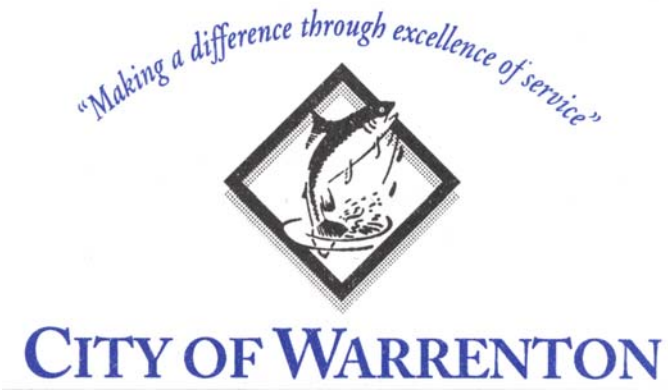


City of Warrenton

Natural Hazards Mitigation Plan Addendum

Prepared for
City of Warrenton
225 S. Main Avenue
Warrenton, Or 97146

In cooperation with

Columbia River Estuary Study Taskforce (CREST)
750 Commercial Street, Room 205
Astoria, OR 97103

Adopted by the Warrenton City Commission on January 26, 2010

RESOLUTION NO. 2290

A RESOLUTION ADOPTING THE CITY OF WARRENTON'S REPRESENTATION IN THE CLATSOP COUNTY MULTI-JURISDICTION HAZARD MITIGATION PLAN

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

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

WHEREAS, the City of Warrenton has participated in the development of the Clatsop County Multi-Jurisdiction Natural Hazard Mitigation Plan, which has established a comprehensive, coordinated planning process to eliminate or minimize these vulnerabilities, and

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

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

THE CITY COMMISSION OF THE CITY OF WARRENTON RESOLVES AS FOLLOWS:

Section 1. The City Commission of the City of Warrenton hereby accepts and approves of its section of the Clatsop County Multi-Jurisdiction Hazard Mitigation Plan as a reasonable process to identify and plan for potential hazards in the City of Warrenton and Clatsop County,

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

Section 3. The City of Warrenton 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 Warrenton will continue to participate in the updating and expansion of the Clatsop County Multi-Jurisdiction Hazard Mitigation Plan in the years ahead, and

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

PASSED BY THE CITY COMMISSION AND APPROVED BY THE MAYOR, this 26th day of January, 2010.

Mayor

ATTEST:

City Recorder

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

FEMA

February 16, 2010

Honorable Jeff Hazen
Chair, Clatsop County Board of Commissioners
800 Exchange Street, Suite 410
Astoria, Oregon 97103

Dear Commissioner Hazen:

On November 12, 2008, the U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) approved the ***Clatsop County Natural Hazards Mitigation Plan*** as a multi-jurisdictional local plan as outlined in 44 CFR Part 201. With approval of this plan, the following entities are now eligible to apply for the Robert T. Stafford Disaster Relief and Emergency Assistance Act's hazard mitigation project grants through November 12, 2013:

Clatsop County	**City of Astoria**	**City of Cannon Beach**
City of Gearhart	***City of Warrenton***	

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

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

Sincerely,

Mark Carey, Director
Mitigation Division

cc: Dennis Sigrist, Oregon Emergency Management

Enclosure

BH:bb

Volume III: City Addendum

City of Warrenton

Overview

The city of Warrenton developed this addendum to the Clatsop 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 Warrenton, Oregon, which include coastal erosion, drought, earthquake, flood, landslide, tsunami, volcano, wildfire, wind storm, and 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) How was the Addendum Developed? 2) Community Profile; 3) Risk Assessment; 4) Mission, Goals, and Action Items; and 5) Plan Implementation and Maintenance.

How was the Addendum Developed?

In the fall of 2006, the Oregon Partnership for Disaster Resilience (OPDR) at the University of Oregon's Community Service Center partnered with Oregon Emergency Management (OEM) and Clatsop and Lincoln Counties to develop a Pre-Disaster Mitigation Planning Grant proposal. Each county joined The Partnership by signing (through their County Commissions) a Memorandum of Understanding for this project. FEMA awarded the Oregon Coast Region a grant to support the development of multi-jurisdictional natural hazard mitigation plans for the two counties and the cities therein. The Partnership, OEM, and the participating communities were awarded the grant in the fall of 2006 and Clatsop County's multi-jurisdictional planning efforts began in the fall of 2007.

The Columbia River Estuary Studies Taskforce (CREST) led the development of Clatsop County's multi-jurisdictional plan. A graduate student with OPDR assisted CREST with data collection and plan writing to support the development of the county's community overview and risk assessment as well as similar components for the city addendums. The Countywide Steering Committee—composed of various county stakeholders and representatives from each city—guided development of Clatsop County's Natural Hazards Mitigation Plan. Warrenton's

planner, Pamela Alegria, represented Warrenton on the Countywide Steering Committee.

CREST and Warrenton's planner worked together to develop Warrenton's addendum to the Clatsop County Natural Hazards Mitigation Plan, with assistance from OPDR. Warrenton's planner wrote the mitigation plan, while CREST edited plan drafts and provided general plan development guidance. OPDR provided a plan template and researched and wrote the addendum's community profile.

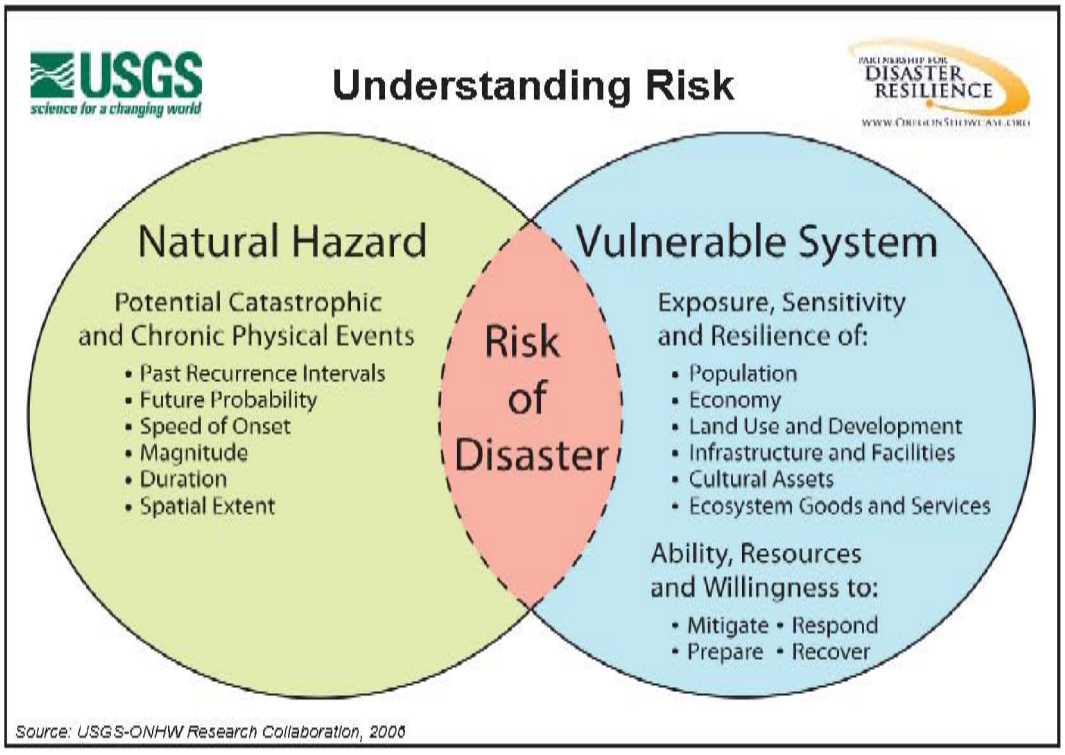
Between November 2007 and June 2009, the planner worked with CREST to write the risk assessment and action item portions of the addendum. To accomplish this, the planner held individual meetings with several key community stakeholders, which included the Warrenton public works director, the wastewater treatment plant superintendent, the Warrenton planning director, and the Warrenton city manager. The planner also reviewed and incorporated information from community plans and technical reports, such as the Warrenton Stormwater Management Plan, into the plan's risk assessment. While developing the addendum, Warrenton participated in the county's public involvement process to develop a plan that addresses local needs (Please see pages 1-7 to 1-8 of the Clatsop County Mitigation Plan and Appendix B). Finally, between June and October, 2009, OPDR conducted a final review of Warrenton's addendum and made edits to the plan in collaboration with the Warrenton planning director.

The City of Warrenton adopted Warrenton's Addendum to the Clatsop County Natural Hazards Mitigation Plan via resolution on January 26, 2010.

Community Profile

The following section describes the city of Warrenton from a number of perspectives 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 hazard assessments located in the risk assessment, should be used as the local level rationale for the risk reduction actions. The identification of actions that reduce the city's sensitivity and increase its resilience assist in reducing overall risk, or the area of overlap in Figure 1 below.

Figure 1. Understanding Risk



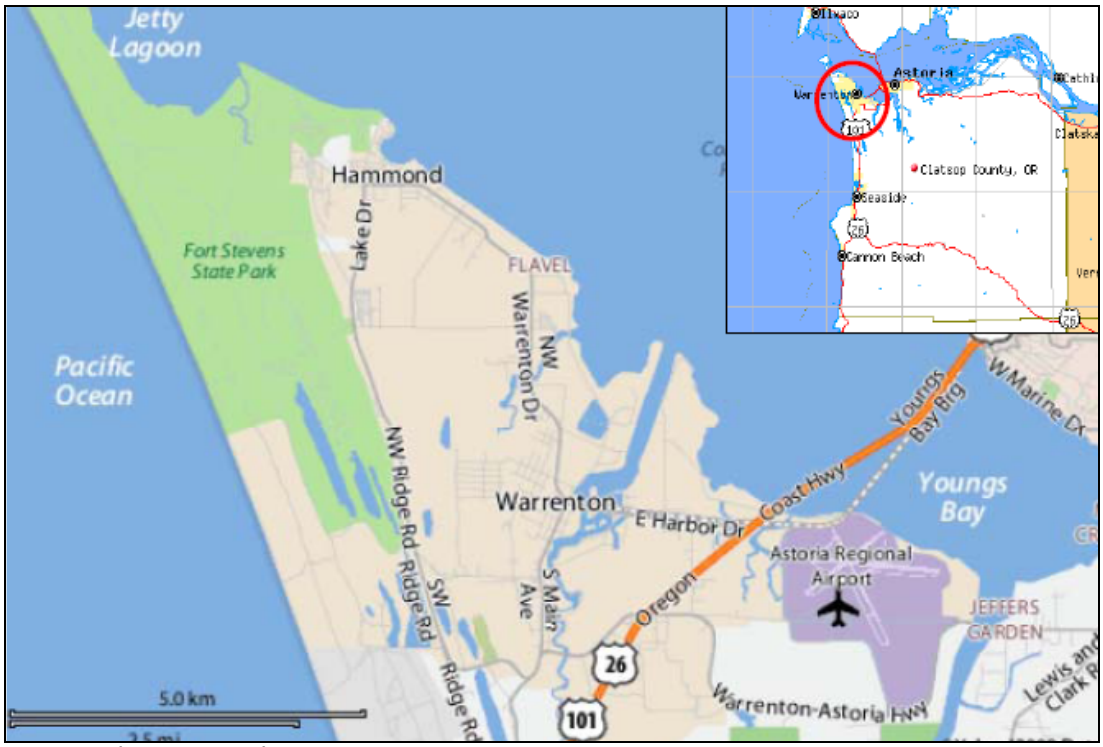
Source: USGS - Partnership for Disaster Resilience Research Collaborative, 2006

Geography & Climate

Warrenton is located at the mouth of the Columbia River in the northwestern corner of Clatsop County. It is bordered by water on three sides: the Pacific Ocean to the west, the Columbia River to the north and Young's Bay to the east (see Figure 2 below). The climate is moderate. The monthly average temperatures range from highs around 69 degrees and lows around 60 degrees in July and August, to highs around 48 degrees and lows around 36 degrees in December and January. Warrenton receives approximately 66 inches of rain annually. Monthly precipitation averages range from 10 inches during the wetter months of November through January, to approximately one inch during the drier summer months of June through August.[1]

[1] National Weather Forecast 2007

Figure 2. Map of the City of Warrenton



Source: Yahoo Maps <yahoomaps.com>

Knowledge of geographic factors like soil types can help identify areas vulnerable to natural hazards, specifically landslides and earthquake related hazards such as liquefaction, and can assist in mitigation planning. The primary types of soil found in the city of Warrenton are Coquille-Clatsop (C-C), Grindbrook-Walluski-Hebo (G-W-H), and Waldport-Gearhart-Brailler (W-G-B).

Population & Demographics

Lewis and Clark's expedition, the Corps of Discovery, arrived near present-day Warrenton in the winter of 1805-06. Lexington, as Warrenton was then known, was the Clatsop County seat and emerged as a bustling fishing and logging hub bordered by the Pacific Ocean, the Columbia River and Young's Bay. Warrenton was incorporated as a city in 1899 and annexed the former community of Hammond in 1992.

In 2000, the city had a population of 4,096 permanent residents, which comprised approximately 11% of Clatsop County's total population. Among Clatsop County's cities between 1980 and 2000, Warrenton grew at the fastest rate, with a growth of 26%, in part due to the annexation of Hammond in 1991. Table 1 shows the

city's population growth between 1980 and 2000. In 2008, the population of Warrenton is estimated to be 4,650.[2]

Table 1. Population Growth, City of Warrenton, 1980-2000

Census	Population	Percent Change
1980	3,009	-
1990	3,270	8.70%
2000	4,096	25.30%

Source: US Census, 2000

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. Of this number, a disproportionate burden is placed upon special needs groups, particularly children, the elderly, the disabled, minorities, and low income persons. Portions of Warrenton's residents fall into these special needs populations.

Nearly 5% of the city's population speaks a language other than English as their primary language. In 2000, 14% of all individuals and 15% of families in Warrenton were living below the federal poverty level.[3] More information on special needs populations is shown in Tables 2 through 4.

Table 2. Population by Age, City of Warrenton, 2000

Age Range	Percent of Population
Under 5 years	7.4%
5 to 9 years	7.1%
10 to 14 years	7.2%
15 to 19 years	7.4%
20 to 24 years	5.7%
25 to 34 years	12.5%
35 to 44 years	17.2%
45 to 54 years	12.3%
55 to 59 years	5.3%
60 to 64 years	4.8%
65 to 74 years	7.3%
75 to 84 years	4.5%
85 years +	1.3%

Source: US Census, 2000

[2] Portland State University Population Research Center, "Table 4. Population Estimates for Oregon and its Counties and Incorporated Cities: April 1, 1990-July 1, 2008," *2008 Oregon Population Report,* March 2009.

[3] US Census 2000

Table 3. Poverty Distribution by Age Group, City of Warrenton, 2000

Age	Percent of Population
Under 5 years	2.31%
5-11 years	1.56%
12-17 years	1.44%
18-64 years	7.40%
65 to 74 years	0.94%
75 years and over	0.55%

Source: US Census, 2000

Table 4. Disabled Population, City of Warrenton, 2000

Age	Percentage of Population
5-15 years	1.9%
16-64 years	29.0%
65 years and over	8.9%
Total	**39.7%**

Source: US Census, 2000

Employment & Economics

Education, health, social services and retail trade are the largest employment industries in Warrenton, as shown in Table 5 below. In addition, of the total employed civilian population 16 years and older, 14.2% are paid by local, state, or federal government.[4] Only 3.6% of the population was employed by natural resource jobs including agriculture, forestry, and fishing. This percentage does not include the self employed population such as those in the fishing industry. A breakdown of Warrenton's employment by industry is shown below in Table 5.

[4] U.S. Census Bureau, "Profile of Selected Economic Characteristics 2000, Warrenton, Oregon/ 'Class of Worker,'" www.census.gov.

Table 5. Employment by Industry, City of Warrenton, 2000

Industry	Percent
Educational, health and social services:	20.5%
Retail trade	19.7%
Construction	13.0%
Arts, entertainment, recreation, accommodation and food services:	12.6%
Manufacturing	9.7%
Public administration	5.9%
Finance, insurance, real estate and rental and leasing:	4.5%
Professional, scientific, management, administrative, and waste management services:	4.2%
Agriculture, forestry, fishing and hunting, and mining:	3.6%
Transportation and warehousing, and utilities:	2.7%
Information	1.9%
Wholesale trade	1.5%

Source: US Census, 2000

In 2004, the largest employers in Warrenton were Fred Meyer (retail-220 employees), Weyerhaeuser Co. (lumber-155 employees), Pacific Coast Seafood Co. (fish processing-125 employees), Costco (retail-120 employees) and Warrenton School District (education-100 employees).[5]

Median income can be used as an indicator of the strength of the region's economic stability. In 1999, the median household income in Warrenton was $33,472, according to the 2000 US Census Bureau. This is approximately $8,000 below the 1999 national median household income of $41,994, and almost $3,000 below the $36,301 median household income for Clatsop County. Although it can be used to compare areas as a whole, this number does not reflect how income is distributed among Warrenton's 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 1960s in the Northwest and California use earthquake resistant designs and

[5] Infrastructure Finance Authority, "5 Largest Employers, Public and Private as of August, 2004" http://www.orinfrastructure.org/profiles/Warrenton/, accessed November 4, 2009.

construction techniques. In addition, FEMA began assisting communities with floodplain mapping during the 1970s, and communities developed ordinances that required homes in the floodplain to be elevated to at least one foot above Base Flood Elevation.

In 2000, Warrenton had 1,621 housing units. Of those, 65.3% (1,059) were owner occupied, 34.7% (562) were renter occupied, and 9.9% were vacant. Nearly 57% of the city's housing stock was built prior to 1980 before stronger seismic building codes were put into place. Other housing characteristics for Warrenton are provided in Tables 6 and 7.

