Press Release
For
The City of Coos Bay Addendum to
The Coos County Multi-Jurisdictional Hazard Mitigation Plan

In February 2002, the Federal Emergency Management Agency's (FEMA) published interim final rule 44 CFR Part 201, which established the Pre-Disaster Mitigation program and requires all states and communities to develop natural hazard mitigation, plans in order to apply for FEMA mitigation project funding.

Since 2000, the Partnership for Disaster Resilience at the University of Oregon's Community Service Center has been leading a statewide planning initiative to build capacity for the development of mitigation plans and projects. The planning initiative is in partnership with Oregon Emergency Management (OEM), Department of Land Conservation and Development (DLCD), Department of Geology and Mineral Industries (DOGAMI), FEMA Region X, and local governments.

OVERVIEW

The City of Coos Bay developed the City's addendum to the Coos County Multi-jurisdictional Natural Hazards Mitigation Plan in an effort to increase the community's resilience to natural hazards. The addendum focuses on the natural hazards that could affect the City of Coos Bay.

The addendum provides a set of actions that aim to reduce the risks posed by natural hazards through education and outreach programs, the development of partnerships, and the implementation of preventive activities via land use plans, storm water management plans, or water management conservation plans. The actions described in the addendum are intended to be implemented through existing plans and programs within the city.

The other aspect to the Natural Mitigation Plan is that when FEMA has grants available, the City would then be able to apply for grant money to help the City achieve the tasks that are listed in this plan.

You can review a copy of the City's Addendum to the Coos County Multi-jurisdictional Natural Hazards Mitigation Plan document on the City's website at www.coosbay.org. You may also review a paper copy at the Coos Bay Library (525 Anderson) or the Public Works and Development Department at City Hall (500 Central Avenue).

The deadline for submitting written comments to Jim Hossley, Public Works and Development Director, is September 30, 2010 by 5:00 pm. If you have any questions, please call the Public Works and Development Director at 541-269-8918.

City Addenda
City of Coos Bay

Overview

The city of Coos Bay developed this addendum to the Coos County Natural Hazards Mitigation Plan in an effort to increase the community's resilience to natural hazards. The addendum focuses on the natural hazards that could affect the city of Coos Bay, Oregon, which include: drought, earthquake, flood, landslide, tsunami, volcano, wildfire, and severe winter/windstorm. It is impossible to predict exactly when disasters may occur, or the extent to which they will affect the city. However, with careful planning and collaboration among public agencies, private sector organizations, and citizens within the community, it is possible to minimize the losses that can result from natural hazards.

The addendum provides a set of actions that aim to reduce the risks posed by natural hazards through education and outreach programs, the development of partnerships, and the implementation of preventative activities such as land use or watershed management programs. The actions described in the addendum are intended to be implemented through existing plans and programs within the city.

The addendum is comprised of the following sections: 1) Addendum Development Process 2) Community Profile; 3) Risk Assessment; 4) Mission, Goals, and Action Items; and 5) Plan Implementation and Maintenance.

Addendum Development Process

2005 Planning Process

The city of Coos Bay participated in Coos County's 2005 planning process, and developed an addendum to the county's plan at that time. The Coos County Natural Hazards Mitigation Plan was adopted in July, 2005.

Two representatives from Coos Bay Engineering Services participated in the development of Coos County's 2005 Natural Hazards Mitigation Plan.

2009 Plan Update Process

In the fall of 2006, the Oregon Partnership for Disaster Resilience (The Partnership/OPDR) at the University of Oregon's Community Service Center partnered with Oregon Emergency Management (OEM) and Resource Assistance for Rural Environments (RARE) to develop a Pre-Disaster Mitigation Planning Grant proposal to create and/or update existing natural hazards mitigation plans for Oregon's southern coastal cities. FEMA awarded the region with a pre-disaster mitigation planning

grant, and planning efforts began in the fall of 2007. RARE provided a staff person ('RARE Participant') to facilitate and document the cities' planning processes.

The following representatives served as steering committee members for the city of Coos Bay's natural hazard mitigation plan update process.

- Glenda Hales, Coos County Emergency Manager
- Joan Morrison, Representative for Residents, Englewood Diking District, Libby Drainage District
- Karen Turner, Coos Bay Engineering Services Coordinator Department
- Stan Gibson, Coos Bay Fire & Rescue Chief
- Steve Doty, Coos Bay Public Works Operations Administrator
- Jim Hossley, Coos Bay Public Works and Development Director

The planning process and associated resources used to create Coos Bay's updated addendum to the Coos County Natural Hazards Mitigation Plan were developed by the Partnership. The planning process was designed to: (1) result in an addendum that is DMA 2000 compliant; (2) coordinate with the state's plan and activities of the Partnership; and (3) build a network of local organizations that can play an active role in plan implementation.

The following is a summary of major activities included in the planning process.

Phase 1: Getting Started

During the months of October 2007 – January 2008, the RARE Participant established contacts with Coos Bay staff, and assisted the city in identifying members to serve on the plan's steering committee. With assistance from OPDR, the RARE Participant developed and facilitated a 'Kick-off' meeting on November 2nd, 2007, and introduced the steering committee to the planning process. This process was part of a county-wide effort to update all city addendums that were developed in conjunction with the 2005 Coos County Natural Hazards Mitigation Plan. As such, the RARE Participant conducted interviews with important stakeholders in the region, including the following representatives from Coos Bay and surrounding areas.

- State Parks Southwest Regional Manager
- Natural Resources Specialist, Sunset Bay State Park Region 3 Office
- Cape Blanco Park Manager
- Kalmiopsis Audubon Society
- Rocky Mountain Elk Foundation
- Southwest Oregon Provincial Advisory Committee

- Retired Senior Volunteer Program

Stakeholder interview questions are located at the end of this addendum in Appendix A, Public Process. Input from stakeholder interviews was used to develop the city's risk assessment, and interviews additionally informed the city's selection of mitigation action items.

As part of the regional Pre-Disaster Mitigation grant, *The Partnership* implemented a region-wide household preparedness survey. The survey gauged household knowledge of mitigation tools and techniques and assessed household disaster preparedness. The survey results improve public/private coordination of mitigation and preparedness for natural hazards by obtaining more accurate information on household understanding and needs. Results of the survey are documented in an independent report in Appendix A, Public Process.

Additionally, the Partnership, with a commitment from the Institute for Business & Home Safety (IBHS) provided individuals in the region with access to, and use of, the IBHS interactive, web-based *Open for Business* property protection and disaster recovery planning tool. The purpose of the planning tool is to: (1) create understanding of the importance of disaster planning; (2) teach local businesses how to navigate the interactive, web-based *Open for Business* property protection and disaster recovery planning tool; (3) assist small businesses in developing their own plans during the training; and (4) teach businesses how to communicate the importance of developing and utilizing plans for property protection and recovery from business interruption. An Open for Business workshop was held in Coos Bay on February 14, 2008. All Coos County businesses and residents were encouraged to attend, including representatives from the city of Coos Bay.

Phase II: Risk Assessment

Phase II of the planning process focused on identifying and understanding the relationship between natural hazards, vulnerable systems within the community, and existing capabilities. To begin the risk assessment process, the RARE Participant reviewed existing research concerning the causes and characteristics of potential natural hazards, as well as their probabilities of occurrence and potential impacts. Resources included Oregon's Technical Resource Guide, and reports produced by the Department of Geology and Mineral Industries (DOGAMI) among others. Please see the Risk Assessment section below for hazard-specific resources and information.

On February 21st, 2008, the RARE Participant developed and facilitated a "Risk Assessment" meeting at Coos Bay's City Hall. Steering committee members discussed the city's risks and vulnerabilities to natural hazards. The RARE Participant documented information from this meeting in the risk assessment section of the addendum. The risk assessment additionally enabled the committee to identify mitigation actions to reduce losses from natural hazards.

Phase III: Developing a Mitigation Strategy

During the months of April, 2008 – June, 2008, the RARE Participant assisted in the development of mitigation actions that seek to reduce the city's vulnerabilities to natural hazards. In partnership with Coos Bay's Steering Committee, the RARE Participant developed and facilitated an "Action Item / Plan Implementation & Maintenance" meeting at Coos Bay's City Hall on May 12th, 2008. At this meeting, the steering committee reviewed the city's existing actions, and identified new actions that would reduce the impact of natural hazards on their community. Additionally, the committee discussed a schedule and strategy for continued plan implementation and maintenance.

2009 Plan Update Changes by Section

This section details the changes made to each section. If a change is not described in this section, the plan remained the same.

Addendum Development Process

This section was created in the 2009 Plan Update. The 2005 addendum did not provide a description of the city's planning process.

Community Profile

The 2005 addendum included a short description of the community's characteristics, population, and economy. The 2009 Plan Update reflects the most recent data available, including information regarding the city's geography & climate; population & demographics; employment & economics; housing; land use & development; transportation & community patterns; critical facilities & infrastructure; historic & cultural resources; government structure; existing plans & policies; social systems & community organizations; and existing mitigation activities.

Risk Assessment

The 2005 addendum provided a preliminary set of "community issues" that included mention of previous occurrences and vulnerabilities within the community. The 2009 Update provides a more comprehensive risk assessment for all seven of the natural hazards described within Coos County's Natural Hazards Mitigation Plan. Additionally, the addendum now addresses drought and volcano hazards.

Mission, Goals, and Actions

The 2005 addendum identified two earthquake/tsunami actions, three flood actions, two landslide actions, three wildfire actions, and one severe winter/wind storm action. All 2005 actions have been deferred, and are included in this addendum. Action #1 combines two of the 2005 education & outreach actions [wildfire & earthquake/tsunami] into one multi-hazard action. Action #2 was previously an earthquake/tsunami action, and is now multi-hazard. Actions #3 and #4 are new, and were identified in the 2007-09 planning process. Please see the action item worksheets at the end of this addendum for more specific information regarding their statuses of completion.

Plan Implementation and Maintenance

This section was created in the 2009 Plan Update. The 2005 addendum did not provide a description of the city's plan implementation and maintenance schedule.

