Lane County
Multi-Jurisdiction
Hazard Mitigation Plan

Version 3.0 (April 2017)

LANE COUNTY, CITY OF COBURG, CITY OF CRESWELL,
DUNES CITY, CITY OF FLORENCE, CITY OF OAKRIDGE,
CITY OF VENETA, CITY OF WESTFIR

Developed by the Lane County Hazard Mitigation & Emergency Management Steering Committee, in accordance with PUBLIC LAW 93–288 (Robert T. Stafford Disaster Relief and Emergency Assistance Act), as amended, 42 U.S.C. 5121-5207; PUBLIC LAW 106–390 (Disaster Mitigation Act of 2000); et al.

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Lane County Sheriff's Office

Byron M. Trapp, Sheriff

April 4, 2017

Oregon Office of Emergency Management
Ms. Angie Lane
State Hazard Mitigation Officer
3225 State Street, Rm 115
Salem, OR 97301

Dear Ms. Lane,

Enclosed is the '*Lane County Multi-Jurisdiction Hazard Mitigation Plan, Version 3.0*'. This 2017 version of the Plan aims to support all of Lane County, including both rural areas and incorporated cities, in becoming more aware of natural hazards and their associated risks. This Plan seeks to improve focus on development changes and making real improvements in hazard mitigation. This Plan update replaces and updates the previous '*Lane County Natural Hazards Mitigation Plan 2012 Update*'.

Questions and concerns related to content and use of this Plan should be directed to Linda Cook, Lane County Emergency Manager at 541-682-6744.

Sincerely,

Byron M. Trapp
Sheriff

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ACRONYMS AND ABBREVIATIONS

CFR	Code of Federal Regulations
COOP	Continuity of Operations Plan
CRS	Community Rating System
CSZ	Cascadia Subduction Zone
CWPP	Community Wildfire Protection Plan
DLCD	Department of Land Conservation (Oregon)
DOGAMI	Department of Geology and Mineral Industries (Oregon)
DRP	Disaster Recovery Plan
EF	Enhanced Fujita
EOP	Emergency Operations Plan
EQ	Earthquake
EWEB	Eugene Water & Electric Board
FEMA	Federal Emergency Management Association
FIRM	Flood Insurance Rate Map
FMA	Flood Management Assistance
GAO	Government Accounting Office
GIS	Geographic Information Systems
HazMat	Hazardous Materials
HM&EM-SC	Hazard Mitigation & Emergency Management Steering Committee
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
HWY	Highway
IA	Incident Annex
IFC	International Fire Code
IMS	Interpretive Map Series
IMT2	Incident Management Team Type 2
KBDI	Keetch-Byram Drought Index
LC	Lane County
LCFDB	Lane County Fire Defense Board
LCRCP	Lane County Rural Comprehensive Plan
LMD	Lane Management Division (Lane County)
MGMT	Management
MMI	Modified Mercalli Intensity
MWERS	McKenzie Watershed Emergency Response System
NCDC	National Climatic Data Center
NFIP	National Flood Insurance Program
NHMP	Natural Hazards Mitigation Plan
NID	National Inventory of Dams
NOAA	Nation Oceanic and Atmospheric Association
NRC	Natural Resources Conservation
NRCS	Natural Resources Conservation Service
NRS	National Response System
NSSL	National Severe Storms Laboratory
NWS	National Weather Service
OEESC	Oregon Energy Efficiency Specialty Code
OEM	Oregon Emergency Management

OESC	Oregon Electrical Specialty Code
OFC	Oregon Fire Code
OMDISC	Oregon Manufactured Dwelling Installation Specialty Code
OMSC	Oregon Mechanical Specialty Code
OPSC	Oregon Plumbing Specialty Code
OR	Oregon
ORS	Oregon Revised Statute(s)
ORSC	Oregon Residential Specialty Code
OSSC	Oregon Structural Specialty Code
PA	Public Assistance
PDM	Pre-Disaster Mitigation
PDSI	Palmer Drought Severity Index
PGA	Peak Ground Acceleration
PNW	Pacific Northwest
PSU	Portland State University
PW	Public Works
RFC	Repetitive Flood Claim
RFPD	Rural Fire Protection District
RLP	Repetitive Loss Property
SFHA	Special Flood Hazard Area
SRGP	Seismic Resiliency Grant Program
SRL	Severe Repetitive Loss
SUB	Springfield Utility Board
UGB	Urban Growth Boundary
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey

EXECUTIVE SUMMARY

Planning Process

This 2017 version of the '*Lane County Multi-Jurisdiction Hazard Mitigation Plan*' aims to support all of Lane County, including both rural areas and incorporated cities, in becoming more aware of natural hazards and their associated risks. This Plan seeks to improve focus on development changes and making real improvements in hazard mitigation. This Plan update replaces and updates the previous '*Lane County Natural Hazards Mitigation Plan 2012 Update'*.

This Plan recognizes that taking sustained actions to protect people and property from hazards is the responsibility of the whole community. Effective hazard mitigation is dependent on individuals taking responsibility - both personally and professionally - for achieving a better understanding of natural hazards, the risks they pose and, committing to actions aimed at minimizing those risks.

This updated Plan marks a departure from the previous version. First, while recognizing that hazard mitigation starts at the local level it is equally evident that natural hazards "know no boundaries", jurisdictional or otherwise. Therefore, this Plan update formally integrates information specific to Lane County at-large with information about seven cities situated in the county and combines it into a single document, and hence a Multi-Jurisdictional Plan. Second, the Plan includes updates pursuant to FEMA's review and feedback of the 2012 Plan version in anticipation of FEMA's new requirements for Plan revisions to reflect changes in development and changes in priorities. Third, hazard profiles are updated with more breadth and depth of information and analysis and are expanded to include dam failure, drought, pandemic and tsunami.

While the primary audience for this Plan is Lane County staff, we hope that it will contribute to the efforts of all our partners who, like Lane County, strive to engage the whole community in achieving improved disaster resilience with each passing year. To facilitate wider dissemination of this Plan and to keep the community engaged in continuously providing input, the document is available at the Lane County Emergency Management website at http://lanecounty.org/prepare under the Plans section.

This Plan update is a joint product of Lane County Emergency Management; the Lane County Hazard Mitigation & Emergency Management Steering Committee; elected officials, executives and staff from the Cities of Coburg, Creswell, Dunes City, Florence, Oakridge, Veneta and Westfir; and over 515 people who participated in the Public Engagement process. This Plan update was drafted and refined over a number of iterations with help from our contractor, Greg Wobbe, Principal for OCR West, LLC and the plan development process was kept on track by Julie Smith, Principal Project Manager and Partner of Make It Happen, LLC.

Hazard Identification and Risk Assessment

This Plan update uses the best available data to facilitate in-depth understanding of the most significant hazards in Lane County. Long term residents will not be surprised to find severe winter storms, floods and wildfires at the top of the list since at least one of these three hazards seem to materialize each year. Severe winter storms are typically characterized by snow and ice that wreak havoc on trees and power lines. It is not uncommon for thousands of residents to lose power for several days at a time during a severe storm. The areas most vulnerable to annual, localized flooding are in proximity to the Siuslaw and Mohawk rivers. These two rivers are not controlled by any dams and therefore overtop their banks somewhat regularly. Fortunately, the flood inundation areas for these rivers are generally low-density population areas with ample stretches of green space for flood storage. Wildfires, usually small to moderate in size, break out nearly every summer in eastern Lane County near the Cities of Oakridge and Westfir keeping the Oregon Department of Forestry, Lane County Fire Defense Board and local residents on high alert throughout the summer. Most of the fires are believed to be human-caused but natural ignitions from lightning caused by thunderstorms are an ongoing concern.

Other hazards that are top of the mind and included in this Plan are dam failure, drought, earthquake, hazardous materials, landslide, pandemic, tsunami, windstorm, winter storm and volcano. Lane County has seen previous occurrences of all but two of these hazards: dam failure and volcano.

Since 2012, Lane County has been included in four Presidential Disaster Declarations with damage reports estimated at a combined total of $19,000,000. Presidential Disaster Declarations are crucial to our local economy because they help our public infrastructure agencies recoup up to 75% of incurred disaster costs, totaling roughly $14,000,000 over the past five years.

- DR-4296 (January 2017; severe storm (ice), flood)
- DR-4258 (December 2015; wind, rain, landslides)
- DR-4169 (February 2014; snow, ice)
- DR-4055 (January 2012; bitter cold, snow)

This Plan further assesses Lane County's vulnerability to these hazards in terms of human life, property, infrastructure, economy and environment. Considering these factors, analysis shows that Lane County is most vulnerable to severe winter storms, wind storms, wildfire, flood, earthquake and tsunami.

Mitigation Strategy

Lane County's vast expanse of diverse geological features combined with the interplay of human actions and natural occurrences make it inevitable that Lane County will continue to experience hazardous incidents. Therefore, a comprehensive mitigation strategy must assume interminable planning. In other words, the need for hazard mitigation planning will never cease even though political-will may wax and wane as the population, economy and developed areas change over time.

This Plan document outlines Action Items that can be taken to mitigate either multiple hazards at once or a specific hazard. The Action Items are intentionally broad because implementation will require additional steps to zero in on the specific problem(s) each Action Item aims to solve and how best to go about it. Additional steps must include analyzing the following:

- Depth of ownership: How can the action item be implemented in such a way that it guides ongoing management actions and thereby engage management in owning the action item?

- Stakeholder Engagement: Who does the action item benefit or impact, and do a sufficient number of agencies and persons feel a sense of ownership of the action item?

- Problem Analysis: Do we know the root causes and major effects of problems in order to better design solutions to fully achieve the desired result of the Action Item?

- Cost Benefit Analysis: What are the strengths and weaknesses of alternatives for achieving the benefits or desired results for each Action Item?
- Results Framework: How will we know we have successfully implemented the Action Item?

Lane County Emergency Management is a single resource assigned to convene and oversee this Plan. Given this resource limitation, implementation of the Plan Action Items will rely heavily on the cooperation of Action Item owners and stakeholders once the Action Items have been specified in detail.

The participating jurisdictions (cities) are committed to utilizing this Plan to access mitigation grant funds to assist the implementation of action items set forth in Chapter 4 (Mitigation Strategy) section 4.4.4. Implementation of high benefit/low cost action items will be encouraged in parallel with high priority action items that require grant funding to implement. Opportunities to partner and share costs with affiliated agencies and neighboring jurisdictions for multi-objective projects are encouraged.

Future Updates

This Plan update satisfies the Local Mitigation Plan requirements spelled out in 44 CFR (Code of Federal Regulations) Part 201 – Mitigation Planning which states:

> **§ 201.6 Local Mitigation Plans.**
> The local mitigation plan is the representation of the jurisdiction's commitment to reduce risks from natural hazards, serving as a guide for decision makers as they commit resources to reducing the effects of natural hazards. Local plans will also serve as the basis for the State to provide technical assistance and to prioritize project funding.

The CFR also states that a process must be in place for updating the plan within a five-year cycle. The comprehensive nature of this 2017 Plan update has provided a baseline document for future revisions to build upon. Much of the content will remain unchanged with the exception of dynamic data points such as future Presidential Disaster Declarations, changes to demographics and economy, addition of new Plan contributors, updates to vulnerability assessments and progress on action items.

These dynamic data points will be tracked and the Plan updated as they are observed by Lane County Emergency Management. A full Plan review will be conducted in April of each year to capture any relevant information resulting from the most recent fire season (summer months) and severe storm season (October thru March).

The Hazard Mitigation & Emergency Management Steering Committee will continue to meet quarterly and discuss what changes, if any, need to be captured for the next Plan update.

During the next Plan cycle, Lane County will be applying for an Hazard Mitigation Grant Program award to hire a contractor to add local utilities, specifically Blachly-Lane, Lane Electric Co-Op and Emerald People’s Utility District, to the Plan.

1. INTRODUCTION

1.1 MITIGATION PLANNING BACKGROUND

According to a 2014 report produced by the National Association of Counties (NACO), on average, natural and man-made disasters cause an estimated $57 billion in damages and related costs nationwide each year. While Lane County residents are fortunate to live in a place with abundant natural and cultural resources, we are not unlike other places across the nation in terms of risk and potential impacts of disasters.

Hazards can both directly and indirectly affect all community members, highlighting the importance of developing a strategy to reduce or eliminate (mitigate) risk and vulnerability, and implementing that strategy over time. This Multi-Jurisdiction Hazard Mitigation Plan is intended as a locally specific, comprehensive guide for risk assessment and mitigation strategy.

The ultimate goal of the Lane County Multi-Jurisdiction Hazard Mitigation Plan is to promote the health, safety, and general well-being of all residents. The following Mission Statement provides further definition:

Mission: To promote and implement actions to eliminate or reduce long-term risk to human life and property from the effects of hazards of all types and sources, and to enhance capability to prepare, respond, and recover from such incidents.

An approved Plan is a basic requirement for federal mitigation funds eligibility per section 322 of the Stafford Act, 42 U.S.C. 5165. Detailed requirements are outlined in Code of Federal Regulations (CFR) Title 44, Part 201; Part 206, Subpart N; et al.

The purpose of mitigation planning in general is to identify proactive measures which reduce or prevent negative impacts of future events. FEMA's Mitigation Directorate provides the following definition for mitigation:

"Mitigation is the cornerstone of emergency management. It's the ongoing effort to lessen the impact disasters have on people's lives and property through damage prevention and flood insurance. Through measures such as building safely within the floodplain or removing homes altogether; engineering buildings and infrastructures to withstand earthquakes; and creating and enforcing effective building codes to protect property from floods, hurricanes and other natural hazards, the impact on lives and communities are lessened."

A *Hazard Mitigation Plan* (HMP) is distinguishable from an *Emergency Operations Plan* (EOP), *Continuity of Operation Plan (COOP)* or *Disaster Recovery Plan* (DRP) to the extent that it outlines the proactive implementation of mitigation projects and activities prior to a hazard or disaster occurrence. Mitigation projects (i.e. 'action items') can be short-term or long-term activities which reduce a community's vulnerability to hazard impact through various means including avoidance, protection and preparedness. Thus the Multi-Jurisdiction Hazard Mitigation Plan (referred to herein as Plan) is a blueprint for activities with the goal to protect the public and local assets and reduce the impact of future disasters.

1.2 AUTHORITIES

Federal Authorities

The Lane County Multi-Jurisdiction Hazard Mitigation Plan was developed in accordance with the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), which is the primary authority for providing federal disaster recovery and hazard mitigation financial assistance to states and local governments. The Stafford Act was amended in 1996, 2000 (Disaster Mitigation Act), and 2007. As previously discussed, basic provisions of these acts are implemented as federal rules in CFR Title 44. Program requirements related to hazard mitigation are included in 44 CFR Parts 9, 10, 13, 14, 78, 201 and 206.

Federal administrative authority for hazard mitigation planning in the northwestern United States resides with FEMA's Region X (10) office in Bothell, WA. This Plan was reviewed by FEMA Region X and found to meet or exceed all requirements outlined in the FEMA publication *Local Hazard Mitigation Plan Review Guide* circa October 2012.

State Authorities

This Plan was developed in accordance with ORS Chapter 401 — Emergency Management and Services and subordinate administrative rules. State administrative authority for hazard mitigation planning resides with the Oregon Office of Emergency Management, Mitigation and Recovery Services based in Salem.

Local Authorities

Lane County Emergency Management and Lane County Land Management Division were identified in 2006 as the co-conveners to oversee the plan's implementation and maintenance. Although both entities accomplished much in the subsequent five years, Lane County Emergency Management has solely provided Plan oversight since 2011. Lane County Land Management continues to be an integral contributor to the Plan.

Lane County Emergency Management will be responsible for monitoring implementation over time and tracking the status of identified hazard mitigation actions.

1.3 LOCAL ADOPTION

Upon provisional approval of this Plan by the State of Oregon Office of Emergency Management (OEM) and the Federal Emergency Management Agency (FEMA), governing bodies for each participating jurisdiction will formally adopt the document in public session. Copies of local adoption instruments are included in Appendix A of this document.

1.4 DOCUMENT STRUCTURE

The document is organized into Chapters (1.), Sections (1.1), and Sub-sections (1.1.1). Tables are numbered in order of appearance in the document and figures are numbered in order of appearance within each chapter. During the interim planning cycle period when document composition is most fluid, tables and figures are assigned uniform placeholder numbers per chapter, i.e. Figure 3-x.

This document is structured to address mandated elements for hazard mitigation plans under federal and state requirements. It consists of five chapters and various appendices, each of which satisfies a specific grouping of requirements as described in FEMA publications *Local Multi-Hazard Mitigation Planning Guidance* and *Local Mitigation Plan Review Guide*. Code of Federal Regulations (CFR) requirements pertaining to each respective plan section are included directly following each corresponding heading.

Chapter 1 includes prerequisites for hazard mitigation plans and describes the purpose, authorities, process of local adoption, etc., and provides general profiles of the participating jurisdictions.

Chapter 2 describes the process through which this plan was developed, via planning team and public meetings, and the input of citizens and local officials.

Chapter 3 includes the risk and vulnerability assessments for the County, describing hazards that occur in the western Oregon region and an inventory of local assets and critical facilities that represent varying degrees of vulnerability to hazard impacts.

Chapter 4 describes the mitigation strategy for the participating jurisdictions, representing this Plan's primary function moving forward. It outlines the Plan's overarching goals, and intended activities and projects the jurisdictions intend to implement.

Chapter 5 describes the approach to plan maintenance, which includes processes for local adoption, monitoring and evaluation criteria, strategy for incorporation with other planning mechanisms, and review and update schedules.

1.5 MULTI-JURISDICTION HAZARD MITIGATION PLAN - V3.0

This document is the current version of the Lane County Multi-Jurisdiction Hazard Mitigation Plan (i.e. Version 3.0). The forthcoming planning cycle for this Plan spans a five-year period of 2017-2022.

The previous version of the plan (2.0) was a single jurisdiction (Lane County) document approved by OEM and FEMA and adopted by the Lane County Board of Commissioners in 2012, which itself was an update of the initial version of the plan developed circa 2006.

Development of Version 3.0 was initiated in late 2012 and conducted contemporaneously with Hazard Mitigation-Emergency Management Steering Committee quarterly meetings and interim research and over subsequent years of its planning cycle. It was determined that substantial re-organization of the Plan would make it more accessible for both subject matter experts and the general public. The reformatted document includes a standardized framework for continuous update, data collection, and to assist mitigation project implementation.

Importantly, the current, reformatted Plan is structured and maintained to be current at any given time, more or less. Plan updates are planned at the conclusion of each quarterly meeting of the Hazard Mitigation and Emergency Management Steering Committee (HM&EM-SC). Project planning, implementation reports, hazard event summaries and after action reports, evolving priorities, and directives of the HM&EM-SC, etc. are to be integrated into the Plan document on an ongoing basis.

Other objectives of the reformatting project include addressing new FEMA planning recommendations and requirements outlined in FEMA's *Local Mitigation Planning Handbook*, improved integration of the Plan with other planning documents, facilitate participation from public and administrative entities, and the addition of risk assessments for dam failure, hazardous material incidents, and pandemic. The document resulting from the reformatting project was named Version 3.0. An HMGP grant was developed in 2014 following FEMA Disaster Declaration 4169 to assist funding of the update project. It encompassed an expanded scope of the document to include participating incorporated cities of Lane County including Coburg, Creswell, Dunes City, Florence, Oakridge, Veneta, and Westfir. These planning activities are further detailed in Chapter 2 (Planning Process).

1.5.2 Naming Convention - Subsequent Versions

The major numeric identifier (**1**.0, **2**.0, **3**.0, etc.) denotes the 5-year planning cycle represented by the document. The secondary numeric identifier (2.**1**, 2.**2**, 2.**3**, etc.) distinguishes substantive changes to the document in terms of structure, formatting, or subject matter. Digital file names should include document name, version, and month, day, and year.

As noted above, the current Plan represents the planning cycle to span 2017-2022. Whenever necessary the Lane County Emergency Manager will coordinate assignment of secondary numeric identifiers following substantive changes resulting from major disasters, annual meetings, jurisdictional participants and changes in state or federal requirements, etc.

1.6 PARTICIPATING JURISDICTIONS

General
Per FEMA regulations, formal participation in a FEMA sanctioned hazard mitigation plan involves participating and undertaking elements of the planning process, which include planning, public involvement, risk assessment, mitigation strategy, incorporation, implementation, and adoption.

1.6.1 Current Plan Participants

Lane County Oregon and the incorporated cities of Coburg, Creswell, Dunes City, Florence, Oakridge, Veneta and Westfir are the formal participating jurisdictions for the Plan, and the planning area is defined by their geographic boundaries including unincorporated communities of Lane County. The following table outlines participants in the multi-jurisdiction planning process.

Jurisdiction	Primary Contact	Website	Phone
Lane County – Sheriff's Office	Linda Cook	www.lanecounty.org	(541) 682-6744
City of Coburg	Petra Schuetz	www.coburgoregon.org	(541) 682-7850
City of Creswell	Maddie Phillips	www.ci.creswell.or.us	(541) 895-2531
Dunes City	Jamie Mills	www.dunescityhall.com	(541) 997-3338
City of Florence	Megan Messmer	www.ci.florence.or.us	(541) 997-3437
City of Oakridge	Louis Gomez	www.ci.oakridge.or.us	(541) 782-2258
City of Veneta	Ric Ingham	www.venetaoregon.gov	(541) 935-2191
City of Westfir	Heidi Weiland	www.westfir-oregon.com	(541) 782-3983

1.6.2 Future Plan Participants

Utility providers in Lane County are crucial to hazard mitigation and coordinated emergency management functions. In the future increased coordination between participants in this Plan and Lane County utility providers may ultimately lead to formal participation by these entities. As such, the following table outlines contact information for local utilities identified for future participation.

Utility	Services	Website	Phone
Blachly Lane Electric Cooperative	Electric	www.blachlylane.coop	(541) 688-8711
Emerald People's Utility District	Electric	www.epud.org	(541) 746-1583
Lane Electric Cooperative	Electric	www.laneelectric.com	(541) 484-1151

Lane County defers to the City of Eugene to incorporate a mitigation plan for Eugene Water & Electric Board (EWEB) into their planning document, and similarly to the City of Springfield to incorporate a mitigation plan for Springfield Utility Board (SUB). Operational areas for Consumers Power and Central Lincoln PUD span multiple counties, and accordingly are suited to a regional approach to mitigation planning and incorporation into relevant multi-jurisdictional documents.

1.7 LANE COUNTY PROFILE

The following subsections outline characteristics for Lane County, presented in a context for planning and mitigation. Subject matter includes statewide context for mitigation planning, history of federal (presidential) disaster declarations, demographics and economy, and geography of Lane County.

1.7.1 Statewide Context, Natural Hazards Mitigation

The current version of the State of Oregon Natural Hazards Mitigation Plan (NHMP) was approved by FEMA September 2015, and like local hazard mitigation plans covers a 5-year planning cycle.

The Oregon NHMP classifies 8 natural hazard regions encompassing all or parts of multiple counties. As shown in the map below from the Oregon NHMP, Lane and Douglas Counties are unique as the only two counties in the state with areas that cover two natural hazard regions. western Lane County is included in Region 1 – Coast (striped area, map below), and central and eastern Lane County is included in Region 3 – Mid-Southern Willamette Valley (purple area, map).

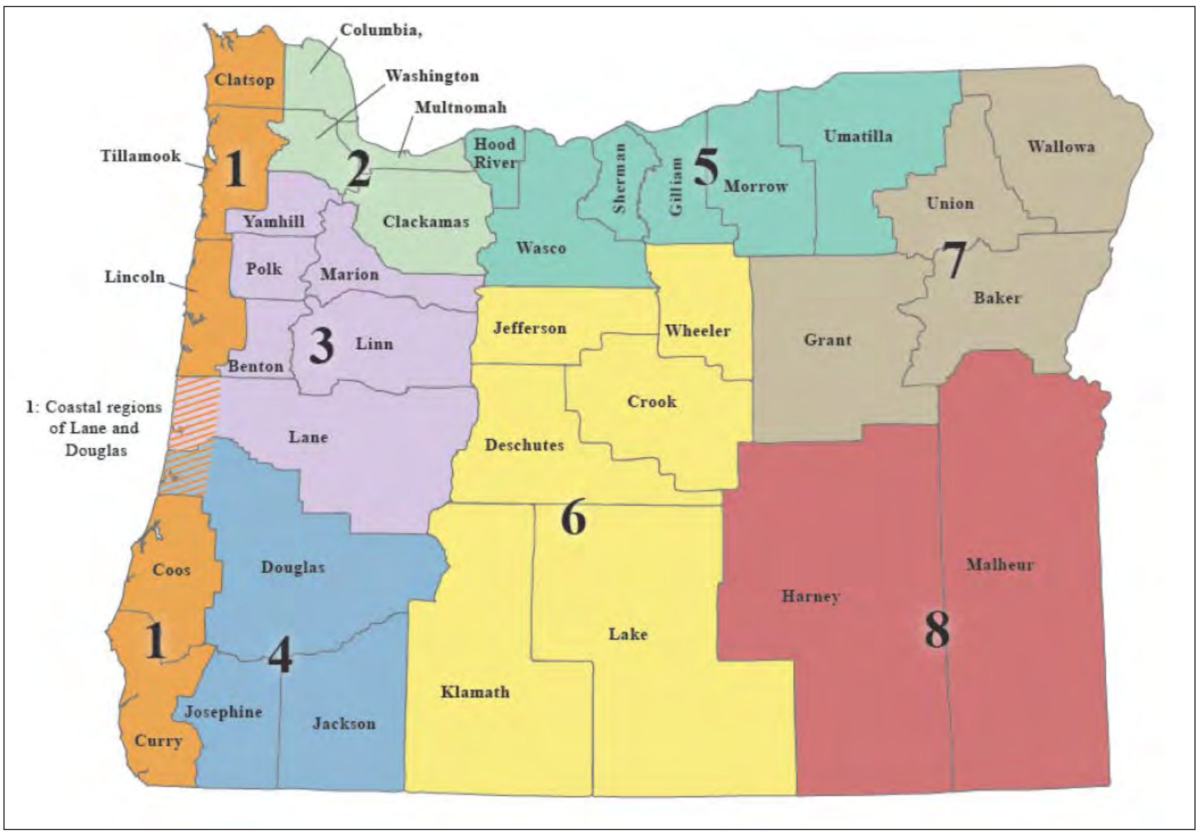


Figure 1-1 Oregon NHMP Natural Hazards Regions

1.7.2 Disaster Declaration History

Presidential Disaster Declarations for the state of Oregon which included Lane County were authorized in 1962, 1964, 1972, 1974, 1996, 1997, 2002, 2004, 2012, 2014, 2015, and 2016. In order for a disaster event to qualify for a presidential declaration, federal assistance must be requested by the governor and local disaster impacts must exceed a given threshold according to preliminary damage assessments conducted by local official and FEMA. The damage threshold to obtain a federal disaster declaration is adjusted annually to account for inflation. As of October 1, 2016 the statewide per capita indicator is $1.43 and the countywide per capita indicator under the Public Assistance Program is $3.61.

The following table summarizes federal disaster declarations for Lane County, most of which involved winter storm impacts and occurred in the months of December, January and February. Total damages including Hazard Mitigation Grant Program (HMGP) expenditures for which data is available totals over $20 million for Lane County for the period 1996 to 2016.

Table I Federal Disaster Declaration History, Lane County

FEMA Disaster # (DR)	Incident Timeframe	FEMA Disaster Reference	Estimated Damage (Lane County)	Estimated Total Damage (Statewide)
4296	December 14-16, 2016	Severe Winter Storm and Flooding	$8,946,741	$17,000,000
4258	December 6-23, 2015	Winter Storm, High Winds, Flooding, Landslides	$1,303,000	$27,100,000
4169	February 6-11, 2014	Winter Storm	$6,731,297	$8,304,174
4055	January 17-21, 2012	Winter Storm, Flooding, Landslides	$1,400,483	$14,100,000
1510	December 26, 2003 - January 14, 2004	Winter Storm	$1,237,444	$10,200,000
1405	February 7-8, 2002	Winter Windstorm	$3,896,333	$4,800,000
1160	December 25, 1996 - January 6, 1997	Flooding, High Winds, Winter Storms	data unavailable	data unavailable
1107	December 10-12, 1996	Winter Storms, High Winds	$1,384,411	data unavailable
1099	February 4-21, 1996	Severe Storms, Flooding	$1,904,828	data unavailable
1036	May 1–Oct. 31, 1994	El Nino	data unavailable	data unavailable
413	January 25, 1974	Storms, Snowmelt, Flooding	data unavailable	data unavailable
319	January 21, 1972	Storms, Flooding	data unavailable	data unavailable
184	December 24, 1964	Heavy Rains and Flooding	data unavailable	data unavailable
136	October 12-16, 1962	Severe Windstorm	data unavailable	$200,000,000
49	December 29, 1955	Flooding	$2,738,000	$50,000,000

Source: FEMA; https://www.fema.gov/disasters; Oregon Office of Emergency Management (OEM); U.S. Geological Survey (USGS). Notes: Damage totals reported in actual (original time period) dollars, and are not adjusted for inflation. Various sources estimate overall damage totals for Lane County at $19 million for the February 1996 flooding disaster (DR-1099).

In addition to federal disaster declarations (primary type), other types of disaster declarations exist at both the federal and state level. Since 2012, there have been nineteen 19 Executive Orders signed by the Oregon Governor declaring a drought emergency somewhere in the state. Lane County was included in one of those declarations in 2015. Additionally, there have been sixteen (16) federal Fire Management Assistance Declarations filed for the state of Oregon. Table II below outlines these other declaration types during the most recent planning cycle, and notably some but not all occurrences have affected Lane County.

Table II Other Declarations, State of Oregon (2012-2016)

Reference #	Type	Description	Timeframe
FM-5126	Wildfire	Oregon Akawana Fire	June 7, 2016
FM-5114	Wildfire	Oregon Dry Gulch Fire	September 13, 2015
FM-5107	Wildfire	Oregon Grizzly Bear Fire Complex	August 20, 2015
FM-5102	Wildfire	Oregon Canyon Creek Fire Complex	August 14, 2015
FM-5097	Wildfire	Oregon Cornet and Windy Ridge Fire Complex	August 11, 2015
FM-5096	Wildfire	Oregon Krauss Lane Fire	August 8, 2015
FM-5092	Wildfire	Oregon Stouts Creek Fire	July 30, 2015
EO15-02 thru 19 and 11, 19	Drought	State of Drought Emergency	May 21, 2015
FM-5080	Wildfire	Oregon 36 Pit Fire	September 15, 2014
FM-5073	Wildfire	Oregon Rowena Fire	August 5, 2014
FM-5066	Wildfire	Oregon Gulch Fire	July 31, 2014
FM-5060	Wildfire	Oregon Moccasin Hill Fire	July 13, 2014
FM-5056	Wildfire	Oregon Two Bulls Fire	June 7, 2014
EO14-01, 02, 04, 05, 12	Drought	State of Drought Emergency	February 13, 2014
FM-5046	Wildfire	Oregon Government Flats Fire Complex	August 17, 2013
FM-5039	Wildfire	Oregon Brimstone Fire	July 28, 2013
FM-5037	Wildfire	Oregon Douglas Fire Complex	July 27, 2013
FM-5036	Wildfire	Oregon Pacifica Fire	July 19, 2013
EO13-05, 06, 09	Drought	State of Drought Emergency	April 13, 2013
EO12-15	Drought	State of Drought Emergency	August 27, 2012

Source: FEMA, OEM

1.7.3 County Overview

Lane County is located in western Oregon and covers a diverse range of terrain including the Pacific Ocean coastline, the Willamette Valley, and the Cascade Range foothills. The overall area is 4,722 square miles (approximately 50 miles north-south and 115 miles east-west). The primary highways are I-5, Hwy 101, Hwy 126, and Hwy 58. The area was first inhabited by Native Americans primarily from the Kalapuya and Siuslaw tribes. European pioneers first arrived in the late 1840's, and Lane County was established in 1851.

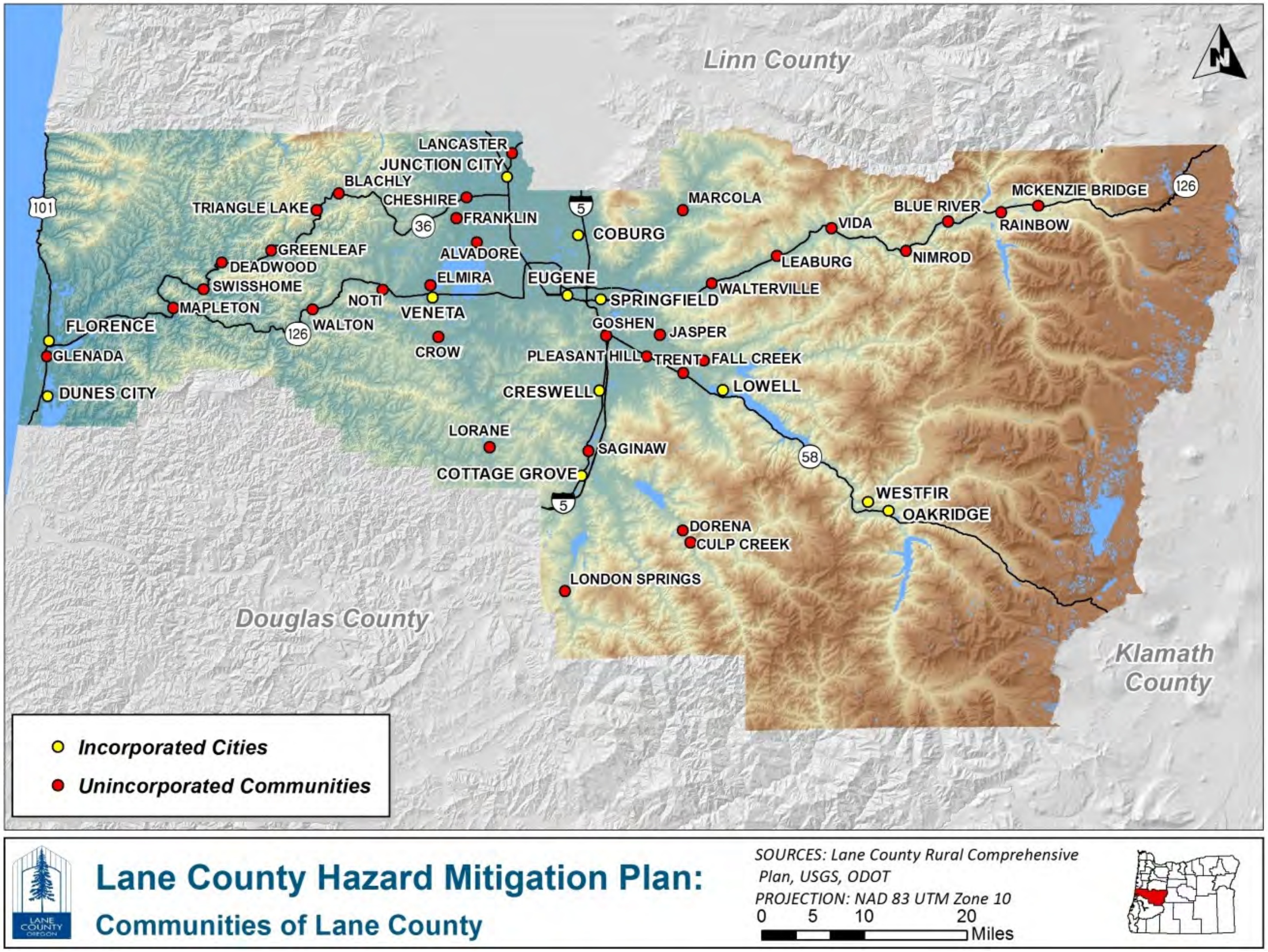


Figure 1-2 Incorporated and unincorporated areas of Lane County

1.7.3 Demographics and Economy

Lane County is the fourth most populous county in Oregon. Portland State University certified population estimate for Lane County is 365,940 (July 1, 2016). This population represents a 13.3% percent increase over the 2000 Census population (322,959), and a 0.83 percent average annual population growth rate for the period. Population residing outside incorporated cities (unincorporated areas) is 97,495.

Table III U.S. Census Data for Lane County as of 2015

Jurisdiction	2015 Population	Median Household Income	% Persons in Poverty	% High School Graduate or Higher	Median Housing Value	Total Housing Units	# Military Veterans
Lane County	362,895	$44,105	19%	91.1%	$215,300	157,510	28,683

Source: US Census http://www.census.gov/search-results.html?q=Lane+County%2C+OR&page=1&stateGeo=none&searchtype=web&cssp=Typeahead

According to data published by the Oregon Department of Revenue, real market value of assets in Lane County exceeds $39 billion, and total assessed exceeds $29 billion. This latter total comprises 8.2 percent of total assessed value in the state and ranks fourth behind the three Portland metro area counties. Residential land and structures combine for over 65 percent of total assets, and commercial/industrial assets total nearly $5 billion (17 percent of total). The following table provides detailed breakdown by classification.

Table IV Assessed Value by Property Class, Lane County 2014-2015

Property Class	Assessed Value	% of Total
Residential Structures	$14,918,465,000	51.1%
Residential Land	$4,095,660,000	14.0%
Commercial/Industrial	$4,949,095,000	17.0%
Farm / Forest	$1,438,300,000	4.9%
Multi Housing	$1,439,174,000	4.9%
Recreation/Misc	$6,537,000	0.0%
Personal	$673,464,000	2.3%
Machinery & Equipment	$590,999,000	2.0%
Manufactured Structures	$258,520,000	0.9%
Utilities	$803,554,000	2.8%
Total Assessed Value	**$29,173,768,000**	**100.0%**

Source: Oregon Department of Revenue, 2014-2015 Property Tax Statistics Detail Tables, http://www.oregon.gov/DOR/programs/gov-research/Pages/research-property.aspx

As of 2015, 73.1 percent of Lane County residents were living in incorporated cities, while the balance of 26.9 percent lived in unincorporated areas. This represents a shift from the year 2000 when approximately 31 percent lived in unincorporated areas. Regarding employment projections, the Oregon Employment Department anticipates that Lane County will add 15,046 net new jobs for a growth rate of 9.7% from 2008 to 2018. This compares to a statewide growth rate of 9.1%.

Lane County’s population density in 2016 was 77.5 residents per square mile, which compares to 70.9 people per square mile in 2000. Table V below shows population change over the more recent period of 2009-2016, and housing unit data for 2012.

Table V Population Comparisons (2009-2016) and Housing Unit Data (2012)

Jurisdiction	Estimated Population 2016	Estimated Population 2009	2009-2016 Population Change (%)	Number of Housing Units 2012	Percent Housing Units Occupied 2012
Lane County	365,940	347,690	5.2%	155,815	93.4%
Coburg	1,070	1,080	-0.9%	403	95.0%
Cottage Grove	9,890	9,485	4.3%	4,108	94.4%
Creswell	5,360	4,790	11.9%	2,078	90.3%
Dunes City	1,320	1,360	-2.9%	859	74.9%
Eugene	165,885	157,100	5.6%	69,828	94.4%
Florence	8,680	9,580	-9.4%	5,207	85.2%
Junction City	6,010	5,460	10.1%	2,250	91.1%
Lowell	1,070	1,030	3.9%	416	89.7%
Oakridge*	3,255	3,755	-13.3%	1,759	86.1%
Springfield	60,140	58,085	3.5%	25,029	95.8%
Veneta	4,755	4,975	-4.4%	1718	96.7%
Westfir	255	340	-25.0%	115	96.5%
Incorporated Lane County	267,690	257,040	4.1%	113,770	N/A
Unincorporated Lane County	98,250	90,650	8.4%	42,045	N/A

Source: PSU Population Research Center, US Census, American Community Survey 2012 Housing Unit Data.

The Lane County Rural Comprehensive Plan (Nov 2010) presents the following chart of population forecasts for Lane County and incorporated cities from 2010-2035.

Table VI Population Forecasts 2010-2035

Table 1.1: Coordinated Population Forecasts for Lane County and its Urban Areas

	Forecast Period:	2010	2015	2020	2025	2029	2030	2035
Lane County Small Cities	Coburg*	1,103	1,387	1,934	2,628	3,216	3,363	4,354
	Cottage Grove	9,957	10,616	11,424	12,261	12,737	12,856	13,542
	Creswell	5,647	6,802	8,263	9,758	10,799	11,060	12,172
	Dunes City	1,457	1,542	1,640	1,726	1,767	1,777	1,823
	Florence	11,212	12,355	13,747	15,035	16,065	16,323	17,434
	Junction City	6,567	9,343	10,799	12,067	12,922	13,136	13,887
	Lowell	1,043	1,228	1,459	1,714	1,960	2,022	2,345
	Oakridge	3,859	4,290	4,672	4,866	5,022	5,061	5,280
	Veneta	4,976	5,902	7,251	8,727	9,623	9,847	10,505
	Westfir	359	370	384	412	423	426	448
Metro Area	Eugene (city only)	156,844	166,609	176,124	185,422	192,536	194,314	202,565
	Springfield (city only)	58,891	62,276	66,577	70,691	73,989	74,814	78,413
	Metro Urban Area West of Interstate-5**	20,931	20,380	19,209	18,521	17,680	17,469	16,494
	Metro Urban Area East of Interstate-5**	8,140	7,926	7,470	7,202	6,875	6,794	6,415
Totals	Eugene/Springfield Total UGB Area	244,806	257,191	269,380	281,836	291,080	293,391	303,887
	Unincorporated Area Outside all UGBs	58,531	55,900	54,344	52,861	52,381	52,261	51,634
	Lane County Total	349,516	366,924	385,297	403,892	417,996	421,522	437,311

Source: Lane County Rural Comprehensive Plan (Nov 2010), Part 1, page 5

In addition to the incorporated communities listed in the table above, the following unincorporated communities are located in the jurisdiction of Lane County and comprise approximately 26 percent of the county's overall population.

- McKenzie Watershed: Marcola, Walterville, Leaburg, Vida, Nimrod, Blue River, Rainbow, McKenzie Bridge.
- Siuslaw Watershed: Glenada, Cushman, Mapleton, Swisshome, Deadwood, Greenleaf, Triangle Lake, Blachly, Walton.
- Long Tom Watershed: Lancaster, Franklin, Cheshire, Alvadore, Elmira, Noti, Crow, Lorane.
- Coast Fork of the Willamette Watershed: Goshen, Saginaw, London, Dorena, Culp Creek.
- Middle Fork of the Willamette Watershed: Pleasant Hill, Jasper, Trent, Fall Creek.

The map below shows general location of populated/developed areas in Lane County. Areas shaded red are properties with improvement values exceeding $10,000 and 111,903 developed parcels falling into this category, serving as an approximation for where people reside, work, or recreate. Development is generally concentrated at lower elevations in the Willamette Valley, coastal cities, and along rivers.

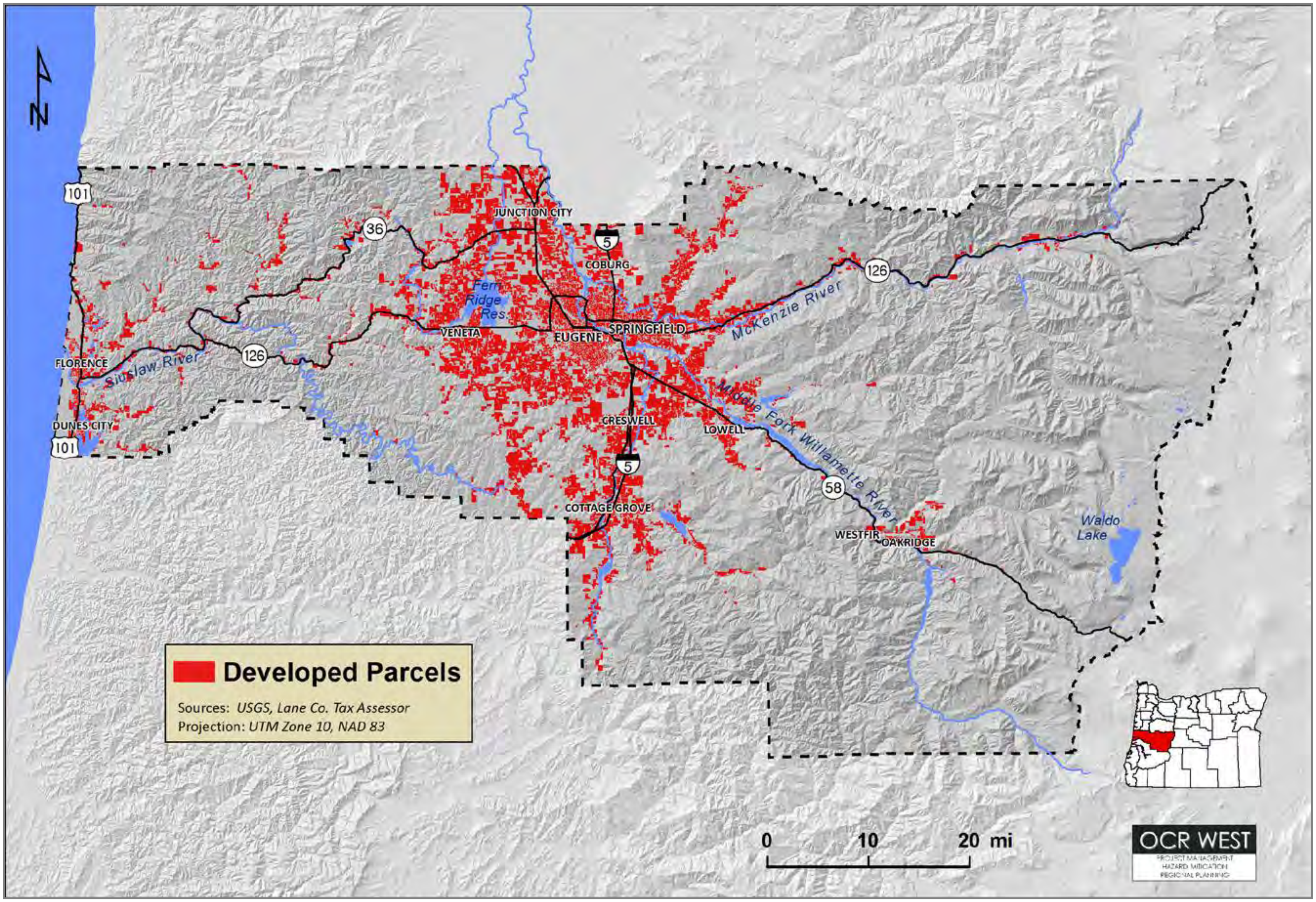


Figure 1-3 Developed Parcels of Lane County

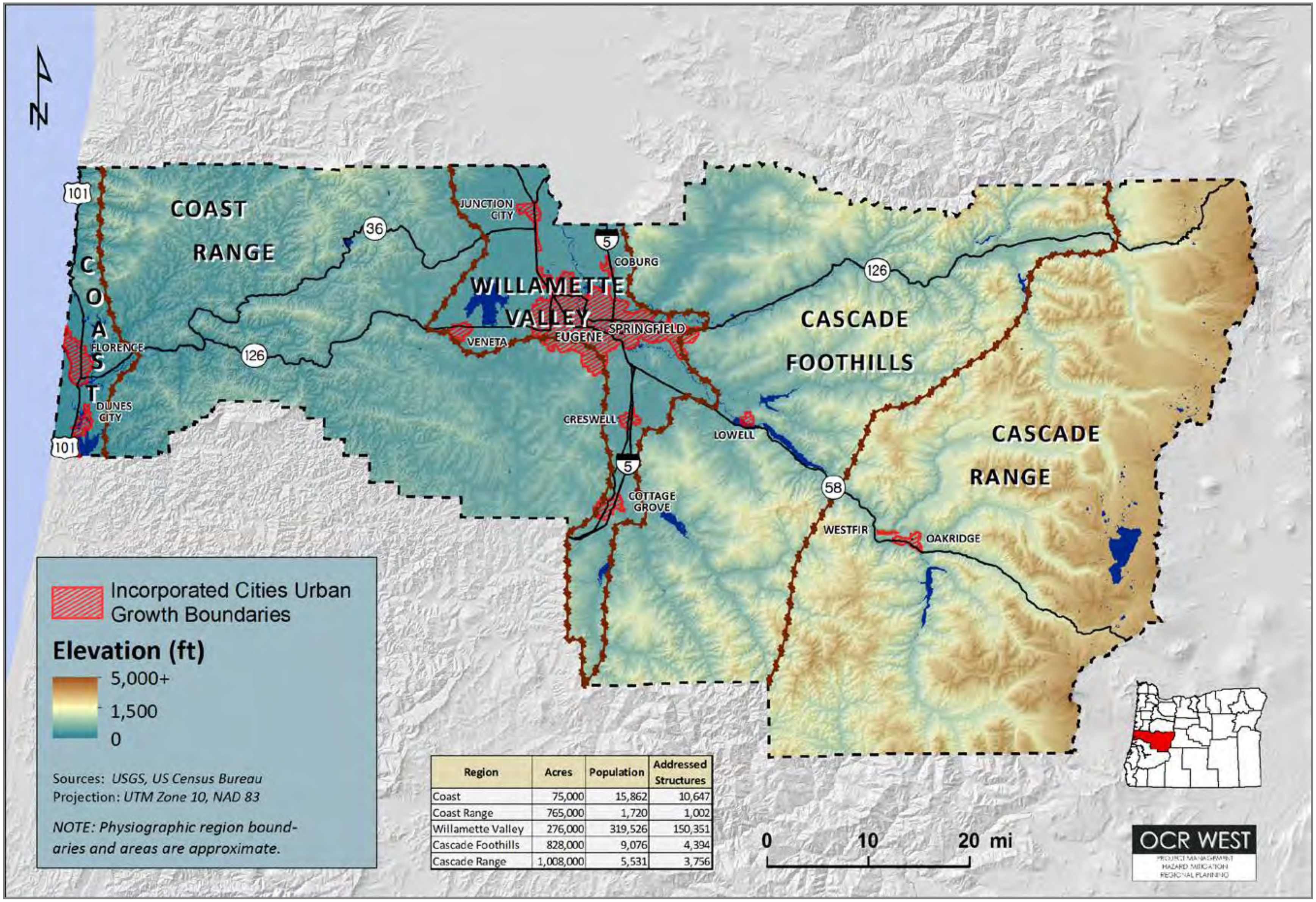
1.7.4 Geography and Climate Overview

This section provides information for understanding the potential and chronic hazards affecting Lane County in order to identify which hazard risks are most significant and which locations are most adversely affected.