Table 6. Housing Type, City of Warrenton, 2000

Housing Type	Percentage
Single-Family	65.7%
Multi-Family	20.5%
Mobile home	13.8%
Boat, RV, van, etc.	0.0%

Source: US Census, 2000

Table 7. Housing Structure Age, City of Warrenton, 2000

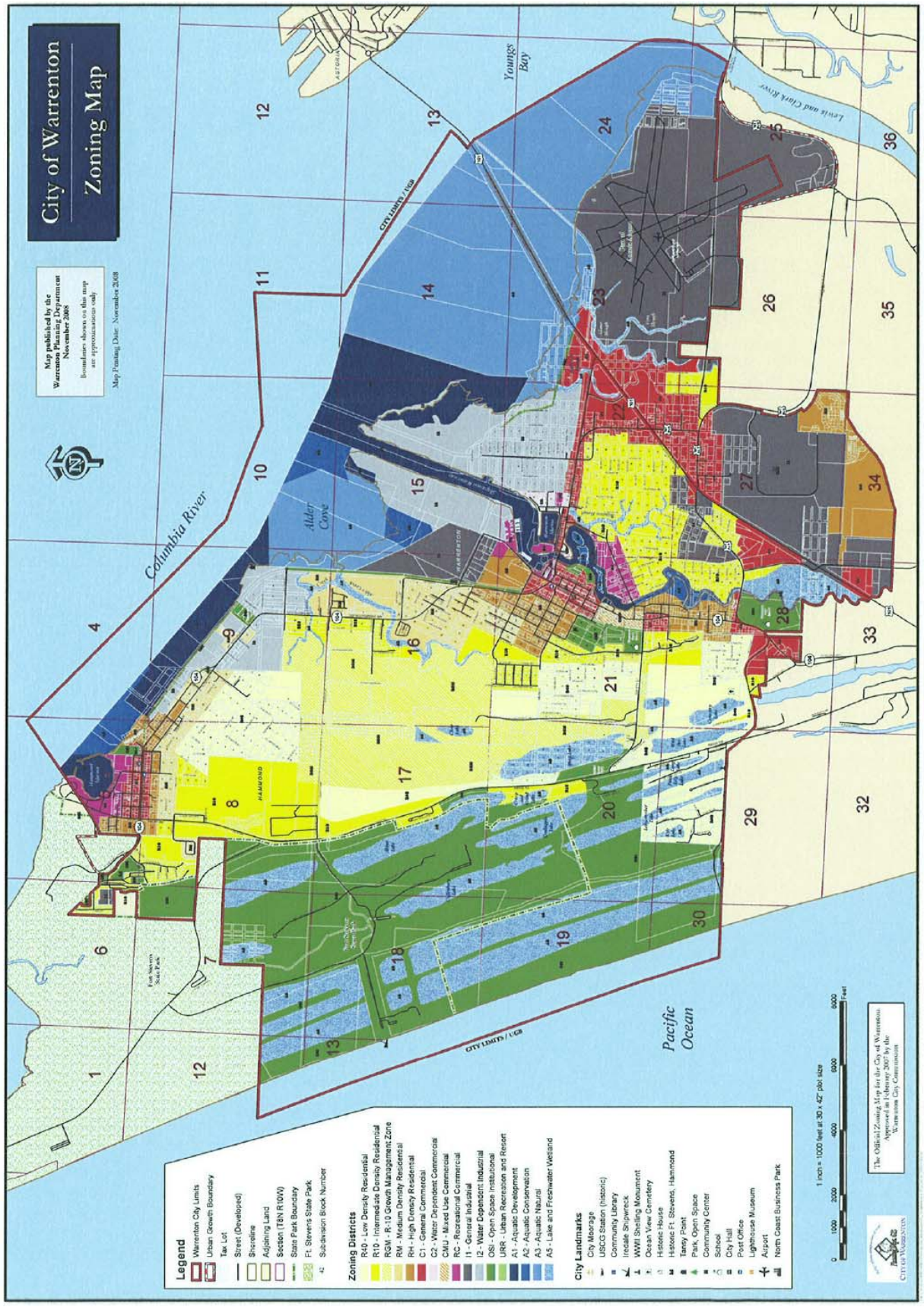
Year Built	Percent of Structures
1980-2000	43.3%
1960-1980	31.4%
Before 1960	25.4%

Source: US Census, 2000

Land Use & Development

Commercial development in Warrenton is located on East Harbor Drive, Highway 101 and the downtown area on Main Avenue. Industrial areas are located in the North Industrial Park near the Astoria-Warrenton Regional Airport; east of Highway 101 and south of Highway 101 Business; and at the Weyerhaeuser plant located along the Skipanon River. Figure 3 shows the zoning of land in Warrenton.

Figure 3. Warrenton Zoning Map.



Recently the city has created an urban renewal district for future development which extends approximately from Skipanon Drive to the north, the city's limits to the south, Alder Avenue to the west, and Heron Avenue to the east. The urban renewal district encompasses 928 acres including existing public right-of-ways and waterways.[6]

In 2007, Cogan Owens Cogan conducted a buildable lands inventory for Warrenton. This report stated that there are approximately 949 acres of buildable land within the Urban Growth Boundary. More than 467 acres of this land is zoned for business development. Of this, 288 acres are zoned for industrial uses and approximately 157 acres are allocated for commercial lands. The city has 481 acres of land available for various residential densities.[7]

Transportation & Commuting Patterns

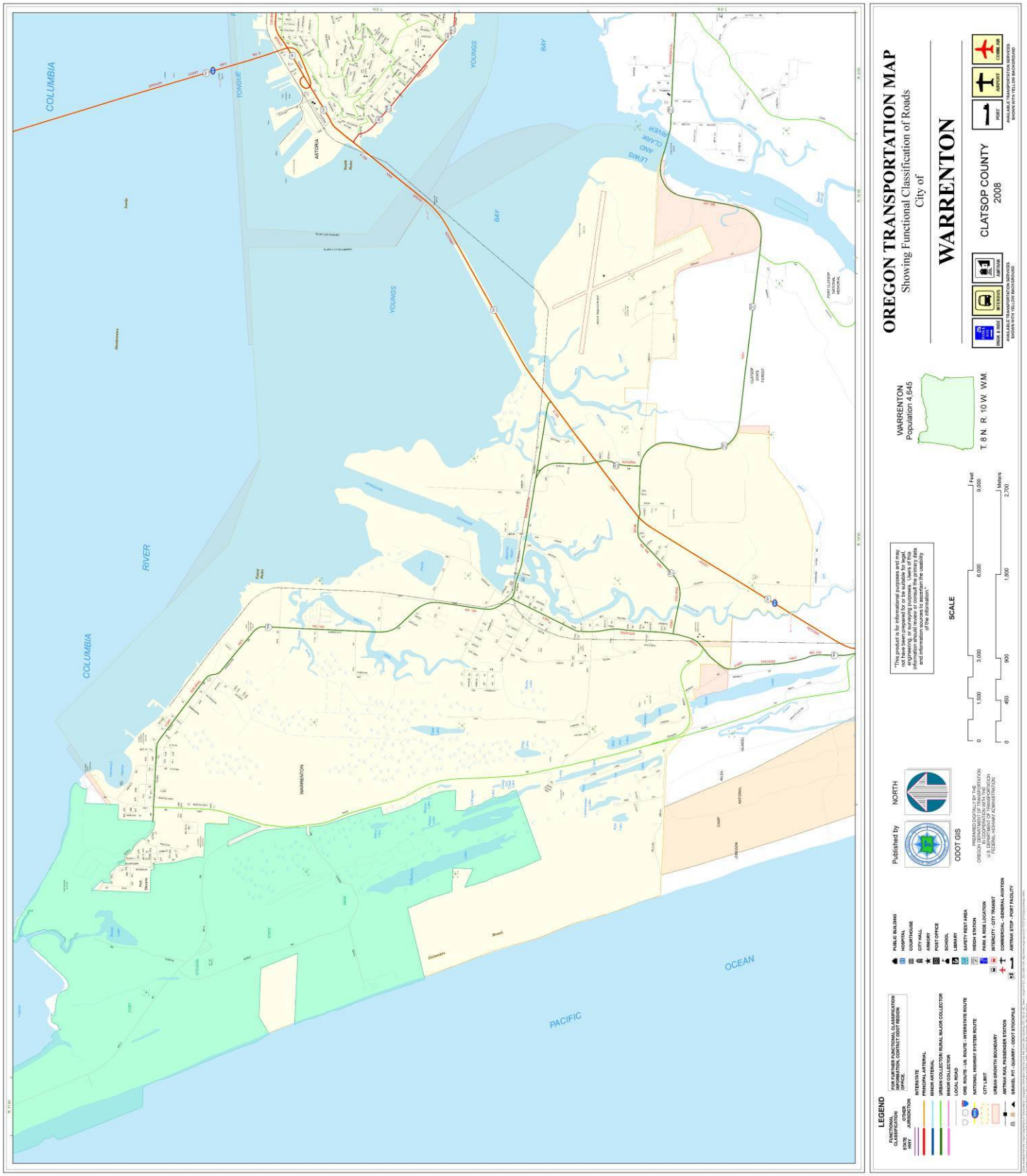
Warrenton is connected to US 101 by secondary roads: East Harbor Drive running east to west and South Main Avenue running north and south. US Highway 101 connects Warrenton with Seaside to the south and Astoria to the north (see Figure 4 Warrenton Transportation Map).

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. According to the 2000 US Census, over 75% of Warrenton's employed population drove to work alone.

[6] Warrenton Urban Renewal District Plan Part 1 of 2, p. 10

[7] Buildable Lands Inventory, pp.8-9.

Figure 4. Warrenton Transportation Map.



Critical Facilities & Infrastructure

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

There is one public elementary school and one public high school in the Warrenton-Hammond School District 30 school system. One private school, Coryell's Crossing, is located on Marlin Avenue.

Warrenton has two fire stations with two paid staff and approximately 30 volunteers. Additionally, the city has one police station that is located in City Hall. The nearest hospital is Columbia Memorial Hospital in Astoria. Medix Ambulance, located on SE Dolphin Avenue, serves the North Coast. The water treatment plant is located at 88650 Lewis and Clark Road in Clatsop County. The wastewater treatment plant is located at 105 NE 5th Street in Warrenton.

The New Young's Bay Bridge connects Warrenton to the communities of Astoria, Jewell, Olney and Clatsop County as well as the route to Highway 30.

The northern portion of Warrenton is home to three marinas, which are the city-run Hammond Marina and Warrenton Mooring Basin, and the privately run Skipanon Marina.

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 National Register of Historic Places lists the Daniel Knight Warren House as an historic site. Other historic structures include the Munson House, the Peace House, the Coast Guard Lifesaving Station, and the Hammond Town Hall. Fort Stevens State Park, located northwest of Warrenton is a historic military fort that was in use from the Civil War until the Second World War. The fort contains several historic military sites and draws approximately one million visitors a year. One significant historic site is Battery Russell Park which is surrounded by historic residences including the Officers Bed and Breakfast. Fort Stevens State Park also contains a stretch of beach where the wreck of the Peter Iredale, which ran aground in 1906, is located.

Governmental Structure

The Warrenton City Commission is the policy making body for Warrenton. The city commissioners are elected at large. The mayor is appointed by the Commission

each January and serves a one year term. The Commission appoints the city manager and the city manager hires all other city employees.

Under the general direction of the Warrenton City Commission, the city manager directs and coordinates the activities of all the city's departments and implements policy as established by the City Commission. The city manager is the administrative head of Warrenton who meets with representatives of other cities, Clatsop County, and other governmental agencies on issues involved with the coordination of city services and agreements with other governmental units. Warrenton currently has the following departments:

Administration

The city recorder/assistant to the city manager serves as the city's official records custodian, clerk of the City Commission, and assistant election officer. Additionally, the city recorder provides website maintenance. The city recorder coordinates with other city departments in the preparation of contracts, leases, deeds, easements, ordinances, and resolutions, and ensures compliance with laws governing public meetings, records, contracts, and elections.

Finance Department

The Finance Department maintains the financial records of the city's activities and prepares the annual budget.

Planning/Building Department

The Planning and Building Department consist of two divisions: (1) Planning Division, which is responsible for all long-range planning, current land use implementation, and economic development; and (2) Building division, which reviews construction plans and issues all permits for construction, plumbing, and mechanical.

Fire Department

The Fire Department provides the following services: wildland fire suppression, basic and intermediate life support, fire prevention, emergency medical services, hazardous materials response, rescue, and public fire prevention and education, fire investigations, and training. The intermediate life support includes the ability to administer intravenous therapy, cardiac monitoring, cardiac medications, respiratory or bronchodilator, and to insert PEAD airways.

Municipal Court

The Warrenton Municipal Court processes traffic violations, misdemeanor crimes, and violations of city ordinances. Other crimes are handled by the District Court in Astoria. Typically court is held twice each month. The staff includes a half-time clerk and a judge.

Police Department

The Warrenton Police Department has six patrol officers, one sergeant and the chief of police. One officer is funded entirely by a local option levy that expires in the fiscal year ending June 30, 2009. Support staff consists of one half-time

secretary. On average, there are five reserve officers who serve in a variety of support functions.

Public Works

The Public Works Department maintains and operates the water distribution system, the water treatment plant, the sewer treatment plant, and the city's storm water system. In addition, the department maintains, repairs, and replaces all the tide gates in the city. Public Works also takes care of the city's parks and other public facilities, and Public Works' Sanitation Division picks up the city's refuse. Warrenton contracts its recycling program with Western Oregon Waste. Finally, the department reviews water and sewer plans for private development, maintains an operating budget, and completes minor street repairs.

Existing Plans & Policies

Communities throughout Oregon have plans and policies that guide and influence land use, development, infrastructure, and population growth. Such existing plans and policies can include comprehensive plans, zoning ordinances, and technical reports or studies. These plans have been developed with the participation of local residents, businesses and policy makers. Many land use, comprehensive, and strategic plans get updated regularly, and can easily adapt to changing conditions and needs.

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

The following are the existing plans and policies for the city of Warrenton:

- 2007 Oregon Structural Specialty Code, based on the 2006 International Building Code
- 2008 Oregon Residential Specialty Code, based on the 2006 International Residential Code.
- Warrenton Buildable Lands Inventory, Cogan Owens Cogan, Adopted Sept. 25, 2007
- Warrenton Fire Department Evaluation, Jan. 2007 by Emergency Services Consulting Inc.
- Hammond Marina Master Plan, adopted 2009

- Warrenton Comprehensive Plan, October 2008

  Section 4.320 Flood Hazards-Flood conditions shall be reduced by requiring buildings in flood hazard areas to be properly elevated or flood proof. The city will work to maintain and improve the system of dikes to help prevent flooding in Warrenton, including possible construction of new pump stations and more efficient tidegates.

- Warrenton Development Code, October 2008

  Chapter 2.17-Flood Hazard Overlay-This chapter contains standards for residential and non-residential construction; description of required construction materials and methods; requirements for subdivisions, manufactured homes, and utilities.

- Warrenton Stormwater Master Plan, HLB/Otak, October 2009.

  This document describes the city's watersheds and methodology for developing the stormwater management plan. The Stormwater Master Plan includes recommendations for existing facility maintenance, repairs and replacements, and a Capital Improvement Plan. The stormwater management strategy focuses on conveyance and flooding issues.

- Warrenton Transportation System Plan, Prepared by CH2M Hill and Angelo Eaton, February 2004.

- Wastewater Master Plan, HLB & Associates, Inc. & H.R. Engineering, adopted 2009.

Community Organizations and Programs

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

The Countywide Community Organizations and Programs table can be found in Appendix F of the Clatsop County Natural Hazards Mitigation Plan. The table highlights organizations that are active within the county and may be potential partners for implementing mitigation actions.

Existing Mitigation Activities

Existing mitigation activities include current mitigation programs and activities that are being implemented by the community in an effort to reduce the

community's overall risk to natural hazards. Documenting these efforts can assist participating jurisdictions to better understand the risks and can assist in documenting successes.

Coastal Erosion

- The South Jetty at the mouth of the Columbia River is eroding and is gradually being repaired. This repair will continue for several more years before completion.
- Along the Columbia River, most of the zoning is Aquatic, and consists of three zones: A-1, A-2, A-3. The aquatic zones help to regulate land uses that contribute to, or are affected by, coastal erosion. Aquatic Development (A-1) Zone provides for navigation and water-dependent uses. Aquatic Conservation Zone (A-2) conserves designated areas for long-term uses of renewable resources that do not require major alterations of the estuary, except for the purpose of restoration. Aquatic Natural Zone (A-3) assures protection of significant fish and wildlife habitats.

Earthquake

- Buildings are constructed to current seismic standards as defined by the International Building Code. In addition, a brochure on Tsunami evacuation includes information on what to do when an earthquake occurs. This brochure is available to citizens of Warrenton and can be found in the Fire Department and the Planning and Building Department. Warrenton S.T.E.P. (Storm, Tsunami, Earthquake Preparedness) has distributed these brochures as part of an emergency disaster packet to approximately 1,200 houses.
- The New Northwest Broadcasters (NNB) Radio Station has been built to current seismic standards.

