



City of Estacada

Natural Hazards Mitigation Plan Addendum

Prepared for
City of Estacada
475 SE Main
Estacada, OR 97023

In cooperation with

Clackamas County Emergency Management
2200 Kaen Road
Oregon City, OR 97045

Adopted by City Council on November 23, 2009



FEMA

December 4, 2009

Honorable Lynn Peterson,
Chair, Board of County Commissioners
2051 Kaen Road
Oregon City, Oregon 97045

Dear Chair Peterson:

On October 19, 2007, the U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) approved the *Clackamas County Natural Hazards Mitigation Plan Update 2007* 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 October 19, 2012:

Clackamas County
City of Estacada
City of West Linn

City of Canby
City of Milwaukie

City of Damascus
City of Oregon City

The list of approved jurisdictions has been updated to include the Cities of Damascus and Estacada, which have recently adopted the *Clackamas County Natural Hazards Mitigation Plan Update 2007*. 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,

A handwritten signature in blue ink that reads "Mark Carey".

Mark Carey, Director
Mitigation Division

cc: Dennis Sigrist, Oregon Emergency Management

KM:bb

RESOLUTION 2009-017

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

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

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

WHEREAS, the City of Estacada has participated in the development of the Clackamas 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 Estacada'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 Estacada to the impacts of future disasters, and

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

NOW THEREFORE, CITY COUNCIL OF THE CITY OF ESTACADA RESOLVES AS FOLLOWS:

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

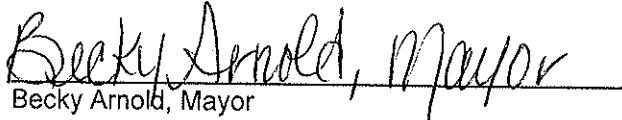
Section 2. The agency personnel of the City of Estacada are requested and instructed to pursue available funding opportunities for implementation of the actions and proposals designated therein,

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

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

Passed and effective this 23rd day of November, 2009.


Becky Arnold, Mayor

ATTEST:


Denise Carey, City Recorder

City of Estacada

Natural Hazards Mitigation Plan Addendum

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Overview

The City of Estacada developed this addendum to the Clackamas County Natural Hazards Mitigation Plan in an effort to increase the community's resilience to natural hazards. The addendum focuses on the natural hazards that could affect Estacada, Oregon, which include flood, landslide, wildfire, severe storms, earthquake and volcano. 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) Planning Process; 2) Community Profile; 3) Risk Assessment; and 4) Action Items.

Section 1: Planning Process

1.1 How was the Addendum Developed?

In the fall of 2007, the Oregon Partnership for Disaster Resilience (OPDR / the Partnership) at the University of Oregon's Community Service Center partnered with Oregon Emergency Management, Resource Assistance for Rural Environments (RARE), Clackamas County, and cities within Clackamas County to develop a Hazard Mitigation Grant Program (HMGP) planning grant proposal. The City of Estacada joined the Partnership by signing a memorandum of understanding for this project. FEMA awarded the Partnership with a grant to support the development and update of city addenda in Clackamas County, and Estacada's local planning efforts began in May, 2009. RARE provided a staff person ('RARE Participant') to facilitate and document the city's addendum development process.

Participants in Planning Process

Representatives from the city's Hazard Mitigation Advisory Committee (HMAC) served as steering committee members for Estacada's natural hazards mitigation planning process. Committee members included:

- Dennis Anderson, Reliance Connects (Local Business)
- Becky Arnold, Mayor of Estacada
- Joe Gamble, Estacada School District
- Fred Hertel, Estacada Fire District
- Tom Seal, Estacada Public Works
- Dave Stone, Estacada Public Works Lead
- Melanie Wagner, Assistant to the City Manager

Planning Process

The RARE Participant and Clackamas County Emergency Management developed and facilitated three plan development meetings with the Hazard Mitigation Advisory Committee on May 19th, June 18th, and July 13th, 2009. Please see Appendix A for meeting agendas and minutes.

Introduction – May 19, 2009: the RARE Participant facilitated an introductory meeting with the assistant to the city manager to present a brief overview of the natural hazards mitigation planning process. They discussed a planning timeline and additions to the steering committee for the planning processes.

Risk Assessment – June 18, 2009: Between May and June 2009, the RARE Participant researched the community assets and the causes and characteristics of natural hazards in Estacada, as well as past events. On June 18th, 2009 the RARE Participant facilitated the first of two plan development meetings with the HMAC. Group members identified

Estacada's community assets and then discussed past hazard events, vulnerable systems within the community, and existing emergency management capabilities.

Action Items – July 13, 2009: Between April and June, 2009 the RARE Participant drafted the plan's Risk Assessment (see Section 3 below), and developed a list of potential mitigation actions based on vulnerabilities identified at the June 18th risk assessment meeting. On July 13th, 2009 the RARE Participant facilitated the second of two plan development meetings with the HMAc. Group members discussed the RARE Participant's proposed mitigation actions, and developed a final list of actions. The HMAc also identified a future coordinating body for Estacada's Natural Hazards Mitigation Plan Addendum, a convener, various public involvement activities to implement during the planning process, and continued public involvement strategies that could occur after the plan's completion. Additionally, the HMAc developed a future meeting schedule (see 1.3 Plan Implementation and Maintenance below).

Public Involvement

Once a final draft was created, the city requested that citizens provide input and/or comment on the plan's content. Clackamas County's project webpage located on the Partnership's website (www.oregonshowcase.org/plans/clackamas) hosted plan drafts during the plan development process, and the city's website provided a link to the Partnership's website. Upon completion of a final draft, the city sent a press release to Estacada News, the city newspaper, and posted the press release on the city's website (see press release language below). The press release informed residents about the planning process, and provided a link to the Partnership's website. Residents were asked to read the plan and to send any comments to the Assistant to the City Manager. Residents were given two weeks time to provide comments. No comments were received.

City seeking public comment on hazard-mitigation plan

The city of Estacada, in partnership with Clackamas County, has drafted a natural hazards mitigation plan and is seeking public comment on the planning document. Citizens are encouraged to view the plan and submit comments at www.cityofestacada.org before Sept. 24.

Adoption

The City of Estacada adopted the Clackamas County Natural Hazards Mitigation Plan via resolution on November 23, 2009.

1.2 Addendum Mission and Goals

The City of Estacada adopts the Clackamas County Natural Hazards Mitigation Plan's mission and goals.

Mission

The mission of the Clackamas County Natural Hazards Mitigation Plan is to promote sound public policy designed to protect citizens, critical facilities, infrastructure, private

property, and the environment from natural hazards. This can be achieved by increasing public awareness, documenting the resources for risk reduction and loss-prevention, and identifying activities to guide the county towards building a safer, more sustainable community.

Goals

Protect Life and Property

- Implement activities that assist in protecting lives by making homes, businesses, infrastructure, critical facilities, and other property more resistant to losses from natural hazards.
- Reduce losses and repetitive damages for chronic hazard events while promoting insurance coverage for catastrophic hazards.
- Improve hazard assessment information to make recommendations for discouraging new development and encouraging preventative measures for existing development in areas vulnerable to natural hazards.

Promote Public Awareness

- Develop and implement education and outreach programs to increase public awareness of the risks associated with natural hazards.
- Provide information on tools, partnership opportunities, and funding resources to assist in implementing mitigation activities.

Enhance Natural Systems

- Balance watershed planning, natural resource management, and land use planning with natural hazard mitigation to protect life, property, and the environment.
- Preserve, rehabilitate, and enhance natural systems to serve natural hazard mitigation functions.

Encourage Partnerships and Implementation

- Strengthen communication and coordinate participation among and within public agencies, citizens, non-profit organizations, business, and industry to gain a vested interest in implementation.
- Encourage leadership within public and private sector organizations to prioritize and implement local, county, and regional hazard mitigation activities.

Augment Emergency Services

- Establish policy to ensure mitigation projects for critical facilities, services, and infrastructure.
- Strengthen emergency operations by increasing collaboration and coordination among public agencies, non-profit organizations, business, and industry.
- Coordinate and integrate natural hazard mitigation activities, where appropriate, with emergency operations plans and procedures.

1.3 Plan Implementation and Maintenance

This section details the formal process that will ensure that the Estacada Addendum to the Clackamas County Natural Hazards Mitigation Plan remains an active and relevant document. The plan implementation and maintenance process includes a schedule for

monitoring and evaluating the plan annually, as well as producing an updated plan every five years. Finally, this section describes how the city will integrate public participation throughout the plan maintenance and implementation process.

Implementing the Plan

After the plan is locally reviewed and deemed complete, the Director of Community Services and Public Safety will submit the plan to the State Hazard Mitigation Officer at Oregon Emergency Management. Oregon Emergency Management submits the plan to the Federal Emergency Management Agency (FEMA--Region X) for review. This review addresses the federal criteria outlined in the FEMA Interim Final Rule 44 CFR Part 201. Upon acceptance by FEMA, the Estacada City Council will adopt the plan via resolution. At that point the city will gain eligibility for the Pre-Disaster Mitigation Grant Program, the Hazard Mitigation Grant Program, and Flood Mitigation Assistance Program.

Coordinating Body

The Hazard Mitigation Advisory Committee will serve as the coordinating body for Estacada's Natural Hazards Mitigation Plan Addendum. Roles and responsibilities of the coordinating body include:

- Serving as the local evaluation committee for funding programs such as the Pre-Disaster Mitigation Grant Program, the Hazard Mitigation Grant Program, and Flood Mitigation Assistance program;
- Prioritizing and recommending funding for natural hazard risk reduction projects;
- Encouraging stakeholders, and relevant hazard mitigation organizations and agencies to implement and/or report of implementation on the plan's identified action items;
- Evaluating and updating the Natural Hazards Mitigation Plan Addendum following a disaster;
- Evaluating and updating the Natural Hazards Mitigation Plan Addendum in accordance with the prescribed plan maintenance schedule; and
- Developing and coordinating ad hoc and/or standing subcommittees. The committee will engage relevant organizations, agencies, and/or neighboring communities as technical advisers in hazard mitigation as needed.

Convener

The city manager will serve as the plan's convener. The convener's roles and responsibilities include:

- Assigning additional stakeholders and representatives to the coordinating body as needed;
- Coordinating HMAC meeting dates, times, locations, agendas, and member notification;
- Documenting the outcomes of HMAC meetings;
- Serving as a communication conduit between the HMAC and the public and/or key plan stakeholders;

- Identifying emergency management-related funding sources for natural hazard mitigation projects;
- Facilitating the incorporation, maintenance, and update of the city’s natural hazard risk GIS data elements;
- Utilizing the risk assessments as a tool for prioritizing proposed natural hazard risk reduction projects; and
- Facilitating and documenting the plan’s five-year update.

Implementation through Existing Programs

This plan is strategic and non-regulatory in nature, meaning that it does not necessarily set forth any new policy. It does, however, provide: (1) a foundation for coordination and collaboration among agencies and the public in the city; (2) identification and prioritization of future mitigation activities; and (3) aid in meeting federal planning requirements and qualifying for assistance programs. The mitigation plan works in conjunction with other city plans and programs including the Comprehensive Land Use Plan, Capital Improvements Plan, Building Codes, as well as the Clackamas County Natural Hazards Mitigation Plan, and the State of Oregon Natural Hazards Mitigation Plan. The mitigation actions described in Section 4 below are intended to be implemented through existing plans and programs within the city. Implementation opportunities are further defined in the action item worksheets (Appendix B) when applicable.

Plan Maintenance

Plan maintenance is a critical component of the natural hazard mitigation plan addendum. Proper maintenance of the plan ensures that this plan will maximize the city’s efforts to reduce the risks posed by natural hazards. This section includes a process to ensure that regular review and update of the plan occurs.

Semi-Annual Meetings

The HMAC will meet on a semi-annual basis to complete the following tasks. Meetings will be held in the spring and fall to discuss the previous hazard season and prepare for upcoming hazard seasons. During the first meeting, the committee will:

- Discuss funding opportunities for the implementation of mitigation strategies.
- Review existing action items to determine appropriateness for funding;
- Educate and train new members on the plan and mitigation in general; and
- Identify issues that may not have been identified when the plan was developed.

During the second meeting of the year, the committee will:

- Review existing and new risk assessment data, and incorporate this information into the plan;
- Document success in implementing mitigation actions and/or applying for funding;
- Discuss the addition and/or subtraction of mitigation actions from the plan;
- Discuss methods for continued public involvement;
- Document successes and lessons learned during the year; and
- Generate a list of members that should be included in future meetings.

The convener will be responsible for documenting the outcome of the semi-annual meetings. The process the HMAC will use to prioritize mitigation projects is detailed in Section 4 below. The plan's format allows the city to review and update sections when new data becomes available. New data can be easily incorporated, resulting in a natural hazards mitigation plan that remains both current and relevant.

Five-Year Plan Update

Local mitigation plans must be updated and resubmitted to the Federal Emergency Management Agency (FEMA) for approval every five years in order to maintain eligibility for federal hazard mitigation assistance programs. Plan updates must demonstrate that progress has been made in the past five years for local mitigation plans to fulfill commitments outlined in the previously approved plan.

Estacada's Natural Hazards Mitigation Plan Addendum will be updated every five years in accordance with the Disaster Mitigation Act of 2000. Because this is an addendum to the Clackamas County Natural Hazards Mitigation Plan, the addendum must be updated in conjunction with the county's five-year plan update schedule. As such, Estacada must update this addendum by September 2012 (and then again five years thereafter). Sufficient time should be allotted for plan update activities and FEMA review, meaning the city should begin the plan update process by September 2011. Additional time will be needed if the city intends to pursue application for mitigation planning grants, and/or contracting for technical or professional services.

During the five-year plan update, the city must review and revise its plan to reflect changes in development, progress in mitigation efforts, and changes in priorities. The following questions will be asked to determine what actions are necessary in updating the addendum:

- Have public involvement activities taken place since the plan was adopted?
- Are the plan goals still relevant?
- Is mitigation being implemented through existing planning mechanisms (such as comprehensive plans, or capital improvement plans)?
- Are there new hazards that should be addressed?
- Have there been hazard events in the community since the plan was adopted?
- Have new studies or previous events identified changes in any hazard's location or extent?
- Have the city's vulnerabilities to hazards changed?
- Have development patterns changed? Is there more development in hazard prone areas?
- Do future annexations include hazard prone areas?
- Did the plan identify the number and type of existing and future buildings, infrastructure, and critical facilities in hazards areas?
- Are there new high risk populations?
- Did the plan document and/or address National Flood Insurance Program repetitive loss properties?

- Is there an action dealing with continued compliance with the National Flood Insurance Program?
- Did the plan identify data limitations?
- Did the plan identify potential dollar losses for vulnerable structures?
- What is the status of each mitigation action?
- Are there completed mitigation actions that have decreased overall vulnerability?
- Are there new actions that should be added?
- Are changes to the action item prioritization, implementation, and/or administration processes needed?
- Do changes need to be made within the five year update schedule?

The convener will be responsible for organizing the HMAC to address plan update needs. The HMAC will be responsible for updating any deficiencies found in the plan, and for ultimately meeting the Disaster Mitigation Act of 2000's plan update requirements. If needed, FEMA provides plan update guidance, tools, and training to assist communities in the plan development/update process.

Continued Public Involvement & Participation

The City of Estacada is dedicated to involving the public directly in the continual reshaping and updating of the Natural Hazards Mitigation Plan Addendum.

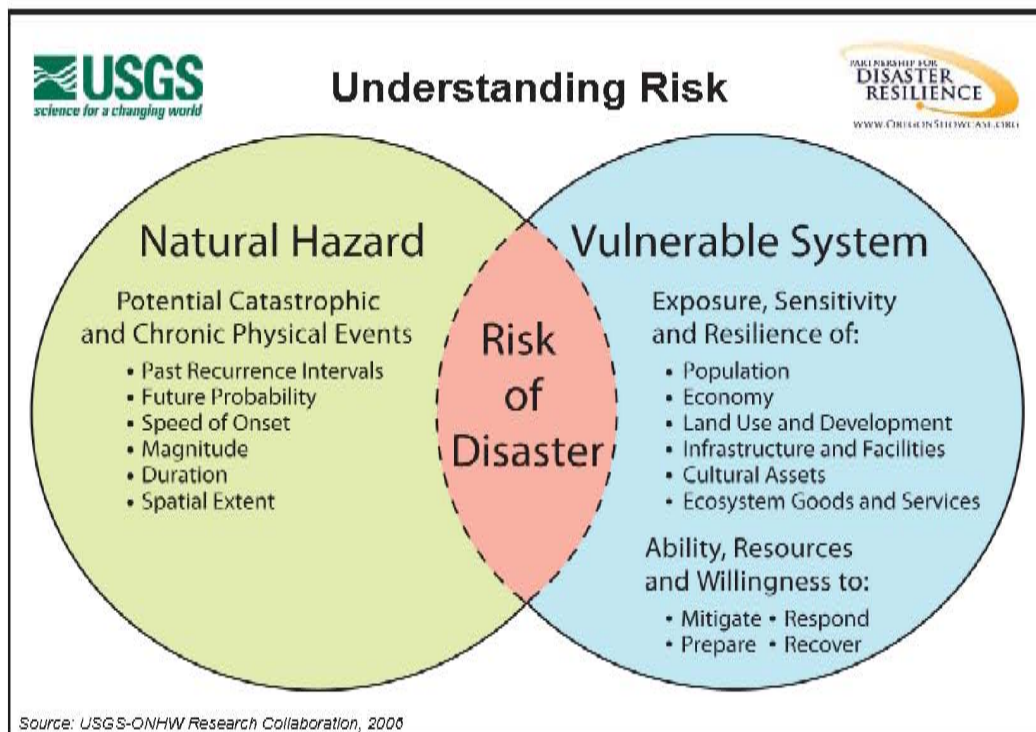
During the plan development process, public participation was incorporated into every stage of the plan development process. To ensure that these opportunities will continue, copies of the plan will be available online on the city's website, and hard copies will be available at City Hall. Fliers will be sent out with water bills and if funding becomes available, the city will create brochures to distribute to the public. Public meetings regarding plan content will be scheduled when deemed necessary, such as after a natural hazard event.

