OBJECTIVES

3.0 GOALS

The City of Salem is vulnerable to a variety of hazards, including both chronic and catastrophic hazards. This section sets forth goals for subsequent activities to mitigate the threats from those hazards. The City of Salem Natural Hazard Mitigation Plan goals are as follows:

Goal 1. Develop and implement mitigation activities to protect human life.

Goal 2. Protect existing buildings and infrastructure as well as future development from the impacts of natural hazards.

Goal 3. Strengthen communication and coordination of public and private partnerships and emergency services among local, county and regional governments and the private sector.

Goal 4. Enhance economic resilience to reduce the impact on the local economy.

Goal 5. Preserve and rehabilitate natural systems to serve natural hazard mitigation functions and protect natural resources.

The Salem Natural Hazard Mitigation Committee recognizes that the Mitigation Plan's goals represent what the City of Salem hopes to accomplish, while its actions define how the goals will be met. There are a number of methods available in a community's "mitigation toolbox" for reducing risk. The Salem Natural Hazard Mitigation Committee has identified a comprehensive range of actions that can be utilized to reduce risk, including the following:

- Research & development;
- Education & outreach;
- Partnership & coordination;
- Risk assessment activities;
- Emergency services;
- Policy development;
- Property protection & structural projects; and
- Professional development & training.

4.0 ALL HAZARDS RISK ASSESSMENT

4.1 Purpose

The foundation of the Salem Natural Hazards Mitigation Plan is the risk assessment. Risk assessments provide information about the areas where the hazards may occur, the value of existing land and property in those areas, and an analysis of the potential risk to life, property, and the environment that may result from natural hazard events.

This section identifies and profiles the previous occurrences, and future probability of natural hazards that can impact the community. The following natural hazards are addressed in the risk assessment:

- Flood
- Landslide
- Earthquake
- Volcanic Eruptions
- Severe Wind & Ice Storms
- Urban Wildland Interface Fires
- Drought
- Hazardous Materials

Section 4.3 includes risk assessment information from the 2003 Natural Hazard Mitigation Plan and new information gathered from the March 19, 2008 Salem Natural Hazards Mitigation Committee meeting. More detailed information about new hazard history and probability and vulnerability assessments can be found in the minutes to the March 19 meeting in Appendix E Public Process.

4.2 Hazard Assessments and Rankings

All of the hazards included in this plan are of concern to the City of Salem. Some hazards, however, are of significantly lower concern than others. During the 2003 plan-development process, the Technical Advisory Committee (TAC) ranked all seven primary hazards in terms of overall vulnerability and then assigned a weighted vulnerability (low, medium, or high) to each of the hazards. In the 2008 Plan update, the Committee reviewed and updated the 2003 TAC rankings with additional information provided by the Oregon Partnership for Disaster Resilience. As shown in the Risk Assessment table in Section 4.3, hazards are given probability and vulnerability ratings.

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 to 35 year period.
- Moderate = One incident likely within a 35 to 75 year period.
- Low = One incident likely within a 75 to 100 year period.

The vulnerability scores address the percentage of population or regional 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

During the March 19, 2008 Hazard Identification meeting, the Committee identified probability and vulnerability scores, using the definitions described above, to each of the natural hazards addressed in this plan. The Committee members based their scores on historical information, experience, and probability and vulnerability scores found in the

Marion and Polk County Natural Hazards Mitigation Plans. Once Committee members identified the probability and vulnerability scores, the scores were assigned a numerical value, with a high score having a value of 3, a moderate score a value of 2, and a low score a value of 1. The probability and vulnerability scores were multiplied together to determine the natural hazard ranking, which can be found in the last row of the Risk Assessment in Section 4.3. The higher the score, the higher the hazard priority. Floods, earthquakes, and severe wind and ice storms are of primary concern to the City of Salem. Landslides and hazardous materials are of secondary concern, and wildfire and drought are of lesser concern. Lastly, volcanic eruptions are of little concern to the city.

4.3 Risk Assessment Table

Salem Natural Hazard Mitigation Plan		ALL-HAZARD ASSESSMENT						
	HAZARD							
QUESTION	Floods	Landslides	Earthquakes	Volcanic Eruptions	Severe Wind & Ice Storms	Urban-Wildland Interface Fires	Drought	Hazardous Materials Incidents
What is the continuing threat?	Buildings, fill, and other restrictions in the floodplain of Mill, Pringle and Claggett Creek, Willamette River, and other urban streams.	Existing development on historic/ancient slides, development exacerbating marginally stable slopes	The threat of the "big one" (maximum credible event)	Minimal	Overhead utilities, tree limbs, and falling trees.	Northwest & southwest areas, field and forest fires adjacent to the UGB (especially to the east and west, see Map 2.1.5) Areas with the highest risk are on steep slopes, have combustible fuels, and are near valuable property	Dry periods in the summer time occasionally reduce drinking water levels in rivers.	Releases especially during floods, earthquakes, and storms; accidents/spills, resulting fish kills, stream pollution, groundwater impacts, and public exposure.
What triggered concern about this hazard originally?	1996 flood damage and evacuations	1996 slide damage and lawsuits	1990's quakes	Mt. St. Helens eruption in 1980 impacted the City's water treatment plan	Seasonal events, especially December 1995	Previous drought conditions and short-term hot/dry weather	Previous drought conditions, especially in 1976-1981 and 2005	Willamette River basin studies of fish, local spills and accidents
What are the previous occurrences for this hazard? (Any commonly known history occurrences, and all disasters that resulted in a local, state or federal disaster declaration.) (continued on next page)	Dec. 29, 1937 Mill Creek Flood - 2 nd largest peak flow on Mill Creek on record. Dec. 24, 1964 Christmas Flood, Rated "approximately a 100 yr. Flood" by FEMA and probably the most damaging in Oregon history. Over \$157 million in losses, seven lives lost and thousands homeless. An unusually early and heavy snowpack in the lower elevations followed by warm weather and heavy rains combined to crest the Willamette River above flood levels. Most of the streams in	Feb. 1996 South Salem, Damage to five homes near Heath Street and Aldous Avenue in Dorchester Heights. 1997 West Salem, Damage to several homes on Gibsonwoods Court. 2005 South River Road landslide near S. Owen Street, blocked	July 19, 1930: magnitude 5.0, 14.5 km NW of Salem. Aug. 19, 1961: magnitude 4.1, 50.2 km SE of Salem, caused minor damage at Albany and Lebanon.	1980 Mt. St. Helens. 2004 small eruption on Mt. St. Helens.	1962 Columbus Day Storm, Effects included more than 38 deaths, power outages for 2-3 weeks, damage to over 50,000 dwellings and \$170-200 million (\$800 million today) in damages. Salem sustained winds of 58 mph and a peak gust of 90mph. Jan. 1950 Salem recorded 32.8 in of snowfall. Freezing	Recent acreage fires that threatened homes. 1989 South River Road 1991 Skyline Chinook Estates 1993 Eola Hills 1996 Viewcrest Fire 2000 Battlecreek Fire 2001 Landau Fire 2002 Minto Brown	1928-1941 All of Oregon experienced drought. 1976-1981 Very dry period with low stream flows 1985-1944 Statewide problems due to drought	1967 Berheimer Fire with pesticides. 1968 Star Ice, ammonia leak and explosion. 1975 Ammonia railcar leak at Boise Cascade near City Hall. 1975 Major oil spill at Boise Cascade into Willamette R.

Salem Natural Hazard Mitigation Plan		ALL-HAZARD ASSESSMENT						
	HAZARD							
QUESTION	Floods	Landslides	Earthquakes	Volcanic Eruptions	Severe Wind & Ice Storms	Urban-Wildland Interface Fires	Drought	Hazardous Materials Incidents
<p>(continued from previous page)</p> <p>What are the previous occurrences for this hazard? (Any commonly known history occurrences, and all disasters that resulted in a local, state or federal disaster declaration.)</p>	<p>Salem overflowed their banks. Jan. 11-16, 1974 Mill Creek flooded some residences and businesses. Demonstrated that the City of Salem is susceptible to significant flooding during a flood with a return frequency of less than 20yrs.</p> <p>1992 Summer "Flash" Flood on Clark Creek</p> <p>Feb. 1996, The combination of record-breaking rain, warm temperatures, and a deep snowpack led to the most severe flooding along the Salem area streams ever recorded. Federal and State disaster relief distributed \$1.7 million in grants, loans, and insurance claims to almost 2,000 applicants. Total damages from the flood have not been calculated.</p> <p>Nov. 1996/Jan. 1997 - Localized flooding on Mill Creek and in Keizer</p>	<p>traffic.</p>	<p>March 25, 1993: magnitude 5.6, Scotts Mills, 21 miles NE of Salem. It was Marion County's largest earthquake in recent recorded history and cause \$25-30 million in damages. No serious injuries were reported.</p> <p>February 8, 1995: magnitude 3.6, 12 km E of Woodburn</p> <p>November 25, 1999: magnitude 3.5, 7 km SE of Woodburn, OR</p>		<p>rain downed many trees and power lines and caused thousands of dollars in damage.</p> <p>1968 Large snow event in Salem</p> <p>Dec. 12, 1995 Gov. declared State of Emergency for Western OR. Severe winds, over 2ft. of rain and mudslides caused damages including loss of life, lost roofs, widespread power outages (est. 250,000 customers) and many downed trees blocking roadways and taking down utilities lines.</p> <p>December 2007, strong windstorm along the coast and to a lesser extent in the Willamette Valley, but no significant damage in Salem.</p> <p>Snow and ice storms are annual occasions, recently in Jan. 2008</p>	<p>2006 Fire started by fireworks burned 14 acres of a field in South Salem by Battle Creek Road.</p>	<p>2000-2001 general statewide and national drought</p> <p>2005 Driest period on record for western Oregon since 1977</p>	<p>1979 Chlorine railcar at Salem Industrial Dr.</p> <p>1983 PCB transformers at 14th and Mill.</p> <p>1986 Gasoline spill, 41,700 gallons in Mill Creek, prevented spill from entering the Willamette River.</p> <p>1988 State Pen. Fire with hazmat</p> <p>1995 I-5 & Mill Creek vinyl acetate truck accident.</p> <p>1992 Butadiene adhesive truck accident.</p> <p>2002 Gasoline tanker truck overturned on I-5, 11,000 gallons contained, 300 spilled</p> <p>2004 gas spill occurred near Detroit Reservoir</p>

Salem Natural Hazard Mitigation Plan		ALL-HAZARD ASSESSMENT						
	HAZARD							
QUESTION	Floods	Landslides	Earthquakes	Volcanic Eruptions	Severe Wind & Ice Storms	Urban-Wildland Interface Fires	Drought	Hazardous Materials Incidents
What happened as a result of previous events?	<p>Section 205 study and Stormwater Master Plan (2000),</p> <p>Land use restrictions, and update of FEMA FIRM in Mill Cr./Shelton Ditch/Lower Pringle system.</p> <p>Digitizing of FIRM maps.</p> <p>Streambank Restoration and Flood Mitigation projects under various Federal programs.</p> <p>Installation of flood alarm systems.</p> <p>Revised City Emergency Response Plan and EOC Training.</p> <p>Inclusion into the Community Rating System (CRS) in May 2008 as an 8.</p> <p>ODOT raised I-5 at Mill Creek to avoid flooding.</p> <p>Bridge replacements at Mill Creek and Center Street, Shelton at 25th.</p> <p>Annual stream cleanups and Public Service Announcements to help with education and outreach.</p> <p>Upsizing culverts in West Salem.</p> <p>Developed an evacuation plan for mobile home park.</p>	<p>Slide mapping and landslide ordinance regulating development</p> <p>Inclinometers are used to measure movements of hillsides, such as along Heath St.</p> <p>Reservoirs are being relocated away from landslide hazards.</p> <p>Erosion control program (SRC 75) developed in 2001.</p>	<p>DOGAMI & USGS area mapping.</p> <p>Mid-1990's seismic risk assessment for City of Salem water and sanitary sewer system.</p> <p>Salem Fire Station upgraded to meet seismic codes.</p> <p>CERT provides earthquake information to the public.</p> <p>Operations Section has a new Emergency Operations Center (EOC).</p> <p>911 and EOC centers are out of City Hall to a seismically safe location.</p>	<p>State studies</p> <p>Pre-treatment facility at the water treatment plant to prevent ash from infiltrating water.</p>	<p>Revised draft of Emergency Response Plan (severe weather annex)</p> <p>New radio tower on Skyline Road designed to withstand high winds.</p>	<p>No significant events</p> <p>Improved water access to West Salem by taking over Illahe and Orchard Heights private water for fire fighting.</p>	<p>Low stream flows during drought conditions</p>	<p>Better understanding of hazardous materials storage sites at risk.</p> <p>Improved hazardous materials emergency response capability in January 2005</p>

Salem Natural Hazard Mitigation Plan		ALL-HAZARD ASSESSMENT						
	HAZARD							
QUESTION	Floods	Landslides	Earthquakes	Volcanic Eruptions	Severe Wind & Ice Storms	Urban-Wildland Interface Fires	Drought	Hazardous Materials Incidents
(continued on next page)								
(continued from previous page) What happened as a result of previous events?	<p>Mutual aid agreements between other cities, Marion County, and the State.</p> <p>Experimenting with porous pavement in the Pringle Creek Community to decrease stormwater runoff.</p> <p>Construction of a new hospital farther from flood hazards and with parking on ground floor.</p> <p>Construction of a retention wall along Pringle Creek.</p> <p>Completion of a June 2004 Regional Detention Feasibility Study for three sites on West Pringle, Croisan, and Glenn Creeks (1 each)</p>		<p>Most unreinforced masonry buildings are brought up to seismic codes when redeveloped.</p> <p>Bridge upgrades.</p> <p>New hospital built to seismic standards.</p> <p>School district has a construction plan for retrofit.</p> <p>City-owned Bush Barn Art Center is being seismically upgraded.</p>					
Could losses from this hazard increase in the future? Why?	Less likely due to land use restrictions in flood prone areas. Also increased community awareness	Less likely with increasing controls on land use and application of the new landslide ordinance	As development continues in high risk areas, many structures are not up to code	Yes, as area grows	Yes, as area grows	Yes, as development encroaches into wildland areas, risk will become greater.	Yes, as area grows, more pressure is put on local water resources.	Yes, as industrial development continues in high hazard areas and as population grows near hazardous materials storage

Salem Natural Hazard Mitigation Plan		ALL-HAZARD ASSESSMENT						
	HAZARD							
QUESTION	Floods	Landslides	Earthquakes	Volcanic Eruptions	Severe Wind & Ice Storms	Urban-Wildland Interface Fires	Drought	Hazardous Materials Incidents
								sites.
<p>What has been done to prevent losses to future development?</p> <p>What has been done to prevent losses to future development?</p> <p>(continued from previous page)</p>	<p>Guide future development during permit review process. Pursuant to adoption of the Stormwater Master Plan, a Stormwater Management Agreement has been agreed to by Salem, Keizer, and Marion County; and a staff-level working group meets as needed to address issues of mutual concern, including flooding.</p>	<p>Landslide ordinance and use of DOGAMI landslide hazard maps during permit application review.</p>	<p>Possible indirect benefit through application of landslide hazard maps during the permitting process.</p>	<p>Nothing</p>	<p>Undergrounding utilities and limiting use of certain tree species</p> <p>Downtown utility master plan being developed.</p> <p>Cleaning of hazardous trees in Salem creeks and parks.</p>	<p>Building ordinances (fire resistance roofing materials)</p> <p>Public education in wildland fire risk mitigation</p>	<p>Improved standards for streets such as porous streets in the Pringle Creek subdivision.</p>	<p>Fire Dept uses the State Fire Marshal's database and deploys hazmat response teams</p> <p>Monitor materials to prevent accidents and develop an effective response system.</p>
<p>What is being done to better protect existing development?</p>	<p>Planning for flood detention, stream monitoring, stream/habitat improvement, conveyance, and prioritization of same. Adoption of Erosion Prevention and Sediment Control ordinance to keep soils on-site and out of the drainage system, which preserves conveyance capacity and reduces threat of localized flooding.</p>	<p>See above</p>	<p>On-going initial inventory of unreinforced masonry buildings in downtown area.</p>	<p>Nothing</p>	<p>Tree maintenance/removal</p> <p>Backup generators installed at critical facilities including EOC and pump stations.</p>	<p>Grass mowing, nuisance ordinances</p> <p>Public education</p>	<p>The City is currently doing water conservation outreach within the community through the City's Environmental Protection Assistance Program</p>	<p>Fire Dept regularly monitors hazardous materials in businesses</p> <p>Developed GIS mapping systems to predict which areas need to be notified at a certain flood stage</p>
Probability Rating	High	High	High	Moderate	High	Moderate	Moderate	Moderate
Vulnerability Rating	High	Moderate	High	Low	High	Moderate	Moderate	High

Salem Natural Hazard Mitigation Plan		ALL-HAZARD ASSESSMENT						
	HAZARD							
QUESTION	Floods	Landslides	Earthquakes	Volcanic Eruptions	Severe Wind & Ice Storms	Urban-Wildland Interface Fires	Drought	Hazardous Materials Incidents
Hazard Ranking	9	6	9	2	9	4	4	6

5.0 MITIGATION ACTION ITEMS

5.1 Updated Mitigation Action Items

This section describes the components that guide implementation of the identified mitigation strategies and is based on strategic planning principles. Short and long-term action items identified through the planning process are an important part of the mitigation plan. Action items are detailed recommendations for activities that local departments, citizens and others could engage in to reduce risk. They both address multi-hazard (MH) and hazard-specific issues.

Action items included in this plan address the following natural and man made hazards that can affect the City of Salem:

- Flood
- Landslide
- Earthquake
- Volcanic Eruptions
- Severe Wind & Ice Storms
- Urban Wildland Interface Fires
- Drought
- Hazardous Materials

Given the relative low probability of occurrence and cost effectiveness of mitigation activities, the drought and volcanic eruptions hazards do not have any hazard specific action items, but are addressed within the multi-hazard action items.

5.1.1 2008 Action Item Update

The Salem Natural Hazards Mitigation Committee, together with the Partnership for Disaster Resilience, developed the action items presented in this plan. The action items are a combination of revised action items from the 2003 Mitigation Plan, and new action items that address hazards and vulnerabilities identified during the 2008 Salem Natural Hazard Mitigation Plan update process. Action items that are taken from the 2003 Mitigation Plan reference the 2003 action items, which are found in Appendix D. The 2003 action items in Appendix D include documentation of the status of each action and indicate whether or not the action has been completed or if it has been revised into a new action item.

5.1.2 Coordination with Existing Plans and Programs

The Salem Natural Hazards Mitigation Plan includes a range of action items that, when implemented, will reduce loss from hazard events in the City. Within the plan, FEMA requires the identification of existing programs that might be used to implement these action items. The City of Salem currently addresses statewide planning goals and legislative requirements through its comprehensive land use plan, various master plans, capital improvements plan, mandated standards and land use development, and building codes. To the extent possible, the City of Salem will work to incorporate the recommended mitigation action items into existing programs and procedures.

Where possible, the City of Salem should implement the Natural Hazard Mitigation Plan's recommended actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, and can adapt easily to changing conditions and needs. Implementing the Natural Hazard Mitigation Plan's action items through such plans and policies increases their likelihood of being supported and implemented.

Plans that can incorporate mitigation action items include the City of Salem Comprehensive Plan, master plans, the City of Salem Subdivision Ordinance, the Community Wildfire Protection Plan (CWPP), and the City of Salem Emergency Operations Plan. Because these plans are used on a regular basis, incorporating mitigation actions into these plans will likewise facilitate their implementation. In addition, when local funds are used to implement mitigation projects related to existing programs, like the Capital Improvement Program (CIP), the regular CIP funding process will be utilized instead of the process highlighted in Section 1.5.3.

5.2 Action Item Worksheets

Each action item has a corresponding action item worksheet describing the activity, identifying the rationale for the project, identifying potential ideas for implementation, and assigning coordinating and partner organizations. The worksheet also has a status section that will allow the Salem Natural Hazards Mitigation Committee to track progress of an action item and identify whether or not it has been completed. The action item worksheets can assist the community in pre-packaging potential projects for grant funding. The worksheet components are described below, followed by a matrix of the action items and the individually listed action items. While the action items are numbered, the numbering is for identification purposes only and does not prioritize the action items. Preceding the worksheets on the following page is an Action Item Matrix that summarizes all the plan's actions.

5.2.1 Rationale or Key Issues Addressed:

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

5.2.2 Ideas for Implementation:

The ideas for implementation offer a transition from theory to practice and serve as a starting point for this plan. This component of the action item is dynamic, since some ideas may prove infeasible, and new ideas may be added during the plan maintenance process. Ideas for implementation include such things as collaboration with relevant organizations, grant programs, tax incentives, human resources, education and outreach, research, and physical manipulation of buildings and infrastructure.

5.2.3 Lead Agency:

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

5.2.4 Internal and External Partners:

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

Internal partner organizations are departments/divisions/sectors within the City that may be able to assist in the implementation of action items by providing relevant resources to the coordinating organization.

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

5.2.5 Plan Goals Addressed:

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

5.2.6 Timeline:

Action items include both short and long-term activities. Each action item includes an estimate of the timeline for implementation. Short-term action items are activities that may be implemented with existing resources and authorities in one to two years. Long-term action items may require new or additional resources and/or authorities, and may take from one to five years to implement.

5.2.7 Action Item Status:

As the Salem Natural Hazards Mitigation Committee implements action items, they can note progress made on each action in the Action Item Status section. Information that should be noted includes when an action is implemented, who implemented it, and how. Noting the status of each action will also facilitate determining the status of the action for the next update cycle. Please note that Action Item Status is only completed for the 2003 actions located in Appendix D.

Action Item	Proposed Action Title	Lead Agency	Partner Organizations	Timeline	Alignment with Plan Goals				
					Protect lives.	Protect existing and future development.	Increase cooperation and coordination among stakeholders.	Reduce Economic Loss.	Protect the natural environment
PLAN IMPLEMENTATION #1	Request FEMA approval of the Natural Hazards Mitigation Plan Update.	City of Salem Emergency Management	Salem Natural Hazard Mitigation Committee, Salem City Council, Oregon Office of Emergency Management, FEMA	Short-Term			X		
PLAN IMPLEMENTATION #2	Salem Emergency Management will take on the role of convener to coordinate hazard mitigation meetings and implementation of mitigation action items.	City of Salem Emergency Management	FEMA Region X, Oregon Office of Emergency Management (OEM)	Ongoing			X		
PLAN IMPLEMENTATION #3	The Salem Natural Hazard Mitigation Committee will be the coordinating body responsible for implementing the Salem Natural Hazards Mitigation Plan.	City of Salem Emergency Management	Salem Natural Hazard Mitigation Committee Oregon Office of Emergency Management	Ongoing			X		
MULTI-HAZARD # 1	Coordinate with the Capital Projects Advisory Board to integrate natural hazard mitigation into State and City respective capital improvements.	Salem Community Development Department	Salem Natural Hazard Mitigation Committee, FEMA	Ongoing		X	X		
MULTI-HAZARD # 2	Develop an inventory of the number and type of structures within the community that are at risk for each hazard type.	Salem Community Development Department	Salem Natural Hazard Mitigation Committee, FEMA, OEM, Capital Projects Advisory Board	Short-Term		X			
MULTI-HAZARD # 3	Develop and annually update contacts and telephone numbers of personnel that would be involved in emergency preparedness/ response to coordinate emergency response actions.	Salem Emergency Management	Salem Natural Hazard Mitigation Committee, FEMA, Oregon State Police, Oregon Office of Emergency Management, Marion and Polk Counties Emergency Management	Short-Term	X		X		
MULTI-HAZARD # 4	Develop and annually update an electronic map/database containing critical facilities at risk so that the data is readily accessible to all City personnel responding to a disaster.	Salem Fire Department	Salem Community Development Department, Public Works, Administrative Services, FEMA, Oregon State Police, Oregon Office of Emergency Management	Short-Term	X		X		
MULTI-HAZARD # 5	Develop public outreach materials for all natural hazard risks addressed in the Salem Natural Hazards Mitigation Plan. Materials should include mitigation actions residents and businesses can implement to reduce their risk to natural hazards, and where they can obtain more detailed natural hazard information.	Salem Emergency Management	Salem Community Development Department, , Community Services, Public Works, FEMA, Oregon State Police, Oregon Office of Emergency Management	Ongoing		X	X	X	
MULTI-HAZARD # 6	Develop a database of names, phone numbers, etc. of all stakeholders (cities, counties, citizens, businesses, and others) involved in planning for and responding to natural disasters.	Salem Emergency Management	Community Services, Public Works, Community Development, Administrative Services, FEMA, Chamber of Commerce, CERT	Short-Term	X		X		
MULTI-HAZARD # 7	Include a post-disaster recovery and mitigation annex/appendix in the Salem Emergency Operations Plan that encourages property owners to incorporate retrofitting and mitigation measures in recovery efforts.	Salem Emergency Management	Salem Natural Hazard Mitigation Committee, FEMA, Oregon State Police, Oregon Office of Emergency Management	Short-Term		X	X		