Flood

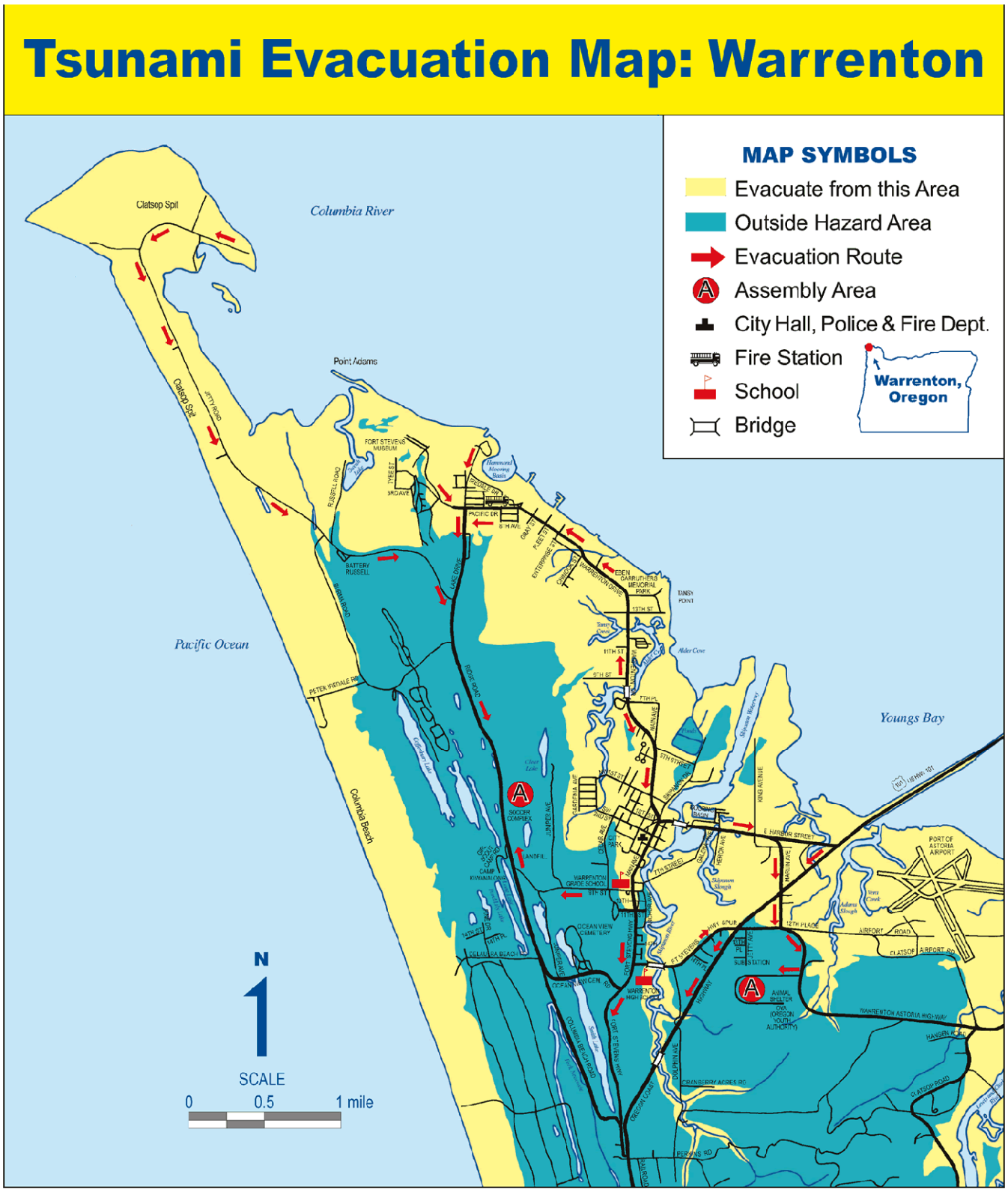
- The city of Warrenton is a member of the National Flood Insurance Program. All properties located in a flood zone are required to build to flood zone standards and to submit pre-elevation and post-elevation certificates from a certified surveyor or engineer.
- If a basement is proposed for a development in Warrenton, the construction plans must be engineered or designed to accommodate periodic high water table flooding conditions.
- A levee system with culverts and tidegates protects the city from flood waters and is maintained by the Public Works Department.
- A Wetland Ordinance has been adopted that protects wetlands and riparian corridors. This enhances the city's ability to naturally mitigate floods.
- In the early 1960s, the 8th Street Dam was built across the Skipanon River to alleviate flooding upstream during high tide.
- In the early 1970s, two pump stations were built in downtown Warrenton to facilitate drainage during high tides in the Skipanon and Columbia Rivers.

- Removal or fill of 50 cubic yards in waters of the state requires a permit from the Department of State Lands and the Army Corps of Engineers.
- The city repaired West Hammond Marina tidegate in 2009.

Tsunami

- A Tsunami Evacuation brochure (see Figure 5 below) with a map and an explanation on "what to know and what to do" has been developed by the Oregon Department of Geology and Mineral Industries (DOGAMI), the city of Warrenton, the State of Oregon and Clatsop County. It represents a worst-case scenario for a tsunami caused by an undersea earthquake. This brochure is available to citizens of Warrenton at the Fire Department and the Planning and Building Department. Warrenton S.T.E.P. distributed this brochure as part of an emergency disaster packet to approximately 1,200 houses.

Figure 5. Warrenton Tsunami Evacuation Map.



Wildfire

- The city of Warrenton is a participant in the Community Wildfire Protection Plan. This committee has met on February 25 and March 31, 2008.

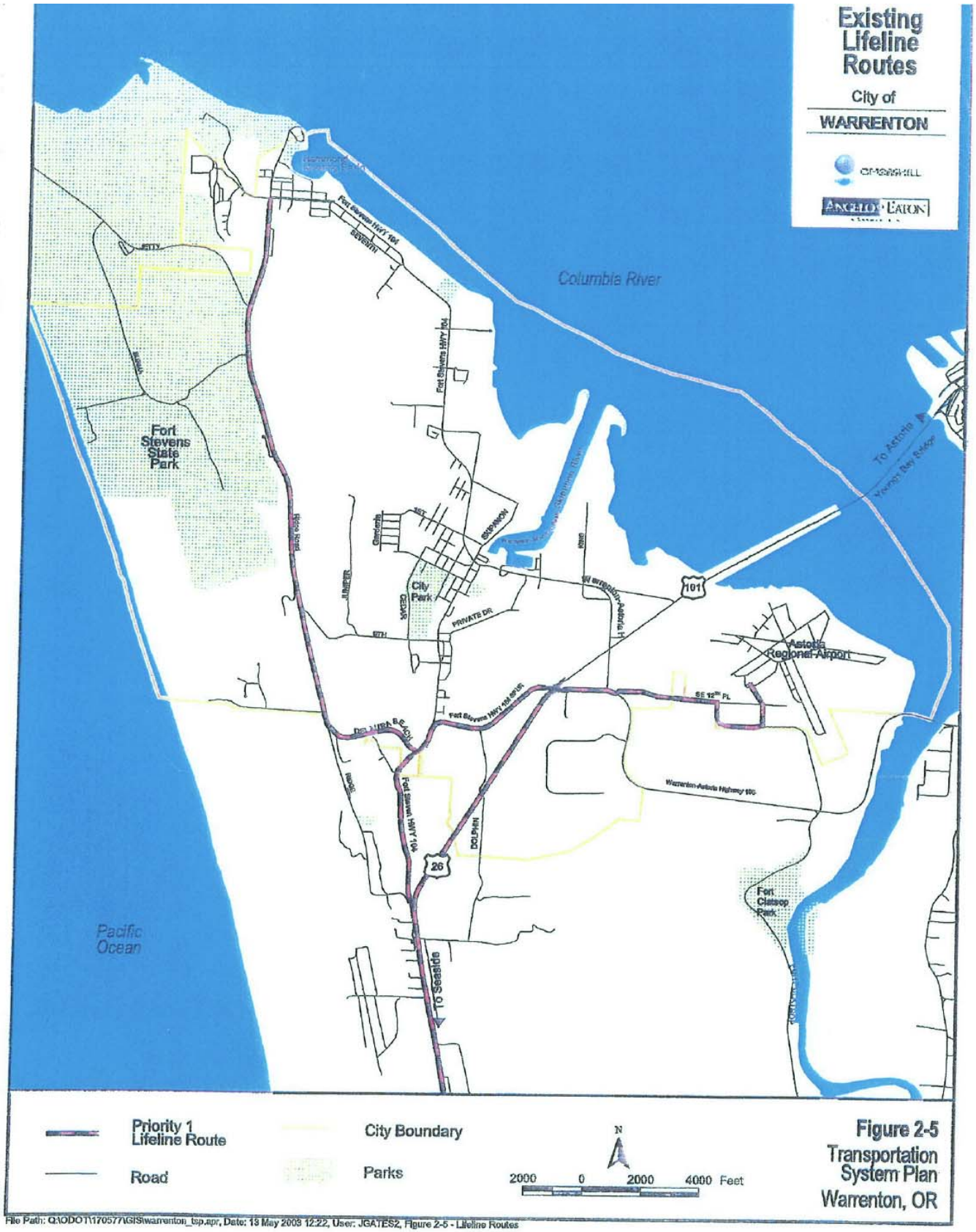
Windstorm

- The Warrenton Development Code requires subdivisions to build utilities underground.
- Qwest has moved lines to prevent the failure of communications that occurred during the Great Coastal Gale in December 2007.
- If there is a power outage and communications are lost, the waste water treatment plant has a generator and radios.
- The city has a generator to run the police and fire operations, and a portion of City Hall.
- The Public Works Department has three 50 kilowatt generators for operating the sewer pump stations during an outage.
- Trees have been cut to ensure that the water treatment plant does not sustain damage in severe windstorms and that access to the treatment plant is unimpeded.

Multi-Hazard

- The city of Warrenton has adopted the International Code Council for building codes requirements for wind, flood, earthquake, and snow.
- A Red Cross trailer with supplies is located in the public works yard.
- Warrenton has established a volunteer citizen's emergency preparedness committee.
- Warrenton contracted with the Oregon Emergency-Preparedness Outreach and hired an Outreach Coordinator.
- Warrenton launched a pilot program to help citizens become prepared for storms, tsunamis, and earthquakes (Warrenton S.T.E.P.).
- Life line routes are designated for emergency responses in the first 72 hours after an incident (see Figure 6). Warrenton's lifeline routes are:
  - US 101 south of Fort Stevens Highway 104 Spur
  - Ridge Road between Hammond and DeLaura Beach Lane
  - DeLaura Beach Lane between Ridge Road and Fort Stevens Highway 104
  - Fort Stevens Highway 104 between DeLaura Beach Lane and US 101
  - Fort Stevens Highway 104 Spur
  - SE 12th Place/Airport Road

Figure 6. Warrenton Existing Lifeline Routes.



Risk Assessment

This section expands on Clatsop County's Natural Hazards Mitigation Plan by addressing Warrenton's unique risks to the following natural hazards: coastal erosion, drought, earthquake, flood, landslide, tsunami, volcano, wildfire, and wind/winter storm. The information in this section was paired with information from the community profile during the planning process to identify issues and develop actions aimed at reducing overall risk.

The following hazard assessments describe each hazard's probability of future occurrence within Warrenton, as well as the city's overall vulnerability to each hazard. Probability and vulnerability estimates were determined based on the following definitions:

> **Probability** scores address the likelihood of a future major emergency or disaster within a specific period of time as follows:
>
> *High* = One incident likely within a 10-35 year period
> *Moderate* = One incident likely within a 35-75 year period
> *Low* = One incident likely within a 75-100 year period
>
> **Vulnerability** scores address the percentage of population or region assets likely to be affected by a major emergency or disaster, as follows:
>
> *High* = More than 10% affected
> *Moderate* = 1-10% affected
> *Low* = Less than 1% affected

Coastal Erosion

The Coastal Erosion Hazard Annex of the Clatsop County Natural Hazards Mitigation Plan adequately describes the causes, characteristics, and history of coastal erosion in Warrenton. Warrenton is surrounded by three bodies of water whose wave actions cause erosion along the shores. The Pacific Ocean is located west of the city, the Columbia River is to the north, and Youngs Bay is to the east. Coastal erosion is primarily located along the riverbanks of the Columbia River and along the shore of the Pacific Ocean. The extent of the hazard depends largely on the local geography and weather conditions. While erosion along coastal areas may be gradual over long periods of time, storms that produce large winter waves, heavy rainfall and/or high winds may also result in very rapid erosion or other damage that can affect properties and infrastructure within a matter of hours. In fact, Warrenton's coastal beach and sand dunes west of Ridge Road are the result of 4,000 years of erosion activity. Beach and dune shorelands in Warrenton are characterized by a series of sand ridges that parallel the Pacific Ocean's shoreline, and are separated by low-lying interdune areas. These shorelands were formed over thousands of years by Columbia River sediments, off-shore currents, and local winds. Until the 1930s, a significant portion of the shorelands consisted of wind-

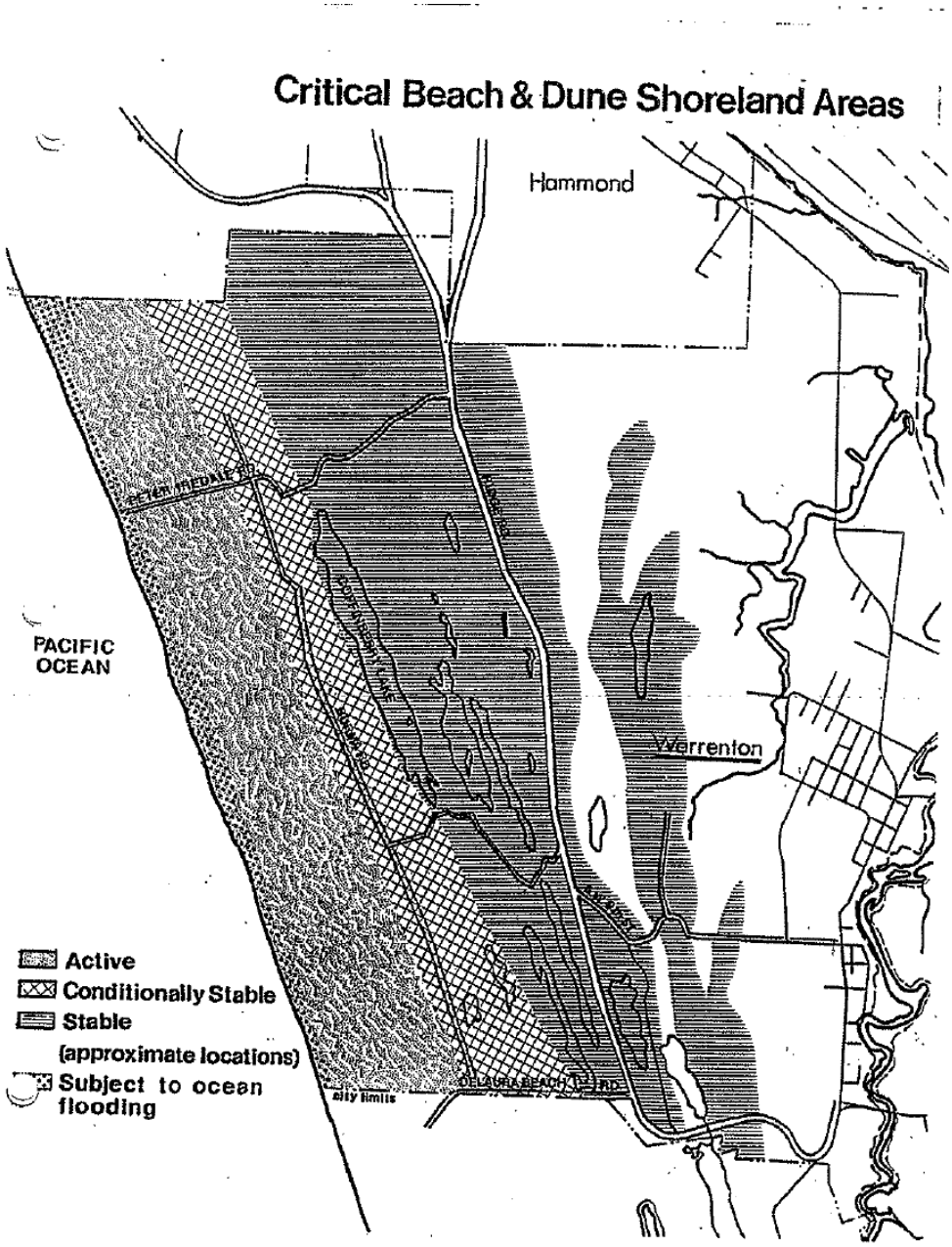
drifted sand. The dunes were then stabilized with fences and vegetation.[8] A map of the critical beach and dune shoreland areas is shown in Figure 7.

A number of natural and regulatory amenities protect Warrenton from coastal erosion. Fort Stevens State Park borders the Pacific Ocean northwest of the city and serves as a natural buffer from coastal erosion. The city of Warrenton also has a beach and dune overlay which extends from the Pacific Ocean low water line to the west of Warrenton Drive/Highway 104. The overlay regulates activities in beach, active dune, recently and older stabilized dune, and interdune areas. The intent is to protect the fragile nature of the landscape by ensuring that development is consistent with the natural capabilities of the beach and dune land forms.

The Clatsop County Mitigation Plan ranks the probability of coastal erosion, especially along sand pits, bluff coastline, and dune-backed beaches, as high. Given Warrenton's location along the Columbia River, the Pacific Ocean, and Young's Bay, Warrenton also has a high probability of experiencing coastal erosion. In addition, the Clatsop County Mitigation Plan ranks the county's vulnerability of coastal erosion as high. Warrenton's vulnerability to coastal erosion is high along the Columbia River. Developments along the river include the Desdemona Sands Subdivision, Pacific Seafood, Nygaard's Logging, Warrenton Fiber, Hammond Marina, Eben Carruthers Park, Waterfront Park, and a dike located along the Columbia River. For more information regarding the impacts of coastal erosion, please see the Coastal Erosion Annex to the Clatsop County Natural Hazards Mitigation Plan.

[8] Warrenton Comprehensive Plan, p. 121

Figure 7. Critical Beach and Dune Shoreland Areas.



From Comprehensive Plan October 2008

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Drought

The Clatsop County Natural Hazards Mitigation Plan adequately describes the causes and characteristics of droughts, as well as the location and extent of a potential drought event. Clatsop County has no record of a severe drought affecting the county, and the same is true for Warrenton. Drought is averted as a result of the area's high rainfall, especially during winter months. Clatsop County estimates a 'low' probability that drought will occur, meaning no more than one incident is likely within a 75-100 year period. Likewise, the county estimates a 'low' vulnerability to drought hazards, meaning less than 1% of the population or regional assets would be affected by a drought. Both estimates are true for Warrenton as well.

Potential drought-related community impacts are adequately described within Clatsop County Mitigation Plan's Drought Hazard Annex.

Earthquake

Clatsop County's Natural Hazards Mitigation Plan adequately describes the causes, characteristics, history, and location of earthquake hazards for the region. Warrenton's location along the Oregon coast makes it susceptible to earthquakes, especially a Cascadia Subduction Zone (CSZ) earthquake. The state has experienced seven CSZ events in the last 3,500 years – some of which were probably as large as magnitude (M)9. 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 1,000 years. The last CSZ event occurred approximately 300 years ago. Scientists estimate that there is a 10-20% probability that a subduction zone earthquake will occur within the next 50 years.[9] Based on this information, Clatsop County estimates a 'high' probability than an earthquake will occur in the future. This high probability estimate is true for Warrenton as well.

The extent of the earthquake hazard depends on a number of factors. These include: 1) the distance from the quake's source (or epicenter); 2) the ability of the soil and rock to conduct the quake's seismic energy; 3) the degree (i.e., angle) of slope materials; 4) the composition of slope materials; 5) the magnitude of the earthquake; and 6) the type of earthquake. Figures 8 to 11, developed by the Department of Geology and Mineral Industries (DOGAMI), further illustrate the extent and location of the earthquake hazard, and show the amplification, liquefaction, earthquake induced landslide, and relative earthquake hazards for Warrenton and Astoria.