In addition to the involvement activities listed above, the city's Natural Hazards Mitigation Plan Addendum has been archived and posted on the University of Oregon Libraries' Scholar's Bank Digital Archive. Contact information is posted on all plan copies to facilitate public comment.

Section 2: Community Profile

The following section describes the City of Estacada from a number of perspectives in order to help define and understand the city's sensitivity and resilience to natural hazards. Sensitivity factors can be defined as those community assets and characteristics that may be impacted by natural hazards, (e.g., special populations, economic factors, and historic and cultural resources). Community resilience factors can be defined as the community's ability to manage risk and adapt to hazard event impacts (e.g., governmental structure, agency missions and directives, and plans, policies, and programs). The information in this section represents a snapshot in time of the current sensitivity and resilience factors in the city when the plan was developed. The information documented below, along with the hazard assessments located in Section 3: Hazard Assessment should be used as the local level rationale for the city's mitigation strategies. 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.

2.1 Geography and the Environment

The City of Estacada is located in the Willamette Valley in central Clackamas County, Oregon, approximately 30 miles southeast of the City of Portland and 15 miles southwest of the Mt. Hood National Forest. Estacada experiences a moderate climate with an

average high temperature of 80 degrees and low of 51 degrees in August, and an average high temperature of 46 and low of 33 in January.ⁱ The average high temperature is 63 degrees while the average low temperature is 42 degrees.ⁱⁱ The city receives an average annual precipitation of 57.53 inches.ⁱⁱⁱ

The Clackamas River flows past the southwestern edge of Estacada. Adjacent to the west of Estacada is the Milo McIver State Park and to the north is Timber Park.

2.2 Population & Demographics

Estacada has remained a small community since its incorporation but has grown significantly over the past eight years. In 2008, Estacada’s population was estimated to be 2,820, an increase of 18.9 % since 2000 (see Table 2.1 below).

Table 2.1 Population Change from 1970 to 2008

Year	Estacada	Percent Change	Clackamas County	Percent Change	Oregon	Percent Change
1970			166,088		2,091,533	
1980			241,919	45.7%	2,633,105	25.9%
1990	2,016		278,850	15.3%	2,842,321	7.9%
2000	2,371	17.6%	338,391	21.4%	3,421,399	20.4%
2008 Estimate	2,820	18.9%	376,660	11.3%	3,791,075	10.8%

Source: PSU Population Research Center, "Population Estimate for Oregon and Its Counties and Incorporated Cities: April 1, 1990- July 1, 2008, US Census

Disaster impacts (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 Estacada’s population fall into these special needs groups. Over 10% of the city’s population, or 262 people, are 65 years or older (see Table 2.2 below). Elderly individuals may require special consideration due to their sensitivities to heat and cold, and their comparative difficulty in making home modifications that reduce risk to hazards.

Table 2.2 Population by Age, 2000

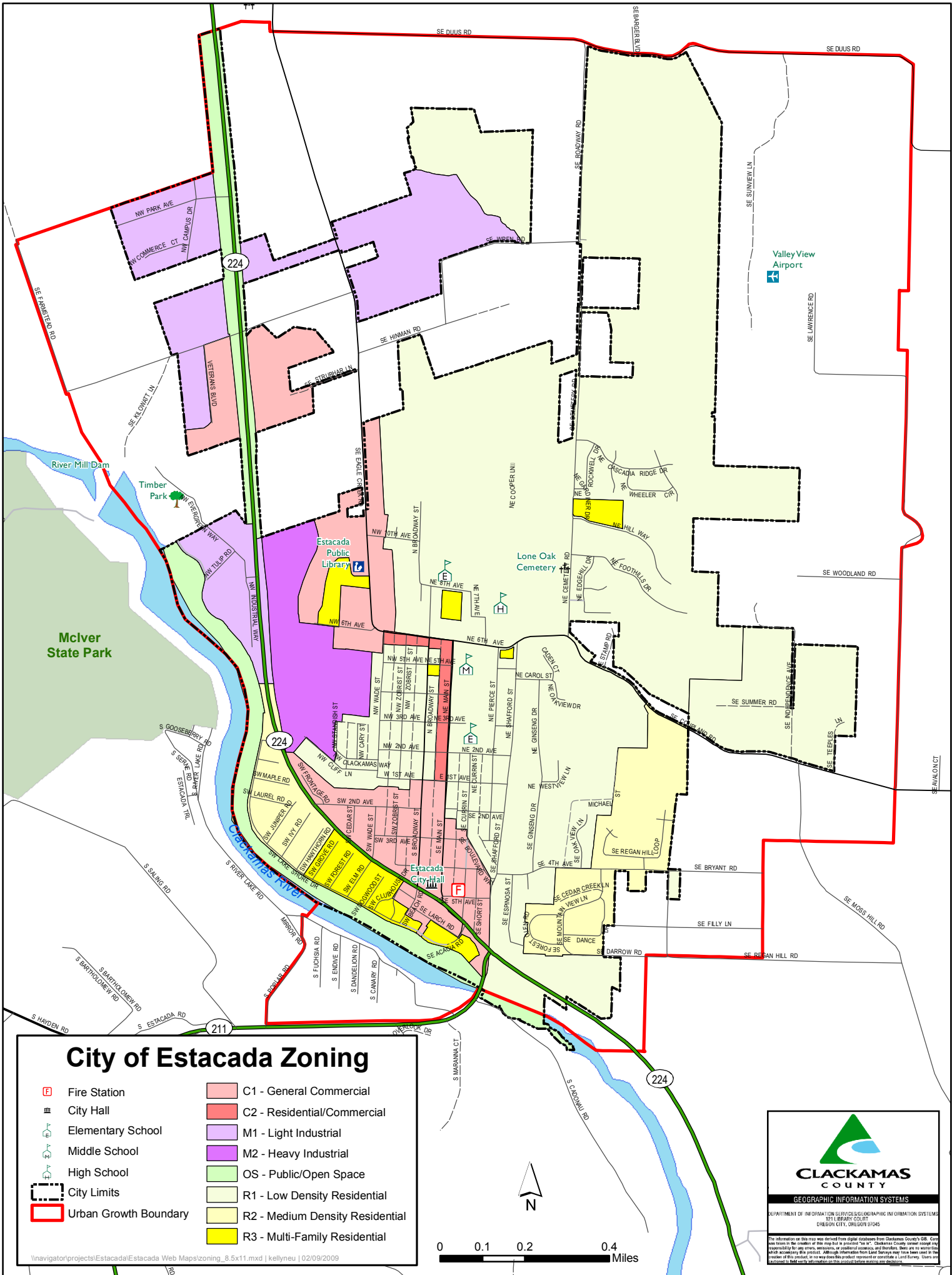
Age Range	Total Persons	% of Total Population
Under 5	164	6.9%
5 to 19	614	25.9%
20 to 44	846	35.7%
45 to 64	485	20.5%
65 and over	262	11.1%
Total	2,371	100.0%

Source: US Census Bureau, "Age Groups and Sex: 2000"

2.3 Land Use & Development

According to the 2004 draft comprehensive plan, the land area within the Estacada Urban Growth Boundary (UGB) spans a total of 2,433.5 acres which includes land in the city limits.^{iv} The city's 2004 Comprehensive Plan determined that UGB expansion was unnecessary. The city contains the following zones that determine the development pattern within the community: Low Density Residential, Medium Density Residential, Multiple Family Residential, General Commercial, Residential Commercial, Light Industrial, Heavy Industrial, and Open Space/Public Facilities.

The majority of land that is zoned for Low Density Residential is located on the east and north side of Estacada as well as a small portion in the southern part of town across the Clackamas River. The area in the southern end of town just north of the Clackamas River is zoned General Commercial and is connected to another area of General Commercial by a strip of Residential Commercial that runs through the center of town. Additionally, there are areas zoned for Heavy Industrial on the southwest side of town, adjacent to the Clackamas River and in the western part of town. For more information regarding the city's land use designations, please see the city's zoning map on page 12 below.



City of Estacada Zoning

- | | | | |
|--|-----------------------|--|---------------------------------|
| | Fire Station | | C1 - General Commercial |
| | City Hall | | C2 - Residential/Commercial |
| | Elementary School | | M1 - Light Industrial |
| | Middle School | | M2 - Heavy Industrial |
| | High School | | OS - Public/Open Space |
| | City Limits | | R1 - Low Density Residential |
| | Urban Growth Boundary | | R2 - Medium Density Residential |
| | | | R3 - Multi-Family Residential |

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CLACKAMAS COUNTY
 GEOGRAPHIC INFORMATION SYSTEMS
 DEPARTMENT OF INFORMATION SERVICES/GEOGRAPHIC INFORMATION SYSTEMS
 301 LIBRARY COURT
 OREGON CITY, OREGON 97045

The information on this map was derived from digital displays from Clackamas County GIS. Clackamas County is not responsible for any errors, omissions, or inaccuracies in this product. Clackamas County cannot be held liable for any damages resulting from the use of this product. Although information from Land Survey may have been used in the creation of this product, it is not shown this product represents or constitutes a Land Survey. Users are encouraged to verify information on this product before making any decisions.

2.4 Housing

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

In 2000, Estacada had 850 housing units. Of those, 64% (544 units) were owner-occupied and 36% (306 units) were renter-occupied.^v In addition, 79% of the homes in Estacada are single-family housing units (see Table 2.4 below).

Table 2.4 Housing by Type

Housing Type	Total Structures	% of Structures
Single-Family Unit	547	79.3%
Multi-Family 3-4 units	68	9.9%
Mobile home	39	5.7%
Duplex	36	5.2%
Boat, RV, van, etc.	0	0.0%
Total	690	100.0%

Source: US Census Bureau, "Units in Structure, Householder 65 Years and Over, and Householder Below Poverty Level: 2000"

Estacada also has a large number of older housing structures that may be vulnerable to earthquakes. About 67% of all housing units were built before 1980 when more stringent building codes were put into place (see Table 2.5 below).

Table 2.5 Age of Housing Structures

Year structure built	Number of Structures	Percent of Structures
1990 to March 2000	144	17.5%
1980 to 1989	126	15.3%
1970 to 1979	268	32.5%
1960 to 1969	49	5.9%
1950 to 1959	61	7.4%
1940 to 1949	27	3.3%
1939 and earlier	150	18.2%
Total	825	100.0%

Source: US Census Bureau, "Year Structure Built and Year Householder Moved Into Unit: 2000"

2.5 Employment and Industry

Historically, Estacada’s economy focused on tourism and forestry. The town was established in 1903 as a tourist destination for nearby Portland. The tourist industry declined in the late 1920’s following the popularization of the automobile.^{vi} Recently, many people are re-discovering the rural lifestyle of Estacada within commuting distance to the Portland Metropolitan area. There are new business opportunities related to recreation as the city is adjacent to Clackamas River Gorge and Mt. Hood National Forest.^{vii}

Table 2.6 shows employment by major industry for the City of Estacada. Office and administrative support occupations; professional and related occupations; and production occupations are Estacada’s largest employment industries.

Table 2.6 City of Estacada Employment by Major Industry, 2000

Industry	Total Persons Employed	% of Population
Office and administrative support occupations	154	14.5%
Professional and related occupations	129	12.1%
Production occupations	127	11.9%
Sales and related occupations	123	11.6%
Construction and extraction occupations	96	9.0%
Transportation and material moving occupations	96	9.0%
Management, business, and financial operations and occupations	80	7.5%
Installation, maintenance, and repair occupations	67	6.3%
Food preparation and serving related occupations	62	5.8%
Protective service occupations	39	3.7%
Building and grounds cleaning and maintenance occupations	29	2.7%
Personal care and service occupations	27	2.5%
Farming, fishing, and forestry occupations	20	1.9%
Healthcare support occupations	15	1.4%
Civilian employed population 16 years and over	1,064	

Source: US Census Bureau, "Occupation by Sex: 2000"

The five largest employers in Estacada include: Estacada School District, Clackamas River Ranger District, Estacada Lumber, Eagle Foundry, and Cascade Utilities.^{viii}

2.6 Transportation and Commuting Patterns

Estacada is connected to surrounding communities by two state highways that run through the downtown area. Highway 211 runs north-south connecting Estacada to Barton and eventually Oregon City to the north as well as the smaller communities of Springwater, Elwood, and Colton to the south. Additionally, Highway 211 connects Estacada to Highway 26, the Mt. Hood Highway.

Highway 224 also runs north-south connecting Estacada to the small communities of Logan, Carver, and eventually Oregon City to the north. It also connects Estacada to Interstate 205. Heading south on Highway 224, the road becomes the Clackamas Highway and leads to unincorporated areas. (See Estacada Transportation Map below on page 16.) Additionally, the Valley View Airport is located within the Urban Growth Boundary.

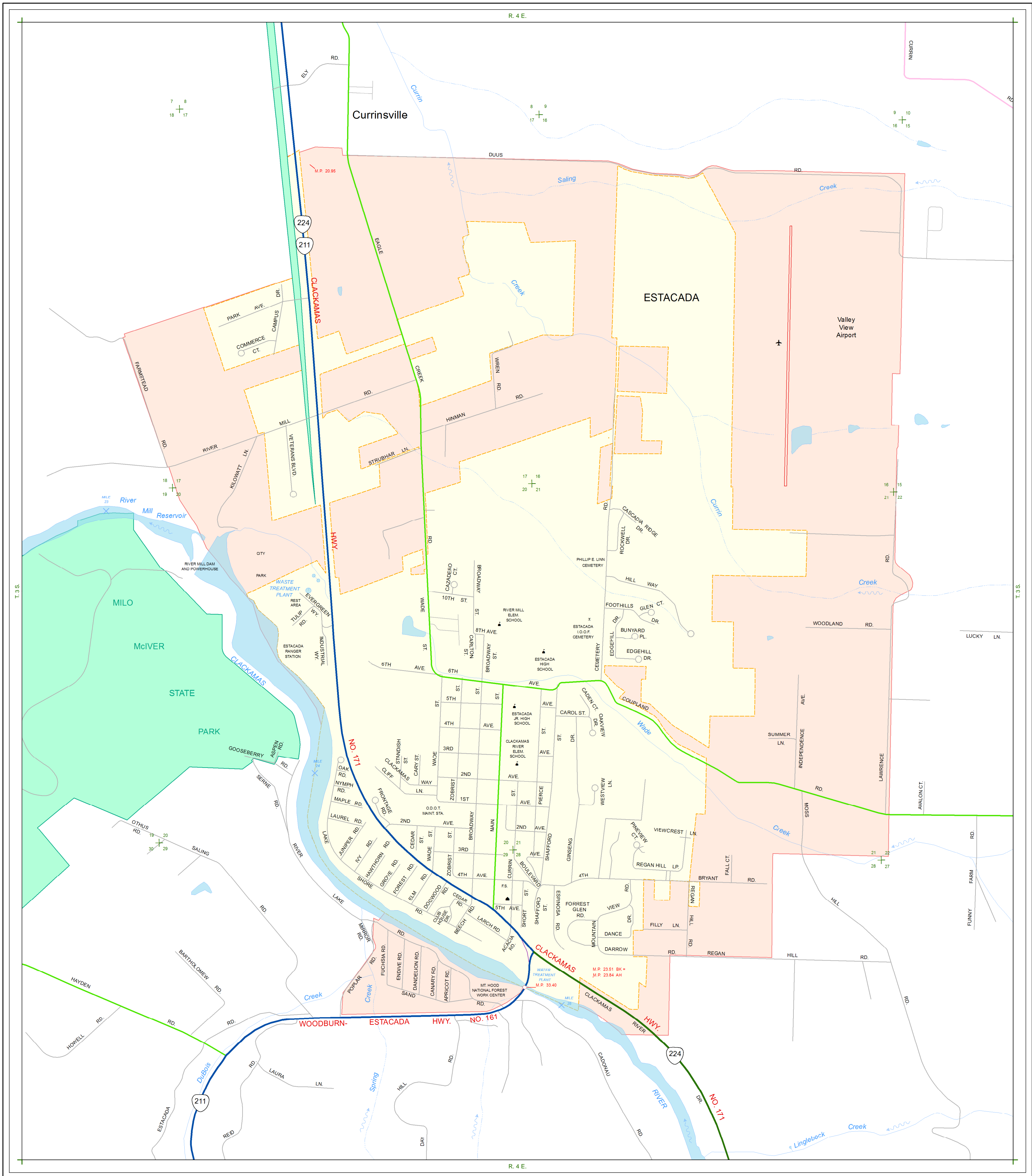
Transportation is an important consideration when planning for emergency service provisions. Growth within the city will put pressure on the major and minor roads, especially if the main mode of travel is by single occupancy vehicles. How people travel to work is indicative of the prevalence of single occupancy vehicle travel, and can help predict the amount of traffic congestion and the potential for accidents.

