State of Oregon

Local Natural Hazard Mitigation Plans:

An Evaluation Process

Partners for Disaster Resistance

Oregon, Showcase State

State of Oregon

Local Natural Hazard Mitigation Plans:

An Evaluation Process

January 2002

Showcase State

PARTNERS *for* DISASTER RESISTANCE
Oregon, Showcase State

Oregon Emergency Management

OREGON emergency management

Department of Land Conservation and Development

Prepared by:

Oregon Natural Hazards Workgroup

Community Service Center
University of Oregon
541-346-3588
http://www.darkwing.uoregon.edu/~onhw

ONHW

Special Thanks & Acknowledgements

Project Advisory Committee

Ann Beier — Department of Land Conservation and Development
Joseph Murray — Oregon Emergency Management
Dennis Sigrist — Oregon Emergency Management

Special thanks to:

Rich Catlin — City of Albany Planning Department
Peggy Collins — Oregon Building Codes Division
Mark Fancey — Mid-Willamette Valley Council of Governments
Abby Kershaw — Oregon Emergency Management
Pat Lewis — Oregon Building Codes Division
Tom Manning — Tillamook County Emergency Management
Casey Marley — Clackamas County Emergency Management
Dennis Olson — Umatilla County
Scott Porter — Washington County Emergency Management
Linda Ryan — Insurance Services Office, Inc.
Dave Stroud — Insurance Services Office, Inc.
Bill Trakimas — Insurance Services Office, Inc.
Bruce Visser — Marion County Emergency Management

Community Service Center Staff

Kathy Lynn — *Project Manager*
Oregon Natural Hazards Workgroup

André LeDuc — *Program Director*
Oregon Natural Hazards Workgroup

Robert Parker — *Managing Director*
Community Service Center

Funding Support

This project was supported by the Federal Emergency Management Agency's Flood Mitigation Assistance Program, which provides assistance to States and communities for activities that will reduce the risk of flood damage to structures insurable under the National Flood Insurance Program (NFIP). Printing was funded by the Federal Emergency Management Agency's Pre-Disaster Mitigation Program. Grant funds were administered by Oregon Emergency Management.

Additional funding support provided by the Public Entity Risk Institute.

Cover Photos

Flooding Lower Siletz River — *November 25,1999*

Debris Flow Dodson-Warrendale — *February 1996*

Structural damage, Molalla High School — after 1993 Scotts Mills Earthquake; brick exterior of building failed (DOGAMI file photo)

Local Natural Hazard Mitigation Plans:
An Evaluation Process

Table of Contents

Local Natural Hazard Mitigation Plans:

An Evaluation Process

Introduction, Background & Purpose

Introduction:
Local Natural Hazard Mitigation Plans in Oregon

Natural hazard mitigation plans assist communities in reducing risk and preventing loss from natural hazards by documenting mitigation goals, recommending activities to minimize losses, and offering technical information and resources to implement activities. This document describes an evaluation process which provides guidance on evaluating hazard mitigation plans and a synthesis of standards and approaches developed by state and federal agencies and organizations to assist communities in achieving risk reduction.

This document works in tandem with the Department of Land Conservation and Development's *Planning for Natural Hazards: Oregon Technical Resource Guide*, a technical resource for land use planning approaches relating to natural hazards affecting Oregon communities. There are many other regional, state, and federal planning tools that assist communities in mitigation planning, including the Oregon State Natural Hazards Mitigation Plan. FEMA recently published a 'how-to-guide' for state and local mitigation planning: *Understanding Your Risks – Identifying Hazards and Estimating Loss*. These documents provide technical and resource assistance for planning and implementing natural hazard mitigation projects.

Oregon Emergency Management (OEM) has developed an *Evaluation Criteria Checklist for Local Natural Hazards Mitigation Plan Review* to evaluate whether or not mitigation plans meet state guidelines and federal requirements, including Disaster Mitigation Act of 2000, and FEMA programs, including the National Flood Insurance Program's Community Rating System, Flood Mitigation Assistance Program, and the Hazard Mitigation Grant Program.

This evaluation process explains OEM's *Evaluation Criteria Checklist for Local Natural Hazards Mitigation Plan Review* and provides a step-by-step process to evaluate community mitigation plans. Each step of this evaluation process includes a series of questions and guidelines intended to help define OEM's criteria. Cities and counties can use this process to determine if they meet state and federal mitigation planning requirements.

OEM's *Evaluation Criteria Checklist for Local Natural Hazards Mitigation Plan Review* is provided in Appendix A and parallels the information described throughout this step-by-step process. For more information on mitigation planning, programs, and available resources, or consultation, contact OEM at (503) 378-2911 and ask for the State Hazard Mitigation Officer.

Background and Purpose: Natural Hazard Mitigation Plans and Policies

Why develop a natural hazard mitigation plan?

There are many reasons to develop a community natural hazard mitigation plan. A natural hazard mitigation plan provides a community with a set of goals, activities, and resources designed to reduce risk from future natural hazard events. The process of developing a mitigation plan can also forge new partnerships among community organizations, businesses, and local citizens. Partnerships among various community agencies, organizations, and citizens can lead to the development of a mitigation plan that provides strategies to assist the community in reducing its risk from future natural hazard events. Oregonians are developing an understanding of the potential impacts natural hazards may have on their communities. As public awareness increases, there is an opportunity to integrate natural hazards mitigation education and programs in a variety of community initiatives, including land use planning, natural resource management, capital improvement projects, housing developments, and economic development programs, among others.

Communities that have sustained financial and personal losses after a natural hazard event will want to work to minimize future damages. Moreover, any Oregon community that has received Hazard Mitigation Grant Program project funding as a result of a Presidential major disaster declaration, or that wants to implement measures using Flood Mitigation Assistance Program funding is required to have a natural hazard mitigation plan. For the purpose of applying for future federal mitigation grant program funding, this applies to all of Oregon's 36 counties and cities therein!

Definition Box

What is natural hazard mitigation?

The process of developing and implementing actions designed to reduce or eliminate long-term impacts resulting from natural hazards.

In cases where communities are required to develop a mitigation plan, there are federal criteria that must be addressed. All communities meeting these criteria may become eligible for certain funding programs. Communities with mitigation plans may be eligible for state and federal mitigation funds. FEMA's Hazard Mitigation Grant Program (HMGP) and Flood Mitigation Assistance (FMA) Program emphasize funding priority to communities with natural hazard mitigation plans that have been formally adopted.

There are many "multi-objective" benefits to a mitigation plan and mitigation planning. Programs addressing issues related to employment, housing, poverty, and economic development can assist in mitigation efforts. At the same time, mitigation can strengthen the social structure of a community by setting goals intended to meet the community's social, economic, and environmental objectives.

What does a mitigation plan do?

Natural hazard mitigation plans document knowledge about the problems associated with natural hazards in a community. They articulate goals that will assist the community in long-term risk reduction from natural hazards, recommend appropriate mitigation action items, and identify resources to implement activities. Preparing

a mitigation plan for your community can reduce public and private costs resulting from natural hazard events. Successes in risk reduction and loss prevention are achieved by implementing programs that address and mitigate the potential impacts natural hazards may have on society, the economy, and the environment.

What do I need to know to develop a mitigation plan?

This document outlines a seven-step approach to evaluating a natural hazard mitigation plan and is intended to assist communities in meeting state guidelines and federal requirements. The approach also provides guidelines for finding information, thinking critically and comprehensively about community problems, developing clear goals, and identifying appropriate mitigation activities. A short checklist is included to assist you in stepping through an evaluation of an existing plan.

The seven-step approach outlined in this document is as follows:

- **Step #1:** Organize to prepare the plan
- **Step #2:** Involve the community
- **Step #3:** Describe your community and how mitigation is currently addressed
- **Step #4:** Identify and characterize the natural hazards impacting your community
- **Step #5:** Define plan goals
- **Step #6:** Develop solutions
- **Step #7:** Set the plan in motion

What state policies address natural hazards?

Statewide Land Use Planning Goal 7[1]

In addition to the guidance issued by the state of Oregon in this document, Oregon Land Use Planning Goal 7 (Natural Hazards) requires communities to protect life and property from natural hazards through their comprehensive land use plans.

State Building Codes

The State Building Code, as defined in ORS 455.010(8), includes construction safety standards for structural, mechanical, electrical, plumbing, elevators, boilers, manufactured dwellings, and recreational vehicles. Municipalities have the authority to prohibit or restrict some construction within their jurisdiction for the purpose of mitigating certain hazards. *(You can find more information on the Building Codes Division at http://www.cbs.state.or.us/external/bcd.)*

Tsunami Hazard

ORS.455.446 prohibits the construction of new essential facilities and special occupancy structures as determined in ORS 455.449 in the tsunami inundation zone established by the Department of Geology and Mineral Industries.

Flood Hazard

Local governments (both cities and counties) have the authority to prohibit or restrict building construction in coastal flood hazard areas, floodways, and floodplains where there is a threat to life and property according to Statewide Land Use Planning Goal 7 and the National Flood Insurance Act. The State Building Code contains related provisions for construction in flood areas.

Wildfire Hazard

Municipalities have the authority to establish wildfire hazard zones in special hazard areas where a combination of combustible natural fuels, topography, and climate conditions result in significant risk of catastrophic fire over relatively long periods each year. Municipalities may restrict construction and require specific methods and materials to increase the fire resistance of the construction.

Seismic Safety Surveys and Seismic Rehabilitation

Municipalities have authority through the adoption of local ordinances to conduct seismic safety surveys and evaluations for the purpose of establishing an inventory of existing buildings subject to damage from a seismic event. Municipalities may also, through the adoption of a local ordinance, establish a seismic rehabilitation program whereby they require evaluation and upgrade of existing buildings within their jurisdiction.

Governor's Flood and Landslide Hazard Mitigation Policy

Oregon Governor John Kitzhaber established a flood and landslide hazard mitigation policy after the devastating statewide flood and landslide events in 1996. The goal of this hazard mitigation policy is to guide governmental action as well as the use of hazard mitigation funding to demonstrate new ways of living within our dynamic environment while minimizing future damages from natural hazard events.

> "Oregon's policy focus is to learn from the flood and landslide events of 1996, and to apply this understanding to mitigate the loss of life and property from all future natural hazard events."

The policy for existing state programs includes direction for Oregon state agencies to look at their stewardship and regulatory responsibilities, establishment of a "Benchmark" by the Oregon Progress Board for hazard avoidance and hazard mitigation planning, review of Goal 7 by the Land Conservation and Development Commission, and development of a program strategy through Oregon Emergency Management to establish and maintain a statewide all-hazards mitigation program.

Federal Policy

Federal guidelines and requirements addressed in this plan include the laws and Federal Emergency Management Agency programs and policies outlined below.

Disaster Mitigation Act of 2000

Congress approved the *Disaster Mitigation Act of 2000* (DMA2K), commonly known as the 2000 Stafford Act amendments, on October 10, 2000. On October 30, 2000, the President signed the bill into law, creating Public Law 106-390. The purposes of DMA2K are to amend the Stafford Act, establish a national program for pre-disaster mitigation, and streamline administration of disaster relief. Section 322 of DMA2K includes information on criteria for tribal and local mitigation plans. These criteria for local mitigation planning will serve, over time, to eliminate the separate planning requirements for all FEMA mitigation programs.

DMA2K is the most recent federal law pertaining to natural hazards mitigation and reinforces the importance of mitigation planning in pre- and post-disaster environments. Section 322 specifically addresses mitigation planning at the state and local level, identifying new requirements, allowing additional Hazard Mitigation Grant Program (HMGP) funds to be used for planning activities, and increasing the amount of HMGP funds available for states that have developed a comprehensive, enhanced mitigation plan prior to a disaster.[2] Rules for DMA2K implementation will be published in 2002 and make clear the federal requirements for hazard mitigation planning.

The National Flood Insurance Program

The National Flood Insurance Program (NFIP) is a program within the Federal Emergency Management Agency (FEMA). NFIP makes federally backed flood insurance available in communities that agree to adopt and enforce floodplain management ordinances to reduce future flood damage.

Community Rating System (CRS)

As part of the National Flood Insurance Program (NFIP), CRS recognizes communities' efforts to strengthen floodplain management. CRS rewards those communities that go beyond the minimal requirements of NFIP by reducing flood insurance premiums for a participating community's property owners. The *CRS Planning Process* is related to FEMA's *Flood Mitigation Assistance Program* guidelines and NFIP guidelines for flood mitigation planning.

What are additional sources for mitigation planning?

Planning for Post-Disaster Recovery and Reconstruction

Planning for Post-Disaster Recovery and Reconstruction, a publication by the American Planning Association and FEMA, outlines ten steps to initiate and complete preparation of a plan for post-disaster recovery and reconstruction.

The State Natural Hazards Mitigation Plan

State hazard mitigation plans are required in order for states to receive mitigation grants following a natural disaster. The federal regulations mandating these plans outline the required planning process and the responsibilities of officials charged with hazard mitigation planning, and also describe essential components of an acceptable state plan.

Local and State Planning Documents

Local comprehensive plans, as well as capital improvement, natural resource, economic development, and emergency operations plans can serve as conduits for implementing mitigation activities. The regulatory nature of local, state, and regional planning documents is one mechanism to link risk reduction strategies with existing land use, natural resource, and economic development strategies within a community.

Oregon Land Use Planning

The Oregon Land Use Planning Act (ORS Chapter 197) requires all cities and counties to adopt and periodically update comprehensive land use plans. Comprehensive plans must comply with 19 statewide planning goals. Statewide Planning Goal 7 aims to protect people and property from natural hazards. Goal 7 guidelines state that in adopting plan policies and implementing measures to protect people and property from natural hazards, local governments should consider:

a. The benefits of maintaining natural hazard areas as open space, recreation, and other low density uses;
b. The beneficial effects that natural hazards can have on natural resources and the environment; and
c. The effects of development and mitigation measures in identified hazard areas on the management of natural resources.

Furthermore, the guidelines state that local governments should coordinate their land use plans and decisions with emergency preparedness, response, recovery, and mitigation programs. For more information on Goal 7, contact the Department of Land Conservation and Development at (503) 373-0050 or visit http://www.lcd.state.or.us.

Multi-Objective Planning

The process of developing a natural hazards plan can serve to address multiple hazards, as well as diverse natural resource, land use, and other community interests (e.g., transportation, park space, recreation, etc.). Multi-objective planning (or management) can help your community identify the best solutions, solve more than one problem with a single solution, and even maintain or improve local environmental and economic integrity. Planning which results in proposed activities that will "meet other community goals"[3] is one of several factors viewed favorably by the state when evaluating and scoring projects which are proposed for funding.

Feasibility of Mitigation Activities

Mitigation plans identify potential projects and activities to achieve plan goals. Considering activity costs and benefits from the perspective of social, technical, administrative, political, legal, economic, and environmental issues or impacts helps to identify the most appropriate activity for a community.

Resources

Documenting existing resources and programs at the local, state, and federal levels will assist in providing technical and/or financial assistance for activity implementation. There are many agencies and organizations that can provide assistance to communities engaged in mitigation planning and post-disaster recovery. An example of resources an Oregon community may be able to take advantage of for mitigation purposes is the Community Development Block Grants (CDBG). The Oregon Economic and Community Development Department administers CDBG's in Oregon. In 2001, Jackson County used CDBG funding to develop a countywide natural hazards mitigation plan, implement a business disaster preparedness survey, and develop a flood mitigation plan for the city of Phoenix.

Information Key

For a comprehensive listing of resources, see Appendix D for state, federal, and national resources and programs that may provide assistance with mitigation activities.

Education and Outreach

Community mitigation planning should be comprehensive and inclusive, meaning that every individual, business, and organization should benefit from involvement in the planning process. Mitigation plans are a mechanism for education and outreach that should involve those who have authority and accountability to make a difference in natural hazard protection and loss reduction. These individuals range from those making household and business decisions to those who affect the sustainability of an entire community and beyond, e.g., urban planners, local fire marshal, city manager, conservation club members, builders/contractors, etc. By becoming involved in the planning process, these individuals, organizations, and agencies can enhance their work and improve their capacity to reach their own goals as they relate to loss reduction, protection of public safety, and corporate citizenship.

Partners for Disaster Resistance: Oregon Showcase State

On December 12, 2000, Oregon Governor John Kitzhaber signed an Executive Order designating Oregon a "Showcase State for Natural Disaster Resistance and Resilience." This Executive Order follows a model developed and tested in Rhode Island by the Institute for Business & Home Safety (IBHS), an initiative of the insurance industry to reduce deaths, injuries, property damage, economic loss and human suffering caused by natural disasters. The Showcase State program provides a comprehensive framework for government and the private sector to prepare for and minimize risk and impact of natural hazards.

Information Key

For more information on the Governor's Executive Orders on the Oregon Showcase State Partnership and the State Strategy Promoting Sustainability, go to http://ww.governor.state.or.us.

State Strategy for Sustainability

Governor Kitzhaber's Executive Order on Sustainability (2000) seeks to further achieve sustainability in government, businesses, schools, and communities. Natural hazard mitigation is a key consideration in sustainability, given the historical loss of life, property damage, and disruption to the economy from natural hazard events in Oregon. Hidden costs of disasters, including social and environmental impacts, affect entire regions, states, and the nation. Catastrophic events strain the taxpayers' ability to pay for losses, governmental and non-profit relief agencies' ability to respond, and insurers' ability to keep insurance affordable and available. In addition, these events weaken the core of any state economy – its businesses and communities.

Sustainability efforts aimed at improving the social, economic, and environmental health of our communities must incorporate education about natural hazards. Educating citizens, businesses, and government on how natural hazards impact their community can result in new partnerships among public and private sector groups and implementation of activities that will reduce risk and prevent loss from natural hazards.

Siletz Flood Mitigation Public Workshop

Source: *Oregon Emergency Management*

Local Natural Hazard Mitigation Plans:

An Evaluation Process

Using the Evaluation Process: Step-By-Step

Using the Evaluation Process: Step-By-Step

This evaluation process helps communities engaged in hazard mitigation planning understand state and federal requirements that must be addressed in mitigation plans. This section describes how this document is organized, and ways for readers to navigate through the material and information. The evaluation process is organized in seven steps. Each step contains a series of questions that will help you understand if your mitigation plan has met the state guidelines and federal requirements. There are two tools to assist you in navigating through the natural hazard mitigation evaluation process.

Tool 1: Evaluation Checklist

The *Evaluation Checklist* is a condensed version of OEM's *Evaluation Criteria for Local Natural Hazards Mitigation Plan Review*, which can be found in Appendix A of this document. By marking "Yes" or "No" you will see whether or not your mitigation plan meets state guidelines and federal requirements. There is a corresponding page number for each question to lead you to a further explanation of the evaluation process and its importance in mitigation planning.

Tool 2: Seven-Step Evaluation Process

The *Seven-Step Evaluation Process* follows the checklist and clarifies each point of evaluation while providing tips to assist with the evaluation process. For each of the steps in the evaluation checklist, the guidelines provide sidebars that describe the specific information your plan should address to meet the various state and federal requirements for mitigation planning. The sidebars are titled, "*So what should my plan have?*"

So What Should My Plan Have?

Your mitigation plan should include the names and organizations of the people who served on the mitigation planning committee.

Finally, each step concludes with a table illustrating the state or federal requirements that are addressed within that step.

Associated State and Federal Guidelines

Step 1: _____	State and Federal Guidelines and Requirements Met in Step #1

Local Natural Hazard Mitigation Plans: Evaluation Checklist

Evaluation Checklist		YES	NO	Page#
Step #1: Organize to prepare the plan				
1.1	Does the plan include a description of why your community developed the mitigation plan?			1-1
1.2	Was there a planning committee to oversee development of the mitigation plan?			1-2
Step #2: Involve the community				
2.1	Was the public involved with the planning process?			2-1
2.2	Did your community involve local, regional, and state agencies and organizations in the planning process?			2-1
2.3	Did your community work with local, state and regional agencies and organizations to identify mitigation activities and assist with implementation?			2-2
Step #3: Describe your community and how mitigation is currently addressed				
3.1	Do the contents of the mitigation plan provide a profile of your community?			3-1
3.2	Does the plan list policies and requirements that pertain to the hazards addressed in the plan?			3-2
3.3	Does the plan describe mitigation activities that are currently in place within your community?			3-6
Step #4: Identify and characterize the natural hazards impacting your community				
4.1	Did your community identify and map the hazards addressed in your mitigation plan?			4-1
4.2	Did your community conduct a vulnerability assessment?			4-3
4.3	Did your community conduct a risk analysis for the hazards addressed in your mitigation plan?			4-4
4.4	Are the major issues and concerns facing your community listed in the plan?			4-5
Step #5: Define plan goals				
5.1	Did your community develop mitigation plan goals?			5-1

Local Natural Hazard Mitigation Plans: Evaluation Checklist

Evaluation Checklist		YES	NO	Page#
Step #6: Develop solutions				
6.1	Does the plan include action items that support the mitigation plan goals?			6-1
6.2	Are the mitigation action items identified in the plan economically, environmentally, and socially feasible?			6-2
6.3	If the plan addresses flood mitigation, does it include action items that meet National Flood Insurance Program requirements?			6-6
6.4	Does the mitigation plan include action items that address Oregon laws related to natural hazards?			6-8
6.5	Does the plan identify organizations that will coordinate and implement mitigation action items?			6-10
Step #7: Set the plan in motion				
7.1	Is the information in the mitigation plan presented clearly and is it easy to understand?			7-1
7.2	Does the mitigation plan include estimated costs for mitigation activities and potential funding sources?			7-1
7.3	Does the mitigation plan include provisions for monitoring, evaluating, and revising the plan?			7-2
7.4	Has the appropriate authority within your community adopted the mitigation plan?			7-2

Remember!

This is a condensed version of OEM's ***Evaluation Criteria Checklist for Local Natural Hazards Mitigation Plan Review,*** which can be found in Appendix A. OEM will use the full checklist to review and evaluate local natural hazard mitigation plans in Oregon.