[9] Geologic Hazards on the Oregon Coast. Oregon Department of Geology and Mineral Industries. http://www.oregongeology.com/sub/earthquakes/Coastal/OrGeoEqNTsu.htm

Figure 8. Relative Earthquake Amplification Map.

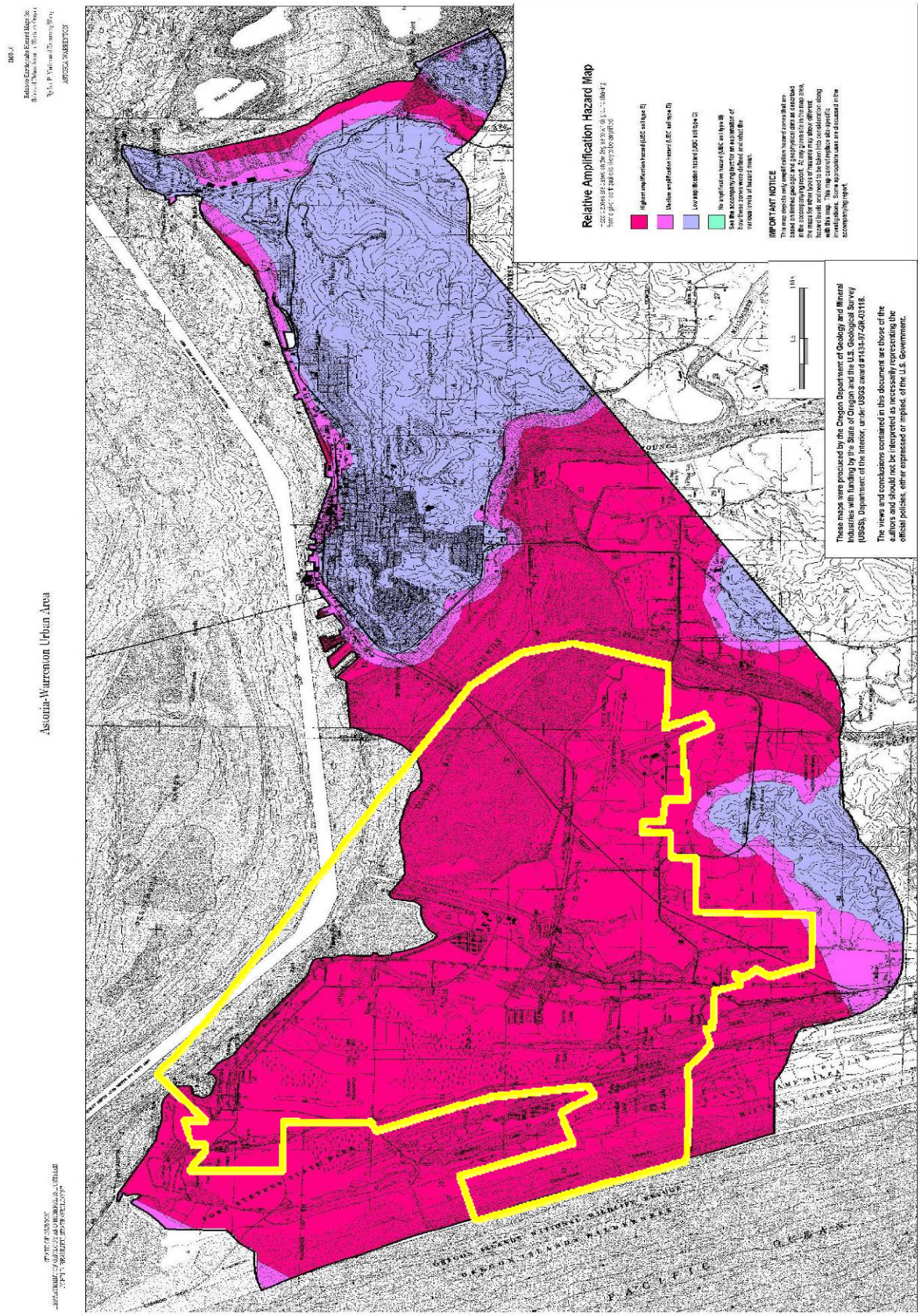


Figure 9. Relative Earthquake Liquefaction map.

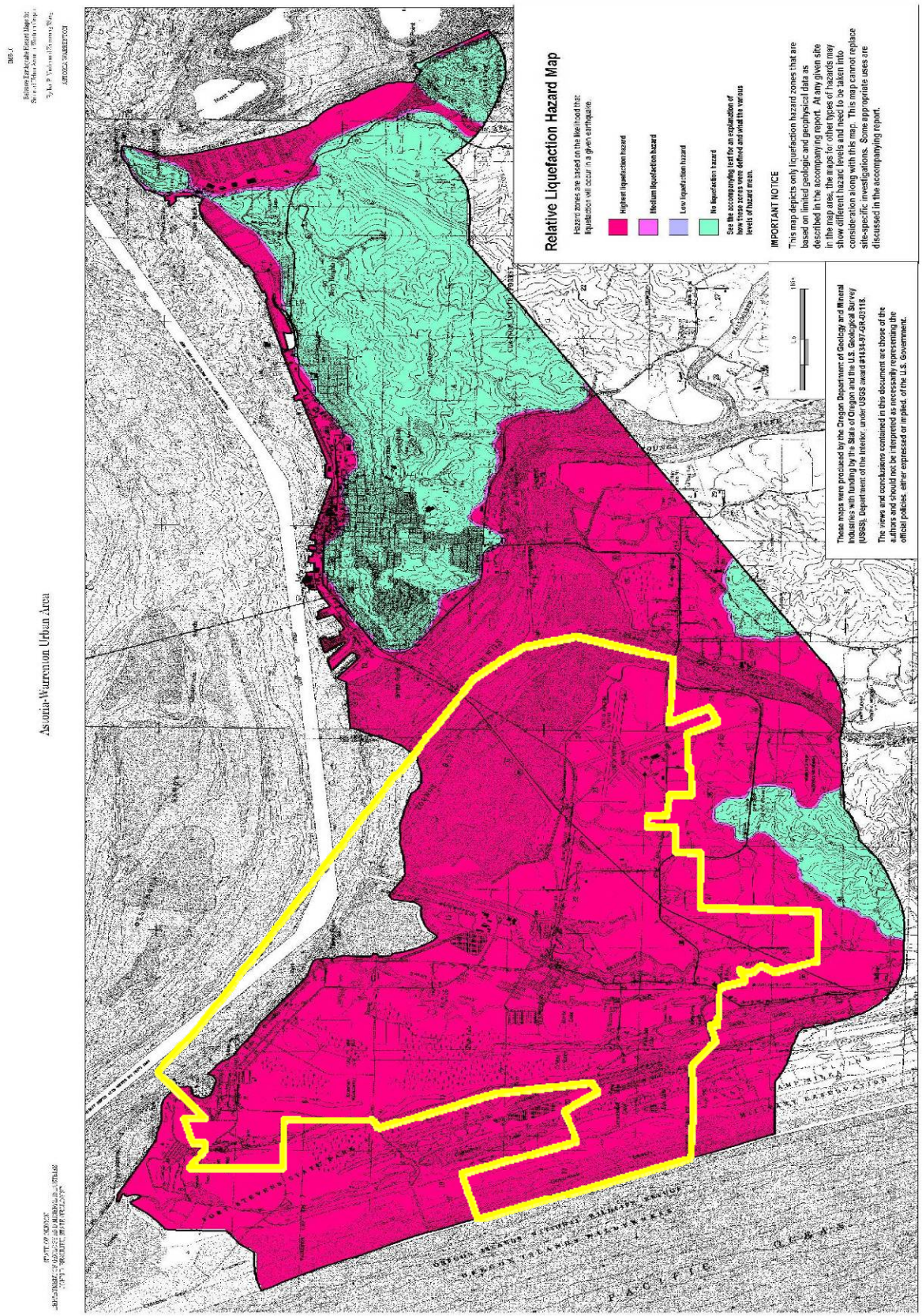


Figure 10. Relative Earthquake-Induced Landslide Hazard Map.

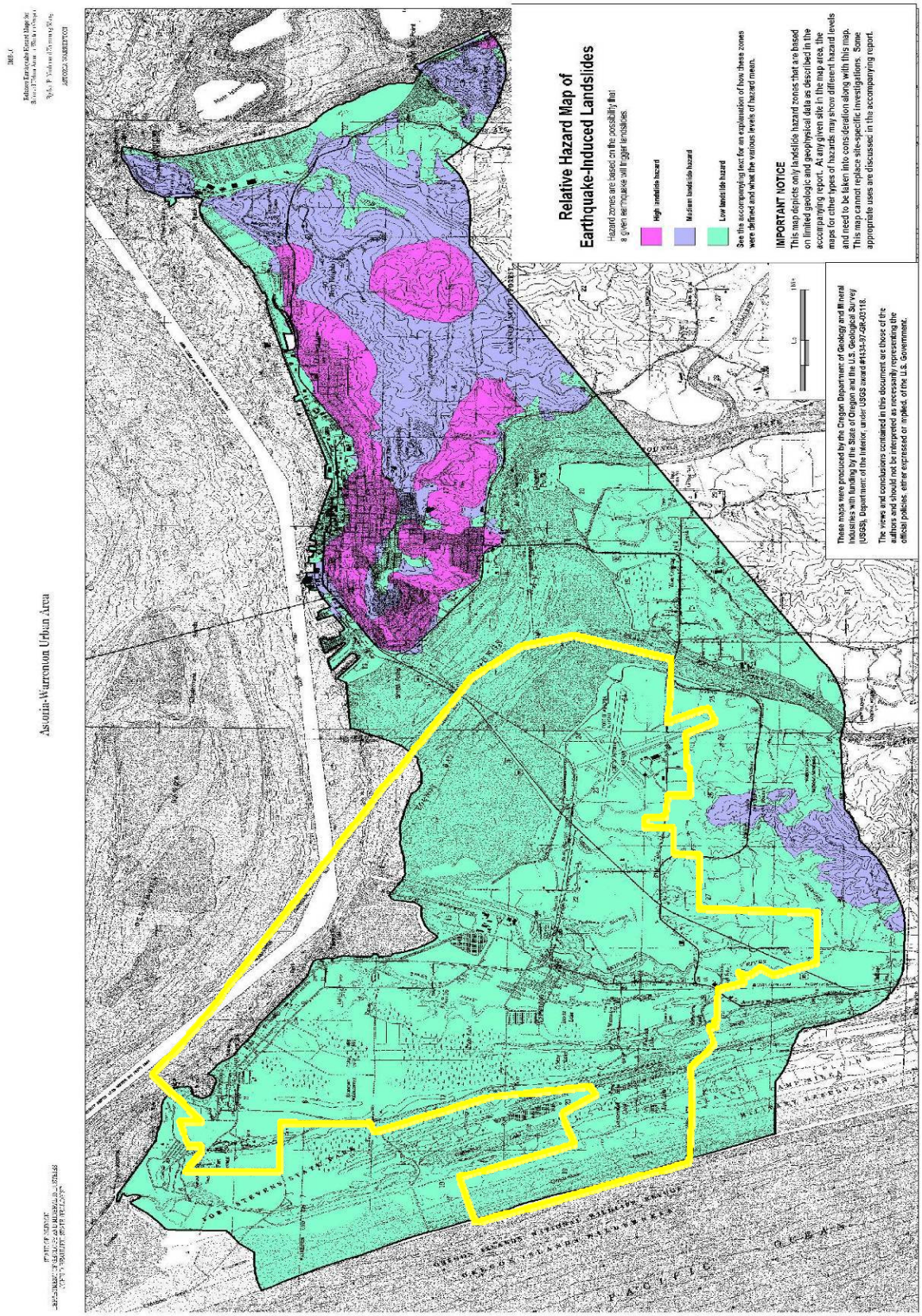
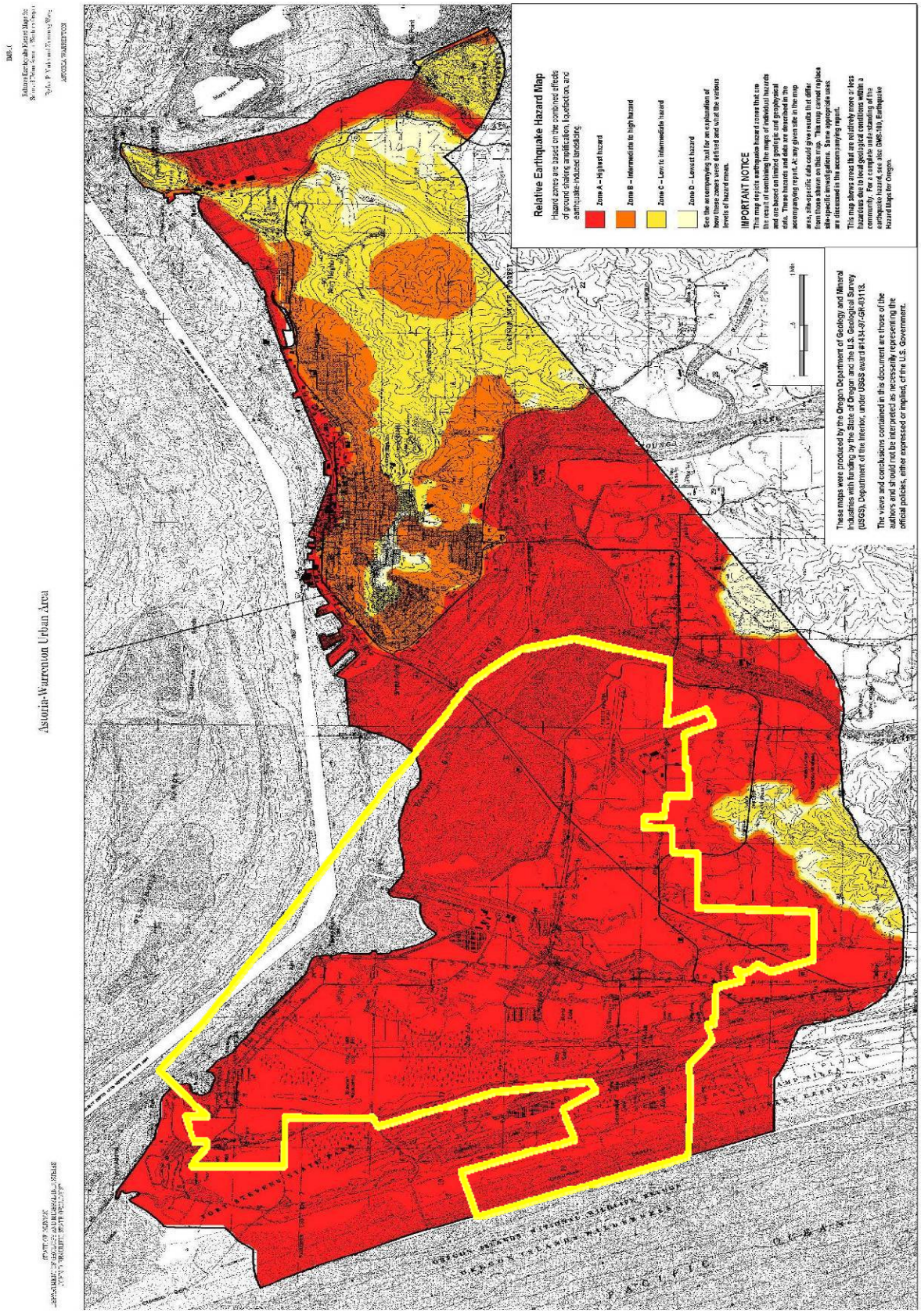


Figure 11. Relative Earthquake Hazard Map.



Clatsop County estimates a 'high' vulnerability to earthquake hazards, meaning more than 10% of the population or regional assets would be affected by a major emergency or disaster. As shown by the figures above, Warrenton has a very high risk of experiencing amplification and liquefaction. All of Warrenton's developed lands are located in Zone A—the highest hazard area for earthquakes. Additionally, as described in Table 7, about 57% of the city's housing stock was built prior to 1980, before stronger seismic building codes were put into place. The combination of these hazards makes Warrenton highly vulnerable to high magnitude earthquake events.

In 2007, DOGAMI completed a seismic needs assessment for public school buildings, acute inpatient care facilities, fire and police stations, sheriffs' offices, and other law enforcement agency buildings. Buildings were ranked for the "probability of collapse" due to the maximum possible earthquake for any given area. Within Warrenton, the Warrenton High School was given a 'high' collapse potential. No buildings in Warrenton were assigned the 'very high' rating.

The city's infrastructure is also highly vulnerable to a severe earthquake event which could have significant impacts within the city. The city is served by water through an 18 inch water main 8 miles to the south of Warrenton. Any disruption of this line could stop water flows and could lead to water contamination. In addition, if the dike along the waste water treatment plant is breached, sewage could be discharged into the Columbia River. Other vulnerable assets in Warrenton include sewer lines going to the sewage treatment plant, power lines, water tanks, and cell towers.

The city would also expect significant damage to roads and bridges following a Cascadia Subduction Zone event, as well as deaths and severe injuries region-wide. Earthquake damage to the New Young's Bay Bridge on Highway 101 would isolate the community from Astoria, and damage to the Skipanon Bridge and Alder Bridge could limit access to parts of Warrenton. Additional community impacts are described within the Clatsop County Mitigation Plan Earthquake Hazard Annex.

Flood

The Flood Annex of the Clatsop County Natural Hazards Mitigation Plan adequately describes the causes and characteristics of the flood hazard in Warrenton. Warrenton is at risk of flooding from two primary sources: riverine flooding and ocean flooding. Riverine flooding generally occurs during periods of heavy rainfall that cause the streams that drain areas south of Warrenton, such as the Skipanon River, Alder Creek, and the Lewis and Clark River, to overflow their banks. In addition, parts of the city are vulnerable to flooding from the Columbia River and Youngs Bay which define the north and eastern boundary of the city.

Ocean flooding results from exceptionally high tides or tsunamis. On some occasions, high tides and riverine flooding can combine to produce flooding in Warrenton. Warrenton is particularly vulnerable to high tides due to the city's flat terrain and low elevation. The Clatsop County Natural Hazards Mitigation Plan

adequately describes the history of flooding that has occurred in Clatsop County and in Warrenton.