Action Item	Proposed Action Title	Lead Agency	Partner Organizations	Timeline	Alignment with Plan Goals				
					Protect lives.	Protect existing and future development.	Increase cooperation and coordination among stakeholders.	Reduce Economic Loss.	Protect the natural environment
MULTI-HAZARD # 8	Maintain a liaison with the Office of Emergency Management to remain informed of state laws and regulations, and potential grant opportunities, governing all aspects of post-disaster recovery and mitigation.	Salem Emergency Management	Salem Police Department, FEMA, Oregon Office of Emergency Management	Ongoing			X		
MULTI-HAZARD # 9	Consider measures when updating the Salem code for mitigating the location of future development in identified/mapped high hazard areas.	Salem Community Development Department	Salem Natural Hazard Mitigation Committee, DLCD, FEMA	Ongoing		X			X
MULTI-HAZARD # 10	Develop and improve natural hazard map overlays, including a composite hazard map, to guide the planning and permit review process.	Salem Public Works Department	Salem Natural Hazard Mitigation Committee, Salem Community Development Department, DLCD, DOGAMI, FEMA	Short-Term		X			
MULTI-HAZARD # 11	Strengthen or replace unsafe public structures (especially facilities critical to disaster and post-disaster planning/response).	Salem Public Works Department	Salem Public Works, Fire Department, Police Department, Community Development, Urban Development, Administrative Services, FEMA, ODOT	Long Term	X	X			
MULTI-HAZARD # 12	Prescribe standards for the design and construction of new public facilities in high hazard areas.	Salem Emergency Management	Salem Public Works, Community Development, Urban Development, ODOT, DOGAMI, DLCD	Long Term		X			X
MULTI-HAZARD # 13	Continue developing alert and warning systems to notify residents of incidents involving natural hazards and hazardous materials.	Salem Fire Department	Public Works, Police Department, GIS and Mapping Departments, ODOT, FEMA, OSHA	Long Term	X		X		
LANDSLIDE # 1	Map areas of landslide risk adjacent to the North Santiam River (upstream of the Geren Island water intake structures) and areas impacted by a catastrophic failure of the Detroit or Big Cliff Dams.	Salem Public Works Department	Salem Community Development, US Army Corps, DLCD, FEMA, BLM, USFS	Long Term	X	X			
LANDSLIDE # 2	Develop a general landslide awareness program based on monitoring soil saturation and rain forecasts (e.g. press release associated with extended period of rain).	Salem Public Works	Salem Community Development Department, Community Services, Marion County, Polk County, FEMA, DOGAMI, ODOT, Neighborhood Associations	Long Term	X	X			X
LANDSLIDE # 3	Educate and inform residents in designated landslide areas about mitigation activities that will reduce the impact of landslides on their properties.	City of Salem Community Development Department	Salem Emergency Management, FEMA, DLCD, DOGAMI, City of Salem Neighborhood & Community Services Division	Ongoing			X	X	
LANDSLIDE # 4	Improve the existing Erosion Prevention and Sediment Control (EPSC) program and regulations established in SRC 65 and 69 to help control erosion.	Salem Public Works Department	Salem Natural Hazards Mitigation Committee, Community Development FEMA, DLCD, ODEQ, ODOT	Ongoing					

Action Item	Proposed Action Title	Lead Agency	Partner Organizations	Timeline	Alignment with Plan Goals				
					Protect lives.	Protect existing and future development.	Increase cooperation and coordination among stakeholders.	Reduce Economic Loss.	Protect the natural environment
LANDSLIDE # 5	Update landslide overlay maps using Light Detection and Ranging (LIDAR) data.	Salem Public Works Department	Salem Natural Hazards Mitigation Committee, City GIS technicians, FEMA, NOAA, DLCD, DOGAMI, Keizer, Turner, Marion County, Polk County	Long Term		X	X		
EARTHQUAKE # 1	Develop an inventory of un-reinforced masonry structures and develop appropriate mitigation action items to reduce the impacts of seismic events.	Salem Community Development Department	Salem Urban Development, Public Works, Fire, FEMA, DOGAMI	Long Term	X	X			
EARTHQUAKE # 2	Identify and inventory critical facilities that require seismic retrofit.	City of Salem Emergency Management	Salem Natural Hazards Mitigation Committee, Salem Community Development Department, Salem Public Works FEMA, OEM, DOGAMI, Local School Districts	Long Term		X	X		
EARTHQUAKE # 3	Partner with the school districts to help identify and prioritize seismic retrofits to school district facilities.	City of Salem Emergency Management	Salem Natural Hazards Mitigation Committee, Salem Community Development Department, FEMA, OEM, DOGAMI, Salem-Keizer School District, private schools, Chemeketa C.C., Willamette, Corban College	Long Term	X	X			
FLOOD # 1	Develop a flood warning system on local creeks that is consistent with the 2000 Stormwater Master Plan and the Corps of Engineers (COE) Section 205 Flood Damage Reduction Study for Mill Creek.	City of Salem Public Works Department	Fire Department, Salem Community Development FEMA, DLCD, Army Corps of Engineers, Marion and Polk Counties, MCSWCD, Santiam Water Control District	Long Term	X				
FLOOD # 2	Encourage landowners in the UGB to provide set-asides for open space for less intensive development.	Salem Community Development Department	Salem Public Works Department DLCD, FEMA, Marion and Polk Counties	Ongoing			X		X
FLOOD # 3	Implement recommendations presented in the 2000 Stormwater Master Plan (SWMP) to reduce flood hazards in the city.	Salem Public Works Department	Salem Community Development Dept. Marion County, Polk County, FEMA	Short-Term		X			X
FLOOD # 4	Revise SRC 140 Floodplain Overlay Zones to increase flood freeboard at 2 feet above the 100-year elevation in areas where past floods (including the 1996 floods) have been higher than the FIRM-predicted 100-year elevation.	Salem Public Works Department	Salem Community Development, Legal, Public Works FEMA, Neighborhood Associations, Marion-Polk Building Industry Association (MPBIA)	Long Term		X		X	
FLOOD # 5	Improve the City of Salem's National Flood Insurance Program (NFIP) Community Rating System (CRS) to reduce NFIP premiums.	Salem Public Works Department	Salem Community Development DLCD, National Flood Insurance Program, FEMA, Marion and Polk Counties	Short-Term			X	X	
WINDSTORM/WINTER STORM #1	Partner with public and private utilities to educate the public about hazardous trees and the damage they can cause in the event of a wind or winter storm.	Salem Public Works Department	Salem Community Services Parks Operations , Salem Fire Department ODOT Portland General Electric, Salem Electric	Long Term		X		X	

Action Item	Proposed Action Title	Lead Agency	Partner Organizations	Timeline	Alignment with Plan Goals				
					Protect lives.	Protect existing and future development.	Increase cooperation and coordination among stakeholders.	Reduce Economic Loss.	Protect the natural environment
WILDFIRE #1	Conduct wildfire prevention outreach, as outlined in the Marion County Community Wildfire Protection Plan (CWPP), to residents near the wildland-urban interface.	Salem Fire Department	Salem Public Works and Community Development Departments, Police Department, Community Services, Oregon Department of Forestry, Marion County Fire District #1, South Suburban Fire District, Neighborhood Associations	Long Term	X		X		
HAZARDOUS MATERIALS # 1	Map facilities that handle or contain hazardous materials, rank them based on their level of risk, and refine response strategies for each situation in the event of an accident.	Salem Fire Department	Salem Emergency Management, Public Works OSHA, Salem Chamber of Commerce, Neighborhood Associations, ODOT, OEM, State Police, State Fire Marshall	Long Term	X		X		X

PLAN IMPLEMENTATION ACTION #1

Proposed Action Item:		Alignment with Plan Goals:	
Request FEMA approval of the Salem Natural Hazards Mitigation Plan Update.		<i>Increase cooperation and coordination among stakeholders.</i>	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> FEMA approval of the Salem Natural Hazards Mitigation Plan update is required to maintain eligibility for the Pre-Disaster Mitigation Grant Program, the Hazard Mitigation Grant Program funds, and Flood Mitigation Assistance program funds The Disaster Mitigation Act of 2000 requires plans to include an action item that ensures the coordination of all relevant jurisdictions to request FEMA approval of the plan update [§201.6(c)(3)(iv)]. The Mitigation Plan should be coordinated with, and ideally developed in cooperation with, all of the local jurisdictions within the geographical area. [FMA FEMA 299 Guidance] 			
Ideas for Implementation:			
Plan Approval Process:			
<ol style="list-style-type: none"> After updates have been completed and incorporated into the plan, the plan will be approved by the Salem Natural Hazards Mitigation Committee. The plan will be submitted to the State Hazard Mitigation Officer at Oregon Emergency Management for their approval. Oregon Emergency Management will submit the plan to the Federal Emergency Management Agency (FEMA--Region X) for review and approval. Upon acceptance by FEMA, the City of Salem's City Council will adopt the plan via resolution. 			
Lead Agency:	City of Salem Emergency Management		
Internal Partners:		External Partners:	
Salem Natural Hazards Mitigation Committee		Salem City Council, Oregon Office of Emergency Management, FEMA Region X	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
Short Term			
Form Submitted by:	Salem Natural Hazards Mitigation Committee		
Action Item Status:			

PLAN IMPLEMENTATION ACTION #2

Proposed Action Item:		Alignment with Plan Goals:	
Salem Emergency Management will take on the role of convener to coordinate hazard mitigation meetings and implementation of mitigation action items.		<i>Increase cooperation and coordination among stakeholders.</i>	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> The convener identified in the 2003 Hazard Mitigation Plan is the Community Development Department, which focused on the creation of the Hazard Mitigation Plan. Review of past meetings regarding the Salem Natural Hazards Mitigation Plan and discussions with staff indicate that Salem Emergency Management would be a more appropriate convener. The convener’s role would be to implement and maintain the plan together with the coordinating body identified in the mitigation plan. 			
Ideas for Implementation:			
<p>The roles and responsibilities of the convener include the following:</p> <ol style="list-style-type: none"> Coordinate Salem Natural Hazards Mitigation Committee meeting dates, times, locations, agendas, and member notification; Document outcomes of Committee meetings; Serve as a communication conduit between the Committee and key plan stakeholders; Identify emergency management-related funding sources for natural hazard mitigation projects; Incorporate, maintain, and update the City’s natural hazard risk GIS data elements; and Utilize the Risk Assessment as a tool for prioritizing proposed natural hazard risk reduction projects. <p>Contact: Roger Stevenson, Emergency Manager City of Salem Emergency Management 595 Cottage St NE Salem, OR 97301</p>			
Lead Agency:		City of Salem Emergency Management	
Internal Partners:		External Partners:	
Salem Natural Hazards Mitigation Committee		FEMA Region X, Oregon Office of Emergency Management (OEM)	
Timeline:		If available, estimated cost:	
Short Term (0-2 years)	Long Term (2-4 or more years)		
	Ongoing		
Form Submitted by:		Salem Natural Hazards Mitigation Committee	
Action Item Status:			

PLAN IMPLEMENTATION ACTION #3

Proposed Action Item:		Alignment with Plan Goals:	
The Salem Natural Hazards Mitigation Committee will be the coordinating body responsible for implementing the Salem Natural Hazards Mitigation Plan.		<i>Increase cooperation and coordination among stakeholders.</i>	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> The Salem Natural Hazards Mitigation Committee identified itself, with the inclusion of other members, to be the main body to implement the Salem Natural Hazards Mitigation Plan. The Disaster Mitigation Act of 2000 requires Mitigation Plans to include a maintenance section describing the method and schedule of monitoring, evaluating, and updating the Mitigation Plan within a five-year cycle [201.6(c)(4)(i)]. A key component to effective maintenance is to have a coordinating body responsible for both the maintenance and implementation of the plan to ensure that it remains relevant to Salem’s needs. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> Convene the Salem Natural Hazards Mitigation Committee on a semi-annual basis to discuss Plan action items and methods for their implementation. After natural hazard events occur, convene the coordinating body to discuss action items for implementation or strategies for amending the plan to incorporate new action items. 			
Lead Agency:		City of Salem Emergency Management	
Internal Partners:		External Partners:	
Salem Natural Hazards Mitigation Committee		Oregon Office of Emergency Management	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
	<u>Ongoing</u>		
Form Submitted by:	Salem Natural Hazards Mitigation Committee		
Action Item Status:			

MULTI-HAZARD ACTION # 1

Proposed Action Item: (from action # 3)		Alignment with Plan Goals:	
Coordinate with the Capital Projects Advisory Board to integrate natural hazard mitigation into State and City respective capital improvements.		<i>Increase cooperation and coordination among stakeholders. Protect existing and future development.</i>	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> The Capital Projects Advisory Board is identified as the main body to implement the State of Oregon capital improvement projects within the greater Salem area. A similar responsibility rests with the Salem Public Works Department in the development and implementation of the City’s Capital Improvements Program (CIP). It is important that natural hazard mitigation be integrated into both the State’s and Salem’s Capital Improvement Program so that critical public facilities, including government buildings, are constructed to function during and after natural disasters. Local units of government want to ensure continuous service by strengthening essential facilities. Ensuring continuous service will assist residents in recovering from a natural disaster as well as make the process easier. The Disaster Mitigation Act of 2000 requires communities to maintain the Hazard Mitigation Plan by having local governments incorporate the requirements of the mitigation plan into other planning mechanisms [201.6(c)(4)(ii)]. Coordinating mitigation activities with other planning activities will help local governments incorporate mitigation into other plans and policies currently being developed. Coordination will also reduce duplication of planning efforts, strengthening the overall mitigation planning process. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> Determine what roles the Capital Projects Board plays in mitigating natural hazards, especially for State of Oregon properties or others in Salem for which it has jurisdiction. Review action items and discuss which ones can be integrated into Capital Improvement Program for the City of Salem. Inventory critical facilities that may be potentially vulnerable to a natural disaster and present these to the Capital Projects Advisory Board for their review. Include members of the Capital Projects Advisory Board in the Natural Hazard Mitigation Committee meetings as needed. Realign or replace roads and utilities when feasible in the course of regularly scheduled replacement to reduce the impact of natural hazard events on new development. Explore the possibility of under grounding utilities that are vulnerable to windstorms and winter storms. 			
Lead Agency:		Salem Community Development Department	
Internal Partners:		External Partners:	
Natural Hazard Mitigation Committee		FEMA, OEM, Capital Projects Advisory Board	
Timeline:		If available, estimated cost:	
Short Term (0-2 years)	Long Term (2-4 or more years)		
	Ongoing		
Form Submitted by:		Salem Natural Hazards Mitigation Committee	
Action Item Status:			

MULTI-HAZARD ACTION # 2

Proposed Action Item: <i>(from Action # 5, # 16)</i>		Alignment with Plan Goals:
Develop an inventory of the number and type of structures within the community that are at risk for each hazard type.		<i>Protect existing and future development.</i>
Rationale for Proposed Action Item:		
<ul style="list-style-type: none"> Many older commercial buildings in the City of Salem are vulnerable to damage in the event of a natural disaster. This could have significant impacts on the City of Salem’s economy. Identifying and retrofitting buildings that are susceptible to a natural disaster will reduce the vulnerability of the buildings in the event of a natural disaster and improve the resiliency of Salem’s local economy. OEM’s checklist for local mitigation plans includes the need to estimate the type and number of structures within the community at risk for each hazard type, including residences, businesses, critical facilities (hospitals, fire stations, and storage sites for hazardous materials), and infrastructure (e.g., roads and utilities). There also needs to be a map of repetitive flood loss properties (extent of flooding, no evaluation of cost of property damage) and discussion of potential mitigation activities for these properties. The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community, particularly to buildings and infrastructure [201.6(c)(3)(ii)]. Inventorying important historic and cultural resources and identifying their vulnerability to natural hazards will help to develop mitigation actions that reduce the City of Salem’s overall vulnerability to natural hazards. 		
Ideas for Implementation:		
<ul style="list-style-type: none"> Determine vulnerabilities of community structures to natural hazards Identify appropriate mitigation measures to help preserve structures within the community that are at risk for each hazard type. Create an electronic data base which illustrates an inventory of the number and type of structures within the community that are at risk for each hazard type. Identify significant cultural and historic resources, whether on the national register or not, that are worthy of additional protection. 		
Lead Agency:	Salem Community Development Department	
Internal Partners:		External Partners:
Salem Natural Hazards Mitigation Committee		FEMA
Timeline:		If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)	
<u>Short Term</u>		
Form Submitted by:	Salem Natural Hazards Mitigation Committee	
Action Item Status:		

MULTI-HAZARD ACTION # 3

Proposed Action Item: <i>(from Action Item # 6)</i>		Alignment with Plan Goals:
Develop and annually update contacts and telephone numbers of personnel that would be involved in emergency preparedness/response to coordinate emergency response actions.		<i>Protect lives. Increase cooperation and coordination among stakeholders.</i>
Rationale for Proposed Action Item:		
<ul style="list-style-type: none"> Emergency response personnel are vital to an effective and efficient response to a natural disaster. Developing and continuously updating a contact list of City of Salem personnel to be involved in emergency preparedness/response ensures a quick and adequate response in the event of a natural disaster. Maintaining an updated list of emergency preparedness/response personnel increases the ability of the City of Salem to respond to a natural disaster, therefore making the City more resilient. The Disaster Mitigation Act of 2000 requires communities to identify comprehensive actions that will reduce the impact of a natural hazard [201.6(c)(3)(ii)]. Developing a contact list of personnel to be involved in the coordination of emergency response actions within will help reduce response time in the event of a natural disaster, which can help reduce the overall impact of an incident on the community. 		
Ideas for Implementation:		
<ul style="list-style-type: none"> Solicit City personnel who may be interested in participating in the emergency preparedness/response process. Offer trainings to City personnel that focus on how to prepare and respond to a natural disaster. Offer incentives to those interested in participating in the emergency preparedness/response process. Once formed, regularly convene with City personnel dedicated to emergency preparedness/response to discuss operational processes in the event of a natural disaster. 		
Lead Agency:	Salem Emergency Management	
Internal Partners:		External Partners:
Salem Natural Hazards Mitigation Committee		FEMA, Oregon State Police, Oregon Office of Emergency Management, Marion and Polk Counties Emergency Management
Timeline:		If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)	
<u>Short Term</u>		
Form Submitted by:	Salem Natural Hazards Mitigation Committee	
Action Item Status:		

MULTI-HAZARD ACTION # 4

Proposed Action Item: (from action # 6)		Alignment with Plan Goals:	
Develop and annually update an electronic map/database containing critical facilities at risk so that the data is readily accessible to all City personnel responding to a disaster.		<i>Protect lives. Increase cooperation and coordination among stakeholders.</i>	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> Developing an electronic map/database noting the location of critical facilities vulnerable to a natural disaster increases the City of Salem’s ability quickly and adequately respond to damaged critical facilities in the even of a natural disaster. In addition, restoring utility services is an essential prerequisite for beginning other recovery efforts (i.e. economic recovery, hospital services, and public facilities) that put a community back online. Completing an inventory of critical facilities vulnerable to damage resulting from a natural disaster will assist the City of Salem in prioritizing buildings for seismic retrofit. The Disaster Mitigation Act of 2000 requires communities to identify comprehensive actions that reduce the effects of hazards on the community, particularly to new and existing buildings and infrastructure [201.6(c)(3)(ii)]. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> Combine the database of critical facilities with known mapped hazard areas to understand risk and develop appropriate response measures. Evaluate a building’s survivability following a single and compound disaster. Develop mitigation funding strategies. Utilize information attained from the Statewide Seismic Needs Assessment resulting from Oregon 2005 Senate Bill 2 Relating to Public Safety, Earthquakes, and Seismic Rehabilitation of Public Buildings to develop or update the City of Salem’s electronic map/data base containing critical facilities vulnerable to natural disasters. Utilize grant funds appropriated from Oregon 2005 Senate Bill 2-5 for rehabilitation of critical facilities. Note: grant funding for seismic rehabilitation is directly related to seismic needs assessment. 			
Lead Agency:	Salem Fire Department		
Internal Partners:		External Partners:	
Salem Community Development Department, Public Works, Administrative Services		FEMA, Oregon State Police, Oregon Office of Emergency Management	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
short term			
Form Submitted by:	Salem Natural Hazards Mitigation Committee		
Action Item Status:			

MULTI-HAZARD ACTION # 5

Proposed Action Item: <i>(from action # 7)</i>		Alignment with Plan Goals:
Develop public outreach materials for all natural hazard risks addressed in the Salem Natural Hazards Mitigation Plan. Materials should include mitigation actions residents and businesses can implement to reduce their risk to natural hazards, and where they can obtain more detailed natural hazard information.		<i>Increase cooperation and coordination among stakeholders. Reduce economic loss. Protect existing and future development.</i>
Rationale for Proposed Action Item:		
<ul style="list-style-type: none"> • Conducting public outreach campaigns raises awareness about natural hazards and helps illustrate what residents and businesses can do to reduce the impact of a natural disaster on their properties, thereby significantly reducing the impact of a natural disaster on the City of Salem. • Several natural hazards, such as severe weather, earthquakes, and floods, have the potential for disrupting transportation services and isolating rural residents from basic services and needs. The City of Salem has a large number of residents, and they need to be educated about the dangers that natural hazards pose and what actions they can take to mitigate the impact hazards on the community. • The Disaster Mitigation Act of 2000 requires communities to identify comprehensive actions and projects that reduce the effects of a hazard on the community [201.6(c)(3)(ii)]. 		
Ideas for Implementation:		
<ul style="list-style-type: none"> • Conduct public outreach campaigns, such as articles in the newspaper or through brochures instructing residents and businesses about the risks natural hazards pose and mitigation actions they can implement. • Coordinate with other groups conducting other emergency management activities to assist in conducting public outreach campaigns, developing emergency kits, and educating residents and businesses about other mitigation activities • Develop handouts that inform residents and businesses about natural hazard risk, appropriate mitigation actions that can be implemented, and where citizens can obtain further information. • Create an online informational website where residents and businesses can be educated about appropriate mitigation actions residents and businesses can implement to reduce the impact of natural hazards • Work with local real estate trade associations to prepare informational handouts advising property owners of natural hazard risks in their area and measures they can implement to reduce their risk of exposure. 		
Lead Agency:	Salem Emergency Management	
Internal Partners:	External Partners:	
Salem Community Development Department, Community Services, Public Works	FEMA, Oregon State Police, Oregon Office of Emergency Management	
Timeline:	If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)	
	<u>Ongoing</u>	
Form Submitted by:	Salem Natural Hazards Mitigation Committee	
Action Item Status:		

MULTI-HAZARD ACTION # 6

Proposed Action Item: <i>(from action # 7)</i>		Alignment with Plan Goals:
Develop a database of names, phone numbers, etc. of all stakeholders (cities, counties, citizens, businesses, and others) involved in planning for and responding to natural disasters.		<i>Protect lives. Increase cooperation and coordination among stakeholders.</i>
Rationale for Proposed Action Item:		
<ul style="list-style-type: none"> Stakeholders within community organizations and programs that provide social and community-based services are important resilience factors because of their existing connections to the public. Communication within the community is a key part of many mitigation strategies. On a daily basis, social service providers work and communicate directly with the public on a number of issues, one of which could be natural hazard preparedness and mitigation. In addition, organizations found within the inventory may also provide grant search resources and temporary working office space for NGOs. The Disaster Mitigation Act of 2000 requires communities to develop actions that reduce the impact of a natural hazard [201.6(c)(3)(ii)]. Developing a database of stakeholders involved in responding to natural disasters will diminish the effects of a natural disaster by providing the City of Salem with a framework for responding to community needs in a potentially chaotic situation. 		
Ideas for Implementation:		
<ul style="list-style-type: none"> Develop an electronic database that includes: names, phone numbers, address, and other contact information for of all stakeholders involved in planning for and responding to natural disasters. Distribute the database to all of the stakeholders and relevant public/private agencies Update the database periodically to maintain an effective database of stakeholders 		
Lead Agency:	Salem Emergency Management	
Internal Partners:		External Partners:
Community Services, Public Works, Community Development, Administrative Services		FEMA, Chamber of Commerce, CERT
Timeline:		If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)	Minimal.
<u>Short term</u> (Within 1 year)		
Form Submitted by:	Salem Natural Hazards Mitigation Committee	
Action Item Status:		

MULTI-HAZARD ACTION # 7

Proposed Action Item: (from Action # 9)		Alignment with Plan Goals:
Include a post-disaster recovery and mitigation annex/appendix in the Salem Emergency Operations Plan that encourages property owners to incorporate retrofitting and mitigation measures in recovery efforts.		<i>Protect existing and future development.</i> <i>Increase cooperation and coordination among stakeholders.</i>
Rationale for Proposed Action Item:		
<ul style="list-style-type: none"> Disaster response is an important component to natural hazards planning that can save lives and property during a natural disaster. Coordinating disaster response efforts with the mitigation plan will ensure that the plan remains relevant to the larger community. Resources that may not be available on a routine basis for certain improvements may become available through various disaster relief sources, particularly where careful planning has allowed the community to identify certain needs in advance, saving critical time in the aftermath of a disaster. The Disaster Mitigation Act of 2000 requires communities to develop actions that reduce the impact of a natural hazard [201.6(c)(3)(ii)]. Incorporating information about mitigation and retrofitting will increase the City of Salem’s ability to recover from a natural disaster. 		
Ideas for Implementation:		
<ul style="list-style-type: none"> Seek guidance from FEMA and the Oregon Office of Emergency Management on how to incorporate recovery and mitigation measures into the Salem Emergency Operations Plan. Periodically update the recovery and mitigation measures that have been incorporated into the Salem Emergency Operations Plan 		
Lead Agency:	Salem Emergency Management	
Internal Partners:		External Partners:
Salem Natural Hazards Mitigation Committee		FEMA, Oregon State Police, Oregon Office of Emergency Management
Timeline:		If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)	Minimal.
<u>Short term</u>		
Form Submitted by:	Salem Natural Hazards Mitigation Committee	
Action Item Status:		

MULTI-HAZARD ACTION # 8

Proposed Action Item: (from Action # 9)		Alignment with Plan Goals:
Maintain a liaison with the Office of Emergency Management to remain informed of state laws and regulations, and potential grant opportunities, governing all aspects of post-disaster recovery and mitigation.		<i>Increase cooperation and coordination among stakeholders.</i>
Rationale for Proposed Action Item:		
<ul style="list-style-type: none"> Disaster response is an important component to natural hazards planning that can save lives and property during a natural disaster. Understanding of the laws and regulations and coordinating disaster response/mitigation efforts with other public agencies will increase the resiliency of the City of Salem to Natural Hazards. The Disaster Mitigation Act of 2000 requires communities to develop actions that reduce the impact of a natural hazard [201.6(c)(3)(ii)]. Communicating with the Office of Emergency Management will increase the City of Salem’s resiliency and ability to recover from a natural disaster. 		
Ideas for Implementation:		
<ul style="list-style-type: none"> Identify a contact at both the Office of Emergency Management Schedule regular meetings to gather up-to-date understanding of the rules and regulations, and potential grant opportunities, governing aspects of post-disaster recovery and mitigation. 		
Lead Agency:	Salem Emergency Management	
Internal Partners:		External Partners:
Salem Police Department		FEMA, Oregon Office of Emergency Management
Timeline:		If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)	Minimal.
	<u>Ongoing</u>	
Form Submitted by:	Salem Natural Hazards Mitigation Committee	
Action Item Status:		