Local Natural Hazard Mitigation Plans:

An Evaluation Process

Step 1: Organize to prepare the plan

Step #1: Organize to prepare the plan

1.1: Does the plan include a description of why your community developed the mitigation plan?

Communities may develop natural hazard mitigation plans for a variety of reasons. It may be in response to a recent disaster, after identifying a need for long-term risk reduction strategies, or for other reasons relating to local or state planning goals. Natural hazard mitigation plans should begin with a description of why the mitigation plan was developed. This helps illustrate the importance and potential outcomes of developing the plan.

States that have received Presidential major disaster declarations resulting from losses after a natural hazard event are required by law (the Stafford Act) to develop a natural hazard mitigation plan. Communities find that after a disaster strikes, public awareness and interest is at a peak. While disasters can potentially cause financial and personal loss, they can also be the impetus for awareness and action. As people and organizations account for their losses, steps that could have been taken to minimize the amount of loss become apparent. Identifying activities to reduce future loss should be the first step in post-disaster reconstruction. It is vital to integrate long-term planning and develop mitigation strategies during post-disaster recovery and reconstruction.

Planning for natural hazards can save lives and minimize the financial and emotional costs from disasters. The potential benefits of mitigation can motivate people involved in the planning process and the general public to give their time, energy, and personal commitment to develop and implement a natural hazard mitigation plan.

Tip 1.1: Benefits of Natural Hazard Mitigation Activities

Implementing mitigation activities within a community can assist in preventing the devastating consequences that may result from natural hazard events. Mitigation activities can reduce loss of life and property, strengthen the economic base of a community, and limit environmental degradation. Specifically, natural hazard mitigation can:

- Save lives and reduce injuries;
- Prevent or reduce property loss;
- Reduce economic loss;
- Minimize agricultural losses;
- Protect infrastructure from damage;
- Safeguard operation of critical facilities during a natural hazard event;
- Decrease disruption of families, schools, and other public and private facilities;
- Strengthen the social fabric of a community and minimize emotional distress after disaster events;
- Protect the environment and natural resources;
- Limit legal liability of government and public officials; and
- Foster public/private partnerships that can provide multiple benefits for the community.

1.2: Was there a planning committee to oversee development of the mitigation plan?

A mitigation plan must include information about the issues facing a community, and mitigation activities that can be implemented successfully by members of the community. To accomplish this, the committee developing the plan must include representatives from public agencies, private sector businesses, nonprofit organizations, and local citizens affected by the natural hazard mitigation plan.

Specifically, members of the committee should include a leader responsible for coordinating local hazard mitigation activities, including plan implementation and monitoring, organizations responsible for implementing plan provisions, and appropriate stakeholder groups. These groups may include:

- Property, land and home owners, and renters exposed to the hazard;
- Representatives of neighborhood organizations;
- Business owners;
- Managers of critical facilities;
- Agriculture, forest users, and others who affect (and are effected by) watershed conditions;
- Land developers, real estate agents, lenders, and others who affect the future development of communities;
- Planning office representatives;
- Local or state government employees at the policy level;
- Emergency managers; and
- Building code officials.

Tip 1.2: Roles and Responsibilities of the Committee

A committee working on a natural hazard mitigation plan can have a strong hand in ensuring the success of both the development and implementation of a plan. People will tend to support what they have helped to create. Specifically, the committee can work together to:

- Guide the development of the plan by setting goals, identifying appropriate activities, and developing a process for public participation;
- Ensure that neighboring jurisdictions and appropriate regional, state, tribal, and federal agencies participate in plan development;
- Distribute the plan to all stakeholders and the general public by means of public libraries, websites, local media, and other means;
- Present findings to the community to get feedback;
- Develop clear, effective educational materials and hold public forums to discuss community issues;
- Oversee implementation of mitigation activities; and
- Develop and implement a communication plan to better inform the public about the benefits of risk reduction and loss prevention. This is accomplished by having a committee that represents different segments of the population, from the working class to children, from the public sector to private industry.

So What Should My Plan Have?

A description of why your community decided to develop or revise your mitigation plan and the long-term outcomes that your mitigation plan can help to achieve.

Your mitigation plan should include the names and organizations of the people who served on the mitigation planning committee.

Associated State and Federal Guidelines

Step 1: Organize to prepare the plan	State and Federal Guidelines and Requirements Met in Step #1
1.1 Does the plan include a description of why your community developed the mitigation plan?	Community Rating System Guideline #1
1.2 Was there a planning committee to oversee development of the mitigation plan?	OEM Evaluation Criteria Checklist for Local Natural Hazards Mitigation Plan Review

Local Natural Hazard Mitigation Plans:

An Evaluation Process

Step 2: Involve the community

Step #2: Involve the community

2.1: Was the public involved with the planning process?

Public involvement ensures that the plan includes diverse community perspectives, reflects community need, and assists in garnering community support and participation during plan implementation. Including citizen input about the issues at stake and potential solutions during mitigation plan development is the first step in identifying outreach and education activities. State and federal policies require that the planning process must involve the general public. Even without these requirements, public participation is essential, as it strengthens the integrity of the plan.

Tip 2.1: Inviting people to become involved

Members of the public who should be included in development of the mitigation plan are comprised of those people interested in the livelihood and sustainability of their community. They may include:

- Property owners, homeowners, and renters;
- Representatives of neighborhood organizations;
- Business owners and managers;
- Managers of critical facilities;
- Farmers, land managers, and anyone shaping the physical geography of the watershed landscape or watershed;
- Land developers, real estate agents, lenders, and others who affect the future development of the community;
- Neighboring jurisdictions;
- Representatives of appropriate regional, state, tribal, and federal agencies; and
- Colleges and universities.

2.2: Did your community involve local, regional, and state agencies and organizations in the planning process?

Natural hazards have little consideration for county lines, political districts, or jurisdictions. A river flooding upstream of your community will likely have consequences downstream. Therefore, developing relationships with neighboring communities and investigating regional issues during development of the mitigation plan is essential. Fostering partnerships with local, regional, and state agencies helps ensure that a broad spectrum of community issues will be considered during development of the mitigation plan. Partnerships and coordination help communities identify resources and programs that will assist in implementing mitigation activities. Partnerships and coordination demonstrate the community's commitment to reducing damages from future natural disasters through the provision of financial or technical assistance that support the community's mitigation goals and priorities.

Tip 2.2: Agencies and organizations to involve in the planning process

It is important to include a broad spectrum of agencies and organizations in the planning process. Reaching out for technical expertise, or to organizations that may have maintained databases on hazard occurrences will strengthen your planning document. Some of these agencies may have resources to offer to your community later as hazard mitigation activities are implemented. Involving these agencies and organizations can be accomplished through interviews or by sending invitations to public meetings, hearings, and workshops.

Selected agencies and organizations to consider:

- American Red Cross and other voluntary organizations;
- Businesses and private-sector organizations;
- Chamber of commerce;
- Civic organizations;
- Local, county, and state emergency managers;
- Elementary and secondary schools and universities;
- Environmental advocacy groups;
- Federal Emergency Management Agency;
- Land trusts;
- Local farm bureau;
- Local fire departments/districts and ambulance services;
- Local native american tribes and organizations;
- Planning commissions;
- Planning, parks, and local government affairs office;
- Regional council of governments (COG);
- Regional planning, water, sewer, and sanitary districts;
- National Marine Fisheries Service;
- National Weather Service;
- Natural Resources Conservation Service;
- Oregon Economic and Community Development Department;
- Oregon Department of Fish and Wildlife;
- Oregon Department of Forestry;
- Oregon Department of Geology and Mineral Industries;
- Oregon Department of Land Conservation and Development;
- Oregon Emergency Management;
- United States Army Corps of Engineers;
- United States Department of Agriculture;
- United States Geological Survey; and
- United States Fish and Wildlife Service.

2.3: Did your community work with local, state and regional agencies and organizations to identify mitigation activities and assist with implementation?

Coordination with local, regional, and state agencies and organizations is essential to developing feasible mitigation activities that will be successfully implemented. Partnerships illustrate the commitment of various organizations to a common goal. Once partnerships are formed, it is easier to identify potential activities and implement them as the various organizations have committed to doing their part.

Information Key

The Community Rating System (CRS) credits activities that occur during the process of developing a mitigation plan. Among other requirements, the CRS requires that 1) the community contact other agencies at the beginning of the planning process, and 2) the community send a draft plan to these agencies for comment.

Communities participating in CRS can request a copy of the draft 2002 CRS Coordinator's Manual by contacting the Insurance Services Office. Contact information can be found in this document in Appendix D: Resource Directory.

Tip 2.3: Fostering interagency partnerships

Fostering coordination and collaboration among agencies and partners during the mitigation planning process assists in consolidating resources and programs. Cost-effectiveness, increased coordination, and outreach can all result from interagency partnerships, and agencies will tend to support a mitigation plan that they have helped to create. Additionally, interagency agreements facilitate program development and funding of agreed upon mitigation activities.

So What Should My Plan Have?

Your mitigation plan should include a summary of how public participation was integrated within the planning process and how information in the final plan will be disseminated to various stakeholders in the community.

The plan should include a section describing interagency agreements related to plan implementation. Additionally, it should include a section that demonstrates the community's commitment to reducing damages from future natural disasters through the development of partnerships with businesses, schools, higher education, and other private and nonprofit interests able to provide financial or technical assistance in support of the community's mitigation goals and priorities.

Associated State and Federal Guidelines

Step 1: Organize to prepare the plan	State and Federal Guidelines and Requirements Met in Step #1
2.1 Was the public involved with the planning process?	Community Rating System Guideline #2, DMA2K #17, OEM Evaluation Criteria Checklist for Local Natural Hazards Mitigation Plan Review
2.2 Did your community involve local, regional, and state agencies and organizations in the planning process?	Community Rating System Guideline #3, DMA2K #12, OEM Evaluation Criteria Checklist for Local Natural Hazards Mitigation Plan Review
2.3 Did your community work with local, regional, and state agencies and organizations to identify mitigation activities and assist with implementation?	DMA2K #14

Local Natural Hazard Mitigation Plans:

An Evaluation Process

Step 3: Describe your community

Step #3: Describe your community and how mitigation is currently addressed

3.1: Do the contents of the mitigation plan provide a profile of your community?

Developing strategies for mitigation is dependent on an understanding of the history of natural hazard events, and the demographic, economic, environmental, and social structure of the community. Providing historical perspectives and current data assists in forecasting future changes in a community. This is important because community risk from hazards can increase with changes in population and development. For example, increases in the percentage of impervious surface and other changes in the watershed may have an effect on the impacts of a flood event. Mitigation plans developed in response to a Presidential major disaster declaration must include an evaluation of natural hazards in the declared area.

Tip 3.1: Creating a community profile

Having a community profile in your hazard mitigation plan is essential to the planning process. A profile illustrates how the community has developed over time, the population, critical facilities, and infrastructure exposed to the natural hazards, and the economic base that may impact the community's abilities to recover from hazard events. It is likely that your community already has information for the community profile on hand. It may exist in your comprehensive land use plan, or you can look to information documented by the local media or the community historical society.

If you don't readily have information for your community profile, you may be able to find volunteers to help you gather it. You may undertake a "treasure hunt" and compile the following:

- Population, demographic, and economic statistics from Oregon Economic and Community Development Department (http://www.econ.state.or.us/), Oregon Employment Department (http://www.olmis.org), and the Census (http://www.census.gov);
- Climate data from the National Weather Service (http://www.nws.noaa.gov/);
- Information on local geology and evidence of natural hazards from the Oregon Department of Geology and Mineral Industries (http://www.oregongeology.com/);
- Historical records on natural hazard events from local newspaper archives and the historical society (http://www.ohs.org/); and
- Information on current planning regulations and building codes from local government offices, the Department of Land Conservation and Development (http://www.lcd.state.or.us/), and the Oregon Building Codes Division (http://www.cbs.state.or.us/external/bcd/).

Information Key

Appendix C: Hazard Policies provides more detailed information on hazard-related policies and programs.

3.2: Does the plan list policies and requirements that pertain to the hazards addressed in the plan?

Local, state, and federal policies pertaining to hazard mitigation must be documented in community mitigation plans. Local comprehensive plans and natural hazard mitigation plans have a direct relationship to a community's factual base and can provide valuable information in its review and update.

Local Comprehensive Plans

The Oregon Land Use Planning Act requires all cities and counties to develop and adopt comprehensive land use plans. The Oregon statewide program for land use planning is founded on a set of 19 statewide planning goals. These goals establish a mandatory standard for comprehensive planning in the state. Goals set requirements for comprehensive plans and determine how land use decisions and statutory laws are to be made. Additionally, most of the goals are accompanied by "guidelines," which are suggestions about how a goal may be applied, though the guidelines are not mandatory. The goals require that local governments provide opportunities for citizen involvement, and they set standards on how certain types of land are planned and zoned. The goals also apply to state agencies when they make decisions affecting land use.

The local comprehensive plans must be consistent with the statewide planning goals. The state's Land Conservation and Development Commission (LCDC) review plans for such consistency. When LCDC officially approves a local government's plan, the plan is said to be "acknowledged." It then becomes the controlling document for land use in the area covered by that plan.

What is a comprehensive plan?

A comprehensive land use plan (commonly referred to as the "comprehensive plan") is an official document adopted by a city or county, which sets forth the general, long-range policies on how the community's future development should occur. A comprehensive plan combines an inventory of existing conditions (factual base); general goals and objectives; policies; and implementing ordinances and regulations.[4] Local plans must:

1. Address all the applicable topics in the Statewide Planning Goals, as well as issues of local concern.
2. Anticipate and provide for future land use needs (20 years).
3. Include plan elements corresponding to each applicable statewide goal (e.g., citizen involvement, agricultural lands, ***natural hazards***, transportation, coastal resources, etc.).
4. Include implementing measures which must comply with the statewide goals and be consistent with and carry out comprehensive plan policies.

Information Key

For more information on comprehensive land use plans and the statewide planning system check out the Land Conservation Development Commission website and the Oregon Technical Resource Guide at http://www.lcd.state.or.us

How do comprehensive plans relate to mitigation plans?

Natural hazard mitigation plans can provide a factual base on the natural hazards affecting a community; specifically, on the effects natural hazards can have on current and future development. Natural hazard mitigation plans can assist communities in addressing Statewide Land Use Planning Goal 7, which requires communities to protect life and property from natural hazards through their comprehensive land use plans. This is accomplished through the factual base established in the mitigation plan that documents historical incidents of hazards in the community and hazard identification. Moreover, natural hazard mitigation plans recommend action items to assist the community in reducing risk and preventing loss from natural hazard events. The action items may recommend amendments and improvements to policies, zoning requirements, and ordinances for improvement, which further assist in meeting Goal 7 planning requirements.

Information Key

Communities engaged in periodic review of their comprehensive plan can look to their flood mitigation plan (if available) in addressing Goal 7. Likewise, if a community developing a mitigation plan has recently updated Goal 7 during periodic review, that factual base will assist in development of the mitigation plan.

Mitigation Successes

The Salem Landslide Ordinance is one example of a mitigation success story. The 1996 flood events contributed to two major landslide events in Salem, which damaged a number of homes and forced the city into litigation. Through FEMA's Hazard Mitigation Grant Program, the city of Salem, Marion County, and DOGAMI received $250,000 to map landslide areas and develop a landslide ordinance. Through development of the ordinance, they updated their landslide hazard inventory, and adopted and implemented the landslide hazard ordinance.

The ordinance requires the preparation and approval of geological assessments before development occurs in areas identified with a moderate degree of hazard. Those areas then undergo a preliminary review of geologic conditions. The ordinance requires staff to determine if a geotechnical report requiring more information and detail than the geological assessment is necessary. This approach ensures adequate review of proposed development on private property where potentially greater risk requires more detailed information to fully identify and address the hazard. Additionally, prior to development, a declaratory statement indicating that the property is within an identified hazard area must be recorded on the property deed. Compliance with the ordinance is required as part of land use and building permits for regulated activities within identified hazard areas.

Summary of hazard policies and programs

The following table provides an outline to the various programs and policies related to specific natural hazards that impact Oregon communities.

Table 3-1. Hazard Policies and Programs

Hazard	Oregon Policies and Programs	Federal and National Policies and Programs
Multi-Hazard	Local Comprehensive Plans	Federal Emergency Management Agency (FEMA) Pre-disaster mitigation planning
	Goal 2: Land Use Planning	
	Goal 7: Natural Hazards	American Planning Association (Resources on landslides, flooding, and post-disaster recovery)
	Oregon Building Codes	
Flood	Goal 5: Natural Resources, Scenic and Historic Areas, and Open Spaces	National Flood Insurance Program (NFIP).
	Division of State Lands (DSL) Fill and Removal Permit Program	NFIP Community Rating System and Flood Mitigation Assistance Programs
	The Oregon Plan for Salmon and Watersheds	FEMA Region X's Policy on Fish Enhancement Structures in the Floodway.
	Oregon's Wetlands Protection Program	Army Corps of Engineers Permit Program
Landslides	Goal 17: Coastal Shorelands	American Planning Association: Landslide Hazards and Planning
	The Oregon Plan for Salmon and Watersheds	
	Senate Bill 12: Rapidly moving landslides	
Coastal Hazards	Goal 17: Coastal Shorelands	National Flood Insurance Program (NFIP)
	Goal 18: Beaches and Dunes	NFIP V-Zone Construction
	Ocean Shore Regulation	
	Tsunamis - ORS 336.071, ORS 455.446, and ORS 455.488	Army Corps of Engineers Permit Program
Wildfire	Senate Bill 360: Wildland/Urban Interface	National Fire Protection Agency Firewise Program
	Additional Criteria for Forestland Dwellings ORS 215.730	
	Urban Interface Fire Protection - ORS 477.015-061	
Seismic	Senate Bill 13: Seismic Event Preparation	USGS Earthquake Hazards Program
	Senate Bill 14: Seismic Surveys For School Buildings	
	Senate Bill 15: Seismic Surveys For Hospital Buildings	
	Senate Bill 96: Seismic Hazard Investigation	National Earthquake Hazards Reduction Program (NERHP) - FEMA/USGS Partnership
	Tsunamis - ORS 336.071, ORS 455.446, and ORS 455.448	
	Oregon Seismic Safety Policy Advisory Commission (OSSPAC) - ORS 401.337 to 401.353	

Tip 3.2: Oregon policies

Policy requirements addressed within the plan should include:

- Local hazard management policies, programs, and capabilities to mitigate the hazards addressed by the plan (e.g., floodplain management ordinance, building codes, etc.).
- References to laws, regulations, ordinances, administrative rules, etc. that establish the legal basis for the mitigation measures being proposed.
- Information on building codes adopted by the community. The State Building Code, as defined in ORS 455.010(8), includes construction safety standards for structural, mechanical, electrical, plumbing, elevators, boilers, manufactured dwellings, and recreational vehicles. Municipalities have the authority to prohibit or restrict some construction within their jurisdiction for the purpose of mitigating certain hazards.
- Information on whether the community has had a Building Code Effectiveness Grading Report (BCEGS) performed by the Insurance Services Office, Inc., and, if so, what BCEGS score the community received.
- Compliance with Statewide Land Use Planning Goal 7: Areas Subject to Natural Hazards, which aims to protect people and property from natural hazards.[5]

Websites to access information on Oregon laws relating to natural hazards:

- Oregon Land Use Statutes, Statewide Planning Goals, and DLCD Administrative Rules: http://www.lcd.state.or.us
- Land Use Board of Appeals (LUBA) Decisions: http://luba.state.or.us/
- State Building Codes Division: http://www.cbs.state.or.us/external/bcd

Information Key

To review a natural hazards mitigation plan prepared by another community in Oregon, contact Oregon Emergency Management at (503) 378-2911 and ask for the State Hazard Mitigation Officer.

3.3: Does the plan describe hazard mitigation activities that are currently in place within your community?

Mitigation plans should list the goals, activities, projects, and success stories that have been implemented or accomplished in the community. Documenting existing mitigation activities establishes a baseline of risk reduction efforts that have taken place within a community.

Tip 3.3: Case Studies: Existing Mitigation Activities

This section highlights existing mitigation activities occurring throughout the state.

Local Action: Non-structural mitigation in Eagle Point, Oregon

Using funds from the FEMA Hazard Mitigation Grant Program received as a result of the December 1996/January 1997 flooding, two homes have been elevated in Eagle Point. The city also acquired and demolished two homes, designating the vacant lots as open space in perpetuity.

FireFree Program – Bend, Oregon

FireFree is a unique private/public program for interface wildfire mitigation involving partnerships between an insurance company and local government agencies. It is an example of an effective non-regulatory approach to hazard mitigation. Originating in Bend, the program was developed in response to the city's "Skeleton Fire" of 1996, which burned over 17,000 acres and damaged or destroyed 30 homes and structures. Bend sought to create a new kind of public education initiative that emphasized local involvement. SAFECO Insurance Corporation was a willing collaborator in this effort.

Public Education and Outreach - Portland General Electric

Through the Right Tree-Right Place program, Portland General Electric (PGE) educates homeowners, landscapers, and tree propagators on tree species that will not be subject to ongoing stress from constant trimming. PGE offers tree owners a certificate to help defray the cost of a new tree that replaces one that is inappropriate. PGE also runs a tree-trimming program and keeps a database of information in order to build profiles of trees that cause power line outages. The database of tree failures intends to identify those trees that are at an above average risk. PGE foresters work with local government and the public to assess and identify situations in which trees or power lines put life and property at risk. Calls and faxes to PGE's tree-trimming program result in immediate response to clear roads of fallen trees.

So What Should My Plan Have?

Your mitigation plan should include a profile of your community, a list of local, state, and federal policies relating to the hazards addressed in your plan, and a summary of mitigation activities and resources that exist within your community.

