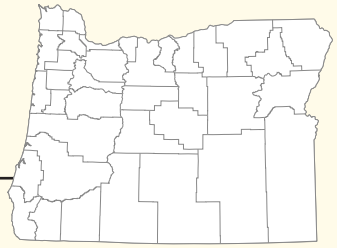
City of Brookings

Natural Hazards Mitigation Plan Addendum



Prepared as an addendum to the Curry County Multi-Jurisdictional Natural Hazards Mitigation Plan

Photos: Gary Halvorson, Oregon State Archives

U.S. Department of Homeland Security
Region X
130 228th Street, SW
Bothell, WA 98021-9796

FEMA

June 16, 2009

Honorable Bill Waddle
Chair, Curry County Commissioners
Post Office Box 746
Gold Beach, Oregon 97444

Dear Chair Waddle:

On August 8, 2005, the U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) approved the Curry County Natural Hazard Mitigation Plan as a local plan as outlined in 44 CFR Part 201. With approval of this plan, the following entities are now eligible to apply for the Robert T. Stafford Disaster Relief and Emergency Assistance Act's hazard mitigation project grants through August 5, 2010:

Curry County **City of Brookings**

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

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

Sincerely,

Mark Carey, Director
Mitigation Division

cc: Larry Anderson, Mayor, City of Brookings
cc: Dennis Sigrist, Oregon Emergency Management

Enclosure

KM:bb

RESOLUTION NO. 09-R-913

A RESOLUTION ADOPTING BROOKINGS'S REPRESENTATION IN THE CURRY COUNT MULTI-JURISDICTIONAL NATURAL HAZARDS MITIGATION PLAN

WHEREAS, the City of Brookings is vulnerable to the human and economic costs of natural, technological and societal disasters, and

WHEREAS, the City Council of Brookings recognizes the importance of reducing or eliminating those vulnerabilities for the overall good and welfare of the community, and

WHEREAS, the City of Brookings has participated in the development of the Curry County Multi-Jurisdictional Natural Hazards Mitigation Plan, which has established a comprehensive, coordinated planning process to eliminate or minimize these vulnerabilities, and

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

WHEREAS, these proposed projects and programs have been incorporated into the Curry County Multi-Jurisdictional Natural Hazard Mitigation Plan that has been prepared and promulgated for consideration and implementation by Curry County and the city of Brookings; NOW THEREFORE

THE COMMON COUNCIL OF THE CITY OF BROOKINGS RESOLVES AS FOLLOWS:

Section 1. The Common Council of the City of Brookings hereby accepts and approves of its section of the Curry County Multi-Jurisdictional Natural Hazards Mitigation Plan as a reasonable process to identify and plan for potential hazards in Brookings,

Section 2. The agency personnel of the City of Brookings are requested and instructed to pursue available funding opportunities for implementation of the actions and proposals designated therein,

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

Section 4. The City of Brookings will continue to participate in the updating and expansion of the Curry County Multi-Jurisdictional Natural Hazards Mitigation Plan in the years ahead, and

Section 5. The City of Brookings will further seek to encourage the businesses, industries and community groups operating within and/or for the benefit of the City of Brookings to also participate in the updating and expansion of the Curry County's Multi-Jurisdictional Natural Hazards Mitigation Plan in the years ahead.

PASSED BY THE CITY COUNCIL AND APPROVED BY THE MAYOR, this June 08, 2009.

Hon. Larry Anderson, Mayor

ATTEST:

Joyce Heffington, City Recorder

Volume III: City Addenda
City of Brookings

Overview

The city of Brookings developed this addendum to the Curry 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 Brookings, Oregon, which include: coastal erosion, drought, earthquake, flood, landslide, tsunami, volcano, wildfire, and severe winter storm. It is impossible to predict exactly when disasters may occur, or the extent to which they will affect the city. However, with careful planning and collaboration among public agencies, private sector organizations, and citizens within the community, it is possible to minimize the losses that can result from natural hazards.

The addendum provides a set of actions that aim to reduce the risks posed by natural hazards through education and outreach programs, the development of partnerships, and the implementation of preventative activities 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, & Action Items; and 5) Plan Implementation & Maintenance.

Addendum Development Process

2005 Planning Process

The Curry County Multi-Jurisdictional Natural Hazard Mitigation Plan (NHMP) was adopted in August, 2005. The city of Brookings participated in the county's planning process as a 'stakeholder,' and additionally developed mitigation actions within the county's plan at that time. Although the city of Brookings did not develop a full addendum to the Curry County Natural Hazard Mitigation Plan, the city's risks and vulnerabilities were partly documented within the county's plan.

2009 Planning 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 hazard mitigation plans for Oregon's southern coastal

cities. The city of Brookings partnered with OPDR and RARE to develop a full city addendum to the Curry County Multi-Jurisdictional Natural Hazard Mitigation Plan. FEMA awarded the region with a pre-disaster mitigation planning grant, and Brookings's planning efforts began in the fall of 2007. RARE provided a staff person ('RARE Participant') to facilitate and document the cities' planning processes.

Representatives from the following organizations served as Steering Committee members for the city of Brookings's natural hazard mitigation planning process.

- Brookings Planning Department
- Brookings Building Official
- Curry County Emergency Management
- Brookings Public Works
- Curry County Health Services
- Brookings Fire Department

The planning process and associated resources used to create Brookings's Addendum to the Curry County Natural Hazard 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 I: Getting Started

During the months of October 2007 – January 2008, the RARE Participant established contacts with Brookings staff, and assisted the city in identifying members to serve as the plan's Steering Committee. With assistance from OPDR, the RARE Participant developed and facilitated a 'Kick-off' meeting on November 1st, 2007, and introduced the Steering Committee to the planning process. Additionally, the RARE Participant conducted interviews with important stakeholders in the Brookings community. This process was part of a county-wide effort to create city addenda for each of Curry County's three incorporated cities.

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.

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 March 14th, 2008, the RARE Participant developed and facilitated a "Risk Assessment" meeting at Brookings'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: Action Item Development, and Plan Implementation and Maintenance

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 risk to natural hazards. In partnership with Brookings's Steering Committee, the RARE Participant developed and facilitated an "Action Item/Plan Implementation & Maintenance" meeting at Brookings's City Hall on May 29th, 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.

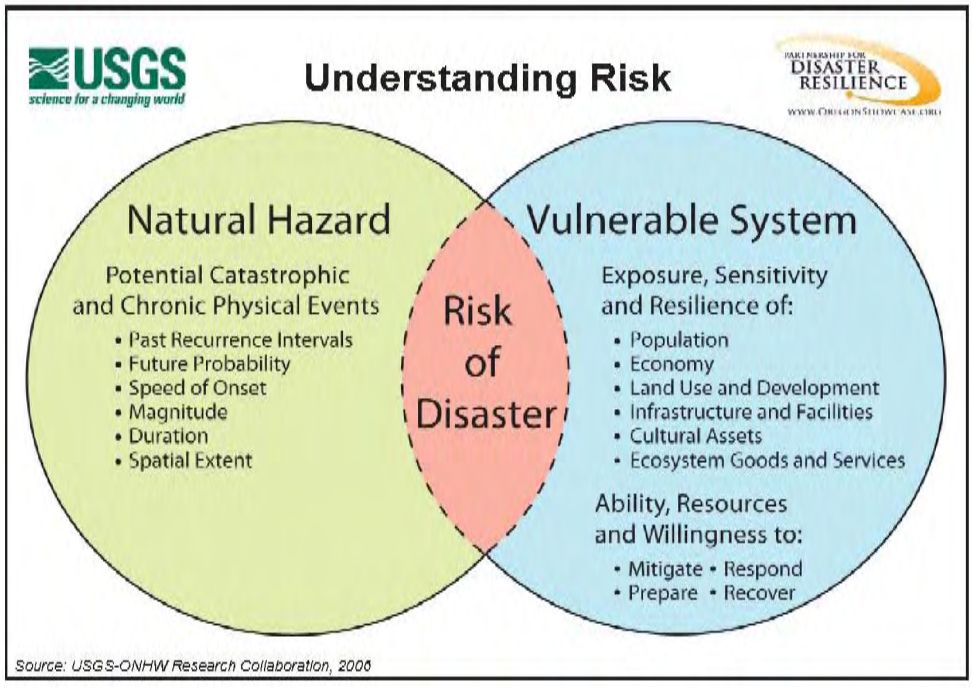
Adoption

The Brookings City Council will be responsible for adopting Brookings's Addendum to the Curry County Multi-Jurisdictional Natural Hazards. This governing body has the authority to promote sound public policy regarding natural hazards.

The city of Brookings adopted the Curry County Multi-Jurisdictional Natural Hazard Mitigation Plan via resolution on Insert Date, Year.

Community Profile

The following section describes the city of Brookings 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 the risk assessments, 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 the figure below.



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

Geography & Climate

Brookings is located in Curry County, Oregon. The community is the southernmost city on the coast of Oregon and is situated at the mouth of the Chetco River. Portland, Oregon is found 344.5 miles to the northeast. According to the 2000 U.S. Census, Brookings encompasses a total area of 2.8 square miles, including 0.03 square miles of water and 2.8 square miles of land.

The average monthly low is 41°F and the average monthly high is 69°F, and the city receives an average annual precipitation of about 75 inches.[i]

Population & Demographics

Brookings was established in 1913 on the rock bluff above of the Chetco River. The original town of Brookings was established by John E. Brookings, cousin to Robert S. Brookings of the Brookings Institute, when he moved his lumber business from the San Bernardino Mountains of Southern California.

Over the past two decades, the city has grown significantly. In 1990, the city of Brookings was home to 4,400 residents. The 2000 U.S. Census counted 5,447 permanent residents, and Portland State University's Population Research Center estimated a population of 6,465 residents in July, 2008. The 2008 estimate is a 19% increase from the 2000 Census count (see Table 1 below).

Table 1. Brookings Population Change, 2000-2008

Year	Population	% Change
1990	4,400	-
2000	5,447	23.8%
2008	6,465	19%

Source: Portland State University, Population Research Center[ii]

The population increase may be attributed to an increase in retirees. As shown in Table 2 below, almost 24% of the population is 65 years or older. Of persons over 65, 45.3% are disabled (see Table 3). 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.[iii] Of this number, a disproportionate burden is place upon special needs groups, including children, the elderly, the disabled, minorities, and low income persons.

Table 2: Population by Age, City of Brookings, 2000

Age	Number	Percentage
Under 5	296	4.8
5 to 19 years	1093	20
20-44 years	1475	27.1
45-64 years	1281	23.5
65+ years	1302	23.9
Median Age	43.1	

Source: US Census, 2000

Table 3: Disabled Populations, City of Brookings, 2000

Age	Percentage
5 -15 years	7.5
16 - 64 years	20.6
65 years and older	45.3

Source: US Census, 2000

The racial composition in 2000 was 90.5% White, 2.4% American Indian and Alaska Native, 1.3% Asian, .2% Black of African American, and .1% Native Hawaiian or Other Pacific Islander. Another 1.4% identified with 'some other race,' and 4% of the population identified with two or more races.[iv]

Employment & Economics

Historically, Brookings's economy focused on fishing and lumber. Both commercial fishing and lumber have declined in the last few decades. The economy has transitioned to more tourism, services, and light manufacturing. Table 4 shows employment by major industry for the city of Brookings. Retail trade; educational, health and social services; and arts & entertainment are Brookings's largest employment sectors.

Table 4: Employment by Industry, City of Brookings

Industry	Number	Percentage
Retail trade	375	17.3
Educational, health and social services	305	14.1
Arts, entertainment, recreation, accommodation and food services	276	12.7
Public administration	242	11.2
Manufacturing	212	9.8
Construction	153	7.1
Professional, scientific, management, administrative, and waste management services	124	5.7
Other services (except public administration)	113	5.2
Agriculture, forestry, fishing and hunting, and mining	109	5
Finance, insurance, real estate, and rental and leasing	94	4.3
Information	74	3.4
Transportation and warehousing, and utilities	52	2.4
Wholesale trade	40	1.8

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 Brookings was $31,656. This is almost $10,000 below the 1999 national median household income of $41,994, and almost $1,500 above the $30,117[v] median household income for Curry County.[vi] Although it can be used to compare areas as a whole, this number does not reflect how income is divided among area residents.

Housing

Housing type and year-built dates 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 Brookings had 2,178 housing units. Of those, 88.3% were occupied (2,309) and 11.7% were vacant (305). Of the occupied housing units, 56.9% (1,313 units) were owner-occupied and 43.1% (996 units) were renter-occupied.[vii]

About 48% of the city's housing stock was built prior to 1980, before stronger seismic building codes were put into place (see Table 5 below).