MULTI-HAZARD ACTION # 9

Proposed Action Item: <i>(from Action # 10)</i>		Alignment with Plan Goals:
Consider measures when updating the Salem code for mitigating the location of future development in identified/mapped high hazard areas.		<i>Protect existing and future development. Protect the natural environment.</i>
Rationale for Proposed Action Item:		
<ul style="list-style-type: none"> • Goal 7 of Oregon's Land Use Planning Goals requires that local governments "adopt or amend, as necessary, based on the evaluation of risk, plan policies and implementing measures...[that prohibit] the siting of essential facilities, major structures, hazardous facilities and special occupancy structures, as defined in the state building code (ORS 455.447(1) (a)(b)(c) and (e)), in identified hazard areas..." • The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community [201.6(c)(3)(ii)]. Adjusting the Salem code to move future development from identified/mapped hazards areas will reduce the vulnerability of new development to natural hazards. 		
Ideas for Implementation:		
<ul style="list-style-type: none"> • Consider transferring development rights from high hazard areas to safer areas, especially in those areas where the risk to people and property cannot be mitigated. • Address high hazard areas and consider measures for mitigating the location of future development in these areas during the update of the Salem code. 		
Lead Agency:	Salem Community Development Department	
Internal Partners:		External Partners:
Salem Natural Hazards Mitigation Committee		DLCD, FEMA
Timeline:		If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)	
	<u>Ongoing</u>	
Form Submitted by:	Salem Natural Hazards Mitigation Committee	
Action Item Status:		

MULTI-HAZARD ACTION # 10

Proposed Action Item: (from Action # 10)		Alignment with Plan Goals:
Develop and improve natural hazard map overlays, including a composite hazard map, to guide the planning and permit review process.		<i>Protect existing and future development.</i>
Rationale for Proposed Action Item:		
<ul style="list-style-type: none"> • Overlay districts are used to solve problems in zoning codes that are not adequately addressed in conventional use districts. Generally they aim to address specific needs that cut across other district designations and whose inclusion would result in a level of delineation in normal districts that would serve to confound zoning enforcement efforts. They also allow a degree of flexibility that is often needed in dealing with environmental constraints, with floodplains being a common example. • Overlay zones are zones imposed over existing zones and "provide an additional layer of development standards to address special land use needs"1 such as floodplains or other natural hazard areas. Using overlay zoning helps to: (1) Eliminate any confusion created by the broadly defined boundaries on the comprehensive plan map; (2) Ensure consistent administration of all hazards ordinances; (3) Avoid the time and expense of re-interpreting the comprehensive plan map for each development request; (4) Provide clear information, to all current and prospective landowners, of the regulations which affect the use of the zoned parcel. • The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community [201.6(c)(3)(ii)]. Developing an overlay zone in hazard-prone areas that increases restrictions on development will reduce the vulnerability of new development to natural hazards. 		
Ideas for Implementation:		
<ul style="list-style-type: none"> • Coordinate with other public agencies to gather the necessary data to create effective overlay districts and display hazard overlays in maps. • Periodically update this information to retain the valuable tool. 		
Lead Agency:	Salem Public Works Department	
Internal Partners:		External Partners:
Salem Natural Hazards Mitigation Committee, Salem Community Development Department		DLCD, DOGAMI, FEMA
Timeline:		If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)	Medium.
<u>Short Term</u>		
Form Submitted by:	Salem Natural Hazards Mitigation Committee	
Action Item Status:		

MULTI-HAZARD ACTION # 11

Proposed Action Item: (from Action # 11)		Alignment with Plan Goals:	
Strengthen or replace unsafe public structures (especially facilities critical to disaster and post-disaster planning/response).		<i>Protect lives. Protect existing and future development.</i>	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> The Disaster Mitigation Act of 2000 requires communities to assess their vulnerability to natural hazards, particularly by identifying the types and number of buildings, infrastructure, and critical facilities that could be affected. It is important that critical facilities function during and after disasters. Strengthening all essential facilities will improve recovery capacity and reduce risk and loss of life. Retrofitting of vital infrastructure, such as schools and community buildings, provides important improvements that reduce hazard exposure and the cost and time associated with recovery. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> Develop formal agreements with internal and external partners who 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 Natural Hazards Mitigation Plan. Conduct structural and non-structural retrofits of critical facilities to reduce the impacts of a natural hazard. Conduct a cost-benefit analysis to assess whether the cost of mitigation improvements to critical facilities balance with the benefits to be gained. Create proposals to reinforce buildings so they can withstand an earthquake and thereby reduce vulnerability risks; ORS 455.447 regulates vulnerable building retrofits. 			
Lead Agency:	Salem Public Works Department		
Internal Partners:		External Partners:	
Salem Public Works, Fire Department, Police Department, Community Development, Urban Development, Administrative Services		FEMA, ODOT	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
	<u>Long Term</u>		
Form Submitted by:	Salem Natural Hazards Mitigation Committee		
Action Item Status:			

MULTI-HAZARD ACTION # 12

Proposed Action Item: (from Action # 11)		Alignment with Plan Goals:	
Prescribe standards for the design and construction of new public facilities in high hazard areas.		<i>Protect existing and future development.</i> <i>Protect the natural environment.</i>	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> The Disaster Mitigation Act of 2000 requires communities to assess their vulnerability to natural hazards, particularly by identifying the types and number of buildings, infrastructure, and critical facilities that could be affected. It is important that critical facilities function during and after disasters. Strengthening all essential facilities will improve recovery capacity and reduce risk and loss of life. Retrofitting of vital infrastructure, such as schools and community buildings, provides important improvements that reduce hazard exposure and the cost and time associated with recovery. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> 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 Natural Hazards Mitigation Plan. Develop a funding matrix that provides a list of potential funding mechanisms for disaster mitigation activities Coordinate mitigation planning activities with existing land use and master planning activities to incorporate mitigation actions and avoid duplicating efforts. 			
Lead Agency:	Salem Emergency Management		
Internal Partners:		External Partners:	
Salem Public Works, Community Development, Urban Development		ODOT, DOGAMI, DLCD	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
<u>Short Term</u>			
Form Submitted by:	Salem Natural Hazards Mitigation Committee		
Action Item Status:			

MULTI-HAZARD ACTION # 13

Proposed Action Item:		Alignment with Plan Goals:	
Continue developing alert and warning systems to notify residents of incidents involving natural hazards and hazardous materials.		<i>Protect Lives. Increase cooperation and coordination among stakeholders.</i>	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> Alert and warning systems can provide a life-saving service to residents in the event of a natural or manmade disaster. Natural and manmade disasters can occur at any time, often unannounced, putting people at risk. Developing alert and warning systems can reduce the risk of exposure to natural hazard incidents and hazardous materials spills and help to save lives and property. Alert and warning system have significant relevance to hazardous materials accidents. Hazardous materials are located near businesses and residences in Salem as well as along major transportation routes. Trucking routes along the I-5 corridor and Highway 22 may also contain hazardous materials because there are no restrictions on the type of cargo that travels over these routes which run through residential and commercial areas in the city. In addition, the heavily-traveled railroad line near the Capital area has approximately 12,000 cars of hazardous materials running through the area each year. Accidents in businesses or on any of the above routes can have an adverse impact on the quality of life and economy of the city and the state; significant events have already occurred in Salem in 1976 and along the I-5 corridor. Alert and warning systems can help to prevent larger accidents from occurring and help to save lives and property. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> Continue to enforce the Salem Fire Prevention Code to regulate hazardous materials. Develop strategies in local building codes and zoning ordinances to reduce the impact of natural hazard and manmade hazard events on buildings and infrastructure. Continue to develop a reverse 9-11 system to alert nearby residents and businesses of natural hazard events or hazardous materials accident. Develop improved maps to locate areas vulnerable to natural hazard events and hazardous materials. 			
Lead Agency:	Salem Fire Department		
Internal Partners:		External Partners:	
Public Works, Police Department, GIS and Mapping Departments		ODOT, FEMA, OSHA	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
	<u>Long Term</u>		
Form Submitted by:	Salem Natural Hazards Mitigation Committee		
Action Item Status:			

LANDSLIDE ACTION # 1

Proposed Action Item: <i>(from action # 5)</i>		Alignment with Plan Goals:
Map areas of landslide risk adjacent to the North Santiam River (upstream of the Geren Island water intake structures) and areas impacted by a catastrophic failure of the Detroit or Big Cliff Dams.		<i>Protect existing and future development. Protect lives. Protect natural environment</i>
Rationale for Proposed Action Item:		
<ul style="list-style-type: none"> The current landslide hazard maps are a compilation of existing maps. These maps are a “work in progress” and have been compiled at widely varying scales and sometimes only depict risk for certain types of landslides. These various scales and levels of detail may lead to people to believe that some areas have no slope hazard, when the case is that those areas just have not yet been evaluated. Systematic upgrading of these maps will lead to greater understanding of hazard locales. Focusing on areas that will be developed and will affect people and critical infrastructure will improve land use planning and provide for more efficient and cost effective development. Better data provides for better decisions to minimize loss. Incorporating indirect economic loss better depicts the cost from natural hazard events. 		
Ideas for Implementation:		
<ul style="list-style-type: none"> Improve knowledge of debris flow (rapid moving) landslide hazard areas. Improve landslide hazard area maps for a variety of types of landslides that focus on areas that will affect people and critical infrastructure and facilities. Educate identified vulnerable residential and commercial building owners, occupants, and developers of their vulnerability to risk. 		
Lead Agency:	Salem Public Works Department	
Internal Partners:		External Partners:
Salem Community Development		US Army Corps, DLCD, FEMA, BLM, USFS
Timeline:		If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)	
	<u>Long Term</u>	
Form Submitted by:	Salem Natural Hazards Mitigation Committee	
Action Item Status:		

LANDSLIDE ACTION # 2

Proposed Action Item: <i>(from Action # 8)</i>		Alignment with Plan Goals:	
Develop a general landslide awareness program based on monitoring soil saturation and rain forecasts (e.g. press release associated with extended period of rain).		<i>Protect lives.</i> <i>Protect existing and future development.</i> <i>Protect the natural environment.</i>	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> The City of Salem is particularly vulnerable to landslide events. In February 1996, residents in the southwest area around Heath Street, Aldous Avenue, and Dorchester Heights suffered from a landslide event. More recently in 2005, a landslide near Owen Street blocked South River Road. The City has a landslide ordinance, passed in 2000 and revised in 2003, that provides development standards in landslide hazard areas and incorporates mitigation activities for new and existing development. Developing a landslide awareness program that monitors soil saturation and advises residents during high rain periods would significantly help in reducing the impact of a landslide in a neighborhood, and assist in providing warning before a landslide occurs. The Salem Natural Hazards Mitigation Committee identified landslides as a high probability and moderate vulnerability. While an awareness program would not reduce the probability of a hazard recurring, it would help reduce the vulnerability to Salem residents to natural hazard events. The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community, particularly to new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Developing a general landslide awareness program based on monitoring soil saturation and rain forecasts can reduce the impacts of landslides on new and existing development and provide a means for early warning to people at risk. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> Develop appropriate public outreach materials, such as press releases, handouts, radio advertisements, and mailings to inform residents of the landslide risk present in their area. Expand and continue monitoring of landslide-prone areas to provide an overall assessment of the landslide risk in an area. Coordinate efforts with the Marion County Public Works Department to address landslide risks near, but outside, the City's jurisdiction. 			
Lead Agency:		Salem Public Works Department	
Internal Partners:		External Partners:	
Salem Community Development Department, Community Services		Marion County, Polk County, FEMA, DOGAMI, ODOT, Neighborhood Associations	
Timeline:		If available, estimated cost:	
Short Term (0-2 years)	Long Term (2-4 or more years)		
Short Term			
Form Submitted by:		Salem Natural Hazards Mitigation Committee	
Action Item Status:			

LANDSLIDE ACTION #3

Proposed Action Item:		Alignment with Plan Goals:	
Educate and inform residents in designated landslide areas about mitigation activities that residents can take to reduce the impact of landslides on their properties.		<i>Increase cooperation and coordination among stakeholders. Reduce economic loss.</i>	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> The City of Salem has identified several areas as susceptible to landslide events. Furthermore, the Salem Natural Hazards Mitigation Committee identified the Heath Street and South River Road areas as particularly susceptible to landslide events. Educating the residents in designated landslide areas about the impacts from a landslide, and providing mitigation actions they can take to reduce the impact, will help to stabilize these areas to prevent future landslides from occurring. The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions property owners might take that address new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Educating residents in landslide prone areas about the effects of landslides and mitigation activities they can implement can significantly reduce the impact of future landslide events. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> Identify specific landslide issues for areas designated as landslide hazards. Provide informational brochures to current, new, and prospective residents in landslide prone areas to educate them about landslide risks in Salem. Conduct public outreach to residents in other areas that are prone to landslide hazards, possibly through information posted online and communication with relevant community associations. 			
Lead Agency:		City of Salem Community Development Department	
Internal Partners:		External Partners:	
Salem Emergency Management		FEMA, DLCD, DOGAMI, City of Salem Neighborhood & Community Services Division	
Timeline:		If available, estimated cost:	
Short Term (0-2 years)	Long Term (2-4 or more years)		
	Ongoing		
Form Submitted by:	Salem Natural Hazards Mitigation Committee		
Action Item Status:			

LANDSLIDE ACTION #4

Proposed Action Item:		Alignment with Plan Goals:	
Improve the existing Erosion Prevention and Sediment Control (EPSC) program and regulations established in SRC 65 and 69 to help control erosion.		<i>Reduce Economic Loss.</i> <i>Protect the natural environment.</i>	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • Each year tons of sediment nationally are washed and blown from construction sites into municipal storm drainage systems and local streams, rivers, wetlands, and lakes. It is a major source of pollution to these water bodies. Eroded materials also clog streets, storm drains, culverts, and stream channels and cause private property damage. The degradation of fish and wildlife habitat and water quality, plus the burden placed on ratepayers for cleanup, could be largely avoided through implementation of adequate erosion prevention and sediment control practices. (EPSC Handbook) • The Salem Natural Hazards Mitigation Committee identified SRC 75 and 69 as ordinances that need further improvement to help control sediment erosion on construction sites, especially those with excavation activity. • 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)]. Developing mitigation actions for erosion control can significantly reduce the impact of future landslide events and help maintain environmental quality in streams around the City of Salem. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Maintain plan submittal requirements and recommended measures to prevent erosion and control sediments on construction sites and other properties as set forth in the EPSC Handbook. • Support City of Salem staff in the dissemination of information and updating of the EPSC handbook. • Restrict construction activity during rainy times of the year to control erosion on construction sites. • Identify areas in SRC 75 and 69 that could use further improvement to control sediment erosion. 			
Lead Agency:		Salem Public Works Department	
Internal Partners:		External Partners:	
Salem Natural Hazards Mitigation Committee, Community Development		FEMA, DLCD, ODEQ, ODOT	
Timeline:		If available, estimated cost:	
Short Term (0-2 years)	Long Term (2-4 or more years)		
	ongoing		
Form Submitted by:	Salem Natural Hazards Mitigation Committee		
Action Item Status:			

LANDSLIDE ACTION #5

Proposed Action Item:		Alignment with Plan Goals:
Update landslide overlay maps using Light Detection and Ranging (LIDAR) data.		<i>Increase cooperation and coordination among stakeholders. Protect existing and future development.</i>
Rationale for Proposed Action Item:		
<ul style="list-style-type: none"> LIDAR (Light Detection and Ranging) is a new tool that can provide very precise, accurate, and high-resolution images of the surface of the earth, vegetation, and the built environment. The data are collected with aircraft-mounted lasers capable of recording elevation measurements at a rate of 2,000 to 5,000 pulses per second and have a vertical precision of 15 centimeters (6 inches). LIDAR mapping increases the ability to identify areas that are prone to landslides. In 2007 the Oregon Legislature Assembly directed DOGAMI to extend LIDAR collection efforts throughout the state. The ultimate goal is to provide high-quality LIDAR coverage for the entire state. 		
Ideas for Implementation:		
<ul style="list-style-type: none"> Contact DOGAMI and provide a map of Salem along with an estimate of available funding. Seek funding opportunities with DOGAMI to conduct LIDAR mapping for the City of Salem. Once mapping is complete assess the need to update landslide ordinances. Explore potential cost-sharing agreements with Keizer, Turner, Marion and Polk Counties for LIDAR mapping of the entire Salem-Keizer urbanized area. 		
Lead Agency:	Salem Public Works Department	
Internal Partners:		External Partners:
Salem Natural Hazards Mitigation Committee, City GIS technicians		FEMA, NOAA, DLCD, DOGAMI, Keizer, Turner, Marion County, Polk County
Timeline:		If available, estimated cost:
Short Term (0-2 years)	Long Term (2-4 or more years)	Potentially very expensive
	Long term	
Form Submitted by:	Salem Natural Hazards Mitigation Committee	
Action Item Status:		

EARTHQUAKE ACTION #1

Proposed Action Item: (from Action # 16)		Alignment with Plan Goals:
Develop an inventory of un-reinforced masonry structures and develop appropriate mitigation action items to reduce the impacts of seismic events.		<i>Protect lives. Protect existing and future development.</i>
Rationale for Proposed Action Item:		
<ul style="list-style-type: none"> The City of Salem has numerous un-reinforced masonry structures in their downtown. Un-reinforced masonry structures are particularly susceptible to earthquakes, and if damaged, can disrupt businesses located in historic downtown buildings. Inventorying un-reinforced masonry structures and developing action items to address these buildings will help reduce the vulnerability to seismic events. The Salem Natural Hazards Mitigation Committee identified seismic events as having a high probability of recurrence and a high vulnerability in the City of Salem. Addressing the most vulnerable buildings first, those made of un-reinforced masonry, will reduce the city’s vulnerability to seismic events. The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community, particularly to buildings and infrastructure [201.6(c)(3)(ii)]. Inventorying un-reinforced masonry structures will identify the major issues surrounding these buildings and what appropriate mitigation measures should be used to address these issues. In addition, protecting existing buildings and infrastructure will help reduce the negative impact of a seismic event on the community. 		
Ideas for Implementation:		
<ul style="list-style-type: none"> Identify critical facilities constructed of un-reinforced masonry and develop appropriate mitigation action items or consider relocating the facility to a new building. Seek funding to develop programs to retrofit un-reinforced masonry buildings and provide outreach on seismic hazards. 		
Lead Agency:	Salem Community Development Department	
Internal Partners:		External Partners:
Salem Urban Development, Public Works, Fire		FEMA, DOGAMI
Timeline:		If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)	
	<u>Long Term</u>	
Form Submitted by:	Salem Natural Hazards Mitigation Committee	
Action Item Status:		

EARTHQUAKE ACTION #2

Proposed Action Item:		Alignment with Plan Goals:
Identify and inventory critical facilities that require seismic retrofit.		<i>Protect existing and future development.</i> <i>Increase cooperation and coordination among stakeholders.</i>
Rationale for Proposed Action Item:		
<ul style="list-style-type: none"> The Salem Natural Hazards Mitigation Committee noted that certain critical facilities have a high vulnerability for seismic events. Seismically retrofitting these facilities will significantly reduce their vulnerability in the event of an earthquake. Oregon Senate Bill 3 (2005) enables the Oregon Office of Emergency Management to develop a grant program to seismically rehabilitate critical public facilities. While the grant program is still being developed, conducting an inventory of critical facilities early will assist communities in obtaining funding once the grant program is in place. The Disaster Mitigation Act of 2000 requires communities to identify comprehensive actions that protect new and existing buildings [201.6(c)(3)(ii)]. Seismically retrofitting existing critical facilities, including reservoirs and pump stations, will help Salem reduce their vulnerability to seismic events. The Department of Geology and Mineral Industries (DOGAMI) Statewide Seismic Needs Assessment completed in 2007 of educational and emergency service facilities in the state of Oregon identified 48 school structures with a high or very high likelihood of collapse in the event of a major earthquake. In addition, three fire structures and five police structures had a high likelihood of collapse in the event of an earthquake. These facilities should be retrofitted accordingly to reduce the likelihood of collapse should an earthquake occur. 		
Ideas for Implementation:		
<ul style="list-style-type: none"> Use DOGAMI's Seismic Needs Assessment of buildings in Salem to identify and prioritize buildings vulnerable to seismic events. Seek additional information from DOGAMI, if vulnerable reservoirs and pump stations are not included in the Seismic Needs Assessment. Coordinate with OEM and FEMA to determine funding for conducting seismic retrofit of buildings. 		
Lead Agency:	City of Salem Emergency Management	
Internal Partners:		External Partners:
Salem Natural Hazards Mitigation Committee, Salem Community Development Department, Salem Public Works		FEMA, OEM, DOGAMI, Local School Districts
Timeline:		If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)	Potentially very expensive, but costs can be offset by grant programs.
	Long Term	
Form Submitted by:	Salem Natural Hazards Mitigation Committee	
Action Item Status:		

EARTHQUAKE ACTION #3

Proposed Action Item:		Alignment with Plan Goals:
Partner with the school districts to help identify and prioritize seismic retrofits to school district facilities.		<i>Protect lives. Protect existing and future development.</i>
Rationale for Proposed Action Item:		
<ul style="list-style-type: none"> • Due to the high concentration of students and the relative vulnerability of that population, schools have large negative impacts from seismic events. Seismically retrofitting these facilities will significantly reduce their vulnerability in the event of an earthquake. • Oregon Senate Bill 3 (2005) enables the Oregon Office of Emergency Management to develop a grant program to seismically rehabilitate critical public facilities. While the grant program is still being developed, conducting an inventory of critical facilities early will assist communities in obtaining funding once the grant program is in place. • The Department of Geology and Mineral Industries (DOGAMI) Statewide Seismic Needs Assessment completed in 2007 of educational facilities in the state of Oregon identified 48 school structures with a high or very high likelihood of collapse in the event of a major earthquake. These facilities should be retrofitted accordingly to reduce the likelihood of collapse in the event of an earthquake. • The Disaster Mitigation Act of 2000 requires communities to identify comprehensive actions that protect new and existing buildings [201.6(c)(3)(ii)]. Seismically retrofitting existing critical facilities, including reservoirs and pump stations and especially schools, will help Salem reduce their vulnerability to seismic events. 		
Ideas for Implementation:		
<ul style="list-style-type: none"> • Use DOGAMI’s Seismic Needs Assessment of Salem school facilities to identify and prioritize school district facilities that are vulnerable to seismic events. • Educate school district officials about the effectiveness of natural hazard mitigation actions. • Coordinate with OEM and FEMA to seek funding for conducting seismic retrofit of buildings. • Engage the members of the school district with the Salem Natural Hazards Mitigation Committee. 		
Lead Agency:	City of Salem Emergency Management	
Internal Partners:		External Partners:
Salem Natural Hazards Mitigation Committee, Salem Community Development Department,		FEMA, OEM, DOGAMI, Salem-Keizer School District, private schools, Chemeketa C.C., Willamette, Corban College
Timeline:		If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)	Potentially very expensive, but costs can be offset by grant programs.
	Long Term	
Form Submitted by:	Salem Natural Hazards Mitigation Committee	
Action Item Status:		

FLOOD ACTION # 1

Proposed Action Item: <i>(from Action # 8)</i>		Alignment with Plan Goals:
Develop a flood warning system on local creeks that is consistent with the 2000 Stormwater Master Plan and the Corps of Engineers (COE) Section 205 Flood Damage Reduction Study for Mill Creek.		<i>Protect lives.</i>
Rationale for Proposed Action Item:		
<ul style="list-style-type: none"> The Disaster Mitigation Act of 2000 requires that communities identify actions and projects that reduce the impact of a natural hazard on the community, particularly to new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Developing a flood warning system on local creeks will help monitor flood levels and provide adequate warning to residents and businesses near flood prone areas to evacuate 		
Ideas for Implementation:		
<ul style="list-style-type: none"> Refine the existing continuous stream monitoring stations to include rating curves for improved flow measuring accuracy, and install monitors on currently un-monitored streams as funding allows. Perform a cost-benefit analysis of a local flood warning system on local creeks depending on the level of risk for each creek. Conduct a public awareness campaign targeting residents in the floodplain to educate them about the potential flood hazard their property faces. Make floodplain information available at the Marion County building permit counter and at the city of Salem. 		
Lead Agency:	Salem Public Works Department	
Internal Partners:		External Partners:
Fire Department, Salem Community Development		FEMA, DLCD, Army Corps of Engineers, Marion and Polk Counties, MCSWCD, Santiam Water Control District
Timeline:		If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)	
	<u>Long Term</u>	
Form Submitted by:	Salem Natural Hazards Mitigation Committee	
Action Item Status:		

FLOOD ACTION # 2

Proposed Action Item: <i>(from action # 10)</i>		Alignment with Plan Goals:
Encourage landowners in the UGB to provide set-asides for open space for less intensive development in floodplains.		<i>Increase cooperation and coordination among stakeholders. Protect the natural environment.</i>
Rationale for Proposed Action Item:		
<ul style="list-style-type: none"> • Often, homeowners and recent purchasers of property are unaware of the potential flooding hazards found on their property. Educating current property owners, as well as recent arrivals and prospective buyers, about the floodplain hazard on their property will enable property owners to be better prepared in the event of a flooding event. In addition, providing mitigation actions property owners can take will significantly reduce the impact of a flooding event. • The Disaster Mitigation Act of 2000 requires that communities identify actions and projects that reduce the impact of a natural hazard on the community, particularly to new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Encouraging landowners to provide set asides for open space on developments in the floodplain will reduce the impact of flooding events on structures, but also provide open space for floodwaters to flow, reducing the intensity of a flooding event. 		
Ideas for Implementation:		
<ul style="list-style-type: none"> • Conduct a public awareness campaign targeting residents in the floodplain to educate them about the potential flood hazard their property faces. • Make floodplain information available at the Marion building permit counter and at the city of Salem. • Educate current homeowners and prospective buyers of property within Salem’s UGB about potential floodplain issues on their property and actions they can implement to mitigate the impacts of a flood. 		
Lead Agency:	Salem Community Development Department	
Internal Partners:		External Partners:
Salem Public Works Department		DLCD, FEMA, Marion and Polk Counties
Timeline:		If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)	
	<u>Ongoing</u>	
Form Submitted by:	Salem Natural Hazards Mitigation Committee	
Action Item Status:		