Associated State and Federal Guidelines

Step 3: Describe your community and how mitigation is currently addressed	**State and Federal Guidelines and Requirements Met in Step #3**
3.1 Do the contents of the mitigation plan provide a profile of your community?	DMA2K #1-3
3.2 Does the plan list policies and requirements that pertain to the hazards addressed in the plan?	OEM Evaluation Criteria Checklist for Local Natural Hazards Mitigation Plan Review
3.3 Does the mitigation plan describe mitigation activities that are currently in place within your community?	OEM Evaluation Criteria Checklist for Local Natural Hazards Mitigation Plan Review

Local Natural Hazard Mitigation Plans:

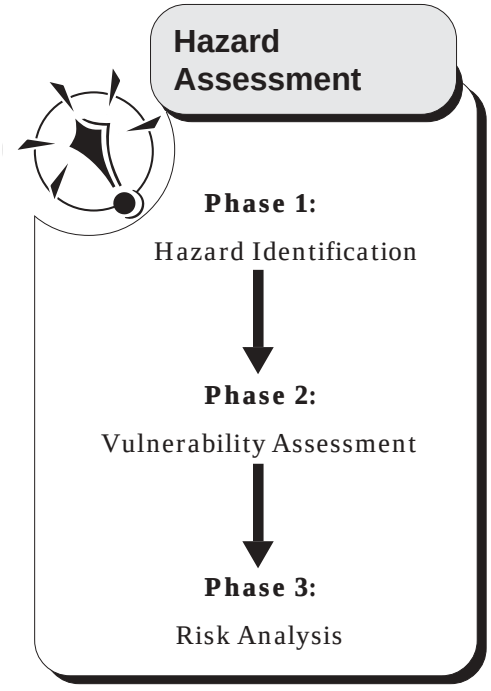
An Evaluation Process

Step 4: Identify and characterize the hazards impacting your community

Step #4: Identify and characterize the natural hazards impacting your community

Understanding the impacts natural hazards have on your community is essential to reducing your community's risk to natural hazards. A hazard assessment provides information on what areas of a community are in need of assistance. This occurs through the evaluation of which populations and facilities are most vulnerable to natural hazards, and to what extent injuries and damages may occur.[6] Hazard assessment illustrates:

- The hazards to which your community is susceptible;
- What these hazards can do to physical, social, and economic assets;
- Which areas are most vulnerable to damage from these hazards; and
- The resulting cost of damages or costs avoided through future mitigation projects.



Statewide Planning Goal 7 requires communities to inventory known natural hazards and implement appropriate safeguards for development in hazardous areas. You can identify the problems facing your community by using existing information that has been developed with your community's hazard inventory.

Identifying the problems your community faces can be distilled into a three-step process: (1) identify the hazards; (2) assess community vulnerability; and (3) determine relative risk. The steps outlined above comprise a hazard assessment. Conducting a hazard assessment can provide information on the location of the hazard, the value of existing land and property in the hazard location, and an analysis of risk to life, property, and the environment that may result from a natural hazard event.

The three steps of a hazard assessment must be conducted sequentially, and each step is dependent on the data and information on a given hazard within your community. Gathering data for a hazard assessment requires a commitment of resources on the part of participating organizations and agencies. Understanding the location and potential impact of natural hazards, however, will enable you to pinpoint the most appropriate solutions to the problems faced by your community. The information below will help you assess which steps of a hazard assessment have been completed for your community mitigation plan.

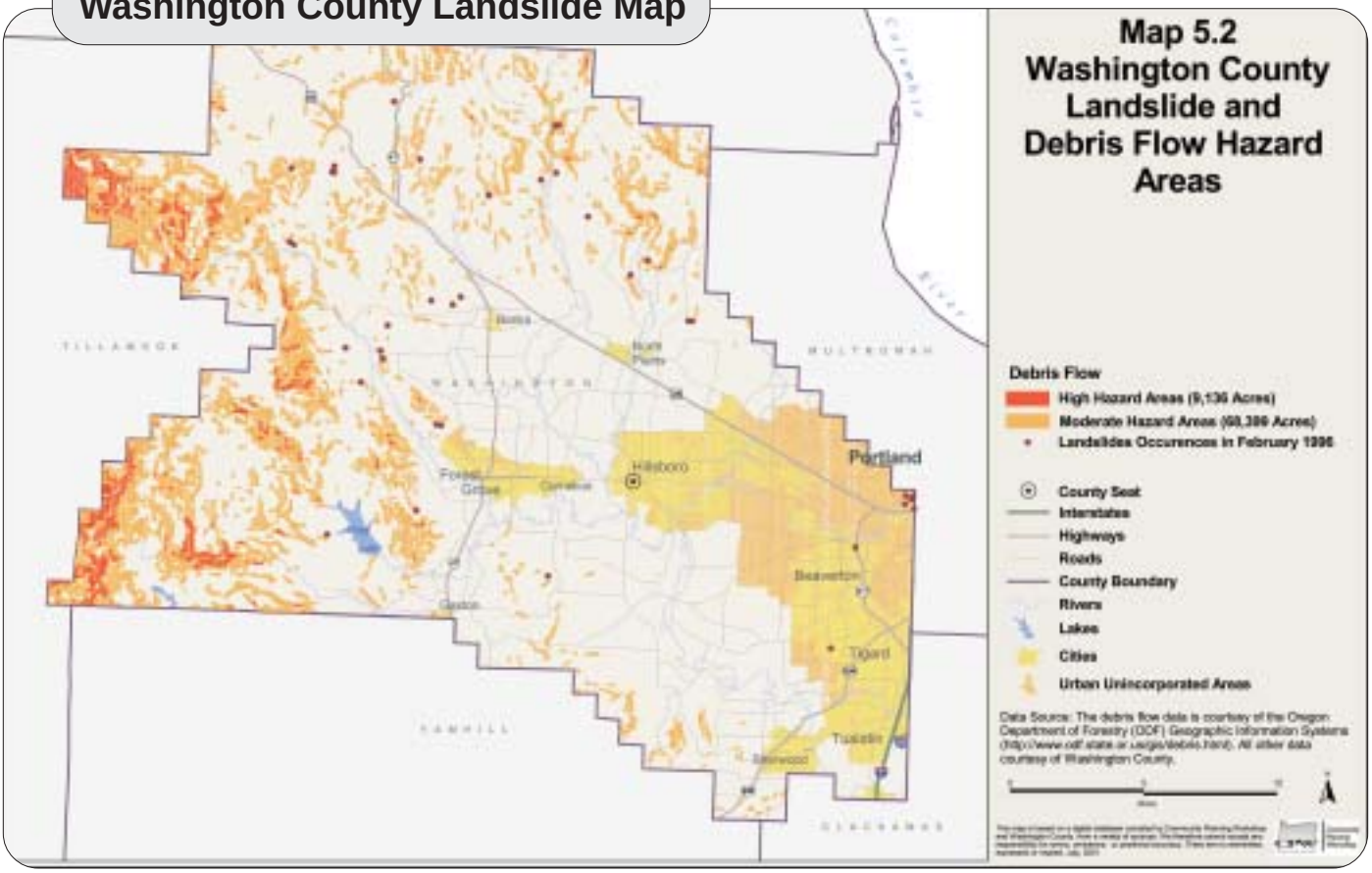
4.1: Did your community identify and map the hazards addressed in your mitigation plan?

Natural hazard mitigation plans should include a description and analysis of the hazards addressed. You can begin by reviewing your community's comprehensive plan when conducting a hazard assessment, since Statewide Land Use Planning Goal 7 requires communities to inventory natural hazards. The plan should include maps outlining all hazard areas within the community or other graphic displays to delineate the hazard area. The hazard description can include a summary of past hazard events, and the causes and characteristics of the hazards threatening your community.

Tip 4.1: Hazard Identification

Hazard identification delineates the geographic extent of the hazard, the intensity of the hazard, and the probability of its occurrence. Maps are frequently used to display hazard identification data. Examples of hazard identification may be a FEMA Flood Insurance Rate Map (FIRM) that depicts the 100-year floodplain, a Department of Geology and Mineral Industries relative earthquake hazard map, or a community map of known landslide occurrences developed by the community in conjunction with previous site-specific development reports. These maps may be a component of a Geographic Information System (GIS), or they may be hand-drawn by community officials who have surveyed specific sites.

Washington County Landslide Map



Source: Washington County Natural Hazards Mitigation Action Plan

4.2: Did your community conduct a vulnerability assessment?

A vulnerability assessment examines the population, land use, and the value of property that lies within hazard areas. Conducting a vulnerability assessment can assist communities in understanding the amount of hazard exposure. It is the second step (after hazard identification) to developing action items that assist in reducing risk to exposed populations and property within hazard areas.

A vulnerability assessment is conducted by estimating the type and number of structures within the community at risk for each hazard. The plan should note protection measures in effect or under construction, impacts of past disasters, and undeveloped areas, wetlands, and other features that provide natural and beneficial functions. The vulnerability assessment should also take into consideration growth and development of the community, including zoning requirements, land designations, population growth, economic development, historic preservation, and recreation needs. Taking inventory of community assets, such as vacant lands, will also provide potential directions for future community action. Communities with vacant lands in hazard areas can look into acquiring the land and using it for open space and parks development.

Tip 4.2: Vulnerability Assessment

Vulnerability assessment combines hazard identification with an inventory of the existing (or planned) property and population exposed to a hazard. A vulnerability assessment should include a summary of potential impacts on people, structures, the environment, and the economy, and an estimation of potential losses for each hazard type. It should also include an estimate of the type and number of structures within the community at risk for each hazard type, including the following:

- Residences;
- Commercial and government buildings;
- Critical facilities (hospitals, fire stations, storage sites for hazardous materials, etc.);
- Roads;
- Bridges;
- Transportation;
- Water and sewage treatment plants;
- Utilities; and
- Other public infrastructure.

Data on these sectors of a community may already exist in your community's emergency operations plan, or in other community documents.

Information Key

FEMA's recently published 'how-to-guide' for state and local mitigation planning: *Understanding Your Risks – Identifying Hazards and Estimating Loss*, includes examples of worksheets to assist in inventorying the assets of your community and understanding what may be affected by a hazard event. These worksheets have been included in Appendix B.

4.3: Did your community conduct a risk analysis for the hazards addressed in your mitigation plan?

Risk assessment answers the fundamental question that fuels the natural hazard mitigation planning process: "*What would happen if a natural hazard event occurred in your community?*"[7] A risk analysis provides a summary of potential impacts on community residents and visitors, adjacent communities, and the economy, and an estimation of potential losses for each hazard type.

Tip 4.3: Risk Analysis

Risk analysis involves estimating the damage, injuries, and financial losses likely to be sustained in a geographic area over a given period of time and certain type of event (e.g., the level of severity). This level of analysis involves using mathematical models. Two measurable components of risk analysis are magnitude of the harm that may result and the likelihood of the harm occurring. Conducting a risk analysis will assist in understanding the losses (human or monetary damage) that may be incurred during a natural hazard event.

FEMA's HAZUS model can assist some communities with risk analysis. HAZUS contains inventory information for every community in the United States. While HAZUS is currently used for generating earthquake loss estimates, it can also be used to inventory elements exposed to other hazards. For more information on HAZUS, contact FEMA Region 10 at (425) 487-4600.

Many communities simply do not have the data or technical expertise to conduct a risk analysis. Regardless of the depth of analysis, however, communities can consider the location of population, structures, and essential facilities as they begin to develop mitigation action items. Additionally, Emergency Operations Plans (EOP's) in Oregon are required to have a hazard analysis and this information can be used in developing a more qualitative risk analysis.

HAZUS®

Go to the FEMA Website at:
http://www.fema.gov

4.4: Are the major hazard issues and concerns facing your community listed in the plan?

Mitigation plans must identify those areas within a community that are at the greatest risk from potential loss from a natural hazard event. This may include a specific population group, location, business district, or natural system within the community.

Tip 4.4: Problem Identification

In Step 3, you identified existing mitigation activities. After assessing the location and extent of the hazards within your community as outlined here in Step 4, and understanding which of the current activities assist in reducing risk to these hazards, it is possible to identify the areas for which no activities currently exist or for which activities exist, but are not adequate to fully mitigate the hazard. Identifying the gaps in resources and the areas of greatest risk is problem identification. Taking a broader look at the future directions of the community (e.g., population growth, economic and land development, historic preservation, recreation needs, vacant lands, etc.) assists in forecasting future needs for mitigation planning.

So What Should My Plan Have?

A map of the hazard area showing the location of the hazard, information on population and land uses within the hazard area, as well as a list of properties that have experienced repetitive or catastrophic losses from recurring hazard events. If data are available, include information on the vulnerability assessment and risk analysis.

Associated State and Federal Guidelines

Step 4: Identify and characterize the natural hazards impacting your community	State and Federal Guidelines and Requirements Met in Step #4
4.1 Did your community identify and map the hazards addressed in your mitigation plan?	Community Rating System Guideline #4, DMA2K #1-3, Statewide Land Use Planning Goal 7, and OEM Evaluation Criteria Checklist for Local Natural Hazards Mitigation Plan Review
4.2 Did your community conduct a vulnerability assessment?	Community Rating System Guideline #5 and DMA2K #4-5
4.3 Does the mitigation plan describe mitigation activities that are currently in place within your community?	DMA2K #6-7
4.4 Are the major hazard issues and concerns facing your community listed in the plan?	OEM Evaluation Criteria Checklist for Local Natural Hazards Mitigation Plan Review

Local Natural Hazard Mitigation Plans:

An Evaluation Process

Step 5: Define plan goals

Step #5: Define plan goals

5.1: Did your community develop plan goals?

Developing goals to reduce risk sets a vision for the future while building consensus among the committee involved with plan development. The mitigation plan should include a description of mitigation goals and how they are related to the State Hazard Mitigation Plan (available at http://www.osp.state.or.us/oem). This sets the stage for proposed strategies, programs, and actions to reduce or avoid losses from the hazards addressed in the plan.

Goals are broad statements that articulate where a community wants to be, or what they hope to achieve in the future. Goals are the framework to identify strategies and actions to reduce or avoid long-term risk to the identified hazards.[8] The mitigation planning committee should facilitate the goal setting process and obtain public input on the goals by presenting them at public workshops or submitting the draft plan for public comment. Communities can also review goals outlined in the State Natural Hazards Mitigation Plan.

Tip 5.1: Example Goal Statements

Goal	Goal Statements
Protect life and property	Develop and implement activities to protect human life, commerce, property and natural systems from natural hazards.
	Reduce insurance losses and repetitive claims for chronic hazard events while promoting insurance coverage for catastrophic hazards.
	Evaluate county guidelines, codes, and permitting processes in addressing natural hazard mitigation.
Protect and restore natural systems	Link watershed planning, natural resource management, and land use planning with natural hazard mitigation activities to protect vital habitat and water quality.
	Preserve and rehabilitate natural systems to serve natural hazard mitigation functions.
Increase public education, outreach, and partnerships	Develop and implement education programs to increase awareness among citizens, local, county, and regional agencies, non-profit organizations, business, and industry.
	Develop and conduct outreach programs to increase the number of local, county, and regional activities implemented by public and private sector organizations.
	Strengthen communication and coordinate participation in and between public agencies, citizens, non-profit organizations, business, and industry.
Enhance emergency services	Strengthen emergency operations by increasing collaboration and coordination among public agencies, non-profit organizations, business, and industry.
	Coordinate natural hazard mitigation activities, where appropriate, with emergency operations plans and procedures.

So What Should My Plan Have?

A statement of the mitigation plan goals developed by the planning committee and how public input was obtained on development of those goals.

Associated State and Federal Guidelines

Step 5: Define plan goals	State and Federal Guidelines and Requirements Met in Step #5
5.1 Did your community develop plan goals?	Community Rating System Guideline #6, DMA2K #9, and OEM Evaluation Criteria Checklist for Local Natural Hazards Mitigation Plan Review

Opportunities for public involvement

Source: Lower Siletz Basin Flood Mitigation Plan Public Workshop

Local Natural Hazard Mitigation Plans:

An Evaluation Process

Step 6: Develop solutions

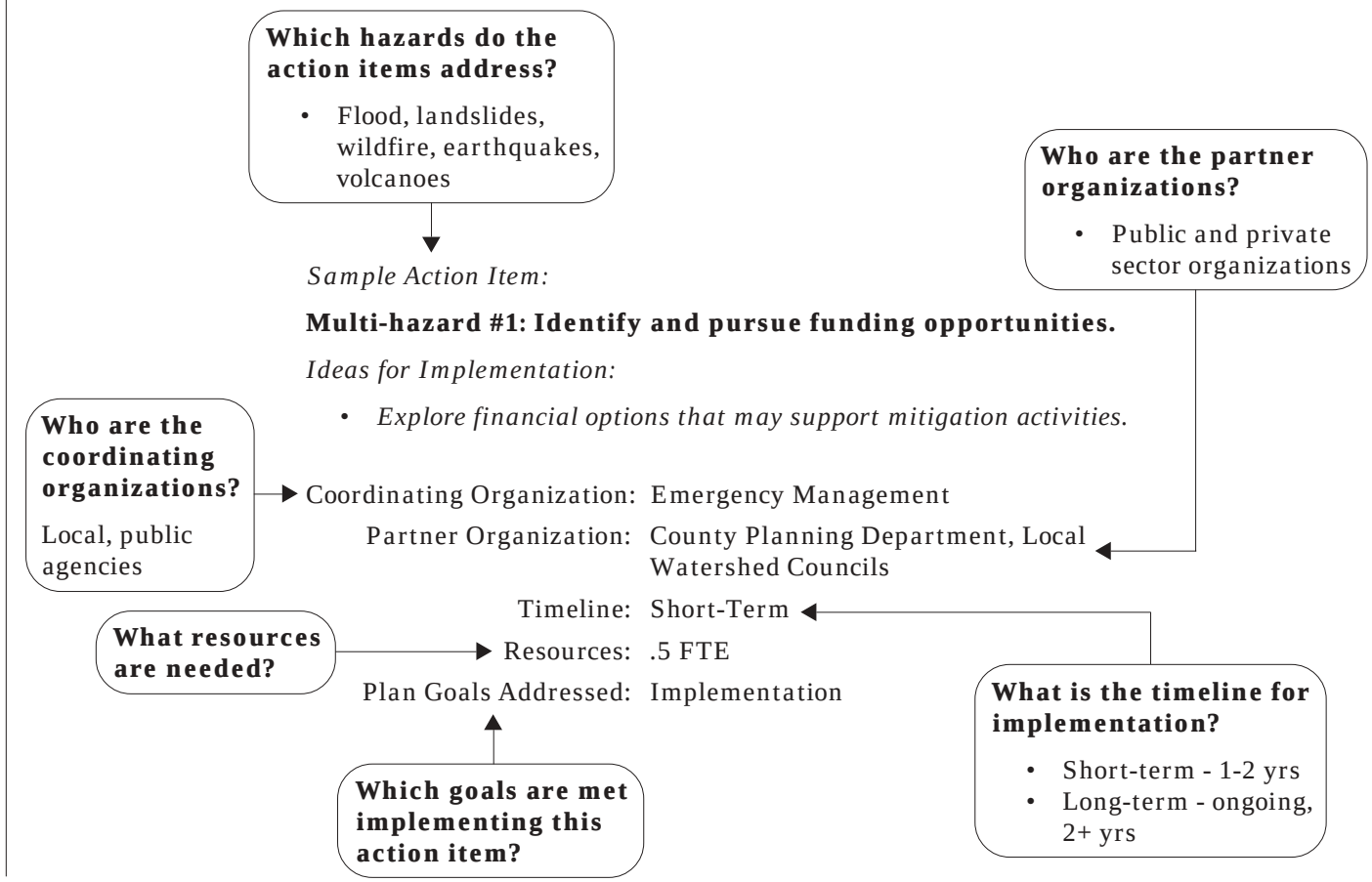
Step #6: Develop solutions

6.1: Does the plan include action items that support the mitigation plan goals?

The plan must include community mitigation goals and action items. The goals and actions outline long-term direction, and strategies, projects, and tasks to reduce the community's risk to natural hazards. Each action item should include timelines for implementation, which describe when activities, projects, or tasks are slated for completion. This section should also include discussion of how each action item supports the mitigation goals and priorities of the community.

Tip 6.1: Action Items

Recommended action items should include information on how, when, and what resources are needed to implement the activity. The diagram below gives an example of a mitigation action item.



6.2: Are the mitigation action items identified in the plan economically, environmentally, and socially feasible?

Mitigation plans should prioritize cost effective mitigation projects and actions that will reduce damages from future natural disasters. The Governor's Flood and Landslide Hazard Mitigation Policy sets a direction for choosing cost effective hazard mitigation strategies.[9] The policy articulates preferences for limited mitigation funds to be used in the following ways:

- Across the area affected: The intent of this is to broadly encourage the combination of expertise and creativity to find ways to reduce existing risk and to avoid creating negative consequences from poor planning or land use decisions. It is intended to offer the opportunity for all parts of the state affected by a hazard to participate in and observe the benefits of proactive actions.
- Where projects or actions can get "the biggest bang for the buck." This will be viewed in multiple ways:
  - Does the action improve watershed health and reduce future risks from floods?
  - Are there other dollars or in-kind services that can be leveraged?
  - Does this link partners within a watershed or along stream reaches to collectively act for the health of the watershed and the long-term reduction of flood losses?
  - Does this take an "all-hazards" view?
  - Does this provide multiple environmental as well as hazard-reduction benefits?
  - Does this meet other community goals (e.g., open space, parks, etc.)?
  - Is there active local support for sustaining/maintaining the hazard mitigation actions?
- To implement locally developed plans and follow-on action projects that address hazard mitigation or avoidance.
- To demonstrate new ideas for mitigating hazards that can be instructive for future hazard mitigation actions. The intent here is to encourage innovative thinking and push the envelope beyond past mitigation actions.
- To elevate, or purchase high-risk private property for public ownership which chronically/repeatedly receives public dollars to repair flood damage.

Information Key

For more information on economic analysis, refer to Appendix E of this document.