The location of Warrenton's flood hazard is best described with the city's 100-year Flood Insurance Rate Maps (FIRMs), portions of which are shown below in Figures 12 to 17.

Figure 12. FIRM Downtown Warrenton North.

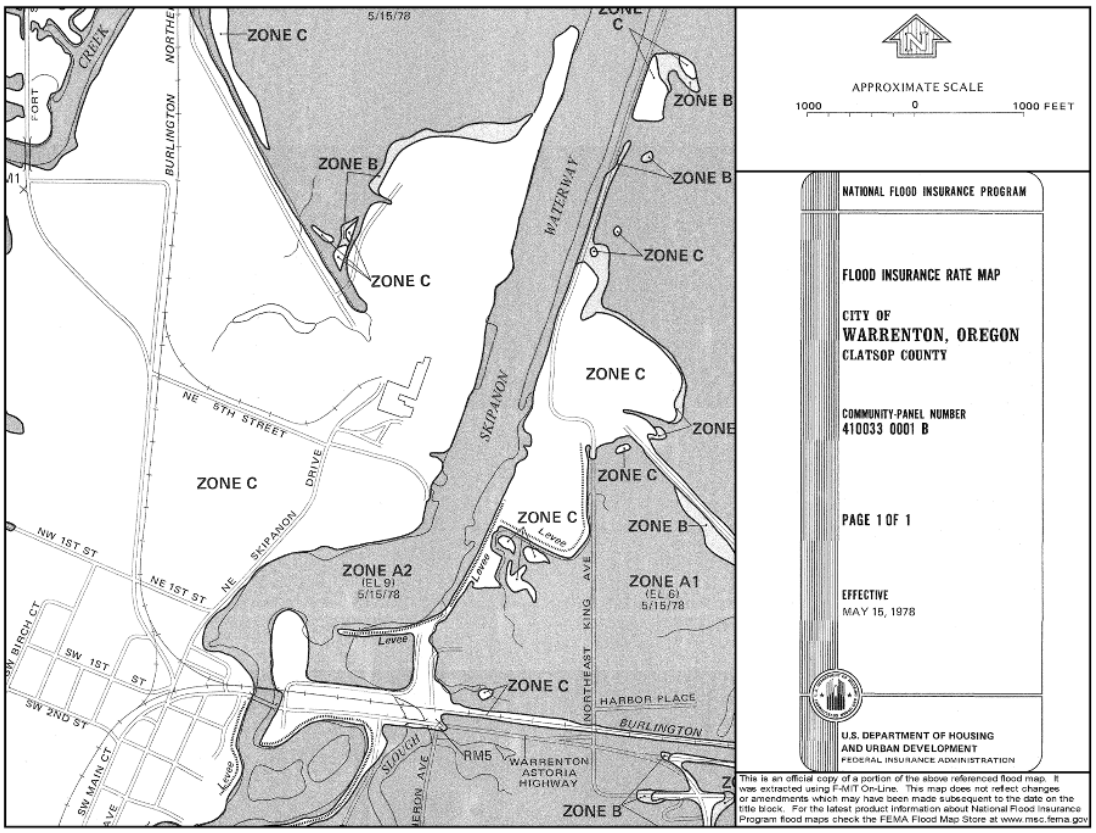


Figure 13. FIRM Downtown Warrenton South.

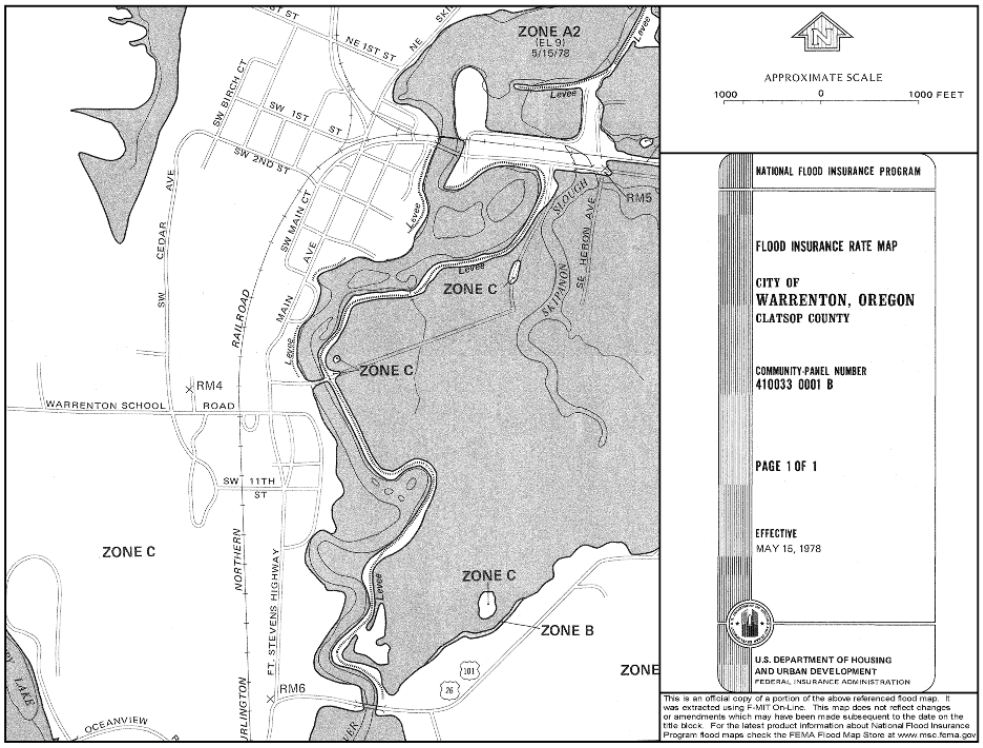


Figure 14. FIRM Warrenton east of Downtown.

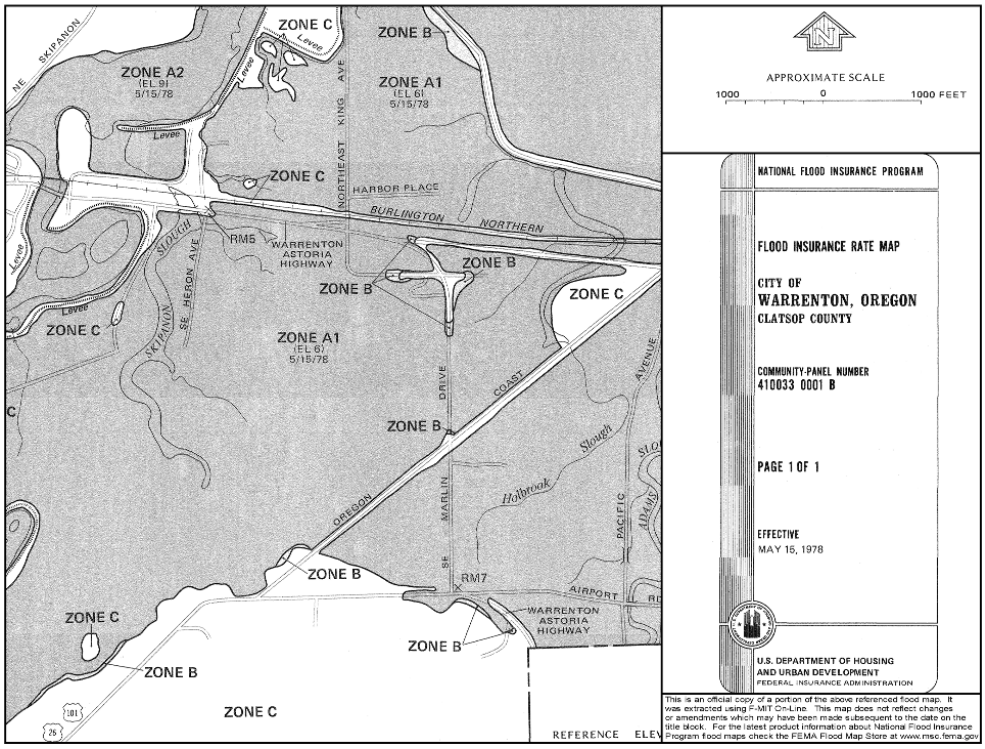


Figure 15. FIRM Warrenton-Astoria Airport

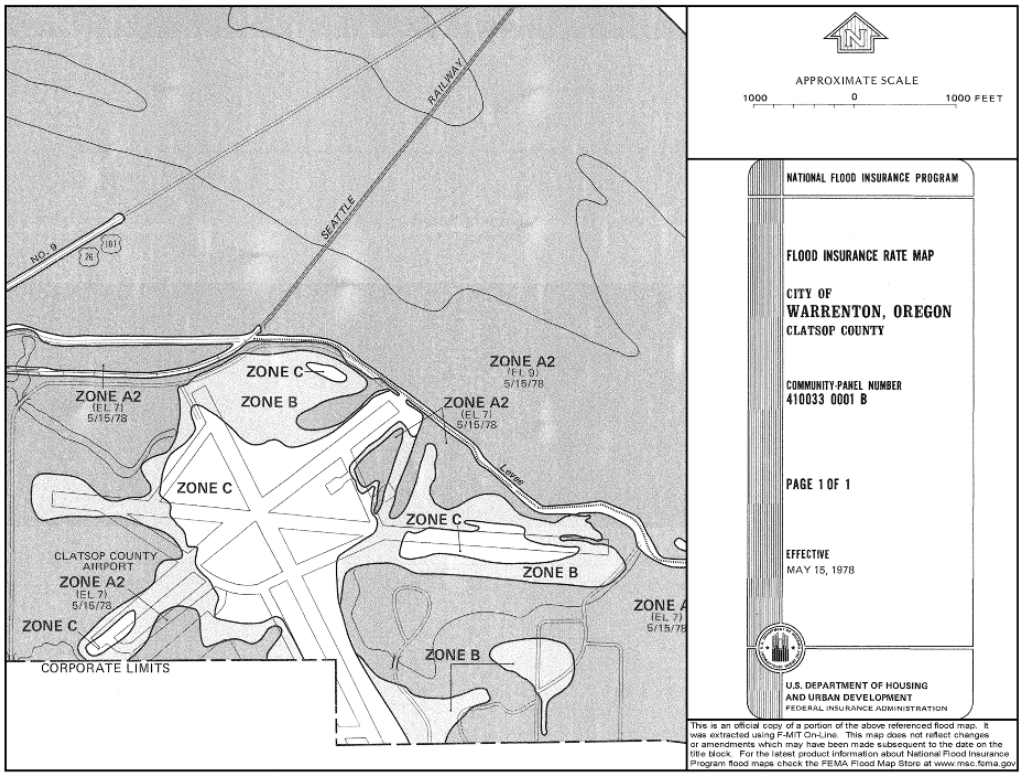


Figure 16. FIRM, Warrenton north of downtown.

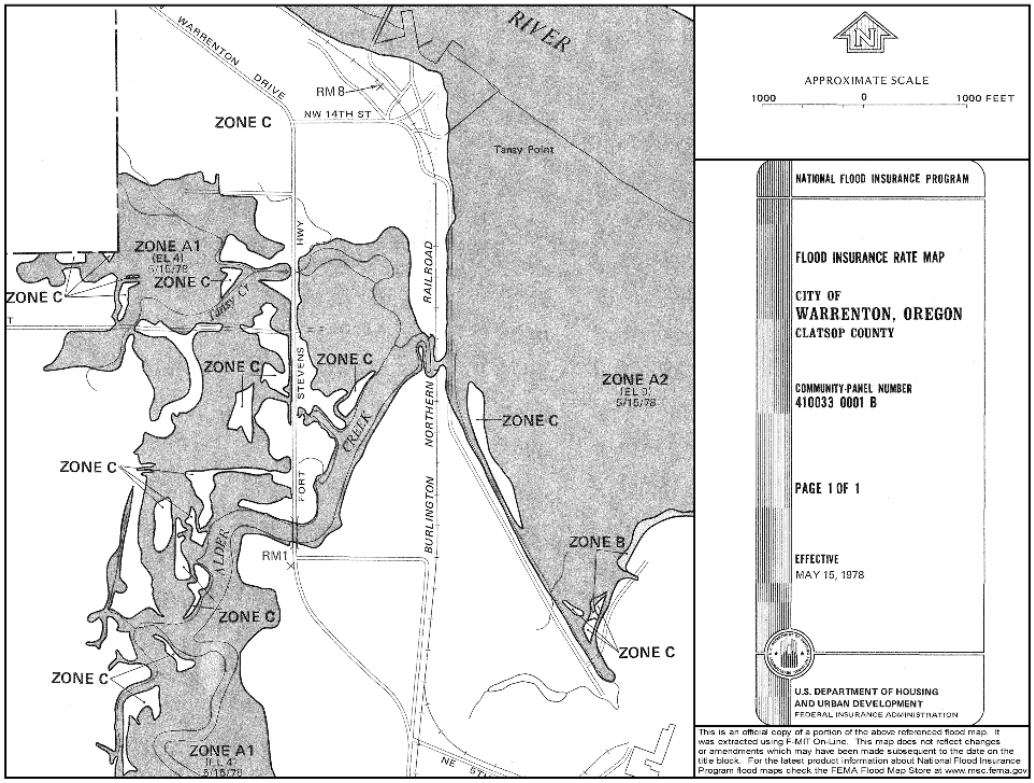
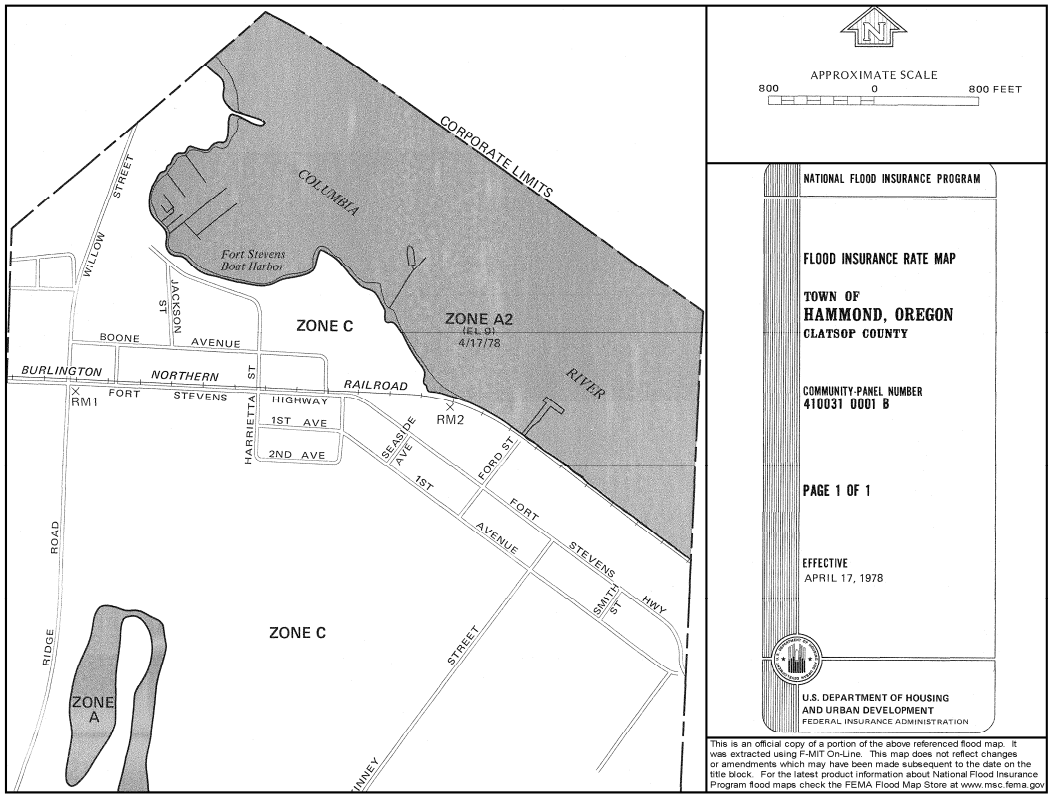


Figure 17. Hammond area.



Warrenton has been a participant in the National Flood Insurance Program (NFIP) since 1978. The FIRM maps for Warrenton are current as of May 15, 1978 and the Hammond area map is current as of April 17, 1978. Warrenton and Hammond have separate maps because in 1978 Hammond was a separate town. Hammond has since been incorporated into the city of Warrenton. FEMA is in the process of developing new FIRMs for Warrenton. However, the city has appealed the most recent FIRMs developed for the city because the protection provided by the dikes was not represented. The appeal process is currently ongoing.

As of April 30, 2009, there are a total of 177 national flood insurance policy holders in the city, with a total of $40,412,900 in coverage. In addition, there have been a total of three losses in Warrenton between 1978 and April 30, 2009. Two of those losses closed with a total payment of $11,478.15, and one loss closed without payment. There have been no repetitive flood losses within Warrenton. A total of 16 letter of map changes have occurred, and Warrenton's last Community Assistance Visit (CAV) occurred on April 25, 2000. Warrenton is not a participant in the Community Rating System (CRS).

As shown in the figures above, large portions of the city are in the 100-year floodplain (Zones A and B), but the majority of Warrenton's built environment is out of the floodplain (Zone C). This includes downtown Warrenton, the Hammond area, the Astoria-Warrenton Airport, and a new 690 unit subdivision, called Forest Rim, currently being built in the southeastern section of the city. These areas are

further protected by an 11 miles system of dikes. Built areas located in the flood zone are the Premarq Center, Walgreens shopping center on Highway 101, and businesses along Harbor Drive and Marlin Avenue. Access roads leading to the airport are also in the floodplain (Zone A2).

Warrenton is protected from floods by a flood control system comprised of dikes, ditches, storm pipes, pump stations, and culvert crossings with tidegates. Through passive conveyance or pump stations, this system is designed to move river and stormwater out of several sub-basins within the city, while also preventing flooding from the Columbia River during high tides. Major sub-basins within the city include the East Hammond and Enterprise Ditch sub-basins that drain almost 600 acres in the Hammond area; the west Hammond sub-basin which drains approximately 316 acres; and two downtown sub-basins which drain 94 acres and 186 acres each. Much of the city's conveyance system is comprised of open channel ditches that move water out of the city. Pump stations on NE 1st Street and SE 3rd/4th Street drain water out of the downtown area. Twenty-three tide gates located throughout the city regulate the flow of water, allowing storm and river water to flow out, while preventing water from high tides to enter. The majority of the city's tidegates are older structures made of cast iron and doors hinged at the top (see figure 18), while newer tidegates are concrete box culverts or corrugated metal pipes. This flood control system is maintained by the city, but regulated by the Army Corps of Engineers who review the dikes every year for the city.