Table 5: Housing Structure Age, City of Brookings

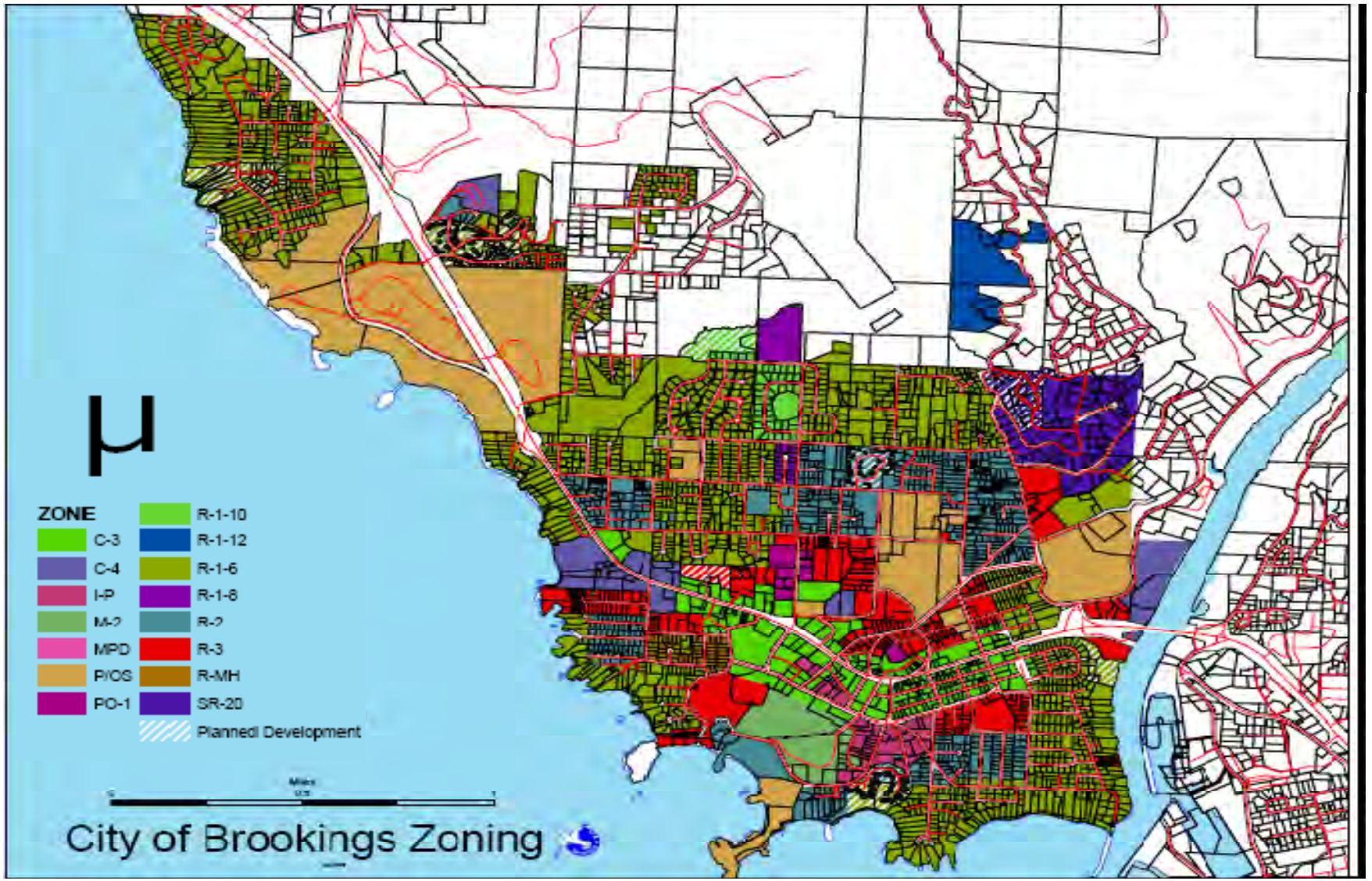
Housing Structure Age	Percentage
1999 to March 2000	4.0
1995 to 1998	15.3
1990 to 1994	14.3
1980 to 1989	18.3
1970 to 1979	16.3
1960 to 1969	11.2
1940 to 1959	18.9
1939 or earlier	1.8

Source: US Census, 2000

Land Use & Development

Development in the city of Brookings spreads mostly along Highway 101. The city is located on the bluffs above the Chetco River, which divides it from the unincorporated city of Harbor. A majority of the city services, retail businesses, and critical facilities are located on the bluffs above the river. Residential development is located along Highway 101 and the hills surrounding the city.

Figure 1: City of Brookings Zoning Map



Transportation and Commuting Patterns

The major transportation route through the city of Brookings is Highway 101 (seen in red on Figure 3 below). Roughly thirty miles north of Brookings on Highway 101 is the city of Gold Beach. South of Brookings on Highway 101 is the Chetco River and the California Border (about 20 miles).

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. How people travel to work is indicative of the prevalence of single occupancy vehicle travel, and can help predict the amount of traffic congestion and the potential for accidents.

Table 6: Transportation Type used to Commute to Work

Transportation Type Used to Commute to Work	Number	Percentage
Car, truck, or van	1,893	87.4
Drove alone	1,573	72.6
Carpooled	320	14.8
Worked at home	142	6.6
Walked	95	4.4
Other means	22	1.2
Bicycle	15	0.7
Public transportation	0	0
Total Workers 16 and over	**2,167**	**100**

Source: US Census, 2000

TO GOLD BEACH

R. 14 W.

TO US RTE. 101

R. 13 W.

T. 40 S.

T. 41 S.

BROOKINGS - CURRY COUNTY

R. 14 W.

R. 13 W.

TO CRESCENT CITY (CALIF.)

LEGEND

FUNCTIONAL CLASSIFICATION (STATE / OTHER)

FOR FURTHER FUNCTIONAL CLASSIFICATION INFORMATION, CONTACT O.D.O.T. REGION OFFICE.

- INTERSTATE
- PRINCIPAL ARTERIAL
- MINOR ARTERIAL
- URBAN COLLECTOR / RURAL MAJOR COLLECTOR
- MINOR COLLECTOR
- LOCAL ROAD
- ORE. ROUTE – US. ROUTE – INTERSTATE ROUTE
- NATIONAL HIGHWAY SYSTEM ROUTE
- URBAN GROWTH BOUNDARY
- CITY LIMIT
- AMTRAK RAIL PASSENGER STATION
- BRIDGE
- GRADE SEPARATIONS : STATE – OTHER FUNCTIONALLY CLASSED – LOCAL ROAD

- PUBLIC BUILDING
- COURTHOUSE
- CITY HALL
- ARMORY
- POST OFFICE
- SCHOOL
- LIBRARY
- SAFETY REST AREA
- WEIGH STATION
- PARK & RIDE LOCATION
- INTERCITY – CITY TRANSIT
- COMMERCIAL – GENERAL AVIATION
- AMTRAK STOP – PORT FACILITY
- GRAVEL PIT – QUARRY – ODOT STOCKPILE SITE

PUBLISHED BY

OREGON DEPARTMENT OF TRANSPORTATION – GEOGRAPHIC INFORMATION SERVICES

NORTH

PREPARED DIGITALLY BY THE OREGON DEPARTMENT OF TRANSPORTATION IN COOPERATION WITH THE U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION

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SCALE

1000 0 1000 2000 FEET

300 0 300 600 METERS

BROOKINGS
Population 6,315 *

T 40-41 S. R 13-14 W. W.M.

PRELIMINARY COPY
SUBJECT TO CORRECTION

OREGON TRANSPORTATION MAP

Showing Functional Classification of Roads
City of

BROOKINGS

CURRY COUNTY
2006

PARK & RIDE | INTERBUS | AMTRAK
AVAILABLE TRANSPORTATION SERVICES SHOWN WITH YELLOW BACKGROUND

PORT | AIRPORT | COMM. AIR
AVAILABLE TRANSPORTATION SERVICES SHOWN WITH YELLOW BACKGROUND

Copies available from the Oregon Department of Transportation, Map Distribution Unit, Mill Creek Office Park, 555 13th St. NE, Suite 2, Salem, Oregon 97301–4178, Telephone (503) 986–3154, http://www.odot.state.or.us/tdmappingpublic

* Based on current Oregon Population Report, College of Urban and Public Affairs, Portland State University, http://www.upa.pdx.edu/CPRC.

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 Brookings has a fire station, hospital, elementary school, middle school, high school, police department, and wastewater treatment plant.

Brooking Medical Center is a part of the Curry Health Network, an association of medical centers, clinics, programs, and medical providers. The Medical Center provides inpatient and outpatient care as well as expert medical specialists in gynecology-obstetrics, psychiatry, neurology, clinical social work, dietetics and urology.

The Port District of Brookings Harbor covers an area of 400 square miles reaching from the mouth of the Chetco River south to the Oregon-California border, north to the drainage of the Pistol River, and east to the Curry-Josephine County line. The Port District is governed by a five-member commission elected at-large from the district which has a population of approximately 16,000 people.

The Port of Brookings Harbor is the busiest recreational port on the Oregon Coast generating more than 31,000 trips for more than 95,000 boaters. It is one of the most active Chinook salmon harbors on the coast as well.[viii]

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 structures and recreation areas are considered to be cultural and historic resources in the city of Brookings:

- The Central Building
- Harris Beach State Park
- Brookings-Harbor Day-use Port area

Government Structure

Brookings has a manager/council non-partisan form of government. The mayor and four councilors are elected at large. The council hires a city manager who administers the day-to-day operations of the city through seven departments: Administrative Services, Police, Fire, Planning, Public Works, Building Safety and Community Development. The city also has a municipal court which handles violations of city ordinances.[ix]

The city of Brookings has the following departments:[x]

- *City Manager*: Directs and coordinates administration of the city government in accordance with policies and directives of the city council.
- *Public Works:* Development and maintenance of city infrastructure.
- *City Attorney*: Representation and legal advice to the city council and staff.
- *Municipal Court Judge:* Violation of city ordinances occurring within the city limits or city owned property.
- *Fire Department:* Participation on the Emergency Response Team. Informed and prepared to handle hazardous waste emergency. Protects the safety and welfare of persons and property.
- *Police Department*: Responsible for the Emergency Response Team in the event of a natural disaster. Protects, trains, and enhances the lives of the citizens.
- *Administrative Services*: Dispatches information to utility crews. Administers emergency outage telephone answering service. Maintenance of utility bills.
- *Planning Department*: Enforces zoning ordinances; works with general public to plan and monitor development activities.
- *Building Department*: Enforcement of building safety regulations.

Existing Plans 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 Brookings'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 are Brookings's existing plans and policies:

<u>Brookings Land Development Code</u>
The Brookings Land Development Code regulates development within the city of Brookings

Section 100 – Hazardous Building Site Protection: The purpose of this section is to reduce building site hazards and threats to life and property

created by flooding, landslides, weak foundation soils and other hazards as may be identified by the city of Brookings or other agencies.

Emergency Operation Plan – 2006

The city of Brookings's Emergency Operation Plan provides a framework by which public officials and emergency responders of Brookings and Curry County plan for, respond to, and recover from major emergencies or disasters. When the plan is activated during a major emergency or disaster, emergency response agencies in the city of Brookings and Curry County may be integrated into a common emergency management system.

Curry County Community Wildfire Protection Plan - 2008

The Curry County Community Wildfire Protection Plan is a baseline of information on structural vulnerability within the wildland urban interface (WUI) in order to develop a Community Wildfire Protection Plan (CWPP.) This plan documents the efforts of local, state, and federal partners in Curry County to accomplish these goals and establish clear strategies for reducing wildfire risk throughout the county.

The Curry County CWPP identifies some areas near Brookings and Harbor that could pose a wildfire threat. Red and Black Mounds, Harris Beach, Harbor Hills, and Mt. View are all listed with the CWPP's Priority Fuels Reduction Projects list.

Social Systems

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 Curry County and may be potential partners for implementing mitigation actions in the city of Brookings.

Name and Contact Information	Description	Service Area	Populations Served							Involvement with Natural Hazard Mitigation
			Businesses	Children	Disabled	Elders	English Second	Families	Low Income	
Area Agency on Aging **93781 Newport Lane** **Post Office Box 1118** **Coos Bay, OR 97420** **Tel: 541-269-2013** **FAX: 541-267-0194**	Provides a variety of supportive services to senior and disabled persons and to low income residents of Coos County. Some include housing (transitional, emergency, & farmworker), home care (homemaker), personal care, self-sufficiency/case management, special transportation, advocacy, information and assistance, wellness education, elder abuse awareness, telephone reassurance (RUOK), respite care, care giver support, weatherization, low-income energy assistance.	Coos and Curry Counties		✓	✓	✓	✓	✓	✓	• Education and outreach • Information dissemination
CG Hill Communications Inc. 905 King Street South Port Orford, OR 97465 Tel: (541) 332-1280	Advertising company specializing in: identity design, web design, marketing/communications, technical writing, and tradeshow/event planning.	Curry County	✓							• Information dissemination
Child Care Resource and Referral 94145 5th Place Gold Beach (541) 247-9426	Directory for childcare centered in Gold Beach	Curry County, Gold Beach		✓				✓	✓	• Information dissemination

Name and Contact Information	Description	Service Area	Populations Served							Involvement with Natural Hazard Mitigation
			Businesses	Children	Disabled	Elders	English Second	Families	Low Income	
Coos-Curry County North Bend Housing Authority 1700 Monroe North Bend, OR 97459 Tel: (541) 756-4111 Fax: (541) 756-4990	For low and moderate income in Coos and Curry counties. Rental assistance, loans, farm labor housing, public housing, property management, home ownership, and family self-sufficiency.	Coos and Curry Counties					✓	✓	✓	• Information dissemination • Education and outreach
Curry County Economic and Community Development 94235 Moore Street Gold Beach, OR 97444 Local: 541-247-4466 Fax: 541-247-3201	Provides Curry County works to sustain and improve Curry County's economy	Curry County	✓							• Information dissemination • Education and outreach
Curry County Health Department 1403 Oregon St Port Orford, OR 97465 Phone: (541) 332-4041	Curry County Health Department works to promote physical, mental, and social well-being through preventing disease and injury, promoting healthy behaviors, and protecting the health of the community.	Curry County		✓	✓	✓	✓	✓	✓	• Education and outreach • Information dissemination
Curry County Extension Office Curry County Fair Grounds 29390 Ellensburg (Hwy 101) Gold Beach, Or 97444 541-247-6672	Provides research-based knowledge and education that focus on strengthening communities and economies, sustaining natural resources, and promoting healthy families and individuals.	Curry County	✓	✓				✓		• Education and outreach • Information dissemination • Plan/project implementation