The federal government also requires a benefit/cost analysis for potential mitigation activities. Listed below are a series of questions that pertain to these two analyses, and should be considered in determining if a project is cost effective and feasible. Considering all of these questions when comparing alternatives can lead to a more comprehensive understanding of the financial and resource costs and potential benefits of a given activity.

- Is the action item technically appropriate for the hazard?
- Does the action item support any of the plan goals?
- Do the action item benefits exceed the costs?
- Is the action item affordable?

- Will the action item comply with all local, state, and federal regulations?
- Is the action item fair to all people who may be affected by the activity?
- Is the action item beneficial, neutral, or harmful to the environment?

Evaluating natural hazard mitigation provides decision-makers with an understanding of the potential benefits and costs of an activity, as well as a standpoint to compare alternative projects. This evaluation, however, can be a difficult undertaking. First, natural disasters affect all segments of the communities they strike, including individuals, businesses, and public services such as fire, police, utilities, and schools. Second, while some of the direct and indirect costs of disaster damages are measurable, some of the costs are non-financial and difficult to quantify in dollars. Third, many of the impacts of such events produce "ripple-effects" throughout the community, thus increasing some of the social and economic impacts a disaster may have on a community immediately after the event and, possibly, for many years into the future.

While economic analysis is complex, benefit-cost analysis and cost-effectiveness analysis are important tools in evaluating a mitigation activity. One framework for evaluating alternative mitigation activities is outlined below:

1. Identify the Alternatives

Different mitigation projects can minimize risk to natural hazards, but do so at varying economic costs. For each problem/risk area identified, alternatives should be chosen that will work to reduce risk.

2. Calculate the Costs and Benefits

Choosing economic criteria is essential to systematically calculating costs and benefits of mitigation projects and selecting the most appropriate alternative. Potential economic criteria to evaluate alternatives are project costs, estimated benefits, and the present and future costs and benefits to society, the economy, and the environment.

3. Analyze and Rank the Alternatives

Once costs and benefits have been calculated, economic analysis tools can rank the alternatives by comparing the various costs and benefits of the alternatives, and including the total amount of the future cost, which may include adding the future interest rate to the final calculation.

Information Key

Benefit Cost Analysis Software and Methodology

The Office of Management and Budget (OMB) regulations require all hazard mitigation projects to be cost-effective before they can be approved for funding. What does this mean? In the language of hazard mitigation, it means a benefit-cost analysis must be used to determine whether a project's benefits—avoided damages in future disasters— outweigh its up-front costs. To standardize the benefit-cost analysis and make it easier to complete, FEMA has developed software to analyze mitigation projects for several different hazards (riverine flooding, earthquake and a generic limited data module for other hazards). The analysis software and user training are offered directly by FEMA to assist state and local governments in pre-determining potential eligibility for cost effective mitigation projects. This is the same software and methodology FEMA will use in their required review. For more information go to: http://www.fema.gov/mit/gamit.pdf

Tip 6.2: Taking the STAPLE/E approach[10]

STAPLE/E stands for Social, Technical, Administrative, Political, Legal, Economic, and Environmental. The STAPLE/E approach provides a series of questions to help make planning decisions and determine benefits and costs of various mitigation activities.

Social: *Community development staff, local non-profit organizations, or a local planning board can help answer these questions.*

- Is the proposed action socially acceptable to the community?
- Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- Will the action cause social disruption?

Technical: *The city or county public works staff, and building department staff can help answer these questions.*

- Will the proposed action work?
- Will it create more problems than it solves?
- Does it solve a problem or only a symptom?
- Is it the most useful action in light of other community goals?

Administrative: *Elected officials or the city or county administrator, can help answer these questions.*

- Can the community implement the action?
- Is there someone to coordinate and lead the effort?
- Is there sufficient funding, staff, and technical support available?
- Are there ongoing administrative requirements that need to be met?

Political: *Consult the mayor, city council or county planning commission, city or county administrator, and local planning commissions to help answer these questions.*

- Is the action politically acceptable?
- Is there public support both to implement and to maintain the project?

Legal: *Include legal counsel, land use planners, risk managers, and city council or county planning commission members, among others, in this discussion.*

- Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
- Are there legal side effects? Could the activity be construed as a taking?
- Is the proposed action allowed by the comprehensive plan, or must the comprehensive plan be amended to allow the proposed action?
- Will the community be liable for action or lack of action?
- Will the activity be challenged?

Economic: *Community economic development staff, civil engineers, building department staff, and the assessor's office can help answer these questions.*

- What are the costs and benefits of this action?
- Do the benefits exceed the costs?
- Are initial, maintenance, and administrative costs taken into account?
- Has funding been secured for the proposed action? If not, what are the potential funding sources (public, non-profit, and private)?
- How will this action affect the fiscal capability of the community?
- What burden will this action place on the tax base or local economy?
- What are the budget and revenue effects of this activity?
- Does the action contribute to other community goals, such as capital improvements or economic development?
- What benefits will the action provide? (This can include dollar amount of damages prevented, number of homes protected, credit under the CRS, potential for funding under the HMGP or the FMA program, etc.)

Environmental: *Watershed councils, environmental groups, land use planners and natural resource managers can help answer these questions.*

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

Open Space in Johnson Creek

Source: *Oregon Emergency Management*

6.3: If the plan addresses flood mitigation, does it include action items that meet National Flood Insurance Program requirements?

The National Flood Insurance Program (NFIP) was created in 1968 to minimize flood losses, strengthen floodplain management, and keep people and their developments above floodwaters. Its basic purpose is to "guide development in floodplain areas in such a way as to greatly lessen the economic loss and social disruption caused by impending flood events."

The NFIP has four goals:

1. Provide flood insurance coverage not generally available in the private market.
2. Stimulate local floodplain management to guide future development.
3. Emphasize less costly non-structural flood control regulatory measures over structural measures.
4. Reduce federal disaster costs by shifting the burden from the general taxpayer to floodplain occupants.

A community that implements a mitigation plan may be eligible for reduced flood insurance premiums under the Community Rating System. The Community Rating System (CRS) is an NFIP program that recognizes communities' voluntary efforts to strengthen floodplain management. It specifically rewards those efforts that go beyond the minimal requirements of the NFIP by reducing flood insurance premiums for the community's property owners. The CRS recognizes 18 creditable activities organized under four categories: Public Information, Mapping and Regulations, Flood Damage Reduction, and Flood Preparedness. The CRS approach additionally sets forth a ten-step planning process of gathering information, setting goals, reviewing alternatives, and deciding what to do.

Information Key

Communities participating in CRS can request a copy of the draft 2002 CRS Coordinator's Manual by contacting the Insurance Services Office. Contact information can be found in this document in Appendix D: Resource Directory.

The CRS steps are:

1. Organize to prepare the plan
2. Involve the public
3. Coordinate with other agencies
4. Assess the hazard
5. Evaluate the problem
6. Set goals
7. Review possible strategies and measures
8. Draft an action plan
9. Adopt the plan
10. Implement, evaluate, and revise the plan

The ten CRS planning steps are addressed throughout this document and can be used as a reference during development of a mitigation plan for any natural hazard. More information on the Community Rating System may be found online at http://www.fema.gov/nfip/crs.htm or by calling (800) 427-5593.

Tip 6.3: NFIP/FEMA requirements for flood mitigation

Reduce repetitive loss: One of the NFIP's primary objectives is to reduce the number of properties subject to repetitive loss. This can be accomplished by first identifying those properties that have been impacted by more than one flood event by elevating or relocating the home, or acquiring the home for demolition and returning the vacant land to open space in perpetuity.

Public education and outreach: Increasing education and outreach and providing technical assistance about the NFIP and related programs to the general public, businesses, and other organizations can assist in reducing loss from future flood events.

Natural Systems and Open Space Preservation: Preservation or creation of open space should be among the measures proposed in a flood mitigation plan, specifically designating areas that will provide natural and beneficial functions such as parks, wetlands, riparian corridors, natural resource areas, nature preserves, etc.

Emergency Services: Flood mitigation plans should direct implementation or improvement of warning methods as a way of reducing future damage, injury, and loss-of-life. Furthermore, they can identify and direct mitigation activities for critical facilities such as utilities, hospitals, fire stations, chemically hazardous areas, etc.

Tillamook Flooding in 1999

Source: *Oregon Emergency Management*

6.4: Does the mitigation plan include action items that address Oregon policy related to natural hazards?

Where appropriate, mitigation plan action items should include implementation of appropriate land use safeguards, building code and/or construction standards, and preservation/maintenance of protective dunes and beaches. Oregon's Statewide Land Use Planning Goals 2 and 7 impose several broad requirements on local governments. Goals 17 and 18 establish additional authority and requirements for coastal communities. Together, these goals establish an obligation for all local governments to:

1) Develop inventories of hazard areas for inclusion in their comprehensive plan;
2) Enact land use regulations based on those inventories and comprehensive plan policies to protect life and property from losses associated with development in hazard areas; and
3) Update inventories, policies, and land use regulations on a periodic basis to reflect new information, new laws and goal requirements, and changing circumstances in the community.

Additionally, the State Building Code, as defined in ORS 455.010(8), includes construction safety standards for structural, mechanical, electrical, plumbing, elevators, boilers, manufactured dwellings, and recreational vehicles. Municipalities have the authority to prohibit or restrict some construction within their jurisdiction for the purpose of mitigating certain hazards.

Dodson-Warrendale 1996

Source: *Oregon Emergency Management*

Tip 6.4: Statewide planning goals with requirements relating to natural hazards

Communities may have addressed hazard-related issues in current plans and policies. Communities developing mitigation plans should review comprehensive planning documents for relevant information.

Goal 2: *All Cities and Counties*	• City and county land use plans shall include "inventories and other factual information for each applicable statewide planning goal ... " • "All land-use plans and implementation ordinances ... shall be reviewed and, as needed, revised on a periodic cycle to take into account changing public policies and circumstances, in accord with a schedule set forth in the plan."
Goal 7: *All Cities and Counties*	• Statewide Land Use Planning Goal 7: Areas Subject to Natural Hazards aims to protect people and property from natural hazards.[11] Goal 7 guidelines for planning state that in adopting plan policies and implementing measures to protect people and property from natural hazards, local governments should consider: a. The benefits of maintaining natural hazard areas as open space, recreation, and other low density uses; b. The beneficial effects that natural hazards can have on natural resources and the environment; and c. The effects of development and mitigation measures in identified hazard areas on the management of natural resources. • Furthermore, the guidelines state that local government should coordinate their land use plans and decisions with emergency preparedness, response, recovery, and mitigation programs.
Goal 17: *Coastal Cities and Counties Only*	• Requires local governments to develop programs to "reduce the hazard to human life and property ... resulting from the use and enjoyment of Oregon's coastal shorelands." • Requires that "[l]and use plans, implementing actions and permit reviews shall include consideration of ... the geologic and hydrologic hazards associated with coastal shorelands." • Requires that "[i]nventories shall be conducted to provide information necessary for ... designating uses and policies. These inventories shall provide information on the nature, location, and extent of geologic and hydrologic hazards ... in sufficient detail to establish a sound basis for land and water use management."
Goal 18: *Coastal Cities and Counties Only*	• Requires local governments to "reduce the hazard to human life and property from natural or man-induced actions associated with [coastal beach and dune areas]." • Requires inventories to be conducted, which "shall describe the stability, movement, [and] hazards ... of the beach and dune areas in sufficient detail to establish a sound basis for planning and management." • "Local governments ... shall base decisions on plans, ordinances and land use actions in beach and dune areas, other than older stabilized dunes, on specific findings that shall include at least: ... Hazards to life, public and private property ... which may be caused by the proposed use."

6.5: Does the plan identify organizations that will coordinate and implement mitigation action items?

The plan needs to identify functions and responsibilities of lead and support organizations, including voluntary and private organizations/ groups where appropriate. Also, it should discuss how local, regional, and state agencies can work together to leverage resources. The plan should identify the following:

- Potential funding sources to assist in implementing plan action items;
- Strategies illustrating how the local plan will be implemented and administered by the local government;
- Discussion of how officials will approach and manage mitigation actions; and
- Lead and support organizations to take responsibility for implementing recommended action items.

Tip 6.5: Develop a plan of action

When issues are identified in the mitigation plan as a potential problem for the community, an appropriate action item should be recommended to develop solutions to each problem. These action items should detail specific activities, a timeline, coordinating and partner organizations, and resources for implementation. Resources may be potential grants or other funding sources, related planning activities, or time and/or material resources that will be essential for activity implementation. In addition, each activity should identify the plan goals that it is assisting in accomplishing.

Table 6.1. Mitigation Action Item Matrix (Example)

City/County Natural Hazards Mitigation Plan

Hazard	Problem/ Risk	Mitigation Action Items					
		Activity	**Timeline**	**Coordinating Organizations**	**Partner Organizations**	**Resources**	**Plan Goals Addressed**
Multi-hazard	Implementing action items recommended in the mitigation plan	Establish a committee to implement, monitor, and evaluate mitigation activities.	Short-term: *6 months*	City Emergency Manager	City Planning Department, watershed council, OEM, school district, utility companies, City Hall	City hall	Implementation
Flood	Repetitive loss to 5 homes in the 100-year floodplain	Seek funding to elevate homes above Base Flood Elevation level, or for acquisition and demolition.	Short-term: *6 to 18 months*	City Emergency Manager	City Planning Department, OEM	FEMA's HMGP or FMA Program	Property Protection
Earthquake	Critical facilities that are not stable or retrofitted to withstand impact from an earthquake	Pursue regulatory mandates for structural mitigation of critical facilities.	Short-term: *1-2 years*	City Planning Department	School district, hospital, OEM, DOGAMI, OSSPAC		Property
Wildfire	Lack of understanding by the public about the risk wildfire poses to their community	Develop and implement, or enhance existing outreach and education programs aimed at mitigating wildfire hazards.	Long-term: *Ongoing*	Local Fire Department or Fire Defense Board	School districts, OEM, ODF, Local government	FireWise, FireFree	Education and Outreach

So What Should My Plan Have?

NFIP lays out a number of goals and activities that must be addressed in flood mitigation plans funded by the Flood Mitigation Assistance Program. These goals are critical to sound floodplain management. A flood mitigation plan should include:

- Recommended activities designed to reduce the number of properties that have experienced two or more losses in flood events; and
- Recommended activities that address prevention, property protection, emergency services measures, structural projects, natural resource protection, and public information programs.

Associated State and Federal Guidelines

Step 6: Develop Solutions	State and Federal Guidelines and Requirements Met in Step #6
6.1 Does the plan include action items that support the mitigation plan goals?	DMA2K #10 and OEM Evaluation Criteria Checklist for Local Natural Hazards Mitigation Plan Review
6.2 Are the mitigation action items identified in the plan economically, environmentally, and socially feasible?	Community Rating System Guideline #7, DMA2K #10
6.3 If the plan addresses flood mitigation, does it include action items that meet National Flood Insurance Program requirements?	Community Rating System Guideline #7, DMA2K #11
6.4 Does the mitigation plan include action items that address Oregon laws related to natural hazards?	OEM Evaluation Criteria Checklist for Local Natural Hazards Mitigation Plan Review
6.5 Does the plan identify organizations that will coordinate and implement mitigation action items?	DMA2K #15, OEM Evaluation Criteria Checklist for Local Natural Hazards Mitigation Plan Review

Local Natural Hazard Mitigation Plans:

An Evaluation Process

Step 7: Set the plan in motion

Step #7: Set the plan in motion

7.1: Is the information in the mitigation plan presented clearly and is it easy to understand?

The hazard mitigation plan should have a logical layout, and include the background, purpose, and methodology of the planning process. The mitigation plan should also include a table-of-contents and definitions of terms and acronyms.

Tip 7.1: Sample framework for a mitigation plan

I. History of the hazard(s) *(insert the hazards your plan addresses here)* and losses to the community
II. Causes and characteristics of the hazard(s) in the community
III. The effect of community growth and development on the hazard event(s)
IV. Community hazard assessment
   a. Hazard identification - where is the hazard located?
   b. Vulnerability assessment - how many residents, properties, businesses, etc., are residing in hazard areas?
   c. Risk Analysis - what is the probability that life and property will be impacted by a given natural hazard event, and what is the total amount of loss that may be incurred?
V. Community problems relating to the hazard event(s)
VI. Existing mitigation activities that are addressing community problems
VII. Mitigation action items – activities that will assist in solving the community problems for which no mitigation activities exist.
   a. Timeline
   b. Desired outcome
   c. Estimated budget
   d. Coordinating and partner organizations
   e. Potential resources

Information Key

For more information on Hazard Assessment, refer to *Planning for Natural Hazards: Oregon Technical Resource Guide*, or FEMA's *Understanding Your Risks: Identifying Hazards and Estimating Losses.*

7.2: Does the mitigation plan include estimated costs for mitigation activities and potential funding sources?

Local and regional mitigation plans can provide a strong foundation for implementing plan action items by developing activity budgets and identifying potential grant programs, bond measures, or other funding sources. The State Natural Hazards Mitigation Plan specifically requires that state designated "small and impoverished communities" must include a section describing how funds available under this program will be used to maximize benefits to all citizens within the community. Each activity must have one or more funding sources (or other resources) designated for its implementation or a budget explaining how the action items will be financed.

Additionally, each action item should have a timeline that is short-term or long-term. Short-term action items are those activities that can be implemented with existing resources or within the current budget cycle. Long-term action items require external resources and may take up to five years for full implementation.

Tip 7.2: Define the implementing measures of the plan

To ensure implementation of mitigation plan action items, clear procedures for monitoring implementation, reviewing progress, and recommending revisions should be established. A strategy to ensure plan implementation, monitoring, and evaluation is to establish a formal hazard mitigation committee. Members of this committee could be the coordinating organizations of the mitigation plan and members of the planning committee that assisted in developing the plan. The hazard mitigation committee's primary role is to coordinate implementation of plan action items, work with partner organizations, meet activity timelines, and identify and pursue funding for activities.

7.3: Does the mitigation plan include provisions for monitoring, evaluating, and revising the plan?

The plan should include a section describing the established method and schedule of monitoring, evaluating, and updating the mitigation plan at least biennially, but preferably annually.

Tip 7.3: Monitoring and Evaluation

Mitigation plans should be reviewed and amended as appropriate. This can be on a defined periodic basis, when planning laws change, or after disasters. FEMA suggests updates for flood mitigation plans reflect:

- Changes in characteristics of the floodplain or floodway brought about by a flood or other disaster;
- Changes in population, land use, or development;
- Changes in community goals or priorities;
- Unanticipated changes in the floodplain or floodway due to development in the area; and
- Advances in flood mitigation knowledge, strategies, or techniques.

Following these suggestions will assist in meeting FEMA requirements for flood mitigation plans, as well as applying an effective evaluation methodology for the rest of your plan.

7.4: Has the appropriate authority within your community adopted the mitigation plan?

The mitigation plan must be presented to the proper authority for formal adoption. This may require holding public hearings and getting the legislative body and chief executive to adopt the plan. Formal adoption can do the following:

- Demonstrate community commitment to efforts aimed at reducing potential loss from hazard events;
- Prepare the public for what the community can be expected to do before and after a hazard event;
- Ensure continuity of hazard loss reduction efforts over time;
- Ensure eligibility for funding under several federal programs; and
- Result in additional credit under the Community Rating System for action items specifically related to flood mitigation.

Tip 7.4: Who has the authority to adopt a community mitigation plan?

Many state and federal funding programs require formal adoption of mitigation plans. City Councils or County Boards, Planning Commissions, and Planning Boards can adopt a community plan.

Once a community mitigation plan has been formally adopted, the plan can be set in motion. Implementation of action items set forth in the plan document make way for successful hazard mitigation planning.

Associated State and Federal Guidelines

Step 7: Set the plan in motion	State and Federal Guidelines and Requirements Met in Step #7
7.1 Is the information in the mitigation plan presented clearly and is it easy to understand?	Community Rating System Guideline #8, DMA2K #13, and Local Natural Hazards Mitigation Plan Review and Evaluation Checklist
7.2 Does the mitigation plan include estimated costs for mitigation activities and potential funding sources?	Community Rating System Guideline #8, DMA2K #19, and Local Natural Hazards Mitigation Plan Review and Evaluation Checklist
7.3 Does the mitigation plan include provisions for monitoring, evaluating, and revising the plan?	Community Rating System Guideline #10, DMA2K #16, and Local Natural Hazards Mitigation Plan Review and Evaluation Checklist
7.4 Has the appropriate authority within your community adopted the mitigation plan?	Community Rating System Guideline #9, DMA2K #18, and Local Natural Hazards Mitigation Plan Review and Evaluation Checklist

References

Burby, Raymond, ed. *Cooperating with Nature: Confronting Natural Hazards with Land Use Planning for Sustainable Communities* (1998) National Academy of Sciences.

Community Planning Workshop, University of Oregon, *Planning for Natural Hazards: The Oregon Technical Resource Guide*, Department of Land Conservation and Development (July 2000).

Community Planning Workshop, University of Oregon, *Evaluation of Oregon Statewide Land Use Planning Goal 7* (1998).

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

Leduc, Andre & Hanschka, Steve, Needs Assessment: Development and Implementation of a Technical Resource Guide (1999).

Platt, Rutherford H. *Disasters and Democracy: The Politics of Extreme Natural Events* (1999) Islands Press.

Mileti, Dennis *Disasters by Design* (1999) University of Colorado at Boulder.

Schwab J. et al, *Planning for Post Disaster Recovery and Reconstruction* (1998) APA/FEMA.

Understanding Your Risks – Identifying Hazards and Estimating Loss (2001) Federal Emergency Management Agency.

Federal Programs and Policies including:

- Disaster Mitigation Act of 2000, Section 322 (PL 106-390)
- National Flood Insurance Program's Community Rating System
- FEMA's Flood Mitigation Assistance Program

National examples of mitigation plans and mitigation plan guidebooks, including:

- Flood Hazard Mitigation Planning: A Community Guide (1997) Massachusetts Department of Environmental Management
- Hazard Mitigation in North Carolina: Measuring Success, North Carolina Emergency Management Division and FEMA
- Wisconsin's Community Flood Mitigation Planning Guidebook (1995) Wisconsin Department of Natural Resources
- Strategy for Reducing Risks from Natural Hazards in Pawtucket, Rhode Island (1998) Coastal Resources Center, University of Rhode Island, Rhode Island Emergency Management, and City of Pawtucket.