The majority of the Estacada’s working population, 83.3%, drives to work alone (see Table 2.9 below). Additionally, the average commute time is 27.7 minutes.^{ix}

Table 2.9 Transportation Mode Used to Commute to Work

Mode of Commute	Number of Commuters	Percent of Commuters
Car, truck, or van -- drove alone	777	74.7%
Car, truck, or van -- carpooled	135	13.0%
Walked	43	4.1%
Worked at home	40	3.8%
Public trans. (including taxicab)	40	3.8%
Other means	5	0.5%
Motorcycle	0	0.0%
Bicycle	0	0.0%
Total	1,040	100.0%

Source: US Census Bureau, “Journey to Work: 2000”



<p>LEGEND</p> <p>FOR FURTHER FUNCTIONAL CLASSIFICATION INFORMATION, CONTACT ODOT REGION OFFICE.</p>		<p>Published by</p> <p>ODOT GIS</p>		<p>NORTH</p>		<p>"This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information."</p>		<p>ESTACADA Population 2,580</p> <p>T. 3 S. R. 4 E. W.M.</p>		<p>OREGON TRANSPORTATION MAP Showing Functional Classification of Roads City of</p> <p>ESTACADA</p>	
<p>FUNCTIONAL CLASSIFICATION</p> <p>STATE HWY</p> <p>OTHER JURISDICTION</p> <p>INTERSTATE</p> <p>PRINCIPAL ARTERIAL</p> <p>MINOR ARTERIAL</p> <p>URBAN COLLECTOR/RURAL MAJOR COLLECTOR</p> <p>MINOR COLLECTOR</p> <p>LOCAL ROAD</p> <p>ORE. ROUTE - US. ROUTE - INTERSTATE ROUTE</p> <p>NATIONAL HIGHWAY SYSTEM ROUTE</p> <p>CITY LIMIT</p> <p>URBAN GROWTH BOUNDARY</p> <p>AMTRAK RAIL PASSENGER STATION</p> <p>GRAVEL PIT - QUARRY - ODOT STOCKPILE</p>	<p>FOR FURTHER FUNCTIONAL CLASSIFICATION INFORMATION, CONTACT ODOT REGION OFFICE.</p> <p>INTERSTATE</p> <p>PRINCIPAL ARTERIAL</p> <p>MINOR ARTERIAL</p> <p>URBAN COLLECTOR/RURAL MAJOR COLLECTOR</p> <p>MINOR COLLECTOR</p> <p>LOCAL ROAD</p> <p>ORE. ROUTE - US. ROUTE - INTERSTATE ROUTE</p> <p>NATIONAL HIGHWAY SYSTEM ROUTE</p> <p>CITY LIMIT</p> <p>URBAN GROWTH BOUNDARY</p> <p>AMTRAK RAIL PASSENGER STATION</p> <p>GRAVEL PIT - QUARRY - ODOT STOCKPILE</p>	<p>PUBLIC BUILDING</p> <p>COURTHOUSE</p> <p>HOSPITAL</p> <p>CITY HALL</p> <p>ARMORY</p> <p>POST OFFICE</p> <p>SCHOOL</p> <p>LIBRARY</p> <p>SAFETY REST AREA</p> <p>WEIGH STATION</p> <p>PARK & RIDE LOCATION</p> <p>INTERCITY - CITY TRANSIT</p> <p>COMMERCIAL - GENERAL AVIATION</p> <p>AMTRAK STOP - PORT FACILITY</p>	<p>PUBLIC BUILDING</p> <p>COURTHOUSE</p> <p>HOSPITAL</p> <p>CITY HALL</p> <p>ARMORY</p> <p>POST OFFICE</p> <p>SCHOOL</p> <p>LIBRARY</p> <p>SAFETY REST AREA</p> <p>WEIGH STATION</p> <p>PARK & RIDE LOCATION</p> <p>INTERCITY - CITY TRANSIT</p> <p>COMMERCIAL - GENERAL AVIATION</p> <p>AMTRAK STOP - PORT FACILITY</p>	<p>SCALE</p> <p>0 300 600 1,200 1,800 Feet</p> <p>0 200 400 800 1,200 Meters</p>	<p>AVAILABLE TRANSPORTATION SERVICES SHOWN WITH YELLOW BACKGROUND</p> <p>PARK & RIDE</p> <p>INTERBUS</p> <p>AMTRAK</p>	<p>AVAILABLE TRANSPORTATION SERVICES SHOWN WITH YELLOW BACKGROUND</p> <p>PORT</p> <p>AIRPORT</p> <p>COMM. AIR</p>	<p>CLACKAMAS COUNTY</p> <p>2008</p>				

Copies Available from the Oregon Department of Transportation, Geographic Information Services Unit, Mill Creek Office Building, 555 13th St. NE, Salem, Oregon 97301, (503) 986-3154, <http://www.oregon.gov/ODOT/TD/TDATA/gis/odotmaps.shtml>
 Population numbers are based on current Oregon Population Report, College of Urban and Public Affairs, Portland State University, <http://pdx.edu/pcr>

2.7 Community Assets

This section outlines the resources, facilities and infrastructure that if damaged could significantly impact public safety, economic conditions, and/or the environmental integrity of Estacada.

Critical Facilities: Those facilities and infrastructure necessary for emergency response efforts.

- City Hall
- Main Fire Station (#110)
- George Community Fire Station (#115)
- Estacada Fire District Administration Building/EOC
- Shelter Sites
- Communications Center at 303 SW Zobrist
- Clackamas County Sheriff's Office/Community Center

Critical Infrastructure: Infrastructure that provides services for the city

- Highway 211
- Highway 224
- Springwater
- Redland
- Utility Lines (Telephone, Power)
- Bridges
 - Highway 211 Bridge
 - Highway 224 Bridge over Eagle Creek
 - Three bridges on 6th Ave
 - Bridge on Cemetery Road
 - Box culvert on Wade Street
- Water treatment, storage, and distribution lines
- Wastewater treatment plant
- Water treatment plant
- Wastewater pump stations
- PGE substation

Essential Facilities: Those facilities and infrastructure that supplement response efforts.

- Library
- Schools
 - Estacada High School
 - Estacada Junior High
 - Clackamas River Elementary
 - River Mill Elementary
 - Eagle Creek Elementary*
- Thriftway Grocery Store
- Forest Service Office*

Vulnerable Populations: Locations serving populations that have special needs or require special consideration.

- Schools
- Mobile Home Parks
 - Altramar II
 - Estacada Mobile Village
 - Mountain View Mobile Estates
 - Silver Fox RV Park
- Adult Care Facilities
 - Golden Years
 - Grace House
 - 300 Main Retirement
 - Senior Community Center
 - Whispering Pines
- Daycare Centers
 - Red Barn Co-Op Preschool
 - Clackamas River Elementary Daycare
 - Summer Daycare at River Mill Elementary and Eagle Creek Elementary

Economic Assets/Population Centers: *Economic Centers* are businesses that employ large numbers of people, and provide an economic resource to the city. If damaged, the loss of these economic centers could significantly affect economic stability and prosperity.

Population Centers usually are aligned with economic centers, and will be of particular concern for evacuation/notification during a hazard event.

- Estacada/Clackamas River Area Chamber of Commerce
- Industrial Park on Park Avenue
- Thriftway

Environmental Assets: Environmental assets are those parks, green spaces, wetlands, and rivers that provide an aesthetic and functional service for the community

- Clackamas River
- Wade Creek
- Wade Creek Park
- Timber Park

2.8 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. There is one building on the National Register of Historic Places, Baby Guard Station, built during the early 20th Century. Additionally, although not included on the National Register of Historic Places, there is the Estacada Bridge built in 1908.^x The Clackamas County Rural Historic Resources Survey also lists:

- Mae B. and C.F. Howe House
- R.G. Marchbank Store

- Ella C. Stephens House
- St. Aloysius Church
- Lichthoen Gustave H. House
- William H.H. Wade House
- August Stubbe House
- Elimore Williams House
- O.R. Jacobs House
- W.T. & Cora Kaake House
- W.A. Cunningham House
- Beary Bartholomew Feed & Grain
- Estacada Lodge
- Estacada City Hall
- Estacada St. Bank
- Frank Frank Store
- Arthur Smadbeck House

Each year there are many community events including local theater productions as well as a four-day summer celebration.^{xi}

2.9 Government Structure

The City of Estacada governs/manages the entire jurisdiction within the Urban Growth Boundary. The city has an elected mayor, six city councilmen, a city manager, and consists of the following departments: public works, administration, public safety, and planning & zoning. These departments provide and coordinate the essential services to city residents.

In addition to the above departments, there are the following advisory groups: Arts Commission, Budget Committee, Community/Senior Center, Infrastructure Committee, Library Board, Parks & Recreation Board, and the Planning Commission.

2.10 Existing Plans & Policies

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

The City of Estacada's Natural Hazards Mitigation Plan Addendum 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 city'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 plan's action items through existing plans and policies increases their likelihood of being supported and getting updated, and maximizes the city's resources.

The following is a list of plans and policies already in place in Estacada.

Plan: Downtown Urban Renewal Plan

Date of Last Revision: January 2007

Author/Owner: Cascade Economic Planning, SERA Architects, Tashman Johnson; City of Estacada

Description: The purpose of the plan is to use the urban renewal program to promote private investment and facilitate development and redevelopment in a manner that is consistent with the city's long term planning goals.

Relation to Natural Hazard Mitigation: The designated Urban Renewal Area is adjacent to the Clackamas River. The plan outlines transportation, public facilities (water system, sewer system, and waterfront improvements), and emergency infrastructure (fire station) improvements. All building improvements should consider potential natural hazards. Retrofits can benefit from mitigation funding if certain elements are in place.

Plan: Transportation System Plan

Date of Last Revision: May 1999

Author/Owner: Kittelson & Associates, Inc., City of Estacada

Description: The plan guides the management and development for appropriate transportation facilities in Estacada, incorporating the community's vision, while remaining consistent with state, regional, and local plans, as well as project population growth.

Relation to Natural Hazard Mitigation: Mitigation actions related to improving transportation facilities should be linked with goals and policies found in the transportation plan. Likewise, any mitigation activities that relate to transportation facilities should be tied to and/or integrated within the Transportation System Plan.

Plan: Development Code

Date of Last Revision: August 2006

Author/Owner: City of Estacada

Description: Provides regulations for development in the City of Estacada.

Relation to Natural Hazard Mitigation: Provides regulations for development in riparian corridors and wetlands, including flood hazard areas.

Plan: Comprehensive Plan (draft)

Date of Last Revision: August 2004

Author/Owner: Morgan CPS Group, City of Estacada

Description: Establishes the city's authority to plan for and deal with issues related to the future development of Estacada. The city opted out of the formal review process and focused its efforts on economic development and urbanization. The document is part of a strategy to revitalize the community.

Relation to Natural Hazard Mitigation: Provides policy guidelines for future development and land use in the city.

Plan: Storm Water Master Plan Update

Date of Last Revision: November 2008

Author/Owner: City of Estacada

Description: The Stormwater Master Plan uses population and growth projections to forecast needs within the stormwater system.

Relation to Natural Hazard Mitigation: Includes Capital Improvements Projects that address the deficiencies in the stormwater system. A number of these projects will reduce the flooding hazard within Estacada.

Section 3: Risk Assessment

The following hazards have been addressed in the Clackamas County Natural Hazards Mitigation Plan. The City of Estacada reviewed the county's plan on June 18, 2009 and assessed how Estacada's risks vary from the risks facing the entire planning area.

3.1 Flood

The Clackamas County Plan adequately describes the causes and characteristics of flooding in Estacada, as well as the history of events. General impacts and vulnerabilities are also described within the county's plan in Section 6 of the 2002 Clackamas County Natural Hazards Mitigation Plan and pages 25 to 29 of the 2007 update.

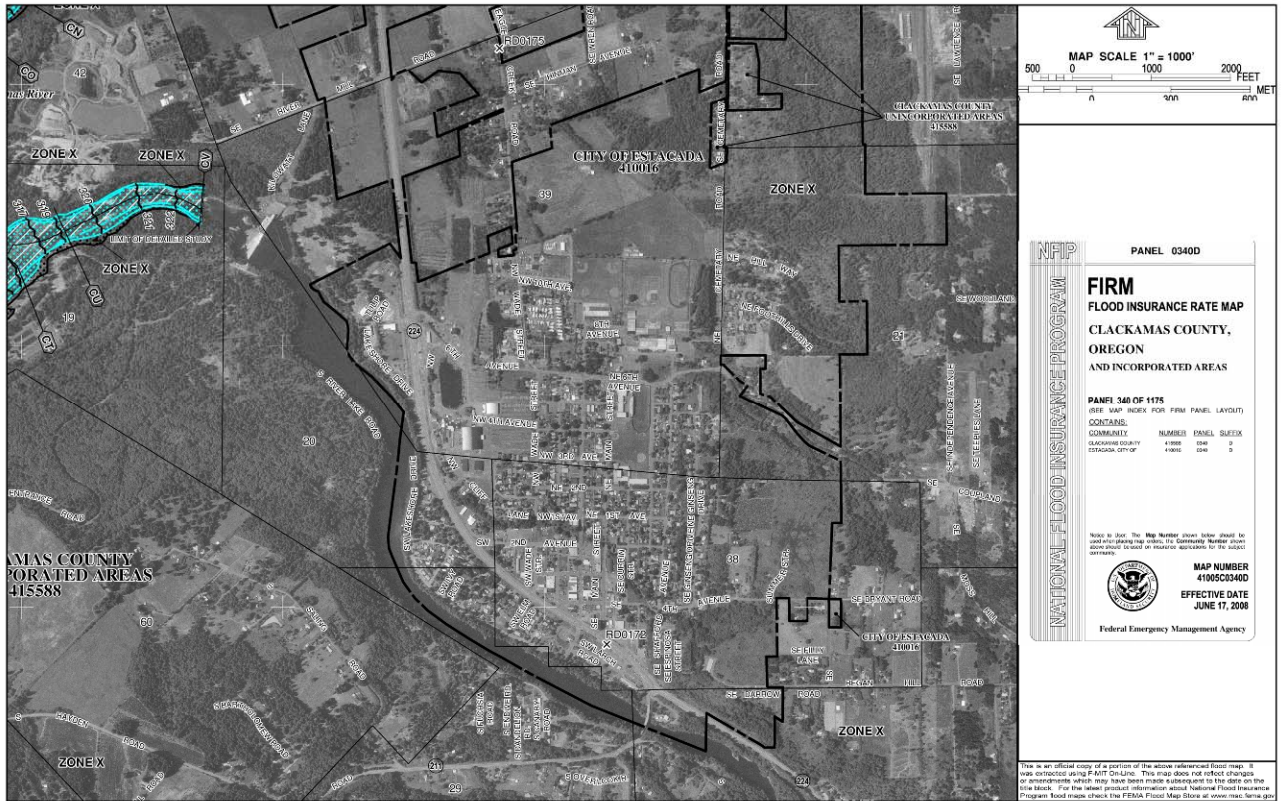
Overall, Estacada's flooding hazard is more of a concern to the city than other hazards presented in this mitigation plan. Sources of flooding in Estacada include Wade Creek, the Clackamas River, and urban flooding from storm water coming off the slopes of the surrounding hillsides. Flooding primarily comes from the smaller tributaries and hillside runoff, not the Clackamas River. The biggest flooding hazard is during heavy rains when water draining from the hillsides can overpower Wade Creek and the city's storm drain system. Examples of this include:

- February 1996: heavy rains saturated soils and toppled trees and carried debris into the Clackamas River. The debris buildup caused the Clackamas River to flood north of Estacada. Runoff from the hillsides caused Wade Creek to spill over its banks and flow down 6th Avenue. (See 1996 Flood Extent Map below on page 27).
- January 1-2, 2009: the buildup of snow from a winter storm quickly melted in heavy rains. A number of water retention ponds in the hills above Estacada broke and the rushing water carried a great deal of debris toward the city, clogging a number of culverts throughout the city. Portions of South Broadway and Main Street flooded because storm drains were overpowered. The north end of Estacada was most severely affected. The culvert near Estacada High School clogged and flooded the school gym, and water crossed 6th Avenue and flooded the junior high school's basement. Further west, Wade Creek flooded homes on Cazadero Court, the Estacada Library (which was first opened in August 2006), and the waste water treatment plant. Significant clean up was required at the junior high school and library. The junior high school was closed for one week while crews cleaned the basement. Over one foot of water filled the library, and destroyed as much as 10% of the library's collection. The library closed for two weeks for clean up efforts.

Estacada is a regular participant in the National Flood Insurance Program with two policies in force totaling \$135,500. The city's most current effective Flood Insurance Rate Map (FIRM) is dated June 17th, 2008 (Initial FHBM 11/09/1973). The city has not

had a Community Assistance Visit and does not participate in the Community Rating System. To date there have been zero losses paid, and zero repetitive loss properties. Unfortunately FEMA mapping does not show the flood hazards in Estacada. Figure 2 below is an excerpt of the overall FIRM and shows that the extent of mapping stops outside of Estacada borders.