Lane County is one of only two counties in Oregon that reaches from the Pacific Coast to the crest of the Cascades. Lane County is located in western Oregon and covers about 4,700 square miles. The geography, topography, climate, and other natural attributes such as vegetation vary markedly throughout the county. FEMA publications note the topography of Lane County is quite varied relative to other counties across the U.S. The Pacific Ocean and Coast Range represent the western geographic boundary, the crest of the Cascade Range the eastern boundary. Between these features is the Willamette Valley, a broad plain where population is most concentrated.

Most of Lane County has a temperate marine climate, with 24-hour temperatures averaging in from the mid 60°F range in July and mid to low 30°F range in January. Average precipitation ranges from 40” in the Willamette Valley to 85” in the mountains. Generally, soil groups are derived from alluvium, marine sediments, igneous materials and sedimentary rock.

The large size and geographic diversity of Lane County are important factors for hazard mitigation planning and emergency management. Based on nomenclature commonly used by the National Weather Service, there are five main physiographic regions within Lane County: Coast, Coast Range, Willamette Valley, Cascade Foothills and Cascade Range. The following map shows these primary physiographic regions, including number of acres, population, and addresses in each. Narrative descriptions for each physiographic region are included on the following pages.



Region	Acres	Population	Addressed Structures
Coast	75,000	15,862	10,647
Coast Range	765,000	1,720	1,002
Willamette Valley	276,000	319,526	150,351
Cascade Foothills	828,000	9,076	4,394
Cascade Range	1,008,000	5,531	3,756

Figure 1-4 Primary Physiographic Regions, Urban Growth Boundaries

Coast Region The Coast Region is the western portion of Lane County and characterized by beaches, sand dunes, rock bluffs, and other coastal features. It is known for wet winters and mild summers. This region is the only portion of Lane County subject to coastal hazards such as storm surge and tsunamis. Strong winds impact the area, usually during winter storms. Wind speeds can exceed hurricane force and cause significant damage to structures or vegetation. Damage is most likely to occur at exposed coastal locations, but may extend into inland valleys as well. Such events are typically short-lived, lasting less than one day.

Annual precipitation typically ranges from 65 to 90 inches. Precipitation is relatively frequent throughout all seasons when compared to other physiographic regions, and highest in winter months. Freezing temperatures at the coast are rare. Notably, average summer temperatures are only about 15 degrees above the coldest month, January. Land ownership and coverage patterns are a relatively mixed distribution of public and private, developed and undeveloped.

Coast Range Mountains Stretching the full length of the state, the Coast Range is heavily forested with peaks ranging from 1,200 to 4,097 feet in elevation. The area experiences heavy rainfall as a result of moist air masses moving off the Pacific Ocean onto land, especially during the winter months. Western slopes of the coast range may get over 100 inches of rain annually.

Snowfall in the Coast Range of Lane County is minimal, usually only 1 to 3 inches annually. Heavily wooded and generally remote, land ownership is primarily public and private forest land with isolated pockets of residential and rural land use.

Willamette Valley The defining feature of the Willamette Valley is the remarkably broad and level floodplain of the Willamette River. The Willamette Valley begins near Cottage Grove and runs northward approximately 110 miles to the urbanized areas and foothills south of Portland. Along its course the valley averages 15-30 miles in width. Lane County is located in the southern portion of the Willamette Valley with cool, wet winters and warm, dry summers. Average annual precipitation is less than 40 inches.

Extreme temperatures in the valley are rare. Days with a maximum temperature above 90°F occur only 5-15 times per year on average and, days with below zero temperatures occur only about once every 25 years. Although snow falls every few years on the South Willamette Valley floor, typical depth is less than 6 inches, though it is more frequent and deeper at higher elevations in the foothills. Ice storms occasionally occur and high winds typically occur several times per year in association with major weather systems.

Cascade Foothills The moderate elevation area comprising the lower western slopes of the Cascades are referred to as the Cascade Foothills. This region receives abundant rainfall and low to moderate snowfall. This region is heavily forested and moderately populated in places. Contains highest concentration of structures in Land ownership is predominantly private forest land, wildland-urban interface residential, and O&C lands managed by the BLM.

Cascade Range Mountains The dominant terrain feature in Oregon is the Cascade Range, stretching the entire length of the state from the California border to Washington. In eastern Lane County, the Cascade Range is characterized by heavily forested slopes with elevations ranging from an average of 4,000 feet to over 10,000 feet (western slopes of Three Sisters Peaks). This area experiences moderately heavy rainfalls as well as extreme winter conditions with heavy snowfalls. The area has a relatively low population.

Monthly mean snowfall totals vary significantly according to elevation. Since precipitation tends to increase with increasing elevation, more potential moisture for snowfall occurs at higher elevations. Most of the precipitation in the Cascade Range occurs during the winter months with November through March accounting for more than 75 percent of the total annual precipitation. Spring rains, summer thunderstorms and autumn snow contribute to the annual precipitation total, but the majority of precipitation occurs in winter.

The following map shows land cover classifications for Lane County. The general pattern is forest land on slopes and higher elevations, and urban development and agriculture at lower elevations.

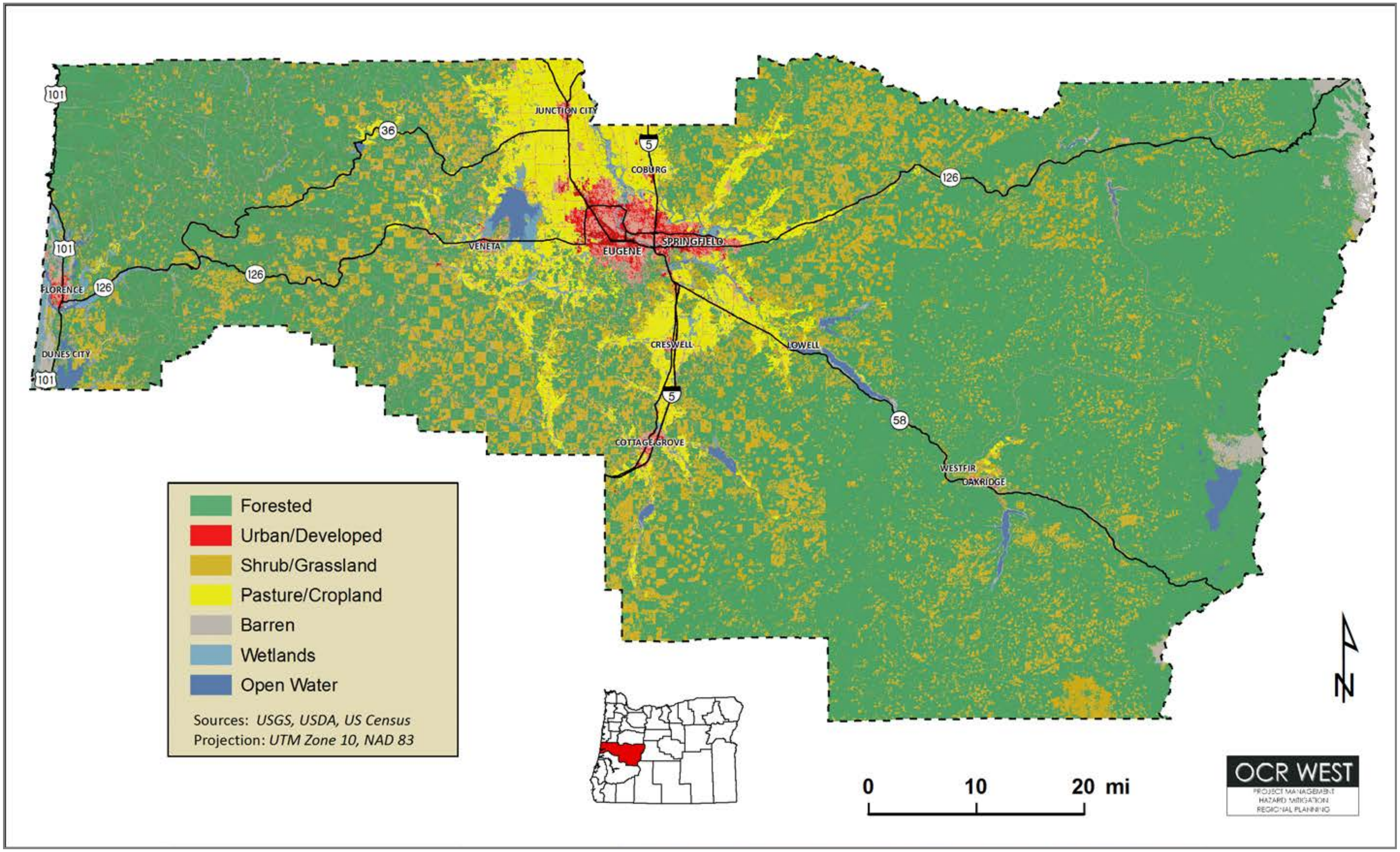


Figure 1-5 Land Cover Types, Lane County Oregon

1.8 PARTICIPATING CITY PROFILES

In addition to Lane County the following incorporated cities are formal participants in the Lane County Multi-Jurisdiction Hazard Mitigation Plan: City of Coburg, City of Creswell, City of Dunes City, City of Florence, City of Oakridge, City of Veneta, and City of Westfir.

Basic profiles of each of these cities are included in the following subsection. Profiles are presented in alphabetical order, and followed by maps indicating general location, landmarks, and density and value of development within and surrounding urban growth boundaries.

Additional participating city notes:

- Descriptions of planning work sessions for individual cities are located in Section 2.2.2.
- Hazard assessments for each participating city are presented in Section 3.3.3.
- Hazard mitigation action items for each participating city are located in Section 4.4.4.
- A jurisdictional annex for each participating city is presented at the end of this document, compiling planning process details, hazard quantification results, and mitigation projects.

1.8.1 City Demographic Profiles

The following profiles are developed for the formal participating municipalities of this plan. Each includes basic location, history, and demographic data. Detailed information for each city is presented in multi-jurisdictional annexes including hazard quantification results and mitigation projects.

City of Coburg

The City of Coburg is located in north-central Lane County near Interstate 5 (I-5) approximately 4 miles north of Eugene, 1 mile north of the McKenzie River, and 2 miles east of Willamette River-McKenzie River confluence. Coburg was incorporated in 1893 and is part of a National Historic District, with buildings dating back to 1875. Current incorporated area encompasses approximately 1 square mile. Per 2014 Lane County Assessor's records, improvement values within urban growth boundary (UGB) exceeds $151 million.

According to certified estimates from Portland State University, city population was 1,070 in 2016. This population represents an 8.87% increase over the 2000 Census population (969), and a 0.5% average annual population growth rate for the period.

The following data is reported by the U.S. Census for the City of Coburg for 2015:

Jurisdiction	2015 Population	Median Household Income	% Below Poverty Level	% High School Graduate or Higher	Median Housing Value	Total Housing Units	# Military Veterans
Coburg	1,055	$51,776	12.4%	95.8%	$225,000	452	78

Source: US Census; http://www.census.gov/search-results.html?q=Coburg+city%2C+OR&page=1&stateGeo=none&searchtype=web&cssp=Typeahead

Further information is located in multi-jurisdictional Annex 1 (Coburg), and Chapters 2-5.

City of Creswell

Creswell is located in central Lane County near Interstate 5 approximately 10 miles south of Eugene, and 1 mile east of the Coast Fork Willamette River. Creswell was incorporated in 1909, and current incorporated area encompasses approximately 1.7 square miles.

According to certified estimates from Portland State University, city population was 5,360 in 2016. This population represents a 49.7% increase over the 2000 Census population (3,579), and a 3.1% average annual population growth rate for the period. Per 2014 Lane County Assessor's records, improvement values within urban growth boundary (UGB) exceeds $289 million.

The following data is reported by the U.S. Census for the City of Creswell for 2015:

Jurisdiction	2015 Population	Median Household Income	% Below Poverty Level	% High School Graduate or Higher	Median Housing Value	Total Housing Units	# Military Veterans
Creswell	5,125	$49,867	7.0%	93.7%	$186,900	2,151	421

Source: US Census; http://www.census.gov/search-results.html?page=1&stateGeo=none&searchtype=web&cssp=Typeahead&q=Creswell+city%2C+OR&search.x=0&search.y=0

Further information is located in multi-jurisdictional Annex 2 (Creswell), and Chapters 2-5.

Dunes City

Dunes City is located in south-western Lane County near US Highway 101 approximately 7 miles south of Florence, 1.5 miles east of the Pacific Ocean, and surrounds Woahink Lake. Dunes City was incorporated in 1963, and current incorporated area encompasses approximately 3.5 square miles.

According to certified estimates from Portland State University, city population was 1,320 in 2016. This population represents a 6.3% increase over the 2000 Census population (1,241), and a 0.4% average annual population growth rate for the period. Per 2014 Lane County Assessor's records, improvement values within urban growth boundary (UGB) exceeds $149 million.

The following data is reported by the U.S. Census for Dunes City for 2015:

Jurisdiction	2015 Population	Median Household Income	% Below Poverty Level	% High School Graduate or Higher	Median Housing Value	Total Housing Units	# Military Veterans
Dunes City	1,315	$53,333	12.8%	95.8%	$283,000	822	194

Source: US Census; http://www.census.gov/search-results.html?page=1&stateGeo=none&searchtype=web&cssp=Typeahead&q=Dunes+city%2C+OR&search.x=0&search.y=0

Further information is located in multi-jurisdictional Annex 3 (Dunes City), and Chapters 2-5.

City of Florence

Florence is located in western Lane County at junction of US Highway 101 and State Highway 126W. Florence is approximately 50 miles west of Eugene, located on north bank of the Siuslaw River and approximately 1 mile east of Pacific Ocean. Florence was incorporated in 1893, and current incorporated area encompasses approximately 5.9 square miles.

According to certified estimates from Portland State University, city population was 8,680 in 2016. This population represents a 19.3% increase over the 2000 Census population (7,273), and a 1.2% average annual population growth rate for the period. Per 2014 Lane County Assessor's records, improvement values within urban growth boundary (UGB) exceeds $1.08 billion.

The following data is reported by the U.S. Census for the City of Florence for 2015:

Jurisdiction	2015 Population	Median Household Income	% Below Poverty Level	% High School Graduate or Higher	Median Housing Value	Total Housing Units	# Military Veterans
Florence	8,260	$32,459	17.1%	91.9%	$188,300	5,260	1,504

Source: US Census; http://www.census.gov/search-results.html?page=1&stateGeo=none&searchtype=web&cssp=Typeahead&q=Florence+city%2C+OR&search.x=0&search.y=0

Further information is located in multi-jurisdictional Annex 4 (Florence), and Chapters 2-5.

City of Oakridge

Oakridge is located in eastern Lane County on State Highway 58. Oakridge is approximately 40 miles southeast of Eugene, located on north bank of the Middle Fork Willamette River and surrounded by Willamette National Forest. Oakridge was incorporated in 1912, and current incorporated area encompasses approximately 2.2 square miles.

According to certified estimates from Portland State University, city population was 3,255 in 2016. This population represents a 3.4%t increase over the 2000 Census population (3,148), and a 0.2% average annual population growth rate for the period. Per 2014 Lane County Assessor's records, improvement values within urban growth boundary (UGB) exceeds $116 million.

The following data is reported by the U.S. Census for the City of Oakridge for 2015:

Jurisdiction	2015 Population	Median Household Income	% Below Poverty Level	% High School Graduate or Higher	Median Housing Value	Total Housing Units	# Military Veterans
Oakridge	3,240	$38,381	23.5%	84.8%	$125,200	1,808	574

Source: US Census; http://www.census.gov/search-results.html?page=1&stateGeo=none&searchtype=web&cssp=Typeahead&q=Oakridge+city%2C+OR&search.x=0&search.y=0

Further information is located in multi-jurisdictional Annex 5 (Oakridge), and Chapters 2-5.

City of Veneta
Veneta is located in west-central Lane County on State Highway 126W. Veneta is approximately 10 miles west of Eugene, located approximately 2 miles southwest of Fern Ridge Reservoir. Veneta was incorporated in 1962, and current incorporated area encompasses approximately 2.6 square miles.

According to certified estimates from Portland State University, city population was 4,755 in 2016. This population represents a 72.5% increase over the 2000 Census population (2,755), and a 4.5% percent average annual population growth rate for the period. Per 2014 Lane County Assessor's records, improvement values within urban growth boundary (UGB) exceeds $205 million.

The following data is reported by the U.S. Census for the City of Veneta for 2015:

Jurisdiction	2015 Population	Median Household Income	% Below Poverty Level	% High School Graduate or Higher	Median Housing Value	Total Housing Units	# Military Veterans
Veneta	4,700	$45,705	19.8%	88.6%	$169,400	1,716	377

Source: US Census; http://www.census.gov/search-results.html?page=1&stateGeo=none&searchtype=web&cssp=Typeahead&q=Veneta+city%2C+OR&search.x=0&search.y=0

Further information is located in multi-jurisdictional Annex 6 (Veneta), and Chapters 2-5.

City of Westfir
Westfir is located in eastern Lane County approximately 2 miles east/north of State Highway 58. Westfir is approximately 35 miles southeast of Eugene, located along North Fork Middle Fork Willamette River and surrounded by Willamette National Forest. Westfir was incorporated in 1979, and current incorporated area encompasses approximately 0.33 square miles.

According to certified estimates from Portland State University, city population was 255 in 2016. This population represents a 7.6 percent decrease from the 2000 Census population (276), and a 0.5 percent average annual population decline for the period. Per 2014 Lane County Assessor's records, improvement values within urban growth boundary (UGB) exceeds $10 million.

The following data is reported by the U.S. Census for the City of Westfir for 2015:

Jurisdiction	2015 Population	Median Household Income	% Below Poverty Level	% High School Graduate or Higher	Median Housing Value	Total Housing Units	# Military Veterans
Westfir	255	$37,321	15.4%	92.8%	$134,100	147	32

Source: US Census; http://www.census.gov/search-results.html?page=1&stateGeo=none&searchtype=web&cssp=Typeahead&q=Westfir+city%2C+OR&search.x=0&search.y=0

Further information is located in multi-jurisdictional Annex 7 (Westfir), and Chapters 2-5.

1.8.2 Regional Maps, Participating Cities

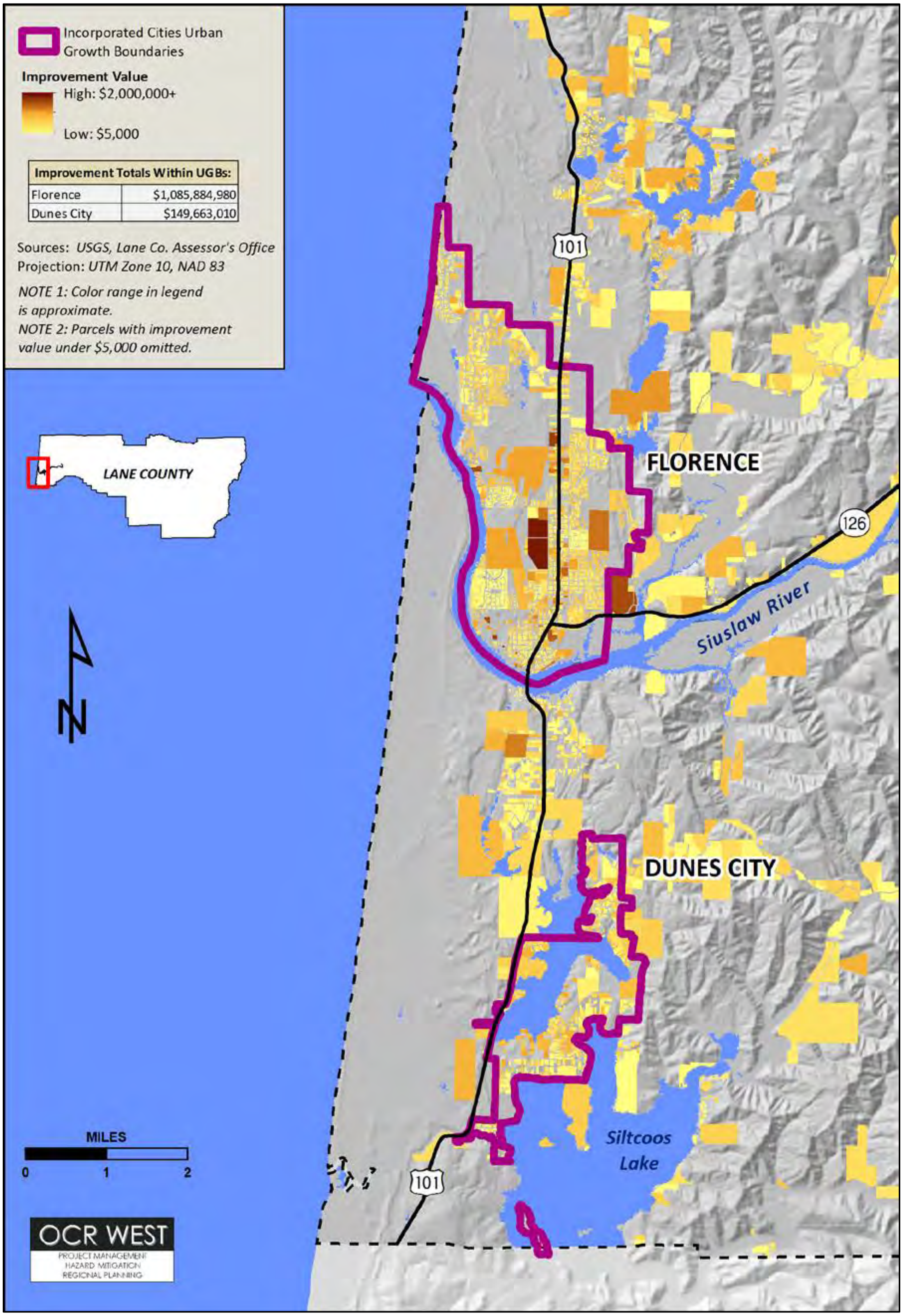


Figure 1-6 Coastal Cities, Lane County Oregon

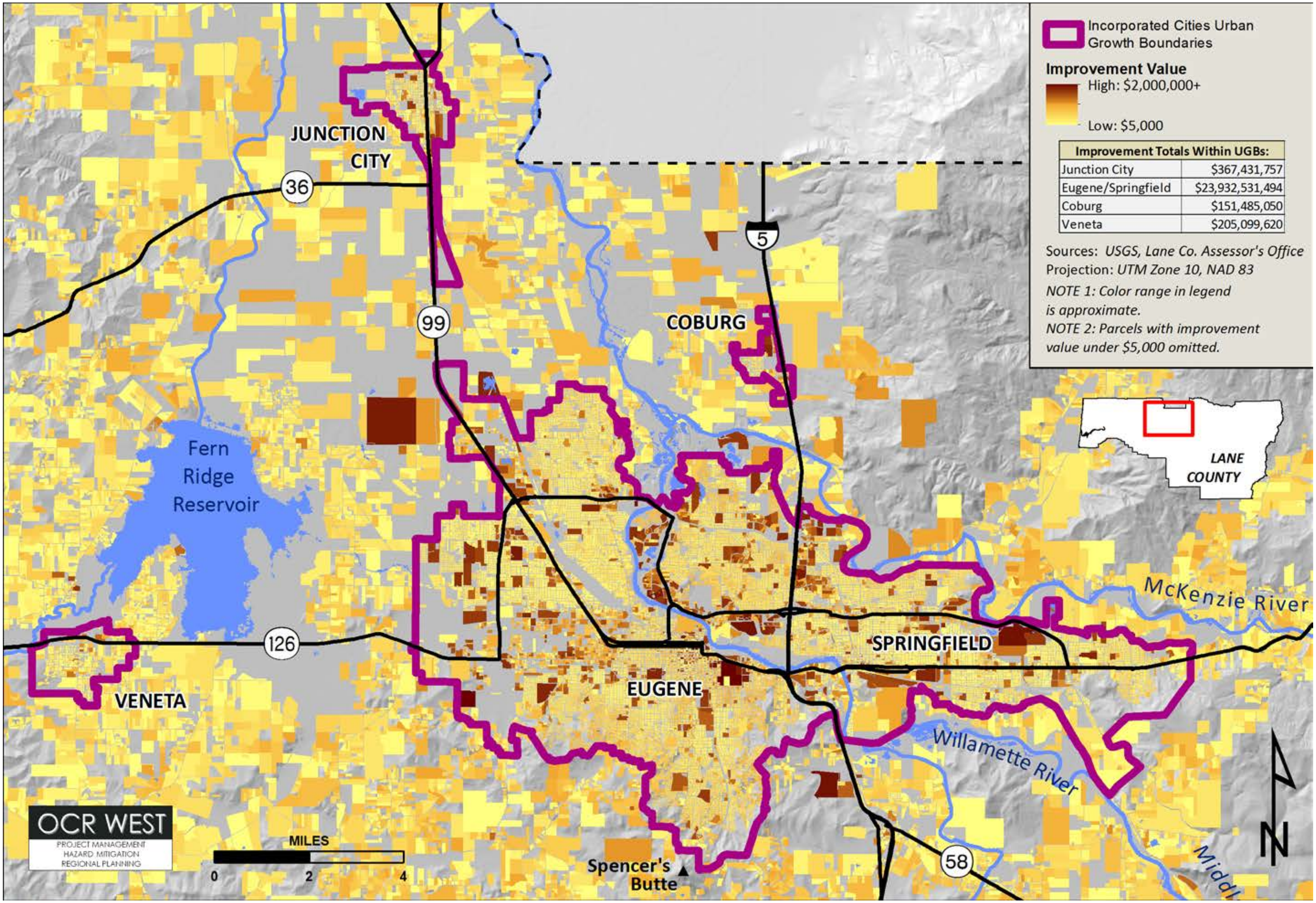


Figure 1-7 Willamette Valley Cities, Lane County Oregon

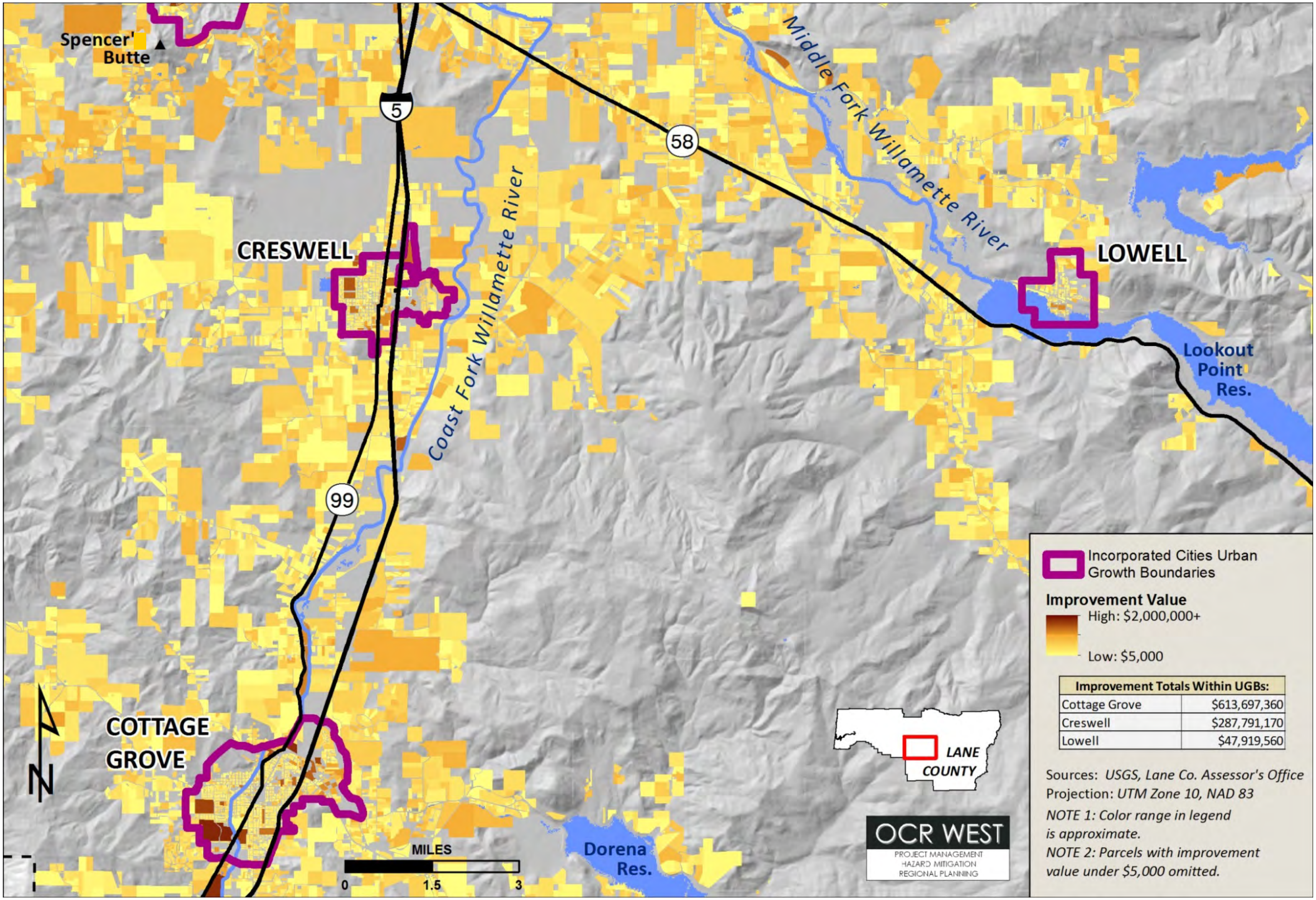


Figure 1-8 South Willamette Valley Cities, Lane County Oregon

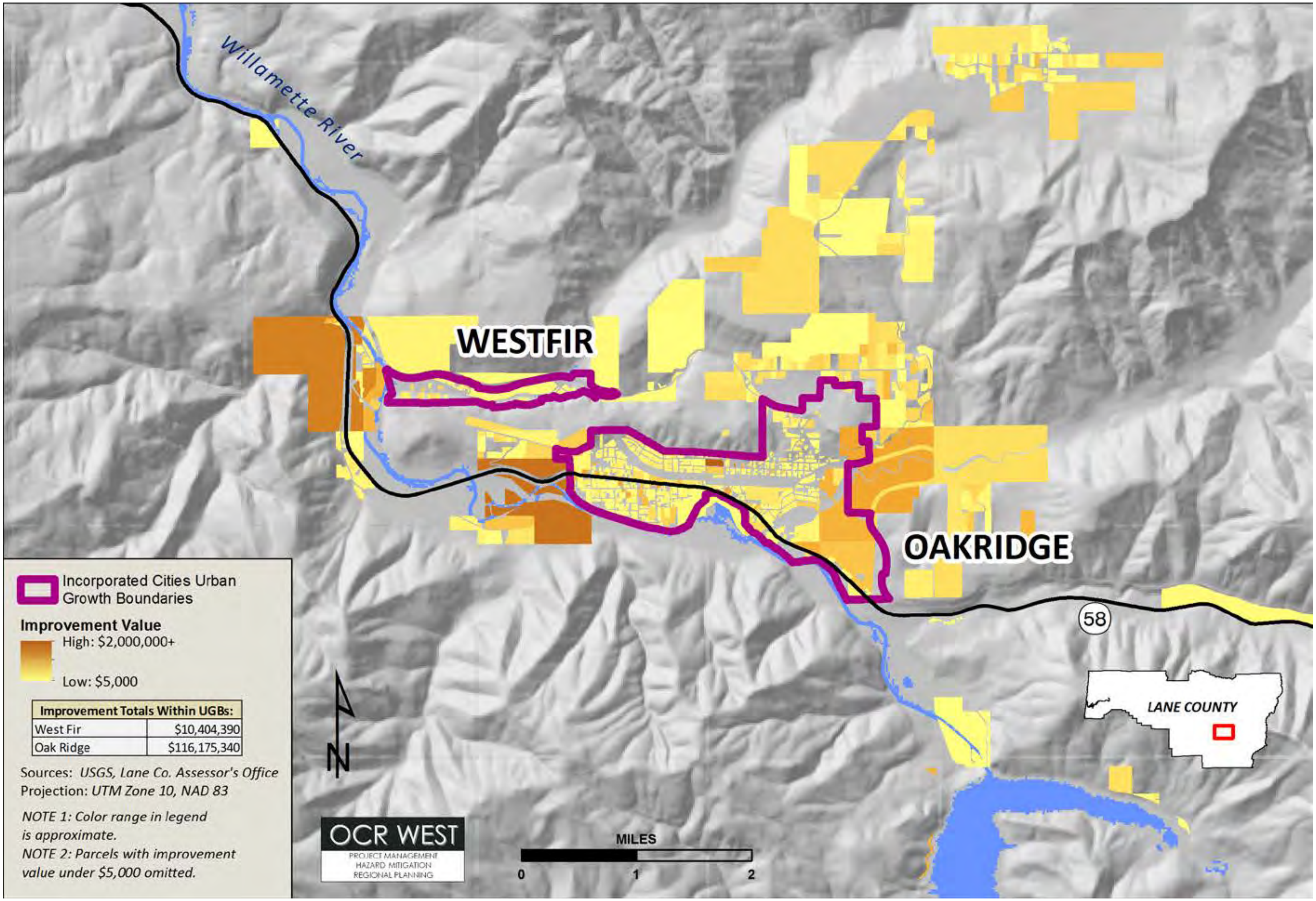


Figure 1-9 Eastern Cities, Lane County Oregon

2. PLANNING PROCESS

> ***44 CFR Requirement §201.6(b):*** *In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process **shall** include:*
>
> *(1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;*
>
> *(2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and non-profit interests to be involved in the planning process;*
>
> *(3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.*
>
> ***Requirement §201.6(c) (1):*** *[The plan **shall** document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.*

The 2012 version of the Plan marked the completion of the first full planning cycle. During the first planning cycle 2006-2011, numerous mitigation projects were successfully implemented despite many natural hazard occurrences including a Presidential Disaster Declaration resulting from winter storms, flooding and landslides in January 2012.

The process to update the Plan followed a four-step outline prescribed in FEMA publication, *Local Multi-Hazard Mitigation Planning Guidance*:

1) Organize resources
2) Assess risks
3) Develop the mitigation plan
4) Implement the plan and monitor progress

The first step (organize resources) was addressed by assembling the Hazard Mitigation Steering Committee (HM&EM-SC) as coordinated by the Lane County Emergency Management. In keeping with the goal of including multiple stakeholders, neighboring communities, agencies, businesses, academia, non-profits, and other interested parties were invited to review the plan document and participate in the planning process.

The second step (assess risks) was conducted via the hazard mitigation steering committee's review and consideration of the original version of the hazard mitigation plan, existing technical reports, studies and planning documents and input from various data sources brought forth by the HM&EM-SC members during meetings. A detailed listing of data sources for risk assessment is found in Section 3.1.2 (Data Sources and Limitations).

The third step (develop the mitigation plan) included input from the HM&EM-SC and data sources referred to in Step 2. Mitigation project development and prioritization for the Plan emphasized a review of costs vs. benefits and the social, technical, administrative, political, legal, economic, and environmental considerations of mitigation related projects. Plan update involved preparing a public review draft and a public comment period to solicit input from the public and interested parties. Comments and recommendations from these sources were incorporated into the final version of the Plan submitted to the State and FEMA and ultimately adopted by the County.

The fourth step (plan implementation and monitoring) will occur on an ongoing and annual basis prior to and following State and FEMA approval. Adoption of the approved plan is the first step toward implementing the plan. Feasibility study and scoping of mitigation projects are secondary steps, followed by grant writing coordinated through OEM to secure funding and ultimately the implement the projects. Other mitigation projects that do not require outside funding will be enacted on an ongoing basis. Monitoring will also occur on an ongoing basis as action items are implemented, following major disaster events, and during semi-annual meetings of the Hazard Mitigation Steering Committee.

Throughout the last five years various approaches were used for updating the plan and implementing projects, including those initially outlined in the 2006 Plan. Over time it became apparent that the breadth of the initial Plan was too unwieldy for a single committee to oversee. Additionally, we found interest in the Plan gradually decline as plan reviewers were asked to focus on the entire document regardless of their specific area of interest or expertise. Although plan reviewers were well intentioned and interesting conversations ensued, key decision makers and subject matter experts were oftentimes not present to help advance projects. Consequently, a new approach was needed for keeping the Hazard Mitigation Plan alive.

Adjustments to implementation and review processes were made over time. Reviews were conducted on a project-by-project basis which proved to generate more enthusiasm, improved results and ultimately engaged more people in the process. Additionally, it was recognized that unforeseen incidents and situations will inevitably emerge; therefore the PLAN is purposely designed to be flexible enough to address new projects and evolving priorities relevant to hazard mitigation.

In the chapter that follows, the Hazard Mitigation & Emergency Management Steering Committee (HM&EM-SC) is profiled in ***Section 2.1 (Hazard Mitigation & Emergency Management Steering Committee)***. ***Section 2.2 (Committee Meetings-Public Involvement)*** provides a recap of HM&EM-SC meetings and primary agenda points for each, describes the process for updating the previous version of this plan, molding it into its current form while addressing new requirements and gathering public input.

2.1 HAZARD MITIGATION & EMERGENCY MANAGEMENT STEERING COMMITTEE

Members of the Hazard Mitigation & Emergency Management Steering Committee (HM&EM-SC) include participants in previous mitigation plan processes as well as new members.

The HM&EM-SC is comprised of representatives from various departments of County government who, in turn, periodically engage the public, media and local and regional stakeholders on various topics and issues. The HM&EM-SC is also supported by several agency affiliated contributors. Professional fields represented by the HM&EM-SC include:

- Emergency Management
- Land Use Planning
- Public Works, Fleet
- Public Works, Roads
- Public Works, Safety
- Law Enforcement
- Law Enforcement Dispatch Services
- Geographic Information Systems
- Management Services, Facilities
- Public Health
- Floodplain Administration
- Technology Services
- Risk Management
- Local Media
- General Public and Interested Stakeholders

Hazard Mitigation & Emergency Management Steering Committee
Listed below is the convener and members of the Lane County Hazard Mitigation & Emergency Management Steering Committee. The following list includes all persons (current and former) with involvement in hazard mitigation at the county level to date.

Name	Agency/Title
Linda Cook	Lane County Emergency Manager, Steering Committee Convener
Mike Finch	Lane County, Information Technology
Melissa Crane	Lane County Public Works, GIS Division Supervisor
Brian Craner	Lane County, Capitol Projects
Matt Dapkus	Lane County, Facilities
Christopher Doyle	Lane County Sheriff's Office. Law Enforcement
Joanna Hill	Lane County, Public Safety, Communications
Selene Jaramillo	Lane County, Public Health
Michael Johns	Lane County Public Works, Fleet
Lisa Lacey	Lane County, Risk Management
Gary Luke	Lane County Public Works, GIS
Keir Miller	Lane County Land Management Division, Senior Planner
Oren Schumacher	Lane County Public Works, Roads Maintenance Planner
Greg J. Wobbe	OCR West, Mitigation Contractor
Pete Zugelder	Lane County, Risk Management, Continuity of Government

Reviewers and Contributors (Version 2.0)
Information and data contributions, document review feedback, and general input to this Plan were received from many planning process participants. Individuals and agencies that provided such contributions are listed below.

Name	Agency
Dustin Bengston	U.S. Army Corps of Engineers
Roger Kline	Eugene Water and Electric Board
Todd Simmons	Eugene Water and Electric Board
Karl Morgenstern	Eugene Water and Electric Board
Mike Russell	Lane County Public Works, Roads
Jeff Bishop	Lane County Waste Management
Brian Johnson	Lane County Public Health
Robin Hawks	Contractor, Technical Editor

Survey Respondents (Version 2.0)
Local Utility Service Providers
Public utilities operating in Lane County were invited to participate in a survey for purposes of assisting with the Plan Update. The following utilities participated.

Agency
Blachly Lane Electric Cooperative
Emerald People's Utility District
Eugene Water and Electric Board

Lane County Fire Defense Board **(**Version 2.0)
Seventeen members of the Lane County Fire Defense Board participated in a survey that was specifically designed to provide essential facility data to HAZUS and to assist with the Plan update. Many of the responses were incorporated into the Plan update as appropriate and applicable.

Agency
Coburg Fire District
Dexter Rural Fire Protection District
Eugene Fire & EMS Department
Goshen Fire District
Hazeldell Fire District
Junction City Rural Fire Protection District
Lane County Fire District #1
Lane Rural Fire & Rescue
Lowell Rural Fire Protection District
McKenzie Fire & Rescue
Oakridge Fire & EMS
Pleasant Hill Rural Fire Protection District
Santa Clara Fire District
South Lane County Fire & Rescue
Springfield Fire & Life Safety
Siuslaw Valley Fire & Rescue
Upper McKenzie Rural Fire Protection District

2.2 PLANNING MEETINGS

44 CFR Requirement 201.6(b)
An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include: (2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process. (3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

Outlined below are the annual highlights of HM&EM-SC meetings and general mitigation activities undertaken during the previous planning cycle. These activities demonstrate the diverse involvement of neighboring communities, local government, regional agencies, the public, and various stakeholders. All activities listed helped inform the plan update process.

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2.2.1 Lane County Planning Process: 2012-2016 Cycle

Outlined by year below is a summary of mitigation activities from the 2012-2016 planning cycle. In keeping with guiding principles set forth in the original plan formation, these activities demonstrate diverse involvement of neighboring communities, local government, regional agencies, infrastructure/utilities, the public, and various stakeholders. Note: Appendix C contains comprehensive meeting notes and outlines for the planning cycle.

2012

General: Implementation of the approved and adopted plan began in 2012. Lane County Emergency Management engaged with emergency management peers, subject matter experts and county staff to construct a framework for completing the action items set forth in the PLAN and documenting activities on a continuous basis. Additional notes below.

Activity: Oregon Emergency Management Conference

Date: September 17-20, 2012

Location: Gleneden Beach, Oregon

Agenda/Outline: Hazard mitigation and emergency management, general.

2013

General: Following FEMA approval of the Hazard Mitigation Action Plan update in 2012 and the official completion of planning cycle 1, the following activities occurred during 2013, the first year of the second planning cycle.

- reformatted plan document to make it adaptable to new FEMA mitigation planning standards released in 2013
- updated/expanded risk assessments for earthquake, flood, landslide, tsunami, windstorm
- developed initial risk assessment framework for dam failure, hazmat incident, pandemic
- analysis of related planning documents, opportunities for plan coordination and integration
- a detailed document review and editing project
- posted a digital version of the current PLAN document on the county emergency management website and HM&EM-SC Sharepoint site
- Hazard Mitigation & Emergency Management Steering Committee (HM&EM-SC) formed.

Activity: Lane County HM&EM-SC Meeting (Summer 2013)

Date: July 10, 2013

Location: Lane County Public Works, N. Delta Hwy

Meeting Agenda/Outline: unofficial formation of Hazard Mitigation and Emergency Management Steering Committee (HM&EM-SC) by consensus. Defined responsibilitiies and expectations. Plan document reformatting overview, new material and processes. Goals review and discussion. Action item implementation, progress reports.

Activity: Work Session, Hazard Mitigation Mapping

Date: September 16, 2013

Location: Lane County Public Works, North Delta Hwy

Meeting Agenda/Outline: Identify data sources and cartographic methods for hazards mapping, various types. Prioritization of mapping projects. Inventory of existing maps and analysis.

Activity: Lane County HM&EM-SC Meeting (Fall 2013)

Date: October 24, 2013

Location: Lane County Sheriff's Office, EOC

Meeting Agenda/Outline: Mission statement, goals review. Similarities, differences and interrelationships of PLAN, EOP, EAP, and COOP. Engaging stakeholders, 'whole community approach' to planning. Mitigation action item discussion: various project types. Discussion per department of mitigation actions completed or proposed. Recent policy changes, FEMA mitigation and the NFIP. Ongoing mapping and hazards analysis. Sharepoint site for Hazard Mitigation & Emergency Management Steering Committee.

2014

Activity: Lane County HM&EM-SC Quarterly Meeting (Winter 2014)

Date: January 23, 2014

Location: Lane County Sheriff's Office, EOC

Meeting Agenda/Outline: Departmental updates. Mitigation actions completed, proposed, and highest priorities. Reviewed Goals and Consider Revision (adopted by consensus, updated goals Section 4.2). Steering, Establishing Milestones, Road Ahead (highlights: transition to multi-jurisdiction document by including incorporated cities not covered by a PLAN, pursue grant funding to implement projects). Overview of USACE Rehabilitation and Inspection Program, potential mitigation opportunities. Established standardized meeting schedule for Hazard Mitigation & Emergency Management Steering Committee (HM&EM-SC), fourth Thursday of every 3rd month, time/location to TBA.

Activity: DR-4169 Severe Winter Storm OEM/FEMA Public Assistance and HMGP applicant briefing

Date: April 16, 2014

Location: Lane County Public Works, N. Delta Hwy

Meeting Agenda/Outline: Disaster declaration update, severe winter storms February 6-10, 2014. Overview of the Public Assistance Program. The State Hazard Mitigation Officer provided overview of Hazard Mitigation Grant Program (HMGP) and priorities for this disaster. HMGP pre-application was made available during the briefing. Technical assistance on project feasibility, environmental considerations and benefit-cost analysis provided.

Activity: Lane County HM&EM-SC Quarterly Meeting (Spring 2014)

Meeting Date: April 24, 2014

Location: Lane County Sheriff's Office

Meeting Agenda/Outline: Federal Disaster Declaration 4169 Oregon Winter Storms. Discussed ideas for improved emergency/incident management. Methods for real-time information exchange between EOC, public works, 1st responders and repair crews. Suggestion: During emergency, activate centralized call center, dispatch, and real-time web-based mapping interface specific to field operations with all 6 utilities in Lane County. Both radio and cell phone capability. Operators on standby for field reports, 2-way info sharing.

Mapping element, need for real-time overview of regional situation. Google Earth type solution suggested, ability to edit and upload web-based map in real-time showing: 1) road blockage, 2) power/communications outages, 3) repair priority, 4) dangerous conditions, 5) work crew status. Also discussed outward facing map interface, public access to report/edit information. Action Item 1: Research off the shelf solutions, prepare Draft 2 to propose to utilities. Incorporate into Hazard Mitigation Action Plan (PLAN).

Briefing on USACE Major Flood / Inundation Maps. Map viewing meetings, public information campaign. Current status, data availability, limitations, security. Map review, areas of interest, evacuation planning. Multi-Jurisdiction PLAN, HMGP application.

Activity: Work Session, Repetitive Flood Claim Mitigation

Meeting Date: June 3, 2014

Location: McKenzie River Trust Office, Eugene

Meeting Agenda/Outline: Discussed mitigation options for Repetitive Flood Claim property. Annual grant opportunity, mitigation funding, project viability.

Activity: Lane County HM&EM-SC Quarterly Meeting (Summer 2014)

Meeting Date: July 24, 2014

Location: Lane County Sheriff's Office

Meeting Agenda/Outline: Discussed coordination cell concept for management of moderate scale emergencies. Hazard mapping, description of new applications for emergency management. Departmental updates. Mitigation actions completed, proposed, and highest priorities. Update on HMGP application for DR-4169.

Activity: Lane County HM&EM-SC Quarterly Meeting (Fall 2014)

Meeting Date: October 23, 2014

Location: Lane County Sheriff's Office

Meeting Agenda/Outline: Discussed Hazard Mitigation Action Plan updates during last 12 months (Mitigation Strategy: mission statement, updated goals, new action items, implemenntation methods; Risk Assessment: new and updated hazard profiles, hazard mapping; Classified Annex: initiate profile and guidance for Technical Hazards). Update on new mitigation action item to relocate backup power and data center for Lane County Administration Building. Ebola virus update. Discussed newly adopted Health in All Policies, implementation method. Department Updates.

2015

Activity: Lane County HM&EM-SC Quarterly Meeting (Winter 2015)

Meeting Date: January 22, 2015

Location: Lane County Sheriff's Office

Meeting Agenda/Outline: Department updates, mitigation and emergency preparedness activities: violent intruder trainings, data center resiliency improvements, security system back-up, measles outbreak, activated ICS, IT network system needs inventory, radio tower and equipment system upgrades, fiber optics to Veneta public works, need for seismic upgrades for county bridges (over 400 bridges not currently reinforced), floodplain management training and

Firewise program outreach. Discussion of annual FEMA Non-Disaster Mitigation Grant cycle. Seismic Rehabilitation Grant Program. National Disaster Resilience Competition.

Activity: Lane County HM&EM-SC Quarterly Meeting (Spring 2015)

Meeting Date: April 23, 2015

Location: Lane County Sheriff's Office

Meeting Agenda/Outline: Discussion of new mitigation action items (no particular order). A) generator relocation, Public Service Building; B) real-time mapping interface for emergency management field operations; c) storm-harden/retrofit utilities network; d) seismic retrofit/upgrade for county bridges; e) retrofit/replace underground fuel storage tank currently unrated for seismic hazard.

Activity: Lane County HM&EM-SC Quarterly Meeting (Summer 2015)

Meeting Date: July 23, 2015

Location: Lane County Sheriff's Office

Meeting Agenda/Outline: Team Exercise, comparing roles, responsibilities in emergency management scenarios. Interesting, valuable exercise. Team members exchanged roles with other team members, explained their understanding of the roles of their counterparts (perception), followed by discussion to clarify details regarding emergency management roles (actual).

2016

Meeting Date: January 28, 2016

Location: Lane County Sheriff's Office

Meeting Agenda/Outline: Communiciations discussion, prioritization excercise.

Agencies Represented: Building Codes, Info Services, Public Works, Emergency Management, Dispatch, Land Management/Floodplain Administration, Facilities, Risk Management.

Minutes/Notes: Community Emergency Notification System (reverse 911). New system is AlertSense. Landline based, has been used for flood evacuation notification. Subscription feature to register cell-phone (opt-in). Also has interal communication feature: dispatch to field, dispatch to dispatch. Can be used by damage assessment teams, call out to EOC, discussion how to use for employee safety / rapid response situation. Drills discussion, scheduling protocol, best practices. Old system was Emergency Alert System (EAS).

Wireless Emergency Alerting (WEA) is cell tower driven. IPAWS integrates all systems (landline, cell phone, etc.).