Oregon natural hazard mitigation plans including Clackamas County (1998); Columbia County (1998); Metro Regional Government's Regional Hazard Mitigation Policy and Planning Guide (June 1999); Eagle Point (2000); and Washington County (2001).

Endnotes:

[1] The Land Conservation and Development Commission adopted amendments to Statewide Planning Goal 7 on September 28, 2001. The amendments become effective on June 1, 2002.

[2] Federal Emergency Management Agency, http://www.fema.gov/mit/plan01_02n.htm.

[3] Governor's Flood and Landslide Hazard Mitigation Policy, May 1996.

[4] ORS Chapter 197: Comprehensive land use planning coordination; ORS Chapter 215: County Planning; and ORS 227: City planning and zoning.

[5] The Land Conservation and Development Commission (LCDC) adopted amendments to Statewide Planning Goal 7 on September 28, 2001. The amendments will become effective on June 1, 2002.

[6] *Understanding Your Risks – Identifying Hazards and Estimating Loss*, FEMA, August 2001.

[7] *Understanding Your Risks – Identifying Hazards and Estimating Loss*, FEMA, August 2001.

[8] FEMA guidelines also require the development of plan objectives. Objectives are measurable strategies that, when accomplished, assist communities in reaching their goals. This planning model uses action items as the term to describe the recommended activities to assist in reaching plan goals.

[9] Oregon Mitigation Task Force, Governor's Flood and Landslide Hazard Mitigation Policy.

[10] Derived from Massachusetts Department of Environmental Management, *Flood Hazard Mitigation Planning: A Community Guide*, FEMA, NRCS, June 1997.

[11] The Land Conservation and Development Commission (LCDC) adopted amendments to Statewide Planning Goal 7 on September 28, 2001. The amendments will become effective on June 1, 2002.

[12] The Land Conservation and Development Commission adopted amendments to Statewide Planning Goal 7 on September 28, 2001. The amendments will become effective on June 1, 2002.

Lincoln County 1999

Source: *Oregon Emergency Management*

Local Natural Hazard Mitigation Plans:

An Evaluation Process

Appendices

State of Oregon

Local Natural Hazard Mitigation Plans:

An Evaluation Process

Appendix A: Evaluation Criteria Checklist

January 2002

Showcase State

Partners for Disaster Resistance
Oregon, Showcase State

Oregon Emergency Management

Oregon emergency management

Department of Land Conservation and Development

Prepared by:

Oregon Natural Hazards Workgroup

Community Service Center
University of Oregon
541-346-3588
http://www.darkwing.uoregon.edu/~onhw

ONHW

Evaluation Criteria Checklist for Local Natural Hazards Mitigation Plan Review

In conjunction with this evaluation tool, Oregon Emergency Management (OEM) has developed the ***Evaluation Criteria Checklist for Local Natural Hazards Mitigation Plan Review***. This serves as a crosswalk between all various state guidelines and federal criteria for natural hazard mitigation plans. This is the tool that OEM uses in evaluating local natural hazard mitigation plans.

This crosswalk was developed using various state and federal guidelines and requirements. Table A-1 illustrates the sources, the acronym used in the crosswalk, and the number of guidelines/requirements listed in the crosswalk.

Table A-1: Crosswalk Sources

Source	Acronym	# of guidelines for mitigation plans
Community Rating System	CRS	10
Disaster Mitigation Act 2000	DMA2K	19
Essential State Criteria (Developed by Oregon Emergency Management)	ESC	14
Preferred State Criteria	PSC	20
American Planning Association	APA	10
Hazard Mitigation Grant Program	HMGP	1
Flood Mitigation Assistance Program	FMA	1

This matrix is a crosswalk of the various state guidelines and federal criteria that need to be addressed in local natural hazard mitigation plans. This is the tool that OEM will use in evaluating local mitigation plans from around the state.

Local Natural Hazard Mitigation Plans: Evaluation Checklist

Step #1: Organize to prepare the plan		Source	Is this in the plan?	Where? Page #
1.1	***Does the plan include a description of why your community developed the mitigation plan?***			
1.a	Make the decision to plan for post-disaster recovery and reconstruction.	APA #1		
1.b	Communities that have received FMA Program funds must develop flood mitigation plans.			
1.c	Developing a Flood Mitigation plan increases the rating for communities participating in the Community Rating System program.	CRS		
1.d	Communities that have received Hazard Mitigation Grant Program funding. *(Mitigations plans are not a requirement of this typed of funding, but may be developed with HMGP funds.)*	HMGP		
1.2	***Was there a planning committee to oversee development of the mitigation plan?***			
1.2.a	A committee that includes the organizations responsible for implementing plan provisions must develop the plan.	ESC #1		
1.2.b	Form a taskforce to develop the plan.	APA #2		
1.2.c	A person has been identified to coordinate local hazard mitigation activities including plan implementation and monitoring.	APA #3, PSC #6		
Step 2: Involve the Community				
2.1	***Was the public involved with the planning process?***			
2.1.a	The planning process must involve the general public.	ESC #2		
2.1.b	Discussion on how the community will maintain public participation in the planning process.	DMA2K #17		
2.1.c	Stakeholders include: property, land and home owners, and renters exposed to the hazard, representatives of neighborhood organizations, business owners and managers, managers of critical facilities, farmers and other who affect watershed conditions, land developers, real estate agents, lenders, and others who affect the future development of the community.	CRS #2		

Local Natural Hazard Mitigation Plans: Evaluation Checklist

Step 2: Involve the Community (continued)		Source	Is this in the plan?	Where? Page #
2.1.d	The plan has been made available to all stakeholders including the general public by means of public libraries, websites, and other venues.	ESC #12		
2.1.e	Present your findings to the community and get feedback. Develop clear, effective educational materials, and hold public forums to discuss the problem.	APA #5		
2.1.f	Build public consensus around the need to develop and implement a plan.	APA #6		
2.1.g	The committee that developed the plan included members of the public.	PSC #1		
2.2 Did your community involve local, regional, and state agencies and organizations in the planning process?				
2.2.a	Other agencies were contacted at the beginning of the planning process.	CRS 2002		
2.2.b	Neighboring jurisdictions and appropriate regional, state, tribal, and federal agencies participated in the development of the plan.	PSC #2		
2.2.c	The community demonstrates commitment to reducing damages from natural disasters through development of partnerships with businesses, academia, and other private/non-profit interests able to provide financial or technical assistance in support of mitigation goals and priorities.	DMA2K #12		
2.2.d	Agencies and organizations to coordinate with include: FEMA, state natural and water resources departments, emergency and coastal zone management agencies, planning or local government affairs office, regional or metropolitan planning, water, sewer, and sanitary districts, USDA, USACE, NWS, USGS and USFW, American Red Cross, planning commissions, PTAs and churches, environmental advocacy groups, civic organizations, and land trusts.	CRS #3		
2.3 Did your community work with local, state, and regional agencies and organizations to identify mitigation activities and assist with implementation?				
2.3.a	A section on describing any interagency agreements necessary for plan implementation.	DMA2K #14		
2.3.b	Description of how the plan will be implemented and administered by the local government.	DMA2K #15		

Local Natural Hazard Mitigation Plans: Evaluation Checklist

Step 2: Involve the Community (continued)		Source	Is this in the plan?	Where? Page #
2.3.c	A discussion of how coordination with the state will occur during plan implementation.	DMA2K #15		
2.3.d	Discuss individual positions and agencies/ departments with specific responsibilities in this regard, and identification of potential funding sources.	DMA2K #15		
2.3.e	Was a draft plan sent to other agencies and other organizations for comment during plan development (prior to adoption?).	CRS 2002		
Step 3: Describe your community and how mitigation is currently addressed				
3.1	***Do the contents of the mitigation plan provide a profile of your community?***			
3.1.a	A general description of development trends within the community and a discussion of actions to mitigate disaster losses in these areas.	DMA2K #13		
3.1.b	What are the future directions of the community? (e.g., population growth, economic and land development, redevelopment, historic preservation, recreation needs, and vacant lands.)	CRS #5		
3.1.c	The plan addresses anticipated changes in the community, which will alter hazard risk such as increased percentage of impervious surfaces, other changes in the watershed, population or demographic changes, etc..	PSC #11		
3.2	***Does the plan list policies and requirements that pertain to the hazards addressed in the plan?***			
3.2.a	The plan references laws, regulations, ordinances, administrative rules, etc. that establish the legal basis for the mitigation measures being proposed.	PSC #10		
3.2.b	The plan must include information on local hazard management policies, programs, and capabilities to mitigate the hazards addressed by the plan.	ESC #5		
3.3	***Does the mitigation plan describe mitigation activities that are currently in place within your community?***			
3.3.a	The plan notes significant hazard mitigation activities, projects, tasks, etc. which have been implemented/accomplished in the past, including those which were proposed in any previous version of the plan.	PSC #7		

Local Natural Hazard Mitigation Plans: Evaluation Checklist

Step 3: Describe your community and how mitigation is currently addressed (continued)		Source	Is this in the plan?	Where? Page #
3.3.b	Information on whether the community has had a Building Code Effectiveness Grading Report (BCEGS) performed by the Insurance Services Office, Inc., and, if so, what BCEGS score they received.	DMA2K #8		
Step 4: Identify and characterize the natural hazards impacting your community				
4.1	***Did your community identify and map the hazards addressed in your mitigation plan?***			
4.1.a	Identify the hazard areas and map the hazard.	CRS #4		
4.1.b	The plan includes a description and evaluation (analysis) of one or more natural hazards.	ESC #3		
4.1.c	The plan includes maps and/or other graphic displays, to delineate hazard areas.	PSC #5		
4.1.d	Document the hazards and risks for your community.	APA #4		
4.1.e	The plan includes a discussion of past hazard events, a description of the various hazard types threatening the community, and maps outlining all hazard areas within the community.	DMA2K #1, #2 & #3		
4.2	***Did your community conduct a vulnerability assessment?***			
4.2.a	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).	DMA2K #4		
4.2.b	A map and discussion of repetitive flood loss properties and potential mitigation activities for these properties.	DMA2K #5		
4.2.c	The plan includes a summary of potential impacts on residents and the economy and an estimation of potential losses for each hazard type.	DMA2K #6 & #7		
4.2.d	If the plan was developed in response to a Presidential major disaster declaration, it must minimally address the hazard(s) that brought about the declaration.	ESC #4		

Local Natural Hazard Mitigation Plans: Evaluation Checklist

Step 4: Identify and characterize the natural hazards impacting your community (continued)		Source	Is this in the plan?	Where? Page #
4.3	***Did your community conduct a risk analysis for the hazards addressed in your mitigation plan?***			
4.3.a	The plan addresses the following risks which may be located in the hazard area: people, property, and buildings, critical facilities, roads, bridges, other transportation systems infrastructure, water and sewage treatment plants, utilities, and other infrastructure.	CRS #5		
4.3.b	If the plan was developed in response to a Presidential major disaster declaration, it must include an evaluation of natural hazards in the declared area.	ESC #4		
4.4	***Are the major issues and concerns facing your community listed in the plan?***			
4.4.a	The plan notes protection measures in effect or under construction, impacts of past disasters, and undeveloped areas and wetlands that provide natural and beneficial functions.	CRS #5		
Step 5: Define Plan Goals				
5.1	***Did your community develop plan goals?***			
5.1.a	Set goals (vision and consensus).	CRS #6		
5.1.b	A description of local mitigation goals and objectives (should be linked to the state plan) with proposed strategies, programs, and actions to reduce or avoid long term vulnerabilities to the identified hazards.	DMA2K #9		
5.1.c	The plan must include hazard mitigation goals/objectives, which seek to reduce future vulnerability to each hazard covered by the plan.	ESC #6		
Step 6: Develop Solutions				
6.1	***Does the plan include action items that support the mitigation plan goals?***			
6.1.a	A section that identifies, describes, and prioritizes specific cost effective mitigation projects and actions that will reduce damages from future natural disasters; a discussion of how these actions supports the mitigation goals and priorities of the state and community.	DMA2K #10		
6.1.b	The plan calls for areas that will provide natural and beneficial functions such as parks, wetlands, riparian corridors, natural resource areas, nature preserves, etc..	PSC #16		

Local Natural Hazard Mitigation Plans: Evaluation Checklist

Step 6: Develop Solutions (continued)		Source	Is this in the plan?	Where? Page #
6.1.c	The plan directs implementation or improvement of warning methods as a way of reducing future damage, injury, and loss-of-life.	PSC #17		
6.1.d	The plan identifies and directs mitigation actions with regard to critical facilities such as lifeline utilities, hospitals, fire stations, chemically hazardous areas, etc..	PSC #18		
6.1.e	Preservation or creation of open space is among the measures proposed.	PSC #15		
6.1.f	The elevation, relocation, and/or acquisition of dwellings and/or other buildings are proposed in the plan.	PSC #19 & 20		
6.1.g	The plan includes public outreach projects and/or actions.	PSC #13		
6.1.h	Strategies address: preventative activities, property protection, emergency services measures, structural projects, natural resource protection, public information programs.	CRS #7		
6.1.i	The plan must include proposed strategies, measures, projects, actions, and/or tasks to implement stated hazard mitigation goals/objectives for each hazard.	ESC #7		
6.2	***Does the plan identify mitigation activities that are economically, environmentally, and socially feasible?***			
6.2.a	For each strategy, decision makers should ask: Is the measure technically appropriate for the hazard? Does it support any of the plan goals and objectives? Do its benefits exceed its costs? Is it affordable? Will it comply with all local, state, and federal regulations? Is it fair to all concerned? Is the project beneficial/neutral/harmful to the environment? How will the hazard area look after project completion?	CRS #7		
6.2.b	Each activity, project, or task must have one or more funding sources (or other resources) designated for its implementation.	ESC #10		
6.3	***If the plan addresses flood mitigation, does it include activities that meet National Flood Insurance Program requirements?***			
6.3.a	A description of activities to be conducted to ensure compliance with the NFIP including activities designed to reduce the number of NFIP target repetitive loss properties.	DMA2K #11		

Local Natural Hazard Mitigation Plans: Evaluation Checklist

Step 6: Develop Solutions (continued)		Source	Is this in the plan?	Where? Page #
6.4	***Does the mitigation plan include action items that address Oregon laws related to natural hazards?***			
6.4.a	Where appropriate, building code and/or construction standards are included among the measures, projects, and/or actions proposed.	ESC #14 #14		
6.4.b	Where appropriate, requirements and guidelines set forth in State Land Use Planning Goals are included among the measures, projects, and/or actions proposed in the mitigation plan (e.g., Goal 2: Land Use, Goal 5: Natural Resources, Goal 7: Natural Hazards, Goal 17: Coastal Shorelands, and Goal 18: Beaches and Dunes).	ESC #13		
6.4.c	Develop the plan; prepare plan elements as needed; link the plan to other plans; link the plan to land use regulations.	APA #7		
6.4.d	Where appropriate, the plan calls for the provision of technical assistance to the general public, businesses, and other organizations to assist these stakeholders in reducing their vulnerability to natural hazards.	PSC #14		
6.5	***Does the plan identify organizations that will coordinate and implement mitigation activities?***			
6.5.a	The plan identifies functions and responsibilities of lead and support organizations, including voluntary and private organizations/groups where appropriate.	PSC #9		
6.5.b	Each activity, project, or task must have one or more organizations identified as being responsible for its implementation (lead and support organizations).	ESC #9 #9		
6.5.c	A discussion of how officials will approach and manage mitigation actions involving the acquisition of private property.	DMA2K #15		
Step7: Set the Plan in Motion				
7.1	***Is the information in the mitigation plan presented clearly and is it easy to understand?***			
7.1.a	The plan includes a table-of-contents.	PSC #3		
7.1.b	The plan includes a definition of terms and acronyms.	PSC #4		
7.1.c	A description of how the plan was prepared.	CRS #8		
7.1.d	Describe the hazard assessment, problem assessment, goals and objectives, possible mitigation activities and the action plan.	CRS #8		

Local Natural Hazard Mitigation Plans: Evaluation Checklist

Step 7: Set the Plan in Motion (continued)		Source	Is this in the plan?	Where? Page #
7.1.e	The plan notes strategies, measures, projects, actions, and/or tasks which were considered but not recommended.	PSC #8		
7.2	***Does the mitigation plan include estimated costs for mitigation activities, and potential funding sources?***			
7.2.a	Recommendations for action and a budget explaining financing for actions.	CRS #8		
7.2.b	State designated "small and impoverished communities" must also include a section describing how funds available under this program will be used to maximize benefits to all citizens within the community.	DMA2K #19		
7.3	***Does the mitigation plan include provisions for monitoring, evaluating, and revising the plan?***			
7.3.a	The plan must have timelines, target dates, or deadlines, which describe when activities, projects, or tasks are slated for completion.	ESC #8		
7.3.b	The plan includes procedures for monitoring implementation, reviewing progress, updating the mitigation plan, and recommending revisions at least biennially but preferably on an annual basis.	CRS #10, DMA2K #16 and PSC #12		
7.3.c	Implement the plan, set pre-disaster elements in motion; when disaster strikes, be ready to act.	APA #9		
7.3.d	Review and amend plan as appropriate on a periodic basis, when planning laws change, or after disasters.	APA #10		
7.4	***Has the appropriate authority within your community adopted the mitigation plan?***			
7.4.a	One or more local governing bodies covered by the plan have adopted it.	ESC #11		
7.4.b	Formal adoption of the plan by the community.	DMA#18 & CRS #9		
7.4.c	Present the plan for adoption, hold public hearings, get the legislative body and chief executive to adopt the plan.	APA #8		

State of Oregon

Local Natural Hazard Mitigation Plans:

An Evaluation Process

Appendix B: Hazard Assessment Worksheets

January 2002

Showcase State

Partners for Disaster Resistance
Oregon, Showcase State

Oregon Emergency Management

Oregon emergency management

Department of Land Conservation and Development

Prepared by:

Oregon Natural Hazards Workgroup

Community Service Center
University of Oregon
541-346-3588
http://www.darkwing.uoregon.edu/~onhw

ONHW

Hazard Assessment Worksheets

The following worksheets are included in FEMA's recently published 'how-to-guide' for state and local mitigation planning: *Understanding Your Risks – Identifying Hazards and Estimating Loss*. The document provides technical and resource assistance for planning and implementing natural hazard mitigation projects. For more information or to obtain a copy of the FEMA planning document, contact FEMA publications at (800) 480-2520 or visit http://www.fema.gov/mit/planning_toc3.htm. The worksheets are as follows:

Worksheet #1: Identify the Hazards
Worksheet #2: Profile Hazard Events
Worksheet #3: Inventory Assets
Worksheet #4: Estimate Losses
Worksheet #5: Wildfire Hazard Rating Form

Worksheet #1 — Identify the Hazards — step 1

Date:

What kinds of natural hazards can affect you?

Task A. List the hazards that may occur.

1. *Research newspapers and other historical records.*
2. *Review existing plans and reports.*
3. *Talk to the experts in your community, state, or region.*
4. *Gather information on Internet Websites.*
5. *Next to the hazard list below, put a check mark in the Task A boxes beside all hazards that may occur in your community or state.*

Task B. Focus on the most prevalent hazards in your community or state.

1. *Go to hazard Websites.*
2. *Locate your community or state on the Website map.*
3. *Determine whether you are in a high-risk area. Get more localized information if necessary.*
4. *Next to the hazard list below, put a check mark in the Task B boxes beside all hazards that pose a significant threat.*

	Task A	Task B
Avalanche	☐	☐
Coastal Erosion	☐	☐
Coastal Storm	☐	☐
Dam Failure	☐	☐
Drought	☐	☐
Earthquake	☐	☐
Expansive Soils	☐	☐
Extreme Heat	☐	☐
Flood	☐	☐
Hailstorm	☐	☐
Hurricane	☐	☐
Land Subsidence	☐	☐
Landslide	☐	☐
Severe Winter Storm	☐	☐
Tornado	☐	☐
Tsunami	☐	☐
Volcano	☐	☐
Wildfire	☐	☐
Windstorm	☐	☐
Other_____	☐	☐
Other_____	☐	☐
Other_____	☐	☐

Note: ***Bolded*** *hazards are addressed in this How-To Guide.*

Use this space to record information you find for each of the hazards you will be researching. Attach additional pages as necessary.

Hazard or Event Description (type of hazard, date of event, number of injuries, cost and types of damage, etc.)	**Source of Information**	**Map Available for this Hazard?**	**Scale of Map**

Source: Understanding Your Risks – Identifying Hazards and Estimating Loss

Worksheet #2 — Profile Hazard Events — step 2

Date: *How Bad Can It Get?*

Task A. Obtain or create a base map.