Figure 2. FEMA FIRMette for Estacada



FEMA mapping does not detail the flooding in Estacada, but the city’s Storm Water Master Plan provides details on the drainage basins near Estacada.^{xiii} A map of the drainage basins can be found on page 26 below. The drainage map and descriptions of each drainage basin identify stream locations and flooding sources within Estacada, as well as mitigation projects completed to help alleviate flooding. The following drainage basins have portions located within city limits:

Basin 20: is a 917 acre drainage basin which is also part of the Currin Creek watershed. It drains the north-northeast portion of the city, and the western part of the UGB. The main stem of the drainage system is an open channel that crosses Cemetery Road just south of Hill Way and traverses the school property prior to discharging to overland sheet flows to Basin 30 and ultimately the Clackamas River. Flooding problems are attributed to culverts of insufficient size and the lack of maintenance of open channel reaches in the system. A realignment and improvement project began on this drainage way in 2002, however, it was not completed.

Basin 40: is the Wade Creek watershed, which is the main stream flowing through the City of Estacada. The size of the drainage basin is 1,293 acres, of which 160 acres are within the existing boundaries of the city. The section of Wade Creek between the crossing of 6th Avenue east of the Estacada High School and the crossing of Wade Street north of 6th Avenue is an open channel paralleling N 6th Avenue and the Eagle Creek Highway. Frequent flooding occurs at the intersection of 6th Avenue and Wade Street, a problem attributed to the insufficient size and hydraulically inefficient configuration of the creek. Street flooding due to storm drains of insufficient size in the streets south of 6th Avenue likely contribute to the flooding problems in this area.

Basin 50: is a typical urban watershed of 63 acres in size, entirely within city limits. It drains the western and central developed part of the city through existing storm drains, and discharges into an ODOT storm drain on Highway 224. Most of the existing storm drains appear to be of only marginal capacity.

Basin 60: is also a typical urban watershed of 47 acres in size, entirely within city limits. It drains the southern developed part of the city through existing storm drains and discharges into the Clackamas River at Elm Road. Most of the existing drains in SW 2nd and 3rd Avenue appear to be of marginal capacity.

Basin 70: is a drainage basin of 178 acres in size, of which 99 acres are located within the existing city boundary. It drains the southeastern part of the city through a mix of existing open channels and underground storm drains, and discharges into the Clackamas River at Acacia Road. Since preparation of the Master Plan in 1977, a large trunk sewer was installed in Basin 70 to eliminate many of the open channel flow areas.

Details of the location of flooding are included in the descriptions of each basin. The extent of the flooding hazard primarily depends on climate and precipitation levels, but due to the prevalence of urban flooding the location of the flood hazard can include much of the city. The committee believes Wade Creek (basin 40) is the biggest source of flooding for the city. A culvert with undersized inlet grating runs near 4th Avenue and the homes here experience lawn flooding almost annually. Hill Way had a creek running alongside it, but a developer filled in the creek and constructed homes on top of it. Now water will rush across the street if the pipe diverting the creek clogs with debris.

The City of Estacada has taken steps to reduce the city's flooding hazard. In 2003-2004 a pipe was installed from SE 4th and Shafford Street to Highway 211/224 to eliminate creek bank flooding along the base of the slopes. In 2007-2008 improvements were made to the Wade Creek pond adjacent to the library. This project provided improved capacity and safety improvements to the pond outlet. Additionally, a number of capital improvement projects are detailed in the Storm Water Master Planning Update. These projects will address flooding issues on Hill Way (Basin 20), Hwy 211/224 (Basin 70), Wade Creek Pond (Basin 99), and other problem areas. Projects include channel improvement, ditch restoration, and culvert replacement in Basin 20. Basin 40 projects include erosion protection, ditch and culvert improvement, box culvert creation, culvert replacement, and storm drain installation. Projects for Basins 50 and 60 include a









number or storm drain installations. Basin 70 projects include storm drain installation and channel replacement.^{xiv}

Additionally, the city's storm water system provides for the transport of surface water to minimize or reduce the potential of neighborhood flooding. Maintenance activities include repair and cleaning of the public storm water piping system, culverts, manholes, catch basins, and open channel ditches. Street sweeping and drainage ditch cleaning occurs regularly, and catch basins are cleaned twice a year. Finally, the Storm Water Master Plan is currently being updated.

The HMAC estimates that the probability of future flooding events in Estacada is 'high,' meaning one event is likely to occur within a 10 to 35 year period. The HMAC additionally estimates that the city's vulnerability to flooding events is 'moderate' meaning 1-10% of the city's population and/or assets could be affected in a major flood event. Both ratings are in agreement with the county's probability and vulnerability estimates.

City of Estacada Study Area

Legend

-  Basin Boundary
-  Subbasin Boundary
-  Subarea Boundary
-  Topographical Contour
-  City Boundary
-  Urban Growth Boundary
-  Stream
-  River/Pond

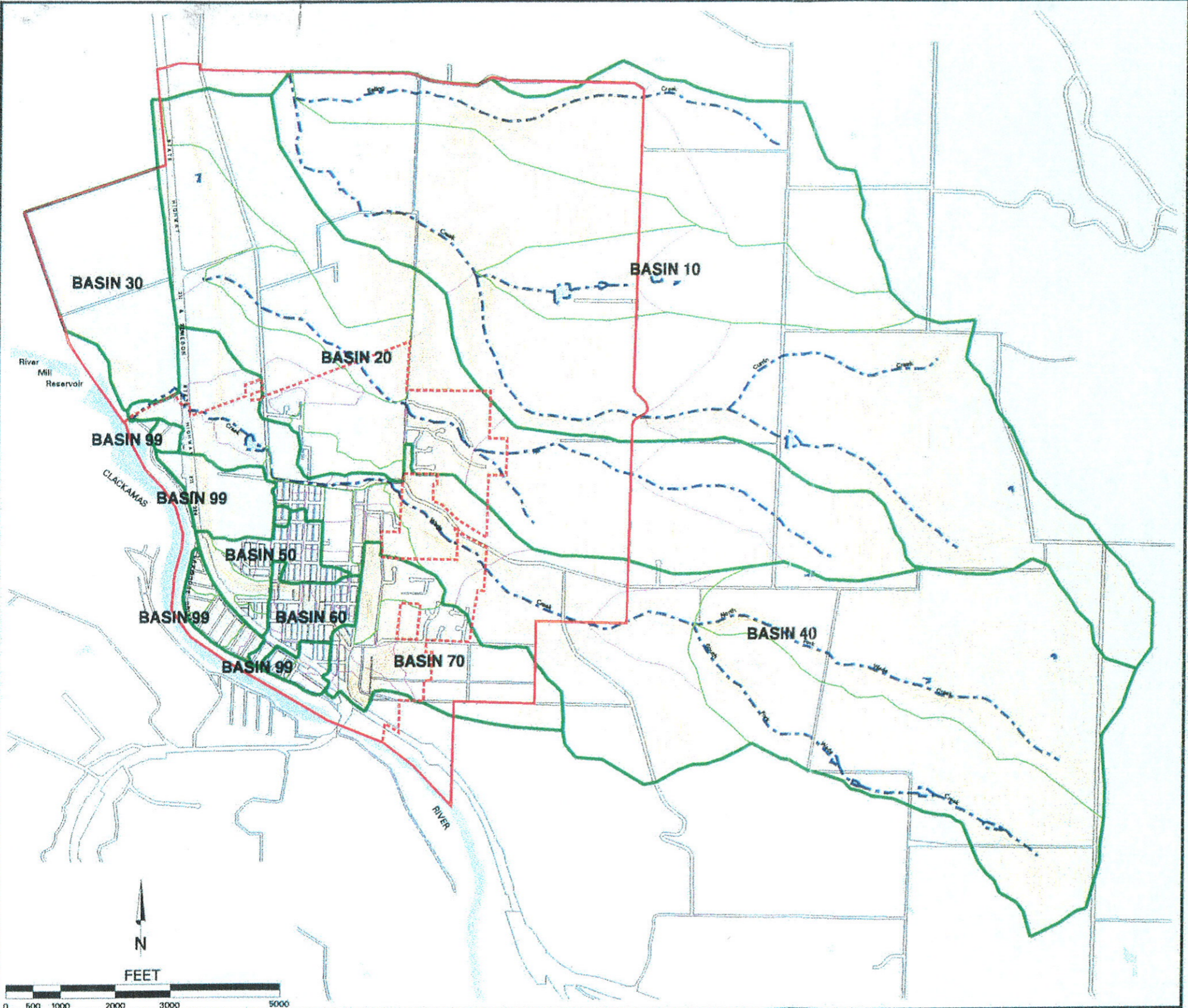


Fig. 2-1

Source: Clackamas County Geographic Information Systems

Date: August 28, 1997

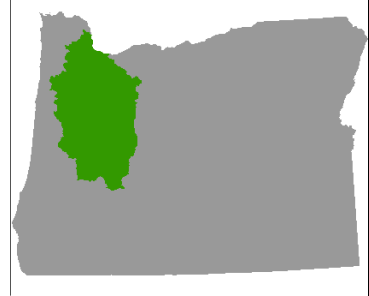
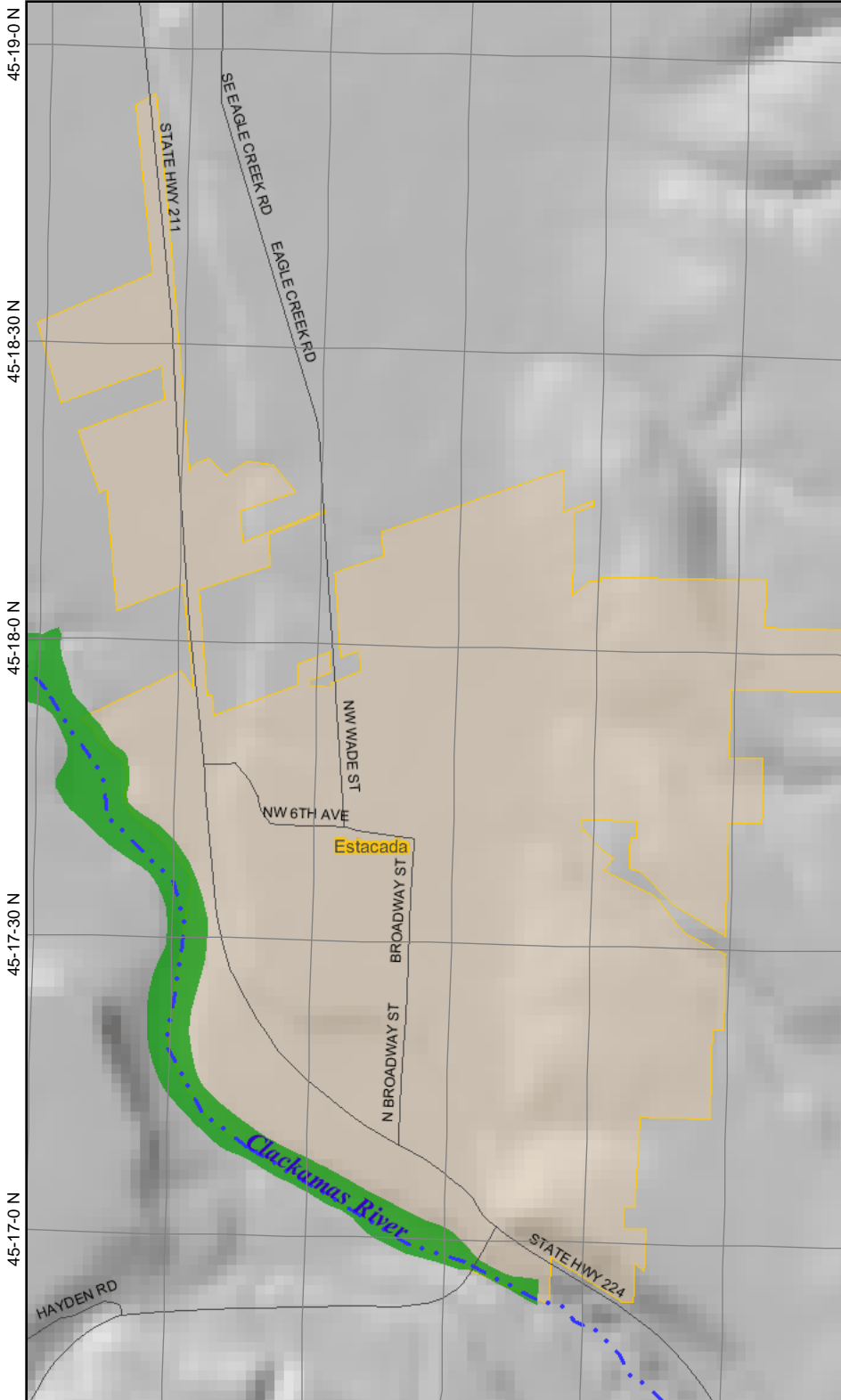
Project Number: 3017

ASCG
INCORPORATED
ENGINEERS ARCHITECTS SURVEYORS INSPECTION SERVICES

1000 NW CASCADE BLVD., SUITE 100, BEAVERTON, OR 97008
503/841-7900 FAX 503/841-5163

Estacada 1996 Flood Extent

122-21-0 W 122-20-40 W 122-20-20 W 122-20-0 W 122-19-40 W 122-19-20 W



Legend

- Major Roads
 - Major Rivers
 - 1996 Flood
 - City Limits 2005
- Adair Village
 - Albany
 - Amity
 - Aumsville
 - Aurora
 - Banks
 - Barlow
 - Beaverton
 - Brownsville
 - Canby
 - Carlton
 - Coburg
 - Cornelius
 - Corvallis
 - Cottage Grove
 - Creswell
 - Dallas
 - Dayton
 - Detroit
 - Donald
 - Dundee
 - Durham
 - Estacada
 - Eugene
 - Fairview
 - Falls City
 - Forest Grove
 - Gaston
 - Gates
 - Gervais
 - Gladstone
 - Gresham
 - Halsey
 - Happy Valley
 - Harrisburg
 - Hillsboro
 - Hubbard
 - Idanha
 - Independence
 - Jefferson
 - Johnson City
 - Junction City
 - Keizer
 - King City
 - Lafayette
 - Lake Oswego
 - Lebanon
 - Lowell
 - Lyons

0 375 750 m.

Map center: 840430, 1298716



Scale: 1:21,041

This map is a user generated static output from an Internet mapping site and is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

3.2 Landslide

The Clackamas County Plan adequately describes the causes and characteristics of landslides in Estacada, as well as the history of events. General impacts and vulnerabilities are also described in Section 7 of the 2002 Clackamas County Natural Hazards Mitigation Plan and pages 33 to 39 of the 2007 update.

Estacada enjoys a fairly level terrain, with the steepest slopes located along the Clackamas River (see slope hazard map below on page 28). In 1996 a landslide occurred behind Bennett's Tire on SE Short Street, and another slide occurred on Espinosa where a house slid and debris ran onto Highway 224. Both streets are located at the south end of the city near the split between Highways 221 and 224. In 2005 a small slide occurred on the hill at Broadway between 1st and SW 2nd Ave. About 20 yards worth of material slid but no damage was sustained. The area has since been rip-rapped and no problems have occurred since. Other areas that could potentially experience landslides include Cazadero Heights, Forest Glen, the south end of Espinosa, the Foothills subdivision, a subdivision on Carol overlooking Coupland, and the hill between Ginseng and Shafford Street.

The HMAC estimates that the probability of future landslide events is 'high,' meaning one event is likely to occur within a 10 to 35 year period. The HMAC estimates that Estacada has a 'low' vulnerability to landslide hazards, meaning less than 1% of the population and/or community assets could be affected by a landslide event. Both hazard ratings are in agreement with the county's ratings.

Estacada has taken steps to reduce the landslide risk. The Municipal Code Title 16 stipulates that detailed analysis must be performed by experts for development on slopes greater than 33%, in recent landslide areas, and on known weak foundation soils. These reports must include the causes, extent and potential of the hazards as well as the provisions proposed to overcome the hazards.

3.3 Wildfire

The Clackamas County Natural Hazards Mitigation Plan adequately describes the causes and characteristics of wildfires in Estacada. General impacts and vulnerabilities are also described in Section 8 of the 2002 Clackamas County Natural Hazards Mitigation Plan and pages 42 to 45 of the 2007 update. The Clackamas County Community Wildfire Protection Plan details a limited history of wildfire in the county. In 1951 approximately 2,000 acres burned in Clackamas and Multnomah Counties. In 2001 lightning strikes started eight fires in eastern Clackamas County on US Forestry Service lands, burning about 80 acres. In 2002 the Bowl Fire burned over 300 acres just east of Estacada. No history of wildfires is reported for Estacada.^{xv}

Clackamas County has two major physiographic regions: the Willamette River Valley in western Clackamas County and the Cascade Range Mountains in eastern and southern Clackamas County. The Willamette River Valley is the most heavily populated portion of the county and is characterized by flat or gently hilly topography. The Cascade Range, which includes Estacada, has a relatively small population and is characterized by heavily forested slopes. Eastern Clackamas County is at higher risk to wildfire than western portions of the county because of its dense forested land. Human caused fires are responsible for the majority of wildfires in Clackamas County.