Name and Contact Information	Description	Service Area	Populations Served							Involvement with Natural Hazard Mitigation
			Businesses	Children	Disabled	Elders	English Second	Families	Low Income	
Curry Family Medical 525 Madrona Port Orford, OR 97465 Ph: 541/332-3861	Fully staffed family medical clinic including a general practice physician and a family nurse practitioner.	Curry County		✓	✓	✓	✓	✓	✓	• Education and outreach • Information dissemination
Curry Health Foundation P.O. Box 1274 Gold Beach, OR 97444 Tel: 541-247-3189 Fax: 541-247-3181	Provides health care services throughout Curry County by representing these needs to the public, and by the soliciting, holding and granting of funds for use in providing the medical and hospital facilities needed in the general community of Curry County.	Curry County		✓	✓	✓	✓	✓	✓	• Education and outreach • Information dissemination
Curry General Hospital 94220 Fourth St. Gold Beach, OR 97444 Tel: 541/247-6621	The hospital continually hosts visiting medical specialists who treat patients and/or perform surgery in oncology / hematology, ophthalmology, orthopedics, neurology, ear-nose-and-throat, cardiology and general surgery.	Curry County		✓	✓	✓	✓	✓	✓	• Education and outreach • Information dissemination
Curry County Public Transportation PO Box 1444 Brookings (541) 247-7506	Public Transportation Provider in Curry County	Coos and Curry Counties	✓	✓	✓	✓	✓	✓	✓	• Information dissemination

Name and Contact Information	Description	Service Area	Populations Served							Involvement with Natural Hazard Mitigation
			Businesses	Children	Disabled	Elders	English Second	Families	Low Income	
Brookings Harbor Chamber of Commerce PO BOX 940 Brookings, OR 97415 Tel:(541) 469.3181	Provides economic development assistance to local businesses.	Brookings	✓							• Education and outreach • Information dissemination • Plan/project implementation
Brookings Harbor Medical Center 585 Fifth St. Brookings, OR 97415 Tel: 541/469-5377	Provides family health care.	Curry County		✓	✓	✓	✓	✓	✓	• Education and outreach • Information dissemination
Brookings Medical Center 585 Fifth St. Brookings, OR 97415 Tel: 541/469-5377	Provides family health care. Expert medical specialists see patients in the Brookings Medical Center in gynecology-obstetrics, psychiatry, neurology, clinical social work, dietetics and urology.	Curry County		✓	✓	✓	✓	✓	✓	• Education and outreach • Information dissemination
Diane's Preschool and Day Care Center 94215 Sixth Street Gold Beach (541) 247-2931	Provides child care	Coos County, City of Bandon		✓				✓		• Information dissemination

Name and Contact Information	Description	Service Area	Populations Served							Involvement with Natural Hazard Mitigation
			Businesses	Children	Disabled	Elders	English Second	Families	Low Income	
Gold Beach Chamber of Commerce 29795 Ellensburg Ave. P.O. Box 489 Gold Beach, OR 97444 Tel: (541) 247-0923	Provides economic development assistance to local businesses.	Gold Beach	✓							• Education and outreach • Information dissemination • Plan/project implementation
Heritage Place Assisted Living and Wellness Center 1000 6th Avenue West Bandon, OR 97411 Tel: (541) 347-7502	Residential care facility that offers an assisted living community that provides a program of services which enhance the quality of your life.	Coos County, City of Bandon			✓	✓				• Information dissemination
Oregon Coast Community Action 2110 Newmark Ave. Coos Bay, OR 97420 Tel: (541) 888-1574	Volunteers are appointed by the court to advocate for abused and/or neglected children who are involved in juvenile court dependency proceedings.	Coos, Curry and Douglas Counties		✓				✓	✓	• Information dissemination
Oregon Employment Department 16399 Lower Harbor Rd Brookings OR 97415 Tel: (541) 469-9836	Promotes employment of Oregonians through developing a diversified, multi-skilled workforce, promoting quality child care, and providing support during periods of unemployment.	Curry County, City of Brookings			✓		✓	✓	✓	• Information dissemination

Name and Contact Information	Description	Service Area	Populations Served							Involvement with Natural Hazard Mitigation
			Businesses	Children	Disabled	Elders	English Second	Families	Low Income	
Outreach Gospel Mission 15701 Hwy 101 S Brookings OR 97415 Tel: (541) 412-0278	The Outreach Gospel Mission is dedicated to proclaiming the Gospel, by providing individuals and/or families with their physical, mental, emotional and spiritual needs. A residential program consists of Bible studies, support groups, life skill training which offers these individuals/families a means of leaving a life of poverty, addictions, domestic violence and related issues	Curry County, City of Brookings		✓	✓	✓	✓	✓	✓	• Information dissemination
Parkview Special Care Center for Alzheimer's 984 Parkview Drive Brookings, OR Tel: (541)469-6817	Parkview Special Care Center specializes in Alzheimer's and dementia care and offers more extensive care to residents who require it.	Curry County, City of Brookings			✓	✓				• Information dissemination
Port Orford Heritage Society Headlands State Park Port Orford, OR 97465 Tel: (541) 332.0521	The Society is dedicated to preserving and interpreting the rich heritage of Port Orford and the neighboring locale.			✓		✓		✓		• Information dissemination
Port Orford Library Foundation P.O. Box 294 Port Orford, OR 97465 Tel: (541) 332.5622	Works to secure funding for libraries within the Port Orford and Langlois areas	City of Port Orford and Langlois area.		✓	✓	✓	✓	✓	✓	• Information dissemination

Name and Contact Information	Description	Service Area	Populations Served							Involvement with Natural Hazard Mitigation
			Businesses	Children	Disabled	Elders	English Second	Families	Low Income	
Port Orford & North Curry Chamber of Commerce P.O. Box 637 Port Orford, OR 97465 (541) 332-8055	Provides economic development assistance to local businesses.	Port Orford and North Curry	✓							• Education and outreach • Information dissemination • Plan/project implementation
Rotary Club of Brookings-Harbor P.O. Box 357 Brookings OR 97415 Tel: (541) 469-7098	Rotary clubs are responsible for four key elements: sustaining or increasing their membership base, participating in service projects that benefit their own community and those in other countries, supporting The Rotary Foundation of RI financially and through program participation, and developing leaders capable of serving in Rotary beyond the club level.	City of Brookings	✓	✓	✓	✓	✓	✓	✓	• Information dissemination
Rush Surgery Center, LLC 648 Chetco Ave. Brookings OR 97415 Tel: (541) 412-9806	Rush Surgery & Medical Center is the largest medical facility in Brookings, Oregon. The Center consists of three distinct departments: 1. Rush Surgery Center 2. Rush Medical Center 3. Eye Center of Brookings	Curry County, City of Brookings		✓	✓	✓	✓	✓	✓	• Information dissemination

Name and Contact Information	Description	Service Area	Populations Served							Involvement with Natural Hazard Mitigation
			Businesses	Children	Disabled	Elders	English Second	Families	Low Income	
South Coast Head Start 2540 Hull Street, Coos Bay, OR 97420 Tel: 541-888-3717	Preschool experience available for children of low income families or children with developmental disabilities. Child must be 3-4 years old by Sept 1 of the year applying. Head Start has 10 locations in Coos and Curry County. Hispanic interpreter on site.	Coos and Curry Counties		✓			✓	✓	✓	• Information dissemination
South Coast Head Start 2540 Hull Street, Coos Bay, OR 97420 Tel: 541-888-3717	Preschool experience available for children of low income families or children with developmental disabilities. Child must be 3-4 years old by Sept 1 of the year applying. Head Start has 10 locations in Coos and Curry County. Hispanic interpreter on site.	Coos and Curry Counties		✓			✓	✓	✓	• Information dissemination
Southwestern Oregon Community College 1988 Newmark Ave., Coos Bay, OR 97420 Tel: (541) 888-2525	Southwestern provides quality learning opportunities.	Coos and Curry Counties	✓	✓	✓	✓	✓	✓	✓	• Education and outreach • Information dissemination • Plan/project implementation

Name and Contact Information	Description	Service Area	Populations Served							Involvement with Natural Hazard Mitigation
			Businesses	Children	Disabled	Elders	English Second	Families	Low Income	
Umpqua Community Development Corporation Coos Bay office: 320 Central, Suite 410 Coos Bay, OR 97420 Phone: (541) 267-6505 Fax: (541) 267-6504	Umpqua Community Development Corporation works with residents to provide: Affordable Housing Development, Education, Training, and Homeowner Assistance Economic Development Community Development Asset and Property Management	Coos, Curry, and Douglas Counties.				✓	✓	✓	✓	
Vagabond House Adult Living 834 Deady Street Port Orford, Oregon 97465 Tel: (541) 332-1211	Residential adult care facility that offers an assisted living community that provides a program of services which enhance the quality of life.	Curry County, City of Port Orford			✓	✓				• Information dissemination
Zion Lutheran Church 2015 Washington Street Port Orford, Oregon 97465 Tel: (541) 332 3581	In service to the people of Port Orford and Langlois, Oregon with worship, prayer, fellowship, and outreach ministries.	Port Orford		✓	✓	✓	✓	✓	✓	• Information dissemination

Current 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 assist participating jurisdictions in better understanding risk, and can also assist in documenting risk-reduction outcomes, or successes within the community. Current mitigation activities are documented within Curry County's Natural Hazard Mitigation Plan, and city-specific activities include in the following.

Landslides
The city maintains a steep slope, coastal, and soil stability section of its developmental code that requires geologic reports before developing steep sloped areas. This section of the development code is for the express purpose of reducing "the effects of flooding, erosion, landslides and siltation during all stages of development on all lots or parcels within the city and to reduce the hazards associated with construction on the steeper hillsides, beach fronts and/or wherever hazards are known or may exist."

Flooding
Brookings is a participant in the National Flood Insurance Program and the city's current effective map date is September 18th, 1985.

Tsunami
Brookings has several different education and outreach tools for tsunamis. These tools include pamphlets on basic guidelines for encountering natural disasters; tsunami evacuation maps; and tsunami zone warning signs. The evacuation zone map, shown in Figure 4 below, was developed by local officials in consultation with the Oregon Department of Geology and Mineral Industries (DOGAMI) and Oregon Emergency Management (OEM). It is intended to represent the worst-case scenario for a tsunami caused by an undersea earthquake near the Oregon Coast. Evacuation routes were developed by local officials and reviewed by Oregon Emergency Management. The Curry County Emergency Management Division is publishing this brochure because the information furthers public awareness of the potential tsunami threat. The map is intended for emergency response and should not be used for site-specific planning.

Wildfire
The Fire Department conducts education and outreach during fire season (fall). Please reference Curry County's Natural Hazard Mitigation Plan for a comprehensive list of outreach activities.

CONTACTS

Oregon Emergency Management
3225 State Street, P.O. Box 14370
Salem, OR 97309
(503) 378-2911
http://egov.oregon.gov/OOHS/OEM/

Curry County Emergency Services
P.O. Box 746
Gold Beach, OR 97444
(541) 247-7011
http://www.co.curry.or.us/

Oregon Department of Geology and Mineral Industries
800 NE Oregon Street #28, Suite 965
Portland, OR 97232
(971) 673-1555
http://www.oregongeology.com

Nature of the Northwest Information Center
800 NE Oregon Street #5, Suite 177
Portland, OR 97232
(971) 673-1555
http://www.naturenw.org/

International Tsunami Information Centre
Box 50027
Honolulu, HI 96850-4993
(808) 541-1658
http://www.tsunamiwave.info/

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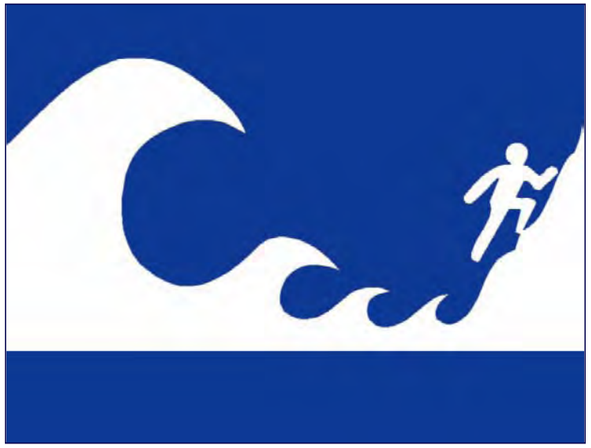
DOGAMI-TS-EB-BRH-01 (11/05)

TSUNAMI

EVACUATION MAP



Brookings-Harbor

IF YOU FEEL AN EARTHQUAKE:

- PROTECT YOURSELF UNTIL THE EARTHQUAKE IS OVER
- MOVE QUICKLY INLAND TO HIGH GROUND AND AWAY FROM LOW-LYING COASTAL AREAS — GO ON FOOT IF AT ALL POSSIBLE—
- DO NOT WAIT FOR AN OFFICIAL WARNING
- DO NOT PACK OR DELAY
- DO NOT RETURN TO SHORE
- WAIT FOR AN "ALL CLEAR" FROM LOCAL OFFICIALS BEFORE RETURNING TO LOW-LYING AREAS

A TSUNAMI MAY BE COMING IN A FEW MINUTES. MORE WAVES MAY BE COMING FOR SEVERAL HOURS AFTER THE FIRST.

TSUNAMI

EVACUATION MAP: Brookings-Harbor

THE INFORMATION IN THIS BROCHURE MAY SAVE YOUR LIFE. PLEASE TAKE THE TIME TO READ IT AND SHARE WHAT YOU HAVE LEARNED WITH YOUR FAMILY AND FRIENDS.

A tsunami is a series of sea waves usually caused by a displacement of the ocean floor by an undersea earthquake. As tsunamis enter shallow water near land, they increase in height and can cause great loss of life and property damage.

People on open beaches, in low-lying areas, by bay mouths or bay tidal flats, and near mouths of rivers draining into the ocean are in greatest danger. If you find yourself in any of these areas and you feel an earthquake, you are advised to evacuate inland to higher ground. Evacuation routes and safe areas are depicted on this map. Evacuate on foot if at all possible.

Recent research suggests that tsunamis have struck the Oregon coast on a regular basis. Tsunamis can occur any time of day or night. Typical wave heights from tsunamis occurring in the Pacific over the last 80 years have been between 20 to 45 feet at the shoreline. A few waves however have been much higher—as much as 100 feet or more because of local conditions.