FLOOD ACTION # 3

Proposed Action Item: <i>(from Action # 12)</i>		Alignment with Plan Goals:	
Implement recommendations presented in the 2000 Stormwater Master Plan (SWMP) to reduce flood hazards in the city.		<i>Protect existing and future development.</i> <i>Protect the natural environment.</i>	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> The City of Salem completed a Stormwater Master Plan in 2000 whose overall goal is to cost effectively balance reductions in flood damages with improvements in stream water quality, reflecting the community's financial resources to support such a broadened program. The plan lists policies and prioritized actions for the stormwater program and provides recommendations and costs for specific projects. Stormwater management plays an important role in flood mitigation, and the action items included in the stormwater plan will help reduce the impact of flooding events in the city of Salem. Stormwater management is a key element in maintaining and enhancing a community's livability. There is a direct link between stormwater and a community's surface and ground waters. As a community develops, the impervious surfaces that are created increase the amount of runoff during rainfall events, disrupting the natural hydrologic cycle. Without control, these conditions erode stream channels and prevent groundwater recharge. The Disaster Mitigation Act of 2000 requires that communities identify actions and projects that reduce the impact of natural hazards on the community, particularly to new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Implementing recommendations presented in the Stormwater Master Plan will help to reduce the impact of floods in the City of Salem while improving water quality for surrounding rivers and streams. The Disaster Mitigation Act of 2000 requires communities to maintain the Hazard Mitigation Plan by having local governments incorporate the requirements of the plan into other planning mechanisms [201.6(c)(4)(ii)]. Implementing the Stormwater Master Plan recommendations addressing flood hazards will coordinate existing plans and policies with the mitigation plan actions and simplify the implementation process by using existing plans and agencies. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> Include City of Salem staff responsible for implementing the Stormwater Master Plan in Salem Natural Hazards Mitigation Committee meetings. Identify and prioritize stormwater action items based on the benefits they will have in reducing the impact of future flooding events. Seek federal funding through the pre-disaster mitigation (PDM) program and through the Flood Mitigation Assistance (FMA) program to assist in implementing the Stormwater Master Plan. 			
Lead Agency:		Salem Public Works Department	
Internal Partners:		External Partners:	
Salem Community Development Dept.		Marion County, Polk County, FEMA	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
<u>Short Term</u>			
Form Submitted by:		Salem Natural Hazards Mitigation Committee	
Action Item Status:			

FLOOD ACTION # 4

Proposed Action Item: (from Action # 13)		Alignment with Plan Goals:	
Revise SRC 140 Floodplain Overlay Zones to increase flood freeboard at 2 feet above the 100-year elevation in areas where past floods (including the 1996 floods) have been higher than the FIRM-predicted 100-year elevation.		<i>Protect existing and future development.</i> <i>Reduce economic loss.</i>	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> The 2003 Salem Natural Hazards Mitigation Plan identified increasing flood freeboard to two? one foot above the 100-year elevation as an action item (see Action # 13, Appendix D. 2003 Salem Natural Hazards Mitigation Plan Action Items). Conversations with the Salem Natural Hazards Mitigation Committee identified the desire to increase flood freeboard to two feet in height, which would require revision of Salem Revised Codes (SRC) 140, but assist in reducing the impact of flooding events. The City of Salem has three repetitive flood loss properties. Increasing the flood freeboard to two feet may significantly reduce the impact of flooding of these properties if they were to be raised in the future. The City of Salem has a total of 3541 structures located in the 100-year floodplain. Increasing the flood freeboard to two feet above the 100-year elevation could significantly reduce the impact of flooding events on these structures should a future flooding event occur. The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community, particularly to current and future buildings and infrastructure [201.6(c)(3)(ii)]. Increasing the flood freeboard level to two feet will significantly protect structures in the floodplain during a 100-year flood event, and provide further protection during a 500-year flood event. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> Work with community members and neighborhood groups to discuss the benefits of raising the flood freeboard to two feet. Coordinate revisions to SRC 140 with National Flood Insurance Protection and Community Rating Service requirements to ensure compliance. 			
Lead Agency:	Salem Public Works Department		
Internal Partners:		External Partners:	
Salem Community Development, Legal, Public Works		FEMA, Neighborhood Associations, Marion-Polk Building Industry Association (MPBIA)	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
<u>Short Term</u>			
Form Submitted by:	Salem Natural Hazards Mitigation Committee		
Action Item Status:			

FLOOD ACTION #5

Proposed Action Item:		Alignment with Plan Goals:	
Improve the City of Salem’s National Flood Insurance Program (NFIP) Community Rating System (CRS) to reduce NFIP premiums.		<i>Increase cooperation and coordination among stakeholders. Reduce economic loss.</i>	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> The National Flood Insurance Program's (NFIP) Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. As a result, insurance premiums under the NFIP are discounted to reflect the reduced flood risk resulting from the community actions meeting the three goals of the CRS: (1) reduce flood losses; (2) facilitate accurate insurance rating; and (3) promote the awareness of flood insurance. The City of Salem has entered the CRS program with a rating of eight. Implementing action items to improve the CRS rating will significantly reduce NFIP premiums on structures located within the floodplain. The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address existing buildings and infrastructure [201.6(c)(3)(ii)]. Maintaining the status of the Community Rating System program can help the community to enhance mitigation efforts and decrease the vulnerability to floods. In addition, the Flood Mitigation Assistance Program requires that communities maintain their compliance with the NFIP. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> Coordinate with the Department of Land Conservation and Development (DLCD) and FEMA to maintain the Community Rating System. Educate businesses and homeowners currently under the NFIP program about the CRS program and any mitigation actions they can implement to reduce their insurance premiums. Identify homes not in the NFIP that should have flood insurance. Develop mitigation activities to address repetitive and single loss flood properties in Salem, particularly in the area of McGilchrist Avenue and Pringle Road SE, adjacent to West Pringle Creek. 			
Lead Agency:	Salem Public Works Department		
Internal Partners:		External Partners:	
Salem Community Development		DLCD, National Flood Insurance Program, FEMA, Marion and Polk Counties	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
Short Term			
Form Submitted by:	Salem Natural Hazards Mitigation Committee		
Action Item Status:			

WINDSTORM/WINTER STORM ACTION # 1

Proposed Action Item:		Alignment with Plan Goals:	
Partner with public and private utilities to educate the public about hazardous trees and the damage they can cause in the event of a wind or winter storm.		<i>Reduce economic loss. Protect existing and future development.</i>	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> Overhead electrical lines and other above ground utilities are subject to damage from nearby trees in high winds and winter storm damage. Post-disaster, it is difficult to remove debris from the downed utility lines and this difficulty delays the time for restoration of power to the community. Partnering with utility companies to maintain and remove hazardous trees, in addition to educating the public about the damage hazardous trees can cause, will help reduce risk of damage from severe wind and winter storms. The Disaster Mitigation Act of 2000 requires communities to develop comprehensive actions to reduce the impacts of natural hazards, with an emphasis on new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Maintenance and removal of hazardous trees will reduce the impact of severe weather, and will continue power service to rural customers as well as ODOT, State Police, county sheriff, emergency services, telephone utilities, and cell phone companies. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> Coordinate with the City of Salem Public Works Department to gather information about the maintenance and removal of hazardous trees. Work with the community and City of Salem Public Works Department to identify areas that are prone to damage from nearby trees and perform the necessary maintenance or removal of those trees. Create a hazardous tree inventory. 			
Lead Agency:		Salem Public Works Department	
Internal Partners:		External Partners:	
Salem Community Services Parks Operations , Salem Fire Department		ODOT Portland General Electric, Salem Electric	
Timeline:		If available, estimated cost:	
Short Term (0-2 years)	Long Term (2-4 or more years)		
	Long Term		
Form Submitted by:		Salem Natural Hazards Mitigation Committee	
Action Item Status:			

WILDFIRE ACTION # 1

Proposed Action Item:		Alignment with Plan Goals:	
Conduct wildfire prevention outreach, as outlined in the Marion County Community Wildfire Protection Plan (CWPP), to residents near the wildland-urban interface.		<i>Increase cooperation and coordination among stakeholders. Protect lives.</i>	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> The Oregon Department of Forestry (ODF) recently completed a Communities at Risk Assessment for the City of Salem that shows areas in northwest and south Salem that are at high risk to wildfire events (See Map 2.1.5: Fire Hazard Areas). Although these areas are just outside of the Salem city limits, they are vulnerable to wildfire events that could impact residents within the city limits. Conducting wildfire prevention outreach to residents near these areas can significantly reduce the vulnerability of the neighborhoods to wildfire events. Interviews with Salem Fire Department staff indicate that the areas with the highest risk have the steepest slopes, the right fuels, and high valued property. The areas outlined by the ODF Communities at Risk Assessment show that many of the areas at risk are near steep slopes and have combustible fuels. Conducting wildfire prevention outreach can help to reduce vulnerability of residents to wildfire events. The Marion County Community Wildfire Protection Plan (2008) outlines strategies for conducting wildfire prevention outreach to residents living in the wildland-urban interface. Conducting wildfire prevention outreach using the CWPP will help to integrate mitigation into existing plans and policies as required by the Disaster Mitigation Act of 2000 [201.6(c)(4)(ii)]. 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 wildfire prevention outreach measures as outlined in the Marion County CWPP will help to protect new and existing buildings from wildfire events. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> The Marion County Community Wildfire Protection Plan contains several action items for reducing the impacts of wildfire on communities throughout the county, including actions to conduct public outreach about fuels reduction and defensible space (see Chapter 6: Action Plan, Marion County CWPP). Using these action items can assist in reducing the impact of wildfire on the City of Salem. Coordinate with responsible agencies listed in the Marion County CWPP to implement action items. 			
Lead Agency:		Salem Fire Department	
Internal Partners:		External Partners:	
Salem Public Works and Community Development Departments, Police Department, Community Services		Oregon Department of Forestry, Marion County Fire District #1, South Suburban Fire District, Neighborhood Associations	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
Short Term			
Form Submitted by:	Salem Natural Hazards Mitigation Committee		
Action Item Status:			

HAZARDOUS MATERIALS ACTION #1

Proposed Action Item: (from Action # 5)		Alignment with Plan Goals:	
Map facilities that handle or contain hazardous materials, rank them based on their level of risk, and refine response strategies for each situation in the event of an accident.		<i>Increase cooperation and coordination among stakeholders.</i> <i>Protect lives.</i> <i>Protect the natural environment.</i>	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> The City of Salem has identified and mapped hazardous materials located in the city. These maps need to be updated to determine the number and types of natural hazards present, and their level of risk. The Salem Natural Hazards Mitigation Committee indicated how the railroad running near the Capital Mall area in Salem is an area for potential concern because of the significant amount of hazardous materials that run through the area each year. Accidents with people and automobiles could derail cars and have the potential to spill hazardous materials in the Capital Mall area, affecting City and State operations. Refining response strategies for accidents on the railroad line would reduce the vulnerability of the City of Salem to hazardous materials incidents. The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community, particularly to buildings and infrastructure [201.6(c)(3)(ii)]. Identifying facilities that handle or contain hazardous materials, ranking them based on their level of risk, and developing appropriate response strategies will help reduce the negative impact of hazardous materials on the population in Salem and improve disaster response efforts. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> Contact businesses and property owners with hazardous materials about strategies they can implement to reduce the impacts of hazardous materials in their immediate area. Coordinate response strategies with alert warning systems to minimize potential exposure to hazardous materials. Provide information on shelter-in-place strategies to property owners and neighbors to reduce exposure to hazardous materials and simplify response efforts. Identify vulnerable areas along the Union Pacific and Burlington Northern Santa Fe railroad lines and coordinate with railroad companies to develop strategies for reducing accidents along the railroad lines. 			
Lead Agency:	Salem Fire Department		
Internal Partners:		External Partners:	
Salem Emergency Management, Public Works		OSHA, Salem Chamber of Commerce, Neighborhood Associations, ODOT, OEM, State Police, State Fire Marshall	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
<u>Short Term</u>			
Form Submitted by:	Salem Natural Hazards Mitigation Committee		
Action Item Status:			

6.0 REFERENCES

Specific to City Of Salem Area

- City of Salem, Salem Revised Code (SRC)
- City of Salem Landslide Ordinance (SRC 69)
- City of Salem, 1992, Salem Comprehensive Plan (revised September 1999)
- City of Salem, 1997, Post Flood Report - Floods of February 7-9, 1996. Public Works Department
- City of Salem, 1990, Salem/Mill Creek, Oregon; Draft Feasibility Report on Flood Damage Reduction
- City of Salem, 1999, Emergency Management Plan
- City of Salem, 1999, Request for Proposals - Development of a Natural Hazard Mitigation Plan
- Marion County, 1999 (update), Manual for Completion of Hydrogeology Reviews and Studies in Compliance with Marion County Sensitive Groundwater Overlay Zone.
- Marion County Natural Hazards Mitigation Plan
- Montgomery Watson, City of Salem, Stormwater Master Plan, September 2000.
- Montgomery Watson, City of Salem, Drainage System Improvement Plan: A Technical Supplement to the Stormwater Master Plan (September 2000)
- Montgomery Watson, City of Salem, Oregon Stormwater Management Program Plan: A Technical Supplement to the Stormwater Master Plan, September 2000
- National Oceanic and Atmospheric Administration, Climactic Data Center, Storm Events Database
- Oregon Dept. of Land Conservation & Development, 1998, Oregon Model Flood Damage Prevention Ordinance.
- Oregon Dept. of Land Conservation & Development, 1999, Local Planning for Natural Hazards - Comprehensive Plan Evaluation Questionnaire (October draft)
- Oregon DOGAMI, 1996, Relative Earthquake Hazard Maps of the Salem East and Salem West Quadrangles, Marion and Polk Counties, Oregon (Dept. of Geology and Mineral Industries) GMS-105
- Oregon DOGAMI, 1999, Water-Induced Landslide Hazards, Western Portion of the Salem Hills, Marion County, Oregon, IMS-6
- Oregon DOGAMI, 1999, Water-Induced Landslide Hazards, Eastern Portion of the Eola Hills, Polk County, Oregon, IMS-7
- Oregon Revised Statutes (*see Appendix A. of this Natural Hazard Mitigation Plan for details*)
- Polk County Natural Hazards Mitigation Plan
- US Army Corps of Engineers, 1998, Hydrologic Engineering Management Plan (HEMP) For Salem/Mill Creek, Section 205 Study, CENWP-PE-HY(Draft, part of City of Salem Quality Plan for Salem, Mill Creek, Oregon).
- US Army Corps of Engineers, 1999, Salem, Oregon (Mill Creek), Section 205 Study: Hydrologic and Hydraulic Analysis (Draft Interim Report), DCAW57-96-0011 (Task 005).
- US Army Corps of Engineers, 2002, Salem, Oregon, Mill Creek Watershed Section 205 Flood Control Feasibility Study.
- US Geological Survey, 1989, Geologic map, Salem 1° x 2° quadrangle, I-1893.
- US Geological Survey,

6.1 Principal References

(Unknown), Annex to State of Oregon Natural Hazards Mitigation Plan Pursuant to Disaster No. FEMA-1061-DR-OR (July 8 and 9, 1995 Wasco County Flash Flood), undated.

Beaulieu, John, and Olmstead, Dennis, Risk Reduction for Communities with Geologic Hazards, A Guide: Salem Landslide Study as a Pilot Effort, State of Oregon, Oregon Department of Geology and Mineral Industries, Portland, OR, Draft of 3/18/99.

Beaulieu, John, Risk Reduction from Geologic Hazards in Oregon, presented at Oregon Emergency Managers Annual Meeting, Eugene, OR, and Oregon Dept. of Geology and Mineral Industries, Portland, OR, 8/26/97.

Biennial Report for 1997 – 1999, from Oregon’s Department of Land Conservation and Development to the Seventieth Legislative Assembly, Reducing Risks and Costs of Natural Hazards, February, 1999, P. 26.

Booth, Derek B., Urbanization and Natural Drainage System--Impacts, Solutions, and Prognoses, *The Northwest Environmental Journal*, Vol. 7, No. 1, Spring/Summer 1991.

City of Vernonia, Hazard Mitigation Committee, Vernonia Natural Hazard Mitigation Plan, September 1996.

Federal Register, Federal Emergency Management Agency (FEMA), 44 CFR Parts 201 and 206, Hazard Mitigation Planning and Hazard Mitigation Grant Programs; Interim Final Rule, February 26, 2002.

FEMA, How to Determine Cost-Effectiveness of Hazard Mitigation Projects, Interim Edition, December, 1996, Mitigation Directorate

FEMA and Oregon State Police (Office of Emergency Management), Interagency Hazard Mitigation Team Report for the Crook County Flooding Disaster, FEMA DR-1221-OREGON, June 1998.

FEMA, Mitigation Directorate, Technical Information on Elevating and Relocating Residential Buildings in the State of Oregon, undated.

FEMA, Multi-Hazard Identification and Risk Assessment: A Cornerstone of the National Mitigation Strategy, 1997.

FEMA, National Flood Insurance Program Community Rating System Example Plans (Washington, DC: FEMA, July 1996).

FEMA, The Project Impact Hazard Mitigation Guidebook for Northwest Communities, Washington, DC, 1998.

FEMA Region IV (with assistance from the Center for Urban and Regional Studies at the University of North Carolina-Chapel Hill), Local Natural Hazard Mitigation Planning Manual, Atlanta, GA: draft, undated.

FEMA Region X Interagency Hazard Mitigation Team, Interagency Flood Hazard Mitigation Report, In Response to the January 18, 1990 Disaster Declaration, State of Oregon, Tillamook and Clatsop Counties, FEMA-853-DR-OR, undated.

Goettel & Associates Inc., Regional All Hazard Mitigation Master Plan for Clackamas County, Draft (Partial), August 11, 1998.

Hofmeister, J., Slope Failure in Oregon During 1996/97 Storm Events, Department of Geology and Mineral Industries, 1999.

Interagency Hazard Mitigation Team Report, February 1996 Landslides & Stream Erosion (draft), FEMA 1099-DR-OR, undated.

Marion County, Marion County Natural Hazard Mitigation Plan, Mid-Willamette Valley Council of Governments, 2006.

Metro, Natural Hazard Mitigation Workshop Proceedings, March 13-14, 1997 (Portland, OR: Metro, undated).

Metro, Other Natural Hazards: Information in the Metro Region (Portland, OR: Metro, March 10, 1997).

National Research Council, Reducing Losses From Landsliding in the United States, National Academy Press, Washington, DC, 1985.

Oregon Department of Forestry , Landslides and Public Safety, Issue Paper, April 10, 1998.

Oregon Department of Forestry, 1999, Storm Impacts and Landslides of 1996 - Forest Practices Technical Report No. 4 (authored by E.R. Robinson, K.A. Mills, J. Paul, and L. Dent with the Oregon Department of Forestry and A. Skaugest, Oregon State University).

Oregon State Department of Geology and Mineral Industries, 1999, Geologic Hazards: Reducing Oregon's Losses (Special Paper 32 by John Beaulieu and Dennis Olmstead).

Oregon State Police, Office of Emergency Management, 1991, Action Plan to Mitigate Flood and Wind Hazards in Clatsop and Tillamook Counties, June 1991.

Oregon State Police (Oregon State Police, Office of Emergency Management)) and Federal Emergency Management Agency, Region 10, Hazard Mitigation: Early Implementation Strategy for the 1996 Oregon State Flood, DR-1099-OR (Salem, OR: OEM, March 15, 1996).

Oregon State Police (Oregon State Police (Office of Emergency Management)) and Federal Emergency Management Agency, Region 10, Homeowner's Landslide Guide (Salem, OR: OEM, undated).

Oregon State Police (Office of Emergency Management) and Federal Emergency Management Agency, Interagency Hazard Mitigation Team Report, FEMA-DR-1149-OR and FEMA-DR-1160-OR (Salem, OR: OEM, March 1997).

Oregon State Police (Office of Emergency Management) and Federal Emergency Management Agency, Reducing Windstorm Damage to Electric Utilities, Interagency Hazard Mitigation Team Report for the Western Oregon Windstorms of December 10-12, 1995 (FEMA-1107-DR-OR), undated.

Oregon State Police (Office of Emergency Management) and Federal Emergency Management Agency, Interagency Hazard Mitigation Team Report, FEMA-DR-1099-OR (February 1996 Flooding, Landslides, and Stream Erosion in the State of Oregon), (Salem, OR: OEM, 1996).

Oregon State Police (Office of Emergency Management), Elevation Guidelines for Oregon Flood Disasters DR-1099/1149/1160, and Flood Mitigation Assistance (FMA) Program, 3/19/98 revision.

Oregon State Police (Office of Emergency Management), Oregon Revised Statutes, Chapters 401, 445 and Others, 1993.

Oregon State Police (Office of Emergency Management), State of Oregon Natural Hazards Mitigation Plan (Salem, OR: OEM, 10/97).

Oregon State Police (Office of Emergency Management), 1996 (and revisions), Hazard Analysis (guidance and worksheets).

Oregon Natural Hazards Workgroup, 2002, Local Natural Hazard Mitigation Plans: An Evaluation Process, Oregon State Police (Office of Emergency Management) and Department of Land Conservation and Development (DLCD).

Oregon's Statewide Planning Goals & Guidelines, 1995 Edition, Goal 7: Areas Subject to Natural Disasters and Hazards, Department of Land Conservation and Development (DLCD), Salem OR, P. 11.

Oregon's Statewide Planning Goals & Guidelines, February 1, 2001 DRAFT. Goal 7: Areas Subject to Natural Disasters and Hazards, Department of Land Conservation and Development (DLCD), Salem OR, P. 3

Oregon's Statewide Planning Goals & Guidelines, September 28, 2001. Goal 7: Areas Subject to Natural Disasters and Hazards, Department of Land Conservation and Development (DLCD), Salem OR.

Portland State University, Department of Geology, Landslides in the Portland Area Resulting from the Storm of February, 1996: Inventory Map, Database and Evaluation, Draft (Portland, OR: PSU, April 6, 1998).

Protecting Our Region's Rivers, Floodplains and Wetlands, METRO Regional Services, Portland, OR, June, 1998.

Scofield, David and Jochim, Candace, Environmental, Groundwater and Engineering Geology: Applications from Oregon, Edited by Scott Burns, Portland State University, Engineering Geology of Transportation Routes in Oregon, Star Publishing Co., Belmont, CA, 1998, P. 193.

State of Oregon, Department of Land Conservation & Development, Report to the 70th Legislative Assembly, August 1999.

State of Oregon, Joint Interim Task Force on Landslides and Public Safety, Report to the 70th Legislative Assembly, October 7, 1998.

State of Oregon, Oregon Progress Board, Oregon Shines II: Updating Oregon's Strategic Plan (Salem, OR: OPB, January 21, 1997).

State of Oregon, State Flood Control Plan Task Force, Report to the 70th Legislative Assembly (undated).

Taylor, G.H. and Hatton, R.R., 1999, The Oregon Weather Book - A State of Extremes (Oregon State University Press).

University of Oregon, Community Planning Workshop, Implementation of Goal 7: An Evaluation and Discussion of Hazards Planning in Oregon, prepared for the Oregon Department of Land Conservation and Development, July 1998.

Wallin, Phil, Restoring the Floodplain of Oregon's Willamette River, *River Voices*, Summer 1997: 17-19.

Williams, Philip and Coulton, Kevin, Reducing Flood Risk and Restoring Salmon: A Blueprint for Oregon's Integrated River Management Strategy, Prepared for The U.S. Fish and Wildlife Service, Oregon State Office, Portland, OR.

Wold, Robert and Jochim, Candace, Landslide Loss Reduction: A Guide for State and Local Government Planning, Colorado Geological Survey, Dept. of Natural Resources, Denver, CO, 1989.

APPENDICES - INFORMATION AND RESOURCE COMPENDIUM

Appendix A. Additional Federal and State Government Mitigation Information

The Federal *Robert T. Stafford Relief and Emergency Assistance Act* provides a specific focus on loss prevention. Section 409 of the act and its implementing regulations (44 Code of Federal Regulations, Part 206, Subpart M, Hazard Mitigation Planning) requires states, as a condition for receiving any Federal disaster grant or loan, to evaluate the impacts of natural hazards within designated disaster areas, to identify actions that will reduce the effects of such hazards, and to prepare and implement hazard mitigation plans to fulfill the act's intent.

Further information about this act and implementing regulations can be obtained from the Federal Emergency Management Agency's web site: <http://www.fema.gov> The regulations for implementing Section 409 of the Stafford Act can be found in 44 CFR Section 206, Subpart M.

- Within 15 days of any presidential major disaster declaration, a Federal Interagency Hazard Mitigation Team (IHMT) is required to submit a hazard mitigation report for the counties included in the declaration.
- Within 90 days, and based on the IHMT report, the State Hazard Mitigation Officer (SHMO) must then revise the state's natural hazards mitigation plan taking into account lessons learned from the disaster.
- In many cases, the SHMO will coordinate the preparation of separate event-specific mitigation plans, which become references to this plan so a connection and continuity is maintained throughout the program over time.
- In addition to the above reference, Federal regulations governing floodplain management and the protection of wetlands are contained in 44 CFR Part 9.

Two teams are prescribed in the Federal regulations: the Hazard Mitigation Survey Team (HMST) and the Interagency Hazard Mitigation Team (IHMT). These are different from Oregon's Governor's Interagency Hazard Mitigation Team (GIHMT), but they do involve some of the same state agencies.

- According to 44 CFR Section 206.401, the HMST means "the FEMA/State/Local survey team that is activated following disasters to identify immediate mitigation opportunities and issues to be addressed in the section 409 hazard mitigation plan. The team may include representatives of other Federal agencies, as appropriate."