Areas of dense vegetation within city limits include the hill west of Ginseng, the area south of SE Coupland Road, east of Espinosa, along Highway 224, and the brush behind the fire station could catch fire and head up the hill, impacting one house.

Five “Community at Risk” (CAR) maps from the Oregon Department of Forestry detail the fire hazard within Estacada. These maps are located at the end of the wildfire section on pages 30-34. The Ignition Risk Rating map indicates a low, moderate, or high likelihood of a fire occurring based upon historic fire occurrence. Additionally, the Ignition Risk Rating map shows that all of Estacada is in a high ignition zone, meaning there are 1.1+ fires per 1,000 acres per ten years.

The Hazard Rating map is used to indicate a low, moderate, or high resistance to control once a fire starts. The rating is based upon a composite of weather (25%), slope (4%), aspect (6%), elevation (2%), fuel (30%), insect/disease mortality (20%), and crown fire potential (13%). The map indicates Estacada has low to moderate hazard ratings

The Rating for Protection Risk map indicates a low, moderate, or high risk associated with inadequate wildfire protection capabilities, including capacity and resources to undertake fire prevention measures. Consistent, statewide data to assess protection capability, such as ISO rating, actual response times, fire station locations, and fire department capacity, was not available at the time this plan was drafted. The map shows the entire city is at low risk.

The Value Rating 2005 map indicates a low, moderate, or high risk of loss of human and economic values associated with communities or landscapes. The NASF definition is used for statewide assessment: non economic values, such as critical wildlife habitat,

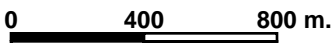
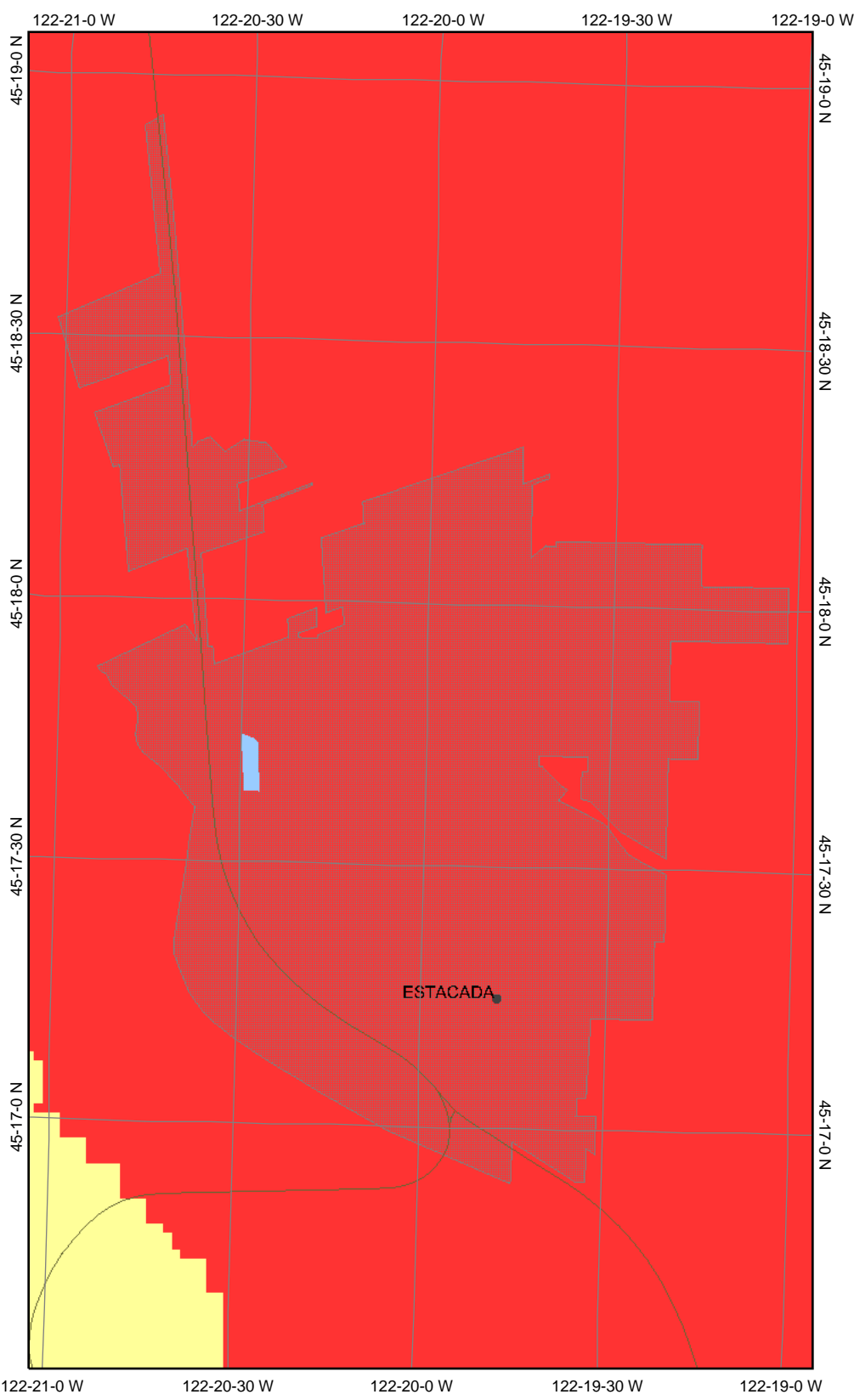
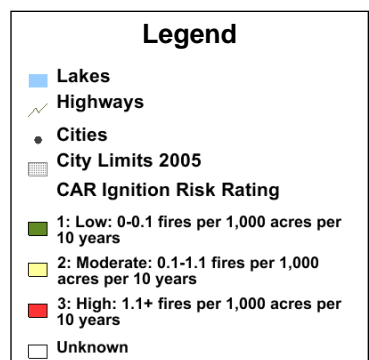
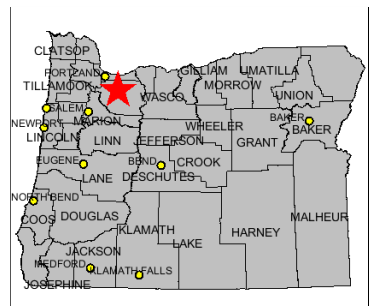
vistas, etc, are not considered. It is a composite of life (50%), municipal watersheds (30%), and commercial forest values (20%). The map shows the majority of the city has a high value rating, with pockets of low value rating.

Finally the Overall Fire Rating map provides an overall rating of low, moderate, or high risk. It is based upon a calculated value from the four CAR ratings: risk, hazard, protection capability, and value. Estacada has a moderate overall fire ranking.

The HMAC estimates the probability of future wildfire events to be ‘moderate,’ meaning one event is likely within a 35 to 75 year period, and vulnerability is ‘moderate’, meaning between 1% and 10% of the population or community assets would be affected by a major wildfire event. Both rankings are in agreement with the county’s ‘moderate’ ratings.

Estacada uses a number of mitigation tools to reduce the city’s risk to wildfires. Public outreach is a primary mitigation tool used by Estacada Rural Fire District #69. The fire district has a number of fire prevention and life safety tips on their website. They inspect homes to ensure they are up to code and the fire district also installs address signs on homes to help emergency responders quickly find their destinations. The fire district stays current on issues by participating in the Clackamas County Fire Prevention Cooperative, a group consisting of the fire districts within the county. The district also contributed in creating the Clackamas County Community Wildfire Protection Plan. The City of Estacada has a weeds and noxious growth ordinance that prohibits grass over 10 inches, thistles, and blackberries. Property owners must also maintain the planting strip between sidewalks and curbs in front of their property.

Estacada Ignition Risk Rating Map



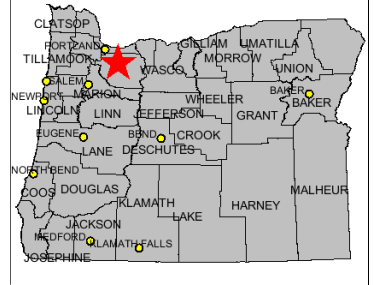
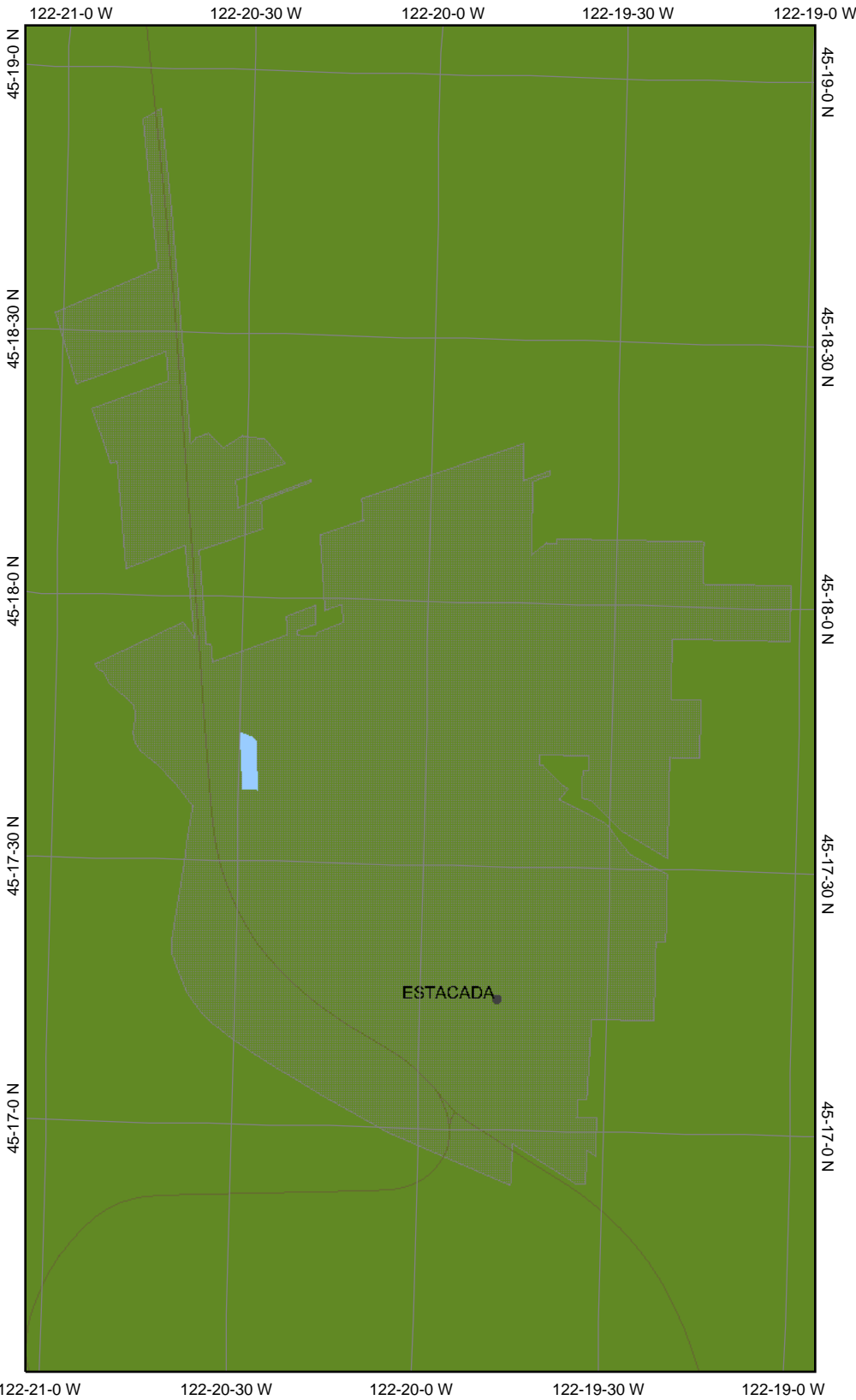
Map center: 840534, 1298158



Scale: 1:22,734

This map is a user generated static output from an Internet mapping site and is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

Estacada Fire Protection Rating



Legend

- Lakes
- Highways
- Cities
- City Limits 2005



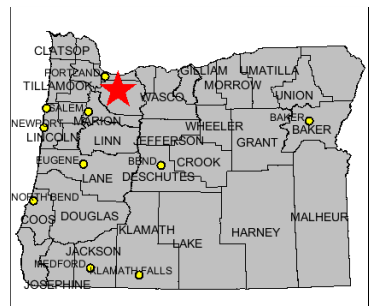
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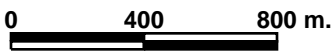
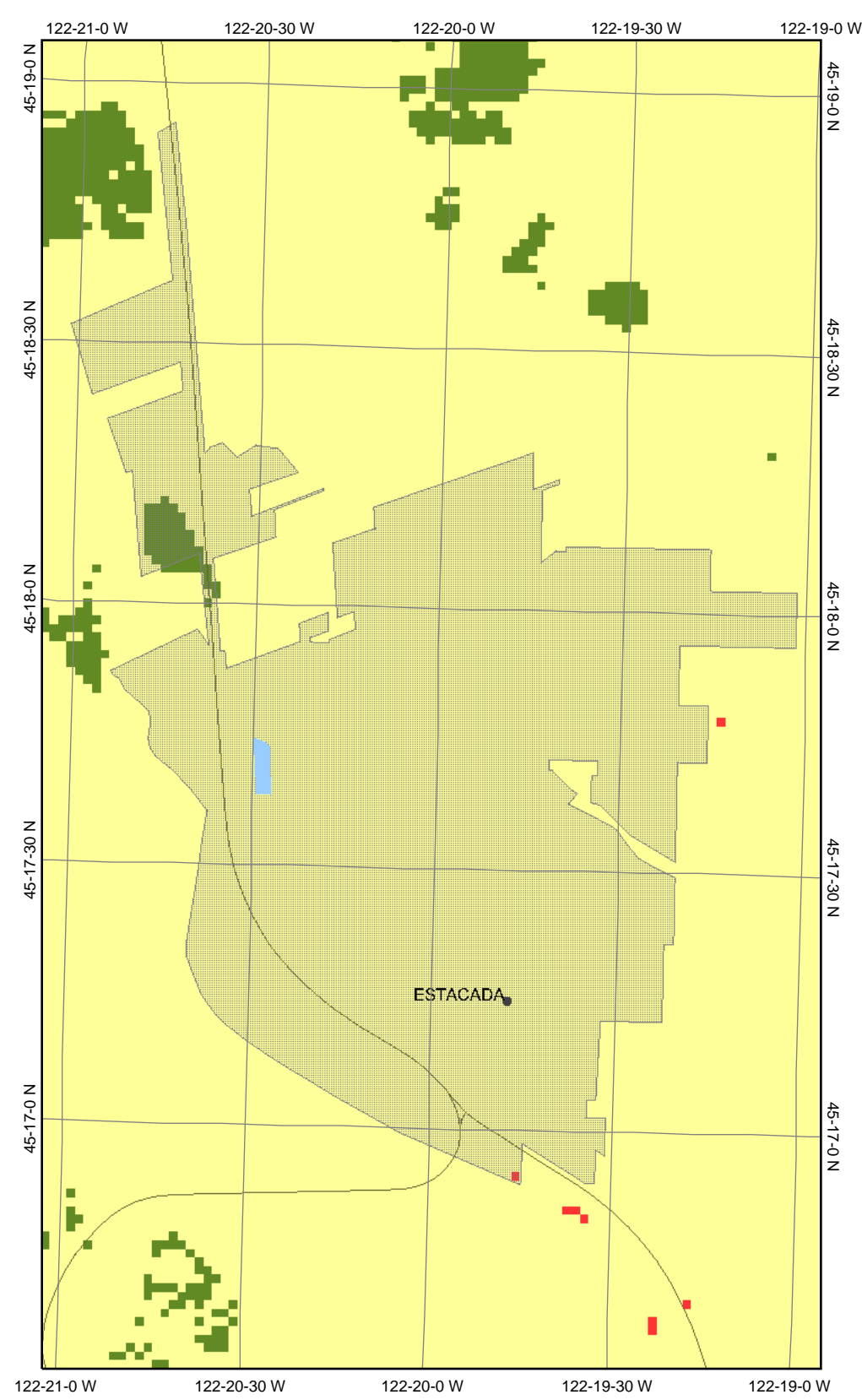
This map is a user generated static output from an Internet mapping site and is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

Estacada Overall Fire Rating



Legend

- Lakes
- Highways
- Cities
- City Limits 2005
- CAR Overall Rating**
- 1: Low: Total weighted score of 0-9
- 2: Moderate: Total weighted score of 10-16
- 3: High: Total weighted score of 17+
- Unknown



Map center: 840534, 1298158



Scale: 1:22,734

This map is a user generated static output from an Internet mapping site and is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

3.4 Severe Storms: Wind and Winter

The Clackamas County Multi-Jurisdictional Natural Hazards Mitigation Plan adequately describes the causes and characteristics, history, location, extent and impacts of the severe storm hazard in the City of Estacada, but one incident requires more explanation:

- December 14-15, 2006: a powerful windstorm caused a number of tree branches to fall down and take out power lines. An oak tree needed to be cut down after the storm, as it received extensive damages.

Additional severe storm information can be found on pages 9-1 to 10-7 of the 2002 Clackamas County Natural Hazards Mitigation Plan, and pages 46 to 50 in the 2007 plan update.