2.2.2 Multi-Jurisdiction Planning Process

The multi-jurisdiction phase of the planning process officially began with a project orientation meeting at Lane County Sheriff's Office on May 27, 2015. Subject matter included:

Hazard Mitigation Planning Context

- Federal context: FEMA, Mitigation Planning, National Priority.
- Authorizing laws: Stafford Act (1996), Disaster Mitigation Act (2000)
- State context: OEM; State Hazard Mitigation Plan; Goal 7 Statewide Planning, Natural Hazards, Local Comprehensive Plans
- Disaster Declaration Cycle: Public Assistance (PA), Individual Assistance (IA), Hazard Mitigation Grant Program (HMGP)

Purpose of Hazard Mitigation Planning

- Hazard Mitigation defined
- Distinction between mitigation and response/emergency management.
- Mitigation project examples: structural reinforcements, infrastructure protection, building site decisions, fuels reduction, stormwater management, public education.
- Concepts are proactive, preventative projects; protective measures; engineering upgrades and improvement; public outreach/education; preparation; siting decisions and requirements; requirements for safety and strength by design.

Preliminary Hazard Identification Discussion

- Discuss top 2 hazard concerns for your community in terms of:
  A) Frequency. B) Maximum potential impact.

Primary Stages of Project

FEMA guidance for 9 tasks to develop hazard mitigation plan.

Task 1: Determine Planning Area and Resources
Task 2: Build Planning Team
Task 3: Create Outreach Strategy
Task 4: Review Community Capabilities
Task 5: Conduct Risk Assessment
Task 6: Develop Mitigation Strategy
Task 7: Keep the Plan Current
Task 8: Adopt the Plan
Task 9: Create Safe and Resilient Community

<u>Condensed List of Stages</u>

- Orientation
- Data Collection
- Develop Mitigation Strategy
- Develop Plan Document
- FEMA/OEM Approval, Adoption Process

Overview of Document Structure, Required Components

- Chapter 1: Introduction, Community Profiles
- Chapter 2: Planning Team, Process
- Chapter 3: Risk/Vulnerability Assessment
- Chapter 4: Mitigation Strategy

- Chapter 5: Plan Adoption, Maintenance, Integration

The multi-jurisdiction planning group reconvened at Lane County Sheriff's Office August 25, 2015 to discuss mitigation project planning in greater detail, subject matter outlined as follows:

Mitigation Project Ideas
FEMA guidance and examples for mitigation projects including:

- structural and infrastructure projects;
- planning projects;
- regulatory standards;
- public education and outreach;
- 5% initiative projects.

Mitigation Grant Programs
Overview of annual non-disaster grant programs

- Pre-Disaster Mitigation (PDM),
- Flood Mitigation Assistance (FMA),
- Repetitive Flood Claims (RFC),
- Severe Repetitive Loss (SRL).

Overview of disaster mitigation grants

- Hazard Mitigation Grant Program (HMGP).

Data Collection Strategies, Post-Event
General discussion, strategies and importance of data collection during and following disaster event.

Individual City Work Sessions

Work sessions with individual cities were conducted following the initial project orientation meeting and intervening months between general planning group meetings. These individual work sessions are outlined per city below.

Date	Location	Meeting/Work Session
June 24, 2015	Florence City Hall	Project overview, basic data collection, Dunes City and Florence
June 24, 2015	Veneta City Hall	Project overview, basic data collection
June 29, 2015	Oakridge City Hall	Project overview, basic data collection
June 29, 2015	Westfir City Hall	Project overview, basic data collection
June 30, 2015	Creswell City Hall	Project overview, basic data collection
July 23, 2015	Coburg City Hall	Project overview, basic data collection, risk assessment, hazard quantification
July 27, 2015	Oakridge City Hall	Risk assessment, Hazard quantification
July 27, 2015	Westfir City Hall	Risk assessment, Hazard quantification
July 29, 2015	Florence City Hall	Risk assessment, Hazard quantification, Dunes City and Florence
July 29, 2015	Veneta City Hall	Risk assessment, Hazard quantification
July 30, 2015	Creswell City Hall	Risk assessment, Hazard quantification
September 22, 2015	Dunes City Hall	Hazard quantification-seismic assessment review, SRGP, FEMA mitigation grant programs, mitigation ideas
September 22, 2015	Florence City Hall	Hazard quantification-seismic assessment review, SRGP, FEMA mitigation grant programs, mitigation ideas
September 23, 2015	Veneta City Hall	Hazard quantification-seismic assessment review, SRGP, FEMA mitigation grant programs, mitigation ideas
September 23, 2015	Westfir City Hall	Hazard quantification-seismic assessment review, SRGP, FEMA mitigation grant programs, mitigation ideas
September 25, 2015	Coburg City Hall	Hazard quantification review, seismic assessment review, SRGP, FEMA mitigation grant programs
October 15, 2015	Creswell City Hall	Hazard quantification-seismic assessment review, SRGP, FEMA mitigation grant programs, mitigation ideas
October 21, 2015	Florence project tour	Mitigation project site tour
October 23, 2015	Oakridge City Hall	Hazard quantification-seismic assessment review, SRGP, FEMA mitigation grant programs, mitigation ideas
November 23, 2015	Veneta City Hall	Identifying mitigation projects
January 4, 2016	Westfir City Hall	City council, mitigation project discussion
January 27, 2016	Veneta project tour	Mitigation project site tour
March 1, 2016	Dunes City project tour	Mitigation project site tour
April 26, 2016	Creswell project tour	Mitigation project site tour
June 27, 2016	Westfir City Hall	Mitigation project review
June 28, 2016	Coburg project tour	Mitigation project site tour
June 28, 2016	Oakridge project tour	Mitigation project site tour

Source: Lane County Multi-Jurisdiction Hazard Mitigation Team

2.3 PUBLIC INVOLVEMENT IN PLANNING PROCESS

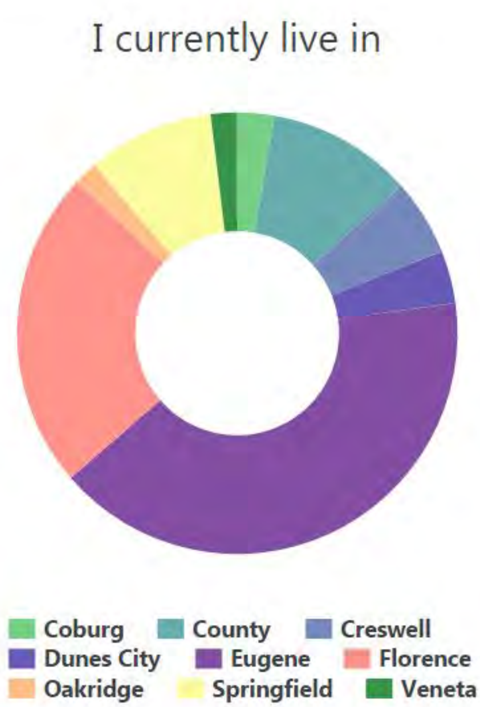
The goal over the past five years has been to more broadly instill a shared understanding of the importance of hazard mitigation and what the Plan is expected to accomplish. Expectations of the mitigation coordinating committee, reviewers and contributors were kept simple and manageable: “participate in mitigation projects and contribute to the Plan document in areas relevant to your area of expertise”. The net was cast wide to create interest and garner participation in the Plan.

Public input throughout the 5-year planning cycle was facilitated through several concurrent means, including the following methods:

- Contact with committee members and their organizations
- Public education and outreach events (Firewise Communities, Community Rating System, educational tables at public events)
- Hazard mitigation web links located at www.lanecounty.org/prepare
- A formalized public involvement campaign

2.3.1 Public Involvement Campaign

Lane County Emergency Management launched an on-line public involvement campaign that ran August through November 2016. Community members were asked a series of open ended questions designed to determine a range of public concerns. They were asked about their perception of natural and man-made hazards, they were invited to provide commentary on goals established by Lane County, and solicited for suggestions on strategies and mitigation actions for increasing community resilience. Over 500 community members participated.



Value	Respondents	Percent
Coburg	14	2.71%
County	55	10.64%
Creswell	29	5.61%
Dunes City	20	3.87%
Eugene	211	40.81%
Florence	121	23.40%
Oakridge	9	1.74%
Springfield	48	9.28%
Veneta	10	1.93%
Totals	517	

All data for this screen (Excel)

Screen comments

PDF Excel

Notes that free-form comments and private data (such as name or email address) is not displayed here. If any exists, use the Excel/Pdf buttons above.

Figure 2-1 Public Involvement Results, <u>Responses by Location</u>

Table VII Public Involvement Results, Hazard Mitigation Goals Ranking

Overall Rank	Item Name	Average Position	Times Ranked
1	Preserve Human Life	1.64	485
2	Restore Services	2.59	481
3	Promote Hazard Awareness	3.06	317
4	Protect Built Environment	3.51	337
5	Preserve Local Resources	3.63	306
6	Restore Economy	3.75	342
7	Demonstrate Resiliency	3.87	186
Total			2454

Source: Lane County Emergency Management via MetroQuest software
Note: Lower "Average Position" score indicates higher goal emphasis

Table VIII Public Involvement Results, <u>Overall Hazard Significance</u>

Overall Rank	Item Name	Average Position	Times Ranked
1	Earthquake	2.23	472
2	Severe Winter Storm	2.80	411
3	Flood	2.93	384
4	Tsunami	2.95	191
5	Windstorm	3.08	376
6	Wildfire	3.28	314
7	Landslide	3.68	189
8	Drought	3.86	194
Total			2531

Source: Lane County Emergency Management via MetroQuest software
Note: Lower "Average Position" score indicates higher overall hazard significance

2.3.2 Public Involvement Survey: Findings

"Preservation of life must be the first priority."

Lane County presented 8 hazard mitigation goals for comment in the survey. When asked about the goal of "Preserving Human Life", commenters agreed the preservation of human life is vitally important.

"Opening transportation routes is first priority to move supplies where they are needed, and get medical help for people."

When asked about "Restoration of Services", community members provided valuable insight, "*If the physical infrastructure itself is intact, critical service providers will move to normalize as rapidly as possible*." Several responses indicated that this is an important factor to consider when attempting to restore the community to normal as quickly as possible after an incident or disaster.

"Restoring the economy and restore services by definition means that we protect the built environment."

When asked about "Restoring the Economy", the responses were similar, expressing in different ways that "*If and when we survive physical injury we will need a viable economy to go on with life*."

The goal most often commented on was "Protecting the Built Environment". One respondent cleanly summed up the consensus noting: "*This is key to the return of the community after a disaster*." All respondents expressed concern with the ability to return to normal without a functioning built environment.

"It is very important that educating officials and the public about hazards be an integral part of the plan.."

The second most commented on goal "Promoting Hazard Awareness", generated a variety of responses, the consensus being that not enough people are aware enough of the hazards present in the county to an appropriate degree.

Another stated in part that *"…the most important thing to do is educate/inform the public about hazards so that they can take measures to be self-sufficient during a disaster. This reduces demands on limited public resources."*

After reviewing the Plan goals, the community was asked to focus on hazards and answer questions about earthquake, severe winter storm, flood, windstorm, drought, wildfire, landslide, and tsunami. By far, earthquake generated the most interest among community members. Comments ranged from expressing uncertainty regarding the effects of a strong earthquake to concern that the public isn't taking hazard risk seriously enough. Several responses expressed concern for survivability of local dams in an earthquake and the possibility of serious flooding if dams should fail. No respondent indicated they felt ready for a large earthquake. Instead all expressed concerns about readiness.

Severe winter storms generated a significant number of responses, with several expressing concerns for the effects of power loss that often results from storm damage. Several respondents expressed the need for increased public knowledge, and the need for people to be more personally resilient. One person stated, "*Public education policy can inform people to be self-reliant and 'camp' in place. 'How to' education, including checking on vulnerable neighbors is a responsible approach to mitigate damage*." All hazards preparedness was a commonly expressed theme.

The community was then asked about potential strategies for Lane County to undertake in increasing public resilience. Strategies around reducing power outages generated the most interest. Participants expressed interest in identifying the most at-risk utility distribution systems and the benefits of undergrounding of overhead power lines. One reply offered potential solutions to consider:

> *"Increase the amount of locally-owned renewable generation (and battery storage) that can provide power in the aftermath of a CSZ earthquake. Transition some portion of Public Safety vehicle fleets to electricity in order to diversify the fueling options and retain capacity when/if fossil fuel supply is constrained. EQ retrofit of communication towers and backup power facilities for communications towers."*

Water tanks, towers, and transmission lines were of paramount concern. Responses included, "*Water #1 issue*", "*fresh water is critical*", "*Water is critical to life so is a high priority*."

"Water is the most important source that we should consider. You can deal with the power out but without water we are in dire straits."

'Regarding Public Service Building, I would be interested in cost comparison for 'major' retrofitting vs new building."

Questions about resilience of public schools had mixed results. Some offered advice on funding: "*This should be done with bond money*." Others recognized the role of schools as shelters, *"…make sure all NEW schools are built - not to life safety standard - but to immediate occupancy standard so they can be used as shelters*."

Comments regarding Lane County buildings were also mixed from, "*Public Works facilities will be critical to recovery*," to "*doesn't seem like this building is that important to life/safety*."

The general consensus is summed up by one respondent with "*people will need help so it's important that the building be safe and available for use*".

Questions about infrastructure generated the most responses, while the suggestion on reducing landslide risk generated the least.

> "*Restrict or prohibit new construction on unstable slopes*."

When asked about stabilizing slopes, respondents considered it significant:

> "*While I think this is important, especially along priority routes, this can be very expensive*."

When asked to consider public services such as Fire, Police and 911 Dispatch Centers, all responses indicated the importance of these services. Many indicating the need for these public servants to be able to respond.

> "*Maintaining order in a disaster is very important*" and "*They need to be operational to provide assistance during emergencies*," were repeated in a variety of different ways.

Several included concern for the families of first responders.

> "*Provisions for family care of Firefighters, so they can focus on community needs without worry or distraction,' in recognition of the families of first responders and their needs in a disaster as well."*

The community clearly expressed concern about natural hazards and the impacts they have on society and individuals. The public is concerned for their own well-being and their ability to recover. Additionally respondents are concerned about the social effects of disasters and the need to be prepared both as a community and as individuals.

2.3.3 Plan Document Viewing, Comment Opportunities

Additionally, the plan is open for comment at all times on the Lane County Emergency Management website. The public can view or download the Plan update and submit comments online by clicking on the appropriate link.
http://www.lanecounty.org/Departments/Sheriff/Office/Emermgmt/Documents/EMComment.pdf

3. RISK ASSESSMENT

> ***44 CFR Requirement §201.6(c) (2)***
> *[The plan shall include] A risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards*

The purpose of risk assessment is to identify and describe hazards that affect Lane County and analyze potential losses for human life and material assets. Through better understanding of potential hazards and the degree of risk they pose, more successful mitigation strategies can be developed and implemented.

This risk assessment follows the four-step process described in the FEMA publication 386-2, *Understanding Your Risks: Identifying Hazards and Estimating Losses*, listed as follows:

Step 1: Identify Hazards
Step 2: Profile Hazard Events
Step 3: Inventory Assets
Step 4: Estimate Losses

This chapter is organized into three sections that address the four steps of the risk assessment process.

Section 3.1 Identifying Hazards, Addresses Step 1. This section lists the hazards considered during the planning process and those ultimately profiled in the plan. It also describes methods, definitions and data sources used for the hazard identification and profile process.

Section 3.2 Hazard Profile, Addresses Step 2. This section presents a detailed outline for each identified hazard. Each hazard profile is addressed as a plan subsection and includes a general description, affected geographic area, and discussion of previous occurrences, probability of future occurrence, magnitude and severity and an assessment of overall vulnerability to each hazard.

Section 3.3 Vulnerability Assessment, Addresses Steps 3 & 4. This section provides a countywide overview of risk exposure. It includes subsections that inventory potentially vulnerable assets and estimates potential losses in terms of structures and dollar value. Specifically, subsections include: National Flood Insurance Program (NFIP) status for the participating jurisdictions, inventories of FEMA/NFIP defined Repetitive Loss Properties, vulnerable populations, critical facilities, vulnerable structures, potential dollar loss estimates, land use and development trends, a multi-jurisdiction risk assessment and an overview of existing planning mechanisms.

3.1 IDENTIFYING HAZARDS

44 CFR Requirement §201.6(c) (2) (i)
[The risk assessment shall include a] description of the type…of all natural hazards that can affect the jurisdiction.

The EM&HM-SC reviewed information on hazards required for consideration. The committee identified hazards in Table VIII below as relevant to Lane County and selected these for detailed profile and mitigation efforts pursuant to the goals of this plan.

Hazard profiles were developed from information provided by the State of Oregon Natural Hazard Mitigation Plan, FEMA, the National Weather Service, the previous version of this Plan, and other referenced sources. Geographic information is provided for each hazard based on information on the impact areas of previous occurrences. For hazards including windstorm, drought, etc., geographic location of impacts is potentially any location in the county, and is noted accordingly.

Many of these hazard types are also identified in the State of Oregon Natural Hazard Mitigation Plan (aka State Plan), though there are differences in the organization and groupings in certain cases. Order of listing is alphabetical and does not imply relative significance.

Table IX Profiled Hazards for Lane County

Hazard Type	Method of Identification
Dam Failure	*Potential occurrence*
Drought	Previous occurrence
Earthquake	Previous occurrence
Flood	Previous occurrences
Hazardous Materials Incident	Previous occurrence
Landslide	Previous occurrences
Pandemic	Previous occurrence
Tsunami	Previous occurrence
Wildfire	Previous occurrences
Windstorm	Previous occurrences
Winter Storm	Previous occurrences
Volcano	*Potential occurrence*

Source: Lane County Hazard Mitigation & Emergency Management Steering Committee.

Simultaneous and/or consequential occurrences of hazards, also referred to as cascading events were considered and incorporated into the corresponding hazard profiles as appropriate.

Geologic hazards such as land subsidence, erosion, and expansive soils were not profiled due to lack of data, but may be developed in future iterations of this hazard mitigation plan.

3.1.1 Hazard Analysis Scoring (Quantification)

44 CFR Requirement §201.6(c)(2)(i):
[The risk assessment shall include a] description of the … location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events

A scoring method was used to assist with prioritizing hazards and understanding risk. It doesn't predict the occurrence of a particular hazard but it does "quantify" the risk of one hazard compared with another. By doing this analysis, planning can first be focused where the risk is greatest. Among other things, this hazard analysis can:

- help establish priorities for planning, capability development, and hazard mitigation
- serve as a tool in the identification of hazard mitigation measures
- be one tool in conducting a hazard-based needs analysis
- serve to educate the public and public officials about hazards and vulnerabilities
- help communities make objective judgments about acceptable risk

The methodology was first developed by the Federal Emergency Management Agency (FEMA) circa 1983, and gradually refined by Oregon Emergency Management (OEM) over the years. The methodology produces scores that range from 24 (lowest possible) to 240 (highest possible). By applying one order of magnitude from lowest to highest, a hazard with a score of 240 is considered ten times more severe than a hazard with a rating of 24.

Vulnerability and probability are the two key components of the methodology. Vulnerability examines both typical and maximum credible events, and probability endeavors to reflect how physical changes in the jurisdiction and scientific research modify the historical record for each hazard. Vulnerability accounts for approximately 60% of the total score, and probability approximately 40%.

In connection with Emergency Management Performance Grant funding administered by OEM, there is a requirement that hazard analyses must be current and updated within the past ten years, and include a written synopsis (narrative) of the most credible events possible to occur within a jurisdiction. Having a current local hazard analysis is also one element in meeting Oregon Progress Board Benchmark #67, “Emergency Preparedness.”

Hazard Quantification Categories

For the purpose of hazard quantification for the following four categories were developed:

1) History (previous occurrences, primarily within last century)

2) Vulnerability (number, degree or extent of people or assets at risk per hazard)

3) Maximum threat (credible worst-case scenario),

4) Probability (calculated likelihood of future occurrence)

Weight Factors, Scoring Guidelines

Weighting factors were developed for each of the four hazard quantification categories. This is done to emphasize certain categories over others in terms of risk assessment. Scoring guidelines are also developed as a method of standardizing assessment and to minimize subjectivity.

History (weight factor for category = 2). History is the record of previous occurrences. Events to include in assessing history of a hazard event for which the following types of activities were required:

- The EOC or alternate EOC was activated;
- Three or more EOP functions were implemented, e.g., alert & warning, evacuation, shelter, etc.
- An extraordinary multi-jurisdictional response was required; and/or
- A "Local Emergency" was declared.

LOW – score at 1 to 3 points based on… 0 - 1 event past 100 years

MEDIUM – score at 4 to 7 points based on… 2 - 3 events past 100 years

HIGH – score at 8 to 10 points based on… 4 + events past100 years

Probability (weight factor for category = 7)

Probability is the likelihood of future occurrence within a specified period of time.

LOW – score at 1 to 3 points based on… one incident likely within 75 to 100 years

MEDIUM – score at 4 to 7 points based on… one incident likely within 35 to 75 years

HIGH – score at 8 to 10 points based on… one incident likely within 10 to 35 years

Vulnerability (weight factor for category = 5)

Vulnerability is the percentage of population and property likely to be affected under an "average" occurrence of the hazard.

LOW – score at 1 to 3 points based on… < 1% affected

MEDIUM – score at 4 to 7 points based on… 1 - 10% affected

HIGH – score at 8 to 10 points based on… > 10% affected

Maximum Threat (weight factor for category = 10)

Maximum threat is the highest percentage of population and property that could be impacted under a worst-case scenario.

LOW – score at 1 to 3 points based on… < 5% affected

MEDIUM – score at 4 to 7 points based on… 5 - 25% affected

HIGH – score at 8 to 10 points based on… > 25% affected

Scores for each category are multiplied by the associated weight factors for each category to create a 'sub-score'. Adding the sub-scores for history, vulnerability, maximum threat, and probability for each hazard produces a 'total score' for each hazard. Note a total score in itself is not as important as how it compares with the total scores for other hazards in Lane County. Comparing scores can help determine priorities in terms of which hazards should the jurisdiction be most concerned about and which ones less so.

The Table X summarizes the quantified Hazard Analysis Score(s) for each hazard.

Table X Hazard Analysis Scoring (Quantification)

Hazard /	History	Probability	Vulnerability	Maximum Threat	TOTAL
Weight Factor (WF)	**WF x 2**	**WF x 7**	**WF x 5**	**WF x 10**	**SCORE**
Winter Storm	10 x 2 = 20	9 x 7 = 63	8 x 5 = 40	6 x 10 = 60	**183**
Wildfire	10 x 2 = 20	9 x 7 = 63	6 x 5 = 30	6 x 10 = 60	**173**
Flood	10 x 2 = 20	7 x 7 = 49	6 x 5 = 30	7 x 10 = 70	**169**
Windstorm	8 x 2 = 16	4 x 7 = 28	8 x 5 = 40	7 x 10 = 70	**154**
Pandemic	4 x 2 = 8	4 x 7 = 28	7 x 5 = 35	8 x 10 = 80	**151**
Landslide	10 x 2 = 20	8 x 7 = 56	4 x 5 = 20	4 x 10 = 40	**136**
HazMat Incident	8 x 2 = 16	7 x 7 = 49	4 x 5 = 20	5 x 10 = 50	**135**
Earthquake	2 x 2 = 4	2 x 7 = 14	5 x 5 = 25	8 x 10 = 80	**123**
Drought	4 x 2 = 8	5 x 7 = 35	2 x 5 = 10	6 x 10 = 60	**113**
Tsunami	3 x 2 = 6	2 x 7 = 14	4 x 5 = 20	7 x 10 = 70	**110**
Dam Failure	0 x 2 = 0	1 x 7 = 7	4 x 5 = 20	8 x 10 = 80	**107**
Volcano	2 x 2 = 4	2 x 7 = 14	2 x 5 = 10	4 x 10 = 40	**68**

Source: Lane County HM&EM-SC. Date: 4-3-2015.

3.1.2 Methods and Definitions

Requirement 44 CFR §201.6(c)(2)(ii): *[The risk assessment **shall** include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description **shall** include an overall summary of each hazard and its impact on the community*

Requirement 44 CFR §201.6(c) (2) (i):
[The risk assessment shall include a] description of the … location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

A common set of definitions/classifications was established for the probability of future hazard occurrences and the magnitude and severity of impacts for the purpose of describing the identified hazards in a quantitative and qualitative way (to the extent that data allows). Classifications used to categorize probability of future occurrence were based on statistical assessments of previous occurrences (or recurrence interval), and equated to a percent probability of occurrence in a given year whenever possible. Classifications for probability of future occurrence are listed below.

- **High -** Greater than 50 percent probability of occurrence in a given year
- **Medium -** 10 to 50 percent probability of occurrence in a given year
- **Low –** Less than 10 percent probability of occurrence in a given year

Potential magnitude and severity for each hazard is classified based on a scenario where the most extreme documented event occurs in modern times. It is acknowledged here that the categories established may involve some degree of overlap and therefore classification of hazards in this manner is inherently subjective. The magnitude and severity classifications used in the hazard profiles for this plan are listed below.

- **Level 4-Catastrophic**—Severe property damage on a regional or metropolitan scale; shutdown of critical facilities, utilities & infrastructure for extended periods, and/or multiple injuries/fatalities
- **Level 3-Critical**—Severe property damage on a neighborhood scale; temporary shutdown of critical facilities, utilities and infrastructure, and/or injuries or fatalities
- **Level 2-Limited**—Isolated occurrences of moderate to severe property damage; brief shutdown of critical facilities, utilities and infrastructure, and/or potential injuries
- **Level 1-Negligible**— Isolated occurrences of minor property damage; minor disruption of critical facilities, utilities and infrastructure, and/or potential minor injuries

Definitions for overall vulnerability are subjective and based primarily on future probability and severity, with additional considerations for potential impacts to special needs populations and the location of buildings, critical facilities and infrastructure. Vulnerability classification criteria are general and involve some degree of overlap. Definitions for overall vulnerability classifications used in this plan are listed below.

- **High Vulnerability**— High probability of future occurrence and critical or catastrophic potential severity
- **Moderate Vulnerability**— Moderate/high probability of future occurrence and limited potential severity
- **Low Vulnerability**— Low/moderate probability of future occurrence and negligible/limited potential severity

3.1.3 Data Sources, Technical Reports, and Data Limitations

Data Sources

The first Hazard Mitigation Plan for Lane County was developed in 2005; since that time there have been significant advances in the availability of data relevant to risk and vulnerability assessment. In addition to the information reported in the original 2005 version, the majority of information contained in the Hazard Profiles and Vulnerability Assessment sections of this 2017 Plan update came from the following agencies, plans, technical documents and data sources:

Agency Sources:

- Federal Emergency Management Agency (FEMA)
- Oregon Office of Emergency Management (OEM)
- National Flood Insurance Program (NFIP)
- National Weather Service (NWS)
- National Oceanic and Atmospheric Administration (NOAA)
- National Climatic Data Center (NCDC)
- National Severe Storms Laboratory (NSSL)
- U.S. Geological Survey (USGS)
- Oregon Department of Geology and Mineral Industries (DOGAMI)
- Natural Resources Conservation Service (NRCS); SNOTEL
- Local, regional media and web encyclopedia sources
- Participating jurisdictions

Technical Documents and Plans:

- Code of Federal Regulations, 44 CFR Part 201.6
- Lane County Rural Comprehensive Plan (November 30, 2010)
- Lane County Community Wildfire Protection Plan
- Federal Emergency Management Agency (FEMA). Publication 386-2, *Understanding Your Risks: Identifying Hazards and Estimating Losses*;
- Environmental Protection Agency Flood Resilience Checklist
- FEMA *Local Mitigation Planning Handbook* (March 2013)
- FEMA Local Mitigation Plan Review Tool for State and Local Use.
- FEMA Flood Insurance Study: Lane County Oregon
- State of Oregon Natural Hazard Mitigation Plan (2012 Edition)
- Oregon Department of Geology and Mineral Industries (DOGAMI) *Interpretive Map Series, IMS-24, Geologic Hazards, Earthquake and Landslide Hazard Maps, and Future Earthquake Damage Estimates.*
- *DOGAMI Open-File Report O-12-07 Lidar data and landslide inventory maps of the North Fork Siuslaw River and Big Elk Creek watersheds, Lane, Lincoln, and Benton Counties, Oregon;* 12-12-2012; (Burns, Duplantis, Jones, English)
- U.S. Geological Survey Open-File Report 03-440; *De-aggregation of U.S. Seismic Hazard Sources: The 2002 Update* (Harmsen, Frankel, Peterson).
- U.S. Geological Survey Professional Paper 1661–F; *Turbidite event history—Methods and implications for Holocene paleoseismicity of the Cascadia subduction zone.* 2012. (Goldfinger, Nelson, Morey, Johnson, Patton, Karabanov, Gutiérrez-Pastor, Eriksson, Gràcia, Dunhill, Enkin, Dallimore, Vallier)

Software and Analysis Tools:

- FEMA 'D-FIRM' Flood Insurance Rate Map Shapefile
- ArcInfo Geographic Information System (GIS) Software, Spatial Analyst

Data Limitations

Quality and availability of source data improved markedly since the original hazard mitigation plan was developed, though many limitations remain. Over time it is expected that hazard related information will continue to improve and will be included in future updates.

National Climatic Data Center (NCDC) information is used extensively as a reporting mechanism for hazard events of various types. It should be noted however that damage descriptions and totals provided by this source is not necessarily a full accounting of local impacts, and further, damage totals for certain hazard events may cover multi-county regions which may or may not accurately reflect direct impacts in the planning area.

3.2 HAZARD PROFILES

44 CFR Requirement §201.6(c) (2) (ii):
[The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazard described in paragraph (c) (2) (i) of this section. This description shall include an overall summary of each hazard and its impact on the community.

Hazard profiles that follow are those that were deemed relevant to the Lane County by the HM&EM-SC. Information is presented in the most objective manner possible, with data sources and limitations of available information noted as appropriate.

Each profile includes a general description of the hazard, the geographic area affected, information regarding previous occurrences, and assessments of probability of future occurrence, potential magnitude and severity, and overall vulnerability. Hazard profiles are organized alphabetically for ease of reference and order should not infer relative importance.

3.2.1 Dam Failure

Hazard Description

Dams are diversion structures that impound water in reservoirs. Dam failure is a breach or overtopping of the structure. This hazard profile focuses on dam failure due to natural causes, such as earthquake, landslide, extraordinary rainfall/snow melt leading to overtopping.

Dam failure can result in serious public safety impacts and catastrophic damages. Dams often serve multiple purposes such as hydroelectric generation, flood control and recreation. Dams are engineered to withstand a flood with a calculated risk of occurrence. Severe rainfall can increase potential of dam failure as a result of physical force of flood waters and/or overtopping. Failed dams can create catastrophic floods due to the tremendous energy of the released water.

According to U.S. Army Corps of Engineer's assessments, deformation and other damage to spillway gates, regulating outlets and powerhouses could impact a dam's ability to manage downstream flows but may not necessarily lead to a catastrophic dam failure.

Warning times for dam failure varies widely and depends on the causal factors. Dam failure can occur in as little as a few minutes or slowly over the course of months. Catastrophic failure of a large dam would result in short evacuation times for locations directly downstream. Topography and floodplain characteristics determine warning time for locations further downstream.

Geographic Location

Similar to flooding, geographic location and relative terrain has significant influence on potential impacts to structures and populations. Obviously, an uncontained volume of water will flow to the lowest accessible point until it reaches elevation equilibrium. Structures and populations located below elevation equilibrium are those that would be inundated. In general, areas mapped within 100-year and 500-year floodplains downstream from a breached dam are the most likely locations to be inundated.

There are 33 dams listed in the National Inventory of Dams (NID) database for Lane County. The 9 largest dams are owned by US Army Corps of Engineers and are located along 3 broad river drainages which reach up into the Cascade Range (McKenzie, Middle Fork Willamette and Coast Fork Willamette). The upper McKenzie River drainage contains Cougar and Blue River Reservoirs. A breach at any one of these reservoirs is unlikely to influence other drainages, but Cougar and Blue River could influence EWEB's Leaburg Dam and Walterville Forebay depending on volume and rate of upstream release.

The upper Middle Fork Willamette drainage contains Hills Creek, Lookout Point, and Fall Creek Dams. Again, breach at any one of these reservoirs is unlikely to influence the McKenzie or Coast Fork Rivers, but could influence Dexter Dam depending on volume and rate of upstream release.

Dorena Dam is located upstream and east of Cottage Grove along the Row River, and Cottage Grove Dam is located upstream and south of Cottage Grove along the Coast Fork Willamette River. Both of these dams are located on independent drainages. Forecasting location, depth, and potential structural impacts involves many variables, each of which retains low probability. This results in a broad range of scenarios, but it can be noted that simultaneous failure of multiple dams at full pool levels has remarkably low probability.

There are 33 dams listed in the National Inventory of Dams (NID) database for Lane County and are shown on the following page on Table XI. A dam is listed in the NID database if it meets one or more of the following criteria:

1. It has High Hazard classification – loss of one human life is likely if the dam fails
2. It has Significant hazard classification – possible loss of human life and likely significant property or environmental destruction
3. It equals or exceeds 25 feet in height and exceeds 15 acre-feet in storage
4. It equals or exceeds 50 acre-feet storage and exceeds 6 feet in height

Table XI Dams Located in Lane County

Name	Owner Type	Owner	Height (Feet)	Storage (acre feet)
LOOKOUT POINT	Federal	USACE WILLAMETTE PROJ.	276	477,700
HILLS CREEK	Federal	USACE WILLAMETTE PROJ.	341	356,000
COUGAR	Federal	USACE WILLAMETTE PROJ.	519	219,000
DORENA	Federal	USACE WILLAMETTE PROJ.	154	131,000
FALL CREEK	Federal	USACE WILLAMETTE PROJ.	205	125,000
FERN RIDGE	Federal	USACE WILLAMETTE PROJ.	49	121,000
BLUE RIVER	Federal	USACE WILLAMETTE PROJ.	270	89,000
COTTAGE GROVE	Federal	USACE WILLAMETTE PROJ.	103	50,000
DEXTER	Federal	USACE WILLAMETTE PROJ.	117	29,900
SILTCOOS LAKE	Private	INTERNATIONAL PAPER CO.	12	15,070
WEYERHAEUSER EAST BASIN, CELL 1 & 2	Private	INTERNATIONAL PAPER CO.	16	585
LEABURG DAM	Public Utility	CITY OF EUGENE	15	459
LEABURG CANAL AND FOREBAY	Public Utility	EWEB	15	459
WALTERVILLE PUMPED S. POND	Public Utility	EWEB	12	390
OAKRIDGE MILL LOG POND	Private	CITY OF OAKRIDGE	13	380
CARROLL RESERVOIR	Private	JEFF & CHRISTINA KNIGHT	25	355
WALTERVILLE FOREBAY	Public Utility	EWEB	24*	275
METROPOLITAN WASTEWATER LAGOON	Local Gov’t	MWMC	15	224
SPRINGFIELD LOG POND	Private	-	7	215
CRESWELL LAGOON	Local Gov’t	CITY OF CRESWELL	7	210
NORMAN STADELI	Private	NORMAN STADELI	23	167
METROPOLITAN SLUDGE PONDS (LAGOON)	Local Gov’t	MWMC	15	160
BOOTH KELLY LUMBER POND (LAGOON)	Private	WEYERHAEUSER	10	144
VAUGHN LOG POND	Private	ROSBORO LLC	12	132
FARNAM CREEK RES	Private	LINDE KESTER	32	132
FORCIA & LARSEN LOG POND	Private	PEGGY KRAFT, DON MERKLE	19	90
ABE EDIGER	Private	G. COOPER-DIAMOND ROCK	18	85
SNELLSTROM-EUGENE LOG POND	Private	SNELLSTROM LUMBER CO.	9	85
S. JETTY RESERVOIR A	Federal	USFS - SIUSLAW	8	70
SANTA CLARA	Public Utility	EWEB	17	64
FORD FARMS RESERVOIR	Private	FORD FARMS, INC.	22	60
KONYN DAIRY LAGOON	Not Listed	-	10	50
SCHWARTZ RESERVOIR	Private	JOHN INDA	20	20

Source: National Inventory of Dams. Note: Walterville Forebay height calculated foot to pool elevation of Walterville Storage Pond

Previous Occurrences
There are no reported previous occurrences of dam failure in Lane County.

In 2012, one of three circular roll gates failed at Leaburg Dam, owned by EWEB and located near Vida. A second roll gate failed in 2014. EWEB spent $3 million to successfully repair the gate in early 2015.

In 2010, The US Army Corps of Engineers' (USACE) dam safety program revealed problems with a number of spillway gates on their Willamette dams. Repair work on components of some of these gates began in 2010 and is ongoing. Until these repairs are completed, USACE is limiting the volume of water stored in some of the reservoirs to keep loads off of these gates.

According to information provided by U.S. Army Corps of Engineers (USACE), only one concrete dam in modern history has ever failed as the result of a seismic event; in that case, the fault ran directly beneath the structure. Generally, concrete dams have performed very well, sustaining only minor damage. With regard to embankment dams, about 1.5 percent of historical failures have been attributed to earthquakes.

The only known complete dam failures as a result of seismic shaking were tailings or hydraulic fill dams, or other relatively small earth fill embankments of older and possibly inadequate design and construction.

A recent example is the 9.1 magnitude undersea megathrust earthquake that occurred on March 11, 2011 in the north-western Pacific Ocean at a shallow depth of about 20 miles and 45 miles east of the Oshika Peninsula of Tohoku, Japan. The earthquake was basically the analog of a Cascadia Subduction Zone event that could impact the U.S. west coast. Dam failure as a result of that earthquake was relatively minor. One small irrigation dam completely failed and of the 252 dams inspected the next day, only six embankment dams had shallow cracks on their crests. All damaged dams were functioning with no problems.

Another recent example is the 8.8 magnitude earthquake that occurred on February 27, 2010 off the coast of central Chile. No embankment dams failed and only a few suffered more than minor damage.

Probability of Future Occurrence
Overall probability of dam failure from natural causes (earthquake, landslide, flood/overtopping) is remarkably low. Due to the lack of data regarding previous occurrences, probability of future occurrence is based on speculative forecasts rather than recurrence intervals.

According to U.S. Army Corps of Engineer's assessments, earthquakes at intervals of 2,500 to 10,000 years could result in ground motions that could significantly impact even well-constructed dams. The likelihood and consequences of a partial or complete dam failure as the result of a seismic event depends on the size and location of earthquake, the reservoir level, the dam's current operational status, and a host of other factors. Based on this data for any one dam probability of a major failure due to earthquake is 0.04 percent over a 100-year timeframe. Probability of simultaneous failure of more than one dam is roughly an order of magnitude lower than probability for a single dam failure. Based on available data this equates to a **Low** probability of future occurrence classification based on classifications set forth in Section 3.1.2.

Magnitude/Severity/Extent
Considering the worst case scenario and in the absence of mitigation measures, magnitude and severity for dam failure is considered **Level-4 Catastrophic,** with potential for widespread severe property damage on a regional scale; extended shutdown of critical facilities, utilities and infrastructure; injuries and fatalities.

Dam Failure Overall Vulnerability
Overall vulnerability to dam failure is classified as **Low Vulnerability** according to definitions from Section 3.1.1. Due to a lack of previous occurrences from which to draw data, this assessment is based on a low probability of causal factors, location of dams in relation to each other, and potential magnitude and severity of an occurrence across a range of scenarios (minor to major).

3.2.2 Drought

Drought is a period of unusually persistent dry weather lasting long enough to cause serious problems such as crop damage and / or water supply shortages. Severity of drought depends upon the degree of moisture deficiency, duration, and size of affected area.

Short term effects of drought include excessively dry soil causing stress for plants and trees and increased potential for wildfire. When rainfall is less than for extended periods stream and river flows decline, water levels in lakes and reservoirs fall and the water table drops increasing the depth to reach groundwater in water wells.

Drought is a unique hazard because it is not a specific event but rather the cumulative result of a persistent period of below average precipitation (rain and snow). In the U.S., drought typically does not require evacuation and does not constitute an immediate threat to life or property. The effects of drought may not be noticed immediately but only become apparent after weeks or months. The effect to the water table may take up to a year or more to be realized.

Drought impacts are typically experienced by the community through voluntary water use curtailment and fire risk warnings. Water supply utilities encourage judicious use of water during drought and certain activities such as outdoor burning and use of fireworks are banned or discouraged.

The Drought Mitigation Center at the University of Nebraska tracks drought conditions across the country and provides situation maps at the county level. As shown in Table XII, the Drought Monitor is an attempt to synthesize multiple drought related indices and impacts which represents a consensus of federal and academic scientists. Some of those indices include: the Palmer Drought Severity Index, the Climatic Prediction Center's Soil Moisture Model, the USGS weekly stream flow map (based on an average of daily stream flow), the National Climatic Data Center's Standardized Precipitation Index and the NOAA/NESDIC Vegetation Health Index.

Table XII Drought Monitor: Drought Severity Classification

Description	Possible Impacts	Palmer Drought Index	CPC Soil Moisture Model (Percentiles)	USGS Weekly Streamflow (Percentiles)	Standardized Precipitation Index (SPI)	Satellite Vegetation Health Index
Abnormally Dry	Short-term dryness slowing planting-growth of crops or pastures; fire risk above average. Lingering water deficits.	-1.0 to -1.9	21-30	21-30	-0.5 to -0.7	36-45
Moderate Drought	Minor crop damage; fire risk high; streams, lakes, wells low; water shortages developing, voluntary restrictions requested.	-2.0 to -2.9	11-20	11-20	-0.8 to -1.2	26-35
Severe Drought	Crop losses likely; fire risk very high; water shortages & restrictions imposed.	-3.0 to -3.9	6-10	6-10	-1.3 to -1.5	16-25
Extreme Drought	Major crop loss; extreme fire danger; widespread shortages or restrictions	-4.0 to -4.9	3-5	3-5	-1.6 to -1.9	6-15
Exceptional Drought	Exceptional and widespread crop losses; exceptional fire risk; low water in lakes, streams and wells, creating water emergencies.	-5.0 or less	0-2	0-2	-2.0 or less	1-5

Source: Drought Monitor http://drought.unl.edu

Geographic Location
Drought is a normal part of virtually all climate zones, including areas with high and low average rainfall. While Lane County is located in a temperate region where precipitation is generally adequate, it is not immune from the occurrence or effects of drought. In general, drought impacts are recorded more frequently in the Willamette Valley and Cascade foothills and somewhat less frequently and severely at the coast and upper elevation Cascades.

Previous Occurrences
According to the National Drought Mitigation Center Drought Reporter, there have been over 296 reports of drought impacts in Lane County for the period January 1, 2013 to June 2016. These reports typically involve impacts on a relatively local level, and specify type. In Lane County water supply and quality impacts were the most prevalent type, followed by relief and water use restrictions, and agriculture, respectively.

Table XIII Lane County Drought Impacts January 2013 – June 2016

Impact Category	Number of Reports
Water Supply & Quality	77
Relief, Response & Restrictions	65
Agriculture	49
Plants & Wildlife	39
Fire	26
Tourism & Recreation	17
Society & Public Health	15
Business & Industry	8
Total	**296**

Source: National Drought Mitigation Center; Drought Reporter; http://droughtreporter.unl.edu/

Figure 3-1 below shows long term patterns of precipitation abundance or scarcity relative to the baseline average for the 115-year period 1895 to 2014.

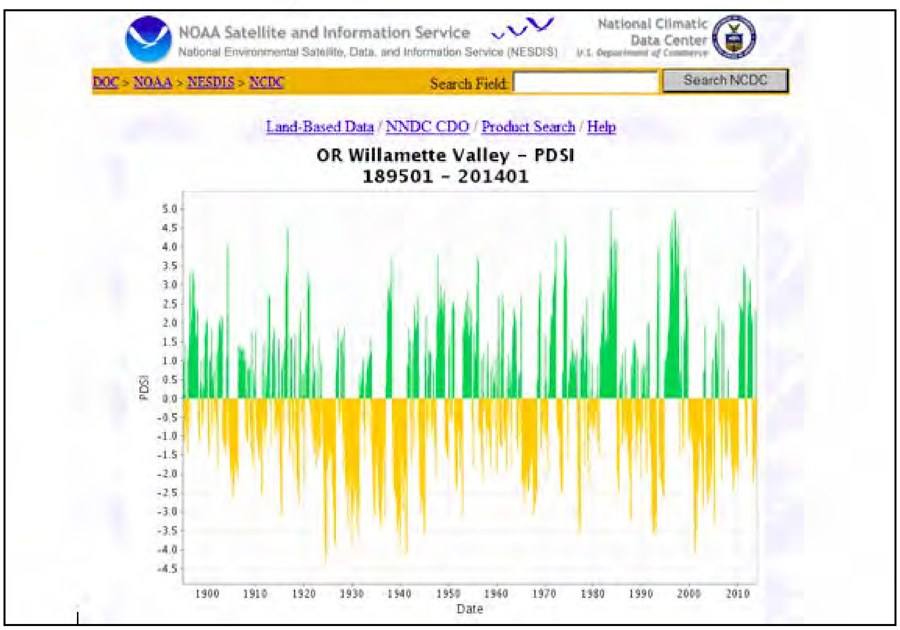


Figure 3-1 Precipitation Baseline Average over 115 Years

Probability of Future Occurrence

Future drought forecasting is typically generated through analysis of ocean current and temperature patterns relative to current and recent conditions.

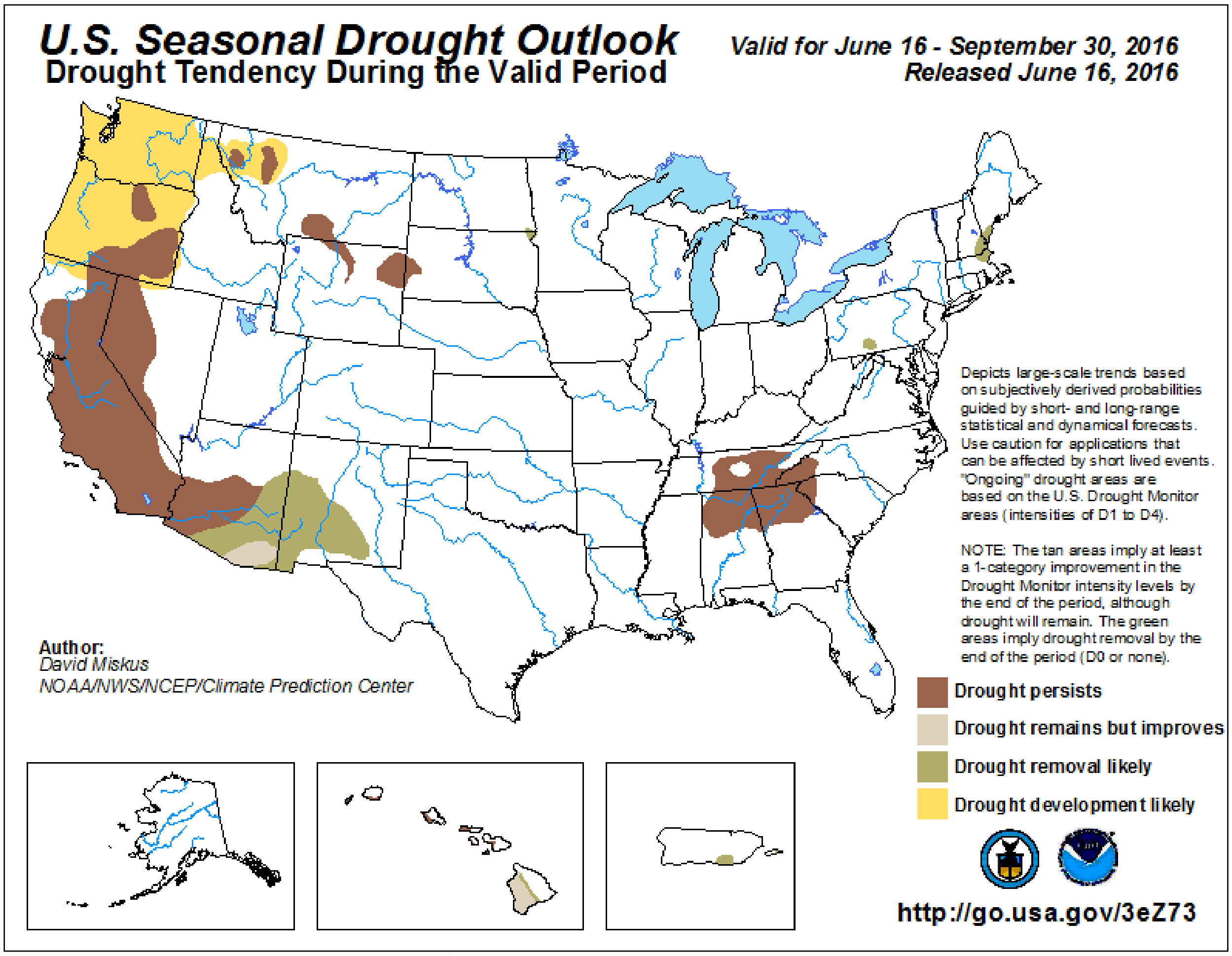


Figure 3-2 US Drought Forecast

Magnitude/Severity/Extent

Tracking drought is challenging due to the numerous definitions and measurement protocols. The Palmer Drought Severity Index (PDSI) is a commonly used measure for moisture depletion or abundance on a regional scale. For 2000-2015, PDSI values for Lane County typically dropped below -2.0 at some point during the summer months. The year 2001 stands out as having the longest and most pronounced drought conditions. PDSI values for 2010-2013 indicate less frequent drought conditions in the summer months. Though the rainfall statistics for western Oregon in the winter months of 2013 were notably low, this did not equate to severe drought or widespread impacts.

As of summer 2016, Long Term Palmer Drought Severity ratings across the western Oregon region including Lane County ranged from moderate to severe. The map in Figure 3-3 shows drought conditions on a national scale as of August 27, 2016.