A distinction can be made between a tsunami caused by an undersea earthquake "near" the Oregon coast and an undersea earthquake "far" from the coast. For an earthquake near the coast, experts believe that a tsunami could come onshore within 15 to 20 minutes after the earthquake—before there is time for official warning. The ground-shaking of the earthquake may be the only warning you have!

A tsunami caused by an undersea earthquake far from the Oregon coast will take several hours to come onshore. You will feel no earthquake. There will typically be time for an official warning and evacuation to safety. In isolated areas along beaches and bays you may not hear a warning. Here, a sudden change in sea level should prompt you to move immediately inland to high ground.

In either tsunami case, evacuate on foot if at all possible because of potential traffic jams, as well as earthquake-induced damage to or blockage of roads.

Brookings Tsunami Evacuation Map

Remember: A tsunami is a series of waves. Waves may continue to arrive over several hours. Stay away from potentially hazardous areas until you receive an "all clear" from local officials.

Risk Assessment

The Curry County Natural Hazard Mitigation Plan addresses the following natural hazards within its plan: earthquake, flood, landslide, tsunami, wildfire, and severe winter storm. The city of Brookings reviewed the county's risk assessment on March 14th, 2008 and assessed how Brookings's risks vary from the risks facing the entire planning area. Additionally, Brookings assessed its risks to hazards that are currently not included within the Curry County Natural Hazard Mitigation Plan. Those hazards include coastal erosion, drought, and volcano.

Coastal Erosion

Coastal erosion is a natural process that continually affects the entire coast. Erosion becomes a hazard when human development, life and safety are threatened. Beaches, sand spits, dunes and bluffs are constantly affected by waves, currents, tides and storms resulting in chronic erosion, landslides and flooding. Changes may be gradual over a season or many years. Changes may also be drastic, occurring during the course of a single storm event.

Erosion may be caused by large waves, storm surges, rip cell embayments, high winds, rain, runoff, flooding, or increased water levels and ocean conditions caused by periodic El Niños. Coastal dunes and bluffs comprised of uplifted marine terrace deposits are especially vulnerable to chronic and catastrophic hazards.

Natural hazards that cause erosion and other impacts on coastal areas can be divided into two general classes: chronic and catastrophic.

Chronic hazards are those that we can often see clear evidence of along the ocean shore and include the following:

- Periodic high rates of beach, dune and bluff erosion;
- Mass wasting of sea cliffs in the form of landslides and slumps due to wave attack and geologic instability;
- Storm surges, high ocean waves and the flooding of low-lying lands during major storms;
- Sand inundation;
- Erosion due to the occurrence of El Niños and from rip embayments; and
- Recession of coastal bluffs due to long-term changes in mean sea level and the magnitude and frequency of storm systems.

Chronic hazards are usually local in nature, and the threats to human life and property that arise from them are generally less severe than those associated with catastrophic hazards. However, wide distribution and frequent occurrence of chronic hazards makes them more of an immediate concern.

The damage caused by chronic hazards is usually gradual and cumulative. However, storms that produce large winter waves, heavy rainfall and/or high winds may result in very rapid erosion or other damage that can affect properties and infrastructure over a matter of hours. The regional, oceanic and climatic environments that result in intense winter storms determine the severity of chronic hazards along the Oregon coast.

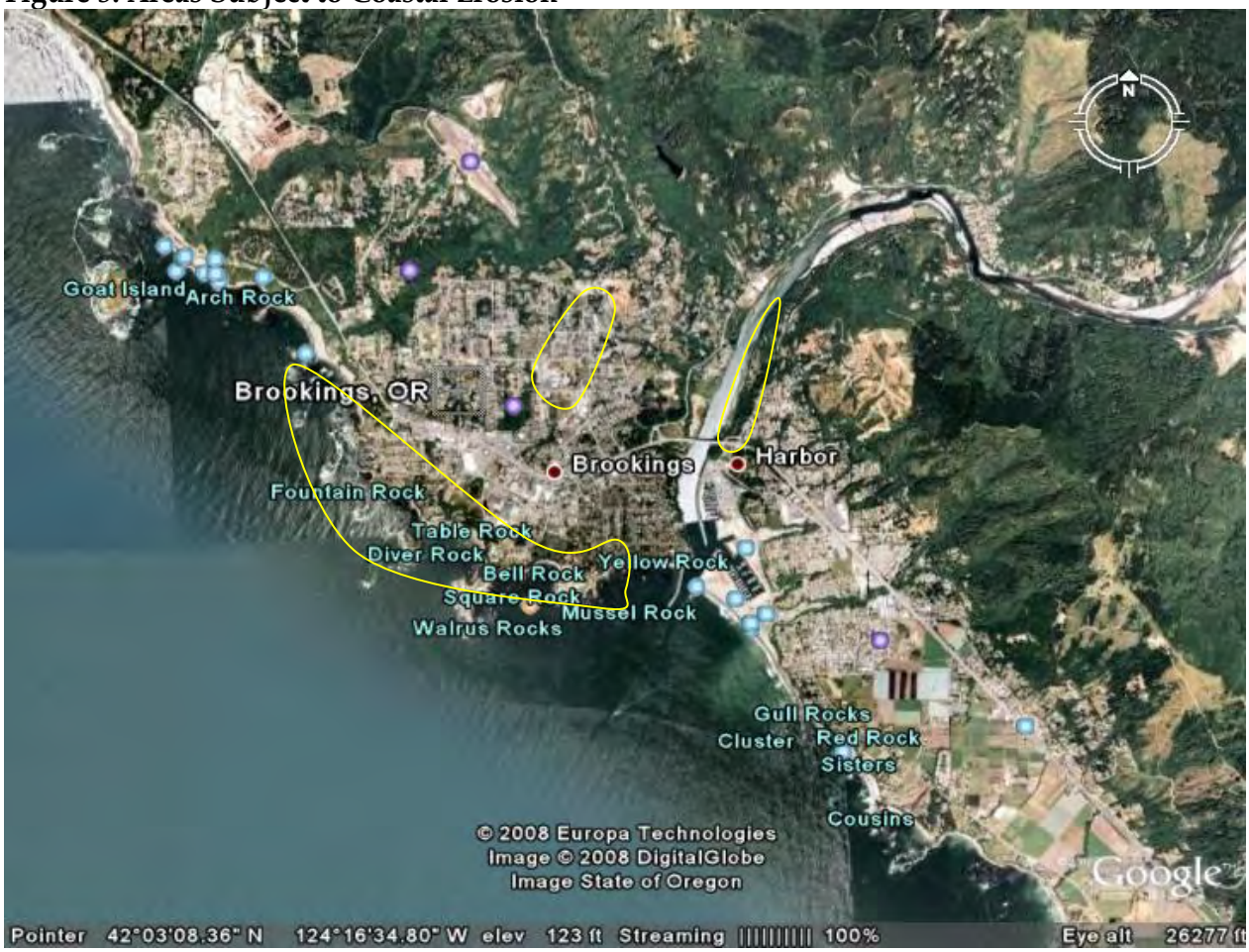
Catastrophic hazards are regional in scale and scope. Though very infrequent, Cascadia Subduction Zone earthquakes, and the ground shaking, subsidence, land sliding, liquefaction and tsunamis that accompany them are very destructive in their effect causing extensive property losses and high numbers of deaths and injuries, both on the coast and inland.

The Brookings Steering Committee identified the following locations as particularly prone to coastal erosion hazards. Each location is additionally identified within Figure 5 below:

- Harbor Hills (circled in yellow next to the unincorporated community of Harbor)
- Dawson neighborhood (circled in yellow on the coast)
- Northern neighborhood areas (circled inland)

Not shown on the map are the erosion/landslides north of Brookings along Highway 101. Washouts and road blockages are typical along Highway 101.

Figure 5. Areas Subject to Coastal Erosion



Source: Google Maps with Steering Committee identified areas

The city does not keep record of previous coastal erosion occurrences; documentation of historic events is therefore not possible at this time. Generally, due to the chronic nature of this hazard, damages are typically very gradual and cumulative in nature.

The city of Brookings estimates a **high probability** that coastal erosion will continue to occur, meaning at least one incident is likely to occur within a 10-35 year period. Additionally, the city estimates a **low vulnerability** to coastal erosion hazards, meaning less than 1% of the population or regional assets would be affected by an event.

Coastal erosion processes create special challenges for people living near the ocean, requiring sound planning in order to minimize the potential dangers to life and property. Attempts to stabilize the shoreline or beach are often futile because the forces that shape the coast are persistent and powerful. Inadequate understanding of the complex interaction of coastal land forms and waters and the various types of coastal erosion can result in serious threats to people, communities and infrastructure.

The degree of damage to structures, as well as injury and death to people caused by coastal erosion and related hazards (e.g., ocean, urban and

riverine flooding, landslides and slumping, storm surges and high ocean wave action, sand inundation, wind storms, tsunamis and earthquakes, etc.) will depend upon: 1) whether the hazard events are catastrophic or chronic in nature and, 2) the proximity of people and property to the event and its magnitude and duration.

The effects from more frequent chronic hazards will in most instances be much less severe than catastrophic events and cover a much smaller area. However, a significant chronic hazard can still result in dangerous slides, flooding, high winds and dangerous wave effects causing major damage to roads, bridges, homes, schools, businesses and infrastructure. Such impacts can be particularly hard on smaller-sized communities, isolated rural homes and farm, and large residential, resort, tourist and commercial developments located in or near areas of known hazards due to erosion, slides and slumping, high wave action and storm surges and ocean or river flooding.

Human activities also influence, and in some cases, intensify the effects of erosion and other coastal hazards. Major actions such as jetty construction and maintenance dredging can have long-term effects on large sections of the coast. This is particularly true along dune-backed and inlet-affected shorelines such as the Columbia River littoral cell. The planting of European bunchgrass since the early 1900s has locked up sand in the form of high dunes. This in turn has contributed to the net loss of beach sand and increased beach erosion. Residential and commercial development can affect shoreline stability over shorter periods of time and in smaller geographic areas. Activities such as grading and excavation, surface and subsurface drainage alterations, vegetation removal, and vegetative as well as structural shoreline stabilization can all reduce shoreline stability. Finally heavy recreational use in the form of pedestrian and vehicular traffic can affect shoreline stability over shorter time frames and smaller spaces. Because these activities may result in the loss of fragile vegetative cover they are a particular concern along dune-backed shorelines. Graffiti carving along bluff-backed shorelines is another byproduct of recreational use that can damage fragile shoreline stability.

Obviously, as compared to the lesser impacts from a chronic hazard, a rare catastrophic event striking the coast will likely result in much more extensive property damage and higher numbers of dead and injured people. A catastrophic incident potentially can seriously damage, disrupt and destroy large numbers of homes, buildings, schools, utilities, infrastructure, boats and port facilities, roads and bridges, and communication and other lifeline systems. Such damage also can seriously impede or prevent the movement of people and goods and may disrupt the response of police, fire and emergency services. Such consequences in turn can produce serious impacts on community and regional economic activity by disconnecting people from home, jobs, school, food and needed commercial, medical and social services. On the coast, the interruption of

the tourist industry for any prolonged time could have very dire economic effects.

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), and 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. In Brookings, and in most areas along the Oregon Coast, drought is of little to no concern. Brookings's average annual rainfall is about 78" and there are no records of severe drought within the city. Drought is averted as a result of the coast's high rainfall from moist air masses moving onto land from the Pacific Ocean, especially during winter months. Brookings's Steering Committee believes that the city's **probability** of experiencing a drought is very **low,** meaning one incident is not likely to occur more than once within a 75-100 year period.

Drought is frequently an "incremental" hazard, meaning the onset and end are often difficult to determine. Also, its effects may accumulate slowly over a considerable period of time and may linger for years after the termination of the event. Potential impacts vary among communities. Drought can occur region-wide, and can affect all segments of a jurisdiction's population, particularly those dependent on rainfall (e.g. agriculture, hydroelectric generation, recreation, etc.). Within Brookings, impacts may include water rationing, a potential decrease in tourism-related activities, and potentially diminished fire-fighting capabilities. The likelihood that a drought emergency would occur, however, is very low. The city has adequate storage capabilities that would most likely prevent a shortage from occurring and/or affecting its residents. As such, the city's Steering Committee estimates a **low vulnerability** to droughts, meaning less than 1% of the population is likely to be affected by a drought event.

Earthquake

Brookings's location on the Oregon Coast makes it susceptible to earthquakes, especially a Cascadia Subduction Zone Earthquake. The Curry County Multi-Jurisdictional Natural Hazard Mitigation Plan in Section 3.4 adequately identifies the causes, characteristics, and previous occurrences of earthquakes for the city of Brookings. The Curry County Multi-Jurisdictional Natural Hazard Mitigation Plan ranked the county's **vulnerability** to earthquakes as **high** meaning more than 10% of the

population would be affected in the event of an earthquake. The county plan also indicates that the **probability** of earthquakes is **moderate**, meaning one event is likely to occur within the next 50 years. These ratings are representative of Brookings's risk 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.[xi]

The Steering Committee identified the following potential earthquake-related impacts within the city of Brookings:

- The potential disruption or destruction of water pumps and intakes could endanger and limit the city's water supply.
- The bridges in the area may be at risk of collapse. The Highway 101 Bridge over the Chetco River, a vital line between Brookings and the city of Harbor and could divide the communities. This would sever the major transportation link Brookings has to the south.
- The Harbor Boat Basin is constructed on fill which could result in liquefaction and damage to buildings, roads, and services.
- The stability of the city's water and sewer connections along the Highway 101 Bridge may be compromised in a high-magnitude earthquake.

Figures 6 - 9 below are from the Oregon Department of Geology and Mineral Industries and they detail the city of Brookings's amplification, liquefaction, earthquake-induced landslides and relative earthquake risks. The areas most likely to be affected by amplification (dark pink) are along the Chetco River. This area includes the Brookings-Harbor Port and upriver water intake.