- In contrast, the IHMT focuses primarily on floods. The same regulation notes that this is “the mitigation team that is activated following flood related disasters pursuant to the July 10, 1980 Office of Management and Budget Directive on Nonstructural Flood Protection Measures and Flood Disaster Recovery, and the subsequent December 15, 1980 Interagency Agreement for Nonstructural Damage Reduction.” While this team’s report is essentially a Federal report, the team is a joint intergovernmental team that generally seeks to accomplish the following:
 - Identify areas of significant hazards.
 - Evaluate sites of significant hazards and determine impacts.
 - Identify areas of damage that would require reconstruction to the standards of the National Flood Insurance Program (NFIP) or to state regulation.
 - Review and evaluate any applicable land use regulations, construction standards, or other hazard mitigation measures.
 - Review and evaluate existing emergency plans, including warning and evacuation plans.
 - Review other pertinent information, such as urban renewal, rehabilitation or master plans.
 - Identify and evaluate measures to mitigate the disaster impacts.
 - Recommend appropriate hazard mitigation measures.
 - Coordinate and take action necessary to implement the recommendations.

While several Federal agencies have special disaster related authorities, such as the U.S. Army Corps of Engineers, Small Business Administration and the Department of Transportation, for purposes of this city-level hazard mitigation planning the most important legislative authority is Public Law 93-288, as amended, commonly known as “The Robert T. Stafford Disaster Relief and Emergency Assistance Act.” Now known as the “Disaster Relief Act,” it has three pertinent sections related to hazard mitigation:

- Section 404: Defines the Hazard Mitigation Grant Program (HMGP). A matching fund program (currently 75% Federal and 25% non-Federal), it funds projects which are considered cost-effective and which substantially reduce the risk of future damage, hardship, loss, or suffering in any area affected by a major disaster. If no unmet needs exist in the disaster area, remaining funds can be applied to projects anywhere in the state.
- Section 406: Defines the Public Assistance Program, which provides funding to eligible government agencies for rebuilding destroyed or damaged public facilities. Funds for hazard mitigation can be included in approved projects during the rebuilding process.
- Section 409: Requires that as a condition of receiving Federal disaster assistance, states must develop or revise hazard mitigation plans which evaluate natural hazards, and make recommendations for mitigating these hazards in the geographic areas receiving such assistance. Statewide plans that address multiple hazards and entire states also are covered under Section 409 which has been renamed to Section 322 of the amended Stafford Act.
- The Stafford Act was amended by the Disaster Mitigation Act of 2000 (PL 106-390). FEMA released a new interim final regulation, dated February 26, 2002, on mitigation planning for state and local governments that implements the local mitigation plan requirements section of the amended Stafford Act. Note that per the new FEMA requirements, local jurisdictions must have plans approved by FEMA by November 1, 2004, to be eligible for Hazard Mitigation Grant Program project grants for Presidentially-declared disasters after this date.

Selected mitigation-related federal authorities that address actions to help minimize future losses are noted below. Some can be taken during the “build-up” phase of a potential disaster, others have longer term pre-disaster mitigation possibilities, and some, while available only in Presidentially-declared situations, have provisions that if applied have

the potential for reducing future losses (e.g., a requirement to follow current building codes). Further information can be obtained from the *Catalog of Federal Disaster Assistance*, published by the General Services Administration (GSA); *Disaster Assistance: A Guide to Recovery Programs*, published by the FEMA (#229-4, November 1995), and the *Federal Response Plan*, also published by FEMA (April 1999). The selections include:

- Small Business Act of 1953, as amended and others: Provides low-interest, long-term loans to repair or replace damaged personal and real property, but within specified limits. The “loans may be increased up to 20 percent for mitigating devices to protect real property from possible future disasters of the same kind.” In addition, the Small Business Administration outlined rules for hazard mitigation loans. In July of 1999, Congress enacted Public Law 106-24, which appropriated \$15 million to the Small Business Administration (SBA) for a pilot program to provide disaster mitigation loans to small businesses in support of FEMA's community based initiative, previously referred to as, Project Impact. This rule amends SBA's regulations allowing pre-disaster mitigation loans so that small businesses may install mitigation devices to prevent future damage. It states that mitigation can include such activities as elevating flood-prone structures; constructing retaining and sea walls; grading and contouring land; relocating utilities; and retrofitting and strengthening structures to protect them against high winds, earthquakes, floods, wildfires, and other natural hazards. Loans are available only to those small businesses located in pre-disaster mitigation communities, and applicants may borrow up to \$50,000 per year at four percent interest per year or less. The SBA amended its regulations again in October of 2002 to further implement the Pre-Disaster Mitigation Program. The new regulations require mitigation measure to conform with the priorities and goals of the State or local government’s mitigation plan. To demonstrate this, the applicant must obtain a written statement from the State or local Emergency Management Director confirming this fact. Applicants may also submit 4 years worth of projects within FY2003 since funding was delayed for FY2000, 2001, and 2002. Responsible agency: Small Business Administration.
- Flood Control Act of 1941, as amended and others: While there must be an “immediate threat of unusual flooding,” authorized mitigation assistance of a temporary nature includes removal of waterway obstructions, actions to prevent the failure of dams, and “work necessary to prepare for abnormal snowmelt.” Responsible agency: Department of the Army, Office of the Chief of Engineers.
- Fishery Conservation and Management Act of 1996: Project grants to eligible recipients can be used for various purposes, including “restoring fisheries or preventing future failures,” as long as the project meets specified criteria. Responsible agency: National Marine Fisheries Service.
- Housing Act of 1949, as amended and others: Provides for direct loans to qualified lower income rural families “to meet emergency assistance needs resulting from natural disasters ... or improve dwellings in rural areas.” Responsible agency: Department of Agriculture, Rural Housing Service.
- Federal-Aid Highway Program, 23 United States Code, as amended: Among a wide array of transportation-related activities, includes formula and project grants intended “to foster safe highway design” and “to replace or rehabilitate deficient or obsolete bridges,” including activities related to capital improvement projects for “safety reasons.” Responsible agency: Department of Transportation, Federal Highway Administration.

State of Oregon

Chaired by the Director of Oregon Military Department (Office of Emergency Management) (OEM) or the Director's designee, the Hazard Mitigation Grant Review Board, a sub-committee of the State's Interagency Hazard Mitigation Team, is an intergovernmental body which reviews, ranks, and selects projects for funding under Section 404 of the Federal Stafford Act. It uses the hazard mitigation plans for the geographic area in question to evaluate proposed projects for funding. The criteria used are those of the Stafford Act and several specific Oregon criteria. The board may also be assembled to evaluate proposed hazard mitigation projects, for which no Federal grant funding is available, if the state has an interest in funding such projects.

The City of Salem, in the Salem Area Comprehensive Plan (SACP), recognizes that the State of Oregon Land Use Goals "are the final standard whereby provisions of the comprehensive plan are to be interpreted". The comprehensive plan is described in Oregon Revised Statute (ORS) 197.015(5), conforming to Statewide Planning Goals promulgated by the Oregon Land Conservation and Development Commission (LCDC.). The Commission's Goal 7 requires every community in an area subject to one or more natural hazards to have a comprehensive plan element that addresses that or those natural hazards.

During the development of community plans, there is a need to consider the primary natural hazards including floods (coastal and riverine), landslides, earthquakes and related hazards, tsunamis, coastal erosion, and wildfires.

LCDC adopted amendments to Statewide Planning Goal 7 on September 28, 2001, with an effective date of June 1, 2002. The amendments to Goal 7 establish a timeline and procedure for local governments to respond to certain new information on natural hazards. Goal 7 now requires local governments to evaluate the risk to people and property from the new hazard information and to allow an opportunity for citizens to review and comment on the information. Based on the evaluation and citizen comments, local governments will incorporate the new hazard information into their comprehensive land use plans as necessary.

When local governments respond to new hazards information through amendments to their comprehensive land use plans and implementing measures, the new Goal 7 language encourages them to:

- a. Avoid development in areas of natural hazards where the risk to people and property cannot be mitigated; and
- b. Prohibit siting of "critical facilities" (e.g., fire stations, hospitals) in hazard areas unless the facility is needed in the hazard area to provide emergency response services in a timely manner.

The new guidelines highlight the relationship of natural hazards to protection of natural resources, discuss the importance of coordinating land use decisions with emergency management programs, and encourage local governments to adopt measures that are more protective than the minimum National Flood Insurance Program changes.

Also of significance on a State level is preparation of the Oregon Military Department (Office of Emergency Management) Plan (OEMP). This plan includes three volumes: Part I - Preparedness and Mitigation of the OEMP, which includes the plans and guidance necessary for the state to prepare to reduce the effects of a disaster, Part II - Emergency Operations Plan, and Part III, Relief and Recovery.

Important state legislation, pertinent to hazard mitigation, has been adopted over many years. Some of the key chapters of the Oregon Revised Statutes (ORS) are summarized below:

- ORS, Chapter 196: Deals with wetlands, and ORS 196.800 to 196.095 are concerned with filling and removing of materials from the “the beds and banks of the waters of this state.” Many of these provisions have a tangential effect on floodplain management and flood hazard mitigation.
- ORS, Chapter 197: Provides the basis for comprehensive land use planning in the State of Oregon, including provisions governing development in floodplains and in areas of geological hazard (Goal 7) which are intended to mitigate the effects of such hazards.
- ORS, Chapter 401: Includes many of the state’s emergency management statutes, one section of which states that the general purpose of the law is to “reduce the vulnerability of the State of Oregon to loss of life, injury to persons or property, human suffering, and financial loss resulting from emergencies.”
- ORS, Chapter 477: Addresses the fire protection of forests and vegetation, including sections on urban interface fire protection, hazard abatement, fire abatement, fire prevention, and related sections.
- ORS, Chapter 516: Creates and defines the duties of the Department of Geology and Mineral Industries (DOGAMI). Section 516.030(3) directs DOGAMI to administer, on a cooperative basis, studies and programs that will “reduce the loss of life and property by understanding and mitigating geological hazards.”
- ORS Chapter 455: Provides legal authority for the Building Codes Division’s (BCD) natural hazard mitigation activities in ORS 455.020 (code adoption), .220 (training), .440 (site soil analysis), .446 (construction in tsunami zones), .447 (seismic site hazard analysis), and .448-.449 (entry and inspection of earthquake damaged buildings).
- ORS Chapter 527: Authorizes the statewide regulation of forest practices. The DOF provides leadership in forest policy and programs including forest fires and management of forest practices in order to mitigate hazards.
- ORS Chapter 1103: Establishes policy for protection of public from rapidly moving landslides. Provides for landslide mapping by the state (DOGAMI and DOF). The law provides DLCD with grants in order to fund development of statewide model ordinances and model Transfer of Development Rights (TDR) measures necessary for local government to regulate in landslide areas. Local governments must regulate in mapped areas, but must adopt a TDR program if regulations result in landowner costs that would exceed certain amounts set in the ORS.
- ORS Chapters 98.805-992, 368-039, 453, 476, 477: Authorizes a wide variety of education and training programs, inspections, investigative and information reports and other activities related to fire and hazardous materials incident prevention, safety, and management.
- ORS Chapters 196 and 390: Defines the Division of State Land’s (DSL) roles related to issue of removal and fill permits or enforcement actions on public and private waterways, wetlands, the Pacific Ocean, and other waters of the state.
- ORS Chapter 527: Provides authority to the Department of Forestry (DOF) for insect and disease control for the purposes of protecting forested land resources.
- ORS Chapter 540: Provides the Water Resources Department (WRD) statutory authorities for dam safety and a statewide hydrographic program for measuring river and stream flows.
- ORS Chapter 569: Provides authority to the Department of Agriculture (DOA) for its water quality and soil conservation measures.
- ORS Chapter 570: Provides authority to the Department of Agriculture for its pest and disease control programs.

- ORS Chapter 810: Designates the Department of Transportation as the “road authority for all state highways” and specifies a wide range of maintenance, operations, and analysis activities related to hazard mitigation (e.g., drainage maintenance, culvert inventory, and bridge seismic retrofit program).

Local governments are represented by several associations that play important roles in hazard mitigation. These include the Association of Oregon Counties (AOC), League of Oregon Cities (LOC), Oregon Special Districts Association, and the Oregon State Police, Office of Emergency Management Association (OEMA). For example, the AOC, LOC, and OEMA sit on the Hazard Mitigation Grant Review Board, all advocate legislation and/or regulatory changes, and all provide contacts with their members as the need arises.

Appendix B. ORS 455.477 (excerpt) - Essential Facility, Major Structure, Hazardous Facility, and Special Occupancy Structures

From 455.447 - Regulation of certain structures vulnerable to earthquakes and tsunamis [note: ORS 455.446, ORS 455.447, and OAR Chapter 632 Div.5 apply to constructing such facilities in tsunami inundation zones (such zones do not exist within the Salem UGB)].

(1) As used in this section, unless the context requires otherwise:

- (a) “Essential facility” means:
 - (A) Hospitals and other medical facilities having surgery and emergency treatment areas;
 - (B) Fire and police stations;
 - (C) Tanks or other structures containing, housing or supporting water or fire-suppression materials or equipment required for the protection of essential or hazardous facilities or special occupancy structures;
 - (D) Emergency vehicle shelters and garages;
 - (E) Structures and equipment in emergency-preparedness centers;
 - (F) Standby power generating equipment for essential facilities; and
 - (G) Structures and equipment in government communication centers and other facilities required for emergency response.
- (b) “Hazardous facility” means structures housing, supporting or containing sufficient quantities of toxic or explosive substances to be of danger to the safety of the public if released.
- (c) “Major structure” means a building over six stories in height with an aggregate floor area of 60,000 square feet or more, every building over 10 stories in height and parking structures as determined by Department of Consumer and Business Services rule.
- (d) “Seismic hazard” means a geologic condition that is a potential danger to life and property which includes but is not limited to earthquake, landslide, liquefaction, tsunami inundation, fault displacement, and subsidence.
- (e) “Special occupancy structure” means:
 - (A) Covered structures whose primary occupancy is public assembly with a capacity greater than 300 persons;
 - (B) Buildings with a capacity greater than 250 individuals for every public, private or parochial school through secondary level or child care centers;
 - (C) Buildings for colleges or adult education schools with a capacity greater than 500 persons;
 - (D) Medical facilities with 50 or more resident, incapacitated patients not included in subparagraphs (A) to (C) of this paragraph;
 - (E) Jails and detention facilities.

Appendix C. Benefit-Cost Methodologies

For Use in Evaluating the Cost Effectiveness of Proposed Hazard Mitigation Measures

1.0 Introduction

This appendix outlines the basic criteria and approach to determining the economic feasibility of natural hazard mitigation measures. Determining the economic feasibility of mitigating natural hazards can be classified according to the type of decision being made and the perspectives of those involved. Examples are included at the end of this appendix.

Developing and evaluating a policy on mandating mitigation of natural hazards is a difficult process. After determining that a sufficient risk exists and that effective mitigation alternatives are possible, knowing whether mitigation is economically feasible is useful in selecting a mitigation plan or strategy. If a public decision is being made, economic feasibility takes on a special definition that differs from economically feasible decisions made in the private sector.

The economic question in the public sector is usually complicated because it involves estimating all of the economic benefits and costs, regardless of to whom they shall accrue. Economic benefits and costs are defined as true changes in economic efficiency. Economists have developed methods to evaluate the economic feasibility of public decisions. One such benefit-cost analysis procedure was prepared for and published by the Federal Emergency Management Agency (FEMA). These models were developed in conjunction with industry economists, engineers and public officials. They are generally accepted when making decisions regarding mitigating natural hazards.

The selection of mitigation projects to be funded can be made using three criteria: 1) maximum present value, 2) benefit-cost ratio, and 3) internal rate of return. Information on using the first two criteria result from a properly structured benefit-cost analysis.

The Maximum Present Value Criterion

The maximum present value criterion states that the optimal investment strategy is to select the set of projects that maximizes present value of future expenditures subject to the available budget. In benefit-cost analysis, those projects with the greatest benefits minus costs calculates this value. All projects or public investment alternatives must be evaluated simultaneously in this procedure.

Benefit/Cost Ratio

Selecting projects for public investment using the benefit-cost ratio criteria is similar to the maximum present value criterion if unlimited funds are available. The set of projects where benefits exceed costs would be the same as the projects selected by using the maximizing present value criterion.

Internal Rate of Return

The internal rate of return for a project or set of projects is that rate of discount that yields a present value of zero. This criterion yields the same results as the maximum present value criterion if capital is unlimited. If the supply of capital is limited, optimal project selection is attained by selecting those projects with the highest internal rate of return.

2.0 Benefit-Cost Models

Mandating specific standards to mitigate natural hazards in new construction represents a cost to building/land owners with a substantial portion of the benefits to be realized by the public. The decision to adopt new regulations and standards requires a formal benefit-cost analysis. The FEMA models were developed to provide this analysis.

Mandating the Mitigation of Privately Owned Buildings/Land

The FEMA benefit-cost model was to aid local, county and state planners in determining the economic feasibility of seismic rehabilitation programs. The model estimates the expected net present value of benefits of seismic rehabilitation derived from the following parameters:

- Building damages prevented
- Rental losses avoided
- Relocation expenses avoided
- Personal and proprietors' income losses avoided
- Business inventory damages prevented
- Personal property losses prevented.
- Value of casualties avoided

Procedures were developed to analyze a single building or a building inventory. The model was the result of an extensive two year research and development project. The model was also extensively tested. Nine seismic rehabilitation projects located in different cities throughout the country were analyzed using the single building model. An inventory of 67 Seattle-area buildings was analyzed.

Mandating the Mitigation of Publicly Owned Buildings

It may seem appropriate for public agencies to use full benefit-cost analysis to make decisions regarding rehabilitation, but that is usually not the case. Agencies commonly include only those benefits and costs that the agency is responsible for, and they tend to exclude those that are the responsibilities of other agencies or the private sector. When an agency is directed to perform a full benefit-cost calculation, the full range of each is considered. With this objective in mind, FEMA developed a benefit-cost model for publicly-owned buildings based on the earlier benefit-cost model for privately-owned buildings. The publicly-owned buildings model includes the value of avoiding lost public services.

The model provides a procedure of evaluating lost public services based on the quasi-willingness to pay principal. Data on the cost of service, payroll, and a post earthquake continuity premium are used to estimate the value of lost public services.

Public Cost Sharing of Mitigating Natural Hazards

The type of decision dictates the nature of the decision process. The first case is when the agency is faced with meeting established mitigation or construction standards. In those cases, the appropriate decision is a cost effectiveness analysis. The decision process objective cannot vary; the total benefits of the action, both public and private, have been implicitly embodied into the regulation or standard. The only issue for the agency to address is to select the best alternative to comply with the process goals. The decision process involves determining and estimating the costs to the agency of those alternatives. The alternative with the least cost to the agency is usually selected. The agency must decide whether the benefits of mitigation exceed the costs if no regulation or standard is requiring the

construction. The benefits in this case are the present value of the reduction in expected future property losses and downtime and disruption due to natural hazards and any other collateral benefits that may be gained from the construction, such as improved public services. The costs are the present value of all additional capital, operating and maintenance costs of the proposed project.

3.0 Mitigation Decisions

Investing by the private sector in a mitigation measure may occur on the basis of one or two reasons. First, it may be mandated by a regulation or standard, or second, it may be economically justified on its own merits.

Conforming to a Mitigation Standard

A building owner, be it a private entity or public agency, having to conform to a mandated standard may consider the following options:

1. Employ resources to change the standard as it relates to the owner's situation,
2. Request cost-sharing from public agencies,
3. Dispose of the building either by sale or demolition,
4. Change the designated use of the building to change the mitigation compliance requirement,
or
5. Evaluate the feasible alternatives to meet the standard and initiate the least-cost mitigation scheme.

The optimal decision will be made on the basis of selecting the most "cost effective" alternative that often can also be termed the "least-cost alternative".

Example: California's real estate disclosure laws (Civil Code, Section 1102 *et seq.*) require sellers of real property to disclose known defects and deficiencies in the property, including earthquake weaknesses and hazards, to prospective purchasers. The seller must also disclose whether the property is located in an earthquake fault rupture zone. To comply with this law, you must disclose if your building has any of the design or construction flaws that will increase the risk of seismic damages.

Correcting some of these deficiencies is expensive and time consuming, but their existence can prevent the sale of the building. The law does not require either the seller or the buyer to correct the deficiencies. Therefore, the conditions of the sale regarding the deficiencies and the price of the building can be negotiated between the buyer and the seller. The economic decision to rehabilitate the structure would be based on an accurate estimate of the risk and the effectiveness of the project.

Mitigating Natural Hazards: The Private Decision

A building owner may also decide to reduce the risk of natural hazard based only on economic criteria. This decision is usually based on the results of an investment or capital budgeting analysis.

Owners deciding the economic feasibility of mitigation should consider the reductions in physical damages and financial losses. A partial list of avoided future losses follows:

1. Building damages
2. Building contents damage
3. Business inventory damages
4. Rental income losses
5. Relocation and disruption expenses
6. Proprietor's income losses

First, these can be estimated using observed prices, costs and engineering data. The difficult part is to correctly determine the effectiveness of the mitigation and the resulting reduction in future damages and losses.

Second, the damages and losses should include those that will be borne only by the owner. Also, the salvage value of the investment can be important in determining economic feasibility. Salvage value becomes more important as the owner's time horizon declines.

4.0 The Costs of Mitigation

Mitigation projects have initial investment costs and recurring costs over the period of the investment. The project may also deteriorate (or be subject to destruction) over the relevant time horizon. The expected loss of the investment is approximated by multiplying the annual probability of destroying the investment times the value of the investment. Estimating deterioration can be captured by using normal depreciation schedules.

The following example benefit-cost analyses have been taken from *How to Determine Cost-Effectiveness of Hazard Mitigation Projects*, Interim Edition, December 1996, Mitigation Directorate, Federal Emergency Management Agency, Washington, DC.

The following example, *Table 11. Limited Data Module for Riverine Flooding*, shows an example benefit-cost analysis for a road culvert replacement project.

The following example, *Table 13. Full Data Module Printout for Riverine Flooding*, is for a flood hazard mitigation project to acquire and demolish structures subject to repetitive flood losses.

The following example, *Table 19. The Full Data Module Printout—Structural*, is for an earthquake hazard mitigation project to improve the resistance of an existing building's structural element.

Recognizing that some projects nearly always are cost-effective, the Federal Emergency Management Agency (FEMA) issued guidance to eliminate the need for conducting benefit-cost analyses for the types of mitigation projects listed.

Appendix D. 2003 Salem Natural Hazards Mitigation Plan Action Items

This appendix includes all the action items found in the 2003 Salem Natural Hazard Mitigation Plan and describes their level of completion, or action item status. The 2003 Mitigation Plan included 17 action items at various levels of completion, and many of the action items had several smaller actions included in their framework. To organize the different action item components for the 2008 update process, the Partnership incorporated the 17 action items into action item worksheets. The “Proposed Action Item” field includes the main title of the action item, and those actions with smaller action items in their framework are included in the “Ideas for Implementation” field. The action item status field details the level of completion for each action item, and if included in the form, for each idea for implementation. Also, since the worksheets were developed separately from the original 17 action items, there are blank fields in most of the forms.

For every mitigation plan five-year plan update, FEMA requires that communities identify which action items have been completed or not completed. If not completed, communities must explain why and whether or not the action will be continued, deferred, or deleted. The Salem Natural Hazards Mitigation Committee, together with the Partnership, reviewed each 2003 action item and discussed their status. For those actions that have not been completed, the Committee discussed whether the action should be kept, deferred, or deleted. The final status of each action item is included in the “Action Item Status” field of the worksheet, and those that are being kept include a reference to a new action in Section 5 of the Salem Natural Hazards Mitigation Plan.

CITY POLICY ACTION # 1

Proposed Action Item:		Alignment with Plan Goals	
Accept the Natural Hazards Mitigation Plan.			
Rationale for Proposed Action Item:			
Ideas for Implementation:			
Lead Agency:		Salem City Council	
Internal Partners:		External Partners:	
City of Salem departments			
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
Summer of 2002			
Form Submitted by:		Technical Advisory Committee	
Action Item Status:			
Completed and addressed in the 2008 NHMP Plan Update.			
Salem City Council adopted the plan in 2002.			
See PLAN IMPLEMENTATION ACTION #1 in 2008 NHMP Plan Update.			