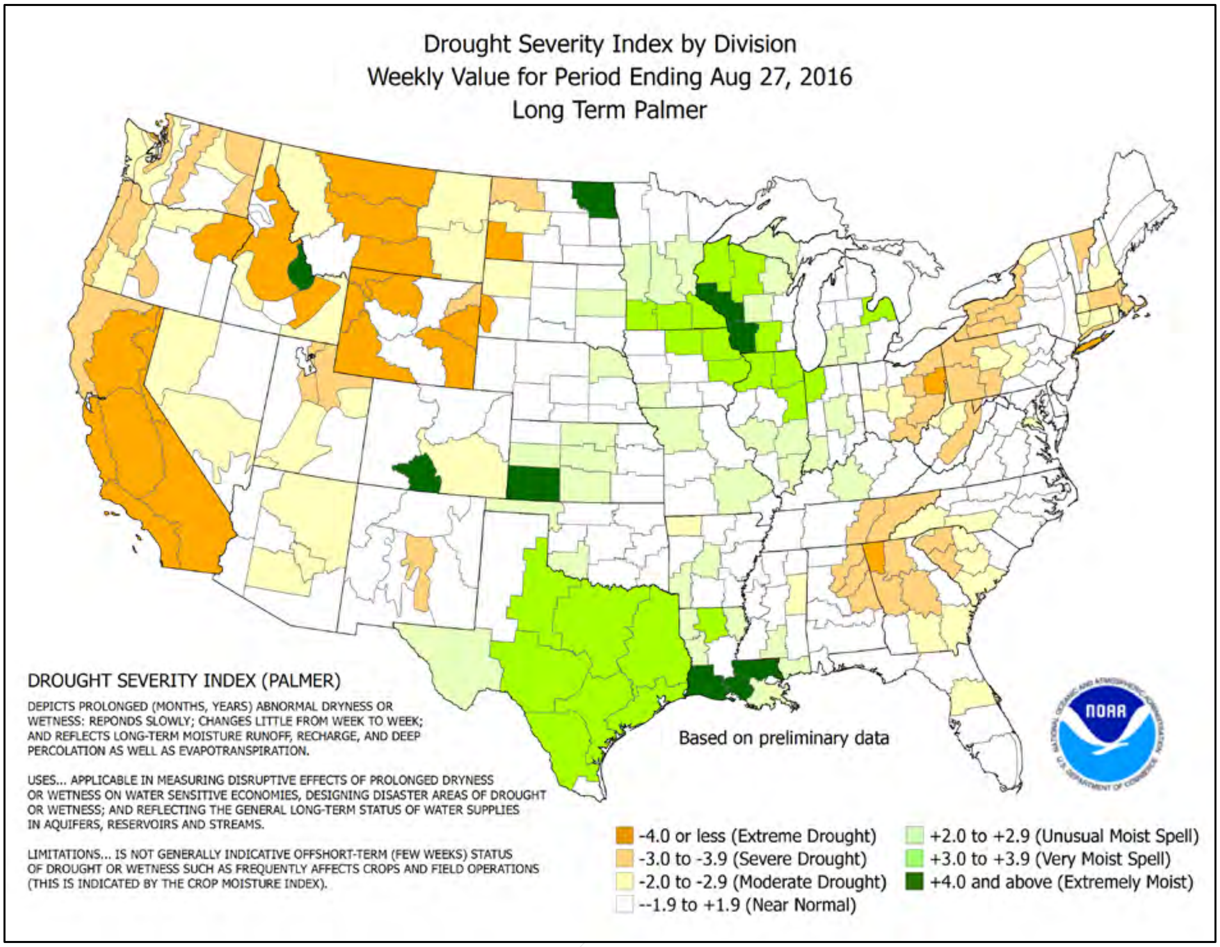


Figure 3-3 Drought Severity Index, August 2016

Drought Overall Vulnerability

Environmental impacts and economic losses, particularly agriculture, recreation and forestry are the most prevalent concerns with drought conditions. Overall vulnerability to drought is classified as **Low Vulnerability** according to definitions from Section 3.1.1.

3.2.3 Earthquake

An earthquake is motion or trembling of the earth caused by an abrupt release of stored energy in the rocks beneath the earth's surface. The energy released results in vibrations known as seismic waves that are responsible for ground shaking. Duration of strong shaking can range from a few seconds to a few minutes, and are commonly followed by aftershocks which can continue for a few days following the original event. Tsunamis are directly related to earthquake activity, for more information see Tsunami profile in Section 3.2.8.

Earthquakes are commonly described in terms of magnitude and intensity. A traditional measurement for the amount of seismic energy released by an earthquake is the Richter scale.

Intensity of the shock at a particular location is measured by the Modified Mercalli Intensity (MMI) scale. The MMI scale quantifies effects on humans, objects of nature and structures.

A third method for measurement of ground motion is expressed as peak ground acceleration (PGA), which is change in speed of ground surface horizontal motion. PGA is expressed as a percent of gravity or "g", with higher PGA values indicating a more violent event. Table XIV below is a combined earthquake Richter (magnitude), MMI and PGA comparison.

Table XIV Earthquake Magnitude / Intensity Comparison

Richter **Magnitude)**	Mercalli **Intensity (cm/s)**	**PGA (% g)**	**MMI Intensity (I – XII) and Description**
1.0 – 3.0	< 0.1	< 0.17	**I.** Motion only noticed by humans in favorable conditions.
3.0 – 3.9	0.1 - 1.1	0.17 – 1.4	**II.** Felt only by persons at rest, especially on building upper floors. **III.** Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motorcars may rock slightly. Vibrations similar to the passing of a truck.
4.0 – 4.9	1.1 - 3.4	1.4 – 9.2	**IV.** Felt indoors by many, outdoors by few. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Parked cars rock noticeably. **V.** Felt by nearly everyone: many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
5.0 – 5.9	3.4 - 8.1	9.2 – 34	**VI.** Felt by all. Some heavy furniture moved. Damage slight. **VII.** Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built structures; some chimneys broken.
6.0 – 6.9	8.1 - 16	34 – 124	**VIII.** Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Major damage to poorly built structures. Chimneys, factory stacks, columns, and walls collapse. Heavy furniture overturned. **IX.** Considerable damage to structures; well-designed frame structures thrown out of plumb. Major damage to substantial buildings, with partial collapse. Buildings shifted off foundations.
7.0 and higher	16 - 31	> 124	**X.** Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent. **XI.** Few structures remain standing. Bridges destroyed. **XII.** Damage total. Line of sight distorted. Objects thrown in the air.

Source: USGS, Earthquake Hazards Program. http://earthquake.usgs.gov

Geographic Location

In general terms, the potential for earthquake impacts is present for all portions of Lane County, though coastline areas possess higher probability of occurrence and/or higher vulnerabilities. In 2008 the Oregon Department of Geology and Mineral Industries (DOGAMI) published an extensive study on the primary geologic hazards of Yamhill, Marion, Polk, Benton, Linn and Lane Counties. Included in this report are earthquake and landslide hazard maps for each county along with future earthquake damage estimates. This study is called *Interpretive Map Series, IMS-24,* *Geologic Hazards, Earthquake and Landslide Hazard Maps, and Future Earthquake Damage Estimates*.

In the statewide context, Lane County has typical propensity to earthquake occurrence for a western Oregon county (considering both Cascadia Subduction Zone and local fault sources). The following map produced with the DOGAMI Geohazards viewer indicates Lane County can expect higher degree of shaking and more frequent occurrence than eastern Oregon counties in general.

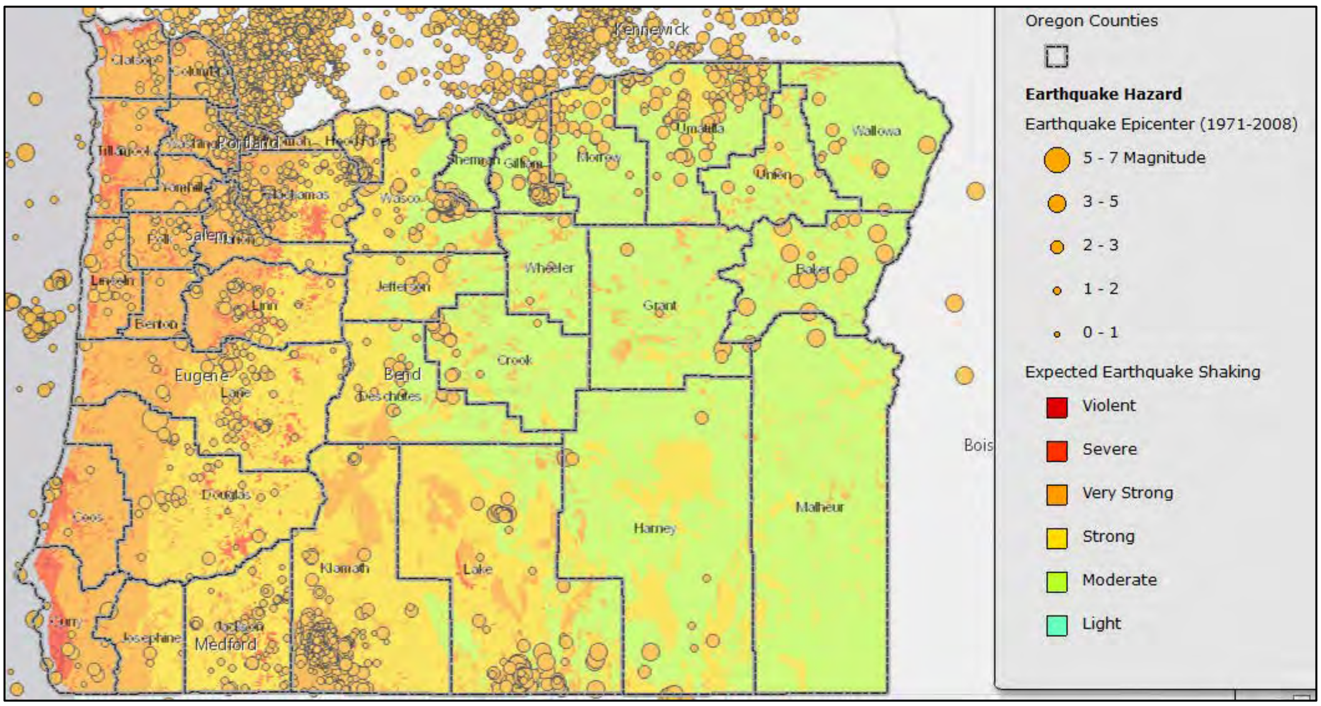


Figure 3-4 Degree of Expected Shaking and Earthquake Occurrences (1971-2008)

Notably, the Cascadia Subduction Zone (CSZ) is a region of the ocean floor off the coast of Oregon and Washington where the North American, Pacific, Juan de Fuca, and Gorda Plates meet. Subduction refers to the Pacific Plate sinking below the North American Plate. The North American Plate is moving in a general southwest direction, overriding the Pacific and Juan de Fuca Plates.

The CSZ lies approximately 50 miles off Lane County's coastline, and extends approximately 600 miles north to south from British Columbia to northern California. Its presence creates higher earthquake (and tsunami) vulnerability to western portions of Lane Count. Figure 3-5 below shows a three-dimensional view of the CSZ and demonstrates how the tectonic plates off the Pacific Coast interact to generate subterranean pressure, volcanic activity, and sudden movement on 400-600 cycles.

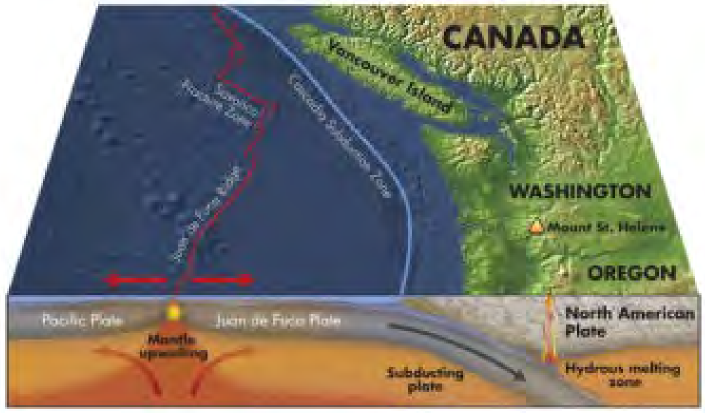


Figure 3-5 Cascadia Subduction Zone (CSZ)

The map shown in Figure 3-6 was produced with the Department of Geology and Mineral Industries (DOGAMI) Statewide Geohazards viewer. It shows estimated shaking intensity as related to Cascadia-Subduction Zone earthquake events. The map shows all of Lane County situated in at least "strong" shaking zones. "Severe" shaking zones are found from the coast to the center of the Coast Range Mountains. The eastern slope of the Coast Range Mountains and Willamette Valley floor is rated as a "very strong" and eastern Lane County is rated as "strong".

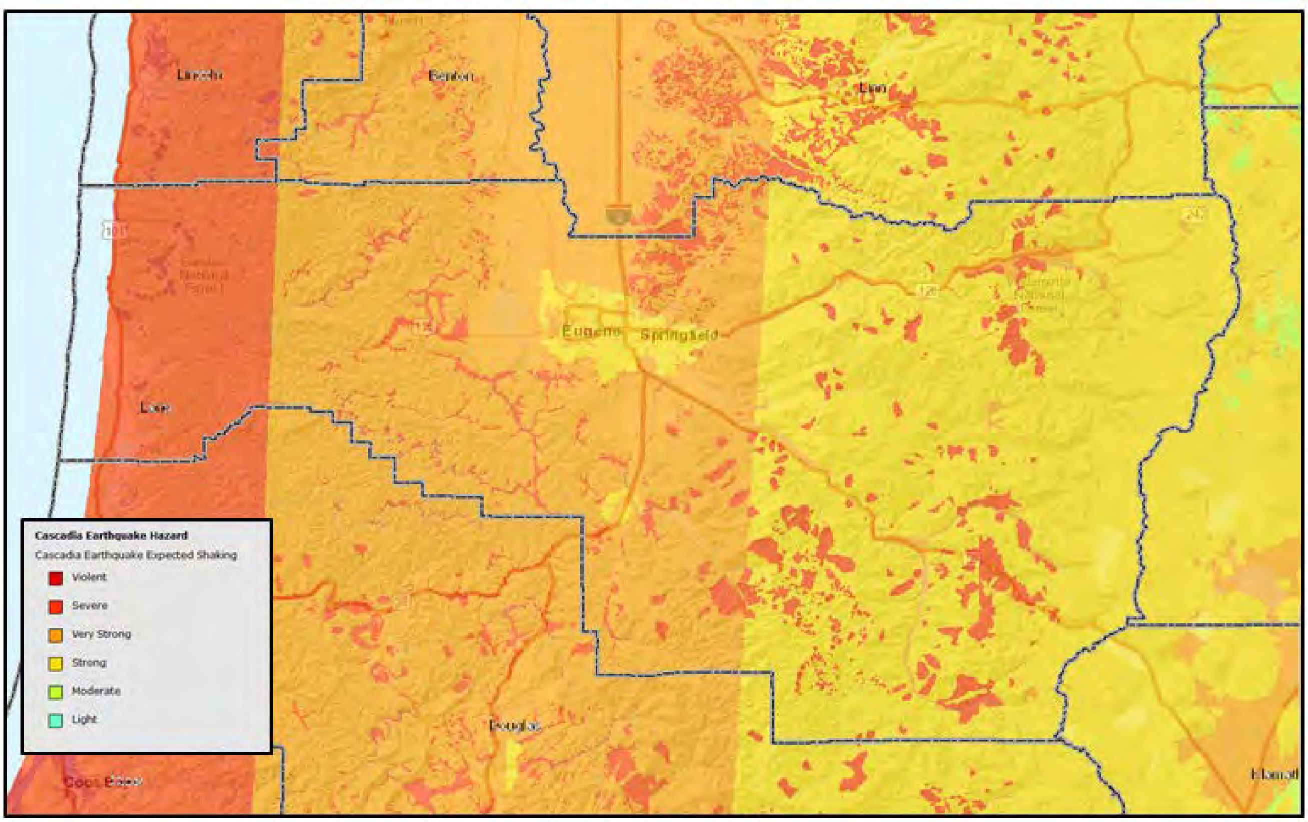


Figure 3-6 Degree of Expected Shaking Cascadia Earthquake Event, Lane County

Previous Occurrences

On July 4, 2015 a 4.2 magnitude earthquake occurred in central Lane County. The epicenter was located near the community of Walterville, approximately 10 miles east of downtown Springfield at a depth of 6 miles below ground surface. This earthquake produced minor to moderate shaking that was noticed by some residents in an approximate 20 mile radius from the epicenter. No injuries or significant damage was reported.

Based on a paleo seismologic study published by researchers at Oregon State University and the USGS, 19 major Cascadia Subduction Zone (CSZ) earthquakes have occurred during the last 10,000 years with magnitudes ranging from 8.7 to 9.2. As shown above in Table XIV *Earthquake Magnitude/Intensity Comparison*, earthquakes with this magnitude are characterized as disastrous or catastrophic. Because the epicenter of these earthquakes is below the ocean surface, it is assumed that tsunamis accompanied each of these events.

Table XV Major CSZ Earthquakes: 1180 BCE to Present

Approximate Year	Recurrence Interval (Years)
1700 CE	312
920 CE	780
650 CE	270
280 CE	370
530 BCE	790
840 BCE	310
1180 BCE	340

Notes, sources: Years of occurrence listed above are approximated from the mid-point of ranges reported in the following journal article: "Earthquake Recurrence Inferred from Paleoseismology" (2003). *Developments in Quaternary Science*. Atwater; Tuttle, Schweig, Rubin, Yamaguchi, Hemphill-Haley. CE = current era (0 AD to present); BCE = before current era

No earthquake activity has caused major damage in Lane County in the last decade, though seismic activity has occurred in Oregon and in the CSZ in recent years.

November 19, 2007 Blanco Fracture Zone off Oregon Coast, approximately 180 miles west-southwest of Florence. 5.8 magnitude earthquake; no damage reported.

July 12, 2004 Off the coast of Lane County approximately 25 miles northwest of Florence. 4.9 magnitude earthquake; no damage reported.

September 21, 1993 Near Klamath Falls, 6.0 magnitude earthquake. Two deaths, $7.5 million in damage. One fatality occurred when car was crushed by earthquake-induced rock fall, and another died of a heart attack. More than 1,000 homes and commercial buildings were damaged. MMI was rated VII in downtown Klamath Falls and at the Oregon Institute of Technology about 2 miles north of downtown. Three highways leading to Klamath Falls were temporarily closed because of rock falls and possible damage to bridges. Rock falls occurred in road cuts and on steep slopes throughout the epicenter region. Ground cracks in fill material were observed at several locations in the area. Felt as far north as Eugene and as far south as Redding, CA.

The map in Figure 3-7 shows earthquake occurrences in western Oregon for the period 1841 to 2002. The different sizes of red circles denote earthquake magnitude. Active faults on this map are defined as those that have moved in the last 780,000 years. Faults active in the last 20,000 years are colored red. Faults active between 20,000 and 780,000 years ago are colored gold.

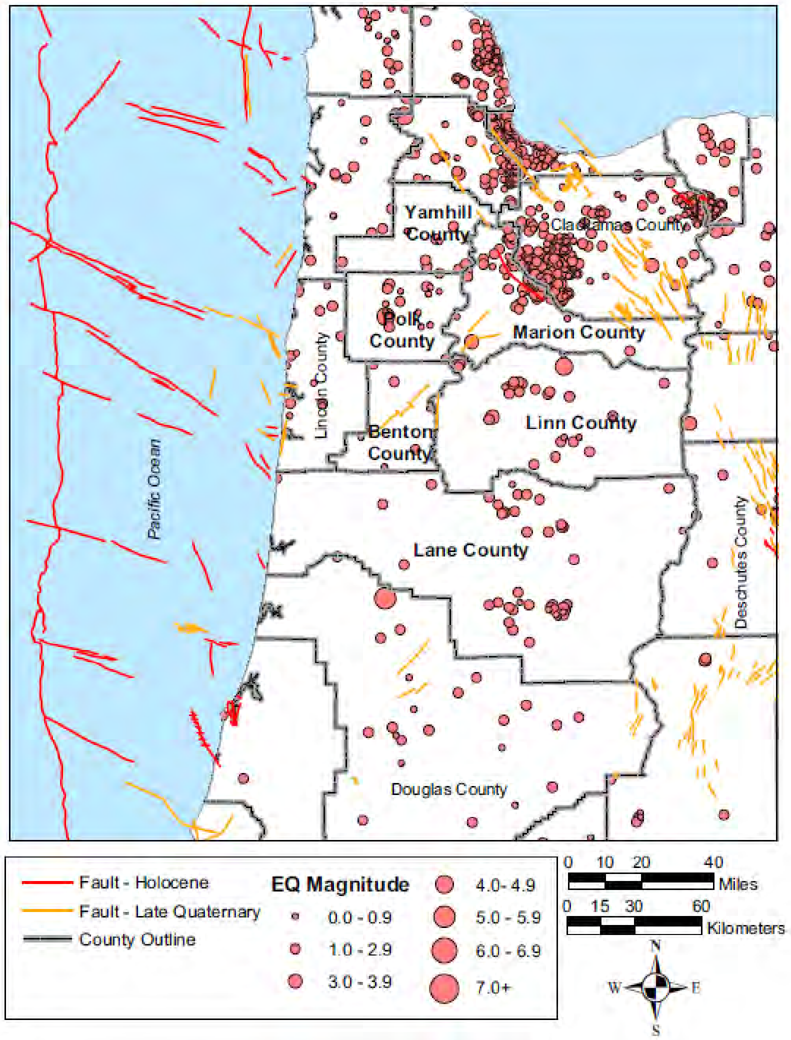


Figure 3-7 Earthquakes 1841 - 2002 and Quaternary Faults

Probability of Future Occurrence

Research published by the Cascadia Region Earthquake Workgroup (CREW) in 2013 states that it is impossible to predict the timing of great subduction zone earthquake. However, it can be said that the *chances* of a CSZ 9.0 magnitude earthquake occurring within the next 50 years is about one in ten. This equates to a one percent probability of occurrence in any given year, and a **Low Probability** of occurrence classification pursuant to Section 3.1.1 (Methods and Definitions).

Magnitude/Severity/Extent

As shown in the map in Figure 3-8 below, potential earthquake intensity is highest in western Lane County along the coast and Coast Range mountains and somewhat lower along the valley floor, Cascade foothills, and Cascade mountains. PGA ranges for western Lane County are 0.6 to 0.8 as a percent of gravity and 0.2 to 0.3 as a percent of gravity for eastern portions of the County. This would indicate significantly higher intensity of shaking on the coast, in addition to higher probability of impacts from tsunami on the coast.

Based on assumptions for most probable worst case scenarios and the impacts of previous earthquakes, a **Level 4 – Catastrophic** magnitude/severity classification is assigned for earthquake.

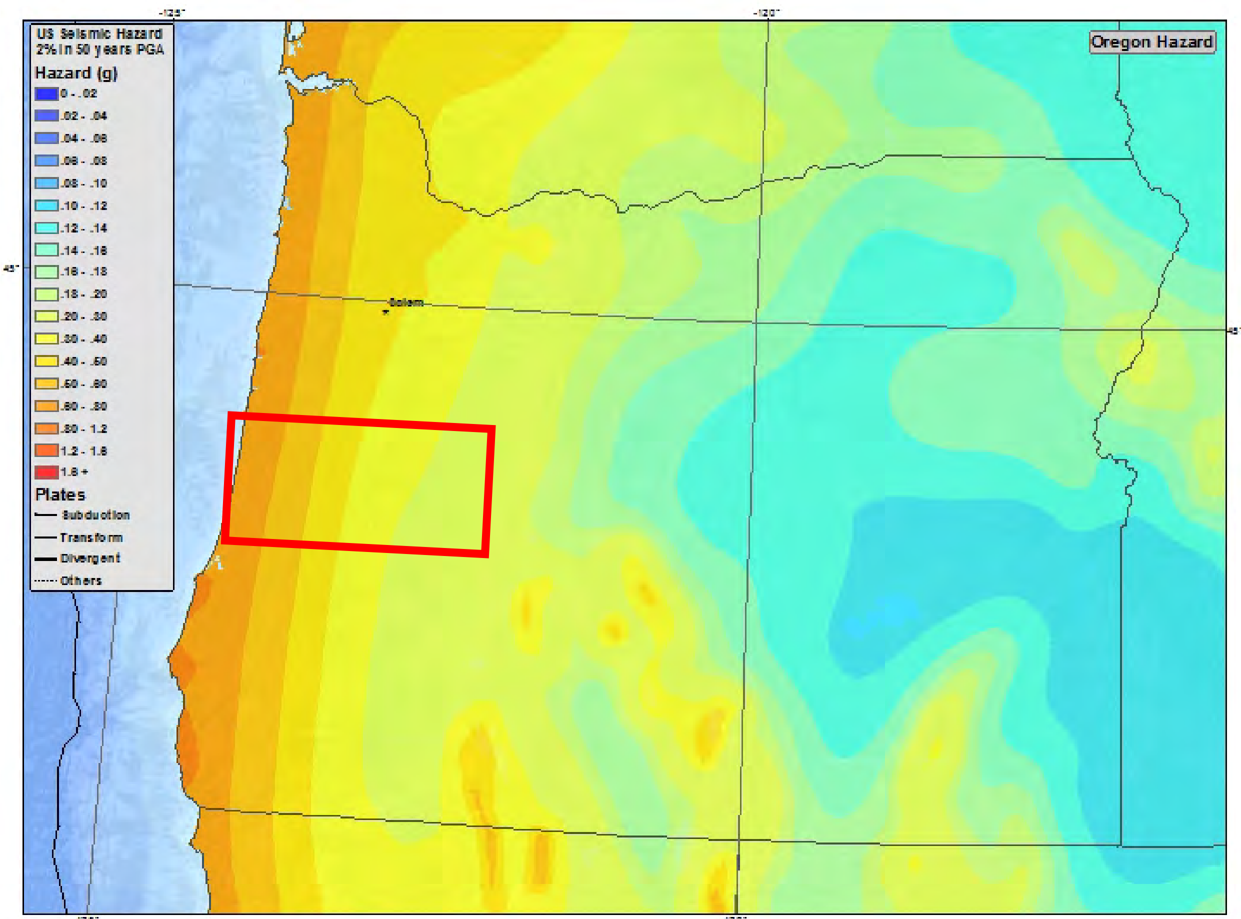


Figure 3-8 Peak Ground Acceleration: 2% Probability of Exceedance in 50 Years

Earthquake Overall Vulnerability

Based on the potentially catastrophic impacts, tempered by forecasts of relatively low probability, a **High Vulnerability** classification is assigned for earthquake. Liquefaction can amplify impacts of earthquakes, causing foundations to shift and damage buildings. The map in Figure 3-9 below shows areas of susceptibility to liquefaction in coastal areas in Florence, along Hwy 101 west of Dunes City, east of Junction City, near Pleasant Hill, Lowell, and Walterville. The coastal areas face the combined risk of liquefaction, potential for a high magnitude earthquake, and tsunami inundation. Considering these factors along with the presence of development in the Cities of Florence and Dunes City and along Hwy 101, coastal areas are considered relatively more vulnerable than the rest of Lane County.

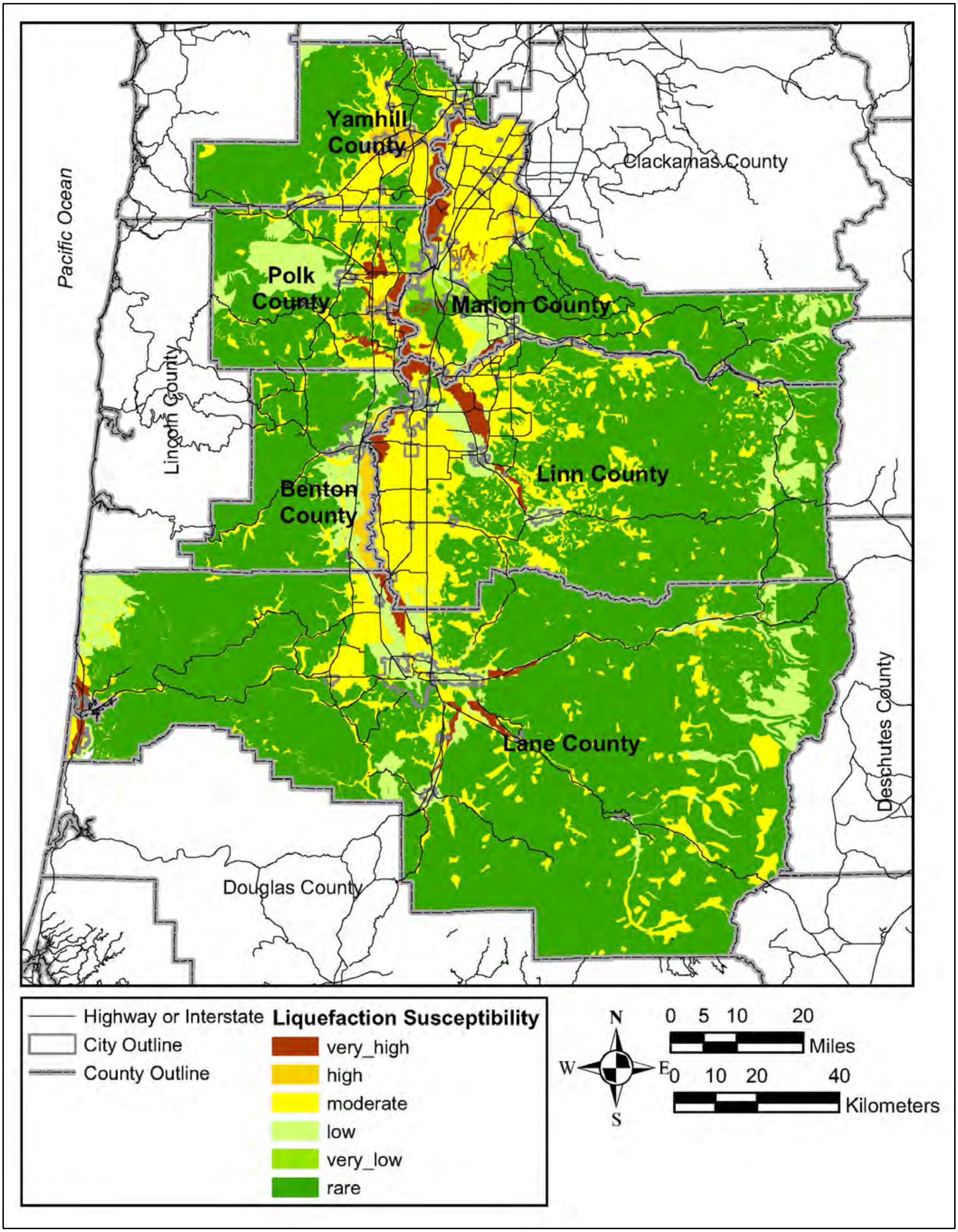


Figure 3-9 DOGAMI IMS-24 Report, Liquifaction Susceptibility, Central-Western Oregon

3.2.4 Flood

A flood is defined as the inundation of land by the rise and overflow of a body of water. Floods most commonly occur as a result of heavy rainfall causing a river system or stream to exceed its normal carrying capacity. In Oregon flooding situations can be worsened by “rain on snow” events that cause rapid snowmelt.

Moving water has awesome destructive power. When a river or creek overflows its banks structures poorly equipped to withstand the water's strength are at risk. Bridges, houses, trees, and cars can be picked up and carried off. The erosive force of moving water can undermine building foundations, causing severe damage. Inundated roadways are extremely dangerous to navigate due to inability to judge depth and location of road centerline, and current.

When floodwaters recede, affected areas are often blanketed in silt and mud. The water and landscape can be contaminated with hazardous materials, such as sharp debris, pesticides, fuel, and untreated sewage. Potentially dangerous mold blooms can quickly overwhelm water-soaked structures. Residents of flooded areas can be left without power and clean drinking water, leading to outbreaks of deadly diseases like typhoid, hepatitis A, and cholera.

Flooding potential in Lane County is most common from October through April when storms from the Pacific Ocean bring steady and occasionally intense rainfall, and soil saturation remains high. Flooding can be aggravated when streams are altered by human activity, such as through channelization of streams or loss of wetlands. Many types of flood hazards exist in Oregon, including riverine floods, flash floods (resulting from locally intense thunderstorms, ice jams and dam failures), coastal floods, shallow area and urban flooding and playa flooding.

Riverine flooding is affected by the intensity and distribution of rainfall, soil moisture, seasonal variation in vegetation, and water-resistance of the surface areas caused by urbanization. Flash flooding is a localized flood that results from a short duration of intense rainfall across a limited geographic area. During extended periods of intense rainfall, storm water conveyance systems can be overwhelmed and flooding of surrounding neighborhoods can result.

Flood hazards can cause severe property damage and loss of life, and is one of the most pervasive natural hazard threats in Lane County, with public safety, housing, property, and infrastructure all potentially impacted. The experience of flooding is usually is preceded by warnings from official sources encouraging the public to avoid flooded roadways, protect structures by sandbagging and securing belongings in elevated positions.

Definitions for National Weather Service flood announcements and warnings are listed below:

Riverine Flooding	
Flood Potential Outlook (FPO):	Announcement to alert the public of potentially heavy rainfall that could send rivers and streams into flood or aggravate an existing flood.
Flood Watch:	Announcement to inform the public that current or developing conditions indicate a threat of flooding, but occurrence is neither certain nor imminent.
Flood Warning:	An announcement by the NWS to inform the public of flooding along larger streams in which there is a serious threat to life or property. A flood warning will usually contain river stage forecasts.
Flood Statement:	A statement issued by the NWS to inform the public of flooding along major streams in which there is not a serious threat to life or property. It may also follow a flood warning to give later information.
Flash Floods	
Flash Flood Watch:	Announcement that current or developing conditions indicate potential flash flooding in the watch area, but occurrence is neither certain nor imminent.
Flash Flood Warning:	Issued to inform the public that flash flooding is in progress, imminent, or highly likely.
Flash Flood Statement:	A statement by the NWS which provides follow-up information on flash flood watches and warnings.

Source: National Weather Service

Geographic Location

Lane County spans a wide range of climatic and geologic regions from the Pacific coast to the high Cascades. This diversity results in considerable variation in precipitation. The average annual precipitation ranges from less than 40 inches in the Willamette Valley to over 100 inches in the Coast Range and along the west slope of the Cascades.

FEMA's definition for a floodplain, or Special Flood Hazard Area (SFHA), is the area inundated to a 1 foot depth by a flood with 1 percent annual probability of occurrence. According to common usage, this is also referred to as the area inundated by the '100-year flood', 'base-flood', aka most severe flood that can be expected to occur during a 100-year timeframe. It is important to note the geographic boundaries of this area are estimated, based on various data inputs which may include topography, hydrology, climatology, and historic records. Flood inundation can and does occur in areas that are not mapped as Special Flood Hazard Areas.

Lane County has more river miles of floodplain than any other county in Oregon. Over 136,000 acres of land is located in Special Flood Hazard Areas, (212 square miles), and more than 11,000 individual parcels are partially or entirely located within SFHAs. Ongoing development along these rivers continues to displace natural areas that have historically functioned to store flood waters.

Lane County features several large rivers, tributaries, streams and creeks that are susceptible to annual flooding events. Flooding along these waterways threatens life and safety and can cause significant property damage. Large rivers include: Willamette River (Main Stem, Middle and Coast Forks); McKenzie River (including the South Fork); Siuslaw River (including the North Fork); Row River; and Lake Creek. Smaller tributaries susceptible to frequent flooding include the Mohawk River, Long Tom River, Fall Creek, Little Fall Creek, Camp Creek, Horse Creek, Coyote Creek, Mosby Creek, Poodle Creek, Siltcoos River and Tenmile River.

The U.S. Army Corps of Engineers (USACE) operates 13 multi-purpose water projects in the Willamette River Basin (commonly referred to as dams or impoundment structures). Nine (9) of those USACE projects are situated in Lane County, all constructed between 1941 and 1968. The primary purpose of these dams is flood control, although they only control flooding on 50 percent of the tributaries in the Willamette Basin. Reservoirs behind the dams are drained throughout the summer and fall months to create storage capacity for water from heavy winter and spring rains. Therefore, most flooding in Lane County occurs along waterways with no flood control devices, such as the Siuslaw River and Mohawk River.

The series of maps on the following pages represent flood hazard areas as defined on currently adopted FEMA Flood Insurance Rate Maps (FIRMs) for Lane County. The first is a map of the entire county, followed by maps for western, central and eastern Lane County respectively. The maps delineate Special Flood Hazard Areas (SFHAs, areas assumed to be inundated to at least 1 foot depth by a flood with 1% annual chance of occurrence, aka 100-year floodplain). Also mapped is the area assumed to be inundated to at least 1 foot depth by a flood with 0.2 percent annual chance occurrence, aka 500-year floodplain. Note: FIRMs for Lane County are currently being revised and updated, and therefore information contained on the referenced map is subject to change.

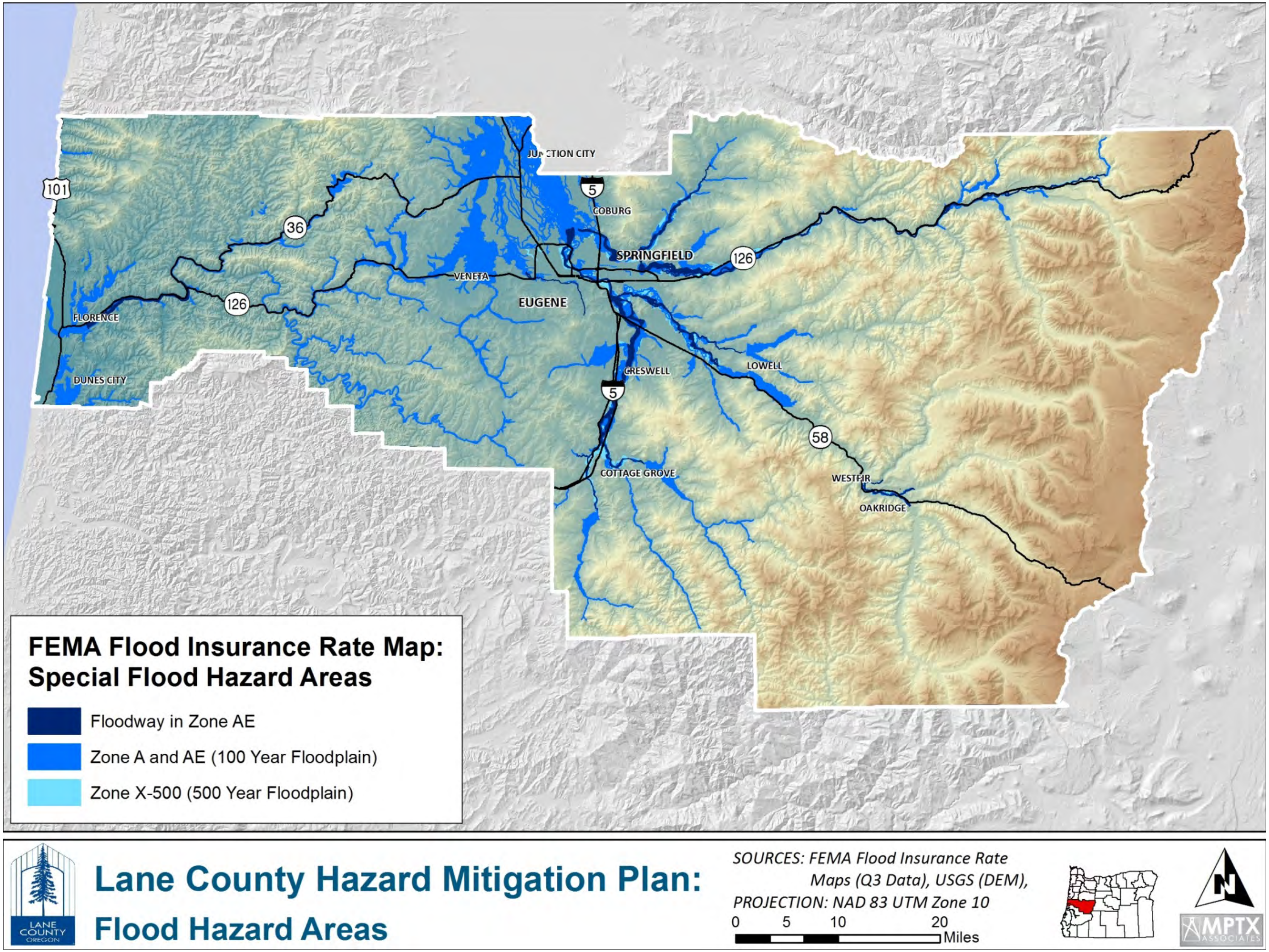


Figure 3-10 Lane County Flood Hazard Areas

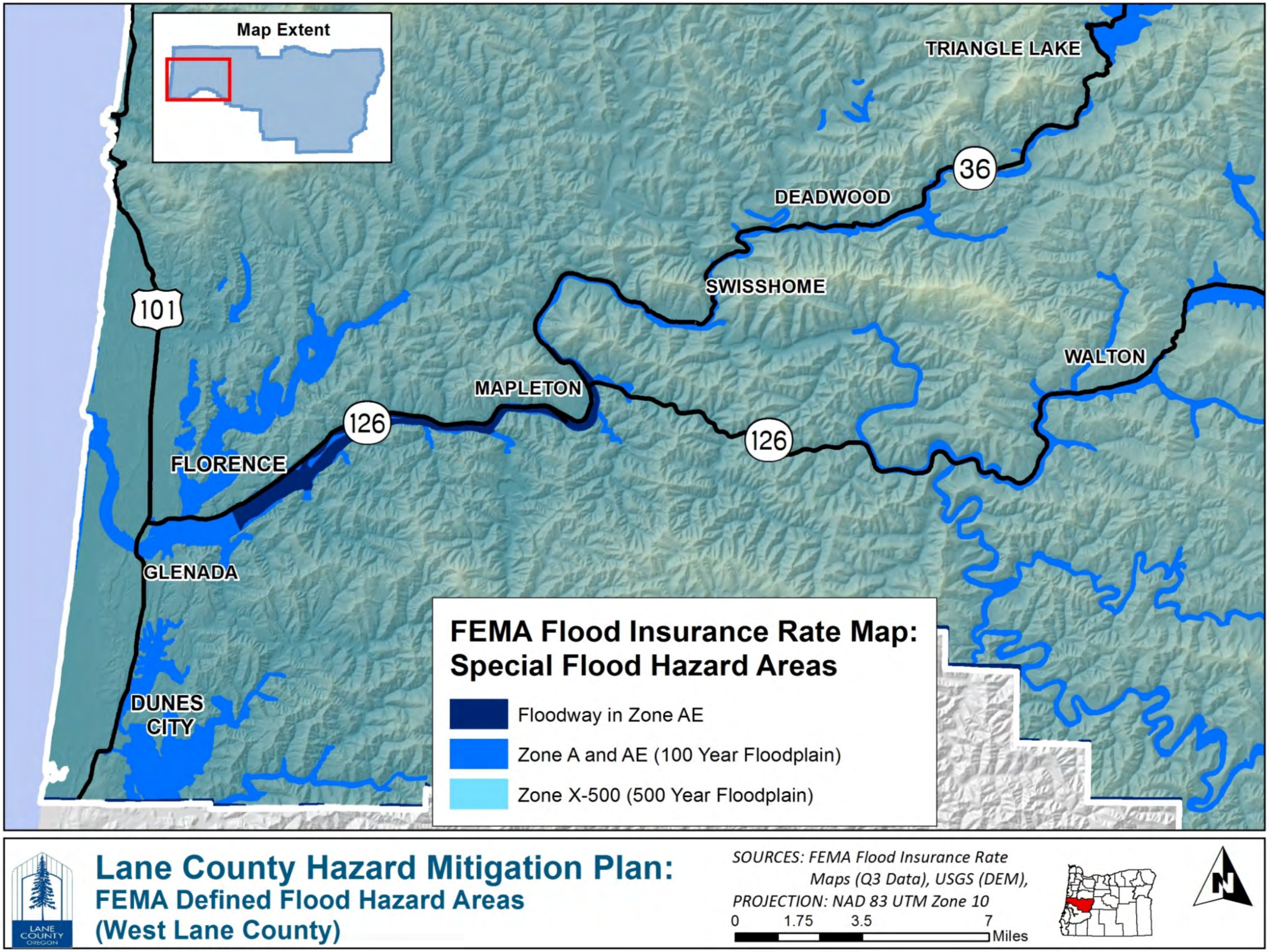


Figure 3-11 Western Lane County Flood Hazard Areas

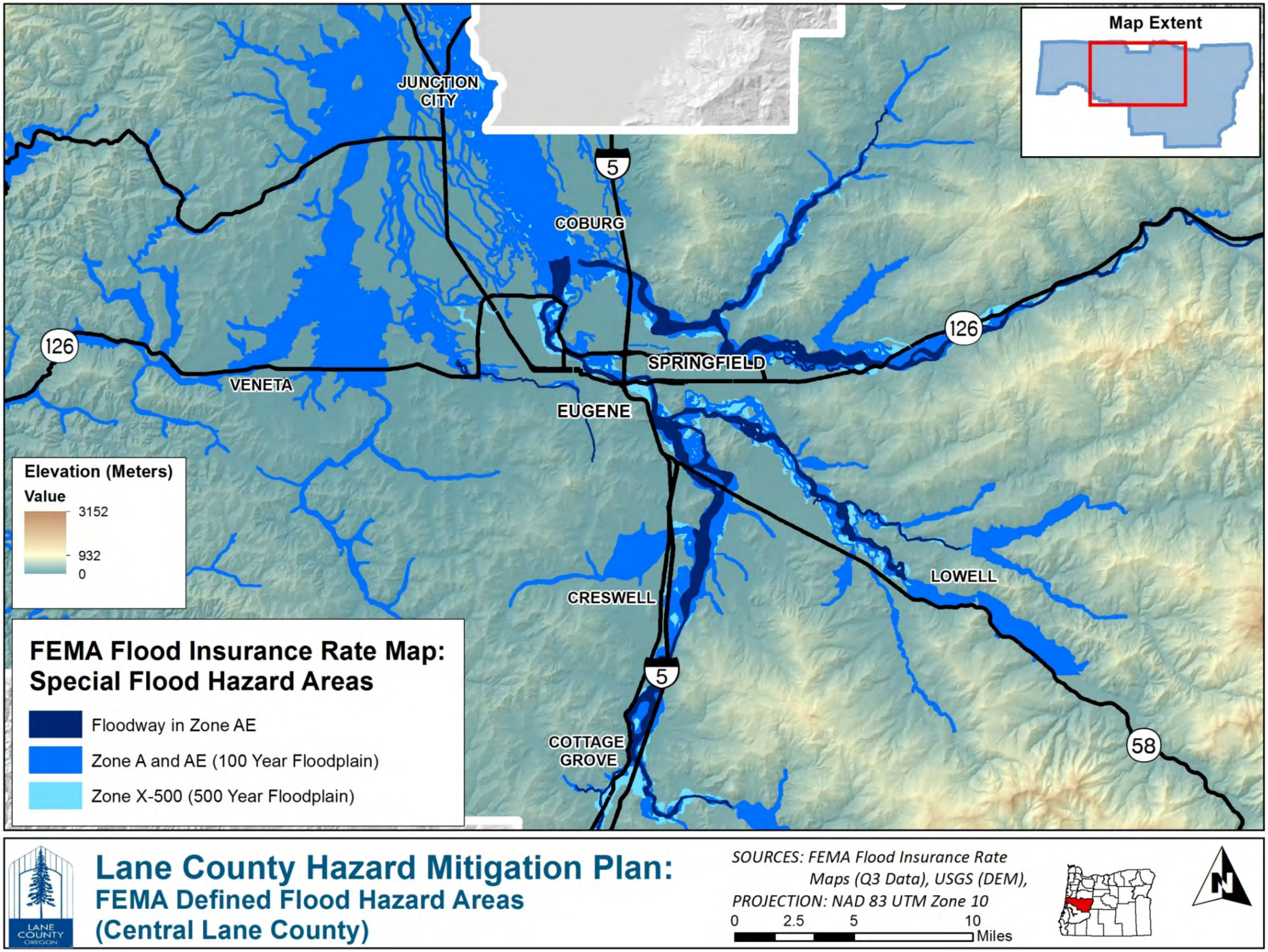


Figure 3-12 Central Lane County Flood Hazard Areas

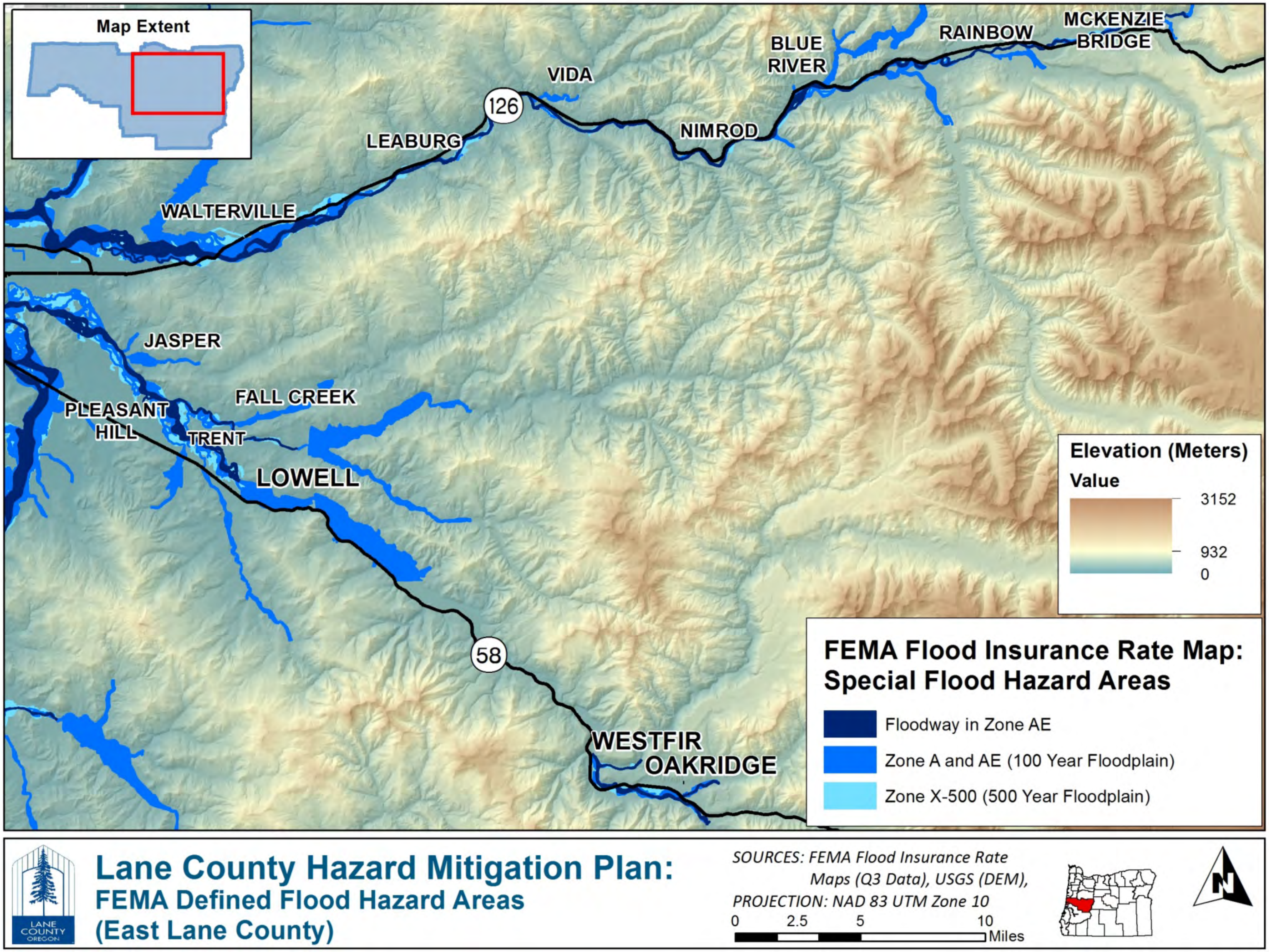


Figure 3-13 East Lane County Flood Hazard Areas

Previous Occurrences (since 2012)
In January 2012 Presidential Disaster Declaration (DR-4055-OR) was announced as a result of flooding, winter storms, and landslides which impacted Lane County and other jurisdictions throughout western Oregon. The NWS reported certain areas of the Coast Range in Lincoln and Lane counties received between 10 and 15 inches of rain during a 24-hour period January 18-19, 2012. Homes, businesses, and roadways were flooded; high winds downed trees knocking out power and landslides closed roadways.