The area most affected by severe storms in Estacada is Lakeshore Drive. The road runs parallel to the Clackamas River and is lined with large fir trees. Lakeshore Drive usually requires a good deal of clean up after a storm, as branches and debris fall in the streets. The street has overhead power lines so power outages are frequent. Generally the power does not stay out very long, but it has been out for up to three days at a time on Lakeshore Drive. Estacada's power grid is divided, so usually the power will go out in half the town at a time. Another potential problem is the heavily wooded area behind the cemetery. Trees and branches blown over in this area during severe storms could affect the high school grounds.

Mitigating severe storms can be difficult because storms affect all areas of the city, but Estacada has made progress in reducing the negative effects of storms. Undergrounding utilities reduces the chance of utility interruption during severe storm events. The Municipal Code states new construction or remodels which exceed \$25,000 must have underground utilities. Single family residences that are converted to multi-family, commercial or industrial purposes must also construct equipment and related facilities to accept and receive all underground utility lines. Currently most phone lines are below ground. Estacada expedites snow remediation efforts by plowing arterials first, then moving onto smaller streets.

The HMAC estimates that the probability of severe wind and winter storm events is 'high,' meaning one event is likely within a 10 to 35 year period. This estimate is the same as the county's 'high' winter storm probability estimate, but higher than the county's 'moderate' wind storm estimate. The history of wind storms in Estacada indicates that they occur frequently enough to warrant the 'high' probability rating.

The HMAC estimates a 'high' vulnerability to wind and winter storms, meaning more than 10% of the population and/or assets could be affected by a severe winter storm. Both ratings are higher than the county's 'moderate' winter storm vulnerability rating and 'low' wind storm vulnerability rating. Estacada's winter storm vulnerability is greater than the county's rating because much of the city can become fairly isolated in large storm events. Additionally, more than 10% of the population is affected when power goes out.

3.5 Earthquake

The Clackamas County Multi-Jurisdictional Natural Hazards Mitigation Plan adequately describes the causes and characteristics, history, location, extent and impacts of the earthquake hazard affecting Estacada. Descriptions of the earthquake hazard can be found on pages 11-1 to 11-20 in the 2002 Clackamas County Natural Hazards Mitigation Plan, and pages 53 to 58 in the 2007 plan update.

Within the Northern Willamette Valley/Portland Metro Region, three potential faults and/or zones are capable of generating high-magnitude earthquakes. These include the Portland Hills Fault Zone, Gales Creek-Newberg-Mt. Angel Structural Zone, and the Cascadia Subduction Zone.

- Portland Hills Fault Zone
The Portland Hills Fault Zone is a series of NW-trending faults that vertically displace the Columbia River Basalt by 1,130 feet and appear to control thickness changes in late Pleistocene (approx. 780,000 years ago) sediment.^{xvi} The fault zone extends along the eastern margin of the Portland Hills for a distance of 25 miles.
- Gales Creek-Newberg-Mount Angel Structural Zone
The Gales Creek-Newberg-Mount Angel Structural Zone is a 50-mile-long zone of discontinuous, NW trending faults. These faults are recognized in the subsurface by vertical separation of the Columbia River Basalt and offset seismic reflectors in the overlying basin sediment.^{xvii}
- Cascadia Subduction Zone
The Cascadia Subduction Zone is a 680-mile-long zone of active tectonic convergence where oceanic crust of the Juan de Fuca Plate is subducting beneath the North American continent at a rate of 4 cm per year.^{xviii} Paleoseismic studies along the Oregon coast indicate that the state has experienced seven Cascadia Subduction Zone (CSZ) events possibly as large as M9 in the last 3,500 years. These events are estimated to have an average recurrence interval between 500 and 600 years, although the time interval between individual events ranges from 150 to 1000 years. Scientists estimate that the chance in the next 50 years of a great subduction zone earthquake is between 10 and 20 percent assuming that the recurrence is on the order of 400±200 years.^{xix}

A high magnitude earthquake could have significant impacts in Estacada. The Scotts Mills quake of 1993 created floor cracks in the Cazadero strip mall and neighboring building, and created a large crack on the backside of the old theater. The theater was torn down because damages were so severe. A number of buildings in Estacada were built before stricter seismic building codes were adopted, making them more susceptible to damage in earthquake events. The main fire station is not up to seismic standards, and a number of older buildings have not been seismically assessed. In 2007, the Department of Geology and Mineral Industries (DOGAMI) released the results of the Statewide Seismic Needs Assessment, which evaluated the collapse potential of education and emergency services buildings. The study found all schools and the fire station to have a

low (<1%) collapse potential.^{xx} Clackamas River Elementary School was rebuilt in 2001 and Estacada Jr. High had seismic work completed. Please see Clackamas County's Natural Hazards Mitigation Plan for additional information regarding potential earthquake-related impacts.

Clackamas County estimates a high probability that earthquakes will occur in the future (event is likely within a 10 to 35 year period), and a high vulnerability to earthquake events (more than 10% of the population and assets would likely be affected in a major event). Both ratings are true for the city of Estacada as well.

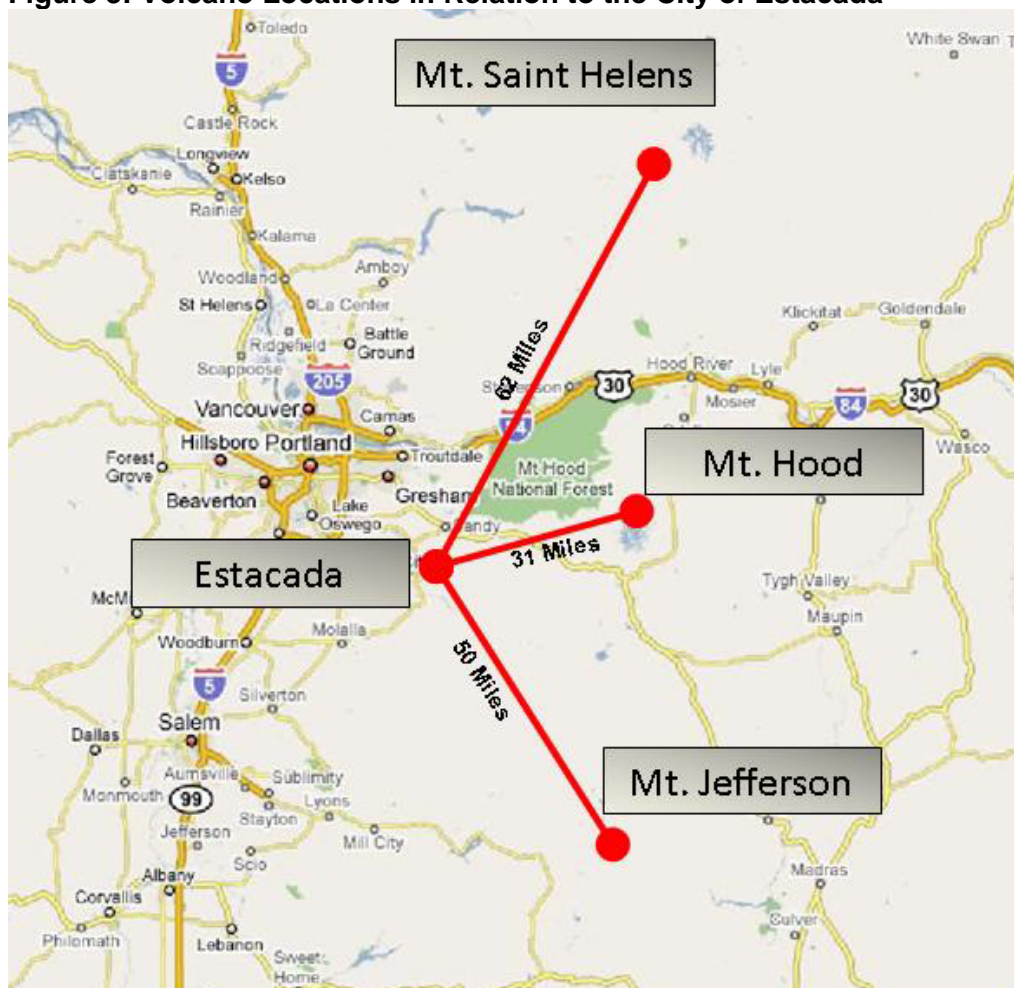
3.6 Volcano

The Clackamas County Natural Hazards Mitigation Plan adequately describes the causes and characteristics, history, location, extent, and impacts of volcanic eruptions affecting the City of Estacada. Descriptions of the volcano hazard can be found on pages 12-1 to 12-13 of the 2002 Clackamas County Natural Hazards Mitigation Plan and pages 61 to 64 of the 2007 plan update.

Immediate danger areas for volcanic eruptions lie within a 20-mile radius of the blast site, and ashfall is likely to affect communities downwind of the eruption. Several volcanoes are located near Estacada, the closest of which are shown in Figure 3 below.

Additionally, Mount Adams is located north of Mount Hood; Mount Rainier is located north of Mount Saint Helens; and the Three Sisters lie to the south of Mount Jefferson.

Figure 3: Volcano Locations in Relation to the City of Estacada



Due to Estacada’s relative distance from volcanoes, the city is unlikely to experience the immediate effects that eruptions have on surrounding areas (i.e., mud and debris flows, or lahars). Depending on wind patterns and which volcano erupts, however, the city may experience ashfall. The eruption of Mount St. Helens in 1980, for example, coated the

Willamette Valley with a fine layer of ash. If Mount Hood erupts the city is likely to be fully coated in ash.

Clackamas County estimates a low probability that volcanic eruptions will occur in the future (one incident within a 75-100 year period), and a high vulnerability (>10% of population or assets affected) to volcanic events. Both ratings are true for the city of Estacada as well. Hazards related to volcanic eruptions (i.e., potential community impacts) are adequately described in the Clackamas County Natural Hazards Mitigation Plan. Although the City of Estacada is unlikely to experience lahars or lava flows, tephra (sand-sized or finer particles of volcanic rock that is ejected rapidly into the air from volcanic vents) drifts downwind from the explosions and can form a blanket-like deposit of ash. Tephra is a public health threat, and can damage agriculture and transportation systems (i.e., aircraft and on-the-ground vehicles). Tephra can also clog drainage systems and create major debris management problems. Within Estacada, public health would be a primary concern, and keeping transportation routes open/accessible would be important as well.

Section 4: Action Items

4.1 Action Items

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. Each action item has a corresponding action item worksheet describing the activity, the project's rationale, potential ideas for implementation, and coordinating / partner organizations. The action item worksheets can assist the community in pre-packaging potential projects for grant funding. Full action item worksheets are located in Appendix B of this addendum.

- MH #1: Develop public education programs to inform the public about methods of mitigating the impacts of natural hazards.
- MH #2: Integrate the goals and action items from the Natural Hazards Mitigation Plan into existing regulatory documents and programs, where appropriate.
- MH #3: Identify and pursue funding opportunities to develop and implement hazard mitigation activities.
- MH #4: Continue to update and improve hazard assessments in the Natural Hazards Mitigation Plan as new information becomes available.
- FL #1: Ensure continued compliance in the National Flood Insurance Program (NFIP) through enforcement of local floodplain management ordinances.
- FL #2: Implement the projects detailed in the Storm Water Master Plan
- FL #3: Conduct a study on the drain system to evaluate efficiency.
- WF #1: Review, promote, and implement action items identified in the Clackamas County Wildfire Protection Plan.
- SS #1: Reduce negative effects from severe windstorm and severe winter storm events.
- EQ #1: Conduct seismic evaluations and upgrades on all critical city facilities for implementing appropriate structural and non-structural mitigation strategies.

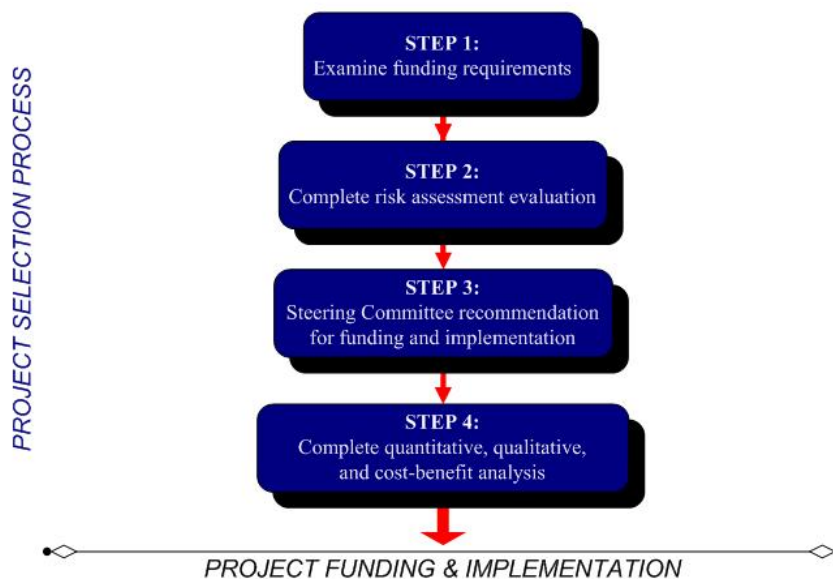
Note: the City of Estacada does not believe that implementing landslide or volcano-related mitigation activities will be cost-effective at this time. As such, the city has not identified landslide or volcanic-eruption mitigation action items. Estacada will partner with Clackamas County, however, on the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

4.2 Project Prioritization Process

The Disaster Mitigation Act of 2000 (via the Pre-Disaster Mitigation Program) requires that jurisdictions identify a process for prioritizing potential actions. Potential mitigation activities often come from a variety of sources; therefore the project prioritization process needs to be flexible. Projects may be identified by committee members, local government staff, other planning documents, or the risk assessment. Figure 4 illustrates the project prioritization process.

Figure 4: Project Prioritization Process

Action Item and Project Review Process



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

Step 1: Examine funding requirements

The first step in prioritizing the plan's action items is to determine which funding sources are open for application. Several funding sources may be appropriate for the city's proposed mitigation projects. Examples of mitigation funding sources include but are not limited to: FEMA's Pre-Disaster Mitigation competitive grant program (PDM), Flood Mitigation Assistance (FMA) program, Hazard Mitigation Grant Program (HMGP), National Fire Plan (NFP), Community Development Block Grants (CDBG), local general funds, and private foundations, among others.

Because grant programs open and close on differing schedules, the Hazard Mitigation Advisory Committee (HMAC) will examine upcoming funding streams' requirements to determine which mitigation activities would be eligible. The HMAC may consult with the funding entity, Oregon Emergency Management, or other appropriate state or regional organizations about project eligibility requirements. This examination of funding sources and requirements will happen during the HMAC's semi-annual plan maintenance meetings.

Step 2: Complete risk assessment evaluation

The second step in prioritizing the plan's action items is to examine which hazards the selected actions are associated with and where these hazards rank in terms of community risk. The HMAC will determine whether or not the plan's risk assessment supports the implementation of eligible mitigation activities. This determination will be based on the location of the potential activities, their proximity to known hazard areas, and whether community assets are at risk. The HMAC will additionally consider whether the selected actions mitigate hazards that are likely to occur in the future, or are likely to result in severe / catastrophic damages.

Step 3: Committee recommendation

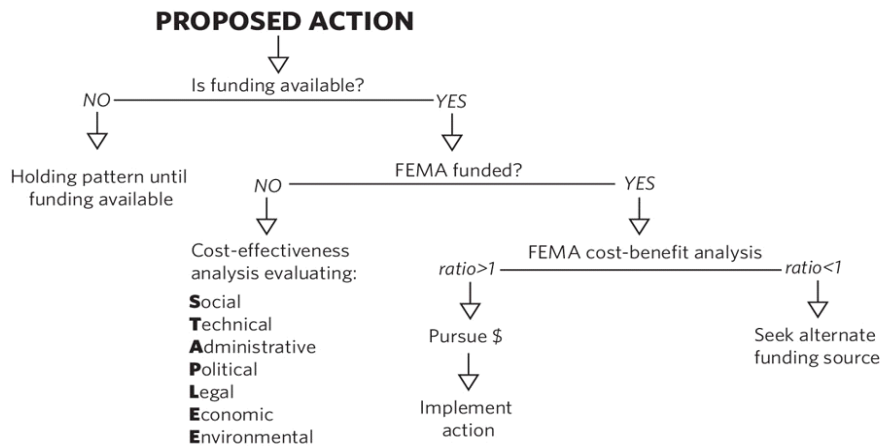
Based on the steps above, the HMAC will recommend which mitigation activities should be moved forward. If the HMAC decides to move forward with an action, the coordinating organization designated on the action item form will be responsible for taking further action and, if applicable, documenting success upon project completion. The HMAC will convene a meeting to review the issues surrounding grant applications and to share knowledge and/or resources. This process will afford greater coordination and less competition for limited funds.

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

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

The fourth step is to identify the costs and benefits associated with the selected natural hazard mitigation strategies, measures or projects. Two categories of analysis that are used in this step are: (1) benefit/cost analysis, and (2) cost-effectiveness analysis. Conducting benefit/cost analysis for a mitigation activity assists in determining whether a project is worth undertaking now, in order to avoid disaster-related damages later. Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. Determining the economic feasibility of mitigating natural hazards provides decision makers with an understanding of the potential benefits and costs of an activity, as well as a basis upon which to compare alternative projects. Figure 5 shows decision criteria for selecting the appropriate method of analysis.