Figure 6: Relative Amplification Hazard Map

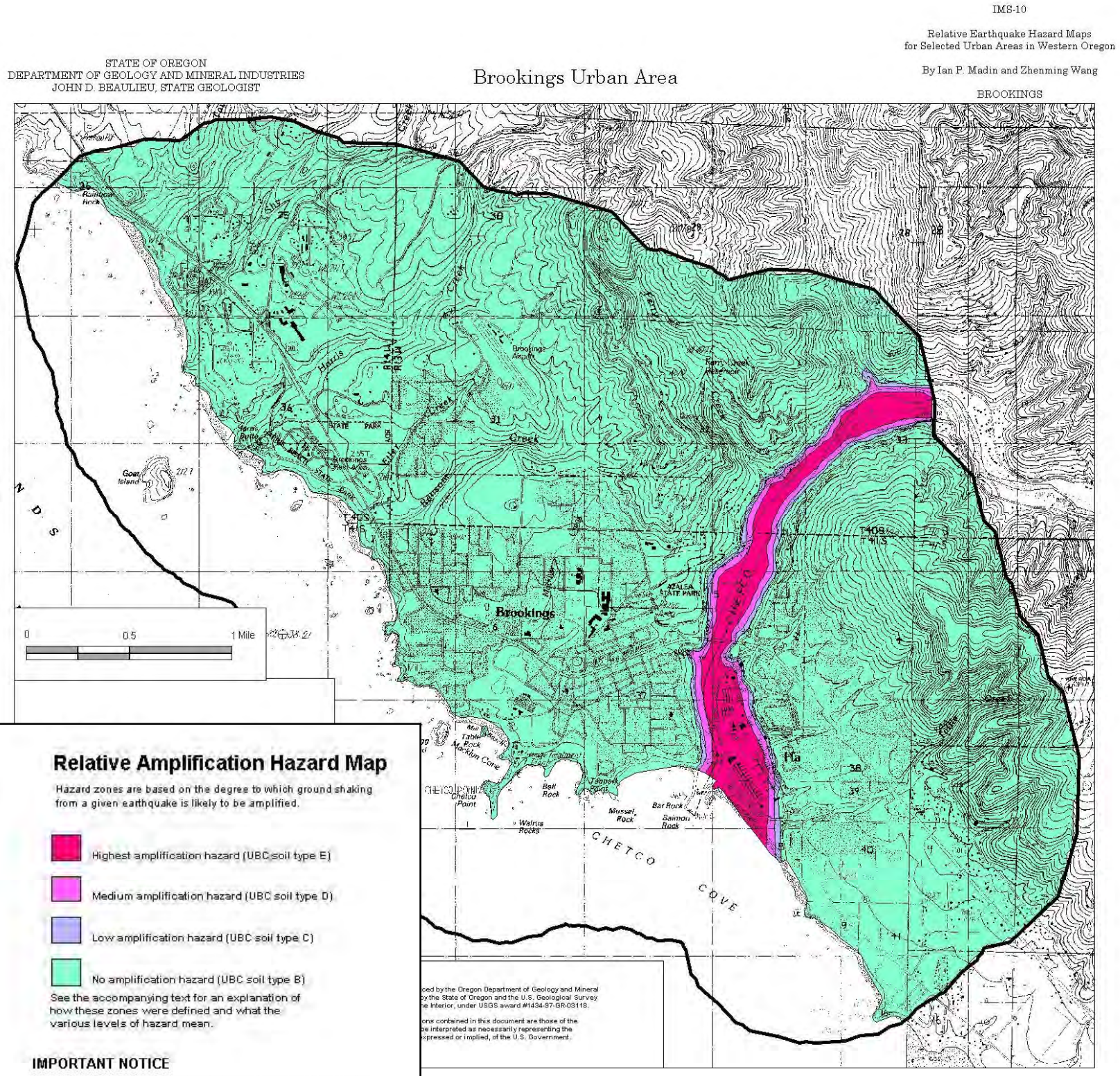


Figure 7: Liquefaction Hazard Map

IMS-10

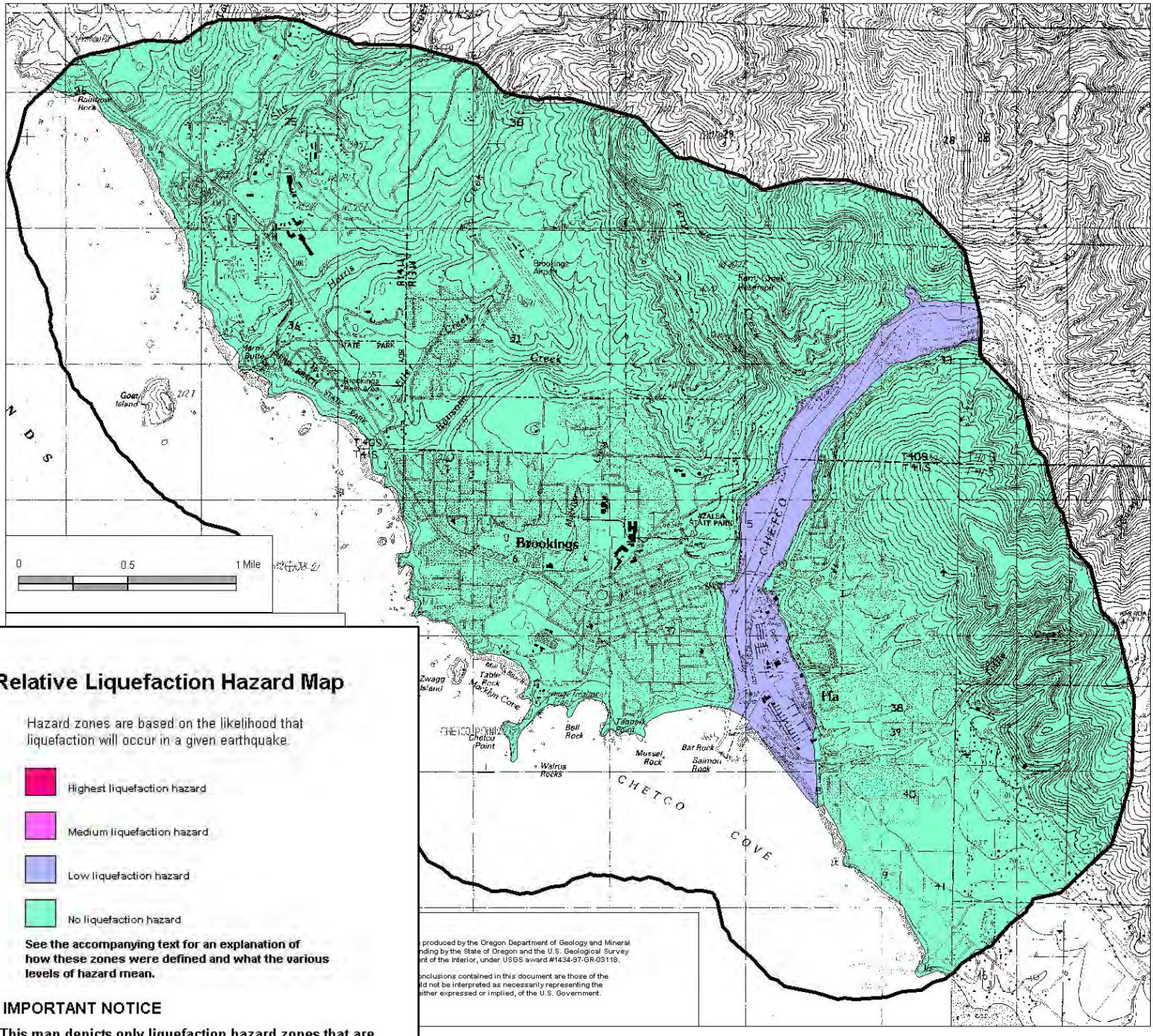
Relative Earthquake Hazard Maps
for Selected Urban Areas in Western Oregon

By Ian P. Madin and Zhenming Wang

STATE OF OREGON
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
JOHN D. BEAULIEU, STATE GEOLOGIST

Brookings Urban Area

BROOKINGS



Relative Liquefaction Hazard Map

Hazard zones are based on the likelihood that liquefaction will occur in a given earthquake.

- Highest liquefaction hazard
- Medium liquefaction hazard
- Low liquefaction hazard
- No liquefaction hazard

See the accompanying text for an explanation of how these zones were defined and what the various levels of hazard mean.

produced by the Oregon Department of Geology and Mineral
nding by the State of Oregon and the U.S. Geological Survey
nt of the Interior, under USGS award #1434-97-GR-03119.

IMPORTANT NOTICE

This map depicts only liquefaction hazard zones that are based on limited geologic and geophysical data as described in the accompanying report. At any given site in the map area, the maps for other types of hazards may show different hazard levels and need to be taken into consideration along with this map. This map cannot replace site-specific investigations. Some appropriate uses are discussed in the accompanying report.

Figure 8: Relative Hazard Map of Earthquake-Induced Landslides

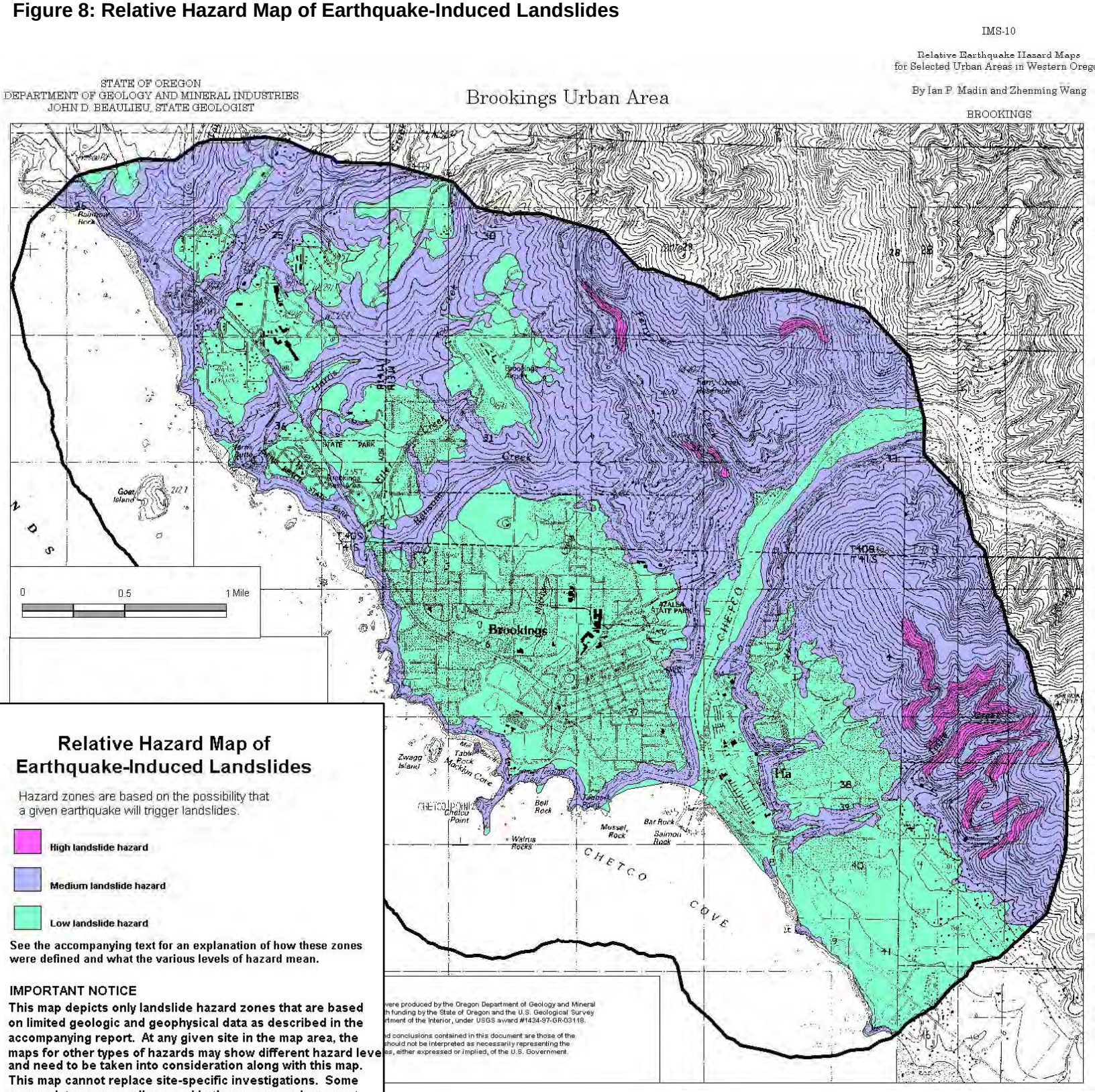
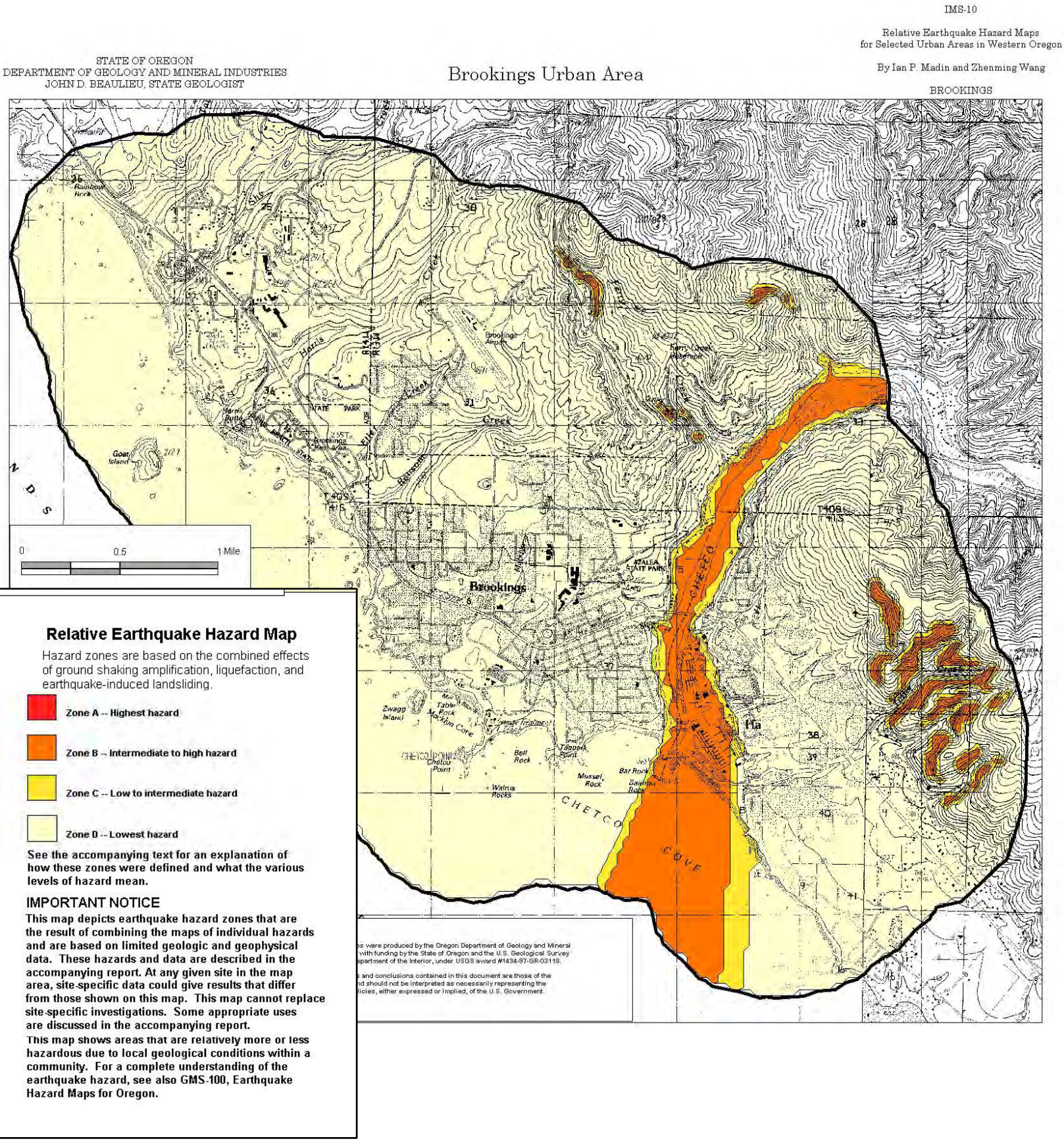