Numerous houses from the Willamette Valley to the west side of the Coast Range were inundated. Landslides, mudslides and downed trees closed highways intermittently, trapping people either trying to escape the rising water or get back home to safety. Lane County officials evacuated residents in Mapleton. The Mohawk Valley Fire District evacuated three families from their homes in the Sunderman Road area near the Mohawk River. Close to 2,000 Eugene Water & Electric Board customers lost power due to the storm.

Roads throughout Lane County were hammered with downed trees and mudslides including Highway 36, between Mapleton and Junction City. January 19, 2012 the Siuslaw River stage was 10.1 feet above flood stage with a gauge reading of 28.1 feet. This level was within 2.1 feet of record stage for the Siuslaw at Mapleton (30.2 feet in 1996). Heavy rain from this storm caused the Mohawk River near Marcola to overflow its banks and flood low lying areas, cresting at 17.9 feet, 2.9 feet above flood stage.

Flooding also occurred February 2014, and again in December 2015 in various locations of Lane County including the Siuslaw River near Mapleton and Mohawk River near Marcola. The following table summarizes flooding events for Lane County from 2012-2016, as reported by NOAA's National Climatic Data Center.

Table XVI Flooding Events as Reported by NCDC, Lane County, 2012-2016

General Location	Date	Damage Reported
MAPLETON	1/18/2012	$2,000,000
MARCOLA	1/19/2012	$1,000,000
MAPLETON	3/30/2012	data unavailable
MAPLETON	11/19/2012	data unavailable
MAPLETON	2/12/2014	data unavailable
SPRINGFIELD	2/14/2014	data unavailable
MAPLETON	12/20/2014	data unavailable
MAPLETON	12/7/2015	$395,000
SPRINGFIELD	12/17/2015	$499,000
Totals:		**$3,894,000**

Source: National Climatic Data Center (NCDC), Storm Events Database

Narrative accounts of flood events in Lane County from 2006-2016 are listed below as provided by the National Climatic Data Center (NCDC).

December 17, 2015: Heavy rain resulted in the Siuslaw River to exceed flood stage at Mapleton. Several small streams also flooded in the area. The Mohawk River also flooded near Springfield. Minor flooding of a pastureland was reported in Swisshome due to flooding of Mann Creek. A new daily rainfall record of 1.65 inches in Eugene broke the previous record of 1.35 inches last set in 1957. Countywide damage reports totaled $894,000.

December 20, 2014: The Siuslaw River near Mapleton crested at 22.8 feet, causing flooding to surrounding areas.

February 12-4, 2014: Prolonged, heavy rain caused the Siuslaw River near Mapleton to overflow its banks at approximately flood stage of 18.02 feet, causing flooding to surrounding areas. The Mohawk River near Springfield reached flood stage two days later, cresting at 15.1 feet.

November 19, 2012: Heavy rain caused the Siuslaw River near Mapleton to overflow its banks, causing flooding to surrounding areas. The Siuslaw River crested at 18.3 feet on January 19th at 11 pm PST, 0.3 feet above flood stage.

March 30, 2012: Heavy rain caused the Siuslaw River near Mapleton to overflow its banks, causing flooding to surrounding areas. The Siuslaw River crested at 20.4 feet on March 30th at 6 pm PST, 2.4 feet above flood stage.

January 19, 2012**:** Heavy rain caused the Mohawk River near Springfield to overflow its banks and flood low lying areas. The Mohawk River crested at 17.9 feet on January 19th at 7 pm PST, 2.9 feet above flood stage. $1 million in property damage documented.

January 18, 2012**:** Heavy rain caused the Siuslaw River near Mapleton to overflow its banks, causing major flooding to surrounding areas. The Siuslaw River crested at 28.1 feet on January 19th at 3 pm PST, 10.1 feet above flood stage. $2 million in property damage documented.

December 3, 2007: Two very powerful storms brought hazardous weather to the Pacific Northwest. The entire forecast area experienced heavy rainfall for an extended period of time, leading to widespread flooding, with the worst hit areas in the Coast Range and areas draining from the Coast Range to the Pacific Ocean. Five rivers in northwest Oregon surpassed major flood stages, fueling the extensive flood damage across the region. The Siuslaw River flooded near Mapleton, causing minor lowland flooding. 3.1" of rain fell at Florence, 4.9" at Vaughn, 7.7" at Horton over a 48 hour period.

December 14, 2006: The Siuslaw River near Mapleton crested above flood stage at 18.3 feet.

November 7, 2006: The Siuslaw River near Mapleton crested at 18.8 feet with flood stage at 18.0 feet.

January 17, 2006**:** A strong, moisture-laden storm brought heavy rains and flooding to Oregon. The Siuslaw River at Mapleton flooded during the event. Flooding affected widespread low-lying areas and agricultural lands. Flooding was also the cause of multiple road closures around the area.

January 14, 2006**:** A series of wet Pacific storms brought heavy rains to the area, causing flooding and damage. The Mohawk River near Springfield flooded and Oregon Governor Ted Kulongoski declared a state of emergency in 24 of Oregon's 36 counties.

Previous Occurrences (prior to 2006)

A detailed report was prepared by U.S. Department of the Interior in 1956, *Floods of December 1955-January 1956 in the Far Western States, Geological Survey Water-Supply Paper 1650.* This document includes summaries of flooding across significant portions of Lane County such as upper and lower Willamette, McKenzie, Siuslaw Rivers and tributaries. The following excerpt from that report is as follows:

> "Before 1900, major floods are known to have occurred in the Willamette Valley in 1813, 1843, 1844, 1849, 1853, December 1861, January 1881, and February 1890. Quantitative data are lacking for those floods that occurred prior to 1861, but it is known that the stages reached by the flood of 1861 have not since been equaled. The greatest flood since that year occurred in February 1890, and the next greatest was probably that

> of January 1881. After 1900 several floods had peak discharges of the same general magnitude as that of December 1955, but were greater in some basins and less in others. These floods occurred in January 1901, January 1903, November 1909, January 1923, March 1931, January 1943, December 1945, January 1948, and January 1953." Source: DOI, USGS, 1956.

The Lane County Land Management Division, Floodplain Administration Office maintains detailed information on previous flooding, including major events in 1996 and 1964. In February 1996, prolonged precipitation accompanied by early snowmelt caused by a warm-weather pattern known as an atmospheric river or "Pineapple Express," caused many waterways in Oregon to rise to 100-year flood levels. In Lane County flooding was particularly severe along the Siuslaw and Mohawk Rivers. The Eugene/Springfield metropolitan wastewater system was forced to flush millions of gallons of raw sewage into the Willamette River when rainwater overwhelmed pipes and pumps leading to the treatment plant. If the effluent had not been released, sewage would have backed up into buildings and low areas. About 40 residents and businesses reported sewage backups during the storm. (Pittman, 1996)

For the 1996 flood, damages in Lane County were estimated at $19 million. The following is a list federal disaster relief amounts by category for DR-1099-OR: Public Assistance (PA, public sector response cost and infrastructure damage) $564,608; Individual Assistance (IA, disaster housing for displaced citizens) $720,706; Individual & Family Grant (IFG, displacement costs) $220,564. Small Business Administration loans (SBA) equaled the following: $1.75 million for home loans, $926,500 for business physical loans and $119,700 for economic injury loans.

Later in the year, on November 17-18 a moist southwest flow aloft produced moderate to heavy rain and strong winds over southwest Oregon. Storm total rainfall ranged from 8 to 12 inches on the coast with 3 to 7 inches inland. The rainfall amount and rate produced numerous landslides impacting residences and closing highways. Strong winds of 40 – 70 mph were reported on the coast and many trees and power lines were downed across southwest Oregon.

President Clinton declared the state a major disaster area (FEMA, 1997, January 23) after this storm citing damage from severe storms, high winds, flooding and land and mud slides. Although the floods of 1996 represented a large-scale disaster, they are not unprecedented within the recent past. The Christmas Flood of 1964 caused $157 million in damage statewide, and 20 Oregonians lost their lives.

In addition to the 1996 and 1964 floods, Lane County has experienced several other significant floods since records have been kept. In 1972, flooding along the Siuslaw River caused extensive damage within the community of Mapleton. The floods of 1945, 1942 and 1927 caused severe damage to the City of Eugene and the surrounding areas. Early records indicate that the Southern Willamette Valley flooded often in the mid to and late 1800's, with major flooding occurring in 1850-51, 1861, 1881 and 1890. While the 1996 events were devastating to the entire region, the floods of 1861, 1890, and 1964 exceeded the 1996 event in terms of velocity and volume of water. All three floods are estimated to have exceed the so-called "100-year flood," or Base Flood in Lane County, and all within a time frame of about 100 years.

Probability of Future Occurrence

Based on historical flooding occurrence as reported by federal sources, there are six (6) flooding events noted by the NCDC during the most recent 6-year period. This equates to a one event per year average, and a **High Probability** classification according to terms and definitions set forth in Section 3.1.1. The following river gauge records are additional data sources supporting future probability analysis.

USGS Gauge: ***Siuslaw River near Mapleton*** Lat: 44.063333° N, Long: -123.882778° W

General Flood Categories (in feet)

Major Flood Stage:	28
Moderate Flood Stage:	22
Flood Stage:	18
Action Stage:	15

Typical Impacts per Gauge Height

28 feet	ABOVE 28 FT...EXPECT MAJOR FLOODING OF THE RIVERVIEW AVENUE AREA AND NUMEROUS HOMES AND BUSINESSES IN THE TOWN OF MAPLETON. FLOODING OF ROADS ADJACENT TO THE SIUSLAW RIVER IN THE VICINITY OF MAPLETON IS LIKELY. FLOODING OF HIGHWAYS 126 AND 36 WILL BE SIGNIFICANT.
25 feet	ABOVE 25 FT...EXPECT WIDESPREAD FLOODING...INCLUDING SEVERAL HOMES AND STRUCTURES IN LOW AREAS OF MAPLETON. MANY SECTIONS OF HWY 126 FROM TIERNAN TO MAPLETON...AND HWY 36 NORTH OF MAPLETON BEGIN TO FLOOD. FLOODING MAY BE EXACERBATED DURING HIGH TIDE.
22 feet	ABOVE 22 FT...EXPECT WIDESPREAD FLOODING OF LOW-LYING LAND. SEVERAL HOMES AND STRUCTURES IN LOW AREAS OF MAPLETON START TO FLOOD. NUMEROUS RURAL ROADS ALONG AND NEAR THE SIUSLAW RIVER WILL LIKELY BE FLOODED...AND WATER BEGINS TO COVER THE LOWER SECTIONS OF HWY 126 AT THIS STAGE. FLOODING MAY BE EXACERBATED DURING HIGH TIDE.
20 feet	ABOVE 20 FEET...EXPECT WATER OVER EAST MAPLETON ROAD. FLOODING OF SOME LOW-LYING HOMES AND STRUCTURES BEGINS. FLOODING MAY BE EXACERBATED BY HIGH TIDE.
18 feet	ABOVE 18 FT...EXPECT MINOR FLOODING OF LOW LYING DAIRY LAND ALONG WITH SOME STRUCTURES RIGHT ALONG THE BANKS OF THE SIUSLAW RIVER IN THE VICINITY OF MAPLETON

Table XVII Siuslaw River Historical Crests at Mapleton Ranked by Gauge Height

Gauge Height	Date
(1) 30.21 ft	2/7/1996
(2) 28.45 ft	1/21/1972
(3) 28.28 ft	1/16/1974
(4) 28.07 ft	1/20/2012
(5) 28.00 ft	12/16/1964
(6) 25.79 ft	12/28/1998
(7) 25.73 ft	12/25/1980
(8) 23.99 ft	12/13/1977
(9) 23.98 ft	12/31/2005
(10) 23.67 ft	12/6/1981
(11) 23.58 ft	1/8/1976
(12) 23.01 ft	2/23/1986
(13) 22.93 ft	1/27/1970
(14) 22.75 ft	12/16/1982
(15) 22.70 ft	1/6/1978
(16) 22.69 ft	1/11/2006

USGS Gauge: ***Willamette River at Harrisburg***; Lat: 44.271389° N, Long: -123.173889° W

General Flood Categories (in feet)

Major Flood Stage:	17
Flood Stage:	14
Action Stage:	10.8

Typical Impacts per Gauge Height

20 feet	ABOVE 20.0 FT...EXPECT WIDESPREAD AND MAJOR FLOODING FROM NORTH OF EUGENE TO HARRISBURG. NUMEROUS SMALL COMMUNITES AND DEVELOPED AREAS HISTORICALLY FLOOD NEAR THIS LEVEL.
18 feet	ABOVE 18.0 FT...EXPECT FLOODING OF SOME HOMES AND WIDESPREAD LOWLAND FLOODING. HWY 99E MAY BE FLOODED AND CLOSED IN NUMEROUS LOCATIONS AT THIS LEVEL.
17 feet	ABOVE 17.0 FEET...MAJOR FLOOD STAGE...EXPECT WIDESPREAD FLOODING ALONG THE WILLAMETTE BETWEEN EUGENE AND ALBANY...INCLUDING SEVERAL STRETCHES OF HWY 99E IN THE VICINITY OF HARRISBURG.
16 feet	ABOVE 16.0 FT...EXPECT WIDESPREAD LOW LAND FLOODING MAINLY WEST OF THE RIVER. PORTIONS OF HWY 99E MAY BE FLOODED. HISTORICALLY...FLOODING NEAR THE HARRISBURG BRIDGE HAS OCCURRED AT THIS AND HIGHER STAGES.
15 feet	ABOVE 15.0 FT...LOW PARTS OF STATE HWY 99E HAVE HISTORICALLY BEGUN TO FLOOD AT THIS POINT. EXPECT WIDESPREAD LOW LAND FLOODING ALONG THE WILLAMETTE RIVER IN THE HARRISBURG VICINITY.
14 feet	ABOVE 14.0 FT...EXPECT MINOR FLOODING ALONG THE WILLAMETTE RIVER... MAINLY CONCENTRATED ALONG THE WESTERN BANKS.
12 feet	ABOVE 12.0 FT...SLOUGHS IN THE HARRISBURG VICINITY BEGIN TO FILL.

Table XVIII Willamette River Historical Crests near Harrisburg Ranked by Gauge Height

Gauge Height	Date
(1) 23.00 ft	12/04/1861
(2) 21.10 ft	1/1/1943
(3) 19.69 ft	12/29/1945
(4) 18.75 ft	1/7/1948
(5) 18.40 ft	12/31/1942
(6) 18.03 ft	10/30/1950
(7) 18.00 ft	01/19/1953
(8) 18.00 ft	3/19/1932
(9) 17.90 ft	12/15/1946
(10) 17.57 ft	2/11/1961
(11) 17.25 ft	12/23/1964
(12) 17.00 ft	4/1/1931
(13) 16.25 ft	12/26/1955
(14) 15.56 ft	11/19/1996
(15) 15.00 ft	1/18/1951
(16) 14.99 ft	12/7/1981
(17) 14.71 ft	1/21/1972
(18) 14.70 ft	2/8/1996
(19) 14.55 ft	1/18/2006
(20) 14.35 ft	2/23/1986
(21) 14.19 ft	1/1/2006

USGS Gauge: ***Mohawk River at Springfield***; Lat: 44.092778° N, Long: -122.956667° W

General Flood Categories (in feet)

Major Flood Stage:	25
Moderate Flood Stage:	22
Flood Stage:	15
Action Stage:	12.5

Typical Impacts per Gauge Height

22 feet	ABOVE 22 FT...EXPECT MAJOR WIDESPRESD FLOODING OF FARMLAND AND ROADS. DAMAGE AND IMPACTS SIMILAR TO THE FEB 1996 AND DEC 1964 FLOODS CAN BE EXPECTED WITH SIGNIFICANT FLOODING IN MARCOLA.
18 feet	ABOVE 18 FT...EXPECT EXTENSIVE FLOODING OF FARMLAND AND LOCAL ROADS FROM THE CONFLUENCE WITH THE MCKENZIE RIVER UPSTREAM TO THE MARCOLA AREA. ALSO EXPECT NUMERIOUS ROAD CLOSURES.
15 feet	ABOVE 15 FT...EXPECT FLOODING OF LOW AREAS AND SOME RURAL ROADS NEAR THE RIVER.
12.5 feet	ABOVE 12.5 FT...THE RIVER IS AT BANKFUL LEVEL IN THE SPRINGFIELD VICINITY. THERE MAY BE AREAS WHERE WATER IS FLOWING OVER THE BANKS OF THE RIVER.

Table XIX Mohawk River Historical Crests near Springfield Ranked by Gauge Height

Gauge Height	Date
(1) 24.30 ft	11/1/1960
(2) 23.11 ft	2/7/1996
(3) 22.90 ft	12/22/1955
(4) 22.60 ft	12/22/1964
(5) 22.10 ft	12/28/1945
(6) 21.30 ft	1/1/1943
(7) 21.26 ft	1/21/1972
(8) 20.77 ft	11/19/1996
(9) 20.21 ft	2/13/1984
(10) 19.73 ft	01/29/1965
(11) 19.70 ft	1/8/1976
(12) 18.76 ft	1/16/1974
(13) 18.62 ft	12/6/1981
(14) 18.17 ft	2/23/1986
(15) 18.03 ft	12/31/2005
(16) 17.86 ft	01/20/2012
(17) 17.81 ft	11/26/1999
(18) 17.69 ft	1/18/2006
(19) 17.55 ft	12/26/1996
(20) 17.40 ft	12/28/1998

Magnitude/Severity/Extent

While some type of seasonal flood-related damage occurs nearly every year, the flooding and associated landslide events of February and November 1996 represent the most significant flooding in the recent past. Therefore, data from the 1996 flooding event is considered representative for a 'severe flood' in Lane County, but should not be considered the 'credible worst case scenario'.

Research conducted by the PNW Ecosystem Research Consortium at Oregon State University advises estimations of a credible worst case scenario for flooding in the south Willamette Valley. The following chart shows the historic record of floods along the Willamette River over a 130 year timeframe. As indicated, flood conditions exceeded the 1964 and 1996 events in at least six years during the 20th century. Three years during the 19th century (1861, 1882, and 1891), flow volume of the Willamette River more than doubled water volume of the 1996 flood event.

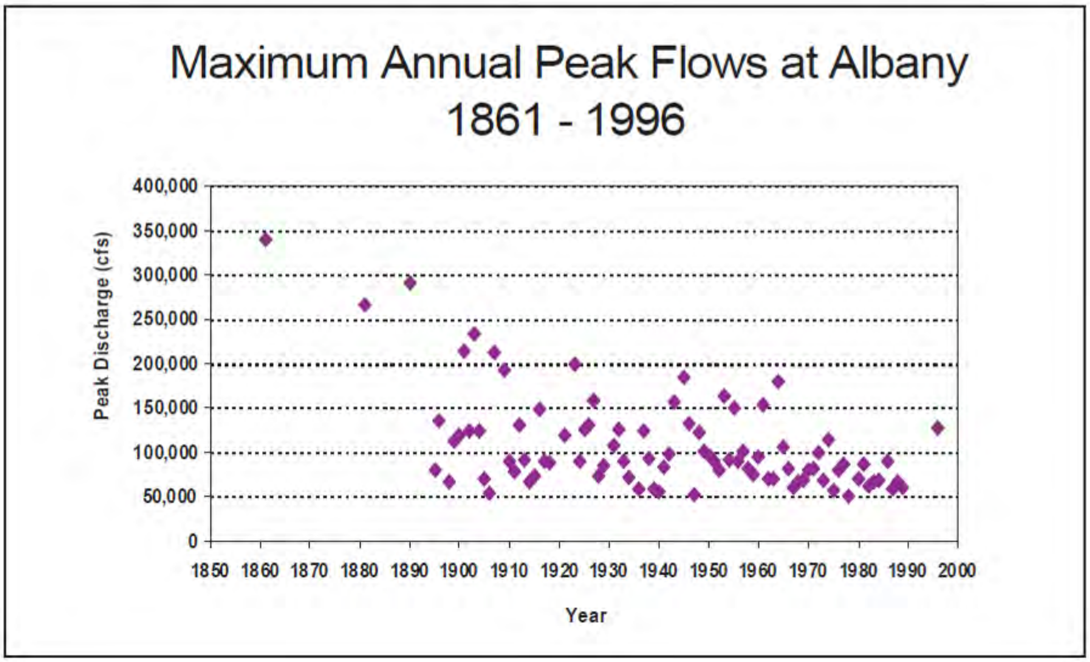


Figure 3-14 Annual Peak Flow, Willamette River at Albany Gauge, 1861-1996

Source: *Flood Inundations/FEMA Floodplains* (Ashkenas, Wildman), PNW Ecosystem Research Consortium, OSU; USGS. Note: Floods greater than 50,000 cfs and largest flows ony are plotted.

Regarding acreage inundated, the following table compares floods from 1861, 1945, 1964, and 1996. Notable is the fact that the area inundated by the 1861 event more than doubles the extent of the 1964 flood. Comprehensive data regarding the depth of flooding and water velocity is not yet available, but is assumed to be much more severe for the flood of 1861.

Table XX Geographic Area of Willamette Valley Inundated by Major Floods

Year	1861	1945	1964	1996
Acres Inundated	320,337	149,797	152,789	194,533

Source: *Flood Inundations/FEMA Floodplains* (Ashkenas, Wildman), PNW Ecosystem Research Consortium, Oregon State University; USGS. Note: Inundation areas for 1861 may include areas from 1890; inundation areas for 1945 may include areas from 1943.

The map shown in Figure 3-15 below compares the extent of flooding for various historic events as mapped by the US Army Corps of Engineers. As indicated, a vast area north of Eugene has been inundated by historic floods and approximates the current Special Flood Hazard Area as defined on FEMA Flood Insurance Rate Maps. Note, the extent of mapping for the 1964 flood ends just south of Junction City, therefore results for points southward (upstream, toward Eugene) must be interpreted from the available data.

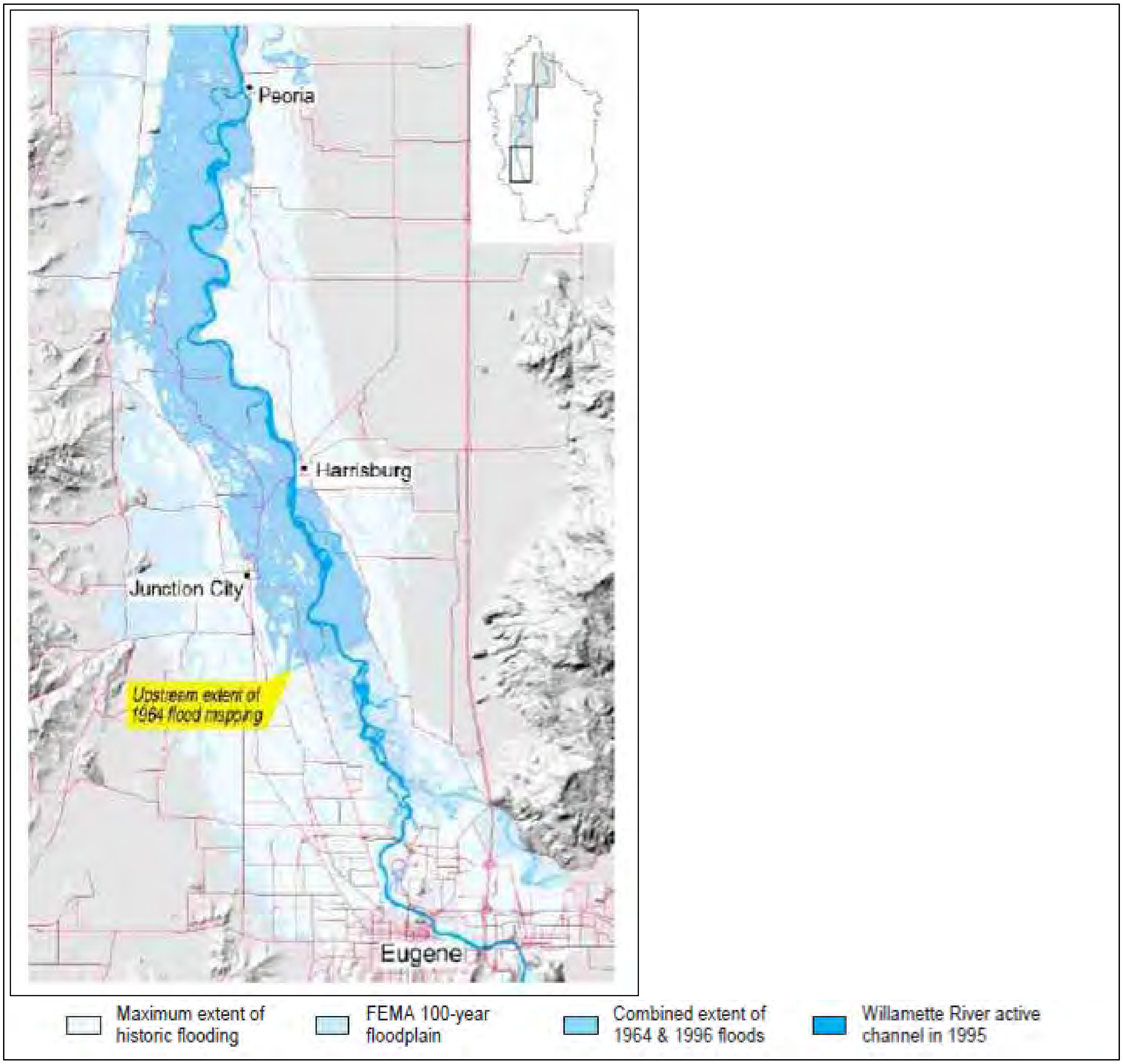


Figure 3-15 Comparative Extent, Historic Flood Events, Willamette River

Sources: *Flood Inundations/FEMA Floodplains* (Ashkenas, Wildman), PNW Ecosystem Research Consortium, Oregon State University; USGS; US Army Corps of Engineers

A credible worst case scenario for flood would involve conditions which exceed the 1861 flood event by 25 percent or more. Considering population and value of development within areas likely inundated by a major flood in Lane County, a **Level 4 – Catastrophic** magnitude/severity classification is assigned.

Flood Overall Vulnerability

Based on potentially catastrophic impacts, high long term probability, and presence of populations, infrastructure and development in floodprone areas, a **High Vulnerability** classification is assigned for flood.

3.2.5 Hazardous Materials Incident

The following description for hazardous materials is provided by the Federal Emergency Management Agency (FEMA):

> *Chemicals are found everywhere. They purify drinking water, are used in agriculture and industrial production, fuel our vehicles and machines, and simplify household chores. But chemicals also can be hazardous to humans or the environment if used or released improperly. Hazards can occur during production, storage, transportation, use, or disposal. The community is at risk if a chemical is used unsafely or released in harmful amounts.*
>
> *Hazardous materials in various forms can cause fatalities, serious injury, long-lasting health effects, and damage to buildings, homes, and other property. Many products containing hazardous chemicals are used and stored in homes routinely. These products are also shipped daily on the nation's highways, railroads, waterways, and pipelines.*
>
> *Chemical manufacturers are one source of hazardous materials, but there are many others, including service stations, hospitals, and hazardous materials waste sites.*
>
> *Varying quantities of hazardous materials are manufactured, used, or stored at an estimated 4.5 million facilities in the United States--from major industrial plants to local dry cleaning establishments or gardening supply stores.*
>
> *Hazardous materials come in the form of explosives, flammable and combustible substances, poisons, and radioactive materials. These substances are most often released as a result of transportation accidents or because of chemical accidents in plants.*

Hazardous material incidents are technological (meaning non-natural hazards created or influenced by humans) events that involve large-scale releases of chemical, biological or radiological materials. Hazardous materials incidents generally involve releases at fixed-site facilities that manufacture, store, process or otherwise handle hazardous materials or along transportation routes such as major highways, railways, navigable waterways and pipelines.

The most commonly encountered impacts of hazardous materials incidents are fire, toxic fumes, and water and soil contamination. The public is generally advised to evacuate any area where a hazmat incident is suspected and to notify authorities immediately.

Geographic Location

Typically railroads, mountain highways, industrial facilities, waterways, and ocean beaches are the most common locations for hazardous materials incidents in Lane County. Notable to geographic location and hazard potential are the following characteristics:

- Roadway, railway intersections
- Pumps, compressor stations, transfer points
- Fixed sites
- Proximity to population, structures, and physical assets

Advanced mapping is in development that will help identify locations where mitigation need is highest. Current mapping analysis focuses on the relationship of rail lines and highways to landslide risk. This relationship has proved relevant for at least one recent incident involving a major landslide in the Willamette National Forest that closed the Union Pacific rail line southeast of Oakridge for an extended period. While no train derailment or hazardous material release occurred in this incident, such potential was demonstrated.

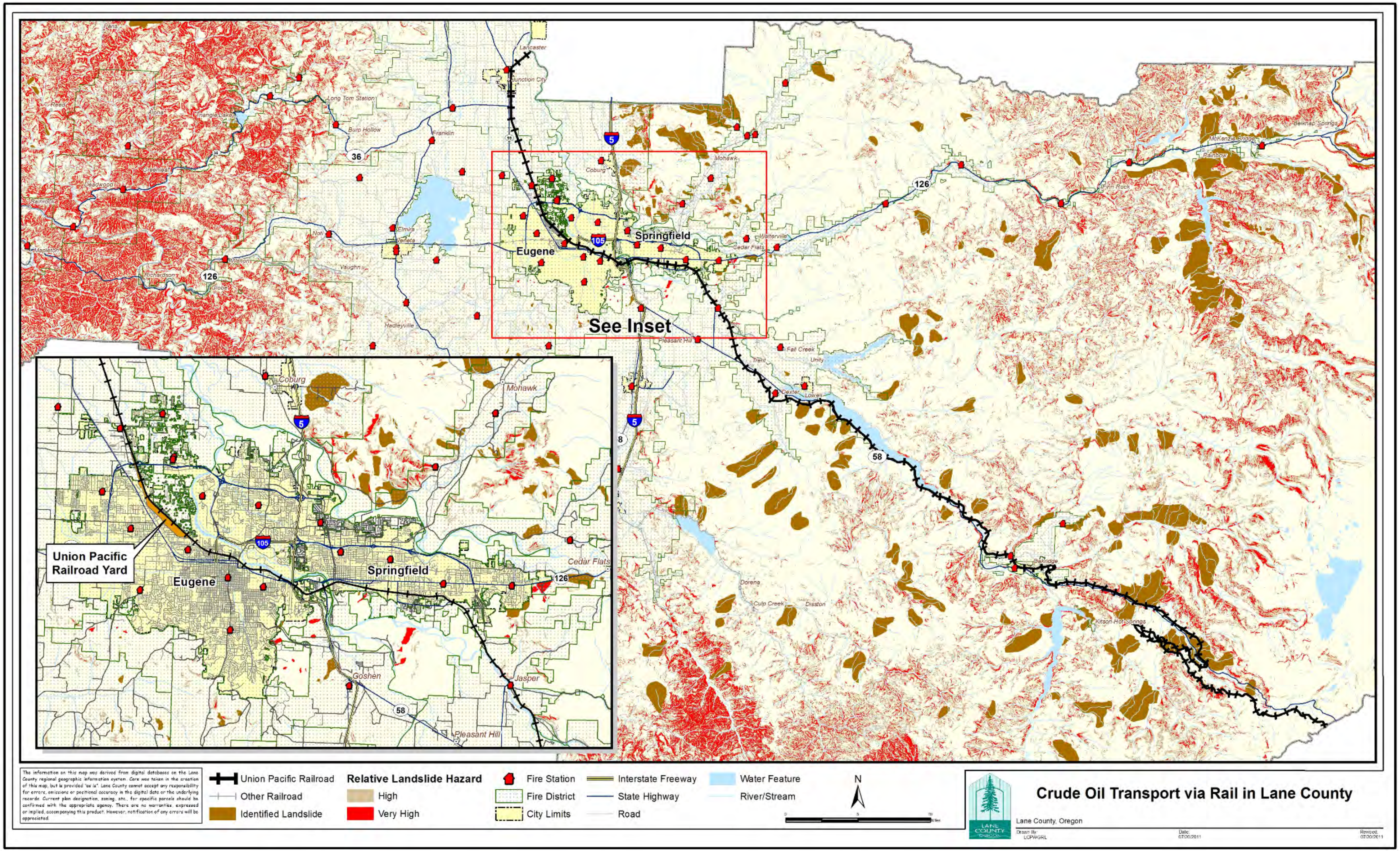


Figure 3-16 Crude Oil Transport by Rail, Landslide Prone Areas: Lane County

Previous Occurrences
According to the National Response Center database there were 85 reports of spill or release of hazardous materials in Lane County from January 2010 to May 2013. A selection of these reports is excerpted in Table XVIII to illustrate the type and severity of hazardous materials releases which may occur over a given period. Note: these detailed reports include date, time, incident type, incident cause, suspected responsible entity, medium affected (land, air, water), material name are no longer accessible.

Probability of Future Occurrence
Based on National Response Center records for Lane County, from January 2010 to May 2013, there were 85 reports of spills of hazardous materials or industrial accidents, an average of 2.07 per month. That equates to a **High Probability** of future occurrence classification according to the definitions set forth in Section 3.1.1, though it should be noted this total includes both significant and also minor occurrences.

Magnitude/Severity/Extent
The magnitude and severity of a hazardous material release depends upon the type of material released, the amount of the release and the proximity to populations. As previous hazardous material incidents have shown, release of materials can and does result in fatalities and evacuations of large numbers of people. Accordingly, magnitude and severity of hazardous material release is considered **Level 3- Critical** by the HM&EM-SC, with potential public safety risks present and neighborhood scale impacts to property and infrastructure.

A key mitigating element for hazardous material incident along waterways in Lane County is the McKenzie Watershed Emergency Response System (MWERS), coordinated by the Eugene Water and Electric Board (EWEB). According to EWEB, MWERS is part of its Drinking Water Source Protection program, which gathers and distributes mitigation and response information in coordination with 27 federal, state and local agencies.

MWERS is used by incident commanders to quickly gain access to information and dispatch response. Emergency responders use Geographic Information System (GIS) technology to access information on threats, critical resources, spill response strategies, equipment availability and other information needed during an incident involving hazardous materials release. First responders and others are able to use this information to effectively stabilize accidental or intentional chemical releases quickly and safely.

Hazardous Materials Incidents Overall Vulnerability
According to subjective assessments based on frequency, threat to human life, risk of property damage, and environmental and economic impacts, Lane County is considered to have **Moderate Vulnerability** to hazardous material incidents.

Table XXI Hazardous Materials Reports, National Response System, Lane County 2010-13

Report Received	Description Of Incident	Nearest City	Material Name
7/26/2010	MOTOR VEHICLE ACCIDENT INVOLVING A RADIOACTIVE DEVICE. DRIVER WAS AIRLIFTED TO HOSPITAL WITH SERIOUS INJURIES. LITTLE INFORMATION IS KNOWN ABOUT THE DEVICE OR ANY RELEASE.	VENETA	RADIOACTIVE MATERIAL
11/5/2010	CRANE TIPPED OVER ON THE DAM. CAUSED DISCHARGE OF UNKNOWN AMOUNTS OF DIESEL FUEL, HYDRAULIC OIL, AND MOTOR OIL INTO THE DEXTER RESERVOIR. THE CAUSE OF THIS INCIDENT IS UNKNOWN AT THIS TIME. THERE WERE NO INJURIES INVOLVED.	LOWELL	OIL: DIESEL
1/16/2011	FORMALDEHYDE (53%) RELEASED FROM CONDENSER LINE DUE TO PRESSURE BUILD UP.	SPRINGF'D	FORMALDEHYDE (50% OR MORE), METH
2/2/2011	MINERAL OIL (NON-PCB) DISCHARGED FROM A UNDERGROUND TRANSFORMER DUE TO UNKNOWN CAUSES. CALLER STATED WHILE DOING ROUTINE MAINTENANCE OIL WAS DISCOVERED IN THE SUMP. THE OIL HAS REACHED AT CATCH BASIN BUT NO VISIBLE SHEEN YET.	EUGENE	OIL, MISC: MINERAL
2/19/2011	A ABCO TRUCK (R&L CARRIERS) PUNCTURED A SADDLE TANK ON A CURB AT THE TRAVEL CENTER LOCATED OFF OF I-5 EXIT 199 IN EUGENE, OREGON. THE PUNCTURED FUEL TANK RELEASED APPROXIMATELY 70 GALLONS OF DIESEL FUEL ONTO THE ASPHALT, SOIL, AND A NEARBY CATCH BASIN. THE FUEL APPEARS TO BE CONTAINED WITHIN THE CATCH BASIN AT THIS TIME.	EUGENE	DIESEL FUEL
3/10/2011	RELEASE OF 15 GALLONS OF TRANSFORMER OIL FROM A POLE MOUNTED TRANSFORMER; THE CAUSE WAS DUE TO THE TRANSFORMER BLOWING.	EUGENE	OIL, MISC: TRANSFORMER
10/19/2011	80 GALLON DIESEL SPILL FROM A FIRE TRUCK. FIRE TRUCK WAS FILLED ON MAY 2011 AND IT WAS DISCOVERED TO BE COMPLETELY EMPTY TODAY. SUSPECTED CAUSE IS FUEL LINE FAILURE.	SPRINGF'D	OIL: DIESEL
11/25/2011	CALLER IS REPORTING A DERAILMENT OF A TANK CAR DUE TO THE AXLE THAT CAME OFF THE TRACK.	OAKRIDGE	
1/1/2012	LOCOMOTIVE UP5442 RELEASED DIESEL FUEL INTO A BELLY PAN. THIS WAS DUE TO A BROKEN FUEL INJECTION PUMP.	EUGENE	OIL: DIESEL
2/16/2012	MOLTEN PHENOL (POSSIBLY NEAR THE 1000 LBS RQ) RELEASED FROM RAILCAR WITHIN THE FACILITY DUE TO UNKNOWN CAUSES.	EUGENE	MOLTEN PHENOL
3/12/2012	TANKER TRUCK OVERTURNED HEADED EAST ON HIGHWAY 58. 1,700 GALLONS OF GASOLINE (UN1203) WAS RELEASED FROM THE TANK. THE GASOLINE HAS NOT YET REACHED ANY WATERWAYS BUT PRECAUTIONARY MEASURES HAVE BEEN TAKEN.	OAKRIDGE	GASOLINE: AUTOMOTIVE (UNLEADED)
3/21/2012	TRAIN DERAILMENT CAUSED BY A MUDSLIDE. THERE WAS 2 TO 4 INCHES ON TOP OF THE RAIL FOR 100 FEET. THE BAGGAGE CAR WAS THE ONLY CAR THAT DERAILED. THERE WAS 246 PASSENGERS AND 15 CREW MEMBERS. PASSENGERS WERE TRANSFERRED BY BUS. NO INJURIES REPORTED.	OAKRIDGE	
4/19/2012	DISCHARGE OF NON-PCB MINERAL OIL ONTO THE GROUND. CALLER STATED THAT THERE WAS AN EXPLOSION OF A BREAKER AND A SUBSEQUENT FIRE.	EUGENE	OIL, MISC: MINERAL
11/12/2012	DRUNKEN MOTORCYCLIST STRUCK 4 INCH PLUG VALVE WITH TEST RISERS, CAUSING A RELEASE OF NATURAL GAS.	JASPER	NATURAL GAS

Source: U.S. Coast Guard, National Reporting System, http://www.nrc.uscg.mil/foia.html

3.2.6 Landslide

Landslide is a geologic phenomenon which includes a wide range of ground movement, such as rock fall, deep failure of slopes, and shallow debris flows. Although gravity is the primary force for a landslide to occur, there are typically other contributing factors. A change in the stability of a slope can be caused by a number of factors, acting together or alone. Natural causes of landslides include:

- groundwater pressure acting to destabilize the slope
- loss or absence of vegetation, root structure, soil structure
- erosion or undercutting by river or ocean waves
- heavy rain or snowmelt
- freeze/thaw cycles
- earthquakes
- volcanic eruptions

Landslides can also be caused or aggravated by human activities including the following:

- vibrations from machinery or traffic
- blasting
- earthwork which alters the shape of a slope, or imposes new loads on an existing slope
- deforestation, cultivation, and road construction
- removal of deep-rooted vegetation that binds colluvium to bedrock
- activities which increase or concentrate amount of water infiltration into soil

As experienced by the public, the most common impacts of landslides are roadway blockage, and less frequent damage to homes and structures. Categories of impacts include threat to public safety, economic impacts created by traffic delays and detours; and environmental impacts related to increased sediment pollution of waterways. Landslides usually occur with little or no warning and therefore during contributing conditions such as heavy rainfall in steep areas, curtailment of land altering activities should be considered.

Geographic Location

In general, landslides typically occur in areas with steep slopes. In Lane County these topographic conditions are concentrated in the Coast and Cascade Ranges (western and eastern planning area) and the foothills of these ranges.

The most commonly affected state highway is Hwy 126. Sections of Hwy 126 that pass through mountainous areas are blocked due to landslides typically on an annual basis. Hwy 58 from Lowell to Willamette Pass is also susceptible, as is U.S. Hwy 101 between Florence and Cape Perpetua. Numerous other roadways are also affected.

Regarding more detailed analysis, in 2008 the Oregon Department of Geology and Mineral Industries (DOGAMI) published an extensive study on the primary geologic hazards of Yamhill, Marion, Polk, Benton, Linn and Lane Counties. Included in this report are earthquake and landslide hazard maps for each county along with future earthquake damage estimates. This study is called *Interpretive Map Series, IMS-24, Geologic Hazards, Earthquake and Landslide Hazard Maps, and Future Earthquake Damage Estimates.*

Previous Occurrences

Based on extrapolations from data presented by DOGAMI in December 2012, the estimated number of landslides detectible by aerial topographic analysis in Lane County exceeds 3,000.

Landslides have been a significant factor in recent disaster declarations in Lane County, the state of Oregon, and western U.S. overall. Notably, Disaster Declaration DR-4258 in December 2015 involved numerous landslides statewide which blocked highways, destroyed and/or imperiled homes, and resulted in public safety impacts. FEMA's preliminary damage assessment for DR-4258 notes 894 total residences impacted statewide, 11 of which were destroyed and 75 sustained major damage.

Landslide damages within Lane County for DR-4258 involved two (2) destroyed homes and one fatality, and damaged a water district main water line resulting in the need to truck in water to ensure uninterrupted water delivery to approximately 100 residences. Approximately 10 percent of the residential damage totals for DR-4258 were attributed to landslides.

Also notable in the 2012-2017 period were a number of landslides in western Lane County which damaged on a number of occasions along Highway 101 north of Florence and south of Yachats.

Highway 36, linking Junction City to Mapleton, was closed by two landslides for a 1½-week period from January 18-27, 2017. On January 18 1,400 cubic yards of debris closed the highway three miles west of Triangle Lake. On January 22 road crews were nearly done clearing the dirt, rocks and trees when a second 1,200 cubic yard slide blocked the highway nearby. According to ODOT, the slides occurred in a narrow and winding portion of Highway 36. A rock crusher smashed boulders at the site of the second slide during the cleanup because they were too big to haul.

January 19, 2008 a massive 60-acre landslide south of Oakridge occurred in the Willamette National Forest and closed the Union Pacific's main north-south railroad line for Western Oregon as reported by the Register Guard.

The landslide was the most serious natural disaster to hit Union Pacific's Oregon main railroad line in 40 years according to an industry spokesman. The slide destroyed the rail bed, tore out the tracks and scoured away another 30 or 40 feet of hillside composed of trees, mud and boulders. It obliterated 1,500 feet of track in one spot and 150 feet in another location 150 feet below where the railroad switches back down the steep slope.

The recovery effort was hampered by continuing instability of the hillside, downed trees, and storms that dumped approximately10 feet of snow in the area.

The map in Figure 3-17 is produced from DOGAMI's interactive Statewide Geo-Hazards viewer, HazVu. Landslide locations shown as brown areas outlined in black on the map of Lane County below, which can be considered a general guide. Areas of red indicate fan deposits, and areas appearing as black indicate many small landslides in close proximity. This mapping indicates concentrations of landslides in the Coast Range east of Mapleton, fan deposits and landslides in Coburg Hills, and large landslides in the Cascades southeast of Hills Creek Reservoir and south of Cougar Reservoir.

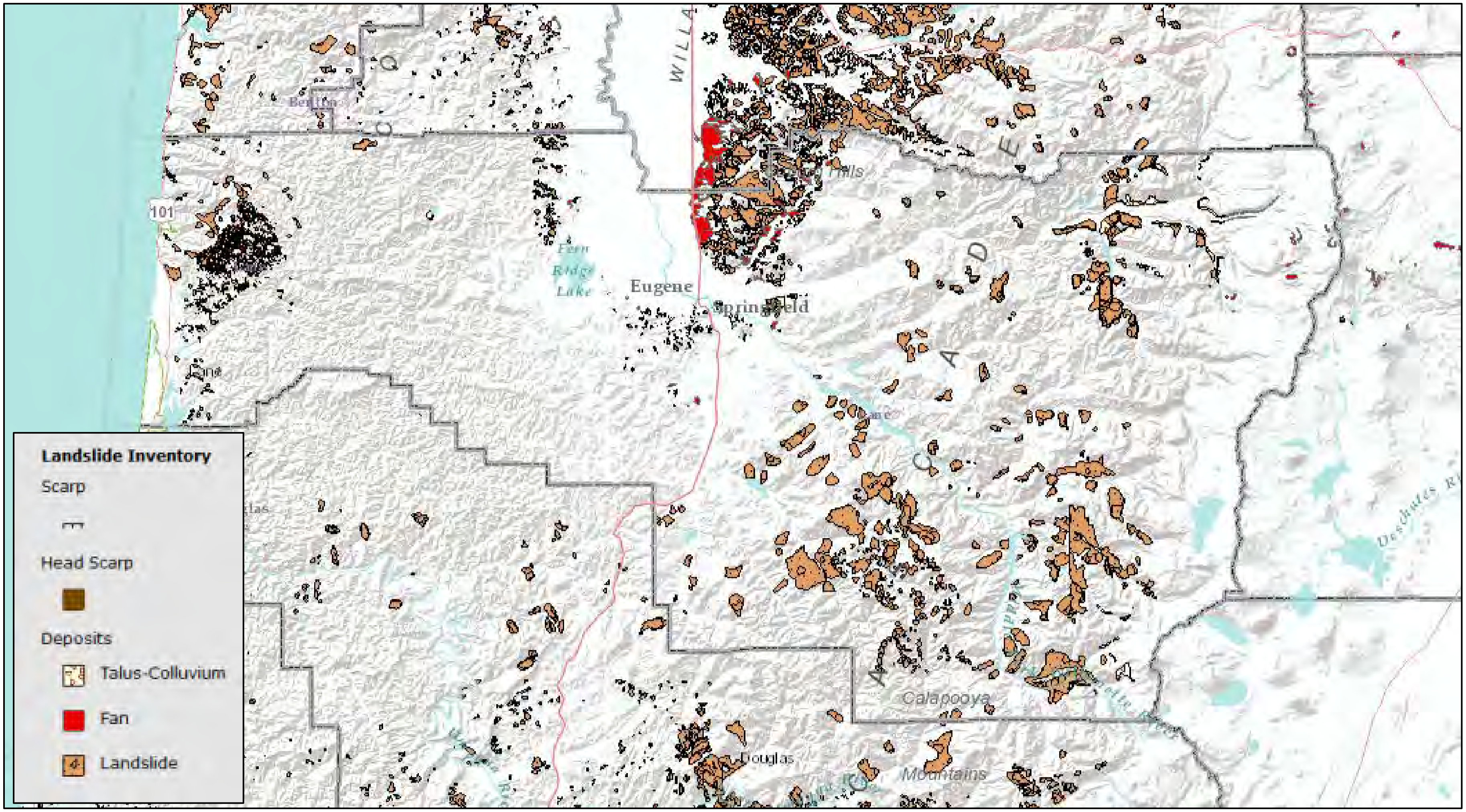


Figure 3-17 Landslide Locations, Lane County

Source: Oregon Department of Geology and Mineral Industries, Statewide Geohazards Viewer; http://www.oregongeology.org/hazvu/

In many parts of Lane County, weathering and the decomposition of geologic materials produces conditions conducive to landslides. Although landslides are a natural geologic process, the incidence of landslides and their impacts on people can be exacerbated by human activities. Grading for road construction and development can increase slope steepness, decrease the stability of a hill slope (by adding weight to the top of the slope and removing support at the base of the slope), and increasing water content. For these reasons, landslides periodically affect county roadways, and response (debris removal), as well as slope stabilization are part of Lane County Public Work's routine work. Development coupled with natural processes such as heavy rainfall or rapid snowmelt can cause landslides or re-activate historical landslide sites.