Figure 5: Benefit Cost Decision Criteria



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

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

For non-federally funded or nonstructural projects, a qualitative assessment will be completed to determine the project's cost effectiveness. The committee will use a multivariable assessment technique called STAPLE/E to prioritize these actions. STAPLE/E stands for Social, Technical, Administrative, Political, Legal, Economic, and Environmental. Assessing projects based upon these seven variables can help define a project's qualitative cost effectiveness.

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- ⁱ Western Regional Climate Center, www.wrcc.dri.edu, Estacada 2 SE, Oregon (352693), accessed July 8, 2009.
- ⁱⁱ Ibid.
- ⁱⁱⁱ Ibid.
- ^{iv} 2005 Buildable Lands Inventory, 3-4
- ^v US Census, “Tenure, Household Size and Age of Householder:2000” accessed July 10, 2009.
- ^{vi} Estacada History, Accessed July 8, 2009. <http://estacadachamber.net/main/>
- ^{vii} City of Estacada, accessed July 8, 2009. <http://www.cityofestacada.org/>
- ^{viii} Oregon Economic & Community Development Department, Estacada Community Profile, accessed July 8, 2009. <http://info.econ.state.or.us:591/FMPro?db=Community.fp4&Format=forms.htm&lay=webpage&op=eq&sort%20name=Estacada&Find>
- ^{ix} US Census Bureau, “Journey to Work: 2000”
- ^x Estacada History, Accessed July 8, 2009. <http://estacadahistory.com/index.html>
- ^{xi} Estacada Chamber of Commerce, Accessed July 8, 2009. <http://estacadachamber.net/main/>
- ^{xii} Burby, Raymond J., ed. 1998. *Cooperating with Nature: Confronting Natural Hazards with Land-Use Planning for Sustainable Communities*.
- ^{xiii} Storm Water Master Planning update, 2009
- ^{xiv} Ibid.
- ^{xv} Clackamas County Community Wildfire Protection Plan, 2005. Page 16-18.
- ^{xvi} Madin, Ian, 1990. *Earthquake-hazard geology maps of the Portland metropolitan area, Oregon; text and map explanation: Portland, OR*. Oregon Department of Geology and Mineral Industries.
- ^{xvii} Yeats, R.S., Graven, E.P., Werner, K.S., Goldfinger, C., and Popowski, T., 1996. *Tectonics of the Willamette Valley, Oregon*. U.S. Geological Survey Professional Paper 1560
- ^{xviii} Goldfinger, C., L. D. Kulm, R. S. Yeats, C. Hummon, G. J. Huftile, A. R. Niem, C. G. Fox, and L. C. McNeill, 1996. *Oblique strike-slip faulting of the Cascadia submarine forearc: the Daisy Bank fault zone off central Oregon*, in Subduction Top to Bottom, G. E. Bebout, D. Scholl, S. Kirby and J. P. Platt (Editors), American Geophysical Monograph 96, 65–74.
- ^{xix} NOAA, 1993. Tsunamis affecting the West Coast of the United States: 1806-1992.
- ^{xx} Department of Geology and Mineral Studies, 2007. *Statewide Seismic Needs Assessment: Implementation of Oregon 2005 Senate Bill 2 relating to public safety, earthquakes, and seismic rehabilitation of public buildings*. <http://www.oregongeology.org/sub/projects/rvs/OFR-O-07-02-SNAA-onscreen.pdf>.

Appendix A: Planning & Public Process



Meeting: Estacada Natural Hazard Mitigation Plan Meeting 1
Date: June 18, 2009
Time: 10:00 to 12:00pm
Location: City Hall

MINUTES

1. Meeting Attendees
 - a. Dennis Anderson, Reliance Connects
 - b. Becky Arnold, Mayor of Estacada
 - c. Joe Gamble, Estacada School District
 - d. Fred Hertel, Estacada Fire District
 - e. Tom Seal, Public Works
 - f. Dave Stone, Public Works Lead Operator
 - g. Melanie Wagner, Assistant to City Manager
 - h. Jay Wilson, Clackamas County Emergency Management
2. Plan Overview
 - a. Laurel reviewed the reasons and benefits for having a natural hazards mitigation plan. Cities with FEMA approved mitigation plans are eligible for funding through FEMA's Hazard Mitigation Grant Program and Pre-Disaster Mitigation Grants.
 - b. Laurel explained the "disaster cycle" to the group, stating that after an event the cycle goes from response to recovery to mitigation and finally to preparedness. Laurel emphasized that the natural hazard mitigation plan (NHMP) focuses on the mitigation portion of the disaster cycle.
 - c. Laurel then showed the group the "understanding risk" diagram, saying natural hazards are chronic and potential events. We cannot always predict or control them, and they will happen. 'The vulnerable system' is the city. These are things that can be controlled. The "risk of disaster" is the overlap between natural hazards and vulnerable systems. The goal of a NHMP is to separate the two bubbles so humans can limit or mitigate any issues that can arise from the area of overlap.
 - d. Lastly, Laurel explained why existing plans, policies, community organizations and programs are helpful for NHMPs. Ideally mitigation would be an element of every city plan, making it easier to infuse mitigation planning into numerous facets of the city.
3. Community Assets
 - a. The group reviewed a list of community assets Laurel created and added to the list as necessary.
 - b. Items with a * next to them designates the facility is outside city limits
 - c. Critical Facilities: Those facilities necessary for emergency response efforts:

- i. City Hall
- ii. Main Fire Station (#110)
- iii. George Community Fire Station (#115)
- iv. Estacada Fire District Administration Building/EOC
- v. Shelters sites
- vi. Communications Center at 303 SW Oberst (?)
- vii. Clackamas County Sherriff's Office/Community Center
- d. Essential Facilities: Those facilities and infrastructure that supplement response efforts
 - i. Library
 - ii. Schools
 - 1. Estacada High School
 - 2. Estacada Junior High
 - 3. River Mill Elementary
 - 4. Eagle Creek Elementary*
 - iii. Thriftway Grocery Store
 - iv. McIver Park*
 - v. Forest Service Office*
- e. Critical Infrastructure: Infrastructure that provides services for the city
 - i. Highway 211
 - ii. Highway 224
 - iii. Springwater
 - iv. Redland
 - v. Utility Lines (Telephone, Power)
 - vi. Bridges
 - 1. Highway 211 Bridge
 - 2. Highway 224 Bridge over Eagle Creek
 - 3. Three bridges on 6th Ave
 - 4. Bridge on Cemetery Road
 - 5. Box culvert on Wade Street
 - vii. Water treatment, storage, and distribution lines
 - viii. Waste water treatment plant
 - ix. Water treatment plant
 - x. Wastewater pump stations
 - xi. PGE substation
- f. Vulnerable Populations: Locations serving populations that have special needs or require special consideration.
 - i. Schools
 - ii. Mobile Home Parks
 - 1. Altramar II
 - 2. Estacada Mobile Village
 - 3. Mountain View Mobile Estates
 - 4. Silver Fox RV Park
 - iii. Adult Care Facilities
 - 1. Golden Years
 - 2. Grace House

3. 300 Main Retirement
 4. Senior Community Center
 5. Whispering Pines
 - iv. Daycare Centers
 1. Red Barn Co-Op Preschool
 2. Summer Daycare at River Mill Elementary and Eagle Creek Elementary
 - g. Cultural or Historical Assets: These assets include facilities that augment or help define community character, and if lost would represent a significant loss for the community
 - i. Spiral Gallery
 - ii. Historical Survey recently completed – Melanie will provide Laurel with the list
 - h. Economic Assets/Population Centers: *Economic Centers* are businesses that employ large numbers of people, and provide an economic resource to the city. If damaged, the loss of these economic centers could significantly affect economic stability and prosperity. *Population Centers* usually are aligned with economic centers, and will be of particular concern for evacuation/notification during a hazard event.
 - i. Estacada/Clackamas River Area Chamber of Commerce
 - ii. Industrial Park on Park Avenue
 - iii. Thriftway
 - i. Environmental Assets: Those parks, green spaces, wetlands, and rivers that provide and aesthetic and functional service for the community
 - i. Clackamas River
 - ii. Wade Creek Park
 - iii. Timber Park
 - iv. Wade Creek
4. Hazard Identification
- a. Laurel provided the group with information from the county plan detailing each hazard. The group reviewed each hazard and added Estacada-specific information. The following is in addition to the handout:
 - b. Flood
 - i. The surrounding hills drain into Estacada. Heavy rains can lead to urban flooding because the added water from the hills can overpower the storm drain system.
 - ii. The main source of flooding is from the smaller tributaries and hillside runoff, not the Clackamas River.
 - iii. February 1996: trees and debris came down from the hills but this caused flooding further down the Clackamas River, not in Estacada. Wade Creek spilt out of its banks and flowed down the street.
 - iv. January 1-2, 2009: The build up of snow mixed with the heavy rains caused a number of water retention ponds located in the hills above Estacada to break. The water from the hills carried a great

deal of debris with it and clogged culverts around the city. The culvert near Estacada High School clogged and flooded the gym and Jr. High basement. The Jr. High was closed for a week while the basement was cleaned out. Wade Creek overflowed its banks and flooded Cazadero Court, the library, and the waste water treatment plant.

v. Impacts

1. A culvert runs near the homes on 4th street and they experience flooding of their lawns almost annually.
2. Hill Way had a creek running aside it so the developer filled the creek in and constructed houses on top of it. Now if the pipe diverting the creek clogs, water will rush across the street.
3. Wade Creek is the ‘hot spot’ in town.

vi. Probability: High

vii. Vulnerability: Moderate

viii. Mitigation Steps

1. The catch basins and storm drains are cleaned at least annually
2. Regular street sweeping
3. Storm Water Master Plan is being updated
4. Ditches are cleaned regularly

c. Landslide

- i. In 1996 sliding occurred behind Bennett’s Tire. Another slide occurred on Espinosa, causing a house to slide and debris to run onto Highway 224.
- ii. In 2005 a small slide occurred on the hill at Broadway between 1st and SW 2nd Ave. About 20 yards worth of material came down but nothing was damaged. This area was rip wrapped and no problems have occurred since.

iii. Impacts

1. Areas that could potentially experience landslides include:
 - a. The hill in between Ginseng and Shafford Street
 - b. Cazadero Heights
 - c. Forest Glen
 - d. Subdivision on Carol overlooking Coupland
 - e. Southern end of Espinosa
 - f. Foothills subdivision

iv. Probability: High

v. Vulnerability: Low

vi. Mitigation Steps

1. Development on steep slopes must have a geotech report completed. All construction on steep slopes must revegetate the hillsides.

d. Wildfire

- i. No history to add to the county plan.

- ii. Clackamas County Community Wildfire Protection Plan: 2002 Bowl Fire burned over 300 acres just east of Estacada
- iii. Impacts
 - 1. There is low potential for a fire within city limits but the urban/wildland interface is to the east and southeast of the city. A good deal of farmland surrounds the city, reducing the fuel load. The Clackamas River provides a natural fuel break from the heavily wooded areas southwest of Estacada.
 - 2. Areas of dense vegetation within city limits include
 - a. The hill west of Ginseng
 - b. The area south of SE Coupland Road
 - c. Along 224 east of town
 - d. East of Espinosa
 - e. Brush behind the fire station could catch fire and head up the hill, impacting one house
- iv. Probability: Moderate
- v. Vulnerability: Low. The committee believes Estacada has limited wildfire lands and fuels. Natural fire breaks help protect the city from the wildland/urban interface, lowering the fire spread potential.
- vi. Mitigation Steps
 - 1. City Code enforces grass height and noxious weeds
 - 2. Estacada Fire gives detailed instructions when they issue burn permits
 - 3. participated in creating the Community Wildfire Protection Plan and hosted a community meeting
- e. Severe Storm: Wind and Winter
 - i. The county plan's description of history, location, extent and impacts applies to Estacada
 - ii. The December 14-15, 2006 windstorm was the biggest storm in recent memory, causing a number of branches to come down and power outages. An oak tree was cut down because the tree received extensive damage and a number of branches fell.
 - iii. Impacts
 - 1. PGE power lines are overhead
 - 2. Lakeshore Drive is the most affected street in the city. The road runs parallel to the Clackamas River and is lined with large fir trees. Lakeshore usually requires a good deal of clean up after a storm, as branches and debris fall in the streets. The street has overhead power lines so power outages are frequent.
 - 3. There are lots of trees behind the cemetery that could cause problems in a big windstorm. This could affect the high school grounds.

4. Estacada's power grid is divided, so usually the power will only go out in half the town at a time.
5. The power does not stay out very long, but it has been out for at least three days at a time on Lakeshore Drive.
- iv. Probability: 'High' for winter and wind. This is higher than the county's 'moderate' wind rating because history has shown that the city has large windstorms frequently.
- v. Vulnerability: 'High' for wind and winter storms. This is higher than the county's 'moderate' winter storm and 'low' wind storm vulnerability ratings because Estacada can become fairly isolated when a big storm hits. More than 10% of the city is affected when the power goes out.
- vi. Mitigation Steps
 1. Phone lines are mostly underground
 2. Plow arterials and hills first, then move to smaller streets
- f. Earthquake
 - i. County's description of causes and characteristics, location, extent, and impacts is applicable to Estacada.
 - ii. The Scotts Mills quake of 1993 created floor cracks in the Cazadero strip mall and neighboring building. The old theater was torn down after because of a large crack on the backside of the building.
 - iii. Impacts
 1. The main fire station is not seismically retrofitted
 2. Have some older buildings, not totally sure of their structural integrity
 - iv. Probability: High
 - v. Vulnerability: High
 - vi. Mitigation
 1. Clackamas River Elementary was rebuilt in 2001 and is structurally sound
 2. Jr. High has seismic work completed
- g. Volcano
 - i. The county plan's description of the causes and characteristics, location, extent, and impacts of a volcanic eruption apply to Estacada.
 - ii. Impacts
 1. The rivers and creeks could flood if enough ash and debris choked it up
 - iii. Probability: Low
 - iv. Vulnerability: High

5. Next Time: Action Items

- a. At the next meeting we'll come up with action items to address the vulnerabilities identified in this meeting. Think of the action items like a



wish list – if someone gave you a pot of money to spend on mitigation work what would you do? These action items can include projects that are planned or things you'd like to see changed. Laurel will bring a list of suggested action items and the group will add their own action items.

Estacada Planning Meeting 1 June 18, 2009

Name	Jurisdiction / Title	Email
Becky Arnold	Mayor	mayor@cityofestacada.org
Melanie Wagner	assist. to C.M.	wagner@cityofestacada.org
DAVE STONE	LEAD OPERATOR	ESTWLDTP@CITYOFESTACADA
DENNIS ANDERSON	RELIANCE CONNECTS	andersond@coaccess.net
Tom Seal	Public Works	
Joe Gamble	Estacada School Dist	gamblej@estacada.k12.or.us
Jay Wilson	Clack County Haz. Mit. Coordinator	on file
Fred Hertel	Estacada Fire Dist.	fhertel@estacadafire.org

Meeting: Estacada Natural Hazards Mitigation Plan Meeting 2
Date: July 13, 2009
Time: 10:00am to 12:00pm
Location: Estacada City Hall

MINUTES

1. Meeting Attendees
 - a. Dennis Anderson, Reliance Connects
 - b. Becky Arnold, Mayor of Estacada
 - c. Joe Gamble, Estacada School District
 - d. Fred Hertel, Estacada Fire District
 - e. Tom Seal, Public Works
 - f. Dave Stone, Public Works Lead Operator
 - g. Melanie Wagner, Assistant to City Manager

2. Meeting 1 Minutes Questions
 - a. Laurel had a couple clarifying questions about the first meeting minutes regarding culverts vs. bridges.
 - b. The meeting 1 minutes have been updated to reflect the group discussion.

3. Formal Review Process and Plan Maintenance
 - a. The City Manager will be responsible for assigning representatives to the committee
 - b. The committee will meet twice a year. The first meeting will be held in the spring to discuss the previous hazard season (severe storm, flood, etc) and prepare for upcoming hazard seasons (wildfire, earthquake awareness month, etc). The second meeting will be held in the fall.
 - c. During the first meeting, the committee will:
 - Discuss funding opportunities for the implementation of mitigation strategies.
 - Review existing action items to determine appropriateness for funding;
 - Educate and train new members on the plan and mitigation in general; and
 - Identify issues that may not have been identified when the plan was developed.During the second meeting of the year, the committee will:
 - Review existing and new risk assessment data, and incorporate this information into the plan;
 - Document success in implementing mitigation actions and/or applying for funding;
 - Discuss the addition and/or subtraction of mitigation actions from the plan;

- Discuss methods for continued public involvement;
 - Document successes and lessons learned during the year; and
 - Generate a list of members that should be included in future meetings.
- d. Timeline for plan updates
- i. The plan will be updated every five years follow the follow county's update cycle. This means the first update will be due in September 2012.
 - ii. The update process will begin in September 2011 to allow sufficient time for update activities and FEMA review.
- e. The City Manager will be responsible for developing and facilitating plan update meetings. The committee will assist the convener throughout the update process.
- f. During the plan evaluation the committee will ask:
- Have public involvement activities taken place since the plan was adopted?
 - Are there new hazards that should be addressed?
 - Have there been hazard events in the community since the plan was adopted?
 - Have new studies or previous events identified changes in any hazard's location or extend?
 - Has vulnerability to any hazard changed?
 - Have development patterns changed? Is there more development in hazard prone areas?
 - Do future annexations include hazard prone areas?
 - Are there new high risk populations?
 - Are there completed mitigation actions that have decreased overall vulnerability?
 - Did the plan document and/or address National Flood Insurance Program repetitive loss properties?
 - Did the plan identify the number and type of existing and future buildings, infrastructure, and critical facilities in hazards areas?
 - Did the plan identify data limitations?
 - Did the plan identify potential dollar losses for vulnerable structures?
 - Are the plan goals still relevant?
 - What is the status of each mitigation action?
 - Are there new actions that should be added?
 - Is there an action dealing with continued compliance with the National Flood Insurance Program?
 - Are changes to the action item prioritization, implementation, and/or administration processes needed?