Adoption

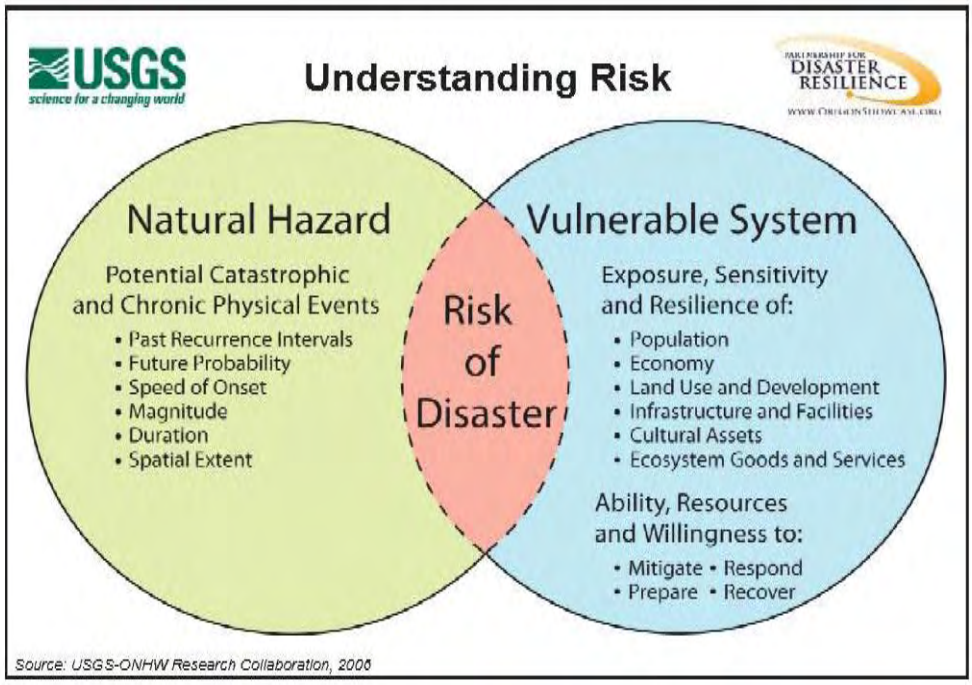
The Coos Bay City Council will be responsible for adopting Coos Bay's Addendum to the Coos County Natural Hazards Mitigation Plan. This governing body has the authority to promote sound public policy regarding natural hazards.

The city of Coos Bay adopted its Addendum to the Coos County Natural Hazards Mitigation Plan via resolution on *Insert Date, Year*.

Community Profile

The following section describes the city of Coos Bay from a number of perspectives in order to help define and understand the city's sensitivity and resilience to natural hazards. Sensitivity factors can be defined as those community assets and characteristics that may be impacted by natural hazards, (e.g., special populations, economic factors, and historic and cultural resources). Community resilience factors can be defined as the community's ability to manage risk and adapt to hazard event impacts (e.g., governmental structure, agency missions and directives, and plans, policies, and programs). The information in this section represents a snapshot in time of the current sensitivity and resilience factors in the city when the plan was developed. The information documented below, along with information from the risk assessment, should be used as the local level rationale for the city's risk reduction actions. The identification of actions that reduce the city's sensitivity and increase its resilience assist in reducing overall risk, or the area of overlap in Figure 1 below.

Figure 1 Understanding Risk[i]



Geography & Climate

Coos Bay is located in Coos County, Oregon in the southwest coastal region. The community is situated on the Coos River and borders the city of North Bend. Coos Bay is approximately 120 miles southwest of Eugene. According to the 2000 U.S. Census, the community encompasses a total area of 15.9 square miles.

The average monthly low is 39°F and the average monthly high is 67°F. The city of Coos Bay receives an average annual precipitation is about 63 inches.

Population & Demographics

In 1990, the city of Coos Bay was home to 15,076 permanent residents. According to the 2000 U.S. Census, there was about a 2% increase in permanent residents to 15,374. Of those 15,374, 48.6% were male and 51.5% female. The racial composition in 2000 was 90.8% White, 4.5 % Hispanic or Latino, 2.2% Native American, and other.

The impact in terms of loss and the ability to recover vary among population groups following a disaster. Historically, 80% of the disaster burden falls on the public.[ii] Of this number, a disproportionate burden is place upon special needs groups, including children, the elderly, the disabled, minorities, and low income persons. Portions of the city of Coos Bay's residents fall into these special needs populations (see Tables 1 and 2 below).

Table 1: Disabled Populations, City of Coos Bay, 2000

Age	Percentage
0 - 15 years	18.5
16 - 64 years	62.3
65 years and older	19.2

Source: US Census, 2000

Table 2: Population by Age, City of Coos Bay, 2000

Age	Number	Percentage
Under 5	884	5.7
5 to 19 years	3,130	20.3
20-44 years	4,744	30.8
45-64 years	3,665	23.8
65+ years	2,951	19.1
Median Age	40.1	

Source: US Census, 2000

Employment & Economics

Historically, the economy of Coos Bay has been largely based on fishing and timber. Both commercial fishing and timber have declined in the last few decades. Timber and fishing industries still exist but not at the scale they were a few decades ago. The economy has transitioned to more tourism and service-based industries. As shown in Table 3 below, the education, health and social services industries employ the largest percentage of workers. This could be due to the city's proximity to Southwest Oregon Community College. Coos Bay is located within the International Port of Coos Bay district and boasts tourism and sport fishing activities as well. Shipping to Coos Bay and along the Coos River is also an important industry.

Table 3: Employment by industry, City of Coos Bay

Industry	Number	Percentage
Educational, health and social services	1,668	25.9
Retail trade	989	15.3
Arts, entertainment, recreation, accommodation and food services	626	9.7
Professional, scientific, management, administrative, and waste management services	409	6.3
Construction	386	6.0
Finance, insurance, real estate, and rental and leasing	380	5.9
Other services (except public administration)	370	5.7
Manufacturing	364	5.6
Transportation and warehousing, and utilities	364	5.4
Public administration	355	5.5
Agriculture, forestry, fishing and hunting, and mining	238	3.7
Wholesale trade	161	2.5
Information	151	2.3

Source: US Census, 2000

Median income can be used as an indicator of the strength of the region's economic stability. In 1999, the median household income in Coos Bay was $31,212. This is more than $10,000 below the 1999 national median household income of $41,994, but roughly equal to the $31,542 median household income for Coos County.[iii] Although it can be used to compare areas as a whole, this number does not reflect how income is divided among area residents. Out of the total population, 21% of those under the age of 18 and 9.9% of those 65 and older are living below the poverty line.

Housing

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

In 2000, the city of Coos Bay had 7,063 housing units. See Table 4 below for an indication of housing types in Coos Bay. Additionally, Table 5 shows that more than 80% of the city's housing stock was built prior to 1980, before strong seismic building codes were put into place.

Table 4: Housing Structure in City of Coos Bay

Housing Type	Owner Occupied Percentage	Renter Occupied Percentage
Single Family	81.2	38.7
Multifamily	1.9	57.9
Mobile home	14.4	2.6
Boat, RV, van, etc.	2.5	.7

Source: US Census, 2000

Table 5: Housing Structure Age, City of Coos Bay

Age of Housing Structure	Percentage
1999 to March 2000	1.3
1995 to 1998	5.1
1990 to 1994	4.3
1980 to 1989	9.1
1970 to 1979	24.4
1960 to 1969	13.0
1940 to 1959	27.6
1939 or earlier	15.3

Source: US Census, 2000

Land Use & Development

Development in the city of Coos Bay spreads mostly along Hwy 101 and to higher elevations in the hills. The city is located on the mouth of the Coos River and inland of the coast. A majority of the city services are located within blocks of Hwy 101. Coos Bay's zoning map for the city core is shown below.


BIRCH AVE
N 8TH ST
TELEGRAPH DR
PARK AVE
7TH TR
8TH TR
ALDER AVE
BAYSHORE DR
N BROADWAY ST
N 2ND ST
N 3RD ST
N 4TH CT
N 4TH ST
N 5TH ST
N 6TH ST
N 7TH ST
N 8TH ST
HIGHLAND AVE
MARKET AVE
COMMERCIAL AVE
CENTRAL AVE
ANDERSON AVE
BENNETT ST
DONNELLY AVE
ELROD AVE
CURTIS AVE
S 2ND ST
S 3RD ST
S 4TH ST
S 5TH ST
S 6TH ST
S 7TH ST
S 8TH ST
QP-1
R-1
R-2
R-3
R-4P
C-1
C-2
WH
W-I
N
W
E
S

Transportation & Commuting Patterns

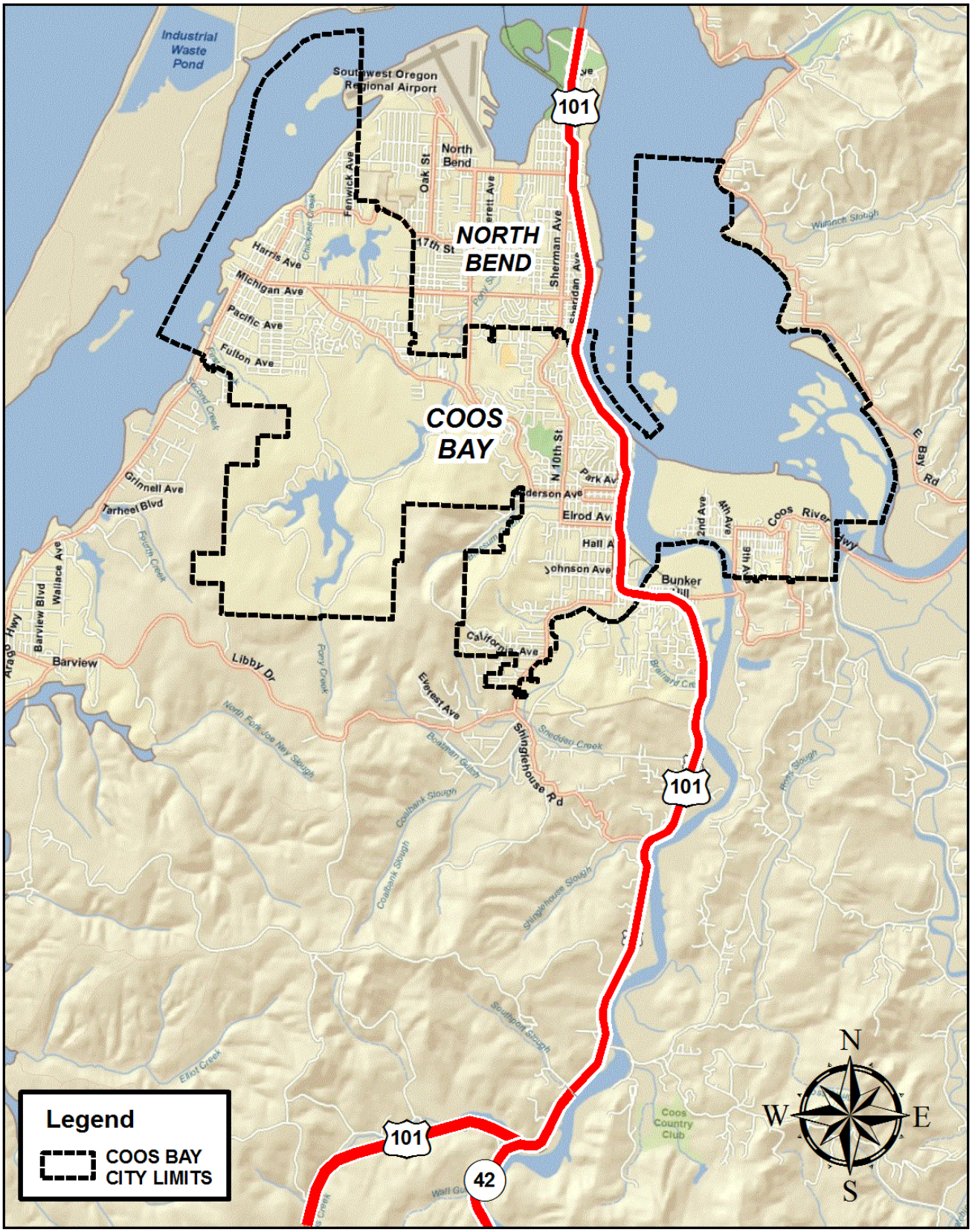
The major transportation route through the city of Coos Bay is Highway 101 (identified in red in the transportation map on page 1-12). Highway 101 runs north to south, and includes one bridge, Conde D. McCullough Memorial Bridge, over the Coos River. Oregon State Highway 42 is just south of Coos Bay, and connects to 101 then runs east/west to Coquille and Interstate 5.