Probability of Future Occurrence

Landslide information provided by DOGAMI notes that as population growth continues to expand and development into landslide susceptible terrain occurs, greater losses are likely to result. In order to begin reducing losses from landslides, widespread endeavors are necessary at all community levels from state government to individual family homes. One successful way to reduce losses from landslides is through pre-disaster mitigation, which can be performed on various scales from statewide to local.

To begin pre-disaster mitigation, the landslide hazard must be located. Once the hazard is located, the population and infrastructure vulnerable to the hazard can be identified and the risk mitigated. Although much can be said generally about landslides in Lane County, a risk and vulnerability assessment needs to be formally conducted, documented and published to better understand the true nature of the hazard specific to Lane County.

Proceeding with a probability based on the best available data and as noted in the Previous Occurrence section, the approximate total number of active or geologically recent landslides in Lane County exceeds 3,000. Using an assumption that the great majority of these occurred during the last 30 years, an average of 100 landslides have occurred per year in recent decades. It should be noted the great majority of these are located in remote areas and forest lands. A very rough estimate of landslides which immediately impact transportation routes or structures would be 1-3 in a given year. This equates to a **High Probability** classification according to definitions for this document.

Magnitude/Severity/Extent

Landslides and rock falls by definition happen abruptly with little or no warning, and therefore are very dangerous in terms of public safety. Vehicular travel on roadways is one element of public safety risk, and another is structures situated close to the base of slopes where a landslide could occur. According to DOGAMI Open-File Report O-02-05, average annual repair costs for landslides in Oregon exceed $10 million, not including other direct and indirect economic impacts. Based on a credible worst case scenario, magnitude/severity of landslides is characterized as **Level 3 – Critical**, with potential for injuries/fatalities and temporary to extended disruption of infrastructure.

Landslide Overall Vulnerability

A **High Vulnerability** classification is assigned to landslide, based on subjective assessment of probability, severity, relative proximity of people and infrastructure, and typical warning period.

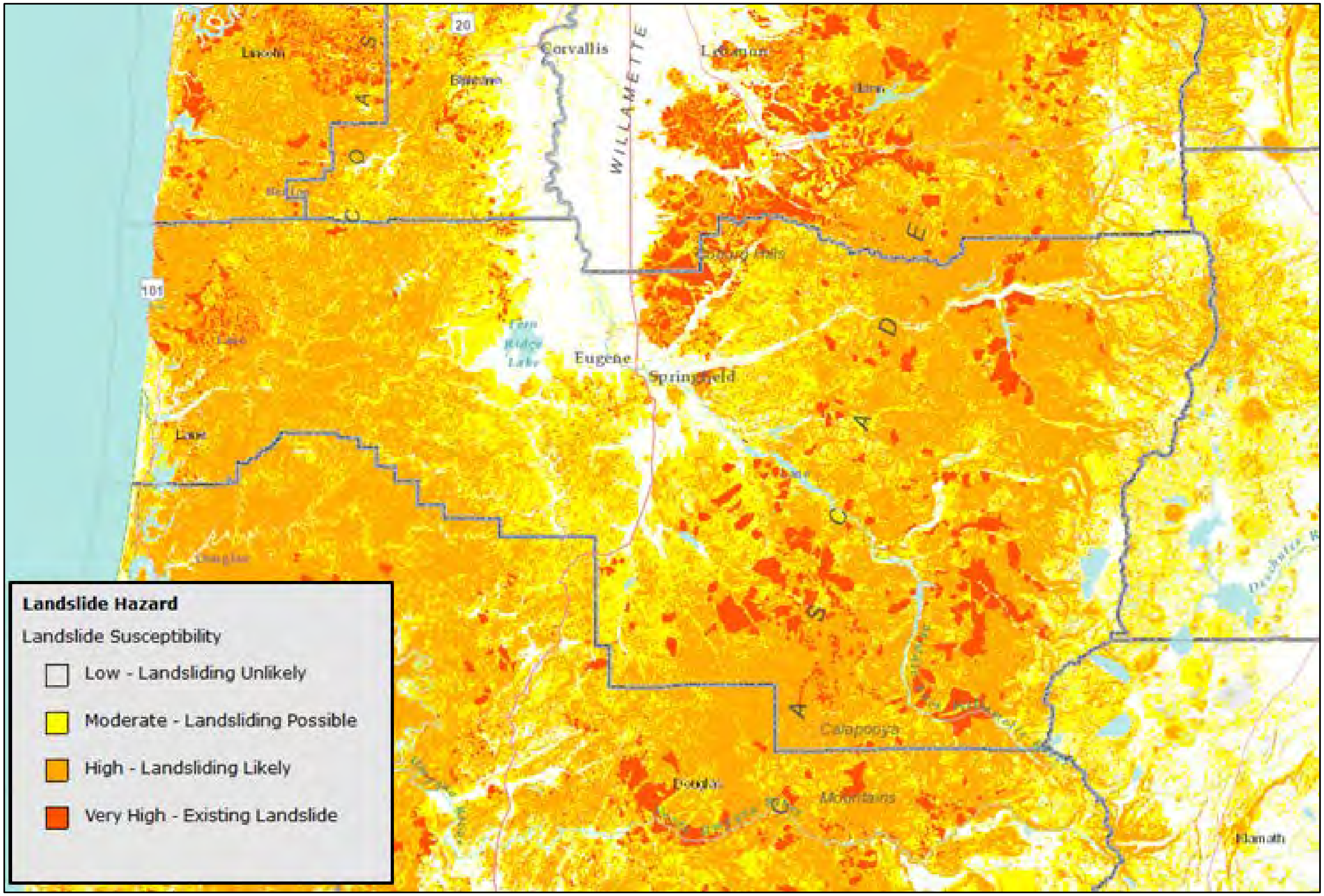


Figure 3-18 Landslide Vulnerability Map, Lane County Oregon

Source: Oregon Department of Geology and Mineral Resources (DOGAMI), Statewide Geohazards Viewer; http://www.oregongeology.org/hazvu/

3.2.7 Pandemic

A pandemic is a global disease outbreak that can originate from any of a number of bacterial or viral infections, and spread person-to-person or by means of various environmental vectors. Historically the most common pandemic occurrences have related to influenza of various types; though cholera, smallpox, measles, HIV/AIDS, typhus, tuberculosis, leprosy, malaria, yellow fever, and Ebola virus are all acknowledged historic or potential pandemic sources.

An especially severe pandemic could lead to widespread illness, death, social disruption, and economic loss. Impacts range from school and business closings to interruption of basic services such as public transportation, health care, food and essential medicines. Public health warnings should be monitored closely and measures to prevent contagion followed closely.

Geographic Location

Pandemics are by definition potentially global in geographic scale. Ever increasing mobility of populations and transfer of goods worldwide create the possibility of disease reaching anywhere on earth. In addition to early and accurate recognition of pandemic occurrence and public information, a critical component of pandemic planning are protocols for travel alerts and quarantine as needed to limit geographic spread.

Previous Occurrences

Lane County was impacted by the H1N1 flu pandemic that swept the globe in 2009. From September to December 2009 there were 1,274 people hospitalized for influenza in Oregon including 195 in Lane County. A total of 63 people had died during that time period in Oregon, including 12 in Lane County.

Lane County Public Health scheduled several public flu shot clinics in an effort to cope with the H1N1 pandemic. By December 2009 Lane County had received and distributed 72,900 doses of the H1N1 vaccine, enough to cover 44 percent of the approximately 167,000 Lane County residents who fell into one of the priority groups for vaccination.

Historically speaking, Native American tribes in what is now Lane County were heavily impacted by diseases spread during the period of initial contact with European settlers prior to the 20th century. Also, the Oregon State Board of Health reported 48,146 cases of flu and 3,675 deaths statewide from October 1918 through September 1920. The following subsections outline pandemic occurrence at various locations in the world, categorized by period as recent, 19th-20th century, or prior.

Pandemics/Disease Outbreaks: 2000-2016 Period

2015 an outbreak of Zika virus initiated in Brazil and spread to other tropical and subtropical regions. Zika is primarily spread by bites from mosquitos, but can also be transmitted by sex, blood transfusion and childbirth. Zika is associated with birth defects including microcephaly. In February 2016, the World Health Organization (WHO) declared Zika a Public Health Emergency of International Concern, and is likely to spread throughout most of the Americas by the end of 2016. It has been estimated that 1.5 million people have been infected by Zika in Brazil, with over 3,500 cases of microcephaly reported between October 2015 and January 2016.

2014 an Ebola virus outbreak in western Africa involved 4,995 laboratory confirmed cases and 2,729 deaths as of October 2014. The corresponding case fatality rate (CFR or contractions resulting in fatality) is 71 percent. One fatality and three total cases are confirmed in the United States.

2009-2010 concerns regarding the spread of a swine flu outbreak (H1N1) originating in Mexico resulted in travel alerts and public recommendations for hygiene and prophylactic measures. Swine Influenza (swine flu) is a respiratory disease of pigs caused by type A influenza virus that regularly causes outbreaks of influenza in pigs. Swine flu viruses cause high levels of illness and low death rates in pigs. Swine influenza viruses may circulate among swine throughout the year, but most outbreaks occur during the late fall and winter months similar to outbreaks in humans. The classical swine flu virus (an influenza type A H1N1 virus) was first isolated from a pig in 1930, and mutated versions have emerged at various times and places in the intervening decades.

2003-2007 Health professionals were also concerned by the possibility of an avian (or bird) flu pandemic associated with a highly pathogenic avian H5N1 virus. During the period 2003-2007, avian influenza was spreading through Asia. A growing number of human H5N1 cases contracted directly from handling infected poultry were reported in Asia, Europe, and Africa, and more than half the infected people have died. There has been no sustained human-to-human transmission of the disease, but the still relevant concern is that H5N1 will evolve into a virus capable of human-to-human transmission.

2003 there were concerns that Severe Acute Respiratory Syndrome (SARS), a new and highly contagious form of atypical pneumonia, might become pandemic. It is caused by a coronavirus dubbed SARS-CoV. Rapid action by national and international health authorities such as the World Health Organization helped to slow transmission and eventually broke the chain of transmission. That ended the localized epidemics before they could become a pandemic. However, the disease has not been eradicated. It could re-emerge. This warrants monitoring and reporting of suspicious cases of atypical pneumonia.

Pandemics: 1800-2000 Period

- 'Third Pandemic', started in China in the middle of the 19th century, spreading plague to all inhabited continents and killing 10 million people in India alone. During this pandemic, the United States saw its first case of plague in 1900 in San Francisco. Today, isolated cases of plague are still found in the western United States.

- The "Asiatic Flu", 1889–1890, was first reported in May 1889 in Bukhara, Uzbekistan. By October, it had reached Tomsk and the Caucasus. It rapidly spread west and hit North America in December 1889, South America in February–April 1890, India in February–March 1890, and Australia in March–April 1890. It was purportedly caused by the H2N8 type of flu virus. It had a very high attack and mortality rate. About 1 million people died in this pandemic."

- 1918-19 Spanish flu (H1N1)—This flu is estimated to have sickened 20-40 percent of the world's population. Over 20 million people lost their lives. Between September 1918 and April 1919, 500,000 Americans died. The flu spread rapidly; many died within a few days of infection, others from secondary complications. The attack rate and mortality was highest among adults 20-50 years old; the reasons for this are uncertain.

- 1957-58 Asian flu (H2N2)—This virus was quickly identified due to advances in technology, and a vaccine was produced. Infection rates were highest among school children, young adults, and pregnant women. The elderly had the highest rates of death. A second wave developed in 1958. In total, there were about 70,000 deaths in the United States. Worldwide deaths were estimated between 1 and 2 million.

- 1968-69 Hong Kong flu (H3N2)—This strain caused approximately 34,000 deaths in the United States and more than 700,000 deaths worldwide. It was first detected in Hong Kong in early 1968 and spread to the United States later that year. Those over age 65 were most likely to die. This virus returned in 1970 and 1972 and still circulates today.

Pandemics: Prior to 1800

- Encounters between European explorers and populations in the rest of the world often introduced local epidemics of extraordinary virulence. Disease killed the entire native (Guanches) population of the Canary Islands in the 16th century. Half the native population of Hispaniola in 1518 was killed by smallpox. Smallpox also ravaged Mexico in the 1520s, killing 150,000 in Tenochtitlán alone, including the emperor, and Peru in the 1530s, aiding the European conquerors. Measles killed a further two million Mexican natives in the 17th century. In 1618–1619, smallpox wiped out 90% of the Massachusetts Bay Native Americans. During the 1770s, smallpox killed at least 30% of the Pacific Northwest Native Americans. Smallpox epidemics in 1780–1782 and 1837–1838 brought devastation and drastic depopulation among the Plains Indians. Some believe that the death of up to 95% of the Native American population of the New World was caused by Old World diseases such as smallpox, measles, and influenza. Over the centuries, the Europeans had developed high degrees of immunity to these diseases, while the indigenous peoples had no such immunity.

- Smallpox devastated the native population of Australia, killing around 50% of Indigenous Australians in the early years of British colonization. It also killed many New Zealand Māori. As late as 1848–49, as many as 40,000 out of 150,000 Hawaiians died of measles, whooping cough and influenza. Introduced diseases, notably smallpox, nearly wiped out the native population of Easter Island. In 1875, measles killed over 40,000 Fijians, approximately one-third of the population. The disease devastated the Andamanese population.

- Ainu population decreased drastically in the 19th century, due in large part to infectious diseases brought by Japanese settlers pouring into Hokkaido.

- Plague of Athens, 430 BC. Typhoid fever killed a quarter of the Athenian troops, and a quarter of the population over four years. This disease fatally weakened the dominance of Athens, but the sheer virulence of the disease prevented its wider spread; i.e. it killed off its hosts at a rate faster than they could spread it. The exact cause of the plague was unknown for many years. In January 2006, researchers from the University of Athens analyzed teeth recovered from a mass grave underneath the city, and confirmed the presence of bacteria responsible for typhoid.

- Antonine Plague, 165–180. Possibly smallpox brought to the Italian peninsula by soldiers returning from the Near East; it killed a quarter of those infected, and up to five million in all. At the height of a second outbreak, the Plague of Cyprian (251–266), which may have been the same disease, 5,000 people a day were said to be dying in Rome.

- Plague of Justinian, from 541 to 750, was the first recorded outbreak of the bubonic plague. It started in Egypt, and reached Constantinople the following spring, killing 10,000/day at its height, and perhaps 40% of the city's inhabitants. The plague went on to eliminate a quarter to a half of the human population that it struck throughout the known world. It caused Europe's population to drop by around 50% between 550 and 700.

- Black Death, started 14th century. The total number of deaths worldwide is estimated at 75 million people. Eight hundred years after the last outbreak, the plague returned to Europe. Starting in Asia, the disease reached Mediterranean and western Europe in 1348 (possibly from Italian merchants fleeing fighting in the Crimea), and killed an estimated 20 to 30 million Europeans in six years; a third of the total population and up to a half in the worst-affected urban areas. It was the first of a cycle of European plague epidemics that continued until the 18th century. During this period, more than 100 plague epidemics swept across Europe. In England, for example, epidemics would continue in two to five-year cycles from 1361 to 1480. By the 1370s, England's population was reduced by 50%. The Great Plague of London of 1665–66 was the last major outbreak of the plague in England. The disease killed approximately 100,000 people, 20% of London's population.

Probability of Future Occurrence
Severe global pandemic outbreaks that involve fatalities in exceeding 700,000 have occurred three times since 1918, relating to a 31 year recurrence interval and a 3 to 4 percent chance of occurrence in a given year. This frequency relates to a **Low Probability** of occurrence.

Magnitude/Severity/Extent
Considering a worst case scenario, pandemic could be **Level-4 Catastrophic** in impact to Lane County, primarily relating to illness and fatalities, and economic effects.

Pandemic Overall Vulnerability
Evaluated based on probability of occurrence, weighted against potential impacts, overall vulnerability is classified as **Moderate Vulnerability** for the planning area. Generally, special needs populations are at greatest risk.

3.2.8 Tsunami

The National Oceanic and Atmospheric Administration (NOAA) describes a tsunami as a series of ocean waves generated by sudden displacements in the sea floor, landslides, volcanic activity or other large, abrupt disturbance of the sea-surface. Tsunamis have reached heights of more than 100 feet. As the waves approach shallow coastal waters, they appear normal and the speed decreases. If the disturbance is close to the coastline, tsunamis can demolish coastal communities within minutes, and a large disturbance can cause inundation and destruction thousands of miles away from its epicenter. Figure 3-19 was developed by the Oregon Department of Geology and Mineral Industries, showing how tectonic plate movement in a marine environment can causes a tsunami.

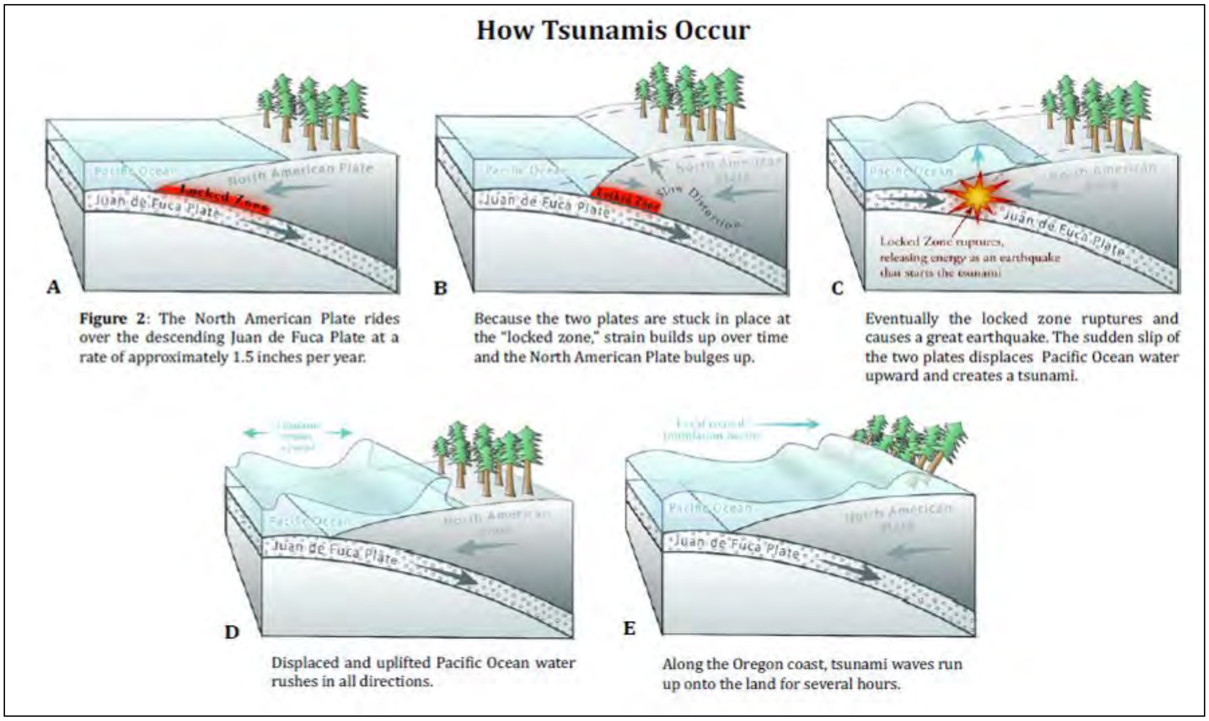


Figure 3-19 How Tsunamis Occur

Source: DOGAMI

The destructive potential for tsunami is enormous, especially if it hits populated areas. In addition to property damage and fatalities, tsunamis cause disease and environmental damage. Areas near the coast get flooded with sea water, and infrastructure, such as fresh water supplies and water treatment plants for sewage, are damaged. This results in water contamination that can cause the spread of diseases, such as malaria. Tsunamis also affect natural resources, animals, plants and landscapes. They kill land and sea animals, uproot trees and damage animal habitats. Waste gets mixed up with toxic substances and hazardous materials, contaminating soil and water.

Recent research suggests that tsunamis have struck the Oregon coast on a regular basis. They can occur any time of day or night. Typical wave heights from tsunamis occurring in the Pacific Ocean over the last 500 years have been 20 – 65 feet at the shoreline. However, because of local conditions a few waves may have been much higher – as much as 100 feet.

Regarding the experience of tsunami by the public, as an abruptly occurring phenomenon warnings are typically brief and urgent. A tsunami generated by a local offshore earthquake can arrive within 10 to 25 minutes whereas a distant tsunami can take several hours. General evacuation protocol in coastal areas is to follow instructions, signage, and messaging and immediately proceed to high ground. The public is highly encouraged make themselves aware of tsunami warning protocols, establish an evacuation plan, and participate in officially sponsored drills and educational workshops.

Geographic Location

Tsunamis are generated by earthquakes in marine and coastal regions. Location of the seismic event which triggers a tsunami is a key indicator for severity and warning time. Regarding a local seismic event, Figure 3-20 shows the location of the Cascadia Subduction Zone in relation to the Pacific Coast of North America, indicating western Lane County is clearly susceptible to tsunami impacts.

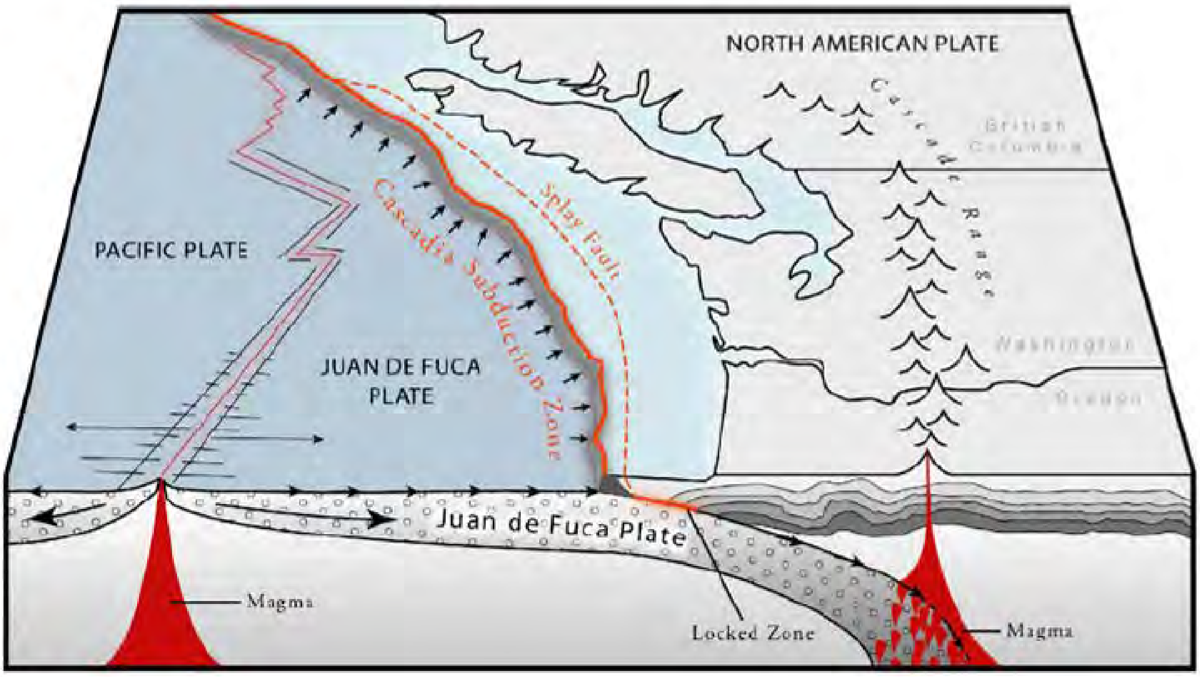


Figure 3-20 Cascadia Subduction Zone Setting

Source: DOGAMI

Produced by the Department of Geologic and Mineral Industries (DOGAMI) in 2007, Figure 3-21 shows areas in the Florence – Siuslaw River vicinity potentially affected by a tsunami.

More recent analysis in 2013 by DOGAMI led to publication of a series of Tsunami Inundation Maps (TIMs) for the entire Oregon coastline. Web links to maps for Lane County's coastline are listed below. High resolution versions of these maps are incorporated into Sub-section 3.3.3 Vulnerable Populations and Structures.

http://www.oregongeology.org/pubs/tim/p-TIM-Lane-01.htm (Neptune, north Lane County coast)

http://www.oregongeology.org/pubs/tim/p-TIM-Lane-02.htm (Heceta Head)

http://www.oregongeology.org/pubs/tim/p-TIM-Lane-03.htm (Mercer Lake, north Florence)

http://www.oregongeology.org/pubs/tim/p-TIM-Lane-04.htm (Florence and mouth of Siuslaw)

http://www.oregongeology.org/pubs/tim/p-TIM-Lane-05.htm (Siuslaw, Cushman)

http://www.oregongeology.org/pubs/tim/p-TIM-Lane-06.htm (Siuslaw, Mapleton)

http://www.oregongeology.org/pubs/tim/p-TIM-Lane-07.htm (Dunes City)

http://www.oregongeology.org/pubs/tim/p-TIM-Lane-08.htm (Siltcoos Lake)

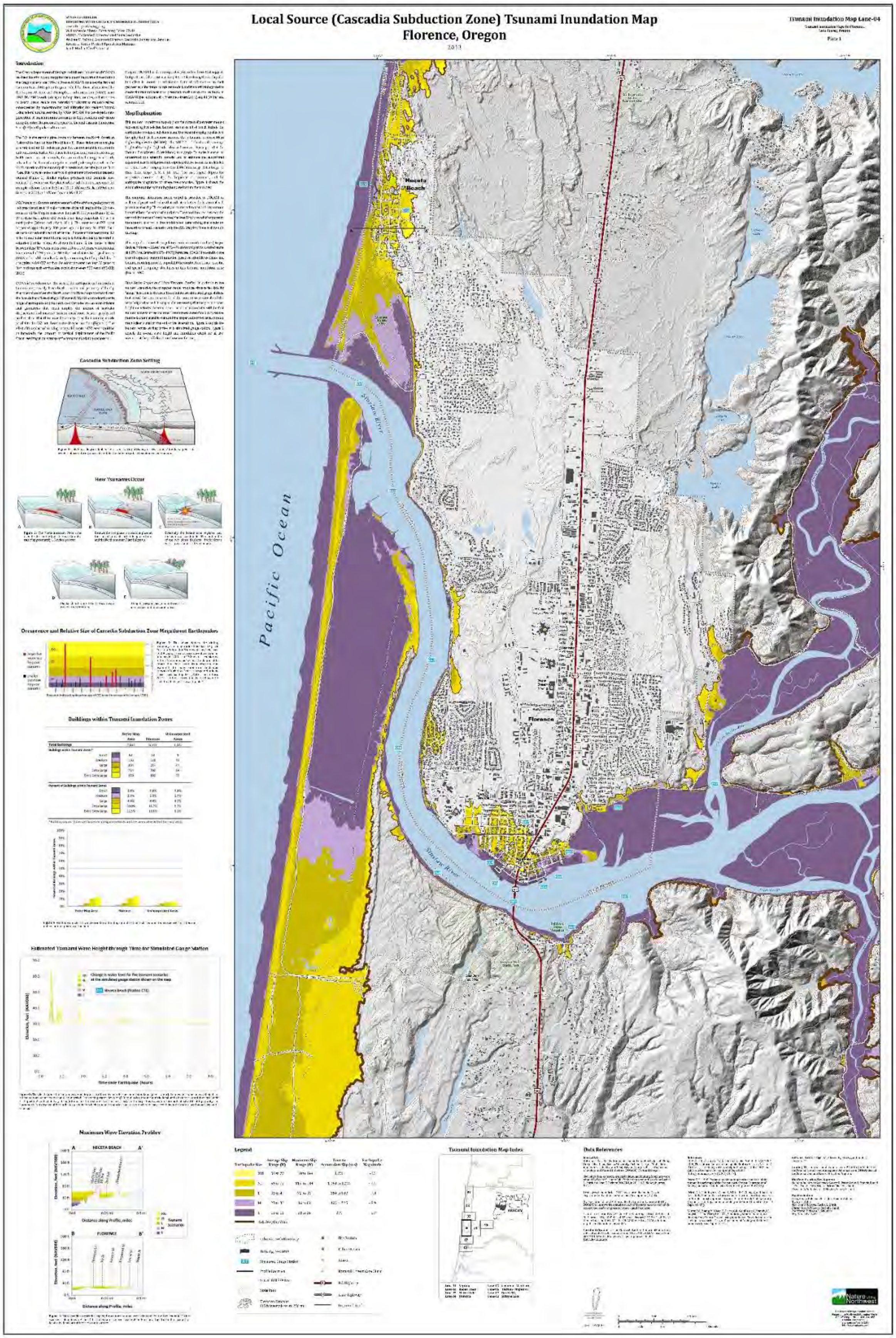


Figure 3-21 Tsunami Inundation Map: Florence, Oregon

Source: DOGAMI

Previous Occurrences

Figure 3-22 below shows the 19 Cascadia Subduction Zone (CSZ) earthquake occurrences over the past 10,000 years, and the corresponding magnitude of tsunami they caused. The chart shows CSZ activity only, additional tsunamis caused by earthquakes in other regions of the world have occurred more frequently.

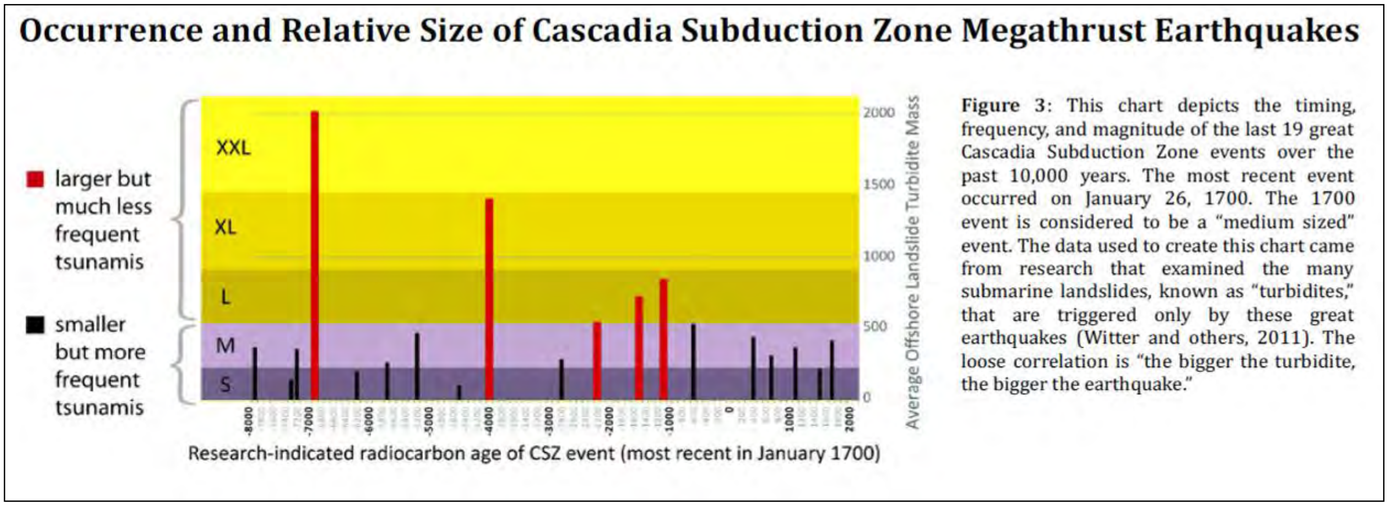


Figure 3-22 Cascadia Subduction Zone Previous Occurrences

Source: Oregon Department of Geology and Mineral Industries

Combining both local and distant earthquake sources, tsunamis from locations across the Pacific basin and CSZ off the Pacific Northwest Coast have hit coastal communities in 930, 1700, 1890, 1944, 1949, 1953, 1960, 1964, 1980 and 2011. The most recent tsunami was caused by a devastating 9.0 magnitude earthquake off the coast of Japan March 11, 2011. West Lane Emergency Operations Center (EOC) in Florence and Lane County Sheriff's Office EOC in Eugene were activated and the tsunami inundation zone in western Lane County was evacuated. At Heceta Beach water receded and subsequently surged 50 - 150 feet at 7:30 AM, 8:00 AM and 9:30 AM. No other impacts were recorded in Lane County, but a federal disaster was declared for Curry, Coos, and Lincoln Counties with damages estimated at over $5 million.

Probability of Future Occurrence

As noted in the earthquake hazard profile, research published by the Cascadia Region Earthquake Workgroup (CREW) in 2013 states that it is impossible to predict the timing of great subduction zone earthquake. However, it can be said that the *chances* of a CSZ 9.0 magnitude earthquake occurring within the next 50 years is about one in ten. This equates to a one percent probability of occurrence in any given year. Thus, a **Low Probability** of occurrence classification is assigned according to the definitions set forth in Section 3.1.1 (Methods and Definitions).

Magnitude/Severity

Considering a worst case scenario, the magnitude and severity of a massive tsunami impact to the coastline of Lane County could be **Level 4-Catastrophic**, with severe property damage on a regional scale, and multiple injuries and fatalities. A tsunami with a similar magnitude occurred approximately 9,000 years ago. Estimated impacts if such a tsunami were to occur today

Tsunami Overall Vulnerability

To the credit of many, tsunami detection, warning, and evacuation strategy has advanced significantly in recent decades. The result is a reduced (though still present) risk to public safety. Development in tsunami inundation areas remains at risk. Overall vulnerability to tsunami is classified as **Moderate Vulnerability**, assigned by balancing the forecast probability of occurrence, numbers of people and evacuation strategy, and amount of development and infrastructure in potentially impacted areas.

3.2.9 Wildfire

A wildfire is an uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming structures. Wildfires often begin unnoticed, spread quickly, and are usually signaled by dense smoke that fills the area for miles around. Causes include both human actions such as arson or careless accidents, as well as natural occurrences such as lightning. Wildfire danger is exacerbated by dry conditions, excessive heat, and high winds.

The experience of wildfire by the public typically involves evacuation advisories (or orders) from official sources. Evacuation measures may be initially broadcast via communiques and followed by door-to-door visits by fire and law enforcement. It is important for individual residences to have an evacuation plan in place and to follow official instructions.

Ninety percent of the wildfires in the U.S. are caused by careless human actions. Burning debris, unattended campfires, equipment failure / engine sparks, cigarettes, fireworks, and arson are some of the human-caused sources of wildfires. Natural occurrences result from lightning and volcanic eruption.

Wildfires can result in people losing their homes, loss of vegetation, soil damage, death of wildlife and loss of food and habitat, and air pollution. Those in the agricultural field often experience economic loss and recreational areas become restricted or inaccessible.

Both vegetation and the built environment provide fuel for fires. The fire danger rating classifications as defined by the U.S. Forest Service are listed below.

Danger Rating	Basic Description	Detailed Description
Low	fires not easily started	Fuels do not ignite readily from small firebrands. Fires in open grassland may burn freely a few hours after rain, but wood fires spread slowly by smoldering and burn in irregular fingers. Low danger of spotting.
Moderate	fires start easily and spread at a moderate rate	Fires can start from most accidental causes. Fires in open cured grassland will burn briskly and spread rapidly on windy days. Forest fires will spread at slow to moderate speed. The average fire is of moderate intensity, although heavy concentrations of fuel may burn hot. Short-distance spotting may occur. Fires are not likely to become serious and control is relatively easy.
High	fires start easily and spread at a rapid rate	All fine dead fuels ignite readily and fires start easily from most causes. Unattended brush and campfires are likely to escape. Fires spread rapidly and short-distance spotting is common. High intensity burning may develop on slopes or in concentrations of fuel. Fires may become serious and their control difficult, unless they are hit hard and fast while small.
Very High	fires start very easily and spread at a very fast rate	Fires start easily from all causes and immediately after ignition, spread rapidly and increase quickly in intensity. Spot fires are a constant danger. Fires burning in light fuels may quickly develop high-intensity characteristics - such as long-distance spotting - and fire whirlwinds, when they burn into heavier fuels. Direct attack at the head of such fires is rarely possible after they have been burning more than a few minutes.
Extreme	fire situation is explosive and can result in extensive property damage	Fires start quickly, spread furiously and burn intensely. All fires are potentially serious. Development into high-intensity burning will usually be faster and occur from smaller fires than in the Very High Danger class (4). Direct attack is rarely possible and may be dangerous, except immediately after ignition. Fires that develop headway in heavy slash or in conifer stands may be unmanageable while the extreme burning condition lasts. Under these conditions, the only effective and safe control action is on the flanks, until the weather changes or the fuel supply lessens.

Source: U.S. Forest Service, Wildland Fire Assessment System

Geographic Location

Wildfire can occur in essentially any physiographic region of the county, though risk of damage from wildfire is highest in the wildland-urban interface of the Coast and Cascade Range foothills. The wildland-urban interface is generally described as an area where development meets dense forest. Fires burning in the wildland urban interface are hard to contain, require concentrated firefighting resources, and are a primary concern from a mitigation standpoint.

The Lane County wildland-urban interface is large, approximately 2,269,000 acres (3,543 square miles) and is the result of a dispersed population in close proximity to abundant vegetative fuels. Nearly 90% of Lane County is forest land and nearly 2.5 million of the county's 2.9 million acres are zoned non-impacted forest land. The U.S. Forest Service and the Bureau of Land Management own and manage the majority of the zoned property. These forest lands contain extensive fuels comprised of flammable grasses, brush, slash and timber. There are nearly 100,000 Lane County residents that live outside the metro area and live near these forest lands. (Lane County CWPP, 2005).

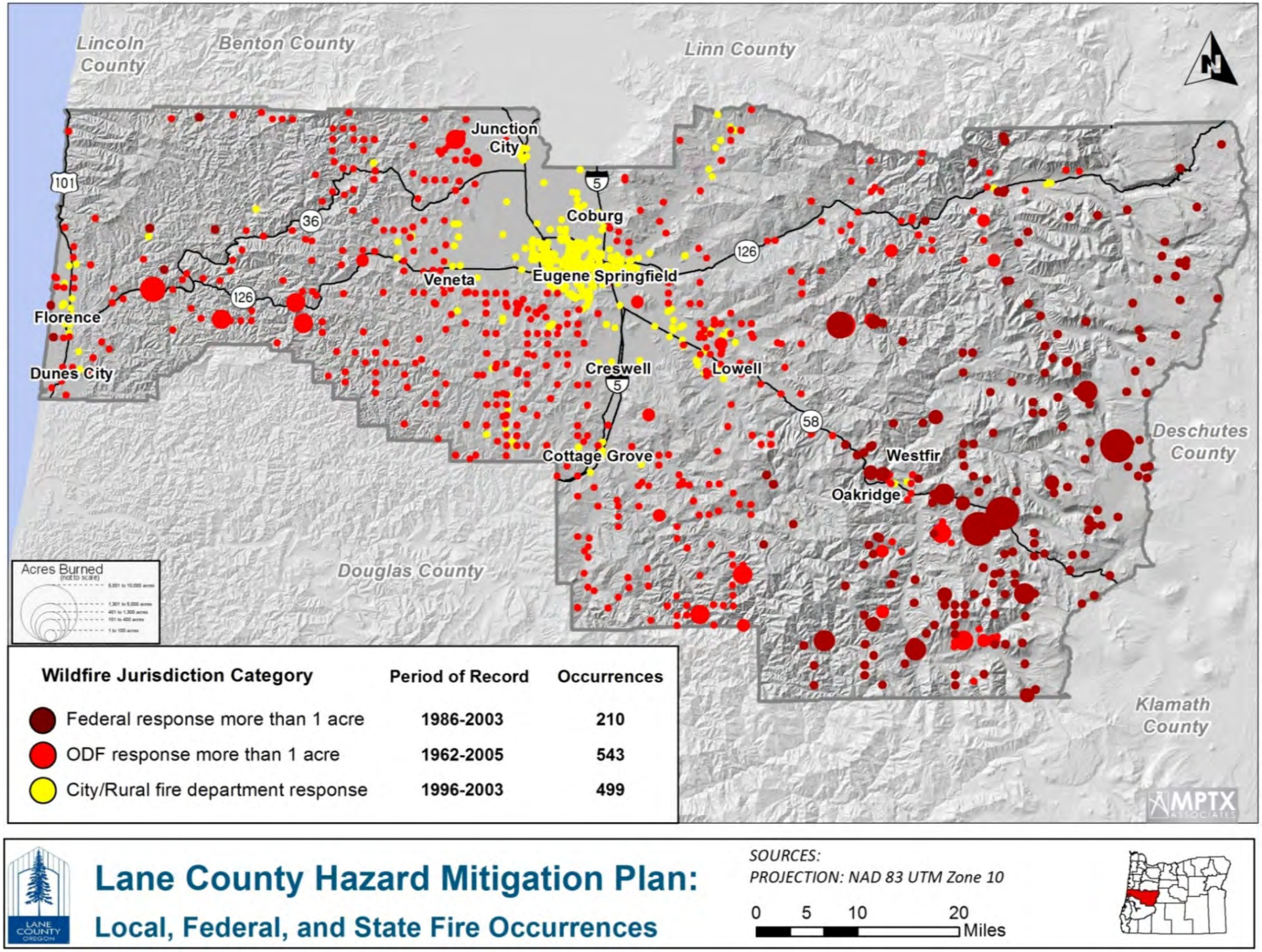


Figure 3-23 Wildfire Locations, Lane County, circa 1986-2003

Previous Occurrences

Significant fires either in or near the eastern portion of Lane County occur consistent with the state average of about once every four years. However, in Lane County the cause of fire includes both natural causes such as lightning as well as manmade causes such as arson.

One of the most damaging wildfires in Lane County in recent years was the Deception Complex Fire. As of September 26, 2014 the Deception Complex fires had burned 6,033 acres west of Oakridge and south of Westfir in the Middle Fork Ranger District of the Willamette National Forest. Homes and structures in the cities of Westfir and Oakridge were threatened. The Oregon Team 4 IMT2 identified and mapped 6 zones to strategically facilitate evacuation and citizen readiness protocols. Total fire fight and response cost exceeded $27 million. The fire history map in Figure 3-24 shows the relative scale of the Deception Complex Fires in red.

Narrative accounts of wildfires are listed below as provided by the National Climatic Data Center (NCDC).

<u>2014:</u> Deception Complex fire located 2 miles west of Westfir and 4 miles west of Oakridge in the Willamette National Forest burned over 6,000 acres. The wildfire threatened the Deception Creek Mobile Home Park on Hwy 58, and led to evacuation standby for nearby cities. Response cost estimated at $27 million.

<u>2009:</u> The Tumblebug Complex fire located 23 miles southeast of Oakridge in the Willamette National Forest, started as a series of 25 small fires sparked by lightning. Firefighters knocked down all but three of the fires. The remaining three fires grew rapidly, exploding to 500, then 2,000 and then 12,000 acres as 35 mph winds in drought like conditions spread the fire through unseasonably dry forests.

<u>2008:</u> Aug 7: Multiple lightning storms started over 60 fires across a 780 square mile area in the south zone Willamette National Forest near Oakridge. Fifty-two (52) of the fires were confirmed, and over 200 acres in total were burned.

<u>2002:</u> The Office Bridge Fire was held to 140 acres, as cooler September weather arrived to bolster efforts of 357 firefighters and aerial crews working on steep, rocky terrain north of the Middle Fork of the Willamette River. Residents of nearby communities - Hemlock, southwest of the fire, and Westfir, across the river and to the east of the fire – were placed on a three-hour evacuation notice although no structures were threatened. Access to the community of Hemlock was restricted to residents only.

<u>August 17, 2002</u>: The Siuslaw River Fire located 18 miles west of Veneta burned 840 acres. According to State Hazard Mitigation Plan cause of fire was fireworks. Cost of suppression was $1.5 million.

<u>Aug 13, 1998</u>: An accidentally human-caused fire consumed 260 acres of timber on steep ridges along the North Fork of the Willamette River east of Road 19 near Huckleberry Flats in the High Prairie area. There was $100k in crop damage attributed to what was known as the Gorge fire.

<u>1996</u>: A fire occurred in Oakridge two days after someone torched a pickup and spray-painted "Earth Liberation Front" and anti-logging messages on the walls of the Willamette National Forest's Detroit Ranger Station, east of Salem. (The Associated Press, 2000) The fire caused an estimated $9 million in damage to the ranger station.

<u>August 13, 1996</u>: Lightning triggered 37 forest fires in the Willamette National Forest near Oakridge, Oregon. These fires, known as the South Zone Complex, burned 3700 acres and smoldered for 4 weeks before being declared out on September 9.

<u>August 24, 1996</u>: Lightning caused a series of forest fires, known as the Moolack Complex, in the Willamette National Forest east of Oakridge. 11,375 acres burned with $1.7 million in damage to campgrounds and timber. The fire smoldered for almost 2 months before it was declared out on Oct 16.

<u>1991</u>: The Warner Creek Fire was set by an unknown arsonist on October 10, 1991. By the time it was controlled on October 27, it had burned 8,973 acres in the Oakridge Ranger District, at a cost of $10 million. The burned area lies north of Highway 58, about 12 miles east of the City of Oakridge. The entire fire area lay within what was soon (January 1992) to be designated a Habitat Conservation Area (specifically, HCA 0-10), a designated management area primarily for Northern Spotted Owl habitat. It was the first large fire in a Spotted Owl HCA. (US Forest Service, Pacific Northwest Region, 1991)

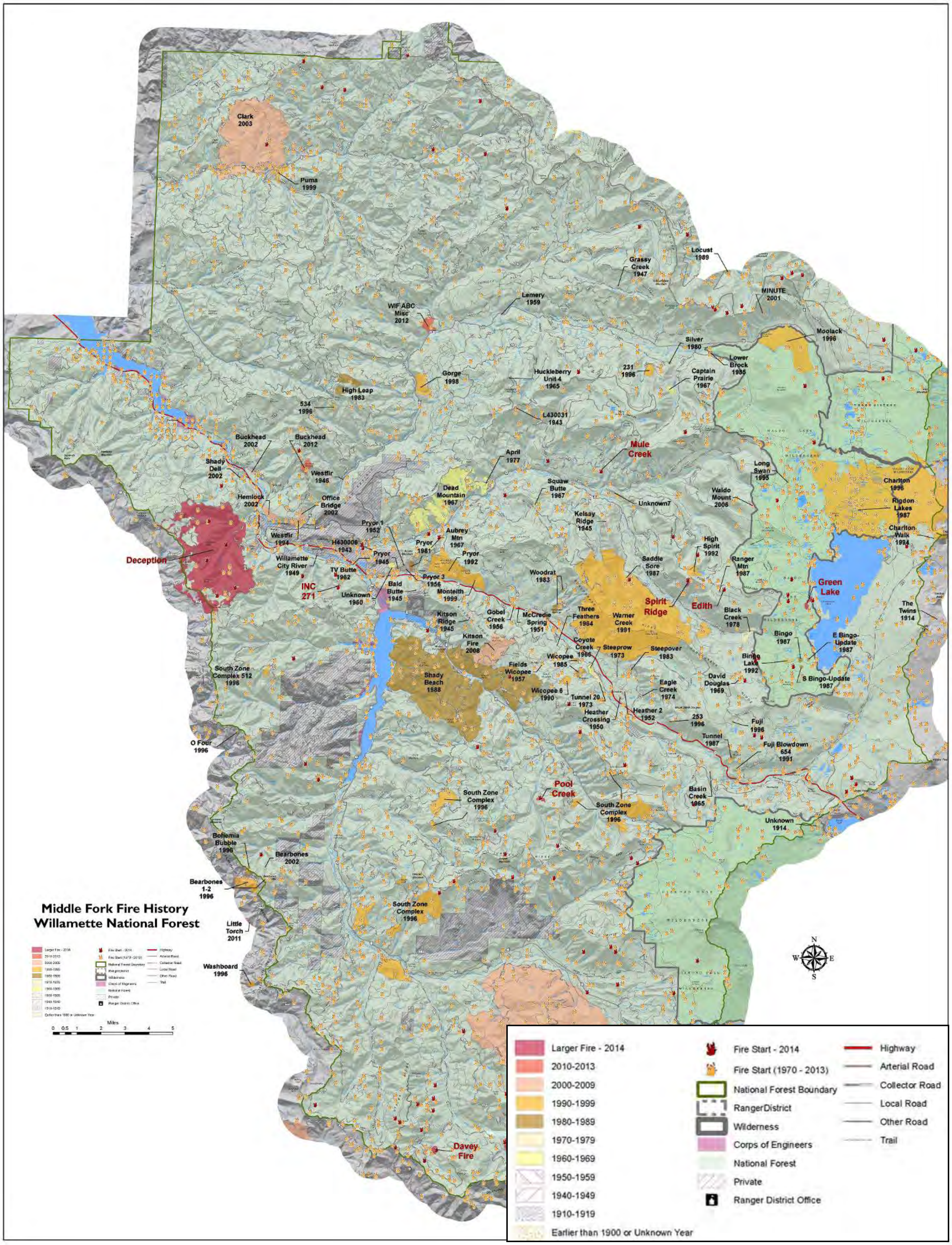


Figure 3-24 Fire History: Middle Fork Willamette National Forest

Survey responses in the Community Wildfire Protection Plan for Lane County (2005) noted the following frequency and impact characteristics for wildfire by county residents.

Table XXII Personal Experience with Wildland Fire, Lane County Residents

Type of Experience	Percentage of Lane County Respondents
Witnesses wildfire or observed smoke or other effects	57%
No experience with wildfire fire	47%
Suffered property damage from a wildland fire	4%
Evacuated home due to a wildfire	4%

Source: ONHW/CPW, 2005

Previous Wildfire Events, early 20th Century

According to descriptions provided by the Oregon Department of Forestry, the Nelson Mountain Fire was one of many large fires in 1910 that burned most areas that are now state forest lands in western Lane County. Large fires burned again in western Lane County in 1917 and 1922. In 1929, a number of large fires burned most of the central Coast Range in Lane County, covering nearly 80,000 acres. With timber depleted, the Great Depression starting, and vast burned areas unsuitable for homesteading, many landowners allowed their land to revert to the county in place of back taxes. Lane County deeded its timberlands to the Board of Forestry in the mid-1940s.