Figure 18. Galena Road Tidegate

Source: Skipanon River Watershed Council.

The extent of the flooding hazard in Warrenton primarily depends on precipitation levels, tidal fluctuations, and the strength of the city's storm levee system. Heavy storms combined with high tides could lead to more flooding events in Warrenton especially if a portion of the levee system malfunctions.

The Clatsop County Natural Hazards Mitigation Plan ranks the probability of flooding in Clatsop County as high. However, Warrenton ranks the flooding hazard

as moderate because the levee system protects the city to a higher level than the rest of the county.

The Clatsop County Mitigation Plan ranks the vulnerability of flooding in the county as moderate, and this ranking applies to Warrenton as well. While Warrenton's levee system has never been breached, the culverts and tidegates included in the system are vulnerable to failure. If the levees are breached, Warrenton's flat topography and soils can facilitate widespread flooding in the city. In addition, if there is a power failure, the sewer pump stations may fail and sewage could be washed out from the wastewater treatment plant and cause contamination in the area. Warrenton's stormwater conveyance system also has little or no slope, resulting in ponding and localized flooding.

The Warrenton's Stormwater Management Plan identified several issues in its flood control system that makes it vulnerable to flooding (listed below). All of these issues are addressed in Warrenton's Stormwater Management Plan as separate action items.

- Many of the older cast iron tidegates have corroded and some doors are missing entirely, increasing the bi-directional flow of water which the tidegates were designed to prevent. A 1999 survey by the Skipanon River Watershed Council showed that 6 of the 23 tidegates were in need of repair.

- Maintenance of ditches owned by the city that are part of the water conveyance system is difficult because the city must obtain permits for each ditch from the Army Corps of Engineers. As a result, pipes and ditches are undersized and clogged with vegetation and debris; some pipes are sloped opposite to the direction of the flow, and key manholes and pipes are unable to drain because they are inundated with water during the fall, winter, and spring.

- The pump station on NE 1st Street is inoperable because the motor was moved to the SE 3rd/4th pump station in the mid-1990s. Much of the upstream system is full of water most of the year. An operable pump would increase outflow of the stormwater during high tide conditions and reduce backwater effects and flooding.

- The pump station on SE 3rd/4th Street is the only operable pump station in downtown and is the only method of draining stormwater from the downtown area during high tides. The station is vulnerable because if a storm event occurs, a power outage would make the station inoperable. This station was installed in 1975 and drains an area of 186 acres including most of downtown.

- The west Hammond sub-basin flood system is near capacity and is undersized to handle an increase in flows. The system needs larger

culverts and the ditches need to be cleaned and re-graded to increase the slope.

- In the East Hammond and Enterprise Ditch sub-basins, the Hammond Marina tidegate is corroded causing bi-directional flow. The Enterprise Ditch tidegate also suffers from frequent sedimentation. Many of the conveyance channels that drain to these tidegates are choked with vegetation and sediments prevent areas from draining properly. A single pump station could be constructed to benefit both sub-basins. As a result of these impediments, flooding occurs along Pacific Drive between King Salmon Street and Iredale Drive near the intersection of 7th Avenue and Hecta Avenue and along Pacific Drive in the vicinity of Chinook Street.

- The East Hammond sub-basin tidegate is corroded and needs replacing. The tidegate on the eastern side of the Hammond Marina drains approximately 147 acres that includes a portion of Hammond and some undeveloped areas west of Ridge Road. In 2007, the corroded culvert, 1,000 feet in length with at least one bend, was temporarily repaired, but it needs to be replaced to eliminate unwanted bi-directional flows during high tide.

Other flood issues identified by city staff include flooding on Alder Creek which, during heavy rains, can create an impasse on Warrenton Drive, one of the major roads in the city.

Finally, Warrenton's bridges provide critical links in the city's transportation system, and flooding of bridges can isolate areas in the city. New Young's Bay Bridge on Highway 101 is a major route for the north coast and is subject to flooding. Evacuation of people or deliveries of supplies will be limited if the New Young's Bay Bridge is not operational. Other bridges in Warrenton include the Skipanon Bridge and Alder Bridge. If either flooded this could preclude access of people and supplies as well.

Landslide

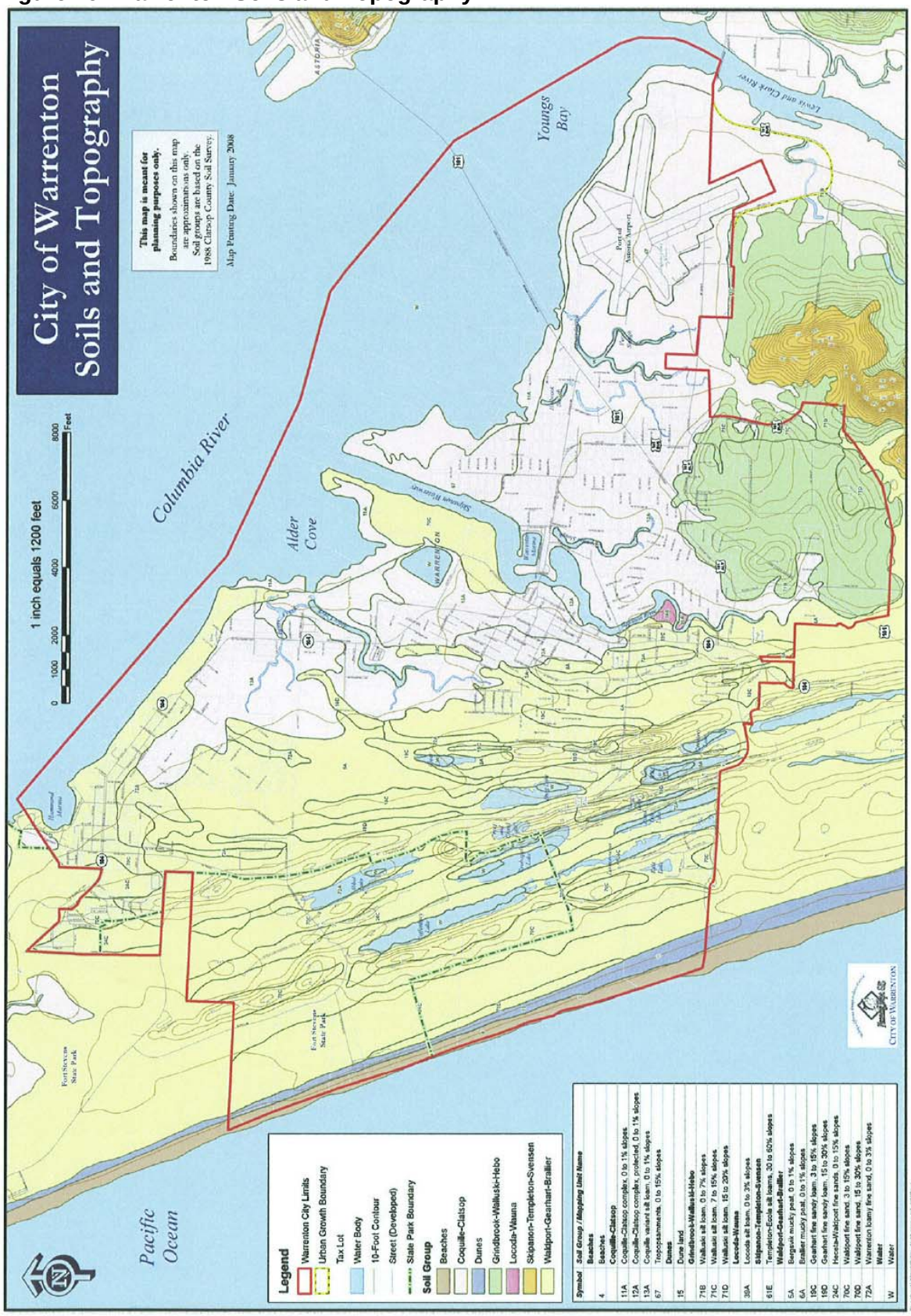
The Landslide Annex in the Clatsop County Natural Hazards Mitigation Plan adequately describes the causes and characteristics of the landslide hazard in Warrenton. The Landslide Annex also adequately describes the history of landslide events in the county, and no landslides have occurred in Warrenton.

Warrenton's topography is generally flat, with sand dunes being the highest topographical feature. As such, the city does not have any areas that are vulnerable to landslides. As shown in Figure 19, Warrenton's likelihood of experiencing an earthquake-induced landslide is none to very low. As such, the city does not consider the hazard to be a threat and therefore, the vulnerability and probability of landslides in Warrenton both rank as low. This is in contrast to

the county, which ranks the probability to landslides as high and the vulnerability as moderate.

While landslides are not a particular concern for Warrenton, there are landslide hazard areas in Clatsop County that can impact the city. During the December 2007 windstorm, a landslide in Woodson on the border of Clatsop and Columbia Counties blocked off Highway 30, one of two primary state highways in Clatsop County connecting the region with the Willamette Valley. In addition, areas along Highway 26 are vulnerable to landslides. Landslide events that block highway access to the Willamette Valley can disrupt the transport of goods and services to Warrenton and can impact the city's economy.

Figure 19. Warrenton Soils and Topography



Tsunami

The Tsunami Annex in the Clatsop County Natural Hazards Mitigation Plan adequately describes the causes and characteristics of the tsunami hazard along the Oregon coast. In most cases, tsunamis are induced hazards created by events occurring under the ocean. A tsunami, often incorrectly referred to as a "tidal wave," is a series of waves that can travel great distances from the earthquake's origin and can cause serious flooding and damage to coastal communities. Tsunamis can be generated from local or distant earthquake events. While tsunami events in Oregon are rare, past events have been destructive along the Oregon coast. The most recent event occurred in 1964 and caused widespread damage in Oregon coastal communities. The history of the tsunami hazard is further described in the Tsunami Annex of the Clatsop County Mitigation Plan.

In 1995, The Department of Geology and Mineral Industries (DOGAMI) conducted an analysis resulting in extensive mapping along the Oregon coast. The maps depict the expected inundation for tsunamis produced by a magnitude 8.8 to 8.9 undersea earthquake. The tsunami maps were produced to help implement Senate Bill 379 (SB 379), which was passed during the 1995 regular session of the Oregon Legislature. SB 379, implemented as Oregon Revised Statutes (ORS) 455.446 and 455.447, and Oregon Administrative Rules (OAR) 632-005, limit construction of new essential facilities and special occupancy structures in tsunami flooding zones. The general location of the tsunami hazard in Warrenton for a large earthquake event is shown in DOGAMI's tsunami inundation map in Figure 20 below.[10]

[10] Note: the tsunami inundation line presented here is a composite line based on an averaging of earthquake and tsunami scenarios using best available data. The line is not fixed nor should the reader assume it represents a worst case scenario; rather it is meant to show areas most vulnerable to the tsunami hazard.

Figure 20. Warrenton Tsunami Hazard Map.

As shown in Figure 20, a tsunami could reach Fort Stevens Park northwest of the city, downtown Warrenton, all of the Hammond area, and the Skipanon River. The extent of a tsunami event in Warrenton will depend on where the tsunami originated and the size of the earthquake that produced the tsunami.

The Tsunami Annex in the Clatsop County Natural Hazards Mitigation Plan ranks the probability of a tsunami event as moderate. This rating is accurate for Warrenton as well. 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 on the Oregon coast every 500 years, on average.[11]

The county estimates a 'high' vulnerability to tsunami hazards, which indicates that at least 10% of the county's population and regional assets are likely to be affected by a tsunami event. This rating appropriately describes Warrenton's vulnerability as well. A U.S. Geological Survey report written in 2007 found that Warrenton ranks as the third most vulnerable Oregon coastal city to tsunami hazards, behind Seaside and Gearhart.[12] Approximately 50% of Warrenton's developed land is within the mapped tsunami inundation zone, which includes 2,500 people (over 60% of Warrenton's population) and approximately 1,750 employees.[13] A large part of Fort Stevens Park, a popular tourist and camping destination that attracts over 900,000 visitors annually, is also in the tsunami inundation zone. Economic assets vulnerable to a tsunami include the Warrenton Fiber and Point Adams Packing Company located along the Columbia River, and Weyerhaeuser and the city's two shopping centers which are located along the Skipanon River and its sloughs. Finally important facilities such as the Warrenton Civic Center—which houses the City Hall, Police, and Fire Departments—the Public Works Department, and the Warrenton High School are located in the inundation zone as well. Additional potential tsunami-related impacts are adequately described in the Tsunami Hazard Annex in the Clatsop County Natural Hazards Mitigation Plan.

Volcano

The Clatsop County Natural Hazard Mitigation Plan adequately describes Warrenton's risk to volcanic events. Generally, an event that affects the county is likely to affect Warrenton as well. The causes and characteristics of a volcanic event are appropriately described within the Clatsop County Mitigation Plan, as well as the location and extent of potential hazards. Previous occurrences are well-documented within the Clatsop County Mitigation Plan, and the community impacts described by the county would generally be the same for Warrenton as well. Warrenton is very unlikely to experience anything more than a small amount of volcanic ash during a volcanic event. The county estimates a 'low' probability of future volcanic events and a 'low' vulnerability to future eruptions. The county's probability and vulnerability estimates are accurate of Warrenton's as well.

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

[12] Nathan Wood, Variations in City Exposure and Sensitivity to Tsunami Hazards in Oregon, USGS, Scientific Investigations Report 2007-5283.

[13] Ibid., 10, 13, 17.

Wildfire

The Wildfire Annex in the Clatsop County Natural Hazards Mitigation Plan adequately describes the causes**,** characteristics, and history of the wildfire hazard in Clatsop County and Warrenton. Warrenton has no recorded history of wildfire, and the county's recent wildfires are mostly related to debris burns. However, the potential for large wildfires does exist in Clatsop County as evidenced by a 1939 wildfire that burned 207,000 acres near Saddle Mountain. Clatsop County and its cities are currently developing a county-wide Community Wildfire Protection Plan (CWPP) which will become part of the Clatsop County Natural Hazards Mitigation Plan when it is completed. Warrenton is participating in this effort as well.

Clatsop County estimates a high probability that wildfires will occur in the future. Most wildfires can be linked to human carelessness. This rating is true for Warrenton as well.

Clatsop County estimates a moderate vulnerability to wildfire events, meaning 1-10% of the population or regional assets are likely to be affected by a major event. Damaging wildfires are most likely to occur in wildland-urban interface areas where wildland fuels are adjacent to urban or residential structures. While Warrenton is not identified as an interface community in the Clatsop County Natural Hazards Mitigation Plan, the Warrenton Fire Department considers Warrenton an interface community, and therefore considers Warrenton's vulnerability to wildfires as high. The wildland-urban interface boundaries are located in forested areas along Ridge Road, DeLaura Beach Road, the Skipanon River between Alternate 104 and Harbor Drive, and Alternate 101 along the Forest Rim Subdivision where 690 units are to be built in three phases. The natural mitigation factor is the maritime climate which reduces the rate at which vegetation dries during the summer months. The extent of the wildfire hazard largely depends on climatic conditions such as winds and precipitation, and the availability of fuels in the path of the wildfire. Potential wildfire-related impacts are adequately described in Clatsop County Mitigation Plan's Wildfire Hazard Annex.

Windstorm/Winter Storm

The Clatsop County Natural Hazards Mitigation Plan adequately describes the causes and characteristics of wind and winter storms, as well as the location and extent of wind and winter storm hazards. Coastal wind storms typically occur during winter months, and they are sometimes accompanied by ice, freezing rain, flooding, and very rarely, snow. Typically, however, the Oregon coast's winters are windy, cold, and wet.

The region's (and Warrenton's) history of events are adequately described within the Clatsop County Mitigation Plan as well. Notable events that occurred in

Warrenton include the December 1995 wind storm that incurred damages to the sewer lift station, pump motors, pilings and docks, and the city's water chlorination building. Debris accumulated behind dams and docks and pump motors had to be replaced.[14] In a December 2007 wind storm, trees blocked access to the Water Treatment Plant and power lines and phone lines were blown down. In December 2008, the city experienced 6 inches of snow at sea level and several days below freezing. This caused roads to become impassible, curtailing travel and delivery of food and other essential items.

The county estimates a high probability that wind and winter storms will occur in the future. Windstorms occur yearly, and the more destructive storms occur once or twice per decade. The county additionally estimates a high vulnerability to windstorms, meaning more than 10% of the population or regional assets would be affected by a major windstorm event. Both estimates are true for Warrenton as well. Potential wind/winter storm impacts are adequately described in the Wind and Winter Storm Annex of the Clatsop County Natural Hazards Mitigation Plan.

[14] Public Works File on FEMA 1995

Mission, Goals, and Action Items

The city of Warrenton adopts the mission and goals found in the Clatsop County Natural Hazards Mitigation Plan for the Warrenton Plan Addendum. In addition, the Warrenton 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.

Short and long-term action items identified through the planning process are an important part of the mitigation plan. Action items are detailed recommendations for activities that local departments, citizens and others could engage in to reduce risk.

Earthquake

1. Construct a $3.5 million gallon water tank to provide an emergency water supply.
2. Coordinate with the Warrenton-Hammond School District to seek funding to assess and seismically retrofit the Warrenton High School.

Flood

1. Coordinate with FEMA on issues surrounding recently proposed revisions to the Flood Insurance Rate Maps to account for flood protection provided by Warrenton's dikes.
2. Once issues related to Warrenton's Flood Insurance Rate Maps (FIRMs) have been resolved, review Warrenton's floodplain ordinance to ensure it meets current National Flood Insurance Program (NFIP) standards and reflects the new FIRMs.
3. Conduct a public outreach campaign with citizens of Warrenton to review any changes to FIRMs, increase knowledge of the local flood risk, and review any changes to Warrenton's floodplain ordinance.
4. Continue regular maintenance of dikes/levees and seek their certification.
5. Implement the Stormwater Management Plan action items relating to the flooding and stormwater issues in Warrenton.
6. Develop a plan if the bridges in Warrenton collapse.
7. Develop a plan to minimize possible flooding of Alder Creek.

Tsunami

1. Move City Hall which contains the Police, Fire, and Public Works Department out of the tsunami inundation zone.
2. Develop more tsunami evacuation routes.
3. Relocate the high school to higher ground out of the tsunami inundation zone.