Transportation is an important consideration when planning for emergency service provisions. Growth within the city will put pressure on both major and minor roads, especially if the main mode of travel is by single occupancy vehicles. Within Coos Bay, driving alone is the most common form of travel (see Table 6 below).

Table 6: Transportation Type used to Commute to Work, Coos Bay

Transportation Type	Number	Percentage
Total Workers 16 and over	**6,439**	**100**
Car, truck, or van	5,844	90.8
Drove alone	5095	79.1
Carpooled	749	11.6
Worked at home	255	4.0
Walked	153	2.4
Public transportation	101	1.6
Other means	51	0.8
Bicycle	35	0.5

Source: US Census, 2000



Major Transportation Route

Critical Facilities & Infrastructure

Critical facilities are those that support government and first responders' ability to take action in an emergency. They are a top priority in any comprehensive hazard mitigation plan. Individual communities should inventory their critical facilities to include locally designated shelters and other essential assets, such as fire stations, and water and wastewater treatment facilities. The city of Coos Bay has 11 fire stations in the vicinity, 3 elementary schools, 2 middle schools, 1 senior high school, 1 community college, 2 police stations, and a waste water treatment facility. The nearest hospital is Bay Area Hospital in Coos Bay.

Bay Area Hospital provides a variety of medical services for the community. It is a 172 – bed, publicly owned acute care facility. As the largest medical center for Oregon's southern coast, Bay Area Hospital offers a comprehensive range of diagnostic and therapeutic services. The hospital's inpatient and outpatient services include medical, surgical, mental health, pediatric, critical care, home health, outpatient psychiatric, oncology, obstetrical, and other specialties. Physicians, nurses and technologists are on duty 24 hours a day to meet the medical and emergency needs of Oregon Coast residents and visitors.

Historic & Cultural Resources

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

- Sunset Bay State Park
- Shore Acres State Park
- Cape Arago State Park

Government Structure

Coos Bay has a manager/council non-partisan form of government. The mayor and councilors are elected at large. The Council hires a city manager who administers the day-to-day operations of the city through four departments: Finance, Police, Fire, and Public Works and Development. Public Works and Development Department has four divisions - Planning, Operations, Building, and Engineering. Departments and services are further described as follows:

- *City Manager*: Directs and coordinates administration of the city government in accordance with policies and directives of the City Council.
- *Public Works and Development*: Responsible for development and maintenance of city infrastructure including the waste water utility;

enforcement of zoning ordinances, and works with the general public to plan and monitor development activities.

- *City Attorney*: Provides representation and legal advice to the City Council and staff
- *Coos Bay Fire Department*: Is a part of the Emergency Response Team and keeps informed and prepared to handle a hazardous waste emergency. The department is charged with protecting the safety and welfare of persons and property.
- *Police Department*: Will participate as members of the Emergency Response Team in the event of a natural disaster.
- *Finance Department*: Responsible for setting up Emergency Response Accounting. The department is charged with recording and maintaining the ongoing fiscal activities of the City.

Existing Plan and Policies

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

The city of Coos Bay's addendum includes action items that, when implemented, will reduce the city's vulnerability to natural hazards. Many of these recommendations are consistent with the goals and objectives of the city's existing plans and policies. Implementing the addendum's action items through existing plans and policies increases their likelihood of being supported and getting updated, and maximizes the city's resources. The following list documents the plans and policies already in place in city of Coos Bay.

- Comprehensive Plan – Created 1983, Revised 1996 and revised again in 2009. The Comprehensive Plan contains regulations for the zoning of land within the city and was adopted to promote and protect the public health, safety, and general welfare.
- Transportation Plan – Feb 2004, the plan is a multi-modal plan, addressing improvement to existing roadways, new pedestrian and bicycle facilities, improvement in public transit service, and other modes (including air, rail, water and pipeline). The plan also includes a transportation improvement program, as well as changes to the city's codes and standards to implement the TSP recommendations.

Community Organizations

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

The following organizations are active within Coos County and may be potential partners for implementing mitigation actions in the city of Coos Bay.

- Area Agency on Aging
- Bay Area Chamber of Commerce
- Bay Area Hospital
- Bicoastal Media
- Boys and Girls Club of Southwestern Oregon
- Coos County Public Health
- Coos Bay Downtown Association
- Coos-Curry County North Bend Housing Authority
- Oregon Coast Community Action
- Southwestern Oregon Community College
- South Coast Head Start
- Southwestern Business Development Center
- The World Newspaper

Existing Mitigation Activities

Existing mitigation activities include current mitigation programs and activities that are being implemented by the community in an effort to reduce the community's overall risk to natural hazards. Documenting these efforts can help participating jurisdictions better understand risk and can assist in documenting successes. The following mitigation projects have been implemented within the city of Coos Bay:

Earthquakes:
The seismic capacity of Coos Bay's building stock will improve over time as the existing stock is gradually replaced and/or upgraded.

Flooding:

- Adopted FEMA floodplain maps, 2009
- Educational Pamphlets about FEMA Flood insurance, Building in a Floodplain, and Floodplain requirements located in City Hall

- Wastewater Collection and Storm Drainage System Development Charge Study, created April, 2006.

Landslides:
Development code requires geotechnical reports for steep slope areas.

The steering committee indicated that Coos River Highway, Ocean Boulevard, Idaho Dr, West Park Roadway, Koos Bay Blvd, and Kingwood Canyon areas are all areas where development of engineering studies and assessments for mitigating potential landslides appear to be warranted.

Tsunami:
Pamphlets have been completed on basic guidelines for encountering natural disasters, as well as tsunami evacuation maps and tsunami zone warning systems.

Wildfire:
All of the fire service providers in Coos County are dedicated to fire prevention and use their resources to provide education information and services to residents.

Risk Assessment

The Coos County Natural Hazards Mitigation Plan addresses the following natural hazards within its plan: earthquakes, floods, landslides, tsunamis, wildfire, and severe winter & wind storms. The city of Coos Bay reviewed the county's plan on February 21st and May 12th 2008, and assessed how Coos Bay's risks vary from the risks facing the entire planning area. Additionally, Coos Bay assessed its risks related to hazards that are currently not included within the Coos County Natural Hazards Mitigation Plan. Those hazards include drought and volcano.

Drought

Drought can be defined in several ways. The American Heritage Dictionary defines drought as "a long period with no rain, especially during a planting season." Another definition of drought is a deficiency in surface and sub-surface water supplies. In socioeconomic terms, drought occurs when a physical water shortage begins to affect people, both individually and collectively, as well as the area's economy.

Drought is typically measured in terms of water availability in a defined geographical area. It is common to express drought with a numerical index that ranks severity. The Oregon Drought Severity Index is the most commonly used drought measurement in the state because it incorporates both local conditions and mountain snow pack. The Oregon Drought Severity Index categorizes droughts as mild, moderate, severe, and extreme.

Coos Bay's Steering Committee estimates a **low probability** that drought will occur, meaning one event is likely within a 75-100 year period. Similarly, the steering committee estimates a **low vulnerability** to drought hazards, meaning less than 1% of the population is likely to be affected by a drought event. The Coos County Natural Hazards Mitigation Plan did not address drought, but the county completed a hazard analysis ranking for Oregon Emergency Management in July 2003 that does account for drought-related risks. Coos Bay's probability and vulnerability ratings are both lower than the county's hazard analysis ratings. [v]

Oregon experienced a dry 18 month period for the entire state between 1904 and 1905. Between 1976 and 1981, western Oregon saw drought conditions with 1976-1977 being the driest year of the century. The most recent recorded drought was the general statewide drought lasting between 2000 and 2001. No further events have been recorded for Coos Bay. Drought is averted as a result of the city's high rainfall from moist air masses moving onto land from the Pacific Ocean, especially during winter months.

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

faced with significant increases in electricity rates. In addition, water-borne transportation systems (e.g., ferries, barges, etc.) could be impacted by periods of low water.

There also are environmental consequences. A prolonged drought in forests promotes an increase of insect pests, which in turn, damage trees already weakened by a lack of water. A moisture-deficient forest constitutes a significant fire hazard (see the Wildfire summary). In addition, drought and water scarcity add another dimension of stress to species listed pursuant to the Endangered Species Act (ESA) of 1973.

Earthquake

The Coos County Natural Hazards Mitigation plan adequately identifies the causes and characteristics of earthquakes, as well as location and extent of earthquakes within the county. Previous occurrences are also well-documented within the county's plan. Earthquakes that affect the county are also likely to affect the city of Coos Bay as well.

When determining the probability of earthquakes, it is difficult to estimate the recurrence intervals from available data. Paleoseismic studies along the Oregon coast indicate that the state has experienced seven Cascadia Subduction Zone (CSZ) events possibly as large as M9 in the last 3,500 years. These events are estimated to have an average recurrence interval between 500 and 600 years, although the time interval between individual events ranges from 150 to 1000 years. Scientists estimate the chance in the next 50 years of a great subduction zone earthquake is between 10 and 20 percent assuming that the recurrence is on the order of 400±200 years.[vi]

The Coos County Natural Hazards Mitigation Plan ranked the county's **vulnerability** to earthquakes as **high**, indicating that more than 10% of the population would be impacted in an earthquake event. The county's plan also indicates that the **probability** of earthquakes is **high**. These rankings are accurate when discussing Coos Bay's risk as well.

The entire community of Coos Bay would be affected by a severe CSZ earthquake. The business area along Coos River is built mostly on fill and could be subject to liquefaction. Additionally, portions of the city may be susceptible to amplification and earthquake-induced landslides, and the extent of an earthquake's effects would vary depending upon conditions. At this time, the city is unable to estimate the potential costs of damages or the number of injuries likely to occur within a given scenario. The community's vulnerabilities and/or potential earthquake-related impacts include:

- The disruption or destruction of water pumps and intakes.
- Potential damages to bridges. The Hwy 101 Bridge over the Coquille River is an important connection to the city of Bandon, and the McCullough Memorial Bridge that crosses the Coos River is a vital line to northern coastal communities.

- Damages to the Port Boat Basin. The Port is constructed on fill which could result in liquefaction.
- Information gaps. The city has not conducted a thorough risk analysis, and there is no earthquake mapping for Coos Bay.
- Water and sewer interruption. The city's water and sewer connections to the Hwy 101 Bridge are at risk of interruption from a seismic event.