CITY POLICY ACTION #2

Proposed Action Item:		Alignment with Plan Goals	
Designate a standing Mitigation Coordinating Committee (MCC).			
Rationale for Proposed Action Item:			
Ideas for Implementation:			
<p>1) The MCC will be a technical committee made up of staff from city departments, other agencies and private sector experts (such as businesses, academia, and other private and non-profit interests).</p> <p>The Committee should be charged with:</p> <p>2) Coordinating the implementation of this Natural Hazard Mitigation Plan, 3) Monitoring progress in implementing the Plan, 4) Setting priorities among competing action items, 5) Working with each department in the development of a work plan and budgeting of each of the action items as prioritized by the Committee, 6) Coordinating the Plan and its implementation with relevant city, county and state plans and city, state and federal regulations. 7) Submitting an annual progress report to the Environmental Commission, Planning Commission and City Council, 8) Recommending changes needed to this Plan as community needs evolve, and Incorporating hazard assessment/mitigation goals into all City activities.</p>			
Lead Agency:		Community Development Department in partnership with other stakeholders represented on the Technical Advisory Committee.	
Internal Partners:		External Partners:	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
Winter of 2003			
Form Submitted by:		Technical Advisory Committee	
Action Item Status:			
<p>Completed Action Item, new committee established in the 2008 NHMP Plan Update.</p> <p>Since the adoption of the NHMP, the Mitigation Coordinating Committee has met twice; September 9, 2005 and April 4, 2006. Responsibilities of Mitigation Coordinating Committee are ongoing.</p> <p>Changes to the Mitigation Coordinating Committee members and responsibilities are included in the 2008 NHMP Plan Update. See section 1.5 PLAN IMPLEMENTATION and PLAN IMPLEMENTATION ACTION #3.</p>			

MITIGATION PLAN IMPLEMENTATION ACTION # 3

Proposed Action Item:		Alignment with Plan Goals:	
Meet with the Capitol Planning Commission.			
Rationale for Proposed Action Item:			
Determine what roles the Capitol Planning Commission plays in mitigating natural hazards, especially for State of Oregon properties or others in Salem for which it has jurisdiction.			
Ideas for Implementation:			
Lead Agency:		Community Development Department	
Internal Partners:		External Partners:	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
Within 6 months of accepting plan			
Form Submitted by:		Technical Advisory Committee	
Action Item Status:			
<p>Not completed and addressed in the 2008 NHMP Plan Update.</p> <p>The Capital Planning Commission has dissolved and is now called the Capital Projects Advisory Board.</p> <p>See MULTI-HAZARD ACTION # 1 in 2008 NHMP Plan Update.</p>			

MITIGATION PLAN IMPLEMENTATION ACTION # 4

Proposed Action Item:		Alignment with Plan Goals:	
Update “All-Hazards” Ranking.			
Rationale for Proposed Action Item:			
Better identify the primary hazards of concern to the citizens of the Salem area			
Ideas for Implementation:			
<p>1) Obtain additional input from stakeholders (cities, counties, citizens, businesses, and others) on the “All-Hazards” ranking (see Section 4.3). Input can be solicited through ongoing meetings of the Natural Hazards Mitigation Coordinating Committee, the Salem Futures process, and other venues.</p> <p>2) For comparison purposes, consider conducting a hazard ranking issue using the “Hazard Analysis” system used by the Office of Emergency Management (Oregon State Police) in conjunction with Oregon counties (see Section 6.0 of the NHMP for a reference).</p>			
Lead Agency:		Community Development Department and Fire Department	
Internal Partners:		External Partners:	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
TBD			
Form Submitted by:	Technical Advisory Committee		
Action Item Status:			
<p>Not completed and addressed in the 2008 NHMP Plan Update.</p> <p>1) Not completed. The “All-Hazards” Ranking was updated by the Salem Natural Hazards Mitigation Committee in the 2008 NHMP Update process. See 1.4 PLANNING PROCESS SUMMARIZED and Section 4.0 ALL-HAZARDS RISK ASSESSMENT of the 2008 NHMP Update.</p> <p>2) Not completed. In the future, the “All-Hazards” Ranking will be updated annually by the Salem Natural Hazards Mitigation Committee. See Section 1.6 PLAN MAINTENANCE and the PLAN IMPLEMENTATION ACTION #3.</p>			

MITIGATION PLAN IMPLEMENTATION ACTION # 5

Proposed Action Item:		Alignment with Plan Goals:	
Refine Existing Hazards Mapping Consider additional research and mapping to better define hazards and property at risk.			
Rationale for Proposed Action Item:			
Any mapping of critical facilities and infrastructure should give due consideration to potential security ramifications. Consider aggregating data as appropriate to protect critical facilities and/or site-specific property data.			
Ideas for Implementation:			
<ol style="list-style-type: none"> 1) Include mapping that addresses pathways for volcanic mudflows, areas impacted by a catastrophic failure of the Detroit Dam and other dams or large above-ground reservoirs, areas of landslide risk adjacent to the North Santiam River (upstream of the Geren Island water intake structures), and urban-wildland interface high fire risk areas. 2) Pertinent to hazardous materials concerns, develop a City-wide map of facilities manufacturing, storing, using, transporting, or otherwise handling significant amounts of hazardous materials as a basis for requiring or encouraging owners to prevent spills and other releases. Rank the facilities in terms of the risk of impact following a natural disaster and develop several disaster response scenarios. Incorporate this inventory and ranking into a database for plotting on City of Salem computer generated maps. Incorporate the response scenarios into the current Fire Department training program. 3) OEM’s checklist for local mitigation plans includes the need to estimate the type and number of structures within the community at risk for each hazard type, including residences, businesses, critical facilities (hospitals, fire stations, and storage sites for hazardous materials), and infrastructure (e.g., roads and utilities). There also needs to be a map of repetitive flood loss properties (extent of flooding, no evaluation of cost of property damage) and discussion of potential mitigation activities for these properties. 			
Lead Agency:		Community Development Department and Fire Department	
Internal Partners:		External Partners:	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
TBD			
Form Submitted by:		Technical Advisory Committee	
Action Item Status:			
Partially completed and portions addressed in the 2008 NHMP Plan Update <ol style="list-style-type: none"> 1) Partially completed. See MULTI-HAZARD ACTION #2 and LANDSLIDE ACTION #1. 2) Completed through training and enforcement of regulations surrounding the hazardous materials storage and use provisions of the Fire Code. See SECTION 2.1 PRINCIPAL NATURAL HAZARD DESCRIPTIONS and HAZARDOUS MATERIALS ACTION #1. 3) Partially completed. See Maps in SECTION 2.1 PRINCIPAL NATURAL HAZARD DESCRIPTIONS and MULTI-HAZARD ACTION #2 and #10. 			

MITIGATION PLAN IMPLEMENTATION ACTION # 6

Proposed Action Item:		Alignment with Plan Goals:	
Develop mitigation plans for facilities at risk & emergency preparedness/response.			
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • Critical facilities play an important role in emergency response and preparedness and should be structurally retrofitted and located in non-hazardous areas to prevent damage from natural hazard events. • The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address existing critical facilities and infrastructure [201.6(c)(3)(ii)]. Developing mitigation actions for critical facilities will protect them from future natural hazard events. 			
Ideas for Implementation:			
<ol style="list-style-type: none"> 1) The City should continue to contact each of the identified facilities to: Develop a list of contacts and telephone numbers, determine if they have their own emergency response plans, determine any special coordination that will be needed during a disaster, and reminder contacts should be made and the list should be updated at least annually 2) The City should develop an electronic map-database containing the Fire Department's list of critical and other facilities at risk so the data is readily accessible to all City and other personnel responding to a disaster. This information should be combined with mapped hazards. Each of these facilities should be evaluated for its' survivability following a single and compound disaster. 3) The City should consolidate and refine existing lists of facilities subject to a single or compound natural hazard event into a single electronic map-database so that the data is readily accessible to all City and other personnel responding to a disaster. This information should be combined with mapped hazards. Each critical facility should be evaluated for its' survivability following a single and compound disaster. Public Works department notes that completing this action would be a multi-year work item subject to funding in the annual budget. 			
Lead Agency:		Fire Department and Public Works Department	
Internal Partners:		External Partners:	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
TBD			
Form Submitted by:	Technical Advisory Committee		
Action Item Status:			
<p>Partially completed and portions addressed in the 2008 NHMP Plan Update. The City of Salem received a Pre-Disaster Mitigation Grant for Fire Station Seismic Retrofits in 2007 totaling \$1.03 million.</p> <ol style="list-style-type: none"> 1) Partially completed. MULTI-HAZARD ACTION #3. 2) Not completed. See MULTI-HAZARD ACTION #4. 3) Partially completed. MULTI-HAZARD ACTION #4. <p>Portions not completed due to data and resource limitations.</p>			

MITIGATION PLAN IMPLEMENTATION ACTION # 7

Proposed Action Item:		Alignment with Plan Goals:	
Public Outreach Inform the public about the benefits of hazard mitigation			
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • Informing the public about hazard mitigation will help enable the public to implement mitigation measures and protect lives. 			
Ideas for Implementation:			
<ol style="list-style-type: none"> 1) Use city programs providing loans for housing rehabilitation (e.g., Homeowner Rehabilitation Loan Program) as a means to provide public outreach on appropriate hazard protection and retrofitting measures. The City could support this by, for example, holding seminars and providing simple example mitigation diagrams and instructions. 2) Present the Natural Hazard Mitigation Plan at neighborhood association meetings. 3) Develop an updateable database of names, phone numbers, etc. of all stakeholders (cities, counties, citizens, businesses, and others) involved in planning for and responding to natural disasters. 4) Expand publicity on the availability of hazard data for any address. Develop generic handouts that explain the data, its shortcomings, and how to obtain more accurate data on any particular site. The handouts should also describe appropriate protection and retrofitting measures and where more information on them can be obtained. 5) Inventory properties located within high hazard areas and inform property owners of the limited ability to obtain natural disaster insurance. 6) The City should work with and encourage local real estate trade associations to prepare a handout advising property buyers about the variety of possible hazards and where to get locally available information about a property's exposure to these hazards. 7) Consider revising the Salem Revised Code (SRC) to include the need for owner disclosure and recording of known natural hazards in a fashion similar to that required in the landslide ordinance. 8) Include a copy of the NHMP and any future updates as an additional Annex to the City's Emergency Management Plan (EMP). 			
Lead Agency:		Community Development Department and Fire Department	
Internal Partners:		External Partners:	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
TBD			
Form Submitted by:		Technical Advisory Committee	

MITIGATION PLAN IMPLEMENTATION ACTION # 7 (CON'T.)

Action Item Status:

Partially completed and portions are addressed in the 2008 NHMP Update.

- 1) Not completed due to resource limitations. See MULTI-HAZARD ACTION #5.**
- 2) Completed and ongoing. See section 1.6.1 CONTINUED PUBLIC INVOLVEMENT.**
- 3) Completed and ongoing. See 1.6.1 CONTINUED PUBLIC INVOLVEMENT and MULTI-HAZARD ACTION #5.**
- 4) Completed and ongoing. See 1.6.1 CONTINUED PUBLIC INVOLVEMENT and MULTI-HAZARD ACTION #5.**
- 5) Completed for flood hazard and ongoing for other hazards. See 1.6.1 CONTINUED PUBLIC INVOLVEMENT and MULTI-HAZARD ACTION #5. Also, city sends out annual letter to homeowners in floodplain.**
- 6) Not completed due to resource limitations. See MULTI-HAZARD ACTION #5**
- 7) Not completed. The Salem Natural Hazards Mitigation Committee decided that these items do not fit into the scope of the NHMP.**
- 8) Not completed. See MULTI-HAZARD ACTION #7.**

MITIGATION PLAN IMPLEMENTATION ACTION # 8

Proposed Action Item:		Alignment with Plan Goals:	
Disaster Awareness/Warning			
The City should research and review the feasibility of disaster awareness/warning measures in consultation with the National Weather Service and/or other agencies involved in warnings.			
Rationale for Proposed Action Item:			
Ideas for Implementation:			
<ol style="list-style-type: none"> 1) Installing other stream gauges on the Willamette River, North Santiam River, and Pringle/Mill Creeks, building on the expanded urban stream monitoring system already being implemented by the City pursuant to the Stormwater Master Plan. 2) Performing a benefit/cost analysis of a local flood warning system on local creeks – an analysis that is consistent with the recently adopted Stormwater Master Plan and the Corps of Engineers (COE) Section 205 Flood Damage Reduction Study for Mill Creek, and 3) Developing a general landslide awareness program based on monitoring soil saturation and rain forecasts (e.g. press release associated with extended period of rain). 			
Lead Agency:		Fire Department, Community Development Department, & Public Works Department	
Internal Partners:		External Partners:	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
TBD			
Form Submitted by:		Technical Advisory Committee	
Action Item Status:			
Partially completed and portions are deferred to the 2008 NHMP Update.			
<ol style="list-style-type: none"> 1) Completed and further actions addressed in 2008 NHMP Update. See FLOOD ACTION #1. 2) Partially completed and in progress. Coordinate with the National Flood Insurance Program's (NFIP) Community Rating System (CRS). See FLOOD ACTION #5. 3) Completed and ongoing. See LANDSLIDE ACTION #2. 			

MITIGATION PLAN IMPLEMENTATION ACTION # 9

Proposed Action Item:		Alignment with Plan Goals:	
Disaster Response - the City should continue to update its Emergency Management Plan (EMP).			
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> Disaster response is an important component to natural hazards planning that can save lives and property during a natural disaster. Coordinating disaster response efforts with the mitigation plan will ensure that the plan remains relevant to the larger community. 			
Ideas for Implementation:			
<ol style="list-style-type: none"> The revised plan should include current resource lists and Emergency Operations Plan (EOP) annexes for each of the hazards discussed in this report. It should utilize the latest GIS mapping available and include a flood stage forecast map that relates the potential inundation areas and damage to specific flood forecasts. A list of appropriate response steps should be included for each flood stage level. Perhaps the EOP should also include the potential for hazardous materials spills. Additional guidelines can be found in FEMA's Community Rating System publications. The updated EOP should include a post-disaster recovery and mitigation annex/appendix with procedures that encourage property owners to incorporate retrofitting and mitigation measures and identifies where outside financial assistance would help. Guidance for this effort is available through FEMA and the Oregon State Police, Office of Emergency Management. The City should maintain liaison with the Oregon State Military Department, Office of Emergency Management with the intent of keeping informed about federal and state laws and regulations governing all aspects of post-disaster recovery and mitigation. 			
Lead Agency:		Fire Department, Community Development Department, & Public Works Department	
Internal Partners:		External Partners:	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
TBD			
Form Submitted by:		Technical Advisory Committee	
Action Item Status:			
Partially completed and portions are deferred to the 2008 NHMP Update.			
<ol style="list-style-type: none"> Completed. Completed. Not completed due to resource limitations. See MULTI-HAZARD ACTION # 7. Completed and ongoing. See MULTI-HAZARD ACTION # 8. 			

MITIGATION PLAN IMPLEMENTATION ACTION # 10

Proposed Action Item:		Alignment with Plan Goals:	
Development Planning/Design/Permitting/Maintenance			
Review the subdivision, zoning and other ordinances, and permit review procedures to determine what changes, if any, are needed to reduce or prevent losses from future natural hazards events.			
Rationale for Proposed Action Item:			
Ideas for Implementation:			
<ol style="list-style-type: none"> 1) Future development should be moved away from identified/mapped high hazard areas and/or transferring development rights from high hazard areas to safer areas, especially in those areas where the risk to people and property cannot be mitigated. 2) Encourage landowners in the UGB to provide set-asides for open space or less intensive development. 3) Voluntary (with incentives) seismic upgrades of critical or otherwise essential facilities located in high seismic risk areas. 4) Evaluate a range of mitigation measures (e.g., less flammable building materials, fuel breaks, etc.) to reduce urban-wildland interface fire risk. 5) Broader use of all natural hazard overlays (including a composite-hazard map) to better guide the planning and permit review process. 6) Enhanced use of a watershed approach for new development that includes contributions from upstream development and impact on, for example, Mill Creek as it passes through Salem. 			
Lead Agency:		Community Development Department (Planning and Building & Safety Divisions), Fire Department, and Public Works Department	
Internal Partners:		External Partners:	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
TBD			
Form Submitted by:		Technical Advisory Committee	
Action Item Status:			
<p>Partially completed and portions are deferred to the 2008 NHMP Update.</p> <ol style="list-style-type: none"> 1) Not completed and will be addressed when the Salem Zoning Code is updated. See MULTI-HAZARD ACTION # 9. 2) Completed and ongoing. See MULTI-HAZARD ACTION # 9 and FLOOD ACTION #2. 3) Not completed and will be deleted. The Salem Natural Hazards Mitigation Committee decided that this item does not fit into the scope of the NHMP. See EARTHQUAKE ACTION #1. 4) Completed and will be deleted. This item is done by the Fire Department. See WILDFIRE ACTION #1. 5) Completed and ongoing. See MULTI-HAZARD ACTION # 10. 6) Completed and will be deleted. This item is addressed in the Stormwater Master Plan. See FLOOD ACTION #3. 			

MITIGATION PLAN IMPLEMENTATION ACTION # 11

Proposed Action Item:		Alignment with Plan Goals:	
Capital Improvement Programs (CIPs): Build on existing hazard mitigation efforts with the goal of improving the planning/budgeting process such that CIPs continue to contribute to hazard mitigation.			
Rationale for Proposed Action Item:			
Ideas for Implementation:			
Possible measures to evaluate include securing hazardous areas for low risk uses: <ol style="list-style-type: none"> 1. Realigning or replacing roads and utilities when feasible in the course of regularly scheduled replacement 2. Strengthening or replacing unsafe public structures (especially facilities critical to disaster and post-disaster planning/response) 3. Prescribing standards for the design and construction of new public facilities in high hazard areas. 4. Suggested projects include those related to flood damage reduction, seismic upgrades of “critical” and “non-critical” but essential public facilities, and retrofitting/relocation of structures in landslide prone areas. 			
Lead Agency:		Public Works Department, Fire Department, Police Department, and Community Development Department	
Internal Partners:		External Partners:	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
TBD			
Form Submitted by:		Technical Advisory Committee	
Action Item Status:			
Partially completed and portions are deferred to the 2008 NHMP Update. <ol style="list-style-type: none"> 1) Completed for some areas and is ongoing. See MULTI-HAZARD ACTION #1. 2) Completed for some buildings including Fire Station, Civic Center, Emergency Operations Building and is ongoing. See MULTI-HAZARD ACTION #11. 3) Completed for some sites and is ongoing. See MULTI-HAZARD ACTION #12. 4) Completed for some areas and is ongoing. See FLOOD ACTION #1, EARTHQUAKE ACTION #2, and LANDSLIDE ACTION #3. 			

MITIGATION PLAN IMPLEMENTATION ACTION # 12

Proposed Action Item:		Alignment with Plan Goals:	
Implement recommendations presented in the Stormwater Master Plan (SMP)			
Rationale for Proposed Action Item:			
These recommendations relate to review of policy and over 200 project-specific measures to better manage stormwater quantity/quality and flooding.			
Ideas for Implementation:			
Lead Agency:		Public Works Department	
Internal Partners:		External Partners:	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
TBD	<u>5 years</u>		
Form Submitted by:		Technical Advisory Committee	
Action Item Status:			
Completed and ongoing. See FLOOD ACTION #3 in the 2008 NHMP Update.			

MITIGATION PLAN IMPLEMENTATION ACTION # 13

Proposed Action Item:		Alignment with Plan Goals:	
Develop effective farming and forestry practices to reduce the impact of natural hazards such as flooding.			
Rationale for Proposed Action Item:			
Ideas for Implementation:			
Contact the Marion and Polk Soil and Water Conservation Districts to determine the potential for increased flooding due to farming and forestry practices in the various smaller watersheds. If there is a concern, encourage appropriate federal, state and regional agencies to help initiate safer agricultural and forestry practices.			
Lead Agency:		Public Works Department	
Internal Partners:		External Partners:	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
TBD			
Form Submitted by:		Technical Advisory Committee	
Action Item Status:			
Not completed and will be deleted. The Salem Natural Hazards Mitigation Committee decided that the action item was outside of the City of Salem and therefore outside of the scope of the NHMP.			

MITIGATION PLAN IMPLEMENTATION ACTION # 14

Proposed Action Item:		Alignment with Plan Goals:	
Increase Flood “Freeboard” to reduce the impact of flooding.			
Rationale for Proposed Action Item:			
Ideas for Implementation:			
<p>If the current regulated flood elevations are too low, as determined by the City of Salem, consider requiring a higher protection level, rather than waiting for a possible new flood study.</p> <p>Consider a freeboard higher than one foot above the 100-year elevation in areas where past floods (including the 1996 floods) have been higher than the 100-year elevation.</p> <p>Marion County increased the freeboard to 2 feet. Check with the State of Oregon (Department of Land Conservation & Development) on this standard.</p>			
Lead Agency:		Public Works Department	
Internal Partners:		External Partners:	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
TBD			
Form Submitted by:		Technical Advisory Committee	
Action Item Status:			
Not completed due to resource limitations. See FLOOD ACTION #4 in the 2008 NHMP Update.			

MITIGATION PLAN IMPLEMENTATION ACTION # 15

Proposed Action Item:		Alignment with Plan Goals:	
Inventory flood damage to assess how many structures have been damaged by flooding events and which structures are vulnerable.			
Rationale for Proposed Action Item:			
Ideas for Implementation:			
City staff should first check with potential funding sources, including FEMA’s Hazard Mitigation and Flood Mitigation Assistance Grant Programs, to determine the possibility of receiving funds for such an inventory. OEM has a general inventory. If funding is available, consider contacting property owners in order to develop an inventory with a focus on those areas subject to repetitive losses (i.e., two or more losses). If there are no funding sources immediately available, the City should consider maintaining contact with the owners of these properties and contacting them after the next flood or other disaster affects the same area. It is likely that new sources of funding would be available then.			
Lead Agency:		Public Works Department	
Internal Partners:		External Partners:	
Timeline:		If available, estimated cost:	
Short Term (0-2 years)	Long Term (2-4 or more years)		
TBD			
Form Submitted by:		Technical Advisory Committee	
Action Item Status:			
Partially completed and portions are deferred to the 2008 NHMP Update.			
Inventory of structures within the floodplain has been created. Three repetitive flood loss properties have been identified. Mitigation actions need to be identified. See FLOOD ACTION #6.			

MITIGATION PLAN IMPLEMENTATION ACTION # 16

Proposed Action Item:		Alignment with Plan Goals:	
Maintain plan risk assessment.			
Rationale for Proposed Action Item:			
<p>Although many features of a risk assessment have been addressed in preparation of this plan or are included in other Action items presented in this section of the NHMP, new (as of February 2001) draft OEM criteria for the risk assessment component of local plans are presented below (these draft criteria should be reviewed against OEM's Evaluation Criteria Checklist for Local Natural Hazards Mitigation Plan Review, January 2002). Many of these issues have been fully addressed in preparation of this NHMP. Other issues require additional work and should be evaluated and prioritized for implementation by the standing Mitigation Coordinating Committee, taking into consideration competing action items and budgetary considerations.</p>			
Ideas for Implementation:			
<ol style="list-style-type: none"> 1) An estimate of the type and number of structures within the community at risk for each hazard type, including residences, businesses, critical facilities (hospitals, fire stations, and storage sites for hazardous materials), and infrastructure (e.g., roads and utilities). Marion County and the City of Salem are jointly participating in a grant to generate an inventory of unreinforced masonry buildings in Salem. City and County divisions have listings of critical and other essential facilities and infrastructure. Action needed - expand the inventory, add facilities that meet the definitions presented in ORS 455 (see Section 7.3 of this NHMP) and add information to the existing mapping developed. 2) A map and discussion of repetitive flood loss properties and potential mitigation activities for these properties. Action needed – Create map, conduct assessment of mitigation activities, and, describe potential activities to be conducted to ensure compliance with the NFIP including activities designed to reduce the number of NFIP targeted repetitive loss properties. 3) A summary of potential impacts on residents and the economy and an estimation of potential losses for each hazard type. Action needed - Consider preparing an estimate of losses under various hazard or combined hazard scenarios. The COE Section 205 Flood Control Feasibility Study considered this from the Mill Creek flooding perspective and information used in that study can be found in the final February 2002 report. Public Works Department notes that completing this action would be a multi-year work item subject to funding in the annual budget. 4) If not already implemented, audit the effectiveness of existing code as they relate to hazard mitigation. One method referenced in FEMA documents is the Building Code Effectiveness Grading Report (BCEGR). 			
Lead Agency:		Public Works Department (for flooding) and Community Development Department (Building & Safety Division).	
Internal Partners:		External Partners:	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
TBD			
Form Submitted by:		Technical Advisory Committee	

MITIGATION PLAN IMPLEMENTATION ACTION # 16 (CON'T.)

Action Item Status:
<p>Partially completed and portions are deferred to the 2008 NHMP Update.</p> <ol style="list-style-type: none">1) Partially completed. Critical facilities have been inventoried, but un-reinforced masonry buildings have not been identified. See MULTI-HAZARD ACTION #2 and EARTHQUAKE ACTION #1.2) Partially completed. Due to restrictions on the dissemination of information about repetitive flood loss properties, a map will not be completed. Mitigation activities need to be identified. See FLOOD ACTION #5, "Ideas for Implementation."3) Partially completed due to lack of resources. See MULTI-HAZARD ACTION #24) Not completed. The Salem Natural Hazards Mitigation Committee decided they do not have the power to change the building code and see this as outside of the scope of the NHMP.

MITIGATION PLAN IMPLEMENTATION ACTION # 17

Proposed Action Item:		Alignment with Plan Goals:	
Include plan maintenance and implementation measures in the Salem Natural Hazards Mitigation Plan.			
Rationale for Proposed Action Item:			
Reducing future losses from natural hazards is a long-term and complex process. Mitigation begins as early as possible so hazards are avoided, future vulnerability is not increased beyond acceptable risk levels, and feasible corrective actions are taken to reduce existing community vulnerability.			
Ideas for Implementation:			
The MCC should outline a Plan Maintenance Process that: <ol style="list-style-type: none"> 1) Establishes the method and schedule of monitoring, evaluating, and updating the mitigation plan within a three-year cycle, 2) Identifies how the community will maintain public participation in the planning process, and 3) Identifies a process for formal adoption of any plan revisions by the City of Salem. It is suggested that the Process outline and identify methods for obtaining funds to maximize benefits to all citizens within the community. However, this requirement is most important for areas that are State-designated as a "small and impoverished community" (note: Salem does not qualify as such a community). 			
Lead Agency:		Community Development Department	
Internal Partners:		External Partners:	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
TBD			
Form Submitted by:		Technical Advisory Committee	
Action Item Status:			
Completed and deferred with adjustments in the 2008 NHMP Update.			
See section 1.5 PLAN IMPLEMENTATION and PLAN IMPLEMENTATION ACTION #3.			

Appendix E. 2008 Plan Update Memo

This memo describes the changes made to the 2003 Salem Natural Hazards Mitigation Plan (NHMP) for the 2008 update of the Salem Natural Hazard Mitigation Plan. It serves as a record of major changes made for each NHMP section.

Memo

To: Federal Emergency Management Agency (FEMA)

From: Oregon Partnership for Disaster Resilience

Date: June 19, 2008

Re: List of changes to the 2003 Salem NHMP for the 2008 Plan Update

Purpose

This memo describes the changes made to the 2003 Salem Natural Hazards Mitigation Plan (NHMP) for the 2008 update of the Salem Natural Hazard Mitigation Plan. It serves as a record of major changes made for each NHMP section.