Wildfire

1. Adopt the policies and programs in the Community Wildfire Protection Plan, once it is completed, into the Warrenton Comprehensive Plan.
2. Apply for wildfire grants to implement action items in the Community Wildfire Protection Plan, now being developed, as they pertain to the city of Warrenton.
3. Upgrade the size of water lines to improve firefighting capabilities.

Winter Storm/Wind Storm

1. Develop a plan for removal of trees.
2. Place existing utilities underground to avoid damage in wind/winter storm events.

Multi-Hazard

1. Develop educational outreach materials for all of Warrenton's natural hazards.
2. Establish and furnish the Community Center as an emergency shelter and develop a list of additional community shelters such as churches or schools.
3. Create a comprehensive emergency response plan.
4. Establish a list of vulnerable persons that need to be monitored during and after a disaster to ensure their safety.
5. Identify areas/facilities to establish a temporary medical facility after a disaster occurs.
6. Establish a partnership with Sunset Empire Transportation to help people seek shelter, obtain supplies, or travel for other needs after a natural disaster.
7. Develop a public notification system.

8. Conduct an inventory of generators and fuel supplies for use in an emergency.

   Note: Warrenton does not believe that implementing landslide or volcano-related mitigation activities will be cost-effective at this time. As such, the city has not identified landslide or volcanic-related mitigation action items. Warrenton will partner with Clatsop County, however, on the implementation of mitigation strategies that benefit both jurisdictions.

See the full list of action item forms at the end of this plan for more detailed information regarding implementation.

Plan Implementation & Maintenance

The city will utilize the same prioritization and plan maintenance process as identified in the Clatsop County Multi-Jurisdictional Natural Hazards Mitigation Plan [See Section 4: Plan Implementation and Maintenance and Appendix D: Economic Analysis of Natural Hazard Mitigation Projects of the Clatsop County Mitigation Plan].

A representative from the Warrenton Planning Department will serve as the convener for the Warrenton's Natural Hazards Mitigation Plan Addendum. The convener will participate in all Clatsop County plan maintenance meetings which happen on a semi-annual basis as outlined in the Clatsop County Natural Hazards Mitigation Plan. In addition, the convener will be responsible for maintaining Warrenton's Addendum and convening a plan committee on an annual basis to identify new risk assessment information, review the status of mitigation actions, identify new actions, and seek funding to implement mitigation activities. Additionally, the city of Warrenton currently addresses statewide planning goals and legislative requirements through its Comprehensive Plan, Development Code, Transportation System Plan, and Wastewater Master Plan. To the extent possible, Warrenton will work to incorporate the recommended mitigation action items into these existing plans, programs and policies. Implementing the addendum's actions items through existing plans, programs and policies increases the likelihood that actions will be supported and implemented. Where possible, opportunities for cross-plan implementation are noted in the full action item worksheets below.

The city of Warrenton's Addendum will be updated every five years in conjunction with the Clatsop County Mitigation Plan's update schedule. Finally, Warrenton will coordinate continued public involvement activities with the activities listed in the Clatsop County Multi-Jurisdiction Natural Hazards Mitigation Plan.

Warrenton Action Items

Earthquake # 1

Proposed Action Item:	**Alignment with Plan Goals**
Construct a $3.5 million gallon water tank to provide an emergency water supply.	Protect Life Minimize Damage to public and private buildings and infrastructure Decrease disruption to critical services

Rationale for Proposed Action Item:

The city of Warrenton relies on an 18 inch water main 8 miles south of the city for its water supply. The water main is not seismically stable, and travels through soils that are vulnerable to earthquake liquefaction and amplification. As such, seismically retrofitting the water main may be difficult. Constructing a $3.5 million gallon water tank will provide another source of water in case the 18 inch water main 8 miles to the south of Warrenton is disrupted

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)]. Constructing a $3.5 million gallon water tank will provide Warrenton with a reliable water supply in the event of an earthquake and make the community more resilient to earthquake hazards.

Ideas for Implementation:

Incorporate construction of a water tank into Warrenton's Capital Improvements Plan.

Seek funding sources for constructing a water tank.

Combine construction of the water tank with seismic improvements to Warrenton's water main where possible.

Coordinating Organization:	Warrenton Public Works

Internal Partners:	**External Partners:**
Planning Department	Clatsop County, FEMA, OEM

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

Form Submitted by:	City of Warrenton
Action Item Status	New Action Item

Earthquake # 2

Proposed Action Item:	**Alignment with Plan Goals**
Coordinate with the Warrenton-Hammond School District to seek funding to assess and seismically retrofit the Warrenton High School.	Protect Life Minimize Damage to public and private buildings and infrastructure Decrease disruption to critical services

Rationale for Proposed Action Item:

In 2007, the Department of Geology and Mineral Industries (DOGAMI) conducted a seismic needs assessment for public school buildings, acute inpatient care facilities, fire stations, police stations, sheriffs' offices, and other law enforcement agency buildings.[15] Buildings were ranked for the "probability of collapse" due to the maximum possible earthquake for any given area. Within the city of Warrenton, the Warrenton High School received a high probability of collapse rating. Further assessing Warrenton's "probability of collapse" and conducting seismic retrofits will reduce the building's vulnerability by preventing damage to life and property.

The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that address new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Assessing the "probability of collapse" for Warrenton High School and seismically retrofitting it will reduce its vulnerability by preventing damage to life and property.

Ideas for Implementation:

Further assess those buildings rated at a "high" risk of collapse. Prioritize any actions that need to be taken to address any seismic concerns and coordinate with Warrenton-Hammond School District and OEM seismic grants coordinator to find appropriate funding sources.

Publicize and improve awareness of the earthquake risk using existing education and outreach efforts.

Use FEMA's procedures document for developing scopes of work for seismic structural and non-structural retrofit projects.

Coordinating Organization:	Warrenton-Hammond School District

Internal Partners:	**External Partners:**
Warrenton Building Inspector	Clatsop County, FEMA, OEM, DOGAMI

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

Form Submitted by:	City of Warrenton
Action Item Status	New Action Item

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

Flood # 1

Proposed Action Item:	**Alignment with Plan Goals**
Coordinate with FEMA on issues surrounding recently proposed revisions to the Flood Insurance Rate Maps to account for protection provided by Warrenton's dikes.	Minimize damage to public and private buildings and infrastructure

Rationale for Proposed Action Item:

FEMA is currently developing new FIRM maps for Warrenton, which were last updated in 1978. FEMA remapped the area approximately 2 years ago, but the maps did not account for Warrenton's dike system because the dikes had not been certified. However, Warrenton lacks the funds to certify the dikes but has maintained them. Warrenton is currently working with FEMA to resolve these issues and develop FIRM maps that accurately address the flood hazard in Warrenton.

FIRM maps show areas subject to flooding in a community and is based on historic, meteorological, hydrologic, and hydraulic data, as well as open space conditions, flood-control works, and development. FIRM maps are the primary tool that state and local governments can use to mitigate against floods. Coordinating with FEMA on revisions to FIRMs will help to reduce the impact of flooding on Warrenton for new and existing developments.

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)]. Coordinating with FEMA to develop FIRMs that accurately reflect Warrenton's flood hazard are necessary to protect new development and existing buildings.

Ideas for Implementation:

Continue to work with FEMA on issues surrounding revisions to Warrenton's Flood Insurance Rate Maps.

Educate FIRM policy holders and other stakeholders that may be impacted by any changes about the proposed revisions.

Coordinating Organization:	Planning Department

Internal Partners:	**External Partners:**
Public Works, Administration	FEMA, OEM,

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

Form Submitted by:	City of Warrenton
Action Item Status	New Action Item

Flood # 2

Proposed Action Item:	Alignment with Plan Goals
Once issues related to Warrenton's Flood Insurance Rate Maps (FIRMs) have been resolved, review Warrenton's floodplain ordinance to ensure it meets current National Flood Insurance Program (NFIP) standards and reflects the new FIRMs.	Minimize damage to public and private buildings and infrastructure

Rationale for Proposed Action Item:

FEMA is currently developing new FIRM maps for Warrenton, which were last updated in 1978. FEMA remapped the area approximately 2 years ago, but the maps did not account for Warrenton's dike system because the dikes had not been certified. However, Warrenton lacks the funds to certify the dikes but has maintained them. Warrenton is currently working with FEMA to resolve these issues and develop FIRM maps that accurately address the flood hazard in Warrenton. Once issues related to the FIRM maps have been resolved, Warrenton should review its floodplain ordinance to ensure it meets current National Flood Insurance Program (NFIP) standards and reflects the new FIRMs.

Participation in the NFIP requires that communities maintain and update a floodplain management ordinance that addresses development within the floodplain and that meets current NFIP program requirements. In 2009 Warrenton reviewed its floodplain ordinance to comply with NFIP regulations, however the issues surrounding the FIRM maps had not yet been resolved. Once the issues relating to Warrenton's FIRM maps have been resolved, Warrenton should review and update its floodplain ordinance to ensure that the ordinance meets current NFIP standards and reflects information in Warrenton's FIRMs.

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)]. Reviewing Warrenton's floodplain ordinance once FIRMs have been developed will ensure that Warrenton is in compliance with current NFIP standards and that new development will be protected from floods.

Ideas for Implementation:

Continue to work with FEMA on issues surrounding revisions to Warrenton's Flood Insurance Rate Maps.

Coordinate efforts between the Planning and Public Works Departments to review Warrenton's floodplain ordinance and the new FIRMs to determine which changes should be made.

Coordinating Organization:	Planning Department

Internal Partners:	External Partners:
Public Works, Administration	FEMA, OEM,

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

Form Submitted by:	City of Warrenton
Action Item Status	New Action Item

Flood # 3

Proposed Action Item:	**Alignment with Plan Goals**
Conduct a public outreach campaign with citizens of Warrenton to review any changes to FIRMs, increase knowledge of the local flood risk, and review any changes to Warrenton's floodplain ordinance.	Minimize damage to public and private buildings and infrastructure

Rationale for Proposed Action Item:

FEMA is currently developing new FIRM maps for Warrenton, which were last updated in 1978. FEMA remapped the area approximately 2 years ago, but the maps did not account for Warrenton's dike system because the dikes had not been certified. However, Warrenton lacks the funds to certify the dikes but has maintained them. Warrenton is currently working with FEMA to resolve these issues and develop FIRM maps that accurately address the flood hazard in Warrenton. Once issues related to the FIRM maps have been resolved, Warrenton should conduct a public outreach campaign with citizens to review any changes to the FIRMs, increase knowledge of the local flood risk, and review any changes made to Warrenton's floodplain ordinance. This public outreach campaign could target audiences such as local building officials, elected officials, NFIP policy holders, business organizations, or the general public.

Community outreach that teaches citizens, businesses, and local officials about Warrenton's NFIP program, FIRMs, and the city's floodplain ordinance can help increase the number of NFIP policies, promote NFIP services, or increase the knowledge about a community's local flood risk. Once the issues surrounding the FIRMs have been resolved, conducting a public outreach campaign can improve the efficacy of Warrenton's floodplain management program.

Ideas for Implementation:

Consider different methods for public outreach, such as an open house, informational brochures, posting information on the city website, combining efforts or combining efforts with other jurisdictions such as Clatsop County, Astoria, or Seaside.

Coordinating Organization:	Planning Department

Internal Partners:	**External Partners:**
Public Works, Administration	FEMA, OEM,

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

Form Submitted by:	City of Warrenton
Action Item Status	New Action Item

Flood # 4

Proposed Action Item:	Alignment with Plan Goals
Continue regular maintenance of dikes/levees and seek their certification.	Protect life Minimize damage to public and private buildings and infrastructure Reduce economic loss Decrease disruption to critical services

Rationale for Proposed Action Item:

The city of Warrenton is protected from ocean and riverine floods by a system of dikes, ditches, storm pipes, pump stations, and culvert crossings with tidegates. Regular maintenance of the dikes and the flood system are needed to continue protecting the city from floods. The city of Warrenton owns and maintains the dikes, and the Army Corps of Engineers reviews them annually for the city. The city of Warrenton is also responsible for obtaining certification of the dikes that the city maintains and owns. Certified dikes are dikes that can contain the 1% annual chance exceedance flood and can influence flood insurance premiums under the National Flood Insurance Program for properties protected by the dikes.

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)]. Maintenance of levees and receiving certification by the Corps of Engineers will sustain this critical infrastructure and prevent floods from damaging the city of Warrenton.

Ideas for Implementation:

Develop a maintenance plan and schedule for Warrenton's dike system.

Seek funding for the certification of dikes.

Coordinating Organization:	Warrenton Public Works

Internal Partners:	External Partners:
City Administration	FEMA, Army Corps of Engineers, Clatsop County

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

Form Submitted by:	City of Warrenton
Action Item Status	New Action Item

Flood # 5

Proposed Action Item:	**Alignment with Plan Goals**
Implement the Stormwater Management Plan action items relating to the flooding and stormwater issues in Warrenton.	Reduce economic loss. Minimize damage to public & private buildings and infrastructure. Decrease disruption to critical services.

Rationale for Proposed Action Item:

Warrenton is protected from floods by a flood control system comprised of dikes, ditches, storm pipes, pump stations, and culvert crossings with tidegates. This system is designed to move river and stormwater out of several sub-basins within the city, either through passive conveyance or pump stations, while preventing water from the Columbia River during high tides or floods from entering. Tidegates located throughout the city regulate the flow of water, allowing storm and river water to flow out, while preventing water from high tides to enter. However, many of the flood control structures are aging and in need of repair, and a failure in the dike system could incur significant damage to property. To address Warrenton's stormwater needs, the city adopted a *Stormwater Management Plan* in October 2009 that took a comprehensive look at Warrenton's stormwater system and provided prioritized capital improvement project recommendations. Implementing the stormwater plan's action items will significantly reduce the probability and vulnerability of flood events in the city. The specific action items are listed in the ideas for implementation below.

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)]. Implementing the stormwater plan's action items will improve the critical flood control infrastructure which will protect existing and future developments in Warrenton.

Ideas for Implementation:

Stormwater Management Plan Action Items (details found on pp. 62-87 of the stormwater plan):
CIP # 1: Repair/Refurbish West Hammond Marina Tidegate
CIP # 2: Repair/Refurbish East Hammond Marina Tidegate
CIP # 3: Tidegate Repair & Replacement Plan
CIP # 4: Evaluate and upgrade existing pump station adjacent to SE 3rd/4th St.
CIP # 5: Refurbish existing pump station adjacent to NE 1st St.
CIP # 6: Upsize storm system in west portion of Hammond Marina sub-basin
CIP # 7: Relieve stormwater drainage issue in the East Hammond/Brailler-Enterprise Ditch area
CIP # 8: Obtain programmatic permit to allow O&M routine maintenance of city drainage ditches, if such a permit is necessary
CIP # 9: Create and implement Monitoring Plan for city of Warrenton
CIP # 10: Upgrade downtown conveyance system and create definitive connection between north and south downtown pump stations
CIP # 11: Sanitary sewer inflow/infiltration study
CIP # 12: Stormwater rate study

Coordinating Organization:	City of Warrenton Administration

Internal Partners:	**External Partners:**
Public Works Department, Planning Department	US Corps of Engineers, Oregon Department of State Lands

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	$115,050
2 years		
Form Submitted by:	City of Warrenton	
Action Item Status	New Action Item	

Flood # 6

Proposed Action Item:	**Alignment with Plan Goals**
Develop plan if the bridges in Warrenton collapse.	Protect life. Reduce economic loss. Decrease disruption to critical services.

Rationale for Proposed Action Item:
The city of Warrenton has several bridges that serve to connect various sections of the city. These bridges include the New Young's Bay Bridge, Alder Creek Bridge, Skipanon Bridge, and the Alternate Highway 101 Skipanon Bridge. If either of these bridges collapse, people will be isolated from necessary services such as food and medical services. Developing an emergency preparedness/response plan in the event of a bridge collapse will help the community prepare for a potential disaster.

Ideas for Implementation:
Establish a partnership with the Coast Guard located in Warrenton. Partner with the Oregon Department of Transportation, emergency services, Warrenton Public Works Department, and surrounding cities and Clatsop County.

Coordinating Organization:	Oregon Department of Transportation

Internal Partners:		**External Partners:**
Public Works		FEMA, Clatsop County PW, ODOT, Medics, Columbia River Hospital and Providence Hospital
Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	3 years	

Form Submitted by:	Warrenton Steering Committee
Action Item Status	New action item.

Flood # 7

Proposed Action Item:	**Alignment with Plan Goals**
Develop a plan to minimize possible flooding of Alder Creek.	Protect Life Minimize damage to public & private buildings & infrastructure

Rationale for Proposed Action Item:

Alder Creek is prone to high waters and if it flooded would create an impasse on Warrenton Drive, one of the major roads in the city. Developing a plan to minimize possible flooding of Alder Creek will reduce the likelihood that the road will be damaged by flood events.

The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Developing a plan to minimize possible flooding of Alder Creek would protect Warrenton Drive and prevent isolation between the north and southern portions of the city.

Ideas for Implementation:

Conduct a study of Alder Creek to determine flood issues and potential solutions for preventing future floods of Alder Creek.

The Oregon Department of Transportation (ODOT) is responsible for maintaining Warrenton Drive. Warrenton should coordinate with ODOT in developing strategies for mitigation hazards along Warrenton Dr.

Coordinating Organization:	City of Warrenton Public Works

Internal Partners:	**External Partners:**
Planning Department	FEMA, ODOT

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

Form Submitted by:	City of Warrenton
Action Item Status	New Action Item

Tsunami # 1

Proposed Action Item:	**Alignment with Plan Goals**
Move City Hall, which contains the Police, Fire, and Administrative offices, out of the tsunami inundation zone.	Decrease disruption to critical services. Protect life. Minimize damage to public and private buildings and infrastructure.

Rationale for Proposed Action Item:

City Hall (containing the Administrative Offices, Planning and Building Departments, Police Department, and Fire Department) and the Public Works Building across the street are in the tsunami inundation zone. These governmental services are essential to operate during and after a disaster. Moving these facilities will ensure continuous service for Warrenton's residents. Several areas outside of downtown are outside the tsunami inundation zone, and these include area East of 101, near Ft. Stevens, and west of the community soccer fields.

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)]. Moving City Hall and emergency facilities that are located in the building will increase the city's resiliency to tsunami hazards.

Ideas for Implementation:

Search for suitable locations outside the tsunami inundation zone. These include areas east of highway 101, area near Ft. Stevens, and west of the community soccer fields.