From 2005-2007, under the direction of Oregon Senate Bill 2, DOGAMI completed a statewide seismic needs assessment that surveyed K-12 public school buildings, hospital buildings with acute inpatient care facilities, fire stations, police stations, sheriffs offices and other law enforcement agency buildings. The needs assessment consisted of rapid visual screenings (RVS). RVS results were grouped into categories by risk of probable damage in a high magnitude earthquake. The following buildings within or near the city of Coos Bay were listed at "Very High" or "High" risk of probable damage in a high magnitude event:

- Blossom Gulch Elementary School
- Bunker Hill Elementary School
- Madison Elementary School
- Marshfield Senior High School
- Millicoma Intermediate School
- Resource Link Charter School
- Sunset Middle School
- Coos Bay Fire Station Eastside
- Coos Bay Fire Station Empire
- Coos Bay Police Department/City Services
- Coos Bay Community College (CC) : Coaledo Hall
- Coos Bay CC: Eden Hall
- Coos Bay CC: Empire Hall
- Coos Bay CC: Fairview Hall
- Coos Bay CC: Prosper Hall
- Coos Bay CC: Randolph Hall
- Coos Bay CC: Sitkum Hall

Flood

The Coos County Natural Hazards Mitigation Plan in Section 3, Tab 2 adequately describes the causes and characteristics of flooding, as well as the previous occurrences of flooding events within the city of Coos Bay.

Significant flooding occurred late December 2005 in southwest Oregon. Coalbank Slough south of Coos Bay flooded the Libby and Englewood Diking Districts damaging homes on Old Wireless Lane, Illinois Avenue and along Southwest

Boulevard in the Englewood area. The area was a focus of mitigation efforts with the assistance of FEMA funding to buy-out properties on Old Wireless Lane and to elevate homes on Illinois Avenue.

During the 1996 statewide flooding events, Coos Bay experienced local flooding between November 17th and December 11th. The state received a presidential disaster declaration on December 21st. Additionally, heavy storms caused raw sewage spills within the city on May 7th, 2001.

The Coos County Natural Hazards Mitigation Plan ranked the county's **vulnerability** to floods as **moderate**, meaning 1-10% of the population or regional assets are likely to be impacted by a flooding event. The county plan also indicates that the **probability** of flooding is **high**, meaning one event is likely to happen within a 10 year period. The city of Coos Bay's Steering Committee believes that these ratings appropriately describe Coos Bay's level of risk as well.

The location and extent of Coos Bay's flooding hazards are best described within the city's Flood Insurance Rate Maps (FIRM). In Figures 2- 4 below, portions of the city's FIRMs show areas of Coos Bay that could be impacted in a one-hundred year flood event[vii] (i.e., areas that have a 1% annual chance of flooding in an A or V zone.)

Figure 2. Coos Bay Flood Insurance Rate Map

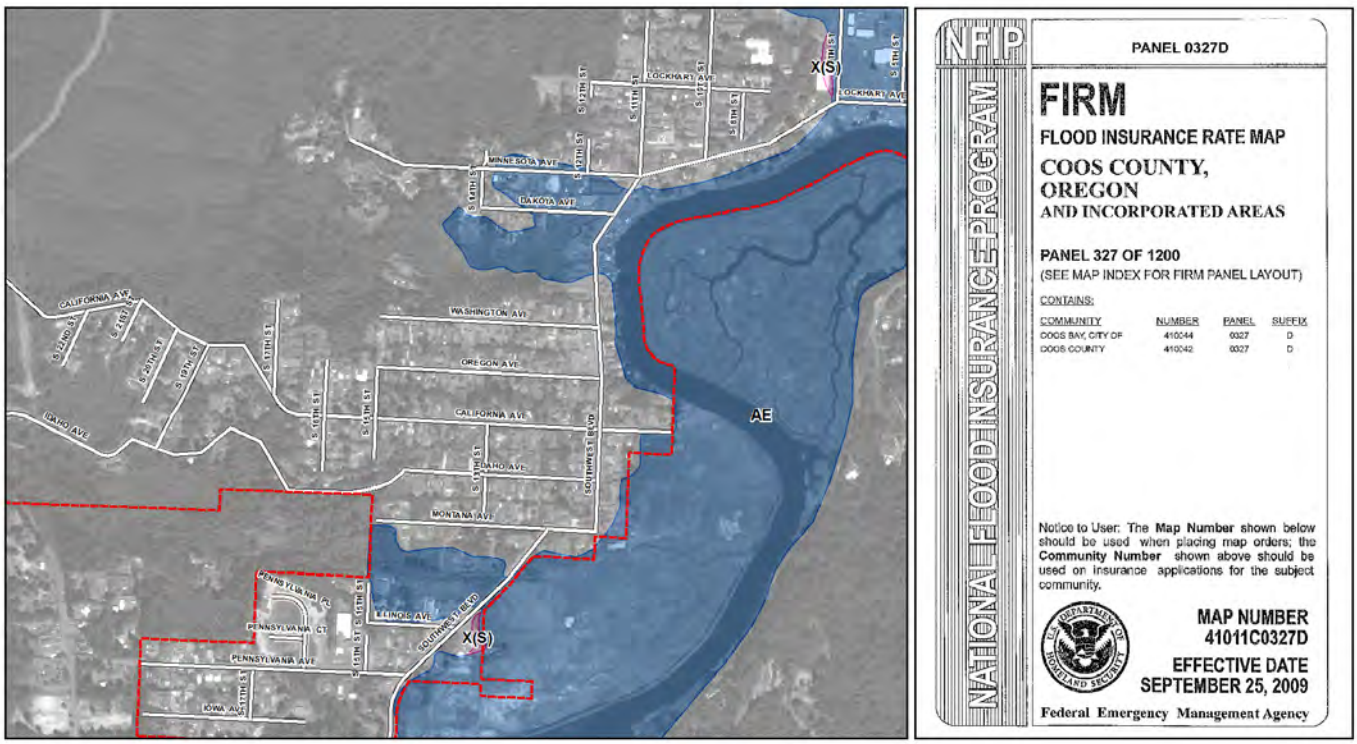


Figure 3. Coos Bay Flood Insurance Rate Map

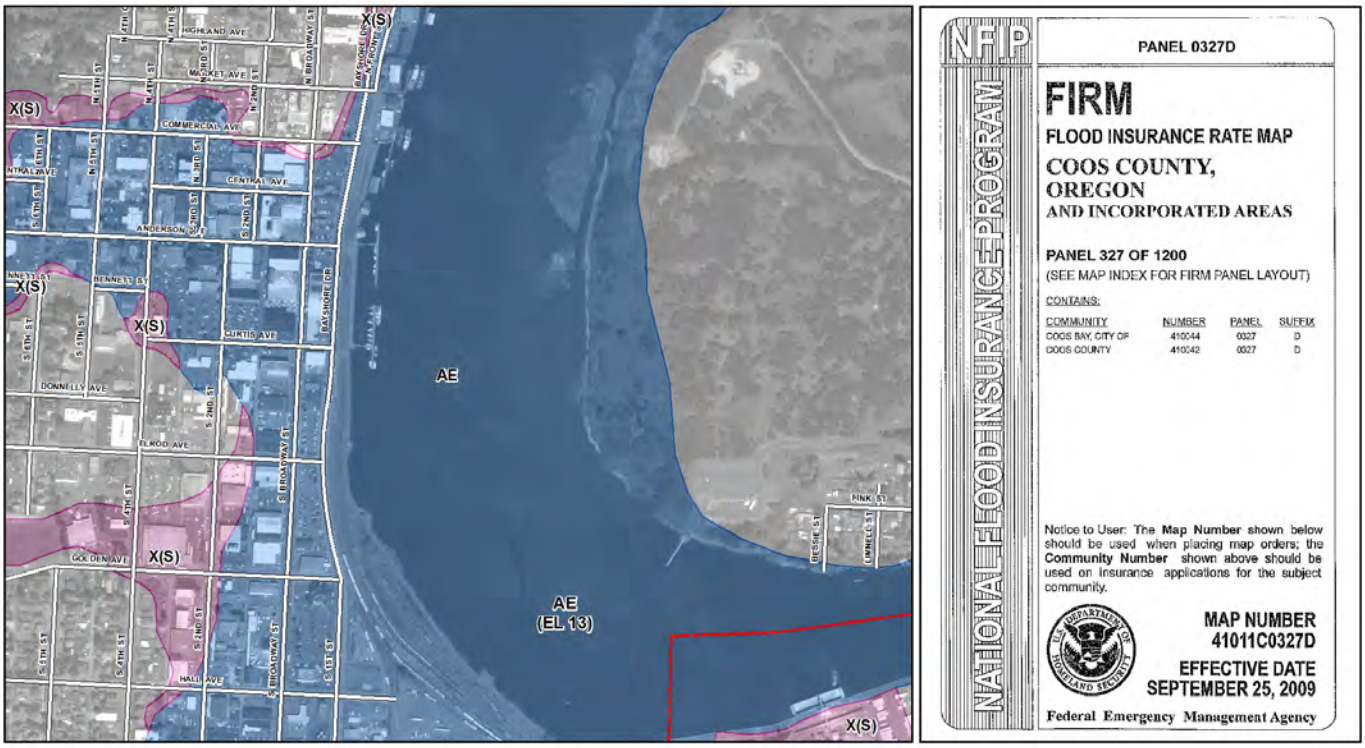
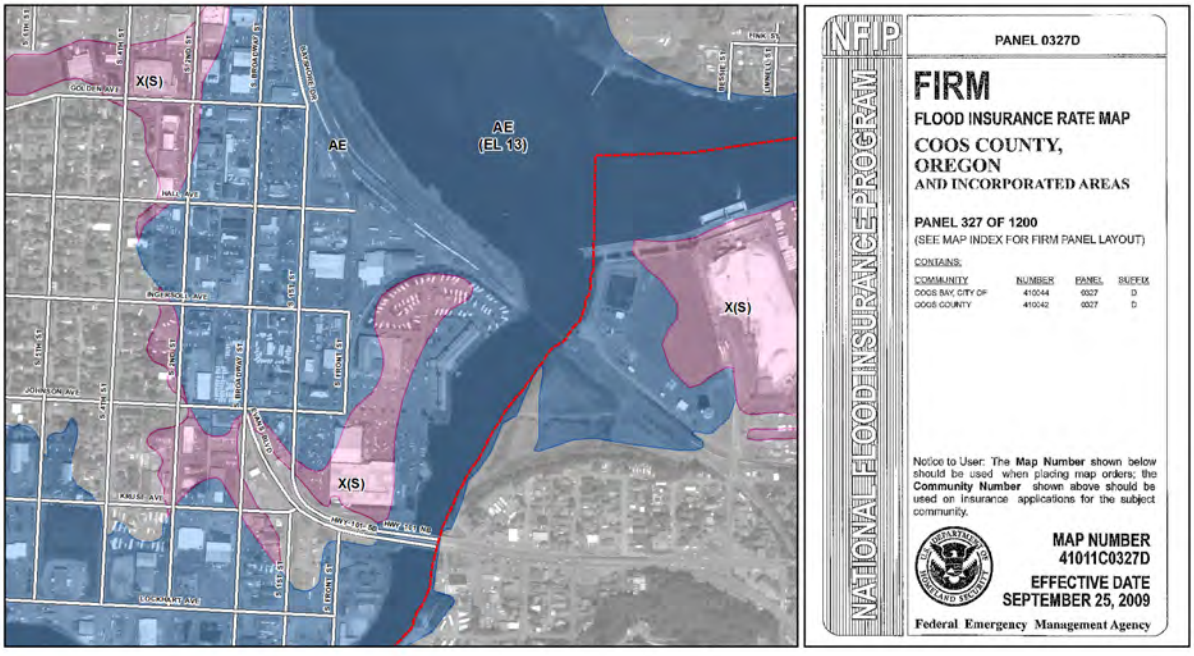