Figure 9: Relative Earthquake Hazard Map



Liquefaction occurs when saturated soil is shaken during an earthquake, reducing the stiffness and strength of that soil. The areas in Brookings most at risk for liquefaction are along the Chetco River and Boat Basin. The majority of the city is located in areas with no liquefaction hazards, and most of the downtown area is located on the bluff (i.e., not subject to liquefaction).

The city's relative earthquake hazard is based on the combined effects of ground shaking, amplification, liquefaction, and earthquake induced landslides in an area. According to Figures 6-9 the majority of the city is located in areas not directly at risk to amplification, liquefaction, or earthquake-induced landslides. However, lands located along the Chetco River and Harbor Hills (not within the city of Brookings) are at high risk to all three.

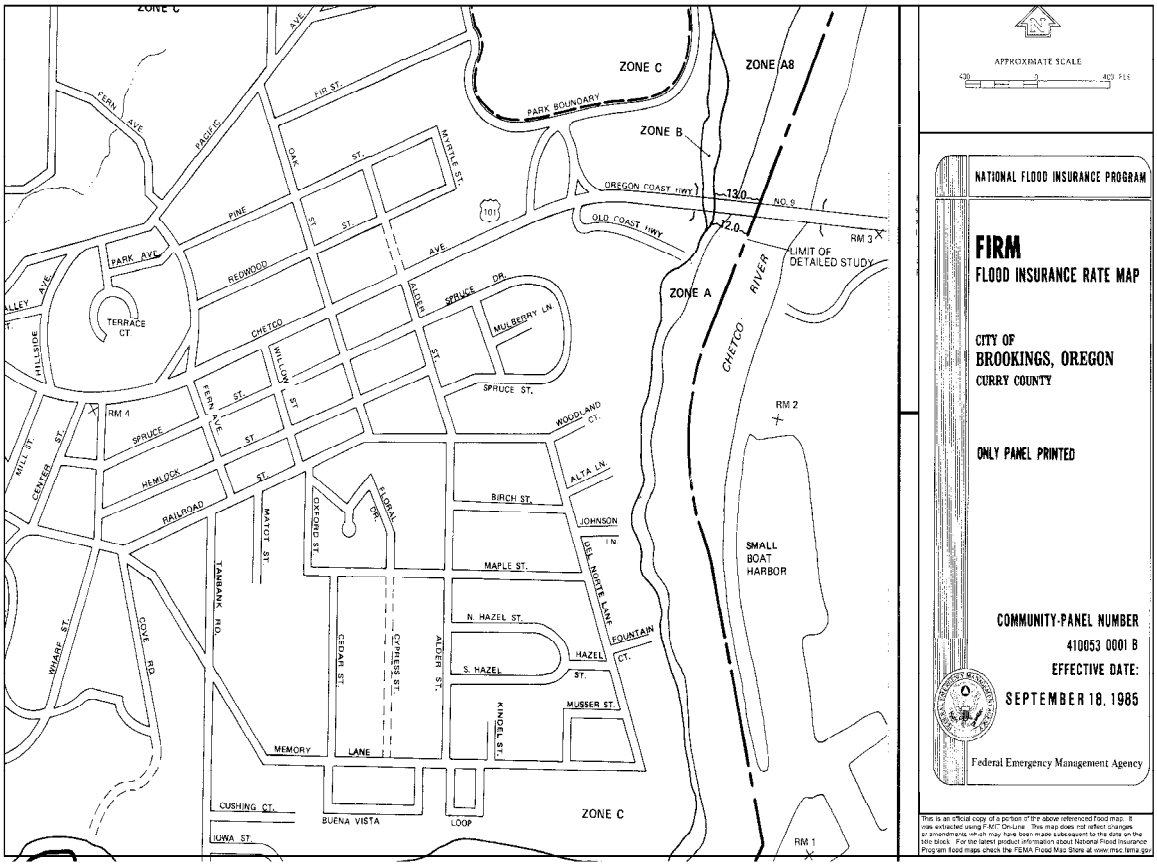
From 2005-2007, under the direction of Oregon Senate Bill 2, DOGAMI completed a statewide seismic needs assessment that surveyed K-12 public school buildings, hospital buildings with acute inpatient care facilities, fire stations, police stations, sheriff's offices and other law enforcement agency buildings. 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. Within the city, the Brookings-Harbor High School was listed at "moderate" risk of probable damage in a high magnitude event.

Flood

The Curry County Multi-Jurisdictional Natural Hazard Mitigation Plan in Section 3.2 adequately identifies the causes, characteristics, and previous occurrences of flooding for the city of Brookings. Severe winter storms are addressed in conjunction with flooding hazards, but for the purposes of this addendum, the two have been separated.

In Figure 10 below, FEMA's Flood Insurance Rate Maps show areas within the city that are risk to flooding along the Chetco River. There are some residences in the area but they comply with development codes and the city's floodplain management system.

Figure 10. Federal Emergency Management: Flood Insurance Rate Map



Source: FEMA Flood Insurance Rate Maps, 1985

Flood Insurance Policies for the City of Brookings

The city of Brookings is a participant in the National Flood Insurance Program (NFIP) and the city's most recent effective map date is August 18, 1985. There are 20 NFIP Policies in Brookings. There have been 5 total claims since 1978 reimbursing $17,379. The total coverage of these policies is $5,153,000. There are 3 policies are in the A zone. The total premium is $9,512. [xii] There are no repetitive loss properties.

Curry County estimates a **moderate vulnerability** to flooding events, meaning 1-10% of the population or regional assets would be affected by a flooding event. Likewise, the county estimates a **moderate probability** that flooding will occur in the future, meaning one event is likely to occur within a 50 year period. The Brookings Steering Committee agreed that these scores would be representative of the city's risks as well.

The Steering Committee identified the following potential community impacts or concerns about potential flood hazards:

- The Brookings-Harbor Boat Basin is at the mouth of the Chetco River and has the potential to flood.

- The area known as Bridge Street Neighborhood (near Highway 101 bridge underpass) is currently being developed near the Chetco River. This area has the potential to flood.
- The area known as Sea Cliff Terrace has the potential to flood.
- Other areas indicated on the FIRM located on the west/coastal side are below the bluff has the potential to flood.

Landslide

The Curry County Multi-Jurisdictional Natural Hazard Mitigation Plan in Section 3.3 adequately identifies the causes, characteristics, and previous occurrences of landslides for the city of Brookings.

The Curry County Multi-Jurisdictional Natural Hazard Mitigation Plan ranked the area's **vulnerability** to landslide events as **high,** meaning more than 10% of the population or regional assets would be affected by a major landslide event. The county plan also indicates that the **probability** of landslides is **high, meaning** one event is likely within a 10 year period. The Brookings Steering Committee agreed that these scores are representative of Brookings's risk as well.

DOGAMI has identified locations (Figure 8 above) as prone to landslides in the aftermath of an earthquake. It can be assumed that these same areas may be prone to landslides due to other causes such as rain storms. Because the map is focused on earthquake induced landslides, however, it may underestimate landslide hazards triggered by other events.

Although the city is located in the lowest level of earthquake-induced landslide risk, landslides that occur outside city limits have impacts on the city as well. As identified in the Curry Mitigation plan, Highway 101 is highly vulnerable to landslides/erosion. The coastal highway is vulnerable to mudslides, high winds, and heavy rains and major landslides on Highway 101 can close the city to tourists and commercial traffic. Blockages to 101 can create a large impact on the area's economy, and emergency vehicles may have very limited access to stranded motorists.

Tsunami

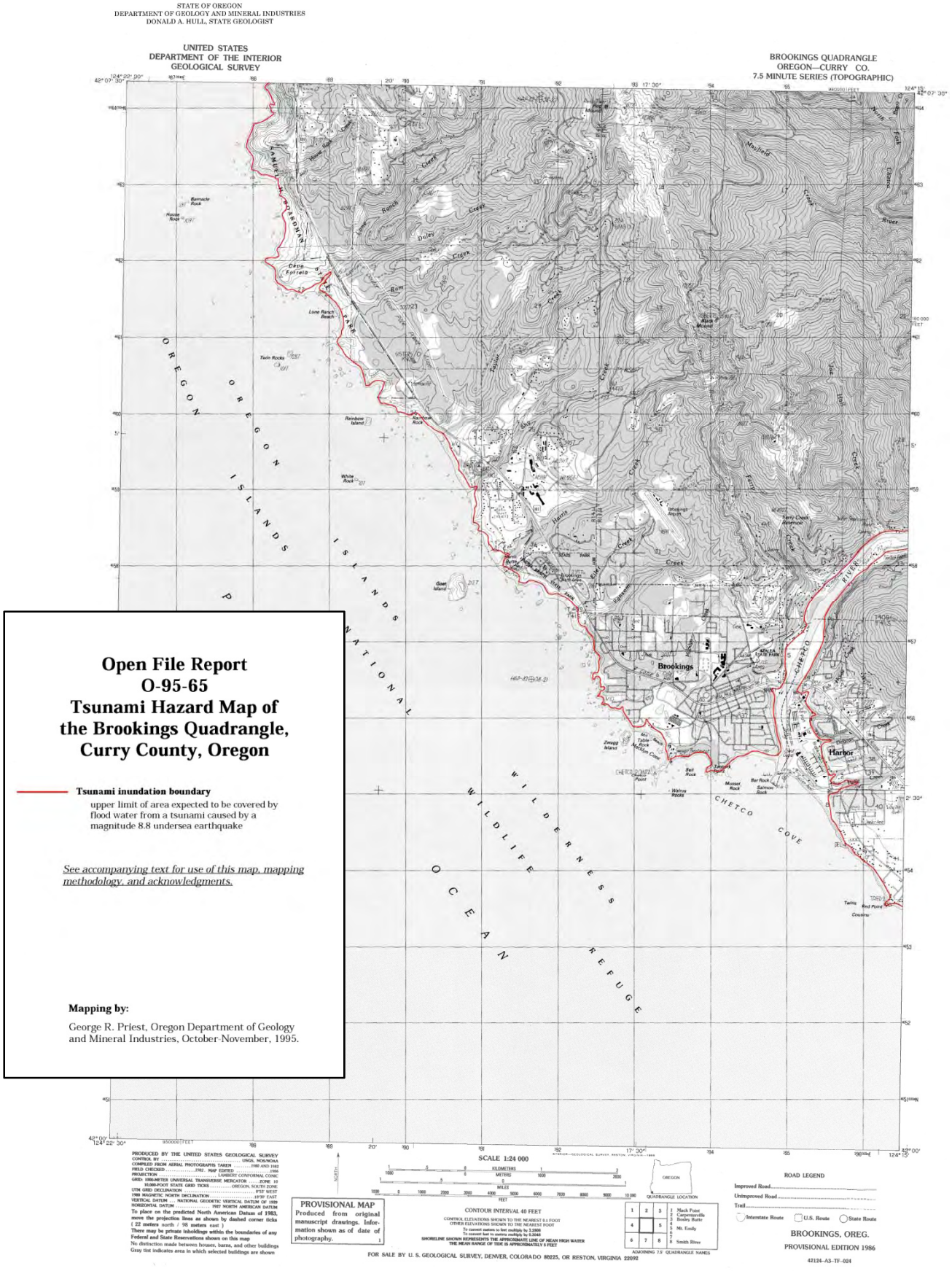
Brookings's location along the Oregon Coast makes it susceptible to tsunamis from both near shore (following a Cascadia Subduction Zone earthquake) and distant tsunamis. The extent of the tsunami hazard is limited to those areas adjacent to the Pacific Ocean and the Chetco River.