Identify sources to pay for the relocation.

Coordinating Organization:	City Administration

Internal Partners:	**External Partners:**
All City Departments	FEMA, OEM

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

Form Submitted by:	City of Warrenton
Action Item Status	New action item.

Tsunami # 2

Proposed Action Item:	**Alignment with Plan Goals**
Develop more tsunami evacuation routes.	Protect life. Increase education and awareness of the risks and hazards in Clatsop County.

Rationale for Proposed Action Item:
Warrenton has developed a tsunami evacuation route map with two assembly areas, as shown in figure 5 in the Warrenton Addendum. However, these routes are dependent on roads and bridges remaining operational. In the event of a local earthquake event that renders roads and bridges inoperable, travel on foot would be the alternative. Developing additional tsunami evacuation routes that take into account the possibility that roads and bridges are inoperable will make them more effective for citizens and visitors to Warrenton.

Ideas for Implementation:
Consult with the Oregon Department of Geology and Mineral Industries to develop addition tsunami evacuation routes. Incorporate Warrenton's existing trail system in the tsunami evacuation route map to allow for evacuation on foot.

Coordinating Organization:	**City of Warrenton Administration**

Internal Partners:	**External Partners:**
All city departments	Oregon Dept. of Geology and Mineral Industries, Warrenton Trail Association, FEMA

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

Form Submitted by:	City of Warrenton
Action Item Status	New action item.

Tsunami # 3

Proposed Action Item:	**Alignment with Plan Goals**
Relocate the high school to higher ground out of the tsunami inundation zone.	Protect life. Minimize damage to public and private buildings and infrastructure.

Rationale for Proposed Action Item:

Warrenton's high school is partially in a tsunami zone. Relocating the high school to higher ground will protect the school from tsunami inundation events. Relocating the school will protect students from tsunami hazards and allow the school to be used as a possible shelter for residents or visitors that may be displaced from a tsunami event.

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)]. Relocating the high school to higher ground will protect this important facility from tsunami events.

Ideas for Implementation:

- Search for new locations outside the tsunami area.
- Identify funding sources to pay for the relocation.

Coordinating Organization:	City of Warrenton Administrative Office

Internal Partners:	**External Partners:**
City Administration, Planning Department	Warrenton School Administration DOGAMI, FEMA

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

Form Submitted by:	City of Warrenton
Action Item Status	New Action Item

Wildfire # 1

Proposed Action Item:	**Alignment with Plan Goals**
Adopt policies and programs of the Community Wildfire Protection Plan, once it is completed, into the Warrenton Comprehensive Plan.	Protect natural and cultural resources. Increase cooperation and collaboration among County partners.

Rationale for Proposed Action Item:

Clatsop County and cities within the county are currently developing a Community Wildfire Protection Plan (CWPP) to address the wildfire hazard in the county. A CWPP assesses the risk of wildfires in a community and develops actions to address these risks and reduce the impact of wildfires. Many of these actions propose policies and programs communities can adopt to reduce wildfire risk. Incorporating policies and programs found in Clatsop County's CWPP into the Warrenton Comprehensive Plan will provide Warrenton with a policy framework for mitigating wildfires.

Ideas for Implementation:

Obtain a copy of the CWPP once it is completed and determine policies and programs Warrenton can incorporate into the Comprehensive Plan.

Collaborate with the CWPP's implementation committee and with Clatsop County to incorporate relevant policies and programs.

Coordinating Organization:	Fire Department

Internal Partners:	**External Partners:**
Planning Department, Fire Chief	Clatsop County, CWPP Committee, Oregon Department of Forestry

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

Form Submitted by:	City of Warrenton
Action Item Status	New Action Item

Wildfire # 2

Proposed Action Item:	**Alignment with Plan Goals**
Apply for wildfire grants to implement action items in the Community Wildfire Protection Plan, now being developed, as they pertain to the city of Warrenton.	Protect natural and cultural resources.

Rationale for Proposed Action Item:

When completed, the Community Wildfire Protection (CWPP) Plan will include a list of action items that Warrenton can implement to reduce the city's risk from wildfire events. Currently the city of Warrenton fire chief is part of the CWPP committee and is working toward Warrenton being considered an "interface" community because there are areas at risk to wildfires. These include forested areas along Ridge Road, DeLaura Beach Road, the Skipanon River between Alternate 104 and Harbor Drive, and Alternate 101 along the Forest Rim Subdivision where 650 units are to be built in three phases. Applying for grants to implement the CWPP will reduce the risk of wildfires to these areas.

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)]. Funding and implementing wildfire mitigation actions that address new and existing developments in Warrenton will help reduce the community's overall wildfire risk.

Ideas for Implementation:

Coordinate efforts with the implementation committee for the Clatsop County Community Wildfire Protection Plan to write grants.

Identify grant resources for wildfire action items.

Coordinating Organization:	Warrenton Fire Department

Internal Partners:	**External Partners:**
Public Works, Planning, Fire Department	Clatsop County, CWPP Committee

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

Form Submitted by:	City of Warrenton
Action Item Status	New Action Item

Wildfire # 3

Proposed Action Item:	**Alignment with Plan Goals**
Upgrade the size of water lines to improve firefighting capabilities.	Minimize damage to public and private buildings and infrastructure. Decrease disruption to critical services.

Rationale for Proposed Action Item:

Some of the water lines in Warrenton may be too small to support wildfire suppression efforts, especially in areas identified in the Wildland Urban Interface. Upgrading the size of water lines in the community will enable the fire department to adequately suppress wildfires that threaten the city.

The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address new and existing buildings and infrastructure [201.6(c)(3)(ii)].Upgrading the size of water lines will improve existing water lines and help in protecting new and existing buildings in the community.

Ideas for Implementation:

Identify water lines in the city that need upgrading.

Develop a plan and funding resources for water line improvements.

Coordinating Organization:	Warrenton Public Works

Internal Partners:	**External Partners:**
Fire Department, City Administration, Public Works	Oregon Department of Forestry

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

Form Submitted by:	City of Warrenton
Action Item Status	New Action Item

Winter Storm/Wind Storm # 1

Proposed Action Item:	**Alignment with Plan Goals**
Develop a plan for removal of trees.	Protect life. Reduce economic loss. Minimize damage to public and private buildings & infrastructure.

Rationale for Proposed Action Item:
In a windstorm event, fallen trees can damage utility lines, block entrances to homes, preclude travel on roads and create perilous situations to people and property. Developing a plan for tree removal after a windstorm event will minimize damage to infrastructure within the community.

Ideas for Implementation:
Establish partnerships with Nygaard Logging, Weyerhaeuser, Trails and Material Recovery and Recycling and other similar companies to use their equipment and labor to remove trees. Work with the Oregon Department of Forestry to develop an area for placement of removed trees.

Coordinating Organization:	**Pacific Power & Light**

Internal Partners:	**External Partners:**
Fire and Police Departments, City Administration	Nygaard Logging, Weyerhaeuser, Trails Recovery, Oregon Department of Forestry

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

Form Submitted by:	City of Warrenton
Action Item Status	New action item

Winter Storm/Wind Storm # 2

Proposed Action Item:	**Alignment with Plan Goals**
Place existing utilities underground to avoid damage in wind/winter storm events.	Protect life. Minimize damage to public & private buildings & infrastructure. Reduce economic loss.

Rationale for Proposed Action Item:

Tree falls during wind or winter storm events can be a risk to overhead power lines. During a wind or winter storm, tree falls have the potential to down overhead power lines, causing electric power failures. Warrenton has a number of aboveground utilities found throughout the city. Undergrounding these utilities can reduce the effect of ice loading and tree falls to reduce Warrenton's risk to wind or winter storms, and limit disruptions in service.

Warrenton has experienced severe winter/wind storm events in the past and is vulnerable to windstorm events. The wind storm risk assessment notes that Warrenton's probability of a wind/winter storm recurring is high and the city's vulnerability to wind/winter storm events is also high. Undergrounding utilities to reduce the effect of ice loading and tree falls can help mitigate a community's risk to wind or winter storms, and limit disruptions in service.

The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on both new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Continuing to support/encourage electrical utilities to use underground construction methods where possible can reduce future power outages from windstorms.

Ideas for Implementation:

Support/encourage electrical utilities to use underground construction methods outside of new subdivisions and in older subdivisions, or where possible to reduce power outages from windstorms.

Consider providing incentives to utilities or property owners to underground utilities.

Contact Pacific Power and Light and Qwest/Charter Communications to participate in future mitigation plan update processes. Document concerns, where applicable, and seek funding to underground utilities.

Develop a hazardous tree inventory for all community properties.

Coordinating Organization:	Public Works

Internal Partners:	**External Partners:**
Planning Department, Warrenton Urban Renewal District Advisory Committee, City Administration	Pacific Power & Light, Qwest, Charter Communications

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

Form Submitted by:	City of Warrenton
Action Item Status	New Action Item

Multi-Hazard # 1

Proposed Action Item:	**Alignment with Plan Goals**
Develop educational outreach materials for all of Warrenton's natural hazards.	Protect life. Increase education and awareness of the risk and hazards in Warrenton

Rationale for Proposed Action Item:

The risk assessment portion of Warrenton's Addendum outlines the risk the city faces to natural hazard events. According to the risk assessment, Warrenton has a high probability and high vulnerability to coastal erosion, earthquake, wildfire, and windstorm/winter storm hazards. Warrenton has a moderate probability that a tsunami will occur, but a high vulnerability to the tsunami hazard. Warrenton also has a moderate probability and vulnerability to the flood hazard. Given Warrenton's risk to these natural hazards, educational outreach is important to inform citizens on where to go, what to do, and how to minimize the risk from natural hazards. Possible educational outreach materials are listed below.

Ideas for Implementation:

- Distribute list of emergency shelters.
- Create a brochure on what to do in an earthquake.
- Use *The Columbia Press* and the city's web site to inform citizens.
- Create signs for tsunami route.
- Post Stormwater Master Plan on the city's web site.
- Use water bills to disseminate information such as where to pick up bottled water, when to boil water or how to conserve water.
- Establish an informational board at City Hall, the library and other locations.
- Continue to coordinate with state and federal management on emergency preparedness and public education.
- Create and distribute awareness survey.
- Combine outreach efforts with those of Clatsop County, Astoria, Seaside, and Cannon Beach.

Coordinating Organization:	Planning Department

Internal Partners:	**External Partners:**
City Administration	Local businesses, clinics, Astoria Warrenton Chamber of Commerce, Clatsop County, City of Astoria, Seaside, Cannon Beach

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

Form Submitted by:	City of Warrenton
Action Item Status	New action item

Multi-Hazard # 2

Proposed Action Item:	**Alignment with Plan Goals**
Establish and furnish the Community Center as an emergency shelter and develop a list of additional community shelters such as churches and schools.	Protect life.

Rationale for Proposed Action Item:

In the event of a natural disaster, residents and visitors need to have a place to stay, to have a meal, and to obtain necessities. While Warrenton's population is relatively small, the area gets a significant amount of visitors due to Fort Stevens Park located northwest of the city. Establishing the Community Center as an emergency shelter, and developing a list of additional community shelters in churches and schools will prepare Warrenton for a natural disaster event. These emergency shelters can also be areas where community members can obtain supplies, such as blankets, food, medication, water, and other necessities.

Ideas for Implementation:

Contact churches, schools, the Community Center, Wastewater Treatment Plant, and other buildings for possible shelters.

Coordinate efforts with the local Red Cross who may have developed a list of emergency shelters for Warrenton.

Incorporate shelter information when developing an Emergency Response Plan as outlined in Multi-Hazard Action # 3.

Contact restaurants, seafood companies, churches, and retailers to identify areas to provide and distribute emergency supplies.

Coordinating Organization:	City of Warrenton Administration

Internal Partners:	**External Partners:**
City Administration, Public Works, Planning, Emergency Services, Fire	Local churches, Red Cross, School District, local churches, Local food retailers/restaurants [Buoy 9, Fred Meyer, Costco, Main Street Market, Clatsop County Food Distributor, Rite Aid, & Walgreens, Serendipity, Rods Bar & Grill]

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

Form Submitted by:	City of Warrenton
Action Item Status	New Action Item

Multi-Hazard # 3

Proposed Action Item:	**Alignment with Plan Goals**
Create a comprehensive emergency response plan.	Protect life. Minimize damage to public & private buildings & infrastructure. Increase cooperation and collaboration among partners

Rationale for Proposed Action Item:
Creating a comprehensive emergency response plan would establish the list of people to respond and the type action(s) needed to alleviate or rectify the impacts of a disaster. This can include forming a group that makes decisions in an emergency response and developing strategies for businesses to help in a response and recovery effort. In addition, the emergency response plan will include procedures for notifying the public of an emergency.

Ideas for Implementation:
Update Emergency Response: Securing America's Drinking Water vulnerability assessment Establish a group to make decisions during emergencies and include this group as a central component to Warrenton's Emergency Response Plan. In the response planning effort, work with retail establishments to determine their role in an emergency response effort.

Coordinating Organization:	Warrenton Police Department

Internal Partners:	**External Partners:**
Fire Department, Public Works Department, Planning Department, City Administration	FEMA, Oregon Emergency Management, Clatsop County, Astoria-Warrenton Chamber of Commerce

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

Form Submitted by:	City of Warrenton
Action Item Status	New Action Item

Multi-Hazard # 4

Proposed Action Item:	**Alignment with Plan Goals**
Establish a list of vulnerable persons that need to be monitored during and after a disaster to ensure their safety.	Protect life.

Rationale for Proposed Action Item:
The city of Warrenton has a number of vulnerable populations that include school-age children and the elderly. Identifying vulnerable populations and where they live can help to develop mitigation strategies to protect them from future disasters. In addition, identifying vulnerable populations can help a city in its response and recovery efforts to make sure that these populations are safe.

Ideas for Implementation:
Develop a contact list of vulnerable populations to monitor in a response and recovery effort. Consider mapping vulnerable populations to help develop mitigation strategies to reduce their vulnerability and identify their locations in a response and recovery. Combine efforts with Clatsop County.

Coordinating Organization:	Warrenton Police and Fire Departments

Internal Partners:	**External Partners:**
Fire Department, Public Works	Clatsop County, Medics, Hospitals

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

Form Submitted by:	City of Warrenton
Action Item Status	New Action Item

Multi-Hazard # 5

Proposed Action Item:	**Alignment with Plan Goals**
Identify areas/facilities to establish a temporary medical facility after a disaster occurs.	Protect life

Rationale for Proposed Action Item:

Warrenton does not have a hospital and there is only one medical office in the city. After a disaster occurs, Warrenton may need to establish a temporary medical facility to assist ill or injured people for transfer to a local hospital. Identifying areas or facilities that would serve as a temporary medical facility before a disaster occurs will help prepare Warrenton for an eventual catastrophic event and reduce the potential for loss of life. The temporary facility would not only serve residents of Warrenton, but could also assist visitors from nearby Fort Stevens Park.

Ideas for Implementation:

Partner with medical and emergency services to develop appropriate locations for a temporary medical facility.

Incorporate locations for a temporary medical facility in the Warrenton Emergency Operations Plan (see Multi-Hazard Action # 3).

Coordinating Organization:	Warrenton Fire and Police Departments

Internal Partners:	**External Partners:**
Warrenton Fire & Police Departments, Planning Department, City Administration	Columbia Memorial and Providence Hospitals, Medix Ambulance

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

Form Submitted by:	City of Warrenton
Action Item Status	New Action Item.

Multi-Hazard # 6

Proposed Action Item:	**Alignment with Plan Goals**
Establish a partnership with Sunset Empire Transportation to help people seek shelter, to obtain supplies, or travel for other needs after a natural disaster.	Protect life.

Rationale for Proposed Action Item:
In the event of a natural disaster, people may be unable to obtain food or stay in housing that is damaged to the extent it is not habitable. In addition, roads and bridges may be closed or difficult to travel because of the hazard situation. Establishing a partnership with Sunset Empire Transportation will help in transporting people, obtaining supplies, checking on relatives and family, or traveling for other needs.

Ideas for Implementation:
Coordinate development of the partnership with the planning efforts surrounding emergency response in Warrenton.

Coordinating Organization:	**Emergency Operations**

Internal Partners:	**External Partners:**
Fire and Police Departments, Public Works	Sunset Empire Transportation District

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

Form Submitted by:	City of Warrenton
Action Item Status	New Action Item

Multi-Hazard # 7

Proposed Action Item:	**Alignment with Plan Goals**
Develop a public notification system.	Protect life.

Rationale for Proposed Action Item:

A public notification system can warn people of a disaster to give them time to take the necessary precautions. This public notification system can be web-based, make use of a reversed 9/11 telephone system, use a siren, and/or use radio/media broadcasting efforts. This public notification system should be developed in conjunction with emergency response planning efforts indicated in multi-hazard action item #3.

Ideas for Implementation:

Partner with New Northwest Broadcasters.

Conduct a feasibility study on the most cost-effective and appropriate emergency notification system for the city of Warrenton.

Combine development of the emergency notification system with public outreach efforts to ensure the public understands notification warnings.

Coordinating Organization:	State and local emergency services.

Internal Partners:	**External Partners:**
City Administration, Public Works, Planning, Police, Fire.	Oregon Emergency Management, New Northwest Broadcasters

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

Form Submitted by:	City of Warrenton
Action Item Status	New Action Item.

Multi-Hazard # 8

Proposed Action Item:	**Alignment with Plan Goals**
Conduct an inventory of generators and fuel supplies for use in an emergency.	Protect life. Decrease disruption to critical services.

Rationale for Proposed Action Item:
Electricity is oftentimes not available during a disaster. The location of available generators would facilitate providing electricity where it is needed. Delivery of fuel could be curtailed during an emergency creating a shortage of fuel. Preparing an inventory of fuel distribution areas provides the location of fuel for emergency vehicles, people working on the disaster, and citizens.

Ideas for Implementation:
Contact major retailers or organizations that may have generators and/or fuel supplies to develop an inventory. Develop partnerships with these organizations to help in distributing these supplies in the event of an emergency. Coordinate efforts with the emergency response planning efforts as indicated in multi-hazard action item #3.

Coordinating Organization:	Warrenton Fire Department

Internal Partners:	**External Partners:**
Public Works & Police and Administration	Retail, private sector and citizens

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

Form Submitted by:	City of Warrenton
Action Item Status	New action item.