Probability of Future Events

A common method for rating wildfire probability over short timeframes is the Keetch-Byram Drought Index (KBDI). This index predicts the likelihood of wildfire based on soil moisture and other conditions related to drought. KBDI classes range from 0 (no drought) to 800 (extreme drought) and is based on the soil capacity in 8 inches (200 mm) of water. The depth of soil required to hold 8 inches of moisture varies. A prolonged drought (high KBDI) influences fire intensity largely because fuels have lower moisture content. Conditions associated with the various KBDI classifications are listed below.

KBDI Class	Description of Conditions
0 – 200 Low Fire Danger	Soil and fuel moisture is high. Most fuels will not readily ignite or burn. However, with sufficient sunlight and wind, cured grasses and some light surface fuels will burn in spots and patches.
200 – 400 Moderate Fire Danger	Fires more readily burn and will carry across an area with no "gaps". Heavier fuels will still not readily ignite and burn. Also, expect smoldering and the resulting smoke to carry into and possibly through the night.
400 - 600 High Fire Danger	Fire intensity begins to significantly increase. Fires will readily burn in all directions exposing mineral soils in some locations. Larger fuels may burn or smolder for several days creating possible smoke and control problems
600 – 800 Extreme Fire Danger	Surface litter and most of organic layer is consumed. 1000 hour fuels contribute to intensity. Stumps will burn to the end of roots underground. Any dead snag will ignite. Spotting from snags is a major problem if close to line. Expect dead limbs on trees to ignite from sparks. Expect extreme intensity on all fires which makes control efforts difficult. With winds above 10 miles per hour, spotting is the rule. Expect increased need for resources for fire suppression. Direct initial attack is almost impossible. Only rapid response time to wildfire with complete mop-up and patrol will prevent a major fire situation from developing.

Source: US Forest Service

The statewide average for Oregon counties experiencing a major wildfire is roughly once every four years. However, a major wildfire occurs somewhere in the state at least once per year. Regarding wildfires of any size, the State of Oregon Natural Hazards Mitigation Plan notes during a typical year, more than 2,500 wildland fires are started on forest lands in Oregon. ODF and USFS estimate

66 percent of these fires are caused by human activity (1,650); the remainder result from lightning (850).

These estimates and averages are in general agreement with data compiled by the National Interagency Coordination Center (NICC), which focuses on the most preventable and easily mitigated, those fires that are human caused. According to the NICC, the southern region of the U.S. records the most human caused fires in the nation. A much lower number of human caused fires occur in the Northwest, less than 2,000 per year on average, and an even smaller number of human caused fires occur in Lane County. Counting both natural and human causes however, it can be assumed that multiple wildfires occur on an annual basis in Lane County and therefore warrant a **High Probability** of future occurrence classification.

A breakdown of numbers of human caused fires and acreage burned is shown in Table XXIII on the following page.

Table XXIII Human Caused Fires: Number and Acreage by U.S. Region

Human Caused Fires (Number)												
Year	Alaska	*Northwest*	Northern California	Southern California	Northern Rockies	Eastern Great Basin	Western Great Basin	Southwest	Rocky Mountains	Eastern Area	Southern Area	Total
2010	359	***1,078***	2,502	3,394	1,107	810	212	1,600	1,962	15,675	36,108	64,807
2009	328	***1,624***	3,677	4,412	1,344	726	209	2,074	1,434	15,719	38,103	69,650
2008	265	***1,365***	3,407	5,208	1,971	826	224	2,013	1,616	11,152	42,043	70,093
2007	247	***2,346***	3,093	5,140	2,005	1,048	425	1,730	1,876	12,453	43,083	73,446
2006	254	***2,666***	3,676	3,166	2,303	943	331	2,511	2,968	14,227	47,175	80,220
2005	296	***1,924***	3,010	3,781	1,183	813	262	3,287	1,940	13,014	28,920	58,430
2004	426	***1,901***	3,613	3,845	1,883	526	173	1,491	704	11,781	27,758	54,101
2003	379	***2,370***	3,795	3,929	1,970	944	227	1,657	4,214	14,851	16,479	50,815
2002	378	***2,148***	3,789	4,060	1,665	730	215	2,668	2,118	12,857	31,394	62,022

Human Caused Fires (Acreage Burned)												
Year	Alaska	*Northwest*	Northern California	Southern California	Northern Rockies	Eastern Great Basin	Western Great Basin	Southwest	Rocky Mountains	Eastern Area	Southern Area	Total
2010	106,759	***70,684***	22,701	67,326	25,574	183,684	3,173	69,860	118,702	128,649	506,337	1,303,449
2009	43,887	***25,592***	57,997	296,429	32,651	16,975	26,046	210,642	76,842	118,230	1,163,455	2,072,746
2008	1,857	***99,706***	91,022	454,249	105,634	120,391	17,769	339,201	117,554	69,396	2,013,212	3,429,991
2007	59,007	***244,335***	153,154	855,978	237,835	288,627	46,057	90,660	85,442	230,750	1,157,515	3,449,360
2006	147,292	***112,098***	146,999	342,864	126,078	278,288	46,947	392,892	209,693	115,171	2,486,522	4,404,844
2005	8,184	***219,012***	37,658	61,728	53,616	187,248	43,811	267,043	48,356	85,589	509,082	1,521,327
2004	17,789	***58,178***	146,720	84,075	23,585	13,636	13,864	63,062	35,346	101,089	407,456	964,800
2003	22,093	***126,381***	96,415	653,016	137,309	182,916	5,161	127,332	87,823	235,391	248,412	1,922,249
2002	427,321	***105,544***	39,560	412,447	65,891	101,986	29,288	772,299	661,679	104,900	356,204	3,077,119

Source: National Interagency Coordination Center

Magnitude/Severity/Extent

Considering a most credible worst case scenario, magnitude/severity of wildfire impacts in Lane County is classified as **Level 3 - Critical**. Temporary shutdown of facilities can occur, economic and environmental losses are the most common impacts. Injuries and fatalities can occur, most often to wildland firefighters and first responders. A single event could cause structural damage on a neighborhood scale, involving at most a few hundred residences.

Wildfire Overall Vulnerability

According to 2015 Oregon Department of Revenue data for counties, Lane County contains the highest total value of private forest land in Oregon ($1.278 billion). This value is in addition to forest land managed by federal and state agencies. Based on this data, combined with the large number of structures and populations within wildland-urban interface zones, a **High Vulnerability** classification is assigned to wildfire, according to assessments and classifications defined in Section 3.1.1. This is primarily due to the frequency of occurrence, and prevalence of development in the wildland-urban interface.

3.2.10 Windstorm

Hazard Description

In the northwestern region of the U.S., windstorms typically involve sustained winds in excess of 50 mph with less frequent events exceeding 80 mph. Windstorms can affect any region of the state, but have a higher prevalence along coastline and coastal headlands. Windstorms are especially dangerous in areas with tree coverage, exposed property, major infrastructure, and above ground utility lines. The experience of windstorms by the public is typified by downed trees, power outage, and damage to roofs and outbuildings.

Straight-line wind speed can be measured in either knots, commonly for nautical or aeronautical applications, or miles per hour (mph). The conversation of knots to miles per hour is 1 knot = 1.15 mph. Table XXIV below shows an appended Beaufort Wind Scale and the relationship of wind speed in knots, miles per hour, and typical effects on land.

Table XXIV Appended Beaufort Wind Scale

Wind Speed (Knots)	Wind Speed (MPH)	Typical Wind Effects on Land
Less than 1	Less than 1.15	Calm, smoke rises vertically
1 to 4	1.15 to 4	Smoke drift indicates wind direction, still wind vanes
4 to 7	4 to 8	Wind felt on face, leaves rustle, vanes begin to move
7 to 11	8 to 13	Leaves and small twigs constantly moving, light flags extended
11 to 17	13 to 20	Dust, leaves, and loose paper lifted, small tree branches move
17 to 22	20 to 25	Small trees in leaf begin to sway
22 to 28	25 to 32	Larger tree branches moving, whistling in wires
28 to 34	32 to 39	Whole trees moving, resistance felt walking against wind
34 to 41	39 to 47	Whole trees in motion, resistance felt walking against wind
41 to 48	47 to 55	Slight structural damage occurs, slate blows off roofs
48 to 56	55 to 64	Trees broken or uprooted, considerable structural damage potential
56 to 64	64 to 74	Substantial structural damage
64+	74+	Potential major structural damage

Source: NOAA

Rotational windstorms, commonly referred to as tornados, dust devils, or waterspouts occur with lower frequency in Oregon. These are typically short duration, localized events which can present public safety hazard and damage. The NWS Enhanced Fujita Scale is presented below.

Table XXV Enhanced Fujita Scale

EF-Scale:	Typical Damage:
EF-0 (65-85 mph)	Light damage. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
EF-1 (86-110 mph)	Moderate damage. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF-2(111-135 mph)	Considerable damage. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF-3 (136-165 mph)	Severe damage. Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF-4 (166-200 mph)	Devastating damage. Whole frame houses Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.
EF-5 (>200 mph)	Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 m (109 yd.); high-rise buildings have significant structural deformation; incredible phenomena will occur.
EF No rating	Inconceivable damage. Should a tornado with the maximum wind speed in excess of EF-5 occur, the extent and types of damage may not be conceived. A number of missiles such as iceboxes, water heaters, storage tanks, automobiles, etc. will create serious secondary damage on structures.

Geographic Location

Severe windstorm potential is highest along the coast and then fairly uniform across the rest of the county. In hilly areas, wind hazard is strongly determined by local conditions of topography and vegetation cover. The Lane Preparedness Coalition notes the most frequent surface winds in Oregon are from the southwest. Strong winds along the coast typically lose strength as they move inland due to the obstruction of the Coastal Range.

Major windstorms that can impact large areas of the state, like the Columbus Day windstorm of 1962, are relatively rare. It is not uncommon for Oregon to experience several windstorms during the winter months, particularly along the coast. Major damage from these storms is infrequent, but coastal counties typically record 60-100 mph winds at least once per year. Storms with 60-100 mph winds in coastal Lane County typically create 40-60 mph winds in the Willamette Valley.

Recent Occurrences (2006-2016)

Windstorm occurrences for the period 2006-2016 as recorded by the NCDC are listed below.

April 22, 2016: A county official reported an 18 to 24 inch diameter tree was snapped by thunderstorm winds near Junction City, blocking Love Lake Road near milepost 1.75. ODOT reported another tree downed along the Territorial Highway near milepost 5. $5,000 in damage reported.

January 16, 2016: Wind damage from 63 mph winds from a band of thunderstorms brought around 8 large trees down in Eugene. Power poles and power lines damaged, resulting in power outages. A stop sign was blown down, part of a residential roof blew off, as well as damage to outbuildings. A chain link fence blew onto 5th Street blocking southbound lanes. $15,000 in damage reported.

December 10, 2015: Wind damage from 47 mph thunderstorm winds were reported in Eugene and Creswell. Numerous trees were downed on vehicles and buildings, and downed power lines resulted in widespread electricity outages. $260,000 in damage reported.

April 14, 2015: Lane Community College official witnessed a rain wrapped tornado that damaged three vehicles. One vehicle was moved around 125 feet and ended upside down on a berm in a parking lot. Wind speeds were estimated at 65-85 mph, resulting in $25,000 in damage. The tornado affected a total of four cars. One car was flipped onto its back and one car flipped and landed upright. Another car was damaged by one of the cars that flipped. The fourth car had two passengers, was lifted into the air a few feet and dropped. No injuries were reported (photo on following page).

November 22, 2014: 60 mph downburst winds reported in Coburg resulting in approximately 50 large trees downed and $45,000 in damage reported.

March 13, 2011: 60 mph gusts left more than 25,000 people across Lane County without power, toppled trees, damaged homes, closed highways — and caused at least one injury. Damages to public infrastructure Lane County totaled approximately $1.5 million.

December 19, 2007: A potent Pacific storm and associated cold front brought strong 59 mph winds to the coast and heavy snow to the Cascades.

December 3, 2007: The storms on December 2 and 3 produced an extreme long-duration wind event with hurricane-force wind gusts of 129 mph at Bay City on the Oregon Coast. The storm also brought heavy rains and produced widespread record flooding throughout the region, and was blamed for at least 18 deaths. According to data published by the American Society of Civil Engineers, total direct public losses were about $300 million, with $62 million in infrastructure and $94.1 million in housing alone. Timber losses also account for $42 million. Indirect losses are expected to surpass direct losses by a factor of at least 5. In Lane County, peak wind gusts measuring 87 mph were recorded at the Sugarloaf RAWS, about 8 miles west-southwest of Oakridge. The high wind speeds associated with this storm caused widespread damage to the area.

March 7, 2006: Strong Pacific system, cold 43 mph winds at Florence. $375,000 in damage reported.

February 3, 2006: A strong winter storm brought high winds to portions of western Oregon. Many residents experienced power outages due to trees blown down by strong winds. An estimated 3500 residents of Lane County were without power for portions of the night. $300,000 in damage was reported.

Figure 3-24 Tornado, Lane Community College, April 14, 2015

Source: The Oregonian

Previous Occurrences (prior to 2006)

Reports of three notable storms from the period prior to 2006 are listed below, (map graphic on following page).

February 7, 2002: Oregon Severe Winter Windstorm with High Winds (DR-1405). Lane County among five other declared counties. $4.8 million in infrastructure damage, response and debris removal costs.

October 12, 1962: The Columbus Day Storm: Peak winds were felt as the storm arrived October 12. At Oregon's Cape Blanco, an anemometer that lost one of its cups registered wind gusts in excess of 145 miles per hour; some reports put the peak velocity at 179 miles per hour. At the Mount Hebo Air Force Station in the Oregon Coast Range, the anemometer pegged at its maximum 130 miles per hour for long periods — the level of a Category 3 hurricane; damage to the radar domes suggested wind gusts to at least 170 miles per hour. Dome tiles were thrown down the mountainside; the 200-pound chunks tore through entire trees. At the Naselle Radar Station in the Willapa Hills of southwest Washington, a wind gust of 160 miles per hour was observed. In Salem, a wind gust of 90 miles per hour was observed. At Corvallis, an inland location in the Willamette Valley, one-minute average winds reached 69 miles per hour, with a gust to 127 miles per hour, before the anemometer was destroyed and observation tower began flying apart, forcing abandonment of the station. Portland measured wind gusts reached 116 miles per hour at the Morrison Street Bridge. For the Willamette Valley, the lowest peak gust officially measured was 86 miles per hour at Eugene. This value, however, is higher than the maximum peak gust generated by any other Willamette Valley windstorm in the 1948–2010 period. Many anemometers within the heavily stricken area of northwestern Oregon and southwest Washington were destroyed before winds attained maximum velocity. For example, the wind gauge atop the downtown Portland studios of KGW radio and TV recorded two gusts of 93 miles per hour, just before flying debris knocked the gauge off-line at about 5 p.m. The following is excerpted from a storm report prepared by Wolf Read of the University of Washington: *Columbus Day Storm of 1962: Most powerful windstorm to strike the Pacific Northwest in the 20th century. Undamaged homes were the exception, not the rule. In 1962 dollars, the Columbus Day Storm caused an estimated $170-200 million in damage in Oregon (approx. $1.6 billion in 2016 dollars). In sheer gustiness of wind, as indicated by the ratio of maximum gust speed to sustained wind speed, called the gust factor, the Columbus Day Storm behaved more like a hurricane than a typical mid-latitude cyclone. Over 11 billion board feet of timber downed. The large number of 1,000-year-old plus trees blown down suggests that the Columbus Day Storm may have been the event of the millennium.* Sources: FEMA; U.S. Weather Bureau; University of Washington, (Read)

February 24, 1961: The February 24th gale repeated the ever-familiar broken trees not just at the U of O campus, but throughout Eugene, with specimens down on 13th and Alder, 12th and Ferry and 1665 Lincoln Street. The tree on Alder appears to have brought down a high-tension line during its fall. South Eugene High School lost some roofing. Eugene Water and Electric Board suffered many outages, and downtown lights wavered with each pounding surge of wind.

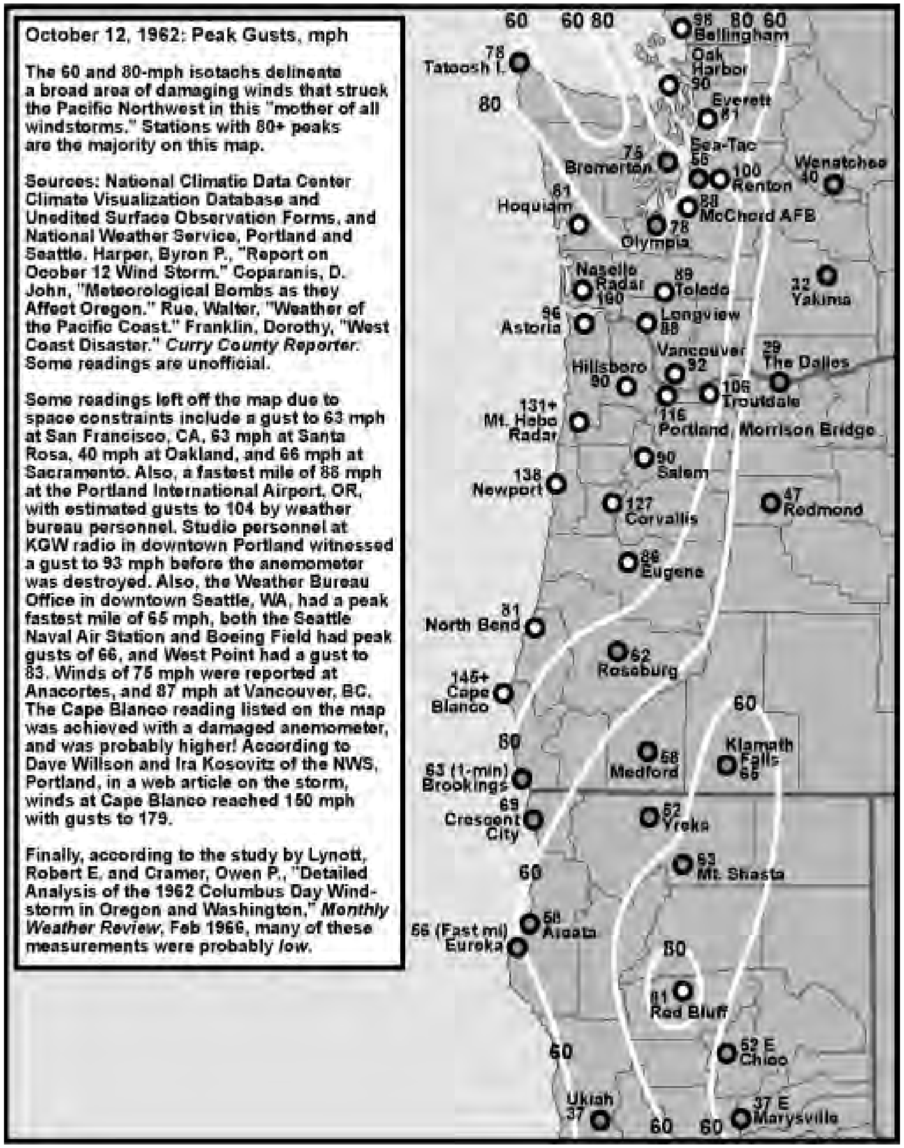


Figure 3-25 Peak Gusts, October 12, 1962 (Columbus Day Storm)

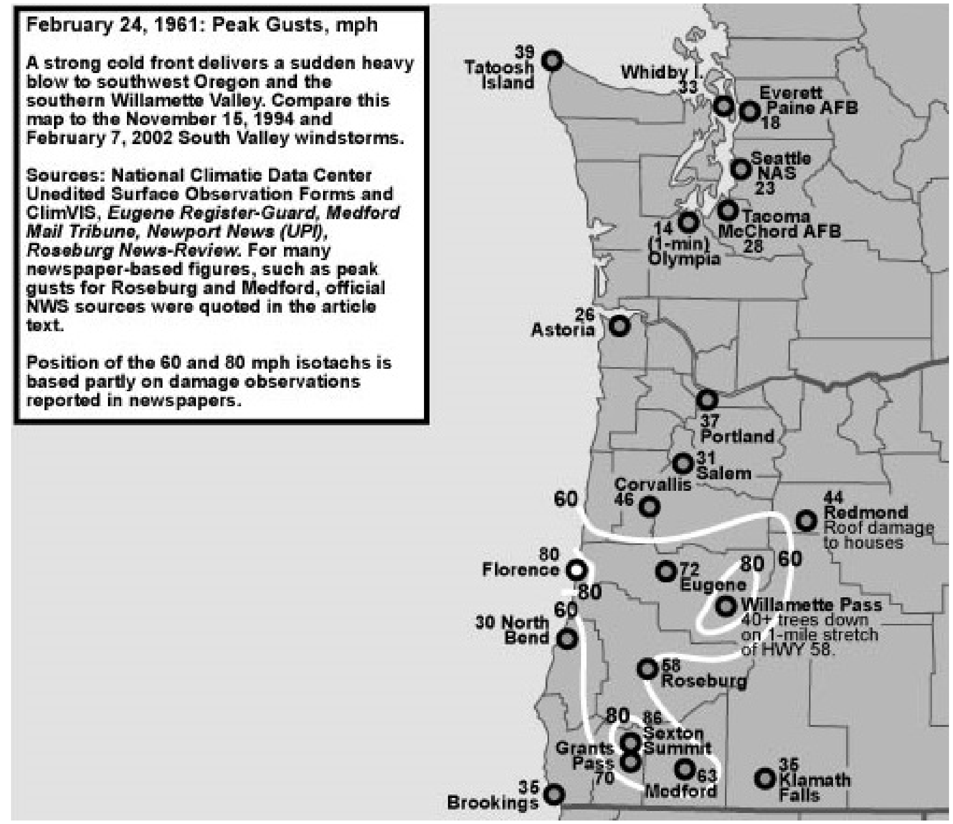


Figure 3-26 Peak Gusts, February 24, 1961

Probability of Future Occurrence
Sustained wind speeds with two-year recurrence interval range from about 37 to 47 mph in Lane County. These two-year wind speeds are generally too low to cause widespread substantial wind damage. However, significant local wind damage can occur at sites where local wind speeds are higher or, where there are especially exposed locations, such as at the boundary between clear cut and forested lands.

The 50-year recurrence interval of wind speeds range from about 62 to 75 mph. These wind speeds are high enough to cause widespread wind damage. Damage may be severe at particularly exposed sites. Thus, for most regions of Lane County winter storms with significant direct wind damage are not likely every year or every few years, but perhaps once every decade or so, on average, with major wind storm events happening at intervals averaging a few decades.

Based on historical occurrence, Lane County expects a significant windstorm about once every 10 years. This frequency equates to a **Moderate Probability** classification.

Magnitude/Severity/Extent
A wind storm whipped through Lane County on March 13, 2011 resulting in over $1.5 million in damages to public infrastructure with utilities and school districts being hardest hit. Although multiple Oregon counties are typically impacted by the same severe storm, this storm appeared to cause only pockets of damage statewide and nothing severe or widespread enough to trigger the disaster declaration process at the state or federal level. In order for Lane County to have been eligible for federal assistance separate from other counties damages would have had to meet the state's current threshold of approximately $4.6 million in damages.
The February 7, 2002 wind storm was the strongest to strike western Oregon in several years. Starting at approximately 4:00 PM and increasing in intensity over the next three to four hours, severe winds gusted ranging from 40 to 70 miles per hour in the valley floor resulting in extensive property, vegetation and electric utility damage. Other associated impacts included interruption of critical services, damage to homes and businesses, damaged vehicles, closure of roads and considerable loss of business revenues.

On March 12, 2002, a federal disaster was declared for the State of Oregon. Estimated damage to public infrastructure in Lane County’s exceeded $3.5 million.

According to damages related to previous storms, particularly the Columbus Day Storm of 1962, credible worst case scenario impacts from windstorm can be classified as **Level 4 – Catastrophic**. Major damage on a regional scale is possible, with numerous injuries and fatalities and extended disruption of infrastructure and facilities.

Windstorm Overall Vulnerability
Based on assessments of the magnitude of previous occurrences, disruptions of utilities infrastructure and a high future probability, overall vulnerability to thunderstorm impacts is considered **High Vulnerability**, according to subjective assessments and the classifications defined in Section 3.1.1.

3.2.11 Winter Storm

Winter storms are characterized by ice accumulation and freezing rain, heavy snowfall, and/or extreme cold and wind chill conditions. Impacts are determined by factors such as the amount and extent of snow or ice, air temperature, wind speed, event duration, day and time. These hazard events typically create disruption of regional systems such as public utilities, telecommunications, and transportation routes. The public is generally advised to shelter in place and maintain adequate resources (emergency light, water, batteries, food, warm clothes).

An ice storm is used to describe occasions when ice accumulations damage trees, above ground utility lines, and affect travel surfaces. Heavy snowfall can cause extended periods of travel disruption and damage structures. Exposure to extreme cold and wind chill associated with winter storms can be life-threatening, and pipes can freeze or burst.

In 2001, the National Weather Service implemented an updated Wind Chill Temperature index. This index, shown as Figure 3-26 below, was developed to describe the relative discomfort/danger resulting from the combination of wind and temperature. Wind chill is based on the rate of heat loss from exposed skin caused by wind and cold. As the wind increases, it draws heat from the body, driving down skin temperature and eventually the internal body temperature.

Wind (mph)	Temperature (°F)																	
Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: 30 minutes | 10 minutes | 5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph)

Effective 11/01/01

Figure 3-26 National Weather Service Wind Chill Chart

Geographic Location

Severe winter storms in the western Oregon region are less frequent at lower elevations of western Lane County and more frequent at higher elevations in the Cascade Range and Cascade Foothills in the eastern portion of the County. In eastern Lane County, the average annual snowfall for Oakridge is 12.6" and for McKenzie Bridge the average snowfall is 28.7".

Annual snowfalls impact road conditions. Highway 58 provides a low elevation pass through the Cascades running through the towns of Pleasant Hill, Lowell, Westfir and Oakridge as it passes through to the east Lane County border. Highway 58 closes three to four times per year for several hours at a time. The same is true for Highway 126 East which runs along the McKenzie River through the towns of Walterville, Deerhorn and Blue River.

Previous Occurrences

In the past five years there have been three (4) federal disaster declarations related to winter storms for which Lane County was a declared county. These declarations include:

- DR-4296 (January 2017; severe storm (ice), flood)
- DR-4258 (December 2015; wind, rain, landslides)
- DR-4169 (February 2014; snow, ice)
- DR-4055 (January 2012; bitter cold, snow)

DR-4258 - Narrative

December 10-24, 2015: This storm event/period began December 10 when 35-50 mph wind gusts downed trees in Eugene damaged property and caused power outages throughout Lane County. Landslides closed the North Fork Siuslaw Road, between mileposts 14 and 17 and also Ten Mile Creek Road north of Florence. South Jetty Road south of Florence closed due to storm-related erosion. Across Oregon, a total of 43 landslides caused 19 different highways, in addition to flooding, culvert failures and sinkholes.

After a brief reprieve from the wind, rain and landslides, a second storm system hit the Pacific Northwest and resulting in 1-2 feet of snow above 2,500 feet. Three (3) consecutive days, the north bank of the Siuslaw River flooded and closed Highway 126 at Cushman 3 miles east of Florence. A mudslide in Florence caused one (1) fatality and one injury, destroyed one house and heavily damaged another.

The December 2015 storm sequence continued with another round of heavy rains Dec 17-22, and concluded with more rain and 50-70 mph winds across parts of Lane County.

Figure 3-27 Lane County Winter Storm December 2015, Disaster Declaration 4258

Source: Register Guard, 12-11-2015

As shown on the map in Figure 3-28, during month of December 2015, over 20" of rain fell across much of Lane County. Statewide damage was conservatively estimated at over $27 million, with 11 homes destroyed, 75 sustaining major damage. At least 3 fatalities in Oregon were attributed to this disaster including one in Lane County.

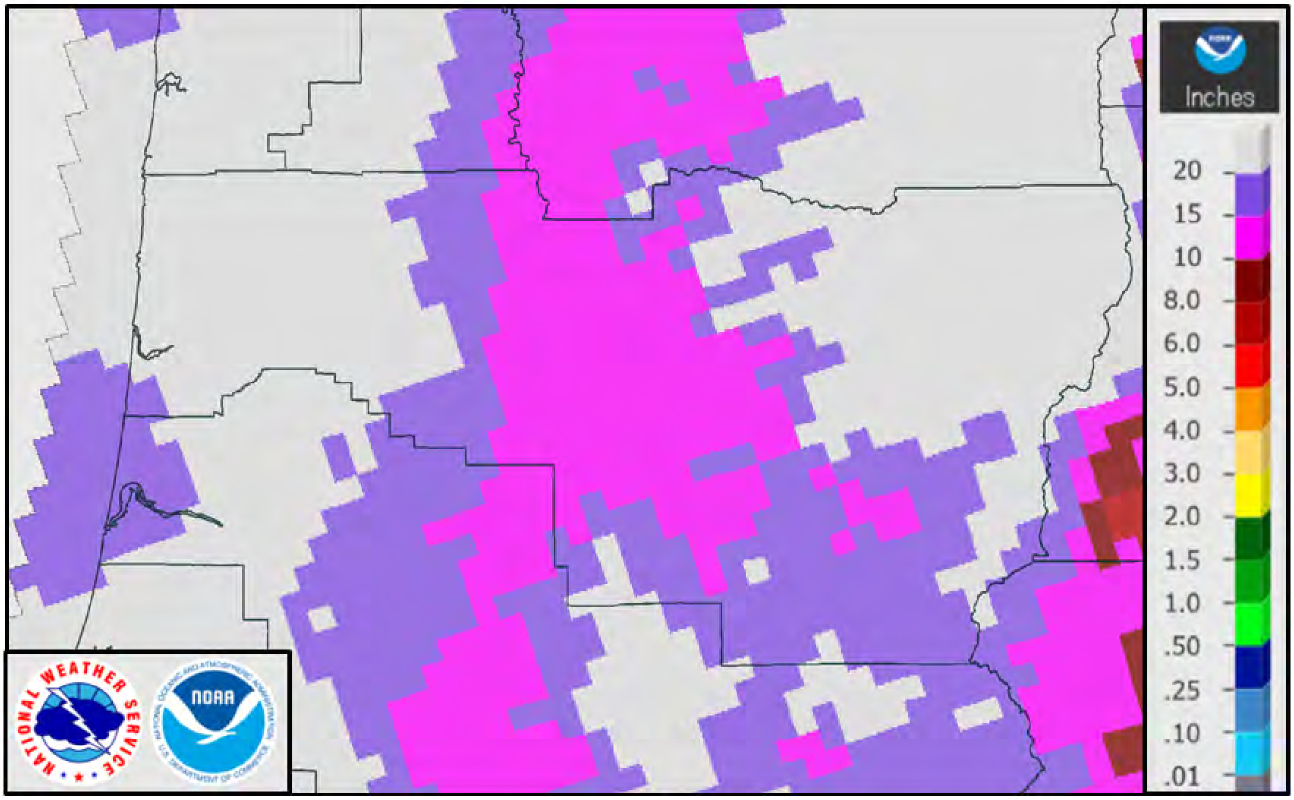


Figure 3-28 Observed Precipitation, Month of December 2015, Lane County, Oregon

Source: NOAA, Advanced Hydrologic Prediction Service, http://water.weather.gov/precip/

DR-4169 - Narrative

February 2014: The following image of ice covered trees and damaged power lines is a typical impact from the winter storm of February 2014, which was the second major winter storm to impact Lane County in a 3-month period. According to reports from utilities this storm left over 22,000 Lane County residences with electrical power outages. Lane County was one of four heavily impacted counties, which also included Linn, Benton, and Lincoln Counties. Total damage and response costs exceeded $6.1 million for this disaster.

Figure 3-29 Lane County Winter Storm February 2014, Disaster Declaration 4169

Source: FEMA

Other Significant Winter Storm Events

There have been several other significant winter storm events as shown in the list below. Unless otherwise noted, information is from the National Climatic Data Center Storm Event database as retrieved from http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent~Storms

March 13 2016 **–** A strong low pressure system generated frequent and persistent snow showers over the northern and central Oregon Cascades. 10 to 18 inches of snow measured above 4000 feet.

December 11-24, 2015 **–** Primarily wind, rain, and landslide event. Hundreds of downed trees on roadways, vehicles, power lines, and structures. Numerous landslides and erosion in coastal areas. Disaster Declaration 4258

February 8, 2014 **–** Major snow event, approximately 12" fell across southern Willamette Valley. Extended travel disruptions, power outages, infrastructure damage. Disaster Declaration 4169.

December 6-8, 2013 **–** Approximately 12" of snow across the southern Willamette Valley was followed by near record cold. NWS Eugene station reported -10° F, the second coldest temperature ever recorded. Major travel disruptions, power outages, significant infrastructure damage. ODOT weather station at Willamette Pass calculated to -20 degrees Fahrenheit. There is uncertainty on the ending time of this event because the wind sensor failed on the 7th.

January 17-21, 2012 **–** Numerous roads damaged or rendered impassable due to winter storm and mudslides. Total damages in Lane County over $1.4 million, approximately 10 percent of the statewide total of $14 million. Disaster Declaration 4055.

February 14-27, 2011 - Heavy snow reported at 31 inches at the McKenzie SNOTEL (Oregon NRCS, 2007-2008) site located in Lane County in the Willamette National Forest. A late February heavy snowfall episode extended into March.

February 14, 2011 - Heavy snow reported at 31 inches at the McKenzie SNOTEL (Oregon NRCS, 2007-2008) site located in Lane County in the Willamette National Forest.

February 27, 2011 - A late February heavy snowfall episode extended into March. A resident of Oakridge measured 13 inches of new snow.

November 21, 2010 - A strong low pressure system dropped south out of British Columbia bringing cold air and heavy snow to the Cascades in Lane County.

November 18, 2010 **-** The McKenzie SNOTEL site measured 13 inches of new snow between during an eight hour period on November 18th.

February 29, 2009 **-** Snowfall estimates were reported to be 16 to 24 inches at the McKenzie SNOTEL site.

March 14, 2009 - Seventeen inches of new snow was reported at Willamette Pass along Highway 58.

April 2, 2009 **-** Between 15 and 24 inches of storm total snowfall were reported at the McKenzie SNOTEL site.

December 25, 2007 **-** A potent Pacific storm brought a substantial snowfall to the Cascades, Cascade Foothills and Coast Range.

March 8, 2006 **-** A strong Pacific storm and associated cold front brought relatively late winter conditions to northwest Oregon. Snow totals from this event ranged from a tenth of an inch to a few inches at the coast and throughout the Willamette Valley.

Probability of Future Occurrence

According to events reported by National Weather Service and FEMA, for the period 2006-2016 Lane County experienced 15 winter storm events, for average of 1.5 per year. This frequency of equates to a **High Probability** of future occurrence according to the definitions set forth in Section 3.1.1 Methods and Definitions.

Magnitude/Severity/Extent

Impacts from winter storms primarily involve the following: 1) transportation safety and disruptions, 2) electricity and communications disruptions, 3) public safety risk for travelers, commuters, and special needs populations, 4) economic losses due to lost production and wages, increased heating and response costs.

Disruptions are frequent and widespread, repair and response is expensive. Utility line damage is a major concern resulting from winter storms in the planning area. Property damage due to falling trees is common. According to these factors, a **Level 3 – Critical** magnitude/severity classification is assigned for winter storm.

Overall Vulnerability

Special needs populations are particularly vulnerable during winter storms when power and communications are disrupted including the elderly, disabled, or low income persons. The physical layout of infrastructure, i.e. location of roads, power and communications lines in relation to trees and mountainous areas create a notable vulnerability to winter storm events. Probability in general is high based on moderate frequency of severe occurrences, and high frequency of moderate/minor events. According to these factors, a **High Vulnerability** classification is assigned to Winter Storm.

3.2.12 Volcano

Hazard Description

As described by the U.S. Geologic Survey Volcanic Hazards Program, volcanic eruptions are one of Earth's most dramatic and violent agents of change. Not only can powerful explosive eruptions drastically alter land and water for tens of kilometers around a volcano, but sulfuric acid and other gases ejected into the stratosphere can change our planet's climate temporarily. Eruptions often force populations living near volcanoes to abandon their land and homes, sometimes forever. Those living farther away are likely to avoid physical danger and severe structural damage to homes, but cities and towns, crops, industrial plants, transportation systems, and electrical grids can still be indirectly damaged by tephra, ash, lahars, and flooding. Disrupted flight patterns are another notable impact from volcanic activity, as ash plumes present a significant risk to jet engines.

Volcanoes typically exhibit identifiable signals prior to eruption that, when detected and analyzed, allows eruptions to be anticipated and communities at risk to be forewarned. The warning time preceding volcanic events typically allows sufficient time for affected communities to implement response plans and mitigation measures. The USGS alert-level system for volcanic activity has two parts – 1) ranked terms to inform people on the ground about a volcano's status and 2) ranked colors to inform the aviation sector about airborne ash hazards.

VOLCANO ALERT-LEVEL TERMS

NORMAL	Volcano is in typical background, non-eruptive state or, *after a change from a higher level,* volcanic activity has ceased and volcano has returned to non-eruptive background state.
ADVISORY	Volcano is exhibiting signs of elevated unrest above known background level or, *after a change from a higher level,* volcanic activity has decreased significantly but continues to be closely monitored for possible renewed increase.
WATCH	Volcano is exhibiting heightened or escalating unrest with increased potential of eruption, timeframe uncertain, **OR** eruption is underway but poses limited hazards.
WARNING	Hazardous eruption is imminent, underway, or suspected.

Source: USGS Cascades Volcano Observatory. Note: When the volcano alert-level is changed, a Volcano Activity Notice (VAN) is issued.

AVIATION COLOR CODES

GREEN	Volcano is in typical background, non-eruptive state or, *after a change from a higher level,* volcanic activity has ceased and volcano has returned to non-eruptive background state.
YELLOW	Volcano is exhibiting signs of elevated unrest above known background level or, *after a change from a higher level,* volcanic activity has decreased significantly but continues to be closely monitored for possible renewed increase.
ORANGE	Volcano is exhibiting heightened or escalating unrest with increased potential of eruption, timeframe uncertain, **OR** eruption is underway with no or minor volcanic-ash emissions [ash-plume height specified, if possible].
RED	Eruption is imminent with significant emission of volcanic ash into the atmosphere likely **OR** eruption is underway or suspected with significant emission of volcanic ash into the atmosphere [ash-plume height specified, if possible].

Source: USGS Cascades Volcano Observatory
Note: When the volcano color code changes, a Volcano Observatory Notification for Aviation (VONA) is issued.

Previous Occurrences

There have been no volcanic eruptions in or affecting the state of Oregon in the preceding 35 years. In 1980, Mount Saint Helens erupted in southwestern Washington State, resulting in indirect impacts in parts of Oregon. Approximately 1,300 years ago (~715 CE), Belknap Crater erupted and created expansive lava flows at McKenzie Pass, also intersecting slightly older flows on the northern flank of North Sister.

The following table denotes approximate timeframe for a series of recent volcanic activity affecting Oregon and/or Lane County.

Table XXVI Volcanic Event History

Volcanic Event	Years since Event	Miles to Lane County Center	Magnitude at Source	Impact in Lane County
Mt. St. Helens	36	150	Major	Minor
Belknap/Mt. Washington	1,300	60	Moderate	Moderate
North Sister	1,600	60	Moderate	Moderate
South Sister	2,000	60	Minor	Minor
Mt. Mazama/Crater Lake	7,700	90	Major	Major

Source: USGS

Geographic Location

Geographic locations of volcanoes in the regional vicinity of Lane County are fairly specific. The closest are located directly on Lane County's eastern boundary, Diamond Peak in south-eastern Lane County; and South, Middle, and North Sister in north-eastern Lane County. Other relatively nearby volcanos (previously active) include Crater Lake to the south-east and Belknap Crater/Mount Washington to the north-east.

Clearly, proximity has direct relationship to volcanic impacts, though it should be noted various climatic and circumstantial factors including wind direction, snow pack, season of occurrence, etc. has a significant effect on areas impacted. The following table outlines location and distance to populated areas of Lane County for the most proximate volcanos.

Table XXVII Volcanoes in Proximity to Lane County

Name	Risk Factor	Latitude	Longitude	Distance to Closest Populated Area	Distance to Closest Metro Area
Diamond Peak	Low	43.52N	122.14W	22 miles (Oakridge)	55 miles (Eug/Spr)
South Sister	High	44.10N	121.76W	20 miles (McKenzie Bridge)	60 miles (Eug/Spr)

Source: USGS

According to information from the State of Oregon Hazard Mitigation Plan, future eruptions at South Sister (and possibly Middle Sister) are likely to include lava flows, pyroclastic flows, and lahars, though no predictable timeframe for occurrence is available. Lahars could travel many miles down upper river valleys, dependent on snow/ice volume melted by the eruption. Ashfall would be expected to occur within 20 miles of the vent, though extraordinary wind conditions could alter ash plume drift to a moderate extent.

Listed below is the threat potential for volcanos in Oregon.

Mountain	Threat Potential
Crater Lake	High to Very High
Mount Hood	High to Very High
Newberry	High to Very High
Three Sisters	High to Very High
Mount Bachelor	Moderate
Belknap	Low to Very Low
Black Butte Crater Lava Field	Low to Very Low
Davis Lake Volcanic Field	Low to Very Low
Mount Jefferson	Low to Very Low

Source: USGS Volcano Hazards Program

The map shown in Figure 3-31 on the following page was developed using the Statewide Geohazards Viewer maintained by the Oregon Department of Geology and Mineral Industries. It represents overall volcanic hazard across western and central Oregon using classifications for high hazard (red) and moderate hazard (orange). Areas surrounding the Three Sisters, and low elevations of the McKenzie River basin stretching westward to Springfield appear as potential volcanic hazard zones.

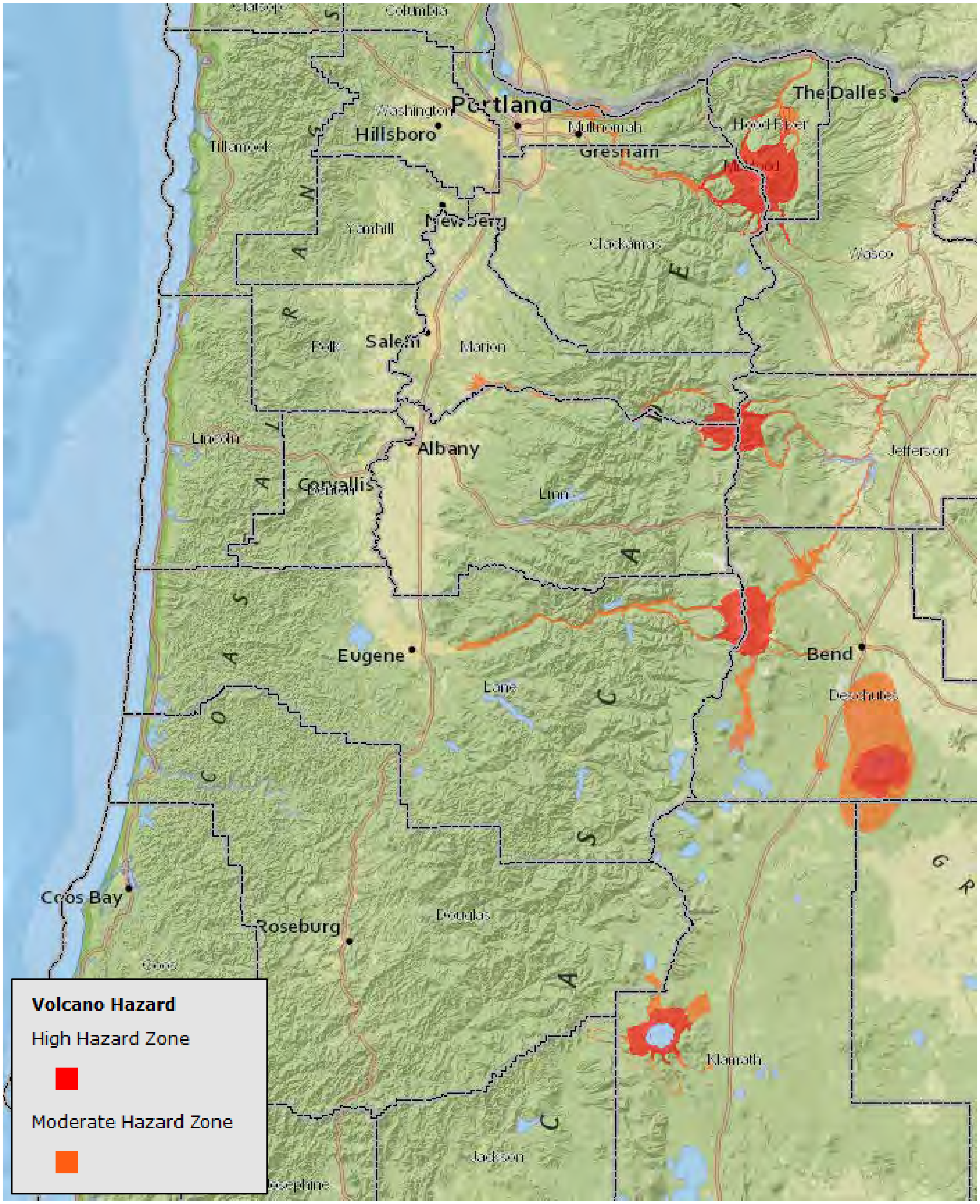


Figure 3-31 Volcanic Hazard, Western-Central Oregon (2015)

Source: Oregon Department of Geologic and Mineral Industries, http://www.oregongeology.org/hazvu/

Probability of Future Occurrence

As a method to estimate probability of future occurrence over intermediate and long timeframes, approximate recurrence intervals can be developed by interpolating previous timeframes for previous volcanic activity which had notable or measurable affect for Lane County.

Using this methodology, five (5) volcanic events with relatively significant magnitude have occurred in the previous 7,700 years, resulting in a 1,540 year averaged recurrence interval. This corresponding occurrence frequency of equates to a 'Low' probability of future occurrence according to the definitions set forth in Section 3.1.1 Methods and Definitions.

The U.S. Geologic Survey (USGS) Cascades Volcano Observatory produces weekly updates for current and short term forecasting. As shown in the report below: as of June 2016, the volcano alert level was 'Normal', aviation color code 'Green'.

CASCADES VOLCANO OBSERVATORY WEEKLY UPDATE

Friday, June 17, 2016 10:58 AM PDT (Friday, June 17, 2016 17:58 UTC)

CASCADE RANGE VOLCANOES

Current Volcano Alert Level: NORMAL

Current Aviation Color Code: GREEN

Activity Update: All volcanoes in the Cascade Range of Oregon and Washington are at normal background levels of seismicity. These include Mount Baker, Glacier Peak, Mount Rainier, Mount St. Helens, and Mount Adams in Washington State; and Mount Hood, Mount Jefferson, Three Sisters, Newberry, and Crater Lake in Oregon. Recent observations:

Only 3 small earthquakes (less than M1) were detected at Mount St. Helens this week. Similarly weak but isolated earthquakes occurred beneath Rainier, Newberry and proximal to South Sister. These events typify "background seismicity" during an otherwise volcanically inactive week in Washington and Oregon.

The U.S. Geological Survey and University of Washington continue to monitor these volcanoes closely and will issue additional updates and changes in alert level as warranted. For additional information, background, images, and other graphics: http://vulcan.wr.usgs.gov

Magnitude/Severity/Extent

According to a report entitled Modern Deformation and Uplift in the Sisters Region, in 2001, scientists discovered that a broad 6 x 12 mile area focused 3– 4 miles west of the summit of South Sister had been rising at an average rate of 1–2 inches per year since late 1997. Rate of uplift decreased to about 0.5 inches per year during 2004–2006, and to less than 0.4 inches per year by 2013. According to these findings, as of 2014 total uplift since 1997 totaled approximately 1 foot.

Modeling of the uplift (inflation) suggests that it was caused either by the intrusion of about 26 million cubic yards of magma at about a 3-mile depth, or by rise of a hot, buoyant plume of water and gas to a similar level that caused heating and expansion of surrounding rock.

The USGS considers an eruption unlikely in the near future if current trends continue. Similar inflation episodes have been recognized at many volcanoes around the world, and others probably went unnoticed before the development of modern monitoring techniques.

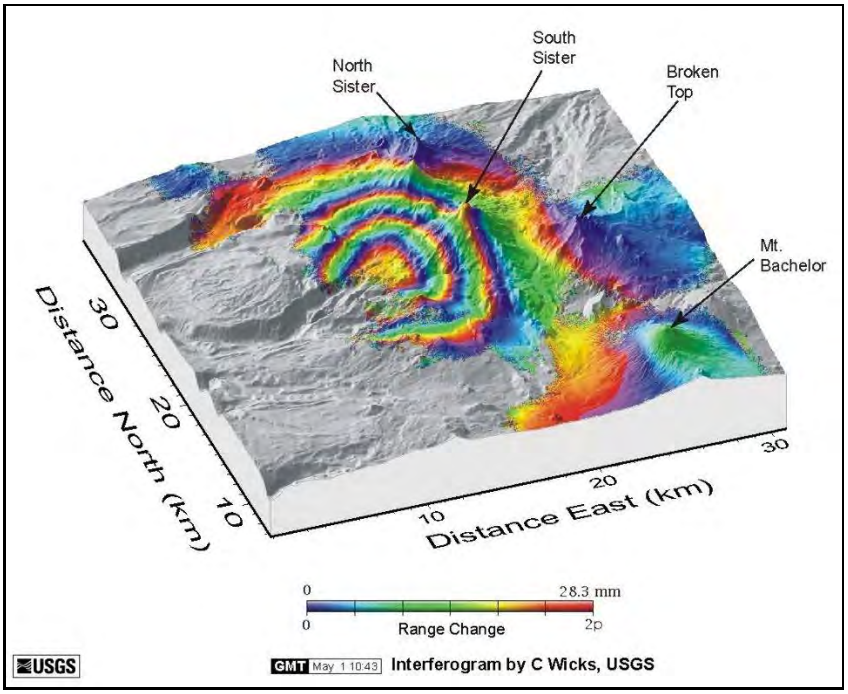


Figure 3-32 Uplift in West Three Sisters Area

Source: USGS Note: Each color band from blue to red represents one inch of upward ground movement.