The Curry County Multi-Jurisdictional Natural Hazard Mitigation Plan in Section 3.4 adequately identifies the causes, characteristics and previous occurrences of tsunamis for the city of Brookings.

The following map (Figure 11) illustrates the location of the tsunami hazard. This map was completed by the USGS and is the official map for implementation of Oregon Revised Statutes (ORS) 455.446 and 455.447,

limiting construction of certain critical and essential facilities in the tsunami inundation zone.

Figure 11. Tsunami Hazard Map



It is difficult to predict the **probability** of when the next tsunami will occur. Oregon has experienced 10 tsunamis in the last 135 years with only 3 causing measurable damage. It is estimated that all Cascadia tsunamis would cause extensive damage, and the last Cascadia Subduction Zone event occurred about 300 years ago.[xiii] Geologists predict a **10-14% chance** that a Cascadia tsunami will be triggered by a shallow, undersea earthquake offshore Oregon in the next 50 years. The forecast comes from evidence for large but infrequent earthquakes and tsunamis that have occurred at the Oregon coast every 500 years, on average.[xiv]

Because the city is located at a high elevation on bluffs, a tsunami would cause greatest impact in the lower lying areas and the beach on the west side of town. The Curry County Multi-Jurisdictional Natural Hazard Mitigation Plan ranked the county's **vulnerability** to tsunamis as **high**, meaning that at least 10% of the county's population would be affected in a tsunami event. The city of Brookings agrees with this ranking.

Potential community impacts include deaths, property and infrastructural damages, and economic difficulties as a result of significantly decreased tourism activities following a major earthquake/tsunami event. Research suggests that older populations have special needs during and after a tsunami. Persons 65 years or older may require assistance in evacuation due to potential mobility and health issues, a reluctance to evacuate, or special medical equipment needs at evacuation shelters. Evacuation must happen very quickly after an earthquake (30 minutes in some communities), which adds to the difficulty of assisting vulnerable population groups. Less than 10% of the city's residents live within the tsunami inundation zone, but close to 25% of those residents are over 65 years of age. [xv]

Gender differences are also important considerations when preparing for and mitigating natural hazards. Single-mother households may have unique evacuation and recovery issues, as they are more likely to have limited mobility and fewer financial resources. Close to 7% of households within the tsunami-inundation zone are female-headed, with children, and no spouse present. [xvi]

Additionally, 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. In the city of Brookings, nearly 40% of households in the tsunami-inundation zone are renter occupied. [xvii]

The United States Geological Survey (USGS) completed a study in 2007 that examined variations in city exposure and sensitivity to tsunami hazards in Oregon. For more information about Brookings's

vulnerabilities to tsunami hazards, please view this document online at http://pubs.usgs.gov/sir/2007/5283/.

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 13. Figure 14 illustrates the eruptive history of volcanoes in the Cascade Range.

Figure 13. Potentially Active Volcanoes of the Western United States[xviii]

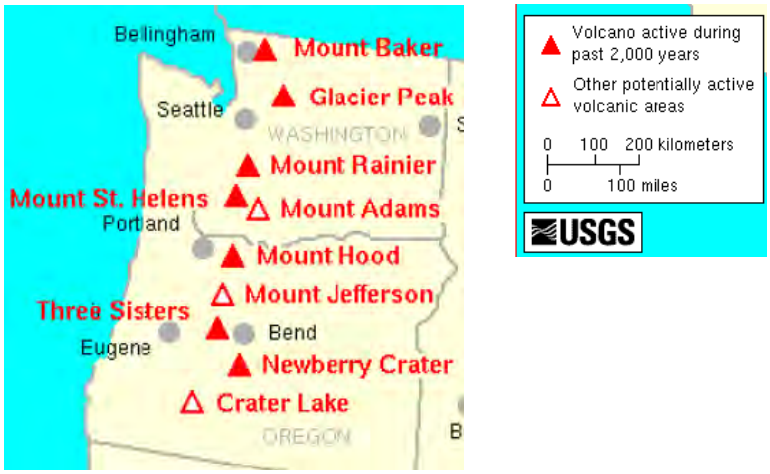
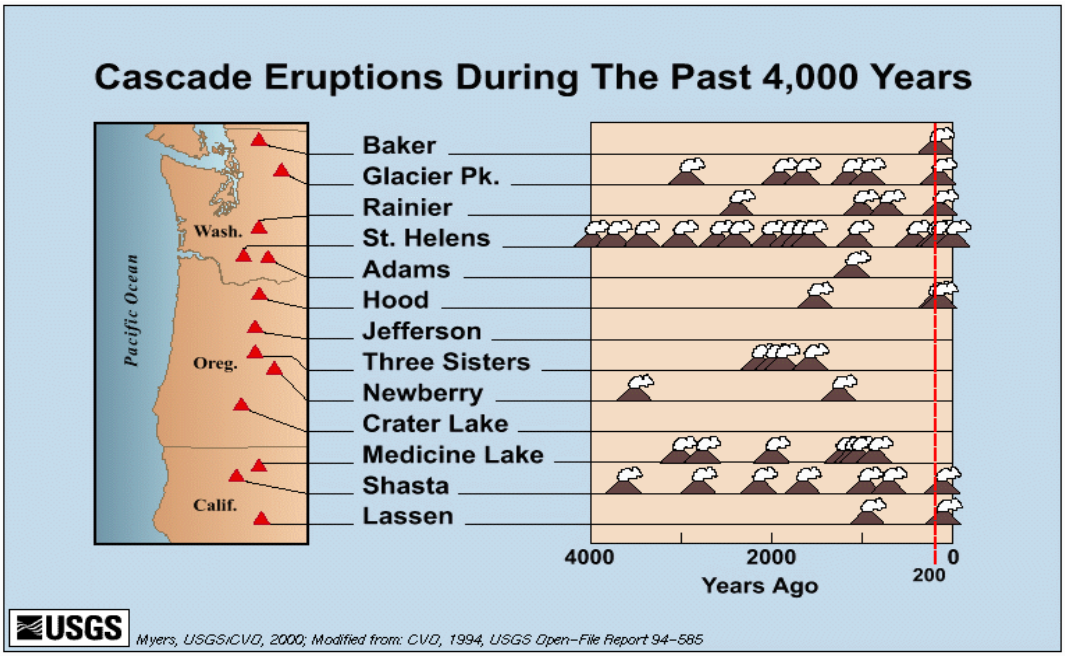


Figure 14. History of Cascade Eruptions[xix]



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.[xx] 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.

Curry County's Natural Hazard Mitigation Plan does not address volcano hazards. Cascades volcanoes tend to erupt at an average rate of 1-2 per century during the last 4,000 years. As such, the Brookings 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.

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 Brookings 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

In February, 2008, Curry County completed a Community Wildfire Protection Plan (CWPP) that provided structural vulnerability assessments for the region (including Brookings), as well a resource and capabilities assessment, wildfire risk assessment, and structural vulnerability study. The CWPP also looked at biomass utilization and economic development opportunities for the county as a whole. When Curry County updates its natural hazard mitigation plan in 2010, the city of Brookings anticipates that the wildfire portion of the mitigation will incorporate findings from the 2008 CWPP. As such, this portion of Brookings's risk assessment will also refer to information within the county's CWPP. Currently, the Curry County CWPP can be found here: http://ri.uoregon.edu/programs/CCE/curry.html.

The county's CWPP adequately identifies the causes and characteristics of wildfire for the region, as well as the location and extent of the wildfire hazard in the county and jurisdictions therein. Previous events are adequately documented as well. Curry County's Natural Hazard

Mitigation Plan estimates a **moderate vulnerability** to wildfires, meaning 1-10% of the population would be affected by a major wildfire event. The county plan also estimates that the probability of wildfires occurring is high, meaning one event is likely within a 10 year period. The city's Steering Committee agrees with the county's vulnerability assessment, but believes that the city's probability of experiencing wildfire is not as high as the county's. Brookings as no recorded history of wildfire events within city limits. As such, the city's Steering Committee estimates a **moderate probability** of wildfires occurring, meaning one event is likely within a 50 year period.

The CWPP shows Brookings and surrounding areas to be a vulnerable structure "hot spot," and a high priority site for fuels reduction. Harris Beach is identified as a "moderate sized limited distribution gorse area with moderate risk rating and closer proximity to condominiums." Mt. View is described as having a heavy concentration of vulnerable structures, with limited access, south aspect, and exposure to winds. Additional community impacts (both past and potential) are adequately described within the Curry County Natural Hazard Mitigation Plan.

Severe Winter Storm

The Curry County Multi-Jurisdictional Natural Hazard Mitigation Plan adequately identifies the causes, characteristics, location/extent, and community impacts related to severe winter storms. Within the county's plan, severe winter storms are addressed in conjunction with flooding hazards. For the purposes of this addendum, the two have been separated. Severe winter storm hazards include high winds and wind storms.

Previous events are well-documented within the Curry County Natural Hazard Mitigation Plan. Additional events that have occurred since the county plan's adoption in 2005 include:

- November 2006: Storm with winds measured at 70 mph in Coos, Curry, and Douglas Counties. Total of $10,000 in damages.[xxi]
- December, 2006: Storm with winds measured at 90 mph. Total of $225,000 in estimated damages for Coos, Curry, and Douglas Counties. The storm also impacted Josephine County, leading to a total storm damage of $300,000.[xxii]

The Curry County Multi-Jurisdictional Natural Hazard Mitigation Plan ranked the county's **vulnerability** to severe winter storms as **high**, meaning more than 10% of the population would be affected by a severe winter storm event. The county plan also indicates that the **probability** of a severe winter storm is **high,** meaning one incident is likely within a 10 year period. The Brookings Steering Committee agrees that these rankings appropriately describe the city's risk as well.

Mission, Goals, & Action Items

The city of Brookings adopts the Curry County Natural Hazards Mitigation Plan mission and goals.

Mission

The mission of the Curry County Natural Hazards Mitigation 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. By increasing public awareness, documenting the resources for risk analysis and reduction and identifying activities to guide the county and each community in building safer more resilient communities.

Goals

The goal of the Curry County Natural Hazards Mitigation Plan is to protect life and property and reduce the effects of natural hazards, and establish a more resilient community.

Protect Life and Property

- Identify high impact areas affected by natural hazards through past events, to determine future projections.
- Explore and implement activities that assist in protecting lives by making homes, businesses, infrastructure, critical facilities, and other property more resistant to natural hazards.
- 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

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

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, to implement mitigation activities.

Actions

The 2005 Curry County Natural Hazards Mitigation Plan identified three wildfire actions, one winter storm/flood action, two landslide actions, and two earthquake/tsunami actions for the city of Brookings. Actions from the county's plan were either deferred or deleted. Deferred actions are now listed as Actions #4 and #5. Because the remaining actions did not specifically address Brookings's unique risks and vulnerabilities, they were deleted from this addendum. Actions #1, #2, and #3 were identified in the 2007-09 planning process.

The following action items are detailed recommendations for activities that local departments, citizens, and others could engage in to reduce risk.

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

2. Seek funding to study the seismic vulnerability of buildings and infrastructure in the city of Brookings and retrofit those that are vulnerable to seismic hazards.

3. Continue to implement and enhance public education programs regarding wildfires, earthquakes, and tsunamis.

Additionally, the city will partner with the county in implementing the following actions:

4. Through multi-agency coordination, develop an abatement plan for control of Noxious Weeds, specifically Gorse, Scotch Broom and Butterfly Brush.

5. Review of county and community comprehensive plans for the need to update hazard specific sections to reflect the latest information on seismic hazards in each community.

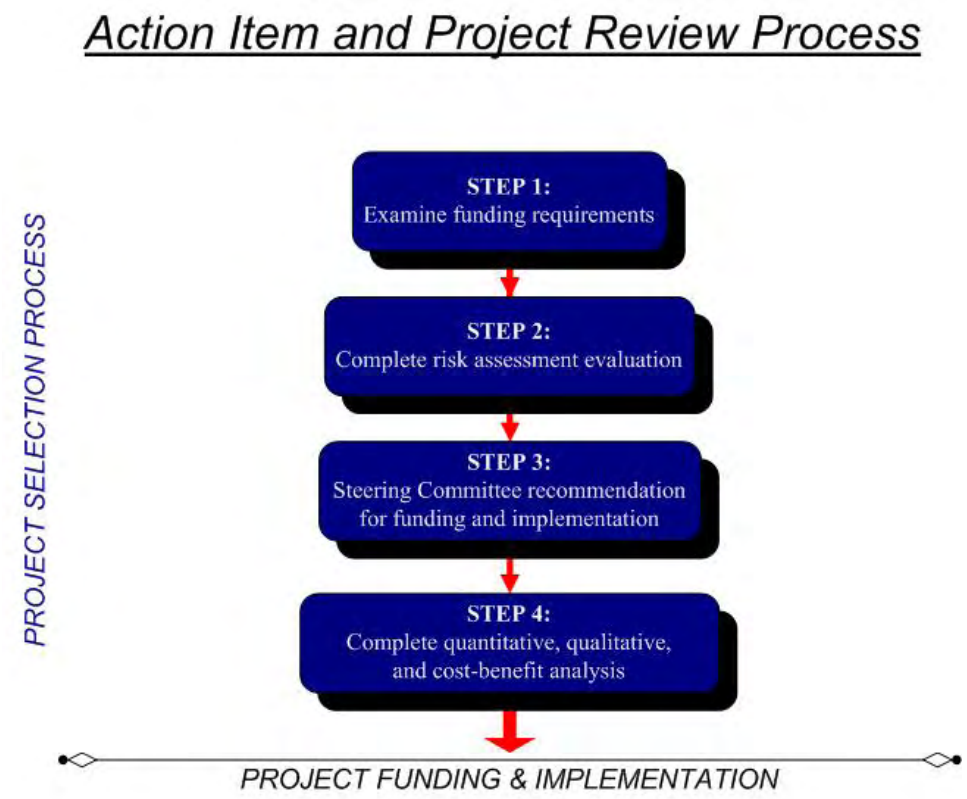
Plan Implementation & Maintenance

The city of Brookings's building official will serve as the convener for the Brookings Natural Hazard Mitigation Plan Addendum. The building official 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 Brookings Natural Hazard Mitigation Plan Addendum will be updated every five years in conjunction with the county's plan update schedule.