Project Background

In February 2008, the City of Salem contracted with the Oregon Partnership for Disaster Resilience (the Partnership) to update the 2003 Salem Natural Hazards Mitigation Plan. The Disaster Mitigation Act of 2000 requires communities to update their mitigation plans every five years to remain eligible for Pre-Disaster Mitigation (PDM) program funding, Flood Mitigation Assistance (FMA) program funding, and Hazard Grant Mitigation Program (HGMP) funding. The Partnership met with members of the Salem Natural Hazards Mitigation Committee (the Committee) to update the City's risk assessment, discuss the plan goals and action items in the 2003 NHMP, develop new goals and action items for the 2008 update, and review all changes made for the 2008 update prior to submittal to FEMA.

The Partnership and the Committee made several major changes to the 2003 NHMP. The major changes are documented and summarized in this memo for each section of the mitigation plan

2008 Update Changes by Section

The sections below only discuss *major* changes made to the 2003 Salem Natural Hazard Mitigation Plan for the 2008 plan update. Major changes include replacement or deletions of large portions of text, changing the location of sections, and new additions to the plan. If there are no sections that are addressed, then it can be assumed sections in the 2008 update are similar to like sections in the 2003 NHMP.

Cover Page and Acknowledgments

1. The Cover Page for the Salem NHMP has been revised to include 2008 update information and the agencies involved in developing the plan update.
2. The Acknowledgments have changed to reflect the participants involved in the 2008 update. The participant list in the 2003 NHMP included representatives of agencies that provided input during the 17 meetings Golder Associates and Robert Olson Associates held to develop the 2003 Salem NHMP. For the 2008 update, members of the original Mitigation Coordinating Committee were invited to participate because they had the most experience with the natural hazards that affected Salem and were involved in previous mitigation planning meetings. The 2008 update built upon information included in the 2003 NHMP, so the majority of the work had been completed and the Committee did not see the need to invite all the original stakeholders for the update process.

Section 1.0 Introduction

Section 1.0 includes an introduction and purpose for the plan, summarizes the process for developing the 2003 NHMP and the 2008 update, identifies City departments responsible for maintaining and implementing the plan, describes procedures for prioritizing projects, and describes procedures for maintaining and reviewing the plan. The major changes in Section 1.0 include the following:

1. **Section 1.2.** “Section 1.2 Hazard Mitigation” was formerly “Section 1.3 Hazard Mitigation” in the 2003 NHMP. Most of Section 1.2 includes new information added by the Partnership and replaces out of date text found in the 2003 NHMP. The new text defines mitigation, gives examples of mitigation strategies, and lists federal programs that communities with mitigation plans are eligible for. These programs include the Pre-Disaster Mitigation (PDM) Program, the Flood Mitigation Assistance (FMA) Program, and the Hazard Mitigation Grant Program (HMGP).
2. **Section 1.3.** “Section 1.3 City of Salem” was formerly “Section 1.5 City of Salem” in the 2003 NHMP. The Committee updated the plans and programs in Section 1.3 for the 2008 update, omitting plans that were no longer relevant and including new plans and programs developed since 2003.
3. **Section 1.4.** “Section 1.4 Planning Process Summarized” was revised to include a summary of the planning process for the 2003 NHMP and the 2008 update. Section 1.4.1 combines sections “1.4.2 Technical Advisory Committee” and “1.4.3 Community Involvement” of the 2003 NHMP, and includes meetings the Mitigation Coordinating Committee held since 2003. “Section 1.4.2 Development of the 2008 Salem NHMP Update” is new information added to the plan describing the 2008 update process.
4. **Section 1.5.** “Section 1.5 Plan Implementation” is a new section added to the 2008 update. 1.5.1 identifies the Plan convener, 1.5.2 identifies Coordinating Body members and their responsibilities, and 1.5.3 Project Prioritization discusses the project prioritization process and summarizes the STAPLE/E approach, which is discussed further in Appendix B. Elements of Section 1.5 were addressed in the 2003 NHMP in Actions 2 and 17, but the Plan did not have a comprehensive section that discussed who was responsible for the Plan and how projects would be prioritized.
5. **Section 1.6.** “Section 1.6 Plan Maintenance” is a new section added to the 2008 update. Section 1.6 discusses who will be responsible for implementing the plan; section 1.6.1 discusses how the public would continue to be included in updating the Salem NHMP; section 1.6.2 discusses the Five-Year Review process. The 2003 NHMP had maintenance information included as Action # 17, but did not clearly delineate how the plan would be updated and what the maintenance process would be. However, some of the information included in Action # 17 has been incorporated into Section 1.6.
6. **Section 1.7.** “Section 1.7 Natural Hazard Mitigation Plan Components” was originally included in the 2003 NHMP, but changed for the update to reflect the 2008 NHMP structure. The major changes include content in Section 4.0 which discussed General Mitigation Measures in the 2003 NHMP, but now includes the Risk Assessment, and Section 5 which now includes new action items developed for the 2008 update.

Section 1.0 Deletions

For the 2008 update, several sections from the 2003 NHMP have been removed because of outdated information or because they are no longer relevant to the 2008 update. The removed sections are the following:

1. Quote from former Mayor Swaim located above “Section 1.0 Introduction” deleted.
2. “Section 1.2 The Planning Context” found in the 2003 NHMP discussed the Salem Futures Project that was being developed in 2003. However, since Salem Futures is no longer in existence, the Salem Natural Hazard Mitigation Committee recommended that references to the project be removed.

Section 2.0 Natural Hazards

Section 2.0 “Natural Hazards” discusses the prominent natural hazards that affect the State of Oregon and the City of Salem and which hazards have been mapped. This section discusses flood, earthquake, landslide, severe weather, urban-wildland interface fire, volcano, drought, and hazardous materials. For 2008 update, most of the changes involved adding new information relevant to the City of Salem. The changes made to each section include the following:

1. **Section 2.1.1 Flood Hazard.** For the 2008 update, additional information was added to this section to discuss how flood hazards affect the City of Salem, information on the Community Rating System, and how many structures, by zone, are located in the floodplain.
2. **Section 2.1.2 Earthquake Hazard.** For the 2008 update, additional information was added to this section to discuss how earthquake hazards affect the City of Salem.
3. **Section 2.1.3 Landslide Hazard.** For the 2008 update, information gathered from the March 19, 2008 hazard identification meeting was added to the landslide hazard section.
4. **Section 2.1.4 Severe Weather.** The Severe Weather Hazard Section had recent information relating to severe weather in the City of Salem added to it. The information came from the NOAA Climatic Data Center and information from the March 19, 2008 hazard identification meeting.
5. **Section 2.1.5 Urban Wildland Interface Fire Hazard.** For the 2008 update, information gathered from conversations with Salem Fire Department staff was added to this section.
6. **Section 2.1.6 Volcano Eruption Hazard.** Additional information about volcanic eruptions from Mount Hood and Mount Jefferson and their impact on the City of Salem included in this section.
7. **Section 2.1.7 Drought Hazard.** The 2003 NHMP did not include drought. The Salem Natural Hazard Mitigation Committee decided to include the drought hazard in the 2008 update. The Partnership added information about drought as it relates to Oregon and the City of Salem.
8. **Section 2.1.8 Hazardous Materials.** The 2003 NHMP included information on hazardous materials. The 2008 update also included hazardous materials information, but added additional information gathered from the March 19, 2008 hazard identification meeting.
9. **Section 2.2 Mapped Hazards.** Section 2.2 in the 2003 Salem NHMP discussed mapped hazards and included a “Section 2.2.3 All-Hazards Map” that explained the methodology for developing the “all hazards” map. Only the first part of Section 2.2 was retained for the 2008 update, and Section 2.2.3 was moved to Appendix F Natural Hazard Maps.

Section 2.0 Deletions

The 2003 NHMP included “Section 2.2.1 Hazard Rankings” which described how the committee ranked the natural hazards in the plan. This section was removed from Section 2.0 in the 2008 update, revised, and placed in Section 4.0 as “Section 4.2 Hazard Assessments and Rankings.” Section 4.2 now includes definitions for hazard assessments, describes the methodology for developing the assessments, and how the natural hazards are ranked. See Section 4.2 in this memo for more information.

Section 3. Goals and Objectives

Section 3 discusses the goals and objectives for the Salem NHMP. The 2003 Salem NHMP included the following three goals:

- 1) Lives should be protected.
- 2) Existing properties should be protected.
- 3) Future development should be protected.

Each goal also had its own set of objectives.

For the 2008 update, the Salem Natural Hazard Mitigation Committee, together with the Partnership, revised the goals to read like the following:

- 1) Protect lives.
- 2) Protect existing and future development.
- 3) Increase cooperation and coordination among stakeholders.
- 4) Reduce economic loss.
- 5) Protect the natural environment.

(Objectives to be included here once a decision is made)

Section 4.0 All-Hazards Risk Assessment

Section 4.0 describes the purpose of the Risk Assessment, the methodology and definitions for the probability and vulnerability assessments, and includes a Risk Assessment table that describes the extent, the threat, the hazard history, probability and vulnerability assessments, and the rankings for all the hazards addressed in the Salem NHMP. In the 2003 NHMP, the risk assessment information was in Appendix 7.2, but is now part of Section 4.0.

1. **Section 4.1 Purpose.** Section 4.1 Purpose is an addition made in the 2008 update and describes the purpose of the risk assessment and the hazards addressed by the plan.
2. **Section 4.2 Hazard Assessments and Rankings.** Portions of Section 4.2 are taken from the 2003 NHMP “Section 2.2.1 Hazard Rankings.” Section 4.2 discusses the methodology used for the 2003 NHMP hazard rankings. Information added for the 2008 update includes definitions of vulnerability and probability assessments, a description of how the Committee decided probability and vulnerability assessments, and how natural hazard rankings for the 2008 update were developed.
3. **Section 4.3 Risk Assessment Table.** The format and much of the information found in the risk assessment table is taken directly from the 2003 NHMP. For the 2008 update, several changes were made to update the table. These changes include:
 - Moving the Risk Assessment Table from Appendix 7.2 in the 2003 NHMP to Section 4.0 in the 2008 update. This makes the Risk Assessment part of the plan, rather than an Appendix to the plan.
 - Updated hazard history using information gathered from the March 19, 2008 Salem Natural Hazards Mitigation Committee meeting. Hazards addressed include: Flood, Landslide,

Earthquake, Volcanic Eruption, Severe Wind and Ice Storms, Urban Wildland Interface Fire, and Hazardous Materials.

- Added a column to the table to address the drought hazard.
- Removal of the hazard assessments and rankings found in the 2003 NHMP and replacing them with new probability and vulnerability assessments for the 2008 update. In the 2003 NHMP, the methodology for obtaining the hazard assessment scores was unclear. The 2003 plan also pre-empted assessments completed for the Polk County and Marion County Natural Hazard Mitigation Plans. For the 2008 update, new probability and vulnerability hazard assessments with a clear methodology that are linked with hazard assessments found in the Polk County and Marion County Natural Hazard Mitigation Plans are included. For more information, see Appendix G Public Process.
- Inclusion of new hazard rankings as described in Section 4.2.

Section 4.0 Deletions

In the 2003 Salem NHMP, Section 4 included a description of Mitigation Measures that communities can take to reduce vulnerability of natural hazards, but most of this information has been incorporated into the plan or removed because new additions to the 2008 update made the information redundant. In its place is the Risk Assessment information for the City of Salem. The Sections found in the Section 4.0 of the 2003 NHMP included the following:

- Section 4.0 introductory paragraph;
- “Section 4.1 General Measures Available to Reduce Future Losses;”
- “Section 4.2 Other Considerations” which included 4.2.1 Cost/Benefit Analysis for Hazard Mitigation, 4.2.2 Concurrent Hazards and Compound Disasters, 4.2.3 Multiple Objective Management;
- “Section 4.3 The City of Salem’s Current and Prospective Mitigation Measures.”

Section 4.1 of the 2003 NHMP had information that was largely incorporated into the action items of the 2008 update. As a result, information in Section 4.1 was redundant and removed. Section 4.2.1 Cost/Benefit Analysis and Section 4.2.3 Multiple Objective Management were removed because this information is addressed in Section 1.5.3 Project Prioritization Process and in Appendix B STAPLE/E Approach of the 2008 update,. Finally, Section 4.2.2 Concurrent Hazards and Compound Disasters had information discussed in Section 2.0 of the 2008 update, and was removed. Section 4.3 was removed because this information was included in Section 5.0 Action Items in the 2008 update.

Section 5.0 Mitigation Action Items

Section 5.0 of the 2008 update defines action items and lists the natural hazards they address, explains how action items are coordinated with Existing Plans and Programs, describes the different categories found in the action item worksheets, includes an action item matrix, and lists 33 action items.

1. **Section 5.1 Updated Mitigation Action Items.** Section 5.1 is a new addition to the 2008 update that defines action items and lists the hazards that the action items address.
2. **Section 5.1.1 2008 Action Item Update.** This is a new addition to the 2008 update and describes how the Partnership and the Salem Natural Hazard Mitigation Committee developed the action items for the 2008 update.
3. **Section 5.1.2 Coordination with Existing Plans and Programs.** This section is a new addition to the 2008 update and describes how the Mitigation Plan is coordinated with existing City plans and programs.

4. **Section 5.2 Action Item Worksheets.** Section 5.2 describes action item worksheets and is a new addition to the 2008 update. To organize the different elements of an action item, the Partnership placed all the new action items into action item worksheets. Section 5.2 describes in detail the different action item categories.
5. **Action Item Matrix.** The action item matrix is a new addition in the 2008 update. The matrix summarizes the major elements of each action item and how they relate to the plan's goals.
6. **Action Items.** The 2008 update includes 33 action items. They are a combination of new action items addressing issues committee members identified in the March 19 hazard identification meeting, and action items from the 2003 NHMP that had not yet been completed. The 2003 actions that are included in the update as current action items have been revised as needed. The 2003 action items can be found in Appendix F.

Appendices

The Appendices include supporting information for the Salem NHMP. The 2003 NHMP numbered the appendices as section 7, however for the 2008 update, the appendices were assigned a letter. With the exception of Appendix 7.2, the same appendices found in the 2003 NHMP remain, with some edits made to them. Additional appendices were also added for the 2008 update.

1. **Appendix A. Additional Federal and State Government Mitigation Information.** This appendix was included in the 2003 NHMP as Appendix 7.1 but had outdated information. The Partnership updated names of agencies that had changed, removed references to the 1996 floods and landslides, and removed outdated rules relating to the Disaster Mitigation Act of 2000 that had been updated over the past five years.
2. **Appendix B. STAPLE/E Approach.** Appendix B is an addition to the 2008 update. The 2003 Plan did not include information about the STAPLE/E Approach, which allows committees to quickly evaluate mitigation activities.
3. **Appendix C. ORS 455.477.** Appendix C is an excerpt from ORS 455.477 that regulates certain structures vulnerable to earthquakes and tsunamis. It was included in the 2003 NHMP as Appendix 7.3 and remains in the 2008 update with no changes.
4. **Appendix D. Benefit-Cost Methodologies.** Appendix D describes different methodologies for conducting cost-benefit analyses to evaluate the cost effectiveness of Proposed Hazard Mitigation Measures. Appendix D was included in the 2003 NHMP as Appendix 7.4, and remains in the 2008 update with no changes.
5. **Appendix E. 2003 Salem NHMP Action Items.** Appendix E includes all of the action items from the 2003 NHMP incorporated into action item worksheets. Formerly in Section 5.0 of the 2003 NHMP, the action items as an appendix are a new addition in the 2008 update. The action item worksheets are also an addition to the 2008 update and they help organize different elements of each action item. Included with the worksheets is a status bar indicating whether the action item has been completed or not completed. For those actions that have not been completed, the status bar indicates whether the action will be deleted or incorporated into the update and why. The actions that are incorporated into the 2008 update are referenced in the status bar and located in Section 5.

6. **Appendix F. Natural Hazard Maps.** Appendix F includes maps showing natural hazard impacts in the City of Salem. The 2003 NHMP included maps within the body of the report. However, since the maps are referenced throughout the plan, it made more sense to include them in an appendix. The maps in the 2008 update are similar to the maps in the 2003 NHMP but they include new information, such as urban growth boundary extensions. In addition, Section 2.2.3 “All Hazard Map” found in the 2003 NHMP has been moved to Appendix F because it discusses the methodology for creating the All-Hazard map.
7. **Appendix G. Public Process.** Appendix G documents the announcements, agendas, minutes, and sign-in sheets for meetings regarding implementation, maintenance, and updating of the Salem NHMP. Appendix 7.5 of the 2003 NHMP included a public outreach announcement for the plan and was the only record of a meeting in the 2003 NHMP. Appendix G includes the public outreach announcement, as well as the agendas of meetings that have taken place since 2003, and meeting documents from the 2008 Salem NHMP update.

Appendix F. Public Process

This appendix contains announcements, agendas, minutes, and sign-in sheets documenting the public process that has taken place since the inception of the Salem Natural Hazards Mitigation Plan. As noted in section 1.6.1 Continued Public Involvement, the City of Salem is dedicated to involving the public directly in the reshaping and updating of the Salem Natural Hazards Mitigation Plan. Moving forward, the convener will be responsible for documenting the outcome of the semi-annual meetings in this appendix.

Materials from the following meetings are included in this appendix:

- Hazard Mitigation Open House Announcement, December 15, 1999;
- Technical Advisory Committee Meeting, September 9, 2005
- Technical Advisory Committee Meeting, April 4, 2006
- 2008 NHMP Update Kickoff Meeting, February 15, 2008
- 2008 NHMP Update Meeting, #1, March 19, 2008
- Interview with Joe Parrot, April 16, 2008
- 2008 NHMP Update Meeting, #2, April 30, 2008
- 2008 NHMP Update Meeting, #3, May 22, 2008

Hazard Mitigation Open House*

15 December 1999
4:30 p.m. - 7:00 p.m.

Al Loucks Lecture Hall Auditorium

City Library
585 Liberty St. SE
Salem, Oregon

AGENDA

Open House----time to browse around and view printed and mapped materials and ask questions of Salem staff and Golder and Associates personnel (consultants for the project).

- **5:30 p.m.** Brief presentation on background, purpose of study, schedule, review of written and mapped material, together with questions, comments, and suggestions.
 - Introductions — Cecilia DeSantis Urbani
 - Purpose of Study and Schedule — Curt Schneider
 - Present Hazard Information Working Paper #1 — Golder and Associates
 - Questions and Answers — Golder and Associates and Salem staff
- Open House continues
- Adjourn

*Purpose of the Open House is to present: (1) area hazards inventory information and mapping (HIP #1) available to the public; (2) receive feedback as to the inventory information; and (3) to seek any comments citizens may have on goals, objectives and direction the study should follow (within the constraints of the grant).

CECE
CHUCK B
STEVE DANIS
M GONZALEZ
RS STEVENSON

AGENDA

NATURAL HAZARDS MITIGATION Workgroup

*EMAIL
LINK

September 9, 2005 - 1330 - 1430

LOCATION: PW Salmon Run

1. Additions to the agenda

2. Natural Hazards Mit. Workgroup

- PARKS OPS
- RW FACILITIES ENG (

LEARN (AWARENESS)
RISK--

Stevenson
ALL
AS NECESSARY

3. Make up of Work group

Group

4. Frequency of meetings

MONTHLY

NO 2ND TIME AT
1ST MEAN

3RD TIMES

Group

MINIMUM AT LEAST

TRIP DECEMBER

5. Mitigation Steps

Group

- YOU GUYS ARE GOING TO REVIEW 17 POINTS - KEEP
- IN MIND THE ACTIONS NEEDED FOR FUTURE IMPLEMENTATION
- ACTIVITIES NOTED RE PROGRESS IN GIVEN AREAS

6. Rank Steps

Group

CECE
COMMUNITY BIZ'S - LOAD ASSUMPTIONS
SHOWS SITUATION

7. Adjournment

BUSINESS ARE IMPORTANT THOUGH
POTENTIAL

1438

8. Next meeting:

TBD

AGENDA

NATURAL HAZARDS MITIGATION Workgroup

April 4, 2006 - 1000 - 1100

LOCATION: PW 325

ROSTER

- R. STEVENSON ✓
- P. URBANI ✓
- S. DOWNS ✓
- M. GOTTARBA ✓
- B. KOHMEYER ✓
- K. ROSE ✓
- S. JONATHAN CALLED

1. Action Items - progress?? Follow-up to the Action items in the NHMP

Action 2: Mitigation Coordinating Committee - Designate a standing Mitigation Coordinating Committee (MCC) which will be a technical committee made up of staff from city departments and other agencies. **EXPANDED GROUP - OTHERS?**

(MCC/PAUL KEIZER TURNER)
SOLL WATERS CENTER

Action 3: Capital Planning Commission - Meet with the Capital Planning Commission to determine what roles it plays in mitigating natural hazards, especially for State of Oregon properties or others in Salem for which it has jurisdiction. **DAS**

UPDATING MASTER PLANS - VICKI HOWARD -

Lead agency: Community Development Department
Deadline: Within 6 months after accepting this plan.

Action 4: Update "All-Hazards" Ranking - Obtain additional input from stakeholders (cities, counties, citizens, businesses, and others) on the "All-Hazards" ranking — **UPDATED RANKING FROM MC/POLK?**

Lead agency: Community Development Department and Fire Department
Deadline: to be determined (tbd)

(RS)

Action 5: Refine Existing Hazards Mapping - Consider additional research and mapping to better define hazards and property at risk. — **CRITICAL INFRASTRUCTURE LAYER - GIS**

Lead Agency: Community Development Department and Fire Department
Deadline: tbd

Action 6: Facilities at Risk & Emergency Preparedness/Response - The City should continue to contact each of the identified facilities to:

1. Develop a list of contacts and telephone numbers,
2. Determine if they have their own emergency response plans,
3. Determine any special coordination that will be needed during a disaster, and

Reminder contacts should be made and the list should be updated at least annually
Lead Agency: Fire Department and Public Works Department
Deadline: tbd

ALSO

Action 7: Public Outreach - Inform the public about the benefits of hazard mitigation. Possible actions include:

Lead agency: Community Development Department and Fire Department (CERT PROGRAM) **LITERATURE NEEDED**
Deadline: tbd
CCE - PLANNING? | PW - AS REQUESTED - WATER LEVELS - PLANNING(?)

Action 8: Disaster Awareness/Warning - The City should research and review the feasibility of the following in consultation with the National Weather Service and/or other agencies involved in warnings.

Lead Agency: Fire Department, Community Development Department, & Public Works Department
Deadline: tbd

PO NOTIONS
CITY WATCH
PUSH NEWS
CITY WEBSITE
ODD HATZ
WEBSITES
ONGOING

Action 9: Disaster Response - The City should continue to update its emergency operations plan. **ONGOING**

Lead agency: Fire Department, Community Development Department, Public Works Department and Police Department
Deadline: tbd

Action 10: Development Planning/Design/Permitting/Maintenance - Review the subdivision, zoning and other ordinances, and permit review procedures to determine what changes, if any, are needed to reduce or prevent losses from future natural hazards events.

Lead Agency: Community Development Department (Planning and Building & Safety Divisions), Fire Department, and Public Works Department
Deadline: tbd

FLOODING - DAMS
SEISMIC STUDS
REPEATED LOSS PROPERTIES
GLENN DAVIS
FIRM MAPS 2003

Action 11: Capital Improvement Plans (CIPs) - Build on existing hazard mitigation efforts with the goal of improving the planning/budgeting process such that CIPs continue to contribute to hazard mitigation.

Lead agency: Public Works Department, Fire Department, Police Department, and Community Development Department
Deadline: tbd

STORM WATER
SEISMIC
BUDGETS

Action 12: SWMP Recommendations - Implement recommendations presented in the Stormwater Master Program Plan (SWMP).

Lead agency: Public Works Department
Deadline: tbd

CIP
REG. DIST. STUDIES
RIVER DOWNS

Action 13: Farming and Forestry Practices - Contact the Marion and Polk Soil and Water Conservation Districts to determine the potential for increased flooding due to farming and forestry practices in the various smaller watersheds.

Lead agency: Public Works Department
Deadline: tbd

MARION CNTY - LITTLE PUDDING
TMDL ISSUES W/
ALSO POLK WC

Action 14: Increase Flood "Freeboard" - If the current regulated flood elevations are too low, as determined by the City of Salem, consider requiring a higher protection level, rather than waiting for a possible new flood study.

Lead agency: Public Works Department
Deadline: tbd

FEMA FIRM MAPS
GENERAL ISLAND PROTECTION
FLOOD INS.

Action 15: Inventory Flood Damage - City staff should first check with potential funding sources, including FEMA's Hazard Mitigation and Flood Mitigation Assistance Grant Programs, to determine the possibility of receiving funds for such an inventory.

Lead agency: Public Works Department
Deadline: tbd

FIRE CRITERIA
SALEM INDUSTRIAL PARK PROJECT (?)

Action 16: Risk Assessment - Although many features of a risk assessment have been addressed in preparation of this plan or are included in other Action items presented in this section of the NHMP, new (as of February 2001) draft OEM criteria for the risk assessment component of local plans are presented below (these draft criteria should be reviewed against OEM's Evaluation Criteria Checklist for Local Natural Hazards Mitigation Plan Review, January 2002).

Lead agency: Public Works Department (for flooding) and Community Development Department (Building & Safety Division).

Deadline: tbd

CAUSED D. SIGRIST

Action 17: Plan Maintenance and Implementation - Reducing future losses from natural hazards is a long-term and complex process. Mitigation begins as early as possible so hazards are avoided, future vulnerability is not increased beyond acceptable risk levels, and feasible corrective actions are taken to reduce existing community vulnerability.