You can use existing maps from:

- *Road maps*
- *USGS topographic maps or Digital Orthophoto Quarter Quads (DOQQ)*
- *Topographic and/or planimetric maps from other agencies*
- *Aerial topographic and/or planimetric maps*

OR you can create a base map using:

- *Field surveys*
- *GIS software*
- *CADD software*
- *Digitized paper maps*

Title of Map	Scale	Date

Flood	☐ 1. Get a copy of your FIRM. _____ ☐ 2. Verify the FIRM is up-to-date and complete. _____ _____	☐ 1. Transfer the boundaries from your FIRM onto your base map (floodway, 100-yr flood, 500-yr flood). ☐ 2. Transfer the BFEs onto your base map.
Earth-quake	☐ 1. Go to the http://geohazards.cr.usgs.gov Website. ☐ 2. Locate your planning area on the map. ☐ 3. Determine your PGA.	☐ 1. Record your PGA: _____ ☐ 2. If you have more than one PGA print, download or order your PGA map.
Tsunami	☐ 1. Get a copy of your tsunami inundation zone map. _____ _____	☐ 1. Copy the boundary of your tsunami inundation zone onto your base map.
Tornado	☐ 1. Find your design wind speed. _____ _____	☐ 1. Record your design wind speed: _____ ☐ 2. If you have more than one design wind speed, print, download, or copy your design wind speed zones, copy the boundary of your design wind speed zones on your base map, then record the design wind speed zones on your base map.
Coastal Storm	☐ 1. Get a copy of your FIRM. _____ ☐ 2. Verify that the FIRM is up-to-date and complete. _____ ☐ 3. Determine the annual rate of coastal erosion. _____ ☐ 4. Find your design wind speed. _____	☐ 1. Transfer the boundaries of your coastal storm hazard areas onto your base map. ☐ 2. Transfer the BFEs onto your base map. ☐ 3. Record the erosion rates on your base map: _____ ☐ 4. Record the design wind speed here and on your base map: _____
Land-slide	☐ 1. Map location of previous landslides. _____ ☐ 2. Map the topography. _____ ☐ 3. Map the geology. _____ ☐ 4. Identify the high-hazard areas on your map. _____	☐ 1. Mark the areas susceptible to landslides onto your base map.
Wildfire	☐ 1. Map the fuel models located within the urban-wildland interface areas. _____ ☐ 2. Map the topography. _____ ☐ 3. Determine your critical fire weather frequency. _____ ☐ 4. Determine your fire hazard severity. _____	☐ 1. Draw the boundaries of your wildfire hazard areas onto your base map.
Other	☐ 1. Map the hazard. _____	☐ 1. Record hazard event info on your base map.

Source: Understanding Your Risks – Identifying Hazards and Estimating Loss

Worksheet #3a Inventory Assets step 3

Date: *What will be affected by the hazard event?*

Task A. Determine the proportion of buildings, the value of buildings, and the population in your community or state that are located in hazard areas.

Hazard _____

Type of Structure (Occupancy Class)	Number of Structures			Value of Structures			Number of People		
	# in Community or State	# in Hazard Area	% in Hazard Area	$ in Community or State	$ in Hazard Area	% in Hazard Area	# in Community or State	# in Hazard Area	% in Hazard Area
Residential									
Commercial									
Industrial									
Agricultural									
Religious/ Non-profit									
Government									
Education									
Utilities									
Total									

Task B. Determine whether (and where) you want to collect additional inventory data.

	Y	N
1. Do you know where your greatest damages may occur in your hazard areas?	_____	_____
2. Do you know whether your critical facilities will be operational after a hazard event?	_____	_____
3. Is there enough data to determine which assets are subject to the greatest potential damages?	_____	_____
4. Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards?	_____	_____
5. Is there enough data to determine whether certain areas of historic, environmental, political, or cultural significance are vulnerable to potential hazards?	_____	_____
6. Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence?	_____	_____
7. Is additional data needed to justify the expenditure of community or state funds for mitigation initiatives?	_____	_____

Source: Understanding Your Risks – Identifying Hazards and Estimating Loss

Worksheet #3b Inventory Assets step 3

Date: *What will be affected by the hazard event?*

Task C. Compile a detailed inventory of what can be damaged by a hazard event.

Inventory the assets (critical facilities, businesses, historic, cultural, and natural resource areas, and areas of special consideration), that can be damaged by a hazard event.

Hazard _____

Name or Description of Asset	Sources of Information	Critical Facility ✓	Vulnerable Populations ✓	Economic Assets ✓	Special Considerations ✓	Historic/Other Considerations ✓	Size of Building (sq ft)	Replacement Value ($)	Contents Value ($)	Function Use or Value ($)	Displacement Cost ($ per day)	Occupancy or Capacity (#)	Other Hazard Specific Information

Source: Understanding Your Risks – Identifying Hazards and Estimating Loss

Worksheet #4 — Estimate Losses — step 4

Date:

How will these hazards affect you?

Hazard _____

Structure Loss (Task A.1.)						Contents Loss (Task A.2.)				
Name/ Description of Structure	Structure Replacement Value (Step 3) **($)**	x	Percent Damage (Step 4) **(%)**	=	Loss to Structure **($)**	Replacement Value of Contents (Step 3) **($)**	x	Percent Damage (Step 4) **(%)**	=	Loss to Contents **($)**
		x		=			x		=	
		x		=			x		=	
		x		=			x		=	
		x		=			x		=	
		x		=			x		=	
		x		=			x		=	
		x		=			x		=	
		x		=			x		=	
Total Loss to Structure						**Total Loss to Contents**				

Structure Use and Function Loss (Task A.3.)									
Name/ Description of Structure	Average Daily Operating Budget (Step 3) **($)**	x	Functional Downtime (Step 4) **(# of days)**	+	Displacement Cost per Day (Step 3) **($)**	x	Displacement Time (Step 4) **($)**	=	Structure Use & Function Loss **($)**
		x		+		x		=	
		x		+		x		=	
		x		+		x		=	
		x		+		x		=	
		x		+		x		=	
		x		+		x		=	
		x		+		x		=	
		x		+		x		=	
Total Loss to Structure Use & Function									

Structure Loss + Content Loss + Function Loss ($)
Total Loss for Hazard Event (Task B.2.)

Source: Understanding Your Risks – Identifying Hazards and Estimating Loss

Wildfire Hazard Rating Form
-Subdivision-

Name of Subdivision _____ Date _____

County _____ Size (Acres) _____ #Lots _____

Rating _____ Comments _____

A. Subdivision Design — **Points**

1. Ingress/Egress
   - Two or more primary roads ..... **1** _____
   - One Road ..... **3** _____
   - One-way in, one-way out ..... **5** _____

2. Width of Primary Road .....
   - 20 feet or more ..... **1** _____
   - 20 feet or less ..... **3** _____

3. Accessibility .....
   - Road Grade 5% or less ..... **1** _____
   - Road Grade 5% or more ..... **3** _____

4. Secondary Road Terminus: .....
   - Loop roads, cul-de-sacs with outside turning radius of 45 feet or greater ..... **1** _____
   - Cul-de-sac turnaround radius is less than 45 feet ..... **2** _____
   - Dead-end roads 200 feet or less in length ..... **3** _____
   - Dead-end roads greater than 200 feet in length ..... **5** _____

5. Average lot size
   - 10 acres or larger ..... **1** _____
   - Larger than 1 acre, but less than 10 acres ..... **3** _____
   - 1 acre or less ..... **5** _____

6. Street signs
   - Present ..... **1** _____
   - Not present ..... **5** _____

B. Vegetation

1. Fuel Types
   - Light ..... **1** _____
   - Medium ..... **5** _____
   - Heavy ..... **10** _____

2. Defensible Space
   - 70% or more of site ..... **1** _____
   - 30% or more, but less than 70% .... **3** _____
   - Less than 30% of site ..... **5** _____

C. Topography — **Points**

1. Predominant Slope
   - 8% or less ..... **1** _____
   - More than 8%, but less than 20% ... **4** _____
   - 20% or more, but less than 30% .... **7** _____
   - 30% or more ..... **10** _____

D. Roofing Material
   - Class A Rated ..... **1** _____
   - Class B Rated ..... **3** _____
   - Class C Rated ..... **5** _____
   - Non-Rated ..... **10** _____

E. Fire Protection – Water Source
   - 500 GPM Hydrant within 1,000 feet ..... **1** _____
   - Hydrant farther than 1,000 feet or draft site ..... **2** _____
   - Water source within 20 minutes or less, round trip ..... **5** _____
   - Water source farther than 20 minutes, and but less than 45 minutes round trip **7** _____
   - Water source farther than 45 minutes round trip ..... **10** _____

F. Existing Building Construction Materials
   - Noncombustible siding/deck ..... **1** _____
   - Noncombustible siding/combustible deck ..... **5** _____
   - Combustible siding and deck ..... **10** _____

G. Utilities
   - All underground utilities ..... **1** _____
   - One underground, one above ground .... **3** _____
   - All above ground ..... **5** _____

TOTAL FOR SUBDIVISION _____

RATING SCALE:

MODERATE HAZARD	**40-59**
HIGH HAZARD	**60-74**
EXTREME HAZARDS	**75+**

Source: Urban Wildland Interface Code, 2000

State of Oregon

Local Natural Hazard Mitigation Plans:

An Evaluation Process

Appendix C: Hazard-related Policies and Programs

January 2002

Showcase State

Partners for Disaster Resistance
Oregon, Showcase State

Oregon Emergency Management

Department of Land Conservation and Development

Prepared by:

Oregon Natural Hazards Workgroup

Community Service Center
University of Oregon
541-346-3588
http://www.darkwing.uoregon.edu/~onhw

Hazard-related Policies and Programs

This section provides information on state, federal, and national programs and policies related to natural hazards. Table C-1 provides an outline of the various programs and policies related to specific natural hazards that are discussed throughout this section.

Table C-1. Hazard Policies and Programs

Hazard	Oregon Policies and Programs	Federal and National Policies and Programs
Multi-Hazard	Local Comprehensive Plans	Federal Emergency Management Agency (FEMA) Pre-disaster mitigation planning
	Goal 2: Land Use Planning	
	Goal 7: Natural Hazards	American Planning Association (Resources on landslides, flooding, and post-disaster recovery)
	Oregon Building Codes	
Flood	Goal 5: Natural Resources, Scenic and Historic Areas, and Open Spaces	National Flood Insurance Program (NFIP).
	Division of State Lands (DSL) Fill and Removal Permit Program	NFIP Community Rating System and Flood Mitigation Assistance Programs
	The Oregon Plan for Salmon and Watersheds	FEMA Region X's Policy on Fish Enhancement Structures in the Floodway.
	Oregon's Wetlands Protection Program	Army Corps of Engineers Permit Program
Landslides	Goal 17: Coastal Shorelands	American Planning Association: Landslide Hazards and Planning
	The Oregon Plan for Salmon and Watersheds	
	Senate Bill 12: Rapidly moving landslides	
Coastal Hazards	Goal 17: Coastal Shorelands	National Flood Insurance Program (NFIP)
	Goal 18: Beaches and Dunes	NFIP V-Zone Construction
	Ocean Shore Regulation	
	Tsunamis - ORS 336.071, ORS 455.446, and ORS 455.488	Army Corps of Engineers Permit Program
Wildfire	Senate Bill 360: Wildland/Urban Interface	National Fire Protection Agency Firewise Program
	Additional Criteria for Forestland Dwellings ORS 215.730	
	Urban Interface Fire Protection - ORS 477.015-061	
Seismic	Senate Bill 13: Seismic Event Preparation	USGS Earthquake Hazards Program
	Senate Bill 14: Seismic Surveys For School Buildings	
	Senate Bill 15: Seismic Survey For Hospital Buildings	
	Senate Bill 96: Seismic Hazard Investigation	National Earthquake Hazards Reduction Program (NERHP) - FEMA/USGS Partnership
	Tsunamis - ORS 336.071, ORS 455.446, and ORS 455.448	
	Oregon Seismic Safety Policy Advisory Commission (OSSPAC) - ORS 401.337 to 401.353	

Statewide Land Use Planning Goals Related to Natural Hazards

Goal 2: Land Use Planning

Statewide Land Use Planning Goal 2: Land Use Planning establishes a land use planning process and policy framework as a basis for decisions and actions related to use of land. It also assures an adequate factual base exists for such decisions and actions.

Goal 5: Natural Resources, Scenic and Historic Areas, and Open Spaces

Statewide Land Use Planning Goal 5: Natural Resources, Scenic and Historic Areas, and Open Spaces. Local governments shall adopt programs that will protect natural resources and conserve scenic, historic, and open space resources for present and future generations. These resources promote a healthy environment and natural landscape that contributes to Oregon's livability.

Goal 7: Natural Hazards

Statewide Land Use Planning Goal 7: Areas Subject to Natural Hazards aims to protect people and property from natural hazards.[12] Goal 7 guidelines for planning state that in adopting plan policies and implementing measures to protect people and property from natural hazards, local governments should consider:

a. The benefits of maintaining natural hazard areas as open space, recreation and other low density uses;

b. The beneficial effects that natural hazards can have on natural resources and the environment; and

c. The effects of development and mitigation measures in identified hazard areas on the management of natural resources.

Furthermore, the guidelines state that local government should coordinate their land use plans and decisions with mitigation programs, response, recovery, and emergency preparedness.

Goal 17: Coastal Shorelands

Statewide Land Use Planning Goal 17: Coastal Shorelands is concerned with conservation and protection, as well as appropriate development of Oregon's coastal shorelands. It aims to reduce the hazard to human life and property, and the adverse effects upon water quality and fish and wildlife habitat resulting from the use and enjoyment of Oregon's coastal shorelands.

Goal 18: Beaches and Dunes

The purpose of Statewide Land Use Planning Goal 18: Beaches and Dunes is to conserve, protect, and where appropriate, to either develop on or restore resources and benefits of coastal beach and dune areas. It is also concerned with reducing the hazard to human life and property from natural or man-induced actions associated with these areas.

Oregon Building Codes

The Oregon Building Codes Division adopts statewide standards for building construction that are administered by the state and local municipalities throughout Oregon.

Oregon State Building Codes (Flood and Coastal)

The One- and Two- Family Dwelling Code and the Structural Specialty Code contain requirements to elevate a building at least one foot above the base flood elevation. These codes also contain provisions for flood proofing, underfloor drainage, and directing stormwater away from buildings.

Oregon State Building Codes (Landslides)

The One- and Two- Family Dwelling Code and the Structural Specialty Code contain provisions for lot grading and site preparation for the construction of building foundations. Both codes contain requirements for cut, fill and sloping of the lot in relationship to the location of the foundation. There are also building setback requirements from the top and bottom of slopes. The codes specify foundation design requirements to accommodate the type of soils, the soil bearing pressure, and compaction and lateral loads from soil and ground water on sloped lots. The building official has the authority to require a soils analysis for any project where it appears the site conditions do not meet the requirements of the code or that special design considerations must be taken. ORS 455.447 and the Structural Code require a seismic site hazard report for projects that include essential facilities such as hospitals, fire and police stations and emergency response facilities, and special occupancy structures, such as large schools and prisons. This report includes consideration of any potentially unstable soils and landslides.

Oregon State Building Codes (Coastal)

Coastal areas are subject to significant subduction type seismic activity. The northern coast is currently designated as Zone 3. Zone 4 extends from Otter Rock (just north of Newport) to the southern border of the state. These are the two highest risk zones addressed by building codes. The codes also contain provisions for the design and construction of buildings to resist lateral loads from earthquakes.

Oregon State Building Codes (Seismic)

The One- and Two-Family Dwelling Code and the Structural Specialty Code (both included in the State Building Code) contain maps identifying the various seismic zones for Oregon, as described in Section 2 of this guide. The Structural Specialty Code is based on the 1997 edition of the Uniform Building Code published by the International Conference of Building Officials and amended by the state of Oregon. The Uniform Building Code contains specific regulations for development within seismic zones. Within these standards are six levels of design and engineering specifications that are applied to areas

according to the expected degree of ground motion and site conditions that a given area could experience during an earthquake (ORS 455.447).

The Structural Code requires a site-specific seismic hazard report for projects including essential facilities such as hospitals, fire and police stations, emergency response facilities, and special occupancy structures, such as large schools and prisons. The seismic hazard report required by the Structural Code for essential facilities and special occupancy structures must take into consideration factors such as the seismic zone, soil characteristics including amplification and liquefaction potential, any known faults, and potential landslides. The findings of the seismic hazard report must be considered in the design of the building. The Dwelling Code simply incorporates prescriptive requirements for foundation reinforcement and framing connections based on the applicable seismic zone for the area. The cost of these requirements is rarely more than a small percentage of the overall cost for a new building.

The requirements for existing buildings vary depending on the type and size of the alteration and whether there is a change in the use of the building to house a more hazardous use. Oregon State Building Codes recognize the difficulty of meeting new construction standards in existing buildings and allow some exception to the general seismic standards. Upgrading existing buildings to resist earthquake forces is more expensive than meeting code requirements for new construction. State code only requires seismic upgrades when there is significant structural alteration to the building or where there is a change in use that puts building occupants and the community at a greater risk. Your local building official is responsible for enforcing these codes. Although there is no statewide building code for substandard structures, local communities have the option of adopting one to mitigate hazards in existing buildings. The state has adopted regulations to abate buildings damaged by an earthquake in Oregon Administrative Rules (OAR) 918-470. Oregon Revised Statutes (ORS) 455.020 and 455.390-400 also allow municipalities to create local programs to require seismic retrofitting of existing buildings within their communities. The building codes do not regulate public utilities and facilities constructed in public right-of-ways, such as bridges that are regulated by the Department of Transportation.

Additional State Programs and Legislation

Division of State Lands Fill and Removal Permit Program (ORS 196.800-990)

Statewide Land Use Planning Goal 5 requires that local governments shall adopt programs that will protect natural resources and conserve scenic, historic, and open space resources for present and future generations. In implementing this goal, Division of State Lands (DSL) Fill and Removal Permit Program (ORS 196.800-990) requires individuals who remove or fill 50 cubic yards or more in "waters of the state" to obtain a permit from the DSL. In State Scenic Waterways or areas designated by DSL as essential indigenous anadromous salmonid habitat, most removal-fill activities require a permit, regardless of the number of cubic yards affected. In addition, the Oregon Department of Environmental Quality is responsible for water quality certification under section 401(a) of the Clear Water Act. This certification is required as part of the DSL permitting process.

The Oregon Plan for Salmon and Watersheds

"The Oregon Plan" is the state's program to restore native salmon and trout populations and to improve water quality. The overall goal of the Oregon Plan is to restore fish populations to productive and sustainable levels that will provide substantial environmental, cultural, and economic benefits.

Oregon's Wetlands Protection Program

Oregon's Wetlands Protection Program was created in 1989 to integrate federal and state rules concerning wetlands protection with the Oregon Land Use Planning Program. The Wetlands Program has a mandate to work closely with local governments and the Division of State Lands (DSL) to improve land use planning approaches to wetlands conservation. A Local Wetlands Inventory is one component of that program. DSL also develops technical manuals, conducts wetlands workshops for planners, provides grant funds for wetlands planning, and works directly with local governments on wetlands planning.

Senate Bill 12 – Rapidly Moving Landslides

Following the flood and landslide events of 1996, legislation was drafted to reduce risk from future landslide hazards. The legislature passed Senate Bill 1211 in 1997, which dealt with rapidly moving landslide issues around steep forestlands, and not in typical urban or community settings. Senate Bill 1211 granted authority to the State Forester to prohibit forest operations in certain landslide-prone locations, and created the Interim Task Force on Landslides and Public Safety. SB 1211 charged the Interim Task Force with developing a comprehensive, practicable, and equitable solution to the problem of risks associated with landslides.

The Interim Task Force developed the legislative concept that resulted in Senate Bill 12 in the 1999 session (ORS 195.250 et

seq.). Senate Bill 12 directs state and local governments to protect people from rapidly moving landslides. The bill has three major components affecting local governments: detailed mapping of areas potentially prone to debris flows (i.e., "further review area maps"); local government regulating authority; and funding for a model ordinance. The legislature allocated funding to the Department of Geology and Mineral Industries (DOGAMI) to prepare the "further review area maps," and provided $50,000 for a grant to a local government to develop a model program to address rapidly moving landslides. *Senate Bill 12 applies only to rapidly moving landslides, which are uncommon in many communities, but are very dangerous in areas where they do occur.*

Ocean Shore Regulation

The Oregon Parks and Recreation Department (OPRD) is responsible for protecting the scenic, recreational, and natural resource values of the Oregon coast. OPRD accomplishes this through an extensive permitting program for shoreline protection under the authority of the Ocean Shore Law (ORS 390.605–390.770), also known as the "Beach Bill." While not responsible for activities above the statutory vegetation line, the survey line, or the line of established vegetation, OPRD is the permitting authority for actions affecting the ocean shorelands. This distinction can be seen visually at the line of established vegetation that backs the shoreline.

The Division of State Lands (DSL) has co-authority with the OPRD over rocky intertidal areas. The DSL manages the state-owned seabed within three nautical miles of low tide at the ocean shore. Specifically, the DSL regulates removal and filling of seabed and estuaries, including any dredged materials or seabed minerals. DSL may also issue leases for the harvest of Bull Kelp, a large seaweed in rocky areas of Oregon's coast. The Beach Bill requires that a permit be obtained from the OPRD for all "beach improvements" west of a surveyed beach zone line. Communities can check their comprehensive plan or contact OPRD to obtain the location of this surveyed line.

The Removal/Fill Law and implementing regulations (ORS 196.800 – 196.990) contain specific standards and requirements for riprap and other bank and shore stabilization projects in areas that extend from the Pacific Ocean shore to the line of established upland vegetation or the highest measured tide, whichever is greater. OPRD administers the removal/fill regulations jointly with the Ocean Shore Permit Authority. Activities permitted under these regulations are required to comply with the Statewide Planning Goals and be compatible with corresponding provisions of local comprehensive plans. *Permits for shoreline protective structures may be issued only when development existed prior to January 1, 1977, as required under Goal 18.* Foredune management plans, often implemented as hazard mitigation strategies, require a permit from OPRD because these strategies

affect the structure of the shoreline. Other hazard mitigation strategies that require OPRD approval include natural product (dirt) removal, resloping of a vertical bank below the statutory line of vegetation, and mitigating for erosion by altering the course of a stream that flows into the ocean.