- Do changes need to be made within the five year update schedule?
 - Is mitigation being implemented through existing planning mechanisms (such as comprehensive plans, or capital improvement plans)?
4. Review Anatomy of an Action Item
 - a. Laurel reviewed the pieces of an action item and answered any questions the group had.
 5. Update and Brainstorm Action Items
 - a. Laurel developed a list of suggested action items.
 - b. The group reviewed each action item and determined the coordinating organization, internal and external partners, and timeline.
 - c. See action item handouts for the group's final action items.
 6. Next Steps
 - a. Laurel will compile the plan and email it out to the committee for review
 - b. Once a final draft is completed it will need to be presented to the public for their comments. This can mean posting the plan online, writing a press release, presenting it at a community meeting/event, etc.
 - c. Once public comment is completed the plan will be sent into FEMA for preliminary review. Preliminary review takes between 40 and 60 days.
 - d. FEMA will either pre-approve the plan or return the plan with edits. If Laurel is not with the county the Oregon Partnership for Disaster Resilience will take over.
 - e. After we've gained pre-approval the plan will need to be adopted by City Council and then resent to FEMA for official approval.

Meeting 2 - July 13, 2009 10:00am

Name	Jurisdiction / Title	Email
Joe Gamble	Director of Facilities Estacada School Dist	gamblej@estacada.k12.or.us
DENNIS ANDERSON	PROJECT MANAGER, RELIANCE CONNECTS	andersond@cvaaccess.net
Melanie Wagner	Asst. to City Manager, City of Estacada	wagner@cityofestacada.org
Fred Hertel	Deputy Chief, Estacada Fire Dist.	fhertel@estacadafire.org
Joe Seal	LEAS OPERATOR City of ESTACADA	ESTWUTP@cityofestacada.org
Tom Seal	Public Works Director	seal@cityofestacada.org
Becky Arnold	Mayor, Estacada	mayor@cityofestacada.org

Appendix B: Action Item Worksheets

Multi Hazard #1

Proposed Action Item:		Alignment with Plan Goals:	
Develop public education programs to inform the public about methods of mitigating the impacts of natural hazards.		<i>Protect Life and Property, Promote Public Awareness, Encourage Partnerships and Implementation</i>	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • Conducting public outreach campaigns raises awareness about natural hazards and helps illustrate what residents and businesses can do to reduce the impact of a natural disaster on their properties, thereby significantly reducing the impact of natural hazards on the City of Estacada. • The Disaster Mitigation Act of 2000 requires that communities continue to involve the public beyond the original planning process [201.6(c)(4)(ii)]. Developing public education programs for hazard risk mitigation would be a way to keep the public informed of, and involved in, the county's actions to mitigate hazards. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Conduct public education as hazard seasons approach. These include earthquake awareness month in April, wildfire prevention in summer, and flood and severe storm information in winter; • Educate citizens on the importance of proper yard debris disposal; • Identify property owners in flood, landslide, and wildfire hazard zones, and conduct a target mailing to disseminate information on all hazards; • Target neighborhood associations to sponsor CERT teams; • Partner with Clackamas County and other jurisdictions to develop public education flyers for all hazards; • Include insurance information in public outreach and education materials and promote purchase of appropriate insurance coverage; • Include hazard information on the city website and link to the Estacada Rural Fire District #69 website; and • Utilize the city newsletter, Estacada News, and AM radio station to disseminate hazard information 			
Coordinating Organization:		City Manager's Office	
Internal Partners:		External Partners:	
Hazard Mitigation Advisory Committee		Estacada Fire District, Estacada News, Clackamas County, Oregon Partnership for Disaster Resilience, Oregon Emergency Management	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
Ongoing			
Form Submitted by:	Hazard Mitigation Advisory Committee		
Status	New Action, 2009.		

Multi Hazard #2

Proposed Action Item:		Alignment with Plan Goals:
Integrate the goals and action items from the Natural Hazards Mitigation Plan into existing regulatory documents and programs, where appropriate.		<i>Protect Life and Property, Promote Public Awareness, Enhance Natural Systems, Encourage Partnerships and Implementation, Augment Emergency Services</i>
Rationale for Proposed Action Item:		
<ul style="list-style-type: none"> The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community [201.6(c)(3)(ii)]. Incorporating natural hazards plans into comprehensive plans, local ordinances, and land-use regulations will ensure that communities implement the proper mitigation measures for their community. 		
Ideas for Implementation:		
<ul style="list-style-type: none"> Use the mitigation plan to help the city's Comprehensive Land Use Plan meet State Land Use Planning Goal 7, designed to protect life and property from natural disasters and hazards through planning strategies that restrict development in areas of known hazards; Integrate the city's mitigation actions into the current emergency operations plan and capital improvement plans (where appropriate); Incorporate the Natural Hazards Mitigation Plan into conditions of approval where appropriate; Use citizen input for the creation of appropriate ordinances; and Use the natural hazard mitigation planning resources provided by the Oregon Partnership for Disaster Resilience to learn how to better integrate the NHMP into existing documents and programs. 		
Coordinating Organization:	City Manager's Office	
Internal Partners:		External Partners:
City Council, Planning Commission		Oregon Partnership for Disaster Resilience, Clackamas County
Timeline:		If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)	
Ongoing		
Form Submitted by:	Hazard Mitigation Advisory Committee	
Status	New Action, 2009.	

Multi Hazard #3

Proposed Action Item:		Alignment with Plan Goals:
Identify and pursue funding opportunities to develop and implement hazard mitigation activities.		<i>Protect Life and Property, Promote Public Awareness, Enhance Natural Systems, Encourage Partnerships and Implementation, Augment Emergency Services</i>
Rationale for Proposed Action Item:		
<ul style="list-style-type: none"> • Implementation cannot occur without proper funding. The switch from planning to implementation is the step that begins the reduction of risk. • The Pre-Disaster Mitigation Grant Program provides funds for hazard mitigation planning and project implementation prior to a disaster event. PDM grants are nationally competitive. • The Hazard Mitigation Grant Program provides funds to implement long-term hazard mitigation measures and projects after a major disaster declaration. HMGP funds are available to communities within states that have recently received Presidential Disaster Declarations. HMGP funds are prioritized for communities that are directly affected by a disaster, but communities outside of the disaster declaration are typically eligible as well. • Flood Mitigation Assistance helps communities implement measures that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the National Flood Insurance Program. 		
Ideas for Implementation:		
<ul style="list-style-type: none"> • Meetings will be held semi-annually to discuss, update, and implement actions in the NHMP. Funding opportunities should also be discussed at the semi-annual meetings. • Develop incentives for special service districts, citizens, and businesses to pursue hazard mitigation projects; • Allocate city resources and assistance to mitigation projects when possible; and • Partner with other organizations and agencies to identify grant programs and foundations that may support mitigation activities. 		
Coordinating Organization:	Hazard Mitigation Advisory Committee, City Manger’s Office, Public Works, Estacada Fire District	
Internal Partners:	External Partners:	
City Recorder, City Council	Estacada School District, Reliance Connect, Clackamas County Emergency Management, Oregon Emergency Management, FEMA Region X	
Timeline:	If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)	
Ongoing		
Form Submitted by:	Hazard Mitigation Advisory Committee	
Status	New action, 2009.	

Multi Hazard #4

Proposed Action Item:		Alignment with Plan Goals:	
Continue to update and improve hazard assessments in the Natural Hazards Mitigation Plan as new information becomes available.		<i>Promote Public Awareness, Augment Emergency Services</i>	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • At this time the city does not have in-house GIS capabilities. • The city was unable to conduct a quantitative risk analysis for most hazards. • Oregon updates the state risk assessment once every three years. Communities are informed of new risk information if it affects areas in their jurisdiction. • New demographic data will become available after the 2010 census. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Continue to update vulnerability assessment as data becomes available and new development occurs; • Cooperate with participating agencies or secure funding needed to obtain data to perform a risk analysis; • Actively use data to update vulnerability assessment; • Use new data to guide public outreach programs and update educational outreach pieces as new data becomes available; and • Update codes and city policies when new data and information becomes available as required by state planning goal 7. 			
Coordinating Organization:		Hazard Mitigation Advisory Committee	
Internal Partners:		External Partners:	
City Council, City Manager's Office		Clackamas County Emergency Management, DOGAMI, FEMA	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
Ongoing			
Form Submitted by:	Hazard Mitigation Advisory Committee		
Status	New Action, 2009.		

Flood #1

Proposed Action Item:		Alignment with Plan Goals:	
Ensure continued compliance in the National Flood Insurance Program (NFIP) through enforcement of local floodplain management ordinances.		<i>Protect Life and Property, Promote Public Awareness, Enhance Natural Systems, Encourage Partnerships and Implementation, Augment Emergency Services</i>	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • The National Flood Insurance Program provides communities with federally backed flood insurance to homeowners, renters, and business owners, provided that communities develop and enforce adequate floodplain management ordinances. The benefits of adopting NFIP standards for communities are a reduced level of flood damage in the community and stronger buildings that can withstand floods. According to the NFIP, buildings constructed in compliance with NFIP building standards suffer approximately 80 percent less damage annually than those not built in compliance. • The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Continued participation in the NFIP will help reduce the level of flood damage to new and existing buildings in communities while providing homeowners, renters and business owners additional flood insurance protection. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Community Assistance Visits (CAV) are scheduled visits to communities participating in the NFIP for the purpose of: 1) conducting a comprehensive assessment of the community's floodplain management program; 2) assisting the community and its staff in understanding the NFIP and its requirements; and 3) assisting the community in implementing effective flood loss reduction measures when program deficiencies or violations are discovered. Actively participate with DLCD and FEMA during Community Assistance Visits. • Conduct an assessment of the floodplain ordinances to ensure they reflect current flood hazards and situations, and meet NFIP requirements; • Coordinate with the county to ensure that floodplain ordinances and NFIP regulations are maintained and enforced; and • Mitigate areas that are prone to flooding and/or have the potential to flood. These areas include homes adjacent to Wade Creek, Hill Way, and 4th Street. 			
Coordinating Organization:		City Manager's Office	
Internal Partners:		External Partners:	
Public Works		FEMA, Department of Land Conservation and Development, Clackamas County Planning Department, Oregon Emergency Management	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
Ongoing			
Form Submitted by:		Hazard Mitigation Advisory Committee	
Status		New Action, 2009.	

Flood #2

Proposed Action Item:		Alignment with Plan Goals:	
Implement the projects detailed in the Storm Water Master Plan.		<i>Protect Life and Property, Enhance Natural Systems, Augment Emergency Services</i>	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> Stormwater management is a key element in maintaining and enhancing a community's livability. There is a direct link between stormwater and a community's surface and ground waters. As a community develops, the impervious surfaces that are created increase the amount of runoff during rainfall events, disrupting the natural hydrologic cycle. Without control, these conditions erode stream channels and prevent groundwater recharge. Parking lots, roadways, and rooftops increase the pollution levels and temperature of stormwater runoff that is transported to streams, rivers, and groundwater resources. Protecting these waters is vital for a great number of uses, including fish and wildlife habitat, recreation, and drinking water. The Estacada Stormwater Management Plan includes projects to improve the stormwater system. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> Identify funding sources to implement projects; Projects include channel improvement, ditch restoration, culvert replacement, erosion protection, ditch and culvert improvement, box culvert creation, and storm drain installation. 			
Coordinating Organization:		Public Works Department	
Internal Partners:		External Partners:	
City Manager's Office		Engineering Firm	
Timeline:		If available, estimated cost:	
Short Term (0-2 years)	Long Term (2-4 or more years)		
	Ongoing		
Form Submitted by:		Hazard Mitigation Advisory Committee	
Status		New Action, 2009.	

Flood #3

Proposed Action Item:		Alignment with Plan Goals:
Conduct a study on the storm drain system to evaluate efficiency.		<i>Protect Life and Property, Enhance Natural Systems</i>
Rationale for Proposed Action Item:		
<ul style="list-style-type: none"> • The sewage treatment plant pond overflowed in the 2009 flood and caused additional flooding. • A number of the city's drainage ditches and culverts can become clogged with debris from trees and other plants. • Wade Creek pond can overflow and drain down into the waste water treatment plant. 		
Ideas for Implementation:		
<ul style="list-style-type: none"> • Research consulting firms that specialize in drainage systems; • Identify funding to conduct a study; and • Modify the outflow culvert to open and close more easily. 		
Coordinating Organization:	City Manager's Office	
Internal Partners:		External Partners:
Public Works		Clackamas County Water Environment Services
Timeline:		If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)	
	Ongoing	
Form Submitted by:	Hazard Mitigation Advisory Committee	
Status	New Action, 2009.	

Wildfire #1

Proposed Action Item:		Alignment with Plan Goals:	
Review, promote, and implement action items identified in the Clackamas County Wildfire Protection Plan.		<i>Protect Life and Property, Promote Public Awareness, Enhance Natural Systems, Encourage Partnerships and Implementation, Augment Emergency Services</i>	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on existing and new buildings and infrastructure [201.6(c)(3)(ii)]. Developing and implementing programs to improve fire-resiliency will reduce the potential for wildfires to cause damage and can assist a community in mitigating its overall risk to wildfire events. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> Develop and maintain an inventory of potential fuels reduction projects in high-risk areas, prescriptions, and list of prioritized future projects; Obtain funding to implement fuels reduction projects; Encourage use of fire-resistant construction materials, compliance with access requirements, adequate water supply, and incorporation of fuel breaks into new and existing development within the designated Wildland Urban Interface areas; and Develop and provide educational materials to developers/builders and homeowners regarding fire code standards for access, water supply, fuel breaks and vegetation in the wildland interface/forest designated areas. 			
Coordinating Organization:		Estacada Fire District	
Internal Partners:		External Partners:	
City Manager's Office, Public Works		Clackamas County Wildfire Coop, State Fire Marshal's office, Oregon Department of Forestry, Clackamas County	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
Ongoing			
Form Submitted by:	Hazard Mitigation Advisory Committee		
Status	New Action, 2009.		

Severe Storm #1

Proposed Action Item:		Alignment with Plan Goals:
Reduce negative effects from severe windstorm and severe winter storm events.		<i>Protect Life and Property, Promote Public Awareness, Encourage Partnerships and Implementation, Augment Emergency Services</i>
Rationale for Proposed Action Item:		
<ul style="list-style-type: none"> The Disaster Mitigation Act of 2000 requires communities to identify and analyze a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure[201.6(c)(3)(ii)]. Developing and implementing programs to reduce the potential for wind and winter storms to cause power outages can assist a community in mitigating its overall risk to wind and winter storms. 		
Ideas for Implementation:		
<ul style="list-style-type: none"> Reduce power outages by partnering with PGE to obtain funding to bury power lines subject to frequent failures; Encourage burial of power lines for existing development; Ensure that there are back up underground lines to major businesses & employers; Develop partnerships to implement programs to keep trees from threatening lives, property, and public infrastructure; Continue regular tree trimming practices; Partner with PGE to continue hazardous tree inventory and mitigation programs; Create sheltering programs; Promote safe installation and use of generators; and Promote 72 hour kits. 		
Coordinating Organization:	City Manager's Office	
Internal Partners:		External Partners:
Public Works		PGE, Reliance Connects, Estacada Fire District, Estacada School District, Estacada Chamber of Commerce, Red Cross
Timeline:		If available, estimated cost:
Short Term (0-2 years)	Long Term (2-4 or more years)	
	Ongoing	
Form Submitted by:	Hazard Mitigation Team	
Status	New Action, 2009.	

Earthquake #1

Proposed Action Item:		Alignment with Plan Goals:	
Conduct seismic evaluations and upgrades on all critical city facilities for implementing appropriate structural and non-structural mitigation strategies.		<i>Protect Life and Property, Encourage Partnerships and Implementation, Augment Emergency Services</i>	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • The Main Fire Station is not up to seismic standards. • The structural integrity of numerous older structures is not known. • Pre-disaster mitigation strategies will reduce post-disaster response needs by lessening life loss, injury, damage, and disruption. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Identify structures for conducting seismic evaluations; • Obtain funding to perform seismic evaluations; • Prioritize seismic upgrades based on criticality of need and population served; • Partner with appropriate organizations to implement seismic upgrades; and • Seismically retrofit facilities to guarantee continuous operation during and after a natural disaster. 			
Coordinating Organization:		City Manager's Office	
Internal Partners:		External Partners:	
Public Works Department		Estacada Fire District; DOGAMI	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
	Ongoing		
Form Submitted by:		Hazard Mitigation Advisory Committee	
Status		New Action, 2009.	