Lead agency: Community Development Department
Deadline: tbd

7. Adjournment

8. Next meeting: JUNE '06

Meeting: Salem Natural Hazard Mitigation Kickoff
Date: February 15, 2008
Time: 10 am to 11 30 am
Location: City of Salem

AGENDA

1. Introductions (5 minutes)
2. Overview of Plan Needs (10 minutes)
3. Clarification of City Responsibilities (10 minutes)
 - a. Notification and Invitation to MCC members for plan update meetings
 - b. Arranging meeting place
 - c. Provide hazard history events and update maps
4. Meeting Representatives (MCC) (10 minutes)
 - a. Any additional stakeholders not previously represented that should be at the table now
 - b. Date for Kickoff meeting
 - c. History of MCC meetings since plan adoption, has plan been used?
5. Community involvement (10 minutes)
 - a. Past community involvement
 - b. Public involvement in update process
6. Vulnerability assessments (10 minutes)
 - a. Are current vulnerability assessments adequate?
 - b. What was the methodology for determining vulnerability assessments?
 - c. How should vulnerability assessments be changed?
7. Probability assessments (10 minutes)
 - d. Inclusion of Marion County probability assessments
8. Next Steps

Meeting: Salem NHMP Update Meeting # 1
Date: March 19, 2008
Time: 9 am to 11 am
Location: Salem

AGENDA

1. Introductions (10 minutes)
2. Project Overview (20 minutes)
 - Partnership for Disaster Resilience information (Krista)
 - 5 Year Update Requirements (Krista)
 - OPDR Recommended Revisions (Gregoor)
3. Hazard Identification and Vulnerability/Probability Assessment (1 hour 20 min)
 - a. Presentation and identification of hazard history and mitigation activities (Nick & Gregoor)
 - i. Flood
 - ii. Landslide
 - iii. Earthquake
 - iv. Volcanic Eruption
 - v. Severe wind & ice storm
 - vi. Urban-Wildland Interface Fire
 - vii. Hazardous Materials Incidents
 - viii. Drought?
4. Next Steps: Goals & Action Items Meeting (Krista) (10 minutes)

Meeting Minutes

Meeting: Salem NHMP Update Meeting # 1

Date: March 19, 2008

Time: 9 am to 11 am

Location: Salem

1. Meeting attendees (Natural Hazards Mitigation Workgroup)

- Roger Stevenson, City of Salem Emergency Management
- Cliff Sabin, Salem Hospital
- Lyle Gembala, Salem Police
- Mike Gotterba, Salem Public Works
- Sara Jondahl, Salem Public Works
- Bruce Bishop, Salem Planning Division
- Ken Boley, City of Salem
- Steve Downs, Salem Public Works
- John Vanderzanden, Marion County Emergency Management

- Krista Dillon, Partnership for Disaster Resilience (PDR)
- Nick Kraemer, PDR
- A. Gregoor Passchier, PDR

2. Project Overview

-Partnership for Disaster Resilience Overview

Oregon Partnership for Disaster Resilience (OPDR) is an applied research center housed at the University of Oregon's Community Service Center and has been hired to work with the City of Salem to update the Salem Natural Hazards Mitigation Plan (NHMP). Communities are required to update their mitigation plans every five years if they want to remain eligible for Federal Pre-Disaster Mitigation (PDM) Funding and Flood Mitigation Assistance (FMA) program funding. Salem's current version of the mitigation plan is set to expire in May 2008.

-5 Year Update Requirements

There are four components communities must address in their mitigation plan updates:

- **Planning process:** Describes the process communities use to review and analyze each section of the plan and how the public remained involved during the plan maintenance process over the previous five years.
- **Risk Assessment:** The risk assessment section addresses and incorporates the following elements:
 1. Newly identified hazards that pose a more significant threat than was previously apparent;
 2. Occurrences of hazards addressed in the previously approved plan;

3. New occurrences of hazard events;
 4. New hazard-related information or hazard information related to profiling hazards, such as Flood Insurance Program maps or studies, HAZUS studies, or reports from other Federal or State agencies that describe location, extent, probability, or previous occurrences of hazards.
 5. Deficiencies identified in the previously approved plan, and if not resolved, must be addressed in the updated plan accompanied by an explanation of why they remain and an updated schedule to resolve the issue.
 6. Updated maps consistent with new hazard information.
 7. Description of any changes, clarifications, or refinements to the overview summary described in the previously approved plan. It shall continue to include, by type of hazard, a general description of the types of structures affected by the hazard.
 8. In addition, the community should take into account the following when updating its vulnerability assessment:
 - Updates to inventories of existing structures in hazard areas, including structures located in annexed areas.
 - Potential impacts of future land development, including areas that may be annexed in the future.
 - New buildings that house special high-risk populations (i.e., elderly, low-income, disabled).
 - Completed mitigation actions that reduce overall vulnerability.
- **Mitigation Strategy:** Reaffirms or updates plan goals based on current conditions, including the completion of mitigation initiatives, an updated or new risk assessment, or changes in State priorities.
 - **Plan Maintenance Process:** Provides an analysis of whether the previously approved plan's method and schedule for monitoring, evaluating, and updating the plan worked, and what elements or processes, if any, were changed; and the method and schedule to be used over the next five years to monitor, evaluate, and update the plan. The updated plan shall describe how the community will involve the public during the plan maintenance process over the next five years.

-Additional OPDR Recommended Revisions

- OPDR found the following additional update needs for the Salem NHMP as per the Local Hazard Mitigation Plan Review Crosswalk used by FEMA to evaluate whether the plan meets requirements set forth by the Disaster Mitigation Act of 2000.
 1. Update the hazard description information and how they affect the City of Salem
 2. Include probability assessments and update vulnerability assessments into the Salem NHMP.
 3. Elaborate on the impacts of the natural hazards on the community.
 4. Include measures for monitoring, updating, and evaluating the plan
 5. Describe how the NHMP will be integrated into existing plans and policies in the City of Salem.

Additional information for the NHMP includes:

1. Updating hazard history
2. Revisiting goals, objectives, and action items.
3. Develop new action items as needed.

- This information will be gathered through three meetings: March 19 (Hazard History), April 30 (Goals and Action Items), May (date tbd, Final Review of Plan Changes)

3. Hazard Identification and Vulnerability/Probability Assessment

PDR staff facilitated a hazard identification workshop with committee members to discuss new hazard events that have occurred since 2003 in the City of Salem. In addition, committee members discussed probability and vulnerability assessments for each natural hazard that will be included in the update natural hazard mitigation plan.

Flood

History

- December 1996 and 1997, localized flooding, especially in Keizer
- Every year there is an opportunity for flooding
- Flooding issues on McGilchrist Avenue & Pringle Road

Mitigation/Improvement Activities

- Salem has Digital FIRM maps
- Salem will be joining the Community Rating System (CRS) program in May as an 8
- Installed a flood alarm system
- Weekly updates on water levels are held in the spring

Projects Completed

- ODOT raised I-5 at Mill Creek to avoid flooding
- Bridge replacements at Mill Creek and Center Street, Shelton at 25th
- Annual stream cleanups and Public Service Announcements help with education and outreach to stop people from throwing waste into the rivers
- Completed road projects to upsize culverts in West Salem
- Salem is experimenting with using Local Improvement Districts to pay for capital improvements in neighborhoods
- Salem has pre-established sandbag areas for the public
-

Plans and Agreements

- There is an evacuation plan in place for the mobile home park
- The City of Salem has mutual aid agreements between other cities, Marion County, and the State.

Stormwater Runoff

- Completed a regional stormwater detention study
- Had extensive public involvement in the development of the stormwater plan
- There is a stormwater design standard
- Salem has a Stormwater Master Plan, completed in 2000
- The Fairview development in Northwest Salem has porous pavements on the 32 acre development to lessen stormwater runoff

-The Hospital has issues with debris piling up in Pringle Creek. They are currently building a new hospital across the street further away from flood issues. New construction ideas include parking on the first floors and building a retention wall along Pringle Creek

Flood Probability/Vulnerability Assessments

Probability-High
Vulnerability-High

Landslide

Hazard History

-2005, South River Road landslide, near S. Owen Street, blocked off traffic to the city, but no homes were damaged.

Mitigation Activities/Improvements

- Heath Street tried to develop a mitigation plan but the homeowners did not buy in to it
- Inclinometers are used to measure movements of hillsides, such as along Heath Street
- Reservoirs are being relocated away from landslide hazards
- Salem has an Erosion Control Program developed in 2001 (SRC 75) and a Landslides Hazard Ordinance developed in 2000 (SRC 69)
- Salem has a Tree Preservation program

Landslide Probability/Vulnerability Assessments

Probability-High
Vulnerability-Medium

Earthquake

Hazard History

No new earthquake hazard history

Mitigation Activities/Improvements

- Reservoirs and pump stations are vulnerable, and some reinforcements are being completed for these
- The fire station was recently upgraded to fit seismic codes
- Community Emergency Response Teams (CERT) currently do outreach activities with neighborhoods, including earthquake information.
- Salem is building a new computer center to meet seismic codes
- The Operations Section (managed by Public Works) has a new Emergency Operations Center (EOC)
- The 911 and EOC moved out of City Hall to a new seismically safe location
- Most unreinforced masonry buildings downtown are being brought up to current code when they are redeveloped
- Bridges are being upgraded to meet seismic codes, nine upgrades completed in the past four years
- The new hospital will be built to seismic standards
- Seven schools are vulnerable to earthquakes and have a high collapse potential. The school district has a construction plan and is working on a bond to complete deferred maintenance and upgrading schools.

Earthquake Probability/Vulnerability Assessments

Probability-High
Vulnerability-High

Volcano

Hazard History

2004 a small eruption on Mt. St. Helens.

Mitigation Activities/Improvements

- Air handling systems at critical facilities are vulnerable to ash infiltration
- There's a pre-treatment facility at the water treatment plant to prevent ash from infiltrating the water.
- An eruption from Mt. Jefferson could present future drinking water issues.

Volcano Probability/Vulnerability Assessments

Probability-Moderate
Vulnerability-Low

Wind and Ice Storms

Hazard History

- In 1968 a large snow event in Salem
- December 2007 had a windstorm, no significant damage
- Snow and ice are annual occasions in the City of Salem, most recent in January 2008

Mitigation Activities/Improvements

- Salem has tree removal programs in place, and utilities are responsible for trimming trees near power lines
- Salem has a City Arborist who helps manage trees on city properties
- Utilities are preferred to be placed underground, but this is not a requirement
- A tree ordinance regulates how trees are maintained
- The new radio tower on Skyline Road is designed for high winds
- Backup generators are installed at critical facilities including the EOC and pump stations in case of a power outage.
- The downtown utility master plan is currently being developed.

Wind and Ice Storm Probability/Vulnerability Assessment

Probability-High
Vulnerability-High

Urban Wildland Interface Fire

Hazard History

- A constant medium-threat level in South Salem, especially around the Salem/Turner area

Mitigation Activities/Improvements

- CWPP completed for Marion County in 2007
- Polk County currently developing a CWPP
- Chief Parrot would have ideas for mitigation activities
- Improve water access to West Salem by taking over Illahe and Orchard Heights private water for fire fighting.

Wildfire Probability/Vulnerability Assessments

Probability-Moderate
Vulnerability-Moderate

Hazardous Materials

Hazard History

- 2004 a gas spill occurred near the Detroit Reservoir
- 1976 a major oil spill occurred at Boise Cascade into the Willamette River
- Trucks and vehicles on I-5 have had spills in the past, Chief Godfrey and Parrot would have a history on events.

Mitigation Activities/Improvements

- A large railroad goes through the Capital area carrying hazardous materials, a potential mitigation action would be to keep people off and away from the railroads
- Hazardous materials spills largely impact transportation

Hazardous Materials Probability/Vulnerability Assessments

Probability-Moderate
Vulnerability-High

Drought

Hazard History

- Summer time, some years with low stream flows.
- Problems occurs when reservoirs dump large quantities of water as they did in 2001

Mitigation Activities/Improvements

- Completing water conservation outreach within the community through the City's Environmental Protection Assistance Program

Drought Probability/Vulnerability Assessments

Probability-Moderate
Vulnerability-Moderate

4. Next Steps: Goals & Action Items Meeting

The next meeting will discuss the goals and action items for the plan, and committee members agreed to meet on April 30 from 9 to 12 at the Salem Emergency Operations Center.

Natural Hazards Mitigation Work Group

Attendance		Location: Salem EOC	3/19/2008	Time: 1400	
First	Last	Agency	Telephone	Email	
ROGER	STEVENS	CITY OF SALEM ENGR	503-763-3331	RSTEVENS@CITYOFSALEM.NET	
Cliff	Sabin	Salem Hospital	503-501-3074	Cliff.Sabin@Salemhospital.org	
Kirsta	Dillon	Partnership UO	541-346-3588	Kirstam@uoregon.edu	
Lyle	GEMBALA	Salem Police	503-588-6026	lgembala@cityofsalem.net	
MIKE	GOTTERBA	PUBLIC WORKS	503 588 6347	mgotterba@cityofsalem.net	
Sara	Jondahl	City Public Works	503 588 6211	Sjondahl@cityofsalem.net	
BRUCE	BISHOP	CITY PLANNING DEPT.	503-588-6173 x759	bbishop@cityofsalem.net	
Gregor	Paszehner	PDR	541-346-0259	adri@uoregon.edu	
Ken	Boley	City of Salem	503-588-6386	KBoley@cityofsalem.net	
Steve	Dennis	Salem Public Works	503-588-6251	Sdennis@cityofsalem.net	
DOITW	VANDERZANDEW	MCEM	503-365-3133	JVanderzanden@CO.MARION.OR.US	

JOE PARROT INTERVIEW SUMMARY-APRIL 16, 2008, 10 AM

WILDFIRE

WILDFIRE HISTORY EVENTS

- most of the fires are brush fires in wild lands on the fringes of Salem and are minor and insignificant, wildfire not considered to be a big risk
- vulnerable areas have been mapped by the Oregon Department of Forestry's Community at Risk Program where they mapped the entire state for areas at risk to wildfires. The red shaded areas are areas with the highest scores
- The most significant wildfire occurrence was 2 years ago with a 14 acre field fire in south Salem by Battle Creek Road south of Keubler, started by fireworks.

VULNERABLE WILDFIRE LOCATIONS AROUND SALEM

- The areas with the highest risk have the highest slopes, the right fuels, and values at risk (meaning valuable property adjacent to wildland areas)
- Areas at risk are indicated on the ODF's Community's at Risk Program maps
- The wildland urban interface areas are within the South Salem Fire Department's jurisdiction

CURRENT AND FUTURE MITIGATION ACTIVITIES

- Currently not doing much mitigation for wildfire
- Future mitigation activities would be limited to educational efforts, which are outlined in the CWPP, such as promoting 100 ft defensible space, fuels modification or reduction, and promoting noncombustible roofs. Currently there are few worries about roofing material.

COMMUNITY WILDFIRE PROTECTION PLANS

- Marion County currently has a wildland urban plan which discusses the Salem area and provides action items for wildfire mitigation.
- The plan largely speaks to the county public education efforts outside of the city

GROWTH AND DEVELOPMENT

Growth and development currently reduce the risk of wildfire events in Salem because they destroy the natural landscape of the area. Salem does not develop in a pattern with isolated homes throughout the forest, but in a more cohesive pattern.

HAZARDOUS MATERIALS

HAZARDOUS MATERIALS HISTORY

- Hazardous materials occur in the City of Salem on a regular basis, they are all over the city all the time
- Will send a report documenting hazardous materials incidents over the past five years

VULNERABLE AREAS

- Trucking routes along I-5 and Highway 20 that run through Salem are vulnerable because there are no restrictions placed on these routes.
- Two railroad lines run through the City of Salem, one to the west is not an issue because they usually haul logs, but the one that runs through downtown Salem near the Capital area are a concern because there are approximately 12,000 cars of hazardous materials that pass through the city each year.
- Fixed facilities with hazardous materials are located throughout the City

MITIGATION ACTIVITIES

CURRENT

- The City enforces the International Fire Code which regulates building construction and activities related to hazardous materials
- Hazardous inspections occur in homes and in businesses
- State has a reporting program that businesses with hazardous materials must discuss, and the Fire Department has the authority to regulate hazardous materials.
- DEQ also has their own program for regulating hazardous materials

FUTURE

- There are mitigation opportunities for alert and warning systems
- The city is in the process of developing a reverse 9-11 system where the city can use GIS to plot areas at risk and make phone calls to affected areas and institute shelter in place to protect people from hazardous materials.
- Emergency Management has been involved in mapping flood prone areas to provide improved warning systems should flood levels rise

IMPACTS OF GROWTH AND DEVELOPMENT

- growth and development increase the consequences of hazardous materials events because as the population grows, the more people are at risk. They are working to a) prevent events from happening through monitoring, b) know what to do if something should happen, and c) have an effective response system in place.

Meeting: Salem NHMP Update Meeting # 2

Date: April 30, 2008

Time: 9 am to 12 pm

Location: Salem Emergency Operations Center

AGENDA

1. Introductions (5 minutes)
2. Meeting Overview (Gregoor) (5 minutes)
3. Discussion/evaluation of Goals and Objectives (Gregoor) (20 minutes)
4. Evaluation of current action items (Nick & Gregoor) (60 minutes)
- Break* (10 minutes)
5. Presentation of new Action Items (Nick & Gregoor) (60 minutes)
6. Presentation of Plan Maintenance and Implementation (Nick) (10 minutes)
7. Next Steps: Development of Plan and Final Plan Review (10 minutes)

Meeting: Salem NHMP Update Meeting # 2

Date: April 30, 2008

Time: 9 am to 12 pm

Location: Salem Emergency Operations Center

AGENDA

1. Introductions (5 minutes)

Good morning, welcome to the second meeting for the Salem Natural Hazard Mitigation Plan update. For those not here previously, my name is Gregoor Passchier and I am a research intern that works for the Partnership for Disaster Resilience who has been contracted to complete the update to the Mitigation Plan. We are an organization based at the University of Oregon that has completed Natural Hazard Planning work throughout the State of Oregon. The update Salem is completing is a FEMA requirement that must be completed every five years for communities to remain eligible for PDM and FMA funding. Our goal is to send a completed mitigation plan update to FEMA by the end of May. But before we begin I would like to go around the room and have everyone introduce themselves.

2. Meeting Overview (5 minutes)

There are four main objectives we would like to discuss today. They are:

- Look at current plan goals and objectives and develop any updates to these goals.
- Look at plan action items and the current status of these action items
- Review new action items the Partnership developed based on our previous meeting and through conversations with staff
- Discuss plan maintenance and implementation measures the Partnership has developed based on information in the old plan and other ideas we incorporated into the plan.

3. Discussion/evaluation of Goals and Objectives (Gregoor) (20 minutes)

- Plan goals serve to guide the direction of future activities aimed at reducing risk and preventing future loss from natural hazard events.
- The Salem NHMP identified three main goals each with their own objectives. They are indicated on your handout. In bold below each objective are the current plan's action items that correspond with each of the goals. For a goal and objective to be effective and implemented, it should have a corresponding action item.
- What we would like to talk about today is whether the goals and objectives listed here are still relevant to the plan or if they have been met and should be revised. If so, we need to identify new objectives and goals. I would like to go through each of the goals and the objectives and ask you whether any of these have been met, and if so, we need to establish new goals and objectives for the plan.
- In evaluating the goals, we came up with two areas that we feel should be addressed:
 - There is one objective that does not have an action item associated with it. All goals and objectives should have an action item designed to implement it, so we either need to develop an action item addressing this objective, or we need to get rid of this objective and formulate a new one.
 - In addition, there are no goals addressing economic loss and discussing collaboration among different agencies, and we feel there should be some goals that address these issues
 - Potential goals include: (1) Increase cooperation and coordination among local, state, and federal agencies. (2) Reduce economic loss.
- Three questions:

- Do you feel that the goals are relevant to the plan and should they be changed?
- Do you feel that the objectives are relevant, and useful, and should they be kept or altered?
- What are your thoughts on Objective 2.1?
- What do you think about the two additional goals we are proposing?
 - If you agree, we can add these as goals and we will assign you homework to send us objectives for the mitigation plan.

4. Evaluation of current action items (Nick & Gregoor) (50 minutes)

- The next part of the mitigation plan is to evaluate the current action items in the Salem NHMP and whether or not they have been implemented and what should be done with them in the future. Action items are an important part of a mitigation plan because they provide detailed recommendations for activities that local departments, citizens, and others can engage in.
- The Salem NHMP has 17 action items that focus on city policy actions and mitigation implementation measures.
- We took the action items in your plan and put them in the action item forms that the Partnership uses to help organize different elements of an action item and help to fill in the blanks that are missing. One of the additional benefits of having this form is that if communities want to write a grant to implement an action item, they have all the relevant information.
 - I want to briefly explain the main components of the action item form:
 1. Action item statement: this is the action item statement that addresses the specific issue or natural hazard
 2. The statement should align with plan goals to show how the goals are being implemented in the plan.
 3. The rationale explains why the action item is important and provides the reasons for why you are presenting the plan
 4. The ideas for implementation discuss the methods a community can use to implement the action item, which could include coordinating with other organizations, etc.
 5. The coordinating body is the person is responsible for implementation of the action item
 6. The coordinating body works together with internal partners which would include local and state organizations,
 - Many of these are blank, but we will follow-up with the listed coordinating organization to determine internal partners and external partners.
 7. External partners which would include federal agencies
 8. Then there is information that discusses the timeline of events, etc.
- Now I would like to go over each of the action items one by one, together with Nick Kraemer, and see which ones have been completed and which ones have not. For those that have not been completed, we need to decide whether they should be kept in the plan, deferred, or deleted from the plan, and why? The “why” part is a FEMA requirement that needs to be included for each action item.
- There are a few blank spaces included in the form, but we will contact the coordinating organization to determine the external and internal partners needed for the action item.
- We also have to keep a tight timeline for each of these, 3 minutes per action item
- (Nick and Gregoor will review each action item one by one to review status)

Action Item # 2:

Does the current MCC stand? Is this the name that you want the committee to be?

Action Item # 5

Has there been work completed on estimating the number and types of buildings affected by natural hazards and have these been mapped?

Action Item # 6

Has the city addressed any of the ideas of implementation listed in this action item at all?

Action Item # 7

Has the city addressed any of the ideas for implementation listed in this action item?

Action Item # 16

Address all the ideas for implementation, has the city updated its vulnerability assessment of structures? If not, WE NEED TO DEVELOP A MITIGATION STRATEGY FOR UPDATING THESE FOR THE NEXT UPDATE!

Action Item # 17

Do you have a plan implementation process, or is the one that we have adequate?

Break

(10 minutes)

5. Presentation of new Action Items (Gregoor & Nick)

(50 minutes)

- The next task on the agenda is to present new action items for the city of Salem, gather your input, and provide additional action items that we may be missing. The action items are part of the third handout.
- Have a broad range of action items because FEMA requires that communities have a comprehensive range of action items that address all hazards.
- We based these action items on information gathered from the March 19 meeting and are organized around natural hazards that can affect the city of Salem.
- There are four main questions that we will be discussing:
 1. Is the action correct/relevant
 2. Are there any changes that we should make?
 3. Is the coordinating body correct?
 4. Who would the partners be?
- Nick and I will briefly review these (3 minutes for each one), and if you have any input you would like to include, please let us know

6. Presentation of Plan Maintenance and Implementation (Nick)

(30 minutes)

7. Next Steps: Development of Plan and Final Plan Review

(10 minutes)

- New meeting date and time for the final plan review.
- Update on the Maps?
- Update on floodplain information?

Meeting: Salem NHMP Update Meeting # 3
Date: May 22, 2008
Time: 9 am to 12 pm
Location: Salem

AGENDA

1. Presentation and discussion of revised Plan sections (45 minutes)
2. Plan approval process (10 minutes)

Meeting: Salem NHMP Update Meeting # 3
Date: May 22, 2008
Time: 9 am to 12 pm
Location: Salem City Hall, Community Development Conference Room #305,
555 Liberty Road SE,
Salem OR 97302

AGENDA

I'd like to thank everyone for taking the time out to review the plan and provide us with comments. Today we are reviewing the changes made to the Salem NHMP. Our main goal for today is to have approval from the committee on a finalized version of the mitigation plan to send to FEMA for pre-approval. This will include a discussion of what to do with the goals and objectives, and then we will be going through the new plan section by section to review all the changes that we have made and why we made them. We need to have agreement on all changes before we can proceed further.

1. *Discussion of goals and objectives* (30 minutes)

At our last meeting we talked about changing the goals and objectives for the mitigation plan. Originally the plan had three goals:

1. Lives should be protected.
2. Existing properties should be protected.
3. Future development should be protected.

We revised the goals to be more direct, and combined goals two and three. Our new goals are:

1. Protect lives.
2. Protect existing and future development.
3. Increase cooperation and coordination among stakeholders.
4. Reduce economic loss.
5. Protect the natural environment.

The question that we have is what to do with the objectives. After our last meeting, we decided that the objectives need to be revised and further simplified. We did this, but looking back at the objectives, they sound like action items that should be included in the plan. In many of the plans that we have developed, the goals usually do not include objectives because they often act like action items. That is why we proposed to only have goals in the mitigation plan.

We have two questions we need answered:

1. Should we include objectives in the mitigation plan or not?
2. If we are keeping the objectives, what do you think about the ones we have developed? Should they be revised?

4. *Presentation and discussion of revised Plan sections*

(120 minutes)

Now I would like to go over all of the revisions that we have made to mitigation plan, which we have documented in the attached memo. The memo serves as the primary record of revisions to the plan. We will go through each section of the mitigation plan, discuss the changes that were made, and why we made those changes to the plan. Nick and I will tag team, discussing each section.

5. *Plan approval process*

(10 minutes)

We will go back and make any changes to the plan needed so far. What we would like to know is if the committee or just Joe and Roger want to see a final draft before we give it to FEMA for a final review.

We intend to give this document to FEMA by the second week of June once we have made all the necessary revisions. Once FEMA has the plan, they have 45 days to review it and give us pre-approval. Unfortunately, the FEMA reviewer will be leaving from May 22 to June 24 and will not be able to provide pre-approvals of mitigation plans during that time. What this means is that we will not be getting pre-approval until June 24. Dennis Sigrist from Oregon Emergency Management has been notified of this, and he is working with FEMA to get Salem's NHMP early on in the queue and make our plan a priority.

Once we have pre-approval, the Salem City Council needs to adopt the mitigation plan by resolution. The resolution will be sent on to FEMA, and they will give their final approval to the mitigation plan.

6. *Next Steps*

(5 minutes)

Are there any other questions that the committee has?