Figure 4. Coos Bay Flood Insurance Rate Map



The steering committee identified the following areas as particularly vulnerable to flooding events and/or prone to flood-related damages:

- Residential and Commercial areas along Pony Creek Reservoir;
- Highway 101 on the east side of town along Isthmus Slough;
- Upper and Lower Empire Lake Area northwest of town;
- The Libby Drainage District and the Englewood Diking District, as well as several drainage basins within the city limits impact residents each year. These areas are Blossom Gulch, Dakota Avenue, Colorado Avenue, South Seventh Street, and Golden Avenue. Statistics show that certain areas of the Diking and Drainage Districts are inundated with flood waters on a yearly basis. The last assessment and evaluation for mitigation of the flooding problems of the Englewood Diking District and Libby Drainage District is seventeen years old.
- Storm-water pumping stations at various locations throughout the city are annually threatened by flood waters.

The city of Coos Bay is a participant in the National Flood Insurance Program (NFIP). The city's Flood Insurance Rate Maps (FIRM) are current as of September 25, 2009. As of April 12, 2010, there were 155 NFIP policies in Coos Bay with a total value of $34,969,800. Between 1978and April 2010 there have been a total of 51 NFIP claims reimbursing $1,320,957. The total coverage of these policies is $30,957,500. There are 132 policies are in the A zone. The total premium is $162,641.[viii]The city of Coos Bay has 6 repetitive loss properties totaling 13 losses. The building payments ($502,121.44) and content payments ($17,096.23) from repetitive losses equate to a total payment amount of $519,217.67. The average between the 13 losses is $39,939.82 per loss.[ix]

Landslide

The Coos County Natural Hazards Mitigation Plan adequately describes the causes and characteristics of landslides within the region, as well as the location of active slide areas in Coos Bay (see Coos Bay – North Bend Slide Map below in Figure 5). Previous occurrences of landslides within the region are documented in Coos County's Plan, but there is no mention of landslides that specifically happened within Coos Bay. At the present time, Coos Bay does not keep records of previous landslides.

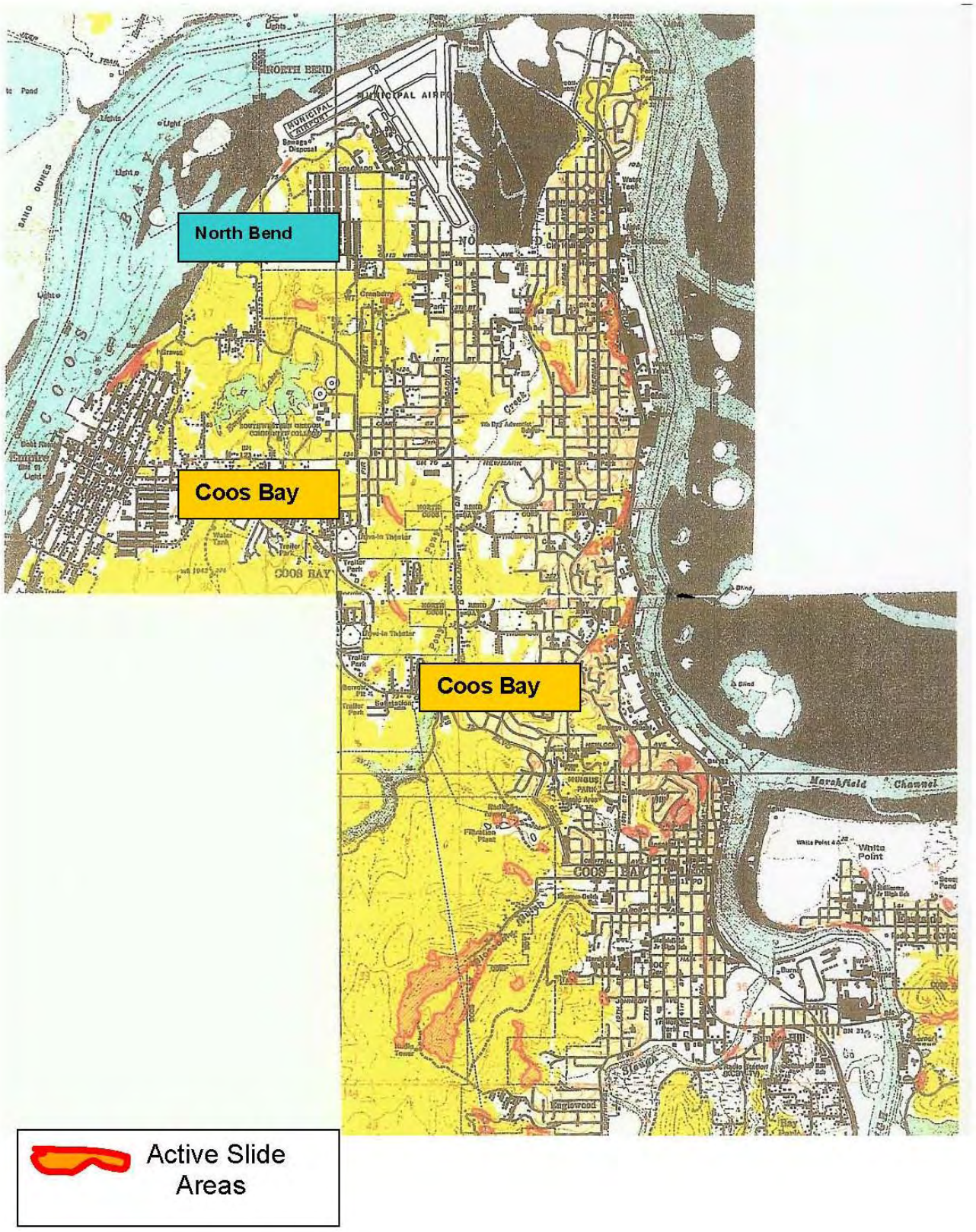
In 2007 the Oregon 74th Legislative Assembly directed DOGAMI to extend lidar collection efforts throughout the state. Lidar (light detection and ranging) is a new tool that can provide very precise, accurate, and high-resolution images of the surface of the earth, vegetation, and the built environment. Legislators approved the consortium model for data collection and data sharing, and provided modest seed money. The ultimate goal is to provide high-quality lidar coverage for the entire state. To achieve this goal DOGAMI has formed the Oregon Lidar Consortium (OLC), which will develop cooperative agreements for the collection of high-quality lidar that benefits the public at large, the business community, and agencies at all levels of government.[x] Currently, South Coast lidar acquisition (including Coos

Bay) has been completed and delivered. The lidar maps could assist the city in better understanding its landslide risks.

The Coos County Natural Hazards Mitigation Plan ranked the county's **vulnerability** to landslides as **high,** meaning more than 10% of the population or regional assets would be affected by a major event. The county plan also indicates that the **probability** of landslides is **high,** meaning one incident is likely to occur within a 10 year period. The Coos Bay Steering Committee agrees that the county's vulnerability and probability assessments appropriately describe the city's risk.

The Coos County Natural Hazards Mitigation Plan adequately describes the potential impacts that landslides can have on Coos Bay. Generally, the coastal land and hills surrounding Coos Bay are at higher risk than areas within the city. The city's steering committee believes that portions of Highway 101 outside of the city are highly vulnerable to landslides/erosion. The potential result is blockages to major transportation arteries, which could prevent residents from accessing essential services and businesses. Landslides often cause immediate damages and can cause a disruption of critical services, block roads, and have long-term effects on the economy. Critical resources, including potable water, wastewater services, telecommunications, and electrical services, can be disrupted as well.

Figure 5. Coos Bay – North Bend Slide Map



Tsunami

Coos Bay is at risk from tsunamis that originate from both local and distant sources. The city is particularly vulnerable to local tsunamis that are generated from magnitude 9+ earthquakes near the Oregon coastline (i.e., the Cascadia Subduction Zone). Cascadia Subduction Zone (CSZ) earthquakes are estimated to have an average recurrence interval between 500 and 600 years, although the time interval between individual events ranges from 150 to 1000 years. Additionally, smaller tsunamis and earthquakes can occur in the subduction zone south of Waldport at a recurrence interval of about 300 years.[xi] In Coos Bay, a tsunami is likely to resemble a major flooding event, since the tsunami waves will travel up the Coos River.

The Coos County Natural Hazards Mitigation Plan adequately describes the causes and characteristics of tsunamis, and also identifies the previous occurrences of tsunamis for the city of Coos Bay. Geologists predict a **10-14 percent chance** that a Cascadia tsunami will be triggered by a shallow undersea earthquake offshore Oregon in the next 50 years, causing a tsunami that will affect the Oregon coast. This forecast comes from evidence for large but infrequent earthquakes and tsunamis that have occurred at the Oregon coast, on average every 500 years.[xii]

The Coos County Natural Hazards Mitigation Plan ranked the county's vulnerability to tsunamis as moderate, meaning 1-10% of the population or regional assets could be impacted by a tsunami event. The Coos Bay Steering Committee ranked Coos Bay's **vulnerability** to tsunamis as **high**. This means that for Coos Bay, a tsunami would likely impact more than 10% of the population or regional assets.

Coos Bay's vulnerability is higher than the county's for several reasons. For example, 30% of the people that live within the tsunami inundation zone are over 65 years of age.[xiii] Additionally, roughly 40% of residents within the tsunami inundation zone are renters.[xiv] Research shows that renters are much less likely than homeowners to prepare for catastrophic events. Renters typically have lower incomes and fewer resources to prepare; preparedness campaigns may pay less attention to renters; higher turnover rates for renters may limit their exposure to hazard information; and renters may lack motivation to invest in mitigation measures for rented property.