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 15 illustrates the project development and prioritization process.

Figure 15: 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

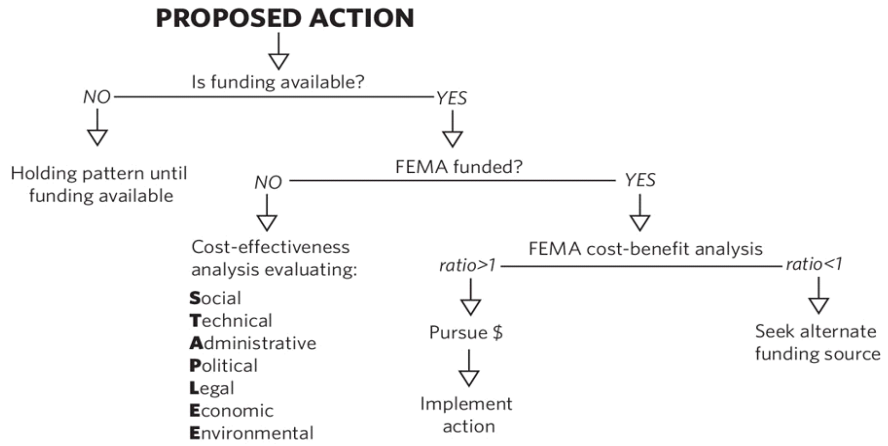
Based on the steps above, the committee will recommend whether or not the mitigation activity should be moved forward. If the committee decides to move forward with the action, the coordinating organization designated on the action item form will be responsible for taking further action and, if applicable, 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 4.2 shows decision criteria for selecting the appropriate method of analysis.

Figure 4.2: Benefit Cost Decision Criteria



Source: Community Service Center's Partnership for Disaster Resilience at the University of Oregon, 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 participating jurisdictions are dedicated to involving the public directly in the continual reshaping and updating of the Brookings Natural Hazard 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.

Copies of the Curry County Multi-Jurisdictional Natural Hazards Mitigation Plan are available in the county's public libraries. Brookings's Addendum to the county's plan will also be available for viewing at the Brookings community library. Additionally, the county's multi-jurisdictional natural hazard mitigation plan has been archived and posted on the Partnership website via the University of Oregon Libraries'

Scholar's Bank Digital Archive. Brookings's updated addendum will be included in the archive as well.

The city will hold public meetings regarding the content of Brookings'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.

[i] Oregon Economic and Community Development Department, Brookings Community Profile.

[ii] Portland State University: Population Research Center, *2007 Oregon Population Report*, http://www.pdx.edu/prc/annualorpopulation.html, (March 2008), 12.

[iii] 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.

[iv] United States Census Bureau, 2000. Fact Sheet: Brookings, Oregon. www.census.gov.

[v] United States Census Bureau. 2000. Fact Sheet: Brookings, Oregon. www.census.gov.

[vi] United States Census Bureau. 2000. People- Income: Brookings Oregon. www.census.gov.

[vii] US Census Bureau, "Profile of General Demographic Characteristics, 2000, Brookings, OR," American Factfinder Quick Tables, www.census.gov

[viii] Port of Brookings Harbor, Brookings Oregon. www.port-brookings-harbor.org.

[ix] City of Brookings, Oregon. www.Brookings.or.us

[x] City of Brookings, Oregon. www.Brookings.or.us

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

[xii] Federal Emergency Management Agency: NFIP Insurance Report, OREGON. February 25, 2008.

[xiii] Kenji Satake et al., 1995 (State's Enhanced Natural Hazard Mitigation Plan, Region 1: Oregon Coast. March, 2006).

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

[xv] United States Geological Survey. Variations in City Exposure and Sensitivity to Tsunami Hazards in Oregon: Scientific Investigations Report 2007-5283.

[xvi] United States Geological Survey. Variations in City Exposure and Sensitivity to Tsunami Hazards in Oregon: Scientific Investigations Report 2007-5283.

[xvii] United States Geological Survey. Variations in City Exposure and Sensitivity to Tsunami Hazards in Oregon: Scientific Investigations Report 2007-5283.

[xviii] 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

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

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

[xxi] State Natural Hazard Mitigation Plan, Region 3 Profile & Risk Assessment. www.oregonshowcase.org/stateplan.

[xxii] State Natural Hazard Mitigation Plan, Region 3 Profile & Risk Assessment. www.oregonshowcase.org/stateplan.

Action #1 (Flood)

Proposed Action Item:	**Alignment with Plan Goals:**
Ensure continued compliance in the National Flood Insurance Program (NFIP) through enforcement of local floodplain management ordinances.	*Protect Life and Property; Natural Systems*

Rationale for Proposed Action Item:

The National Flood Insurance Program provides communities with federally backed flood insurance to homeowners, renters, and business owners, provided that communities develop and enforce adequate floodplain management ordinances. The benefits of adopting NFIP standards for communities are a reduced level of flood damage in the community and stronger buildings that can withstand floods. According to the NFIP, buildings constructed in compliance with NFIP building standards suffer approximately 80 percent less damage annually than those not built in compliance.

Community Assistance Visits (CAV) are scheduled visits to communities participating in the NFIP for the purpose of: 1) conducting a comprehensive assessment of the community's floodplain management program; 2) assisting the community and its staff in understanding the NFIP and its requirements; and 3) assisting the community in implementing effective flood loss reduction measures when program deficiencies or violations are discovered.

The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Continued participation in the NFIP will help reduce the level of flood damage to new and existing buildings in communities while providing homeowners, renters and business owners additional flood insurance protection.

Ideas for Implementation:

- Actively participate with DLCD and FEMA during Community Assistance Visits.
- Conduct an assessment of the floodplain ordinances to ensure they reflect current flood hazards and situations, and meet NFIP requirements.
- Coordinate with the county to ensure that floodplain ordinances and NFIP regulations are maintained and enforced.
- Mitigate areas that are prone to flooding and/or have the potential to flood. These areas include the Brookings-Harbor Boat Basin, Bridge Street Neighborhood, Sea Cliff Terrace, and areas below the bluff on the coastal side of town.

Coordinating Organization:	City of Brookings Planning Department

Internal Partners:		**External Partners:**
		FEMA, OEM, DLCD, Curry County Planning
Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	Long Term - Continuous	

Form Submitted by:	Brookings Steering Committee

Action #2 (Earthquake)

Proposed Action Item:	**Alignment with Plan Goals:**
Seek funding to study the seismic vulnerability of buildings and infrastructure in the city of Brookings and retrofit those that are vulnerable to seismic hazards.	*Protect Life and Property; Partnerships and Implementation*

Rationale for Proposed Action Item:

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, sheriff's 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. Within the city, the Brookings-Harbor High School was listed at "high" risk of probable damage in a high magnitude event.

The following vulnerabilities are listed within Brookings's Addendum to the Curry County Natural Hazards Mitigation Plan:

- The potential disruption or destruction of water pumps and intakes could endanger and limit the city's water supply.
- The bridges in the area may be at risk of collapse. The Highway 101 Bridge over the Chetco River, a vital line between Brookings and the city of Harbor and could divide the communities. This would sever the major transportation link Brookings has to the south.
- The Harbor Boat Basin is constructed on fill which could result in liquefaction and damage to buildings, roads, and services.
- The stability of the city's water and sewer connections along the Highway 101 Bridge may be compromised in a high-magnitude earthquake.

The Disaster Mitigation Act of 2000 [201.6(c)(3)(ii)] requires communities to identify actions and projects that reduce the effects of hazards on both new and existing buildings and infrastructure.

Ideas for Implementation:

- Further assess structures that were identified in DOGAMI's Seismic Needs Assessment as having a 'high' risk of collapse. Prioritize buildings for seismic retrofit and coordinate with OEM seismic grants coordinator to apply for funding.

Coordinating Organization:	City of Brookings Public Works Department

Internal Partners:	**External Partners:**
City of Brookings: Planning and Finance Departments Brookings School System	Oregon Emergency Management Douglas County Emergency Management DOGAMI

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	2-4 years	

Form Submitted by:	Brookings Steering Committee

Action #3 (Multi-Hazard)

Proposed Action Item:	**Alignment with Plan Goals:**
Continue to implement and enhance public education program regarding wildfires, earthquakes, and tsunamis	*Protection of Life and Property* *Public Awareness*

Rationale for Proposed Action Item:

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.[i]

Oregon has experienced 10 tsunamis in the last 135 years with only 3 causing measurable damage. It is estimated that all Cascadia tsunamis would cause extensive damage, and the last Cascadia Subduction Zone event occurred about 300 years ago.[ii] Geologists predict a **10-14% chance** that a Cascadia tsunami will be triggered by a shallow, undersea earthquake offshore Oregon in the next 50 years. The forecast comes from evidence for large but infrequent earthquakes and tsunamis that have occurred at the Oregon coast every 500 years, on average.[iii] See Brookings's tsunami risk assessment for specific information regarding vulnerable populations within the city.

Brookings is vulnerable to wildfires every year given dry, hot, and windy conditions. Public education enhances safety and reduces the risk of wildfires. Education is most effective during the spring, summer, and fall fire season. Education can be limited due to current funds and staff time.

To increase natural hazard mitigation and emergency preparedness in a community, "residents must be aware of the risk and know what they should do before and after the disaster occurs. Outreach and awareness campaigns need to be carefully organized and developed to ensure that residents receive critical information." *Source: Oregon Natural Hazards Workgroup. Lane County Natural Hazard Mitigation Plan (Draft). October 2005. Community Service Center, University of Oregon, Eugene, OR. p. 46.*

Ideas for Implementation:

- Continue wildfire education & outreach activities during wildfire season (fall). Reference Curry County's Natural Hazards Mitigation Plan for a comprehensive list of outreach activities.
- Target tsunami education & outreach to the following populations residing in the tsunami-inundation zone: persons 65 years of age and older; singer-mother households; and renters.
- Develop education & outreach activities to occur during earthquake awareness month (April).

Coordinating Organization:	City of Brookings Fire Department

Internal Partners:	**External Partners:**
City of Brookings Police Department Brookings School System	DOGAMI Oregon Emergency Management

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	Long Term - Continuous	

Form Submitted by:	Brookings Steering Committee

Action #4 (Wildfire)

Proposed Action Item:	**Alignment with Plan Goals:**
Through multi-agency coordination, develop an abatement plan for control of Noxious Weeds, specifically Gorse, Scotch Broom and Butterfly Brush.	*Protect Life and Property* *Natural Systems* *Partnerships and Implementation*

Rationale for Proposed Action Item:

Gorse is a plant that grows well on shady slopes with high soil moisture and good drainage. As a result, this spiny evergreen shrub thrives in Southwest Oregon. 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. Because of various characteristics of the plant, the soil is often bare between individual gorse plants, which increase erosion on steep slopes where gorse has replaced grasses or forbs. Spiny and mostly unpalatable when mature, gorse reduces pasture quality where it invades rangeland. Gorse under story in forests interferes with cultural operations, increasing pruning and thinning costs.

Invasive species like scotch broom and butterfly brush are highly flammable and increase the area's wildfire risk.

The Curry County CWPP shows Brookings and surrounding areas to be a vulnerable structure "hot spot," and a high priority site for fuels reduction. Harris Beach is identified as a "moderate sized limited distribution gorse area with moderate risk rating and closer proximity to condominiums." Mt. View is described as having a heavy concentration of vulnerable.

The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community [201.6(c)(3)(ii)]. Removing noxious weeds will reduce the risk of wildfires in the community.

Ideas for Implementation: Continuing

- Develop a map of gorse infested areas to be targeted.
- Collaboratively determine the best strategy for controlling the spread of gorse.
- Seek funding to replace cutters that can no longer be repaired due to age and the unavailability of replacement parts for use to cut back noxious weeds.
- Explore funding options to procure herbicides for noxious weed mitigation.
- Explore the use of 'Community Service' hours imposed by the courts for abatement work

Coordinating Organization:	City of Brookings Fire Department

Internal Partners:	**External Partners:**
Private Land Owners within the city Brookings Weed Board and Abatement Officer	DEQ, ODF, Curry County

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	Long Term - Continuous	

Form Submitted by:	Brookings Steering Committee

Action #5 (Multi-Hazard)

Proposed Action Item:	**Alignment with Plan Goals:**
Review of county and community comprehensive plans for the need to update hazard specific sections to reflect the latest information on seismic hazards in each community.	*Protection of Life and Property* *Partnerships and Implementation*

Rationale for Proposed Action Item:

New risk assessment information continually becomes available. The city believes it is important to update their Comprehensive Plan as needed to reflect new hazard information.

The Disaster Mitigation Act of 2000 [201.6(c)(4)(ii)] requires that communities incorporate natural hazard mitigation into existing plans and policies. A periodic review of the appropriate planning documents to integrate new risk assessment information would help to integrate natural hazard mitigation into more routine tasks.

Ideas for Implementation:

- Review latest vulnerability assessment and policies addressing natural hazards.
- Amend comprehensive plans, policies and implementation strategies to reflect future development in seismic and tsunami hazard areas, where and if needed.

Coordinating Organization:	City of Brookings Planning Department

Internal Partners:	**External Partners:**
City of Brookings Public Works Department	DOGAMI

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	Long Term – Continuous	

Form Submitted by:	Brookings Steering Committee

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

[ii] Kenji Satake et al., 1995 (State's Enhanced Natural Hazard Mitigation Plan, Region 1: Oregon Coast. March, 2006).

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