Oregon Revised Statute 215.730: Additional Criteria for Forestland Dwellings

ORS 215.730 (County Planning; Zoning, Housing Codes) provides additional criteria for approving dwellings located on lands zoned for forest and mixed agriculture/forest use. Under its provisions, county governments must require, as a condition of approval, that single-family dwellings on lands zoned forestland meet the following requirements:

1. Dwelling has a fire retardant roof;
2. Dwelling will not be sited on a slope of greater than 40 percent;
3. Evidence is provided that the domestic water supply is from a source authorized by the Water Resources Department and not from a Class II stream as designated by the State Board of Forestry;
4. Dwelling is located upon a parcel within a fire protection district or is provided with residential fire protection by contract;
5. If dwelling is not within a fire protection district, the applicant provides evidence that the applicant has asked to be included in the nearest such district;
6. If dwelling has a chimney or chimneys, each chimney has a spark arrester; and
7. Dwelling owner provides and maintains primary fuel-free break and secondary break areas on land surrounding the dwelling that is owned or controlled by the owner. If a governing body determines that meeting the fourth requirement is impractical, local officials can approve an alternative means for protecting the dwelling from fire hazards.

If a water supply is required under this subsection, it must be a swimming pool, pond, lake or similar body of water that at all times contains at least 4,000 gallons or a stream that has a minimum flow of at least one cubic foot per second. Road access must be provided to within 15 feet of the water's edge for fire-fighting pumping units, and the road access must accommodate a turnaround for fire-fighting equipment.

Oregon Revised Statute 477.015-061 Urban Interface Fire Protection

These provisions were established through efforts of the Oregon Department of Forestry, the Office of the State Fire Marshal, fire

service agencies from across the state, and the Commissioners of Deschutes, Jefferson, and Jackson Counties. It is innovative legislation designed to address the expanding interface wildfire problem within Oregon Department of Forestry Fire Protection Districts. Full implementation of the statute will occur on or after January 1, 2002. The statute does the following:

1. Directs the State Forester to establish a system of classifying forestland-urban interface areas;
2. Defines forestland-urban interface areas;
3. Provides education to property owners about fire hazards in forestland-urban interface areas. Allows for a forestland-urban interface county committee to establish classification standards;
4. Requires maps identifying classified areas to be made public;
5. Requires public hearings and mailings to affected property owners on proposed classifications;
6. Allows property owners appeal rights;
7. Directs the Board of Forestry to promulgate rules that set minimum acceptable standards to minimize and mitigate fire hazards within forestland-urban interface areas; and
8. Creates a certification system for property owners meeting acceptable standards. Establishes a $100,000 liability limit for cost of suppressing fires, if certification requirements are not met.

Oregon Revised Statute, Chapter 478: Rural Fire Protection Districts

ORS 478: Rural Fire Protection Districts, includes the following provisions, among others, related to wildfire hazard mitigation:

478.120 Inclusion of forestland in district. The authority to include forestland within a rural fire protection district pursuant to ORS 478.010 (2)(c) applies to forestland within the exterior boundaries of an existing district and to forestland on which structures subject to damage by fire have been added after July 20, 1973.

478.140 Procedure for adding land to district by consent of owner. Any owner consenting to add the forestland of the owner to the district under ORS 478.010 (2)(c) shall do so on forms supplied by the Department of Revenue. The owner shall file the original with the district. The district shall forward a copy to the assessor of each county in which the land is located, within 20 days of receipt.

478.910 Adoption of fire prevention code. A district board may, in accordance with ORS 198.510 to 198.600, adopt a fire prevention code.

478.920 Scope of fire prevention code. The fire prevention code may provide reasonable regulations relating to:

(1) Prevention and suppression of fires.

(2) Mobile fire apparatus means of approach to buildings and structures.

(3) Providing fire-fighting water supplies and fire detection and suppression apparatus adequate for the protection of buildings and structures.

(4) Storage and use of combustibles and explosives.

(5) Construction, maintenance and regulation of fire escapes.

(6) Means and adequacy of exit in case of fires and the regulation and maintenance of fire and life safety features in factories, asylums, hospitals, churches, schools, halls, theaters, amphitheaters, all buildings, except private residences, which are occupied for sleeping purposes, and all other places where large numbers of persons work, live, or congregate from time to time for any purpose.

(7) Requiring the issuance of permits by the fire chief of the district before burning trash or waste materials.

(8) Providing for the inspection of premises by officers designated by the board of directors, and requiring the removal of fire hazards found on premises at such inspections.

478.927 Building permit review for fire prevention code. A district adopting a fire prevention code shall provide plan review at the agency of the city or county responsible for the issuance of building permits for the orderly administration of that portion of the fire prevention code that requires approval prior to the issuance of building permits.

Senate Bill 360: Wildland/Urban Interface

Senate Bill 360, passed in 1997, is state legislation put in place to address the growing wildland/urban interface problem. The bill has three purposes:

1. To provide an interface fire protection system in Oregon to minimize cost and risk and maximize effectiveness and efficiency;

2. To promote and encourage property owners' efforts to minimize and mitigate fire hazards and risks; and

3. To promote and encourage involvement of all levels of government and the private sector in interface solutions.

The bill has a five-year implementation plan that includes public education and outreach, and the development of rules, standards, and guidelines that address landowner and agency

responsibilities. The success of Senate Bill 360 depends upon cooperation among local and regional fire departments, fire prevention cooperatives, and the Oregon Department of Forestry, which means interagency collaboration is vital for successful implementation of the bill. This cooperation is important in all aspects of wildland firefighting. Resources and funding are often limited, and no single agency has enough resources to tackle a tough fire season alone. The introductory language of Senate Bill 360 states: "The fire protection needs of the interface must be satisfied if we are to meet the basic policy of the protection of human life, natural resources, and personal property. This protection must be provided in an efficient and effective manner, and in a cooperative partnership approach between property owners, local citizens, government leaders, and fire protection agencies."

Senate Bill 96 – Seismic Hazard Investigations - Oregon Revised Statutes 455.447 and 336.071

The legislature passed Senate Bill 96 in 1991. This law requires site-specific seismic hazard investigations before the construction of essential facilities, hazardous facilities, major structures, and special-occupancy structures (e.g., hospitals, schools, utilities and public works, police and fire stations). These requirements are adopted into the State Building Code. The law also provides for the installation of strong-motion sensors in selected major buildings and mandates that school officials in all public schools lead students and staff in earthquake drills.

Tsunamis - ORS 336.071, ORS 455.446, and ORS 455.448

Fourteen earthquake-related bills were introduced during the 1995 session. Several passed, including a new requirement for earthquake education and tsunami drills to be conducted in public schools (ORS 336.071), a requirement for essential and special-occupancy structures to be built outside of tsunami inundation zones (ORS 455.446), provisions for the inspection and entrance of buildings damaged by earthquakes (ORS 455.448) and specific provisions for the abatement of buildings damaged by earthquakes. Senate Bill 1057 created a task force to evaluate the risks impacting existing buildings and make recommendations to the 1997 legislature.

Senate Bill 13: Seismic Event Preparation

Senate Bill 13, signed by the Governor on June 14, 2001, requires each state and local agency and persons employing 250 or more full-time employees to develop seismic preparation procedures and inform their employees about the procedures. Further, the bill requires agencies to conduct drills in accordance with Oregon Emergency Management guidelines. These drills must include "familiarization with routes and methods of exiting the building and methods of duck, cover and hold during an earthquake."

Senate Bill 14: Seismic Surveys For School Buildings

The Governor signed Senate Bill 14 on July 19, 2001. It requires the State Board of Higher Education to provide for seismic safety surveys of buildings that have a capacity of 250 or more persons and are routinely used for student activities by public institutions or departments under the control of the board. A seismic safety survey is not required for any building that has previously undergone a seismic safety survey or that has been constructed to the state building code standards in effect for the seismic zone classification. Subject to available funding, if a building is found to pose an undue risk to life and safety during a seismic event, a plan shall be developed for seismic rehabilitation or other seismic risk reducing activities. All seismic rehabilitation or other actions to reduce seismic risk must be completed before January 1, 2032, subject to available funding.

Senate Bill 15: Seismic Surveys For Hospital Buildings

The Governor signed Senate Bill 15 on July 19, 2001. It requires the Health Division to provide for seismic safety surveys of hospital buildings that contain an acute inpatient care facility. Seismic surveys shall also be conducted on fire stations, police stations, sheriffs' offices, and similar facilities subject to available funding. The surveys should be completed by January 1, 2007.

A seismic survey is not required for any building that has undergone a survey or that has been constructed to the state building code standards in effect for the seismic zone classification at the site. Subject to available funding, if a building is evaluated and found to pose an undue risk to life and safety during a seismic event, the acute inpatient care facility, fire department, fire district or law enforcement agency using the building shall develop a plan for seismic rehabilitation of the building or for other actions to reduce the risk. All seismic rehabilitations or other actions to reduce the risk must be completed before January 1, 2022, subject to available funding.

Oregon Seismic Safety Policy Advisory Commission (OSSPAC) - ORS 401.337 to 401.353

OSSPAC is a state advisory commission created in February 1990 through an executive order from Governor Neil Goldschmidt. It is made up of 18 members with interests in earthquake safety including: Oregon Emergency Management, State Building Codes, and the Departments of Geology and Mineral Industries, Land Conservation and Development, and Transportation; two representatives from the Oregon state legislature; one local government representative; one member from education; three from the general public; and six members from affected industries, such as homebuilders and banking industries. The purpose is to reduce exposure to Oregon's earthquake hazards by: (1) developing and influencing policy at the federal, state and local levels; (2) facilitating improved public understanding and encouraging identification of earthquake risk; and (3) supporting research and special studies,

appropriate mitigation and response and recovery. The group has proposed legislative concepts to the State legislature on improving seismic safety in Oregon. They are currently preparing a document entitled "Oregon at Risk" discussing seismic hazards in the state. For information on OSSPAC, contact Oregon Emergency Management at 503-378-2911.

National Programs

National Flood Insurance Program (NFIP)

The function of the NFIP is to provide flood insurance to homes and businesses located in floodplains at a reasonable cost, and to encourage the location of new development away from the floodplain. The program is based upon mapping areas of flood risk, and requiring local implementation to reduce that risk, primarily through restrictions on new development in floodplains. Elevation Certificates are forms published by FEMA required to be maintained by communities participating in the NFIP. New development is required to be elevated or otherwise designed to protect against flooding. The NFIP requires local governments to obtain certificates for all new construction in floodplains and to keep the certificates on file. Local governments must insure that elevation certificates are filled out correctly for structures built in floodplains.

V-Zone Construction

In many of Oregon's coastal communities, FEMA has mapped "V zones" (velocity zones), areas of special flood hazard that are subject to high velocity wave action from storm surges or seismic events. Because of the potential force associated with this wave action, special regulations apply for new construction and substantial improvements in "V zones."

Community Rating System (CRS)

Community Rating System (CRS) is a program operated by the NFIP that recognizes communities who go beyond the minimum requirements of the NFIP. CRS offers reduced flood insurance premiums for communities who adopt higher standards and encourages community activities that reduce flood losses, facilitate accurate insurance rating, and promote flood insurance awareness.

FEMA Region 10 Policy on Fish Enhancement Structures in the Floodway

FEMA regulates development in the floodway. The regulations require that a community prohibit encroachments (including fill, new construction, and other development) within the floodway unless it is demonstrated by engineering analysis that the proposed encroachment will not result in any increase in flood levels during the occurrence of a 100-year flood event. The recent designation of several northwest salmon and steelhead runs as threatened or endangered has resulted in an increased effort to restore fish habitat. Restoring habitat often involves placing structures in stream.

Army Corps of Engineers Permit Program

The U.S. Army Corps of Engineers is responsible for the protection and development of the nation's water resources, including navigation, flood control, energy production through hydropower management, water supply storage and recreation. The Corps administers a permit program to ensure that the nation's waters are used in the public interest, and requires any person, firm, or agency planning work in the waters of the United States to first obtain a permit from the Corps. Permits are required even when land next to or under the water is privately owned. It is a violation of federal law to begin work before a permit is obtained and penalties of fines and/or imprisonment may apply. Examples of activities in waters that may require a permit include: construction of a pier, placement of intake and outfall pipes, dredging, excavation and depositing of fill. Permits are generally issued only if the activity is found to be in the public interest. In Oregon, the Division of State Lands (DSL) and the U.S. Army Corps of Engineers jointly issue permits for development of these activities**.** As mentioned in the discussion of DSL permits, local planning agencies are required to sign off on any permits issued by DSL and the U.S. Army Corps of Engineers and water quality certification is required by the Department of Environmental Quality.

Non-Regulatory Programs

American Planning Association (APA)

The APA embarked on a program to bring together solutions from multiple disciplines into a single source. It will help serve local planning efforts in identifying landslide hazards during the planning process so as to minimize exposure to landslide risks. The APA's website highlights planning efforts to reduce landslide risk and loss.

Firewise

Firewise is a program developed within the National Wildland/ Urban Interface Fire Protection Program, and it is the primary federal program addressing interface fire. It is administered through the National Wildfire Coordinating Group whose extensive list of participants includes a wide range of federal agencies. The program is intended to empower planners and decision makers at the local level. Through conferences and information dissemination, Firewise increases support for interface wildfire mitigation by educating professionals and the general public about hazard evaluation and policy implementation techniques. Firewise offers online wildfire protection information and checklists, as well as listings of other publications, videos, and conferences.

FireFree Program – Bend, Oregon

FireFree is a unique private/public program for interface wildfire mitigation involving partnerships between an insurance company and local government agencies. It is an example of an effective

non-regulatory approach to hazard mitigation. Originating in Bend, the program was developed in response to the city's "Skeleton Fire" of 1996, which burned over 17,000 acres and damaged or destroyed 30 homes and structures. Bend sought to create a new kind of public education initiative that emphasized local involvement. SAFECO Insurance Corporation was a willing collaborator in this effort. Bend's pilot program included:

- A short video production featuring local citizens as actors, made available at local video stores, libraries, and fire stations;
- Two city-wide yard debris removal events;
- A 30-minute program on a model FireFree home, aired on a local cable television station; and
- Distribution of brochures, featuring a property owner's evaluation checklist and a listing of fire-resistant indigenous plants.

State of Oregon

Local Natural Hazard Mitigation Plans:

An Evaluation Process

Appendix D: Resource Directory

January 2002

Showcase State

PARTNERS *for* DISASTER RESISTANCE
Oregon, Showcase State

Oregon Emergency Management

OREGON emergency management

Department of Land Conservation and Development

Prepared by:

Oregon Natural Hazards Workgroup

Community Service Center
University of Oregon
541-346-3588
http://www.darkwing.uoregon.edu/~onhw

ONHW

Resource Directory

This appendix provides contact information for state and federal agencies and organizations that can assist communities developing, revising, or implementing natural hazard mitigation plans.

State Resources

Department of Land Conservation and Development (DLCD)

DLCD administers the state's Land Use Planning Program. The program is based on 19 Statewide Planning Goals, including Goal 7, related to natural hazards, with flood as its major focus. DLCD serves as the federally designated agency to coordinate floodplain management in Oregon. They also conduct various landslide related mitigation activities. In order to help local governments address natural hazards effectively, DLCD provides technical assistance such as conducting workshops, reviewing local land use plan amendments, and working interactively with other agencies.

Contact: Natural Hazards Program Manager, DLCD

Address: 635 Capitol St. NE, Suite 200, Salem, OR 97301-2540

Phone: (503) 373-0050

Website: http://www.lcd.state.or.us/hazards.html

Oregon Floodplain Coordinator: (503) 373-0050 xt. 255

Oregon Department of Consumer and Business Services – Building Codes Division

The Building Codes Division of Oregon's Department of Consumer and Business Services is responsible for administering statewide building codes. Its responsibilities include adoption of statewide construction standards that help create disaster-resistant buildings, particularly for flood, wildfire, wind, foundation stability, and seismic hazards. Information about wildfire-related building codes is found through this department.

Contact: Building Codes Division

Address: 1535 Edgewater St. NW, P.O. Box 14470, Salem, OR 97309

Phone: (503) 373-4133

Website: http://www.cbs.state.or.us/external/bcd

Oregon Department of Forestry (ODF)

ODF's Fire Prevention Unit is involved in interface wildfire mitigation and provides information about Oregon's Wildfire Hazard Zones. The Protection From Fire section of the ODF website includes Oregon-specific fire protection resources. Wildfire condition reports can be accessed on the website as well. ODF's Protection from Fire Program works to do the following:

- Clarify roles of ODF, landowners, and other agencies in relation to wildland fire protection in Oregon;
- Strengthen the role of forest landowners and the forest industry in the protection system;
- Understand and respond to needs for improving forest health conditions and the role/use of prescribed fire in relation to mixed ownerships, forest fuels and insects and disease; and
- Understand and respond to needs for improving the wildland/urban interface situation.

Contact: Oregon Department of Forestry, Fire Prevention Unit

Address: 2600 State Street, Salem, Oregon 97310

Phone: (503) 945-7440

Website: http://www.odf.state.or.us/fireprot.htm

Oregon Department of Geology and Mineral Industries (DOGAMI)

The mission of the Department of Geology and Mineral Industries is to serve a broad range of public, private sector and government users. This is accomplished by providing a cost-effective source of geologic information for Oregonians and to use that information in partnership to reduce the future loss of life and property due to potentially devastating earthquakes, tsunamis, landslides, floods, and other geologic hazards. The Department has mapped earthquake hazards in most of western Oregon.

Contacts: Deputy State Geologist, Seismic, Tsunami, and Coastal Hazards Team Leaders

Address: 800 NE Oregon St., Suite 965, Portland, Oregon 97232

Phone: (503) 731-4100
(541) 574-6642 (Coastal Office)

Website: http://sarvis.dogami.state.or.us homepage

Office of the State Fire Marshal (OSFM)

The Prevention Unit of Oregon's Office of the State Fire Marshal contains 19 Deputy State Fire Marshals located in various regions. The responsibilities of these deputies include public education for local fire districts and inspection of businesses, public assemblies, schools, daycare centers, and adult foster homes. The State Fire Marshal's Community Education Services unit works to keep Oregonians safe from fires and injury by providing them with the knowledge to protect themselves and their property.

Contact: Oregon State Fire Marshal

Address: 4760 Portland Road NE, Salem, Oregon 97305-1760

Phone: (503) 378-3473

Website: http://159.121.82.250/

Email: oregon.sfm@state.or.us

Oregon Emergency Management (OEM)

OEM is heavily involved in disaster damage and impact assessments and administers several disaster recovery and hazard mitigation programs. OEM administers FEMA's Hazard Mitigation Grant Program, which provides post-disaster monies for long-term, cost effective mitigation measures with the goal of minimizing future disaster losses. For example, the acquisition, elevation, relocation, and demolition of flood-prone structures can significantly reduce future flood losses. OEM also administers FEMA's Flood Mitigation Assistance Program. This program provides assistance for NFIP-insured repetitive loss structures as a top priority. OEM provides technical assistance to local jurisdictions in support of their hazard mitigation planning process local jurisdictions to develop hazard mitigation plans and provides training for local governments through workshops on recovery and mitigation.

Contact: Oregon Emergency Management

Address: 595 Cottage Street NE, Salem, OR 97310

Phone: (503) 378-2911

Website: http://www.osp.state.or.us/oem/

Section Director, Financial and Recovery Services (503) 378-2911 xt. 227

State Hazard Mitigation Officer (SHMO) (503) 378-2911 xt. 247

Recovery and Mitigation Specialist: (503) 378-2911 xt. 240

Oregon Division of State Lands (DSL)

DSL is a regulatory agency, responsible for administration of Oregon's Removal-Fill Law. This law is intended to protect, conserve, and make the best use of the state's water resources. It generally requires a permit from DSL to remove, fill, or alter more than 50 cubic yards of material within the bed or banks of waters of the state. Exceptions are in state scenic waterways and areas designated essential salmon habitat, where a permit is required for all instream activity, regardless of size. DSL and the US Army Corps of Engineers may issue these permits jointly.

Contact: Division of State Lands

Address: 775 Summer Street NE, Suite 100, Salem, OR 97301-1279

Phone: (503) 378-3805

Website: http://statelands.dsl.state.or.us/

Assistant Director: (503) 378-3805, ext. 279

Western Region Manager: (503) 378-3805, ext. 244

Federal and National Programs

Federal Emergency Management Agency (FEMA)

FEMA develops and provides maps of flood hazard areas, various publications related to natural hazards mitigation, funding for mitigation projects, and technical assistance. FEMA also operates the National Flood Insurance Program. FEMA's mission is "to reduce loss of life and property and protect the nation's critical infrastructure from all types of hazards through a comprehensive, risk-based, emergency management program of mitigation, preparedness, response and recovery." FEMA Region 10 serves the northwestern states of Alaska, Idaho, Oregon, and Washington.

Contact: FEMA, Federal Regional Center, Region 10

Address: 228th St. SW, Bothell, WA 98021-9796

Phone: (425) 487-4678

Website: http://www.fema.gov

To obtain FEMA publications:

Phone: (800) 480-2520

To obtain FEMA maps:

Contact: Map Service Center

Address: P.O. Box 1038, Jessup, Maryland 20794-1038

Phone: (800) 358-9616

The National Flood Insurance Program

The National Flood Insurance Program (NFIP) Website is a subsection of the Federal Emergency Management Agency (FEMA) site (http://www.fema.gov). The NFIP information is intended for both the general public and the many organizations and agencies participating in the program. It includes information about the NFIP and other flood disaster assistance available from the Federal Government. It also provides access to the newly revised NFIP booklet: *Answers to Questions about the National Flood Insurance Program*.

Contact: The National Flood Insurance Program

Phone: (888) FLOOD29 or (800) 427-5593

Website: http://www.fema.gov/nfip

U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers (USACE) administers a permit program to ensure that the nation's waterways are used in the public interest. Any person, firm, or agency planning to work in waters of the United States must first obtain a permit from the Army Corps of Engineers. In Oregon, joint permits may be issued with the Division of State Lands. The Corps is responsible for the protection and development of the nation's water resources, including navigation, flood control, energy production through hydropower management, water supply storage and recreation.

Contact: U.S. Army Corps of Engineers-Portland District, Floodplain Information Branch

Address: P.O. Box 2946, Portland, OR 97208-2946

Phone: (503) 808-4874

Website: http://www.nwp.usace.army.mil/

American Planning Association (APA)

The APA's research department embarked on a program to bring together solutions from multiple disciplines into a single source. It will help serve local planning efforts in identifying landslide hazards during the planning process so as to minimize exposure to landslide risks. The APA's website highlights planning efforts to reduce risk and loss from landslides.