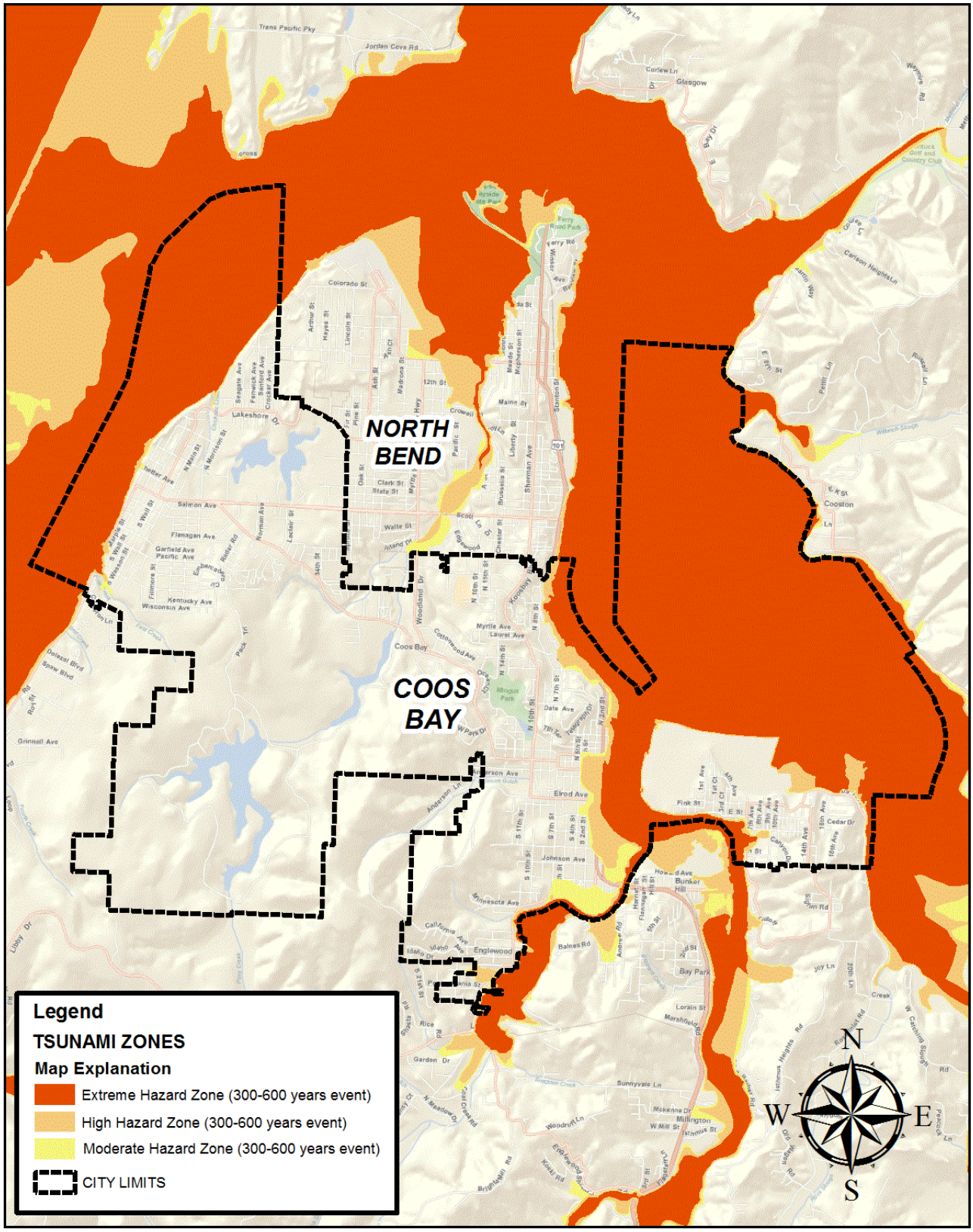
The Oregon Department of Geology and Mineral Industries (DOGAMI) collaborated with the Oregon Graduate Institute and NOAA to create tsunami inundation maps for several areas along the Oregon Coast. The maps depict the expected inundation for tsunamis produced by a magnitude 8.8 to 8.9 undersea earthquake. The tsunami hazard maps were produced to help implement Senate Bill 379 (SB 379), which was passed by the 1995 regular session of the Oregon Legislature. SB 379, implemented as Oregon Revised Statutes (ORS) 455.446 and 455.447, and Oregon Administrative Rules (OAR) 632-005, limits construction of new essential

facilities and special occupancy structures in tsunami flooding zones. Coos Bay's tsunami inundation zone is depicted in Figure 6 below. The steering committee identified the following areas as particularly vulnerable to tsunami waves:

- The Business District is within the tsunami inundation zone. This area is important to the cultural and economic vitality for the city due to its tourist appeal.
- Residential areas at low elevation along Hwy 101 are within the tsunami inundation zone. A tsunami surge up the Coos River could inundate the area.

DOGAMI is currently engaged in remapping the state's 362-mile long coastline for tsunami inundation using state-of-the-art computer models, coupled with laser based terrain mapping and field based geologic investigations. In December, 2008 DOGAMI released *Open-File Report O-08-12, Prehistoric Cascadia Tsunami Inundation and Runup at Cannon Beach, Clatsop County, Oregon* by Robert C. Witter. The report discusses field investigations conducted over the past two years that detail the landward extent of sand deposits left by Cascadia tsunamis over the last 2,000 years.[xv]

Figure 6 Tsunami Map



Volcano

The Cascade Range of the Pacific Northwest has more than a dozen active volcanoes. These familiar snow-clad peaks are part of a 1,000 mile-long chain of mountains which extend from southern British Columbia to northern California. Cascades volcanoes tend to erupt explosively, and have occurred at an average rate of 1-2 per century during the last 4,000 years. Future eruptions are certain. Seven Cascades volcanoes have erupted since the first U.S. Independence Day slightly more than 200 years ago. Four of those eruptions would have caused considerable property damage and loss of life had they occurred today without warning. The most recent events were Mt. St. Helens in Washington (1980-86) and Lassen Peak in California (1914-1917). The existence, position, and recurrent activity of Cascades volcanoes are generally thought to be related to the convergence of shifting crustal plates. As population increases in the Pacific Northwest, areas near volcanoes are being developed and recreational usage is expanding. As a result more and more people and property are at risk from volcanic activity.

To identify the areas that are likely to be affected by future events, pre-historic rock deposits are mapped and studied to learn about the types and frequency of past eruptions at each volcano. This information helps scientists to better anticipate future activity at a volcano, and provides a basis for preparing for the effects of future eruptions through emergency planning.

Potentially active volcanoes in the Pacific Northwest are shown below in Figure 7. Figure 8 illustrates the history of volcanic eruptions in the Cascade Range.

Figure 7. Potentially Active Volcanoes of the Western United States[xvii]

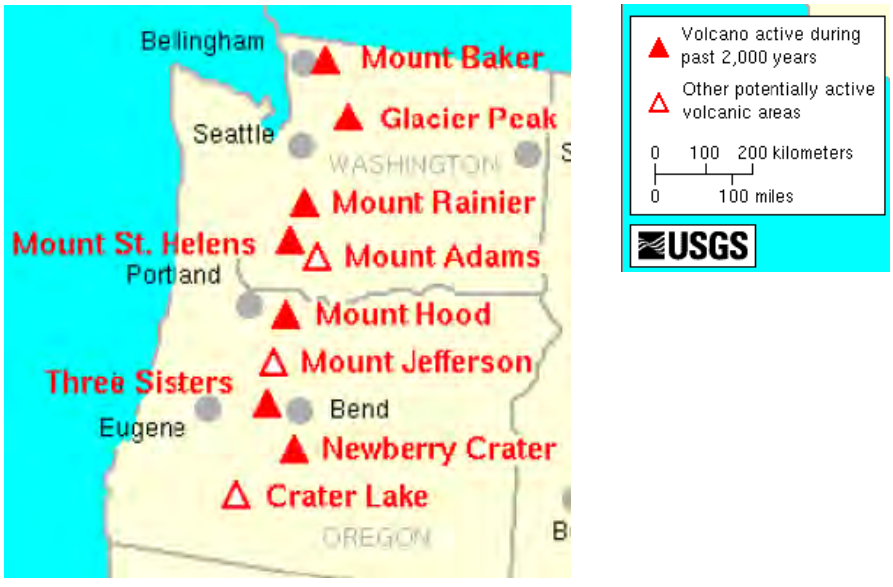
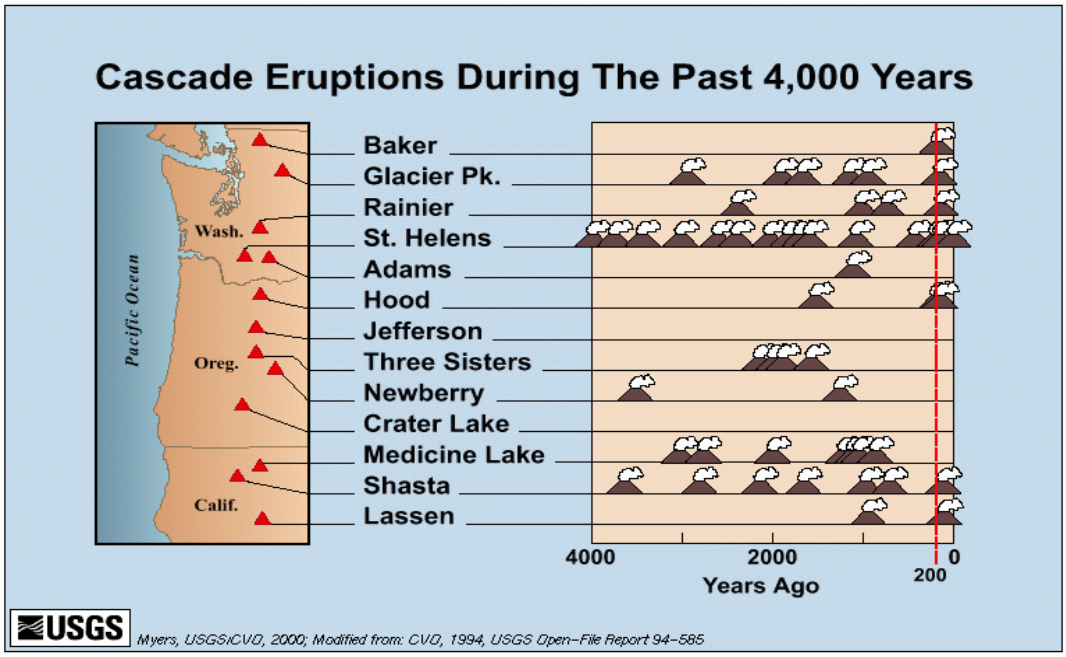


Figure 8. History of Cascade Eruptions[xviii]



Mt. St. Helens, a volcano in Washington State, is the most active volcano in the Cascade Range. Its last major eruption occurred on May 18th, 1980 when a large landslide and powerful explosive eruption created a large crater, and ended 6 years later after more than a dozen extrusions of lava built a dome in the crater.[xix] Larger, longer lasting eruptions have occurred in the volcano's past and are likely to occur in the future. Some reports indicate that ashfall reached Mapleton after the 1980 eruption, but no supporting documentation has been found.

Coos County's Natural Hazards Mitigation Plan does not address volcano hazards because immediate volcanic activity does not exist near the county. The same is true for the city of Coos Bay. Cascades volcanoes have erupted at an average rate of 1-2 per century during the last 4,000 years. As such, the steering committee believes that the **probability** of volcanic activity impacting the county and/or city is very **low**, meaning no more than one event is likely to occur within a 75-100 year period. Consequently, the city believes that volcano-related mitigation actions would not prove cost-effective at this time.

Scientists use wind direction to predict areas that might be affected by volcanic ash; during an eruption that emits ash, the ash fall deposition is controlled by the prevailing wind direction. The predominant wind pattern over the Cascades originates from the west, and previous eruptions seen in the geologic record have resulted in most ash fall drifting to the east of the volcanoes. As such, the city's steering committee estimates a **low vulnerability** to volcanic hazards, meaning less than 1% of the population is likely to be affected by a volcanic event.

Although Coos Bay is unlikely to experience volcanic hazards, the following damages can occur from ash fall:

Structural damages can result from the weight of ash, especially if it is wet. Four inches of wet ash may cause buildings to collapse. A half-inch of ash can impede the movement of most vehicles and disrupt transportation, communication, and utility systems, and cause problems for human and animal respiratory systems. It is extremely dangerous for aircraft, particularly jet planes, as the volcanic ash accelerates wear to critical engine components, can coat exposed electrical components, and erodes exposed structures. Ash fall may severely decrease visibility and even cause darkness, which can further disrupt transportation and other systems.

Ash fall can severely degrade air quality, triggering health problems. In areas with considerable ash fall, people with breathing problems might need additional services from doctors or emergency rooms. In severe events, an air quality warning, similar to those given on summer problem air quality days, could be issued. This would, for example, warn people with breathing problems not to go outside. On roads and streets, ash fall can create serious traffic problems as well as road damage. Vehicles moving over even a thin coating of ash can cause great clouds of ash to swell. This results in grave visibility problems for other drivers, calling for speed restrictions, and often forcing road closures. It also adds to the potential for health problems for residents of the area.

Extremely wet ash creates very slippery and hazardous road conditions. Ash filling roadside ditches and culverts can prevent proper drainage and cause shoulder erosion and road damage. Blocked drainages can also trigger debris flows or lahars if they cause water to pool on or above susceptible slopes. Conventional snow removal methods do not work on dry ash, as they only stir it up and cause it to resettle on the roadway. When ash is pushed to the side of travel lanes, wind and vehicle movement continue to cause it to billow.

Wildfire

The Coos County Natural Hazards Mitigation Plan in Section 3, Tab 1 adequately identifies the causes and characteristics of wildfire hazards, as well as the location and extent of potential wildfire events. No specific instances of wildfire within or surrounding Coos Bay were recorded in the county's plan, and the city does not keep record of previous wildfire occurrences. The lack of wildfire in the past is mostly due to Oregon's wet coastal climate. The last major recorded fire on the Oregon Coast was the Florence/Biscuit Fire of 2002. This was the largest fire in Oregon since the arrival of Euro-Americans, and almost 500,000 acres (perimeter) were burned.

The Coos County Natural Hazards Mitigation Plan estimates that the probability of wildfires occurring is high, meaning at least one event is likely to occur within the next 10 years. Due to the city's relatively low

level of risk (see Wildfire Map below) and the lack of wildfire events in the past, the city believes that the **probability** of wildfires occurring in Coos Bay is **low**, meaning one event is likely within a 75-100 year period. The county estimated a **moderate vulnerability** to wildfire hazards, meaning 1-10% of the population or regional impacts could be impacted by a wildfire event. The Coos Bay Steering Committee believes that the city's vulnerability is also moderate. Although wildfires are not a frequent occurrence in Coos Bay, the buildup of fuel and vegetation in the surrounding forests is cause for concern and speculation that if wildfires do occur in the future, they are likely to be severe.

Oregon has a long history of fire in the undeveloped wildlands and in wildland/urban interface. The effects of fire on ecosystem resources can include damages, benefits, or some combination of both. Ultimately, a fire's effects depend largely on the characteristics of the fire site, the severity of the fire, its duration and the value of the resources affected by the fire.

The ecosystems of most forests and wildlands depend upon fire to maintain various functions. These benefits can include, depending upon location and other circumstances, reduced fuel load, disposal of slash and thinned tree stands, increased forage plant production, and improved wildlife habitats, hydrological processes and aesthetic environments. Despite these potential benefits, fire has historically been suppressed for years because of its effects on timber harvest, loss of scenic and recreational values and the obvious threat to property and human life.

At the same time, the effects of a wildfire on the built environment, particularly in the face of a major wildfire event, can be devastating to people, homes, businesses and communities. Fuel, topography, weather and the extent of development are the key determinants for wildfires. A number of other factors also have been identified which affect the degree of risk to people and property in identified wildfire interface areas. These include:

- Combustible roofing material (for example cedar shakes)
- Wood construction
- Homes and other structures with no defensible space
- Roads and streets with substandard width, grades, weight-load and connectivity standards making evacuation and fire response more difficult
- Subdivisions and homes surrounded by heavy natural fuel types
- Structures on steep slopes covered with flammable vegetation
- Limited on-site or community water supply
- Locations with normal prevailing winds over 30 miles per hour

The city's steering committee indicated the highly noxious plants known as Gorse and Scotch Broom contribute to the fire hazard near Coos Bay. Gorse is extremely competitive, displacing cultivated and native plants, and impoverishing the soil. It creates an extreme fire hazard due to its oily, highly flammable foliage and seeds, and abundant dead material in the plants center. It not only increases the risk of fire, but also produces a hotter fire than most weeds. More description about Gorse is found in the Coos County Natural Hazard Mitigation Plan, along with additional 'issues' and wildfire-related vulnerabilities and impacts.

Severe Winter/Windstorm

High winds can be expected throughout Coos Bay. Destructive wind storms are less frequent, and their pattern is fairly well known. They form over the North Pacific during the cool months (October through March), move along the coast and swing inland in a northeasterly direction. Wind speeds vary with the storms. Gusts exceeding 100 miles per hour have been recorded at several coastal locations, but lessen as the storm moves inland. Less destructive storms usually topple trees, power lines, and cause building damage. Flooding can be an additional problem. A large percentage of Oregon's annual precipitation comes from these events.[xxi]

The Coos County Natural Hazards Mitigation Plan adequately identifies the previous occurrences of windstorms for the city of Coos Bay. Additional events that are not listed in Coos County's Plan include:

- November 13-15, 1981. Three commercial fisherman were believed to have drowned when their fishing boat collided with a barge off Coos Bay. Over 1,500 residents of the Coos Bay area were without power for several days.
- January, 1987. A sustained winter storm caused trees to be uprooted from the saturated ground.
- February 7, 2002. A notable windstorm caused extensive public infrastructure and power line damage. Winds primarily hit the southern coast and reached 75-100mph.
- November, 2006. Storms with winds measured at 70mph in Coos, Curry, and Douglas Counties. $10,000 in total damages across all three counties.
- December, 2006. Storm with winds measured at 90mph in Coos, Curry and Douglas Counties. $225,000 in estimated damages for all three counties.[xxii]

The Coos County Natural Hazards Mitigation Plan ranked the county's **vulnerability** to windstorms as **high**, meaning more than 10%of the population or regional assets would be affected by a major winter/windstorm event. The county plan also indicates that the **probability** of windstorms is **high**, meaning at least one event is likely within a 10 year period. The city believes that the county's probability and vulnerability assessments accurately describe Coos Bay's level of risk as well.

The city's steering committee indicated that windstorms come every year and impact the entire city. Typical damages include downed trees, fallen branches, and damaged roofs. Additionally, power outages are a great concern during severe winter and windstorms. Please see the Coos County Natural Hazards Mitigation Plan for more information regarding potential winter / windstorm related community impacts and vulnerabilities.

Mission, Goals, and Action Items

The city of Coos Bay adopts the Coos County Natural Hazards Mitigation Plan mission and goals.

Mission

The mission of the plan is to promote sound public policy and practices designed to protect citizens, critical facilities, infrastructure, private property, the environment and delicate ecosystems from natural hazards. This can be accomplished by increasing public awareness, documenting the resources for risk reduction and loss-prevention, and identifying activities. The plan serves as a guide to the county and each community toward building safer more resilient communities.

Goals

Protect Life and Property

- Explore and implement activities that assist in protecting lives by making homes, businesses, infrastructure, critical facilities, and other property more resistant to natural hazards.
- Identify high impact areas affected by natural hazards through past events, to determine future projections.
- Provide overall direction for the participating cities, special districts and residents in planning short and long term goals for mitigation measures.
- Define risk reduction plans.

Public Awareness

- Develop public awareness through public education programs.
- Provide information on preparedness and increase public awareness of the risks associated with natural hazards.

Natural Systems

- Balance hazard reduction measures with natural resource management.
- Determine rehabilitative measures to preserve natural systems and the environment.

Emergency Services

- Ensure mitigation projects and policies for critical facilities, services and infrastructure.
- Coordinate natural hazard mitigation activities with emergency operations plans and procedures.

Partnerships and Implementation

- Establish communication and coordination among public agencies, citizens, non-profit organizations, businesses, and industry.
- Coordinate partnerships within public and private sector organizations to identify, prioritize and implement action items between local and county governments, and to implement mitigation activities.

Actions

The following action items are detailed recommendations for activities that local departments, citizens, and others could engage in to reduce risk. Action items should be implemented via existing plans & policies when possible. Implementation opportunities are listed in the action item worksheets, compiled at the end of this addendum.

Multi-Hazard

1. Continue to review city comprehensive plan and zoning ordinance for the need to update hazard specific section to reflect the latest information on natural hazards.

2. Continue to implement public education programs regarding natural hazards.

Earthquake / Tsunami

3. Seek funding to retrofit buildings and/or infrastructure at risk of damage in a high magnitude earthquake. Coos Bay City Hall will be retrofitted using grant funds.

Flood

4. Ensure continued compliance in the National Flood Insurance Program (NFIP) through enforcement of local floodplain management ordinances.

5. Review current storm water capabilities to determine necessity for new or additional mitigation actions.

6. Explore alternative actions to mitigate flooding in Libby Drainage and Englewood Diking Districts.

Landslide

7. Identify and map high risk slide areas to create an accurate logistical assessment.

8. Evaluate current and high hazard slide areas for mitigation prioritization and explore mitigation possibilities.

Wildfire

9. Identify and map all roads, private drives and logging trails to increase the ability of firefighters to locate and gain access to provide emergency service and/or evacuations.

10. Through multi-agency coordination, develop an abatement plan for control of noxious weeds, specifically Gorse, Scotch Broom and Butterfly Brush.