Contact: Principal Investigator, Landslides Project

Address: 122 S. Michigan Ave., Suite 1600, Chicago, Illinois 60603-6107

Phone: (312) 431-9100

Website: http://www.planning.org/landslides

Email: landslides@planning.org

American Red Cross

The American Red Cross is a humanitarian organization, led by volunteers, that provides relief to victims of disasters and helps people prevent, prepare for, and respond to emergencies. The Oregon Trail Chapter was chartered as a Red Cross unit in 1917. The chapter serves the residents of Clackamas, Columbia, Multnomah, Washington, Yamhill, and Tillamook counties. The Oregon Trail Chapter provides a variety of community services which are consistent with the American Red Cross mission and meet the specific needs of this area, including disaster planning, preparedness, and education.

Contact: American Red Cross, Oregon Trail Chapter

Address: P.O. Box 3200, Portland, OR 97208-3200

Phone: (503) 284-1234

Email: info@redcross-pdx.org

Website: http://www.redcross-pdx.org

Building Seismic Safety Council (BSSC)

The Building Seismic Safety Council (BSSC), established by the National Institute of Building Sciences (NIBS), deals with complex regulatory, technical, social, and economic issues and develops and promotes building earthquake risk mitigation regulatory provisions for the nation.

Address: 1090 Vermont Avenue, NW, Suite 700, Washington, DC 20005

Phone: (202) 289-7800

Website: http://www.bssconline.org/

FireFree Program to Promote Home Safety

In a pioneering effort to address wildfire danger in Bend, Oregon, four local agencies and a Fortune 500 corporation joined together to create "FireFree! Get In The Zone," a public education campaign designed to increase resident participation in wildfire safety and mitigate losses. Spearheaded by SAFECO Corporation, the partnership includes the Bend Fire Department, Deschutes County Rural Fire Protection District #2, Bend City Planning, and The Deschutes National Forest. The Oregon Department of Forestry and a number of local government agencies and businesses have joined the program.

Contact: FireFree

Address: 63377 Jamison St., Bend, OR 97701

Phone: (541) 318-0459

Website: http://www.firefree.org

Firewise – The National Wildland/Urban Interface Fire program

Firewise maintains a Website designed for people who live in wildfire-prone areas, but it also can be of use to local planners and decision makers. The site offers online wildfire protection information and checklists, as well as listings of other publications, videos, and conferences.

Contact: Firewise

E-mail: firewise@firewise.org

Website: http://www.firewise.org/

Institute for Business & Home Safety (IBHS)

IBHS was created as an initiative of the insurance industry to reduce damage and losses caused by natural disasters. This website provides educational resources and on-line publications for insurers, businesses, and homeowners who are interested in taking the initiative to minimize future damages and losses.

Contact: Institute for Business and Home Safety

Address: 1408 North Westshore Boulevard - Suite 208 - Tampa, FL 33607

Phone: (813) 286-3400

E-mail: info@ibhs.org

Website: http://www.ibhs.org/ibhs2

Insurance Services Office, Inc.

Insurance Services Office, Inc. (ISO) is the leading supplier of statistical, actuarial, and underwriting information for and about the property/casualty insurance industry. ISO provides advisory services to more than 1,500 participating insurers and their agents. Communities participating in the Community Rating System can request a copy of the draft 2002 CRS Coordinator's Manual by the Insurance Services Office in Oregon.

Contact: Linda Ryan

Phone: (503) 842-0029

Website: http://www.iso.com

Email: lryan@iso.com

National Fire Protection Association (NFPA)

This is the principal federal agency involved in the National Wildland/Urban Interface Fire Protection Initiative. NFPA has information on the Initiative's programs and documents. Other members of the initiative include: the National Association of State Foresters, the US Department of Agriculture Forest Service, the US Department of the Interior, and the United States Fire Administration.

Contact: Public Fire Protection Division

Address: 1 Battery March Park, P.O. Box 9101, Quincy, MA 02269-9101

Phone : (617) 770-3000

Small Business Administration (SBA)

The Small Business Administration's (SBA) Disaster Loan Programs offer financial assistance to those rebuilding their homes and businesses in the aftermath of a disaster. These programs also can provide up to an additional 20% loan for cost effective hazard mitigation for homes or business properties. By offering low-interest loans, the SBA works to assist in long-term recovery efforts.

Contact: SBA, District Office

Address: 650 Capital Mall, Suite 7-500, Sacramento, CA 95814

Phone: (916) 930-3700

Website: http://www.sba.gov/or/

United States Geological Survey (USGS)

The USGS website provides current stream flow conditions at USGS gauging stations in Oregon and throughout the Pacific Northwest. The Oregon USGS office is responsible for water-resources investigations for Oregon and part of southern Washington. Their office cooperates with more than 40 local, state, and federal agencies in Oregon. Cooperative activities include water-resources data collection and interpretive water-availability and water-quality studies. The USGS also has an active seismic research organization and provides information on landslides, volcanoes, and other natural hazards.

Contact: USGS Oregon District Office

Address: 10615 S.E. Cherry Blossom Dr., Portland, OR 97216

Phone: (503) 251-3200

Website: http://oregon.usgs.gov

Email: info-or@usgs.gov

State of Oregon

Local Natural Hazard Mitigation Plans:

An Evaluation Process

Appendix E: Economic Analysis of Natural Hazard Mitigation Projects

January 2002

Showcase State

PARTNERS *for* DISASTER RESISTANCE
Oregon, Showcase State

Oregon Emergency Management

Department of Land Conservation and Development

Prepared by:

Oregon Natural Hazards Workgroup

Community Service Center
University of Oregon
541-346-3588
http://www.darkwing.uoregon.edu/~onhw

Economic Analysis of Natural Hazard Mitigation Projects

Benefit/cost analysis is complicated, and the numbers may divert attention from other important issues. It is important to consider the qualitative factors of a project associated with mitigation that cannot be evaluated economically. There are alternative approaches to implementing mitigation projects. Many communities are looking towards developing multi-objective projects. With this in mind, there is an opportunity to develop strategies integrating natural hazard mitigation with projects related to watersheds, environmental planning, community economic development, and small business development, among others. Incorporating natural hazard mitigation with community projects can increase the viability of project implementation.

Benefit/cost analysis is a key mechanism used by Oregon Emergency Management (OEM), the Federal Emergency Management Agency, and other state and federal agencies in evaluating hazard mitigation projects, and is required by the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended.

This appendix outlines several approaches for conducting economic analysis of natural hazard mitigation projects. It describes the importance of implementing mitigation activities, different approaches to economic analysis of mitigation activities, and methods to calculate costs and benefits associated with mitigation activities. Information in this section is derived in part from the *State Natural Hazards Mitigation Plan*, (Governor's Interagency Hazard Mitigation Team, June 2000), and Federal Emergency Management Agency Publication 331, *Report on Costs and Benefits of Natural Hazard Mitigation*.

This section is not intended to provide a comprehensive description of benefit/cost analysis, nor is it intended to provide the details of economic analysis methods that can be used to evaluate local projects. It is intended to (1) raise benefit/cost analysis as an important issue, and (2) provide background on how economic analysis can be used to evaluate mitigation projects.

Why Evaluate Mitigation Activities?

Mitigation activities reduce the cost of disasters by minimizing property damage, injuries, and the potential for loss of life, and by reducing emergency response costs that would otherwise be incurred. Evaluating proposed natural hazard mitigation actions provides decision-makers with an understanding of the potential benefits and costs, as well as a basis upon which to compare alternative projects.

Evaluating mitigation projects is a complex and difficult undertaking, which is influenced by many variables. First, natural disasters affect all segments of the communities they strike, including individuals, businesses, and public agencies such as fire, police, utilities, and schools. Second, while some of the direct and indirect costs of disaster damages are measurable, some of the costs are non-financial and difficult to quantify in dollars. Third, many of the impacts of such events produce "ripple-effects" throughout the community, greatly increasing the disaster's social and economic consequences.

While not easily accomplished, there is value, from a public policy perspective, in assessing the positive and negative impacts from mitigation activities, and obtaining an instructive benefit/cost comparison. Otherwise, the decision to pursue or not pursue various mitigation options would not be based on an objective understanding of the net benefit or loss associated with these actions.

What are Some Economic Analysis Approaches for Mitigation Strategies?

The approaches used to identify the costs and benefits associated with natural hazard mitigation activities, measures, or projects fall into two general categories: benefit/cost analysis and cost-effectiveness analysis. The distinction between the two methods is the way in which the relative costs and benefits are measured. Additionally, there are varying approaches to assessing the value of mitigation for public sector and private sector activities.

Benefit/cost Analysis

Benefit/cost analysis is used in natural hazards mitigation to determine if the benefits to life and property protected through mitigation efforts exceed the cost of the mitigation activity. Conducting benefit/cost analysis for a mitigation activity can assist communities in determining whether a project is worth undertaking now, in order to avoid disaster-related damages later. Benefit/cost analysis is based on calculating the frequency and severity of a hazard, avoided future damages, and risk.

In benefit/cost analysis, all costs and benefits are evaluated in terms of dollars, and a net benefit/cost ratio is computed to determine whether a project should be implemented (i.e., if net benefits exceed net costs, the project is worth pursuing). A project must have a benefit/cost ratio greater than 1 in order to be funded.

Cost-Effectiveness Analysis

Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. This type of analysis, however, does not necessarily measure costs and benefits in terms of dollars. Determining the economic feasibility of mitigating natural hazards can also be organized according to the perspective of those with an economic interest in the outcome. Hence, economic analysis approaches are covered for both public and private sectors as follows.

Investing in public sector mitigation activities

Evaluating mitigation strategies in the public sector is complicated because it involves estimating all of the economic benefits and costs regardless of who realizes them, and potentially to a large number of people and economic entities. Some benefits cannot be evaluated monetarily, but still affect the public in profound ways. Economists have developed methods to evaluate the economic feasibility of public decisions that involve a diverse set of beneficiaries and non-market benefits.

Investing in private sector mitigation activities

Private sector mitigation projects may occur on the basis of one of two approaches: it may be mandated by a regulation or standard, or it may be economically justified on its own merits. A building or landowner, whether a private entity or a public agency, required to conform to a mandated standard may consider the following options:

1. Request cost sharing from public agencies;
2. Dispose of the building or land either by sale or demolition;
3. Change the designated use of the building or land and change the hazard mitigation compliance requirement; or
4. Evaluate the most feasible alternatives and initiate the most cost effective hazard mitigation alternative.

The sale of a building or land triggers another set of concerns. For example, real estate disclosure laws can be developed which require sellers of real property to disclose known defects and deficiencies in the property, including earthquake weaknesses and hazards to prospective purchasers. Correcting deficiencies can be expensive and time consuming, but their existence can prevent the sale of the building. Conditions of a sale regarding the deficiencies and the price of the building can be negotiated between a buyer and seller.

How can an economic analysis be conducted?

While economic analysis is complex, benefit-cost analysis and cost-effectiveness analysis are important tools in evaluating a mitigation activity. One framework for evaluating alternative mitigation activities is outlined below:

1. Identify the Alternatives

Alternatives for reducing risk from natural hazards can include structural projects to enhance disaster resistance, education and outreach, and acquisition or demolition of exposed properties, among others. Different mitigation projects can assist in minimizing risk to natural hazards, but do so at varying cost.

2. Calculate the Costs and Benefits

Choosing economic criteria is essential to systematically calculating the costs and benefits of mitigation projects and selecting the most appropriate alternative. Potential economic criteria to evaluate alternatives include:

- ***Determine the project cost.*** This may include initial project development costs, and repair and operating costs of maintaining projects over time.
- ***Estimate the benefits.*** Projecting the benefits resulting from a project can be difficult. Expected future returns from the mitigation effort depend on the correct specification of the risk and the effectiveness of

Information Key

Benefit Cost Analysis Software and Methodology

The Office of Management and Budget (OMB) regulations require all hazard mitigation projects to be cost-effective before they can be approved for funding. What does this mean? In the language of hazard mitigation, it means a benefit-cost analysis must be used to determine whether a project's benefits—avoided damages in future disasters— outweigh its up-front costs. To standardize the benefit-cost analysis and make it easier to complete, FEMA has developed software to analyze mitigation projects for several different hazards (riverine flooding, earthquake and a generic limited data module for other hazards). The analysis software and user training are offered directly by FEMA to assist state and local governments in pre-determining potential eligibility for cost effective mitigation projects. This is the same software and methodology FEMA will use in their required review. For more information go to: http://www.fema.gov/mit/gamit.pdf

the project, which may not be well known. Expected future costs depend on the physical durability and potential economic obsolescence of the investment. This is difficult to project. These considerations will also provide guidance in selecting an appropriate salvage value. Future tax structures and rates must be projected. Financing alternatives must be researched, and they may include retained earnings, bond and stock issues, and commercial loans.

- ***Consider costs and benefits to society and the environment.*** These are not easily measured, but can be assessed through a variety of economic tools including existence value or contingent value theories. These theories provide quantitative data on the value people attribute to physical or social environments. Even without hard data, however, impacts of structural projects to the physical environment or to society should be considered when implementing mitigation projects.
- ***Determine the correct discount rate.*** Determination of the discount rate can just be the risk-free cost of capital, but it may include the decision maker's time preference and also a risk premium. Inflation should also be included.

3. Analyze and Rank the Alternatives

Once costs and benefits have been quantified, economic analysis tools can rank the alternatives. Two methods for determining the best alternative given varying costs and benefits include net present value and internal rate of return.

- ***Net present value***. Net present value is the value of the expected future returns of an investment minus the value of expected future costs expressed in today's dollars. If the net present value is greater than the project costs, the project may be determined feasible for implementation. Selecting the discount rate, and identifying the present and future costs and benefits of the project calculates the net present value of projects.
- ***Internal Rate of Return***. Using the internal rate of return method to evaluate mitigation projects provides the interest rate equivalent to the dollar returns expected from the project. Once the rate has been calculated, it can be compared to rates earned by investing in alternative projects. Projects may be feasible to implement when the internal rate of return is greater than the total costs of the project.

Once the mitigation projects are ranked on the basis of economic criteria, decision-makers can consider other factors, such as risk, project effectiveness, and environmental and social returns in choosing the appropriate project for implementation.

How are Benefits of Mitigation Calculated?

The estimation of economic returns, which accrue to building or land owners as a result of natural hazard mitigation, is difficult. Owners evaluating the economic feasibility of mitigation should consider reductions in physical damages and financial losses. A partial list follows:

- Building damages avoided
- Content damages avoided
- Inventory damages avoided
- Rental income losses avoided
- Relocation and disruption expenses avoided
- Proprietor's income losses avoided

These parameters can be estimated using observed prices, costs, and engineering data. The difficult part is to correctly determine the effectiveness of the hazard mitigation project and the resulting reduction in damages and losses. Equally as difficult is assessing the probability that an event will occur. The damages and losses should only include those that will be borne by the owner. The salvage value of the investment can be important in determining economic feasibility. Salvage value becomes more important as the time horizon of the owner declines. This is important because most businesses depreciate assets over a period of time.

Additional Costs from Natural Hazards

Property owners should also assess changes in a broader set of factors that can change as a result of a large natural disaster. These are usually termed "indirect" effects, but they can have a very direct effect on the economic value of the owner's building or land. They can be positive or negative, and include changes in the following:

- Commodity and resource prices
- Availability of resource supplies
- Commodity and resource demand changes
- Building and land values
- Capital availability and interest rates
- Availability of labor
- Economic structure
- Infrastructure
- Regional exports and imports
- Local, state, and national regulations and policies
- Insurance availability and rates

Changes listed above are more difficult to estimate and require models that are structured to estimate total economic impacts. Total economic impacts are the sum of direct and indirect economic impacts. Total economic impact models are usually not combined with economic feasibility models. Many models exist to estimate total economic impacts of changes in an economy. Decision-makers should understand the total economic impacts of natural disasters in order to calculate the benefits of a mitigation activity. This suggests that understanding the local economy is an important first step in being able to understand the potential impacts of a disaster, and the benefits of mitigation activities.

Additional Considerations

Conducting an economic analysis for potential mitigation activities can assist decision-makers in choosing the most appropriate strategy for their community to reduce risk and prevent loss from natural hazards. Economic analysis can also save time and resources from being spent on inappropriate or unfeasible projects. Several resources and models are listed on the following page that can assist in conducting an economic analysis for natural hazard mitigation activities.

Resources

CUREe Kajima Project, *Methodologies For Evaluating The Socio-Economic Consequences Of Large Earthquakes*, Task 7.2 Economic Impact Analysis, Prepared by University of California, Berkeley Team, Robert A. Olson, VSP Associates, Team Leader; John M. Eidinger, G&E Engineering Systems; Kenneth A. Goettel, Goettel and Associates Inc.; and Gerald L. Horner, Hazard Mitigation Economics Inc., 1997.

Federal Emergency Management Agency, *Benefit/Cost Analysis of Hazard Mitigation Projects*, Riverine Flood, Version 1.05, Hazard Mitigation Economics Inc., 1996.

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

Goettel & Horner Inc., *Earthquake Risk Analysis Volume III: The Economic Feasibility of Seismic Rehabilitation of Buildings in The City of Portland*, Submitted to the Bureau of Buildings, City of Portland, August 30, 1995.

Goettel & Horner Inc., *Benefit/Cost Analysis of Hazard Mitigation Projects* Volume V, Earthquakes, Prepared for FEMA's Hazard Mitigation Branch, October 25, 1995.

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

Governor's Interagency Hazard Mitigation Team, State of Oregon *Natural Hazards Mitigation Plan*, June 2000).

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

VSP Associates, Inc., *A Benefit/Cost Model for the Seismic Rehabilitation of Buildings*, Volumes 1 & 2, Federal Emergency Management Agency, FEMA Publication Numbers 227 and 228, 1991.

VSP Associates, Inc., *Benefit/Cost Analysis of Hazard Mitigation Projects: Section 404 Hazard Mitigation Program and Section 406 Public Assistance Program*, Volume 3: *Seismic Hazard Mitigation Projects*, 1993.

VSP Associates, Inc., *Seismic Rehabilitation of Federal Buildings: A Benefit/Cost Model*, Volume 1, Federal Emergency Management Agency, FEMA Publication Number 255, 1994.

State of Oregon

Local Natural Hazard Mitigation Plans:

An Evaluation Process

Appendix F: Frequently-Used Acronymns

January 2002

Showcase State

PARTNERS *for* DISASTER RESISTANCE
Oregon, Showcase State

Oregon Emergency Management

OREGON emergency management

Department of Land Conservation and Development

Prepared by:

Oregon Natural Hazards Workgroup

Community Service Center
University of Oregon
541-346-3588
http://www.darkwing.uoregon.edu/~onhw

Frequently-Used Acronyms

State

AGC	Associated General Contractors
AOC	Association of Oregon Counties
BCD	Building Codes Division (Department of Consumer and Business Services)
BPA	Bonneville Power Administration
CPW	Community Planning Workshop (University of Oregon)
CREW	Cascadia Region Earthquake Workgroup
DAS	Department of Administrative Services
DCBS	Department of Consumer and Business Services
DEQ	Department of Environmental Quality
DLCD	Department of Land Conservation and Development
DOGAMI	Department of Geology and Mineral Industries
DSL	Division of State Lands
ESD	Education Service District
GIHMT	Governor's Interagency Hazard Mitigation Team
GNRO	Governor's Natural Resources Office
IISOI	Insurance Information Service of Oregon & Idaho
LCDC	Land Conservation and Development Commission
LOC	League of Oregon Cities
Metro	Metropolitan Regional Government
OCS	Oregon Climate Service
ODA	Oregon Department of Agriculture
ODF	Oregon Department of Forestry
ODFW	Oregon Department of Fish and Wildlife
ODOT	Oregon Department of Transportation
OEM	Oregon Emergency Management
OEMA	Oregon Emergency Management Association
OERS	Oregon Emergency Response System
ONHW	Oregon Natural Hazards Workgroup (University of Oregon)
ORS	Oregon Revised Statutes
OSFM	Office of State Fire Marshal
OSP	Oregon State Police
OSSPAC	Oregon Seismic Safety Policy Advisory Commission
OSU	Oregon State University
OUS	Oregon University System
OWEB	Oregon Watershed Enhancement Board
PGE	Portland General Electric
PSU	Portland State University
PUC	Public Utility Commission
WRD	Water Resources Department

Federal

AASHTO	American Association of State Highway and Transportation Officials
ATC	Applied Technology Council
BFE	Base Flood Elevation
BLM	Bureau of Land Management
BOR	United States Bureau of Reclamation
BSSC	Building Seismic Safety Council
CDBG	Community Development Block Grant
CFR	Code of Federal Regulations
CRS	Community Rating System
CVO	Cascade Volcano Observatory (USGS)
EDA	Economic Development Administration
EPA	Environmental Protection Agency
EWP	Emergency Watershed Protection (NRCS Program)
FAS	Federal Aid System
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FMA	Flood Mitigation Assistance (FEMA Program)
GNS	Institute of Geological and Nuclear Sciences (International)
GSA	General Services Administration
HAZUS	Hazards U.S.
HMGP	Hazard Mitigation Grant Program
HUD	Housing and Urban Development (United States, Department of)
IBHS	Institute for Business and Home Safety
IHMT	Interagency Hazard Mitigation Team
NCDC	National Climatic Data Center
NFIP	National Flood Insurance Program
NFPA	National Fire Protection Association
NHMP	Natural Hazards Mitigation Plan
NIBS	National Institute of Building Sciences
NIFC	National Interagency Fire Center
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NWS	National Weather Service
SBA	Small Business Administration
SEAO	Structural Engineers Association of Oregon
SHMO	State Hazard Mitigation Officer
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFA	United States Fire Administration
USFS	United States Forest Service
USGS	United States Geological Survey
WSSPC	Western States Seismic Policy Council