Severe Winter / Wind Storms

11. Enhance strategies for debris management relating to severe winter storm events.

Plan Implementation & Maintenance

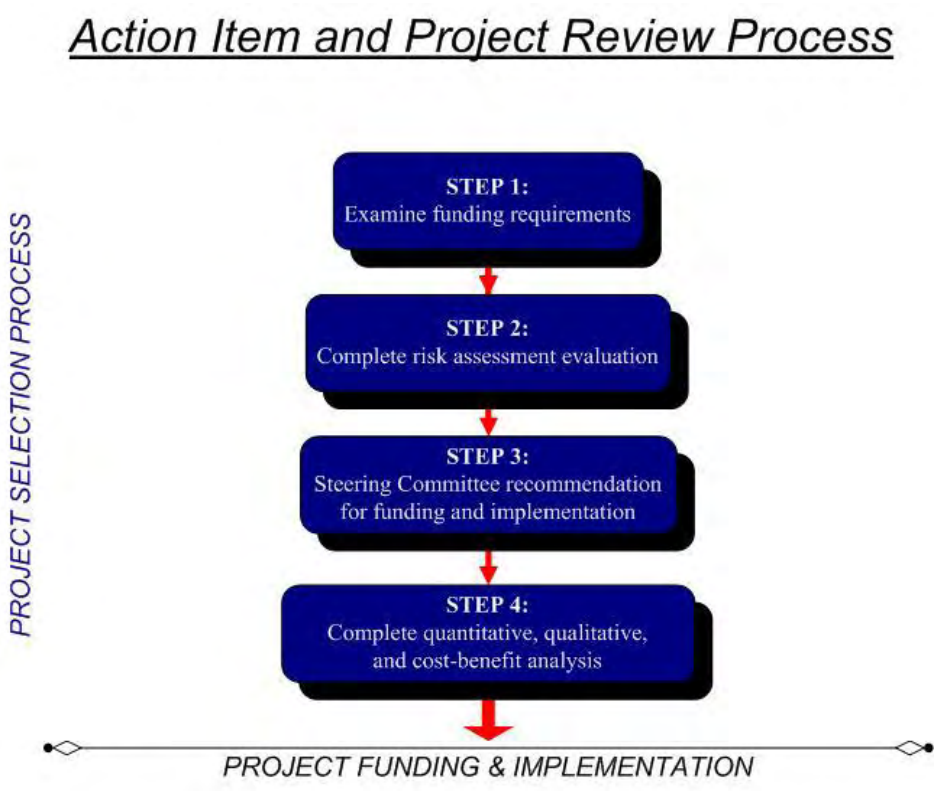
The city of Coos Bay's convener title will serve as the convener for the Coos Bay Natural Hazards Mitigation Plan Addendum. The convener title will be responsible for convening the plan's steering committee on a yearly basis to identify new risk assessment data, review status of mitigation actions, identify new actions, and seek funding to implement mitigation actions. The Coos Bay Natural Hazards Mitigation Plan Addendum will be updated every five years in conjunction with the county's plan update schedule.

Additionally, the city will continue to participate in the county's quarterly natural hazards mitigation plan meetings. Meetings are hosted by Coos County Emergency Management, and representatives from each of the county's cities are invited to attend. The county's meetings are scheduled to discuss the implementation of actions, and to incrementally update portions of the county's and cities' mitigation plans.

Project Prioritization Process

The Disaster Mitigation Act of 2000 (via the Pre-Disaster Mitigation Program) requires that jurisdictions identify a process for prioritizing potential actions. Potential mitigation activities often come from a variety of sources; therefore the project prioritization process needs to be flexible. Projects may be identified by committee members, local government staff, other planning documents, or the risk assessment. Figure 9 illustrates the project development and prioritization process.

Figure 9: Project Prioritization Process



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

Step 1: Examine funding requirements

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

Depending on the potential project's intent and implementation methods, several funding sources may be appropriate. Examples of mitigation funding sources include, but are not limited to: FEMA's Pre-Disaster Mitigation competitive grant program (PDM), Flood Mitigation Assistance program (FMA), National Fire Plan (NFP), Community Development Block Grants (CDBG), local general funds, and private foundations.

Step 2: Complete risk assessment evaluation

The second step in prioritizing the plan's action items is to examine which hazards they are associated with and where these hazards rank in terms of community risk. The committee will determine whether or not the plan's risk assessment supports the implementation of the mitigation activity. This determination will be based on the location of the potential activity

and the proximity to known hazard areas, historic hazard occurrence, vulnerable community assets at risk, and the probability of future occurrence documented in the plan.

Step 3: Committee Recommendation

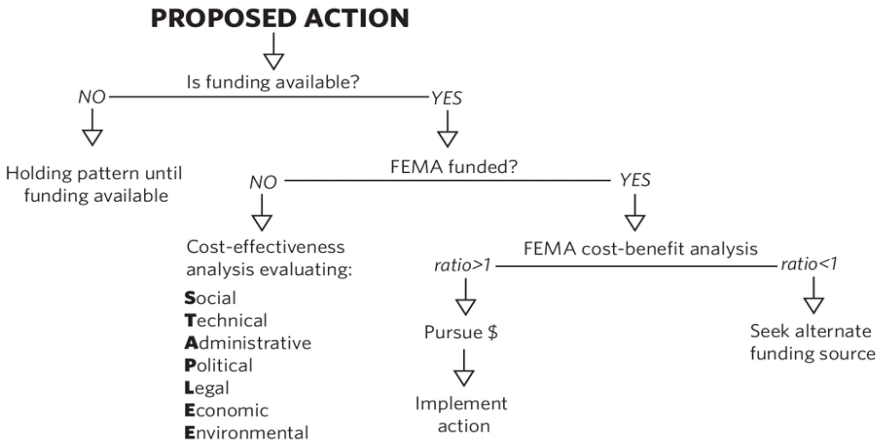
Based on the steps above, the committee will recommend whether or not the mitigation activity should be moved forward. If the committee decides to move forward with the action, the coordinating organization designated on the action item form will be responsible for taking further action and, if applicable,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

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

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

The fourth step is to identify the costs and benefits associated with natural hazard mitigation strategies, measures or projects. Two categories of analysis that are used in this step are: (1) benefit/cost analysis, and (2) cost-effectiveness analysis. Conducting benefit/cost analysis for a mitigation activity assists in determining whether a project is worth undertaking now, in order to avoid disaster-related damages later. Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. Determining the economic feasibility of mitigating natural hazards provides decision makers with an understanding of the potential benefits and costs of an activity, as well as a basis upon which to compare alternative projects. Figure 10 shows decision criteria for selecting the appropriate method of analysis.

Figure 10: Benefit Cost Decision Criteria



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

If the activity requires federal funding for a structural project, the committee will use a Federal Emergency Management Agency-approved cost-benefit analysis tool to evaluate the appropriateness of the activity. A project must have a benefit/cost ratio of greater than one in order to be eligible for FEMA grant funding.

For non-federally funded or nonstructural projects, a qualitative assessment will be completed to determine the project's cost effectiveness. The committee will use a multivariable assessment technique called STAPLE/E to prioritize these actions. STAPLE/E stands for Social, Technical, Administrative, Political, Legal, Economic, and Environmental. Assessing projects based upon these seven variables can help define a project's qualitative cost effectiveness. The STAPLE/E technique has been tailored for use in natural hazard action item prioritization by the Partnership for Disaster Resilience at the University of Oregon's Community Service Center.

Continued Public Involvement & Participation

The city of Coos Bay is dedicated to involving the public directly in the continual reshaping and updating of the Coos Bay Natural Hazards Mitigation Plan Addendum. Although members of the steering committee represent the public to some extent, the public will also have the opportunity to continue to provide feedback about the plan.

As described in the county's plan, the public will have the opportunity to view the county's multi-jurisdictional plan (including Coos Bay's Addendum) in public libraries throughout the county. Coos County committee members will present public comments and suggestions during regularly scheduled meetings, at which Coos Bay representatives will be present. Additionally, a copy of Coos Bay's Addendum to the Coos County Natural Hazards Mitigation Plan will be available for viewing on

the University of Oregon's online Scholar's Bank, along with contact information for the plan's convener.

The city will hold public meetings regarding the content of Coos Bay's Addendum when deemed necessary by the city's steering committee. Meetings will provide a forum in which the public can be informed about the plan's contents. Likewise, public meetings can serve as an opportunity for the public to express their concerns, opinions, or ideas about the plan.

Insert Action Item Worksheets (11 pages)

[i] USGS - Partnership for Disaster Resilience Research Collaborative, 2006.

[ii] Hazards Workshop, Session Summary #16. Disasters, Diversity, and Equity. Annual Hazards Workshop, (July 12, 2000). University of Colorado, Boulder. Peggy Stahl, FEMA Preparedness, Training and Exercise Directorate.

[iii] United States Census Bureau. 2000. People- Income: Coos Bay, Oregon. www.census.gov.

[v] Oregon Emergency Management, July 2003, County Hazard Analysis Scores. http://www.oregonshowcase.org/images/userfiles/File/State_Profiles_Risk_Assessments/FNL_R1_Regional_Profile_RA_11-06-07.pdf.

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

[vii] Federal Emergency Management Agency Flood Insurance Rate Maps, City of Coos Bay, Community-Panel Numbers 410044-0003B.-0005B,-0008B, 1984

[viii] Federal Emergency Management Agency: NFIP Insurance Report, OREGON. 1/25/2008.

[ix] Department of Land Conservation and Development, Oregon Repetitive Flood Losses as of 3/31/2008.

[x] DOGAMI, Oregon Lidar Consortium. http://www.oregongeology.org/sub/projects/olc/default.htm

[xi] State of Oregon Enhanced Natural Hazards Mitigation Plan. Part 3: Hazard Chapters, Tsunami. March 2009.

[xii] Oregon Department of Geology and Mineral Industries. Oregon Geology Fact Sheet: Tsunami Hazards in Oregon. http://www.oregongeology.com/sub/publications/tsunami-factsheet_onscreen.pdf.

[xiii] United States Geological Survey. Variations in City Exposure and Sensitivity to Tsunami Hazards in Oregon: Scientific Investigations Report 2007-5283. Nathan Wood, Figure 11.

[xiv] United States Geological Survey. Variations in City Exposure and Sensitivity to Tsunami Hazards in Oregon: Scientific Investigations Report 2007-5283. Nathan Wood, Figure 13

[xv] McConnell, Vicki S. News Release: December 17, 2008. Tsunami Inundation Study of Cannon Beach Released. http://www.oregongeology.org/sub/news&events/archives/press-release-2008-12-17.pdf

[xvii] USGS Cascades Volcano Observatory, 1999. Potentially Active Volcanoes of the Western United States. http://vulcan.wr.usgs.gov/Volcanoes/WesternUSA/Maps/map_potentially_active.html

[xviii] Myers, USGS-CVO, 2000, Modified from CVO, 1994, USGS Open-File Report 94-585.

[xix] USGS Mt. St. Helens Volcano. http://vulcan.wr.usgs.gov/Volcanoes/MSH/framework.html.Figuresl

[xxi] Taylor and Hatton, 1999, *The Oregon Weather Book*, p. 139; and FEMA-1405-DR-OR, YEAR, Reducing Windstorm Damage to Property and Electrical Utilities.

Taylor and Hatton, 1999, *The Oregon Weather Book*, p.151-157; and Hazards & Vulnerability Research Institute (2007). The Spatial Hazard Events and Losses Database for the United States, Version 5.1 [Online Database]. Columbia, SC: University of South Carolina.