Overall Vulnerability

According to information from the State of Oregon Hazard Mitigation Plan, the Three Sisters region has a clear history of eruptions but none noted in at least the last 15,000 years. North Sister has probably been inactive for at least 100,000 years. Middle Sister last erupted between 25,000 and 15,000 years ago. As noted previously, from 1996 to 2003 South Sister had minor but broad uplift of about one inch a year, indicating subsurface magma activity. There is no current indication that the previously active uplift will result in a volcanic eruption, but monitoring continues in order to quickly identify changes in condition.

3.3 VULNERABILITY ASSESSMENT

***44 CFR Requirement §201.6(c) (2) (ii):** [The risk assessment **shall** include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c) (2) (i) of this section. This description **shall** include an overall summary of each hazard and its impact on the community.*

3.3.1 Overall Vulnerability per Hazard Type

Overall vulnerability to each hazard was based on assessments of previous and potential occurrences regarding the scale of geographic area affected, future probability, and severity of impact considering a worst case scenario. Factors including risk exposure of special needs populations, medical special needs populations, the location of critical facilities, and key infrastructure were also considered.

Overall vulnerability to natural hazard impacts is substantial for Lane County, though it varies widely according to hazard type.

Based on factors and the definitions established in Subsection 3.1.1, Table XXVIII below shows an assessment of overall vulnerability to each of the identified hazards and categories of primary impacts (classified as human, property, infrastructure, economy, and/or environment).

Table XXVIII Vulnerability and Impact Categories per Hazard Type

HAZARD TYPE	OVERALL VULNERABILITY	PRIMARY IMPACT CATEGORIES
Winter Storm	High	Public Safety, Property, Infrastructure, Economy
Windstorm	High	Property, Infrastructure
Wildfire	High	Property, Environment
Flood	High	Property, Infrastructure
Earthquake	High	Public Safety, Property, Infrastructure, Economy
Tsunami	High	Public Safety, Property, Infrastructure
Haz Mat Incident	Moderate	Public Safety, Environment
Landslide	Moderate	Public Safety, Infrastructure, Economy
Pandemic	Moderate	Public Safety, Economy
Tornado	Low	Public Safety, Property
Dam Failure	Low	Public Safety, Property, Infrastructure, Economy
Drought	Low	Economy, Environment
Volcano	Low	Environment, Infrastructure

Notes: Overall vulnerability classifications are defined as follows:
High— Moderate/high probability of future occurrence and potentially critical severity.
Moderate— Moderate/high probability of future occurrence and limited potential severity.
Low— Low/moderate probability of future occurrence and negligible/limited potential severity

3.3.2 Hazard Vulnerability per Geographic Region

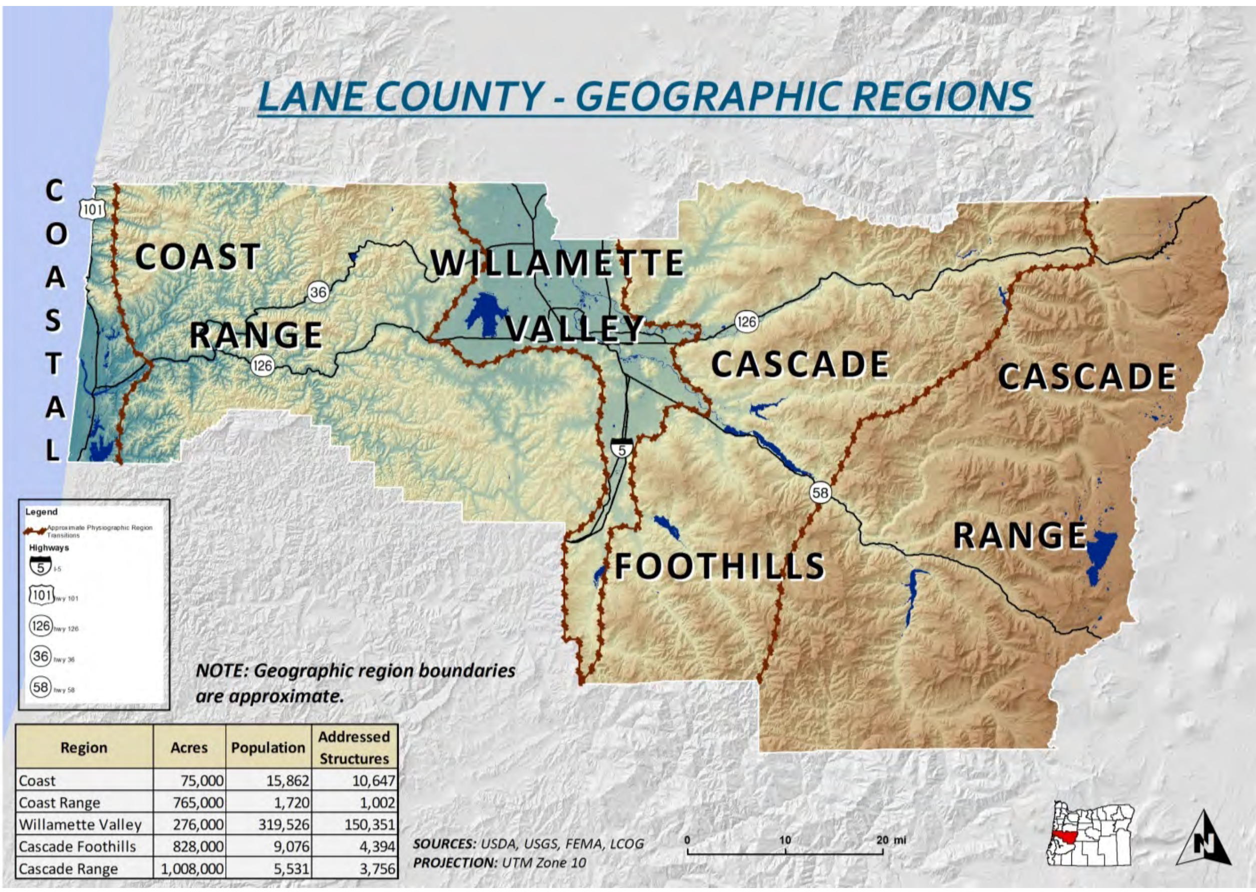
Lane County possesses a remarkable range of elevation, terrain types, climatic regimes, and potential hazards. It shares the distinction with Douglas County as the only counties on the U.S. west coast which range from the Pacific Ocean to the Cascade Crest.

Coastal Lane County due to its proximity to the ocean, coastal headlands, and Cascadia Subduction Zone has notable risk for windstorm, earthquake, and tsunami as compared to other geographic regions.

The Coast Range of Lane County has notable risk for landslide, earthquake, and wildfire.

The Willamette Valley is has unique vulnerability to winter storm, flooding, and dam failure in relation to other regions of the County.

The Cascade foothills and crest in eastern Lane County have relatively higher propensity for wildfire, winter storm, and volcanic activity.



Region	Acres	Population	Addressed Structures
Coast	75,000	15,862	10,647
Coast Range	765,000	1,720	1,002
Willamette Valley	276,000	319,526	150,351
Cascade Foothills	828,000	9,076	4,394
Cascade Range	1,008,000	5,531	3,756

Figure 3-33 Physiographic Regions of Lane County

3.3.3 Risk Assessment, Participating Cities, Distinguishing Characteristics

The following section outlines risk assessment and hazard quantification exercises that were conducted specifically for the participating cities. The hazard quantification process followed the OEM model for evaluating categories of risk including: history of occurrence, probability of future occurrence, vulnerability in terms of percentage of population likely to be affected by an average occurrence, and maximum threat in terms of percentage of population affected under a worst-case scenario. Full risk assessments are located in Section 3.2, and City annexes 1-7.

Risk Assessment Overview, Distinguishing Characteristics: City of Coburg
Hazardous materials incident ranks relatively high for Coburg as compared to other cities and county overall. This is primarily due to proximity to major transportation corridor and interchange. Potential drought is another notable concern for City of Coburg, and efforts to expand stored water capacity and bolster resilience for existing storage are high priorities.

Winter storm, windstorm, and earthquake risks are significant and generally typical for Lane County planning area. Flood risk is also noteworthy as Coburg is situated near the confluence of McKenzie and Willamette Rivers. FEMA defined floodplains are located in western portion of city and UGB. Situated primarily on the open valley floor, the level terrain and lack of dense forests in close proximity result in relatively lower risk factors for wildfire, volcano, and landslide. Tsunami impacts were considered non-applicable for City of Coburg.

Risk Assessment Overview, Distinguishing Characteristics: City of Creswell
Discussion: Creswell results are highly representative of the county planning area overall, with the exception of tsunami which is considered non-applicable. Hazardous materials incident ranks somewhat high for Creswell as compared to county overall, due to proximity to major transportation corridor and railroad running through city center. Seismic risk to water storage in southern portion of the city, and the downtown fire station is notable and a mitigation priority.

Winter storm, and windstorm risks are typical for Lane County planning area. Tornado potential is present and recent activity in general proximity notable. Flooding impacts are possible in the eastern and northern areas of Creswell, in addition to minor street flooding at various locations.

Risk Assessment Overview, Distinguishing Characteristics: City of Dunes City
Discussion: As a coastal community, Dunes City has relatively higher vulnerability to a number of hazard types as compared to Lane County overall. Windstorm and winter storm are notable hazards as typical for Lane County.

Earthquake has have above average relevance for Dunes City as compared to Lane County overall. Two potential earthquake sources are assessed by Oregon Department of Geology and Mineral Industries (DOGAMI). Dunes City is situated in far western Lane County classified with ‘violent’ potential magnitude resulting from a Cascadia Subduction Zone earthquake. Assessing non-Cascadia earthquakes, DOGAMI analysis indicates Dunes City is located in area with ‘very strong’ expected shaking. Refer to earthquake maps in Section 3.2.3 for additional detail.

Since its situated to the east of Hwy 101, the majority of Dunes City is outside mapped tsunami inundation areas but this hazard is nonetheless a relevant concern.

In addition, landslide occurrence is notable hazard types particularly in eastern portions of the city. Wildfire potential is present due to proximity of forested areas to development. Flooding occurrence in proximity to city hall is noted in the risk assessment, as was wind impacts for city hall structure. Drought is another potential impact as Dunes City is working to improve access and monitoring for Woahink Lake.

Risk Assessment Overview, Distinguishing Characteristics: City of Florence
Discussion: As a coastal community, Florence has relatively higher vulnerability to a number of hazard types as compared to Lane County overall. Windstorm presents notable hazard.

Earthquake and tsunami also have significant relevance for Florence. In earthquake/tsunami scenario, evacuation route east to Eugene could potentially be cut off by flooding across Hwy 126 at Cushman. Coastal erosion is a unique hazard factor affecting Florence, particularly along stretch of Siuslaw River west of downtown bordering Rhododendron Drive.

Though much of the city has level terrain, landslide risk is present in portions of the city. Wildfire potential is present in wildland-urban interface. Situated far from the Cascades, volcano risk is lower than county overall.

Risk Assessment Overview, Distinguishing Characteristics: City of Oakridge
Discussion: Located in foothills of Cascade Range and what could be described as a of a mountain river valley, Oakridge has the highest elevation of Lane County cities and corresponding risk factors for winter storm and flooding.

Windstorm is relevant hazard type as typical for planning area overall. Also, situated along highway corridor and rail route with industrial facilities, hazardous materials incident has notable relevance. Surrounded by Willamette National Forest, wildfire is an additional hazard factor.

Drought potential is present and typical for Lane County communities. Due to proximity to dormant volcanos and Hills Creek Reservoir, dam failure and volcanic activity could potentially affect Oakridge.

Risk Assessment Overview, Distinguishing Characteristics: City of Veneta
Discussion: Located in western Willamette Valley and near Coast Range foothills Veneta hazard profiles for Veneta are largely typical for planning area communities.

Wildfire and winter storm are deemed the most significant hazard types, followed closely by windstorm. Notably, a windstorm in December 2015 caused significant damage to city park and library structure.

Flooding impacts are noted for portions of residential neighborhoods of Veneta, and also along Territorial Hwy north of Veneta and west of Fern Ridge Reservoir. Hazardous material incident has notable potential due to proximity to rail line and highway transportation corridor. Lane County Flood Insurance Study noted detailed discussion during coordination meetings in 1980 regarding extent of flooding from the Long Tom River

Hazards with below average significance for Lane County include volcano, landslide, and dam failure. Tsunami was considered a non-applicable hazard type for Veneta, though potential effects from coastal evacuees could be anticipated

Risk Assessment Overview, Distinguishing Characteristics: City of Westfir
Discussion: Located in foothills of Cascade Range in a narrow mountain river valley, and surrounded by Willamette National Forest, wildfire occurrence and future risk is a notable hazard factor. Winter storms also occur relatively frequently causing power outages and complicating travel conditions.

Drought is a significant vulnerability for Westfir and a high mitigation priority. Specific locations within Westfir also experience flooding impacts which can be addressed through mitigation measures. Hazardous materials incident is a concern for city hall as it is in close proximity to rail way.

Earthquake and dam failure are considered lesser hazard factors based on location from major faults and relative elevation of the city. Tsunami is considered non-applicable hazard type.

3.3.4 NFIP & Repetitive Flood Claims

44 CFR Requirement §201.6(c) (2) (ii): *[The risk assessment]* ***must*** *also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged by floods.*

National Repetitive Loss Strategy

The National Flood Insurance Program (NFIP) has developed a strategy to mitigate repetitive flood insurance claims on individual properties (Repetitive Loss Properties). A Repetitive Loss (RL) property is defined as any insurable building with two or more paid flood insurance claims exceeding $1,000 within a ten-year period. A RL property may or may not be currently insured by the NFIP.

A Severe Repetitive Loss property (SRL) is defined as having at least 4 paid flood insurance claims each exceeding $5,000, or when there are 2 or more losses where the building payments exceed the property value. Loss history is determined by counting all flood claims paid on an insured property, regardless of any change(s) of ownership, since the building's construction or back to 1978. States or communities may sponsor projects to mitigate flood losses to these properties or may be able to provide technical assistance on mitigation options.

Depending on individual circumstances, appropriate mitigation measures commonly include elevating buildings above the base flood elevation, demolishing buildings, and removing buildings from the Special Flood Hazard Area. Occasionally, mitigation takes the form of a local drainage-improvement project that meets NFIP standards.

National Repetitive Loss Information

According to the Government Accounting Office (GAO), as of 2004, repetitive loss properties receive over 38 percent of NFIP claims dollars paid (approximately $200 million annually) but represent only 1 percent of all NFIP insured properties. FEMA reports that currently there are over 122,000 RL properties nationwide, and approximately 9,000 properties in the U.S. meet the definition of severe repetitive loss properties.

Local Repetitive Loss Information

There are twenty three (23) properties in Lane County which meet the NFIP definition for Repetitive Loss Properties. This number increased from 21 properties in the previous hazard mitigation plan cycle. General locations and aggregated flood claim data for these properties are presented in the following table.

Table XXIX NFIP Repetitive Loss Data, Lane County (2015)

Near Community	Repetitive Loss Properties (#)	Total Flood Claims	Breakdown by Property Type
Mapleton	12	33	11 residential, 1 business
Springfield	5	13	5 residential
Cottage Grove	1	2	1 residential
Elmira	1	2	1 residential
Vida	1	3	1 residential
Walton	1	2	1 residential
Florence	2	4	2 residential
Total	21	59	22 residential, 1 business

Source: Lane County NFIP Repetitive Loss Update Worksheets (AW-501 reports), through April 2015.

Flood Insurance Claim Information by Community

Based on NFIP data reported as of October 2014, unincorporated Lane County ranks 3rd among Oregon counties in total flood insurance claims (350) and 5th among Oregon counties in total flood insurance payments ($3.17 million). 355 of the 420 overall flood insurance claims occurred in unincorporated Lane County (84.5%)

Table XXX NFIP Flood Insurance Claim Data, Current as of December 2016

Jurisdiction	Total Claims	Closed	CWOP	Total Claim Payments
Coburg, City of	3	3	0	$7,301
Cottage Grove, City of	11	3	8	$5,068
Eugene, City of	17	10	7	$116,465
Florence, City of	5	2	3	$57,374
Junction City, City of	1	1	0	$1,497
Lane County*	355	261	94	$3,175,459
Springfield, City of	27	22	5	$402,491
Veneta, City of	1	1	0	$24,156
Totals	**420**	**303**	**116**	**$3,736,030**

Source: FEMA, NFIP; http://bsa.nfipstat.fema.gov/reports/1040.htm#41
Note: CWOP = closed without payment

Tables XXVIII and XXIX below outline data relevant to NFIP activities in Lane County.

Table XXXI Policies, Total Premiums, Claims Made Under The NFIP

Community	Last CAV Date	Effective FIRM Date	# of Policies	Total Premium	Paid Claims	Total Amount Paid in Claims
Lane County	9/24/2003	6/2/1999	2,439	$539,913,900	261	$3,175,459

Source: NFIP Bureau Net; May 31, 2015

Table XXXII NFIP Policies, Insurance in Force, per Jurisdiction

Jurisdiction	Policies	Insurance in Force	Premium in Force
COBURG	8	$2,590,000	$3,433
COTTAGE GROVE	67	$15,842,400	$50,837
CRESWELL	57	$15,015,500	$34,752
DUNES CITY	8	$2,225,000	$4,149
EUGENE	1,009	$289,702,700	$772,810
FLORENCE	171	$46,528,500	$80,799
JUNCTION CITY	204	$35,939,100	$232,806
LANE COUNTY (UNINC)	2,439	$539,913,900	$1,958,703
LOWELL	1	$280,000	$390
OAKRIDGE	12	$2,110,200	$10,288
SPRINGFIELD	135	$40,669,300	$113,137
VENETA	10	$2,630,000	$4,464
WESTFIR	4	$797,600	$2,771
TOTAL	**4,125**	**$994,244,200**	**$3,269,339**

Source: NFIP Bureau Net; May 31, 2015

3.3.4 Critical Facilities and Lifelines

Critical infrastructure is generally defined as facilities necessary for the basic functioning of communities and provide vital services to the public. Also referred to as 'Lifelines', they are typified by structures and systems vital for provision of energy, water, communications and transportation. These lifelines are both local and regional networks that serve residents and businesses throughout Lane County and beyond. As a category, critical infrastructure and lifelines are different from "life support" systems, which include emergency services and public health which have distinct characteristics and mission.

According to a report from the National Association of Counties, *Improving Lifelines: Protecting Critical Infrastructure for Resilient Counties*, in general there are four main factors that define lifelines:

- They provide necessary services and goods that support nearly every home, business and county agency,
- Lifelines deliver services that are commonplace in everyday life, but disruption of the service has the potential to develop life-threatening situations,
- They involve complex physical and electronic networks that are interconnected within and across multiple sectors, and
- A disruption of one lifeline has the potential to effect or disrupt other lifelines in a cascading effect.

Individual counties define lifelines differently, but in general there are four main lifeline categories broadly understood, listed as follows: that apply to virtually every county across the nation:

1) Energy (examples: oil, natural gas and electricity)

2) Water (examples: drinking water and wastewater systems)

3) Transportation (examples: roads, bridges, rail, airports and ports)

4) Communications (examples: telephone, satellite and internet infrastructure)

3.3.6 Population Vulnerability Assessment

For emergency planning purposes, children, the elderly, the disabled, people living in poverty and people whose primary language is not English are considered special needs populations. This is because these populations in the community struggle disproportionately in their ability to respond to a disaster. Lane County has a substantial number of residents in all of these special needs categories. Almost 8% of the population speaks a language other than English.

It is important to understand the distribution of population in each natural hazard area when considering hazard mitigation measures. Table XXXIII below shows distribution of population and addressed structures in each of the five main physiographic regions of Lane County. The addressed structures are those with an assigned address by the County and do not necessarily include out buildings such as garages, shops, etc.

Table XXXIII Population/Residential Structures per Physiographic Region

Region	Population	Addressed Structures
Coast	15,862	10,647
Coast Range	1,720	1,002
Willamette Valley Floor	319,526	150,351
Cascade Foothills	9,076	4,394
Cascade Range	5,531	3,756

Source: Lane County

Table XXXIV Estimated Social Impact, Crustal or CSZ Earthquake; HAZUS-MH Analysis

County	Earthquake Scenario	Fatalities During Late Afternoon Business Hours	Injuries from Minor to Life Threatening	Households Displaced	People Needing Shelter
Yamhill	Crustal / Cascadia	80 / 90	1,260 / 1,380	4,250 / 3,080	1,000 / 750
Polk	Crustal / Cascadia	20 / 50	280 / 720	1,410 / 1,820	360 / 460
Marion	Crustal / Cascadia	240 / 220	3,720 / 3,170	10,700 / 5,780	2,730 / 1,470
Benton	Crustal / Cascadia	40 / 120	590 / 1,560	1,750 / 2,370	500 / 660
Lane	Crustal / Cascadia	130 / 370	2,080 / 5,200	7,710 / 7,660	2,000 / 2,000
Linn	Crustal / Cascadia	70 / 90	1,120 / 1,290	3,680 / 2,560	920 / 650
Total	Crustal / Cascadia	NA / 940	NA / 13,320	NA / 23,270	NA / 5,990

*See Appendices A–G for detailed scenario input for each county.

NA: It is very unlikely that these events would happen at same time, and therefore the values were not totaled.

Source: DOGAMI IMS-24 Report (2008) Mid/Southern Willamette Valley Geologic Hazards, Earthquake and Landslide Hazard Maps, and Future Earthquake Damage Estimates; US Census; FEMA HAZUS-MH Loss Estimation Software.
Note: NA values not totaled due to improbability that these events would simultaneously occur.

3.3.7 Structure Vulnerability Assessment

Certain hazards affect broad geographic regions, such as winter storms and wind storms whereas other hazards have occurrence patterns which can be more geographically defined. The following section presents a vulnerability analysis for flood, wildfire, and earthquake hazards by relating vulnerable structures to hazard type.

Potentially Vulnerable Structures: Tsunami

In 2008 the Oregon Department of Geology and Mineral Industries (DOGAMI) published an extensive study on the primary geologic hazards of Yamhill, Marion, Polk, Benton, Linn and Lane Counties. Included in this report are earthquake and landslide hazard maps for each county along with future earthquake damage estimates. This study is called *Interpretive Map Series, IMS-24,* *Geologic Hazards, Earthquake and Landslide Hazard Maps, and Future Earthquake Damage Estimates.*

The IMS-24 Maps discussed in this section show the coastline of Lane County and calculated areas likely to be inundated under various tsunami scenarios. These maps can be access via the internet at the following links:

http://www.oregongeology.org/pubs/tim/p-TIM-Lane-01.htm (Neptune, north Lane County coast)

http://www.oregongeology.org/pubs/tim/p-TIM-Lane-02.htm (Heceta Head)

http://www.oregongeology.org/pubs/tim/p-TIM-Lane-03.htm (Mercer Lake, north Florence)

http://www.oregongeology.org/pubs/tim/p-TIM-Lane-04.htm (Florence and mouth of Siuslaw)

http://www.oregongeology.org/pubs/tim/p-TIM-Lane-05.htm (Siuslaw, Cushman)

http://www.oregongeology.org/pubs/tim/p-TIM-Lane-06.htm (Siuslaw, Mapleton)

http://www.oregongeology.org/pubs/tim/p-TIM-Lane-07.htm (Dunes City)

http://www.oregongeology.org/pubs/tim/p-TIM-Lane-08.htm (Siltcoos Lake)

Descriptions of the tsunami modeling methodology, data inputs and parameters are below, excerpted verbatim from map notes prepared by DOGAMI.

> **Introduction**
> The Oregon Department of Geology and Mineral Industries (DOGAMI) has been identifying and mapping the tsunami inundation hazard along the Oregon coast since 1994. In Oregon, DOGAMI manages the National Tsunami Hazard Mitigation Program, which has been administered by the National Oceanic and Atmospheric Administration (NOAA) since 1995. DOGAMI's work is designed to help cities, counties, and other sites in coastal areas reduce the potential for disastrous tsunami-related consequences by understanding and mitigating this geologic hazard. Using federal funding awarded by NOAA, DOGAMI has developed a new generation of tsunami inundation maps to help residents and visitors along the entire Oregon coast prepare for the next Cascadia Subduction Zone (CSZ) earthquake and tsunami. The CSZ is the tectonic plate boundary between the North American Plate and the Juan de Fuca Plate (Figure 1). These plates are converging at a rate of about 1.5 inches per year, but the movement is not smooth and continuous. Rather, the plates lock in place, and unreleased energy builds over time. At intervals, this accumulated energy is violently released in the form of a megathrust earthquake rupture, where the North American Plate suddenly slips westward over the Juan de Fuca Plate. This rupture causes a vertical displacement of water that creates a tsunami (Figure 2). Similar rupture processes and tsunamis have occurred elsewhere on the planet where subduction zones exist: for example, offshore Chile in 1960 and 2010, offshore Alaska in 1964, near Sumatra in 2004, and offshore Japan in March 2011.
>
> *CSZ Frequency*: Comprehensive research of the offshore geologic record indicates that at least 19 major ruptures of the full length of the CSZ have occurred off the Oregon coast over the past 10,000 years (Figure 3). All 19 of these full-rupture CSZ events were likely magnitude 8.9 to 9.2 earthquakes (Witter and others, 2011). The most recent CSZ event happened approximately 300 years ago on

January 26, 1700. Sand deposits carried onshore and left by the 1700 event have been found 1.2 miles inland; older tsunami sand deposits have also been discovered in estuaries 6 miles inland. As shown in Figure 3, the range in time between these 19 events varies from 110 to 1,150 years, with a median time interval of 490 years. In 2008 the United States Geological Survey (USGS) released the results of a study announcing that the probability of a magnitude 8-9 CSZ earthquake occurring over the next 30 years is 10% and that such earthquakes occur about every 500 years (WGCEP, 2008).

CSZ Model Specifications: The sizes of the earthquake and its resultant tsunami are primarily driven by the amount and geometry of the slip that takes place when the North American Plate snaps westward over the Juan de Fuca Plate during a CSZ event. DOGAMI has modeled a wide range of earthquake and tsunami sizes that take into account different fault geometries that could amplify the amount of seawater displacement and increase tsunami inundation. Seismic geophysical profiles show that there may be a steep splay fault running nearly parallel to the CSZ but closer to the Oregon coastline (Figure 1). The effect of this splay fault moving during a full-rupture CSZ event would be an increase in the amount of vertical displacement of the Pacific Ocean, resulting in an increase of the tsunami inundation onshore in Oregon. DOGAMI has also incorporated physical evidence that suggests that portions of the coast may drop 4 to 10 feet during the earthquake; this effect is known as subsidence. Detailed information on fault geometries, subsidence, computer models, and the methodology used to create the tsunami scenarios presented on this map can be found in DOGAMI Special Papers 41 (Priest and others, 2009) and 43 (Witter and others, 2011).

Map Explanation

This tsunami inundation map displays the output of computer models representing five selected tsunami scenarios, all of which include the earthquake-produced subsidence and the tsunami-amplifying effects of the splay fault. Each scenario assumes that a tsunami occurs at Mean Higher High Water (MHHW) tide; MHHW is defined as the average height of the higher high tides observed over an 18-year period at the Yaquina Bay (Central Coast Model) tide gauge. To make it easier to understand this scientific material and to enhance the educational aspects of hazard mitigation and response, the five scenarios are labeled as “T-shirt sizes” ranging from Small, Medium, Large, Extra Large, to Extra Extra Large (S, M, L, XL, XXL). The map legend depicts the respective amounts of slip, the frequency of occurrence, and the earthquake magnitude for these five scenarios. Figure 4 shows the cumulative number of buildings inundated within the map area.

The computer simulation model output is provided to DOGAMI as millions of points with values that indicate whether the location of each point is wet or dry. These points are converted to wet and dry contour lines that form the extent of inundation. The transition area between the wet and dry contour lines is termed the Wet/Dry Zone, which equates to the amount of error in the model when determining the maximum inundation for each scenario. Only the XXL Wet/Dry Zone is shown on this map. This map also shows the regulatory tsunami inundation line (Oregon Revised Statutes 455.446 and 455.447), commonly known as the Senate Bill 379 line. Senate Bill 379 (1995) instructed DOGAMI to establish the area of expected tsunami inundation based on scientific evidence and tsunami modeling in order to prohibit the construction of new essential and special occupancy structures in this tsunami inundation zone (Priest, 1995).

Time Series Graphs and Wave Elevation Profiles: In addition to the tsunami scenarios, the computer model produces time series data for “gauge” locations in the area. These points are simulated gauge stations that record the time, in seconds, of the tsunami wave arrival and the wave height observed. It is especially noteworthy that the greatest wave height and velocity observed are not necessarily associated with the first tsunami wave to arrive onshore. Therefore evacuees should not assume that the tsunami event is over until the proper authorities have sounded the all-clear signal at the end of the evacuation. Figure 5 depicts the tsunami waves as they arrive at a simulated gauge station. Figure 6 depicts the overall wave height and inundation extent for all five scenarios at the profile locations shown on this map.

Table XXXV Total Buildings in Mapped Area

Florence	Entire Map Area (#)	Florence	Unincorporated Areas
Total Buildings	7,662	6,541	1,121

Table XXXVI Total Buildings within Tsunami Zones*

Earthquake Magnitude (general)	Entire Map Area (#)	Florence	Unincorporated Areas
Small Earthquake	62	53	9
Medium	150	131	19
Large	334	287	47
Extra Large	764	700	64
Extra Extra Large	959	889	70

Source: DOGAMI, Tsunami Inundation Map Series (TIMs), Lane County
http://www.oregongeology.org/pubs/tim/p-TIM-Lane-04.htm (Florence and mouth of Siuslaw)

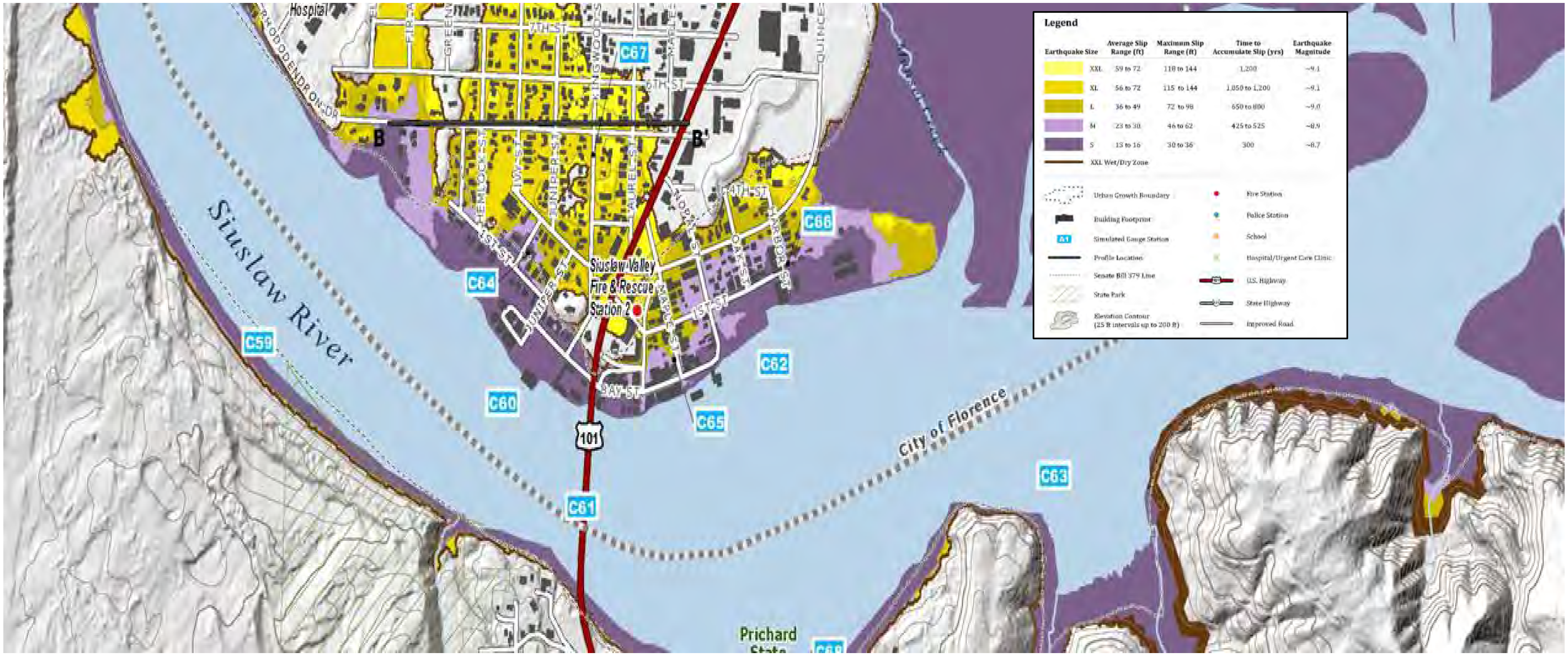


Figure 3-35 Excerpt from DOGAMI TIMs (Florence Old Town Area)

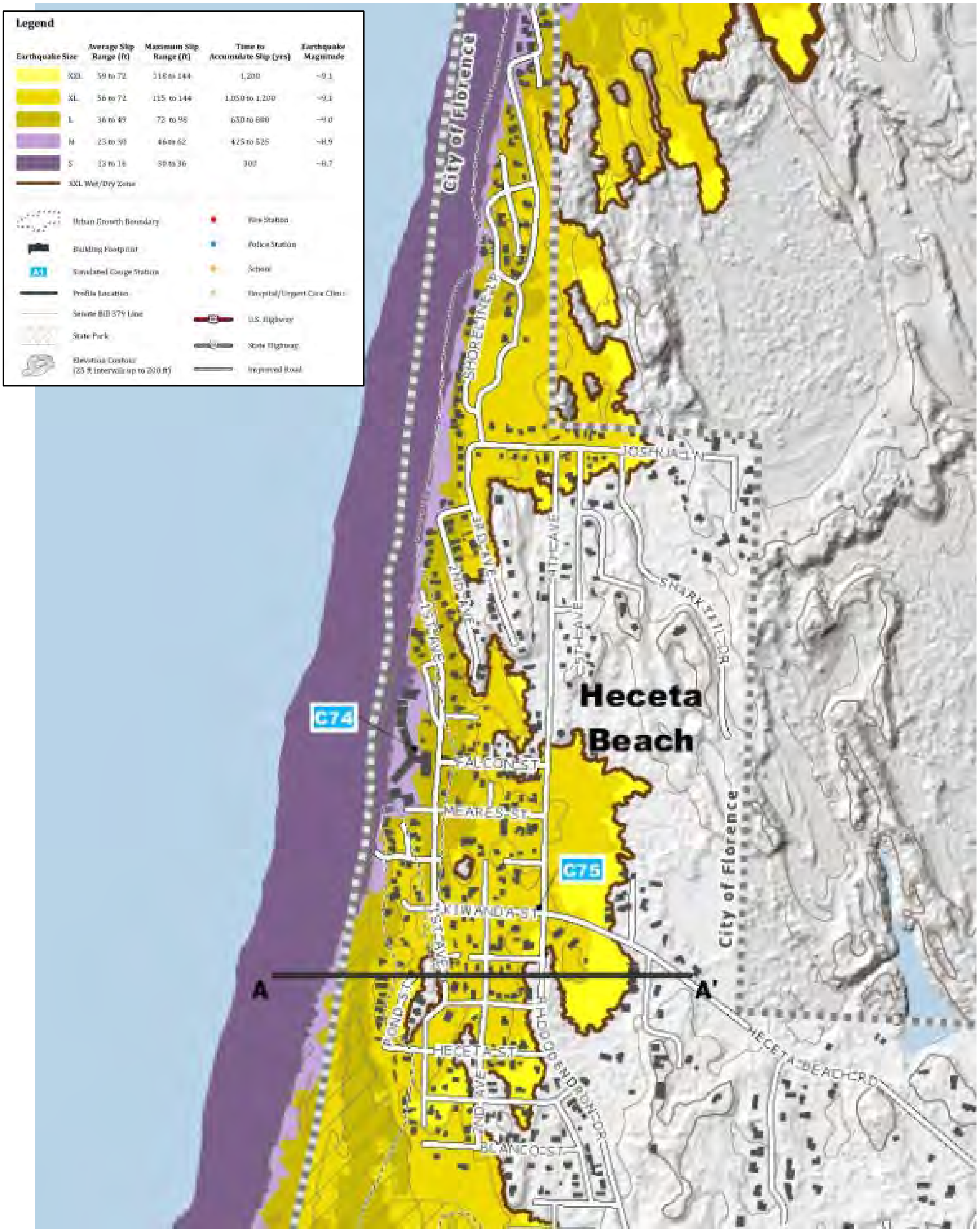


Figure 3-36 Excerpt from DOGAMI TIMs (Northwest Florence, Heceta Beach Area)

Source: DOGAMI; http://www.oregongeology.org/pubs/tim/p-TIM-Lane-04.htm (Florence and mouth of Siuslaw)

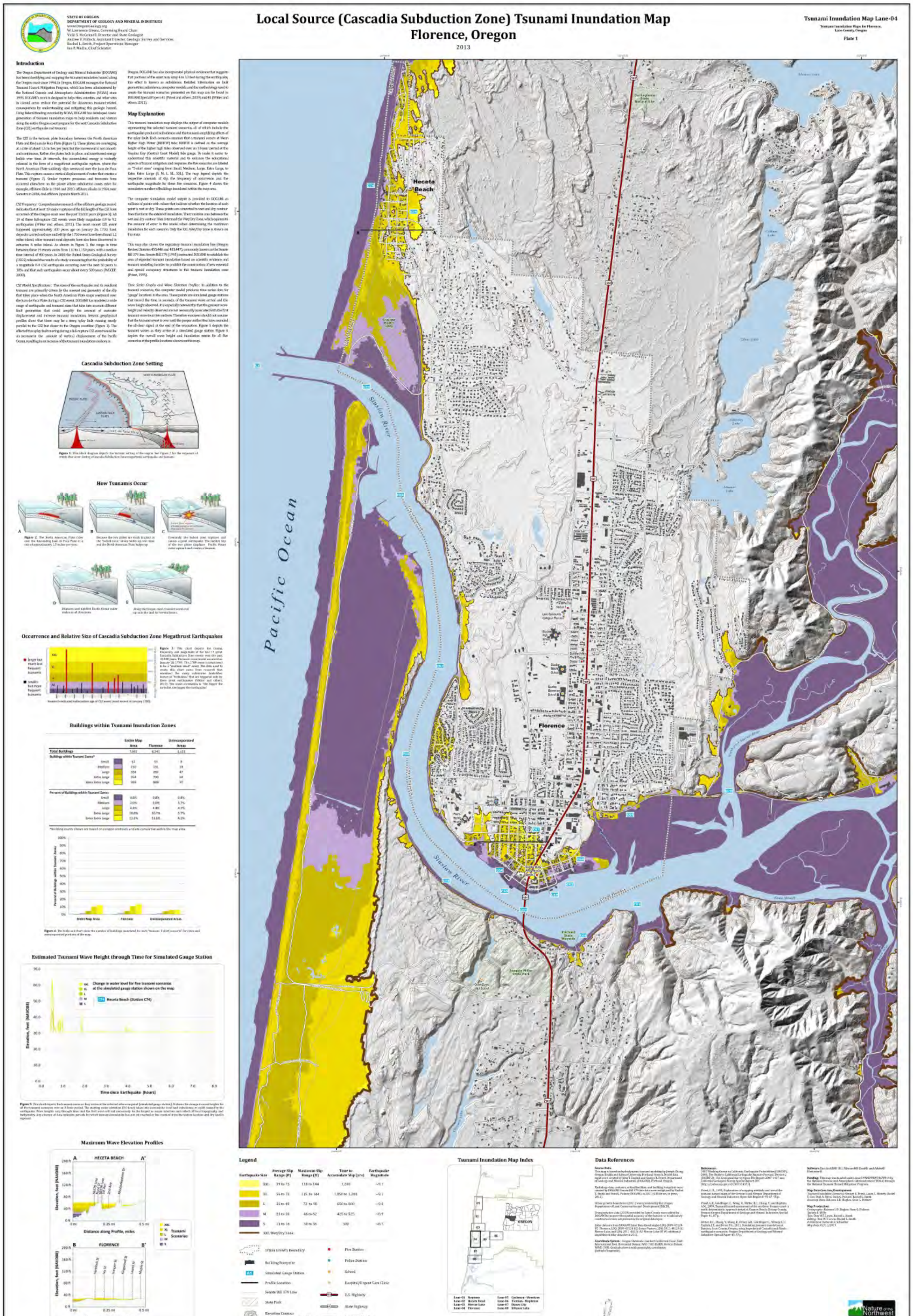


Figure 3-37 Full Map DOGAMI TIMs (Northwest Florence, Heceta Beach Area)

Potentially Vulnerable Structures: <u>Earthquake</u>

During the timeframe 2006-2007 the Department of Geology and Mineral Industries conducted a visual seismic vulnerability assessment for hundreds of public service buildings across the state. Each building was evaluated on a basis of structural irregularities and soil composition on which it was constructed. The result was an assigned 'collapse potential' score for each building in accordance with FEMA 154 specification. Lower score values indicate higher collapse potential during a seismic event, and higher scores indicate better overall structural integrity and seismic resiliency.

The 2006-2007 Seismic Vulnerability Rapid Visual Assessment evaluated 195 structures in Lane County. These included fire stations, police departments, schools, public buildings, and health care facilities. Of the 195 total structures, four (4) were assigned a "Very High" seismic risk classification; 55 were assigned a "High" seismic risk classification; 43 were assigned a "Moderate" risk classification; and 93 were assigned a "Low" seismic risk classification.

The table below reports results for buildings in Lane County which were assigned either "High" or "Very High" seismic vulnerability according to the 2006-2007 DOGAMI assessment. *<u>Note: certain buildings may have been mitigated or replaced since the 2006-2007 assessment.</u>*

Table XXXVII DOGAMI Rapid Visual Seismic Assessment, Very High and High Ratings

Facility Name	Score	FEMA-154 Collapse Potential Rating
Creswell Middle School	-0.1	Very High
Junction City Rural Fire Protection District	-0.1	Very High
Pleasant Hill High School	-0.1	Very High
Walterville Elementary School	-0.1	Very High
Edison Elementary School	0.1	High
Pleasant Hill Rural Fire Protection District	0.1	High
Willagillespie Elementary School	0.3	High
Oakridge Elementary School	0.3	High
Oakridge High School	0.3	High
Mohawk Valley Rural Fire District	0.3	High
Springfield Middle School	0.3	High
Westridge Middle School	0.3	High
Creslane Elementary School	0.5	High
Forum - Bldg "K"	0.5	High
Coburg Rural Fire Protection District	0.5	High
Eugene Police Dept	0.5	High
South Eugene High School	0.5	High
Coburg Elementary School	0.5	High
Laurel Elementary School	0.5	High
Oaklea Middle School	0.5	High
Junction City High School	0.5	High
Lundy Elementary School	0.5	High
Marcola Elementary School	0.5	High
Mckenzie Fire & Rescue	0.6	High
South Lane County Fire & Rescue	0.7	High
Lincoln Middle School	0.7	High
Creswell Station	0.7	High
Creswell Sheriff's Office	0.7	High

Lane County Fire District 1	0.7	High
Fern Ridge Middle School	0.7	High
Junction City Police Dept	0.7	High
Lane County Fire District 1	0.7	High
Cottage Grove Police Dept	0.9	High
Bohemia Elementary School	0.9	High
Harrison Elementary School	0.9	High
LCC Administration - Bldg "F"	0.9	High
LCC Air Technology	0.9	High
LCC Mathematics & Art/GED Bldg "Q"	0.9	High
LCC Auto/Diesel Technology	0.9	High
LCC Business Technology - Bldg "G"	0.9	High
LCC Electronics - Bldg "H"	0.9	High
LCC Health Technology - Bldg "M"	0.9	High
LCC Industrial Technology - Bldg "D"	0.9	High
LCC Machine Technology	0.9	High
LCC Science - Bldg "J"	0.9	High
LCC Workforce Training Center/Apprenticeship	0.9	High
Goshen Rural Fire Protection District	0.9	High
Santa Clara Rural Fire Protection District	0.9	High
Twin Oaks Elementary School	0.9	High
Irving Elementary School	0.9	High
Malabon Elementary School	0.9	High
Willamette High School	0.9	High
Crow Middle/High School	0.9	High
LCC Branch - Florence Center	0.9	High
Siuslaw Valley Fire & Rescue - Station 2	0.9	High
Peace Harbor Hospital - Florence	0.9	High
Siuslaw High School	0.9	High
Swisshome-Deadwood Rural Fire Protection District	0.9	High
Oakridge Police Dept	1.0	High

Source: DOGAMI, Rapid Visual Screening (RVS), Seismic Vulnerability Assessment

Table XXXVIII Estimated Hospital Beds Before and After Cascadia Subduction Earthquake

	Before Earthquake			After Cascadia Earthquake		
County	Number of Hospitals	Available Hospital Beds (approximate)	Average Beds per Hospital	Number of Hospitals Likely Functional Day After	Average Beds Available the Day After	Injuries Requiring Hospitalization
Benton	1	130	130	1	130	420
Lane	4	580	145	1	145	1350
Linn	1	70	70	1	70	340
Marion	5	1070	214	3	642	810
Polk	1	40	40	0	0	190
Yamhill	2	100	50	0	0	360
Total	14	1990	142	6	987	3470

Source: Source: DOGAMI IMS-24 Report (2008) Mid/Southern Willamette Valley Geologic Hazards, Earthquake and Landslide Hazard Maps, and Future Earthquake Damage Estimates; US Census; FEMA HAZUS-MH Loss Estimation Software

Potentially Vulnerable Structures: Flood

The State of Oregon Natural Hazard Mitigation Plan notes there are 73 state owned facilities situated in FEMA defined Special Flood Hazard Areas (SFHAs) in Lane County, ranking second only to Marion County in terms of overall number. Total value for state facilities located in SFHAs is estimated at over $190 million.

Lane County has also conducted mapping analysis for essential facilities and their relationship to SFHAs. The map in Figure 3-38 below shows schools, police and fire stations, Emergency Operations Centers and hospitals located in a flood hazard area.

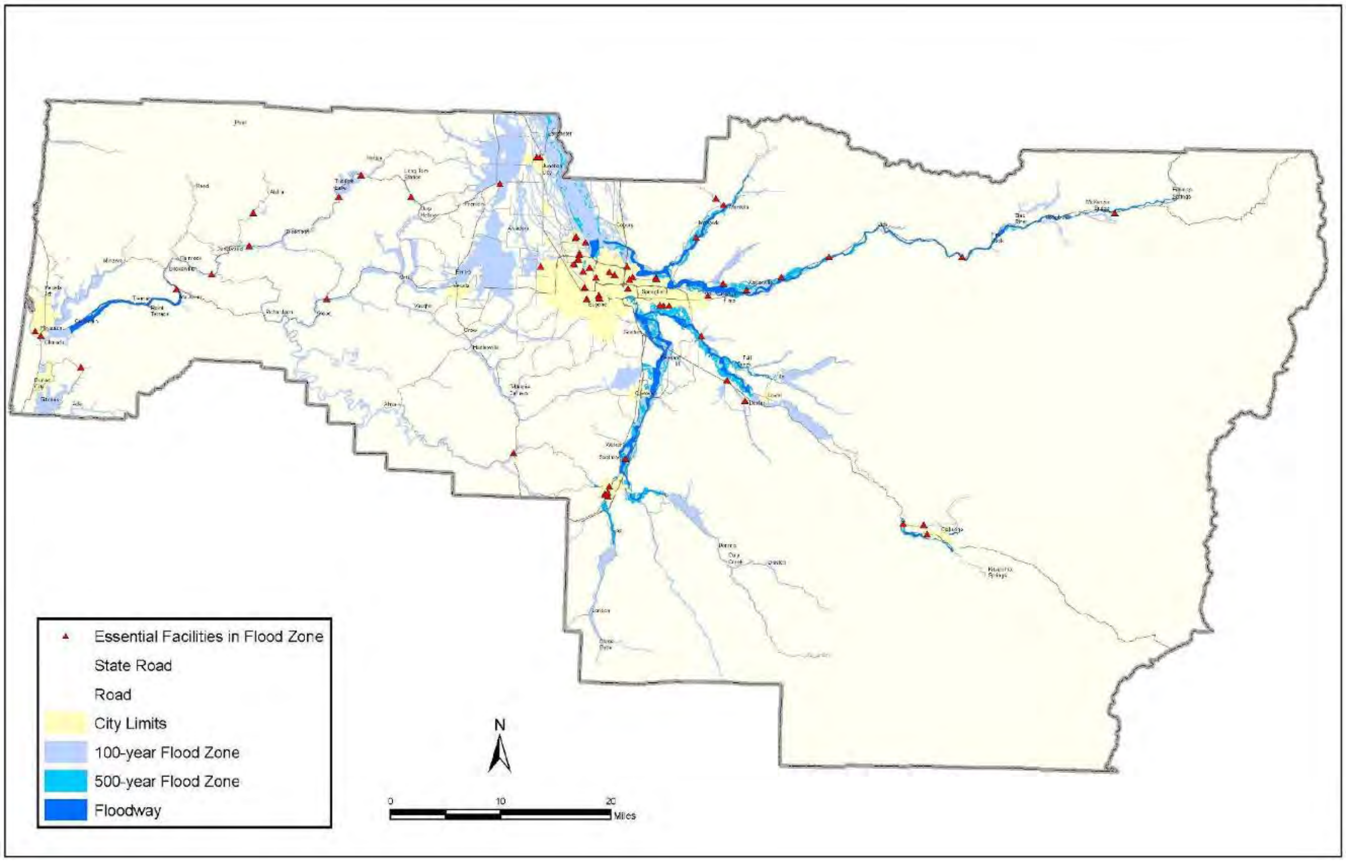


Figure 3-38 Essential Facilities in Flood Zone

Source: Lane County

The map in Figure 3-39 on the following page shows a full inventory of non-essential facilities in relation to mapped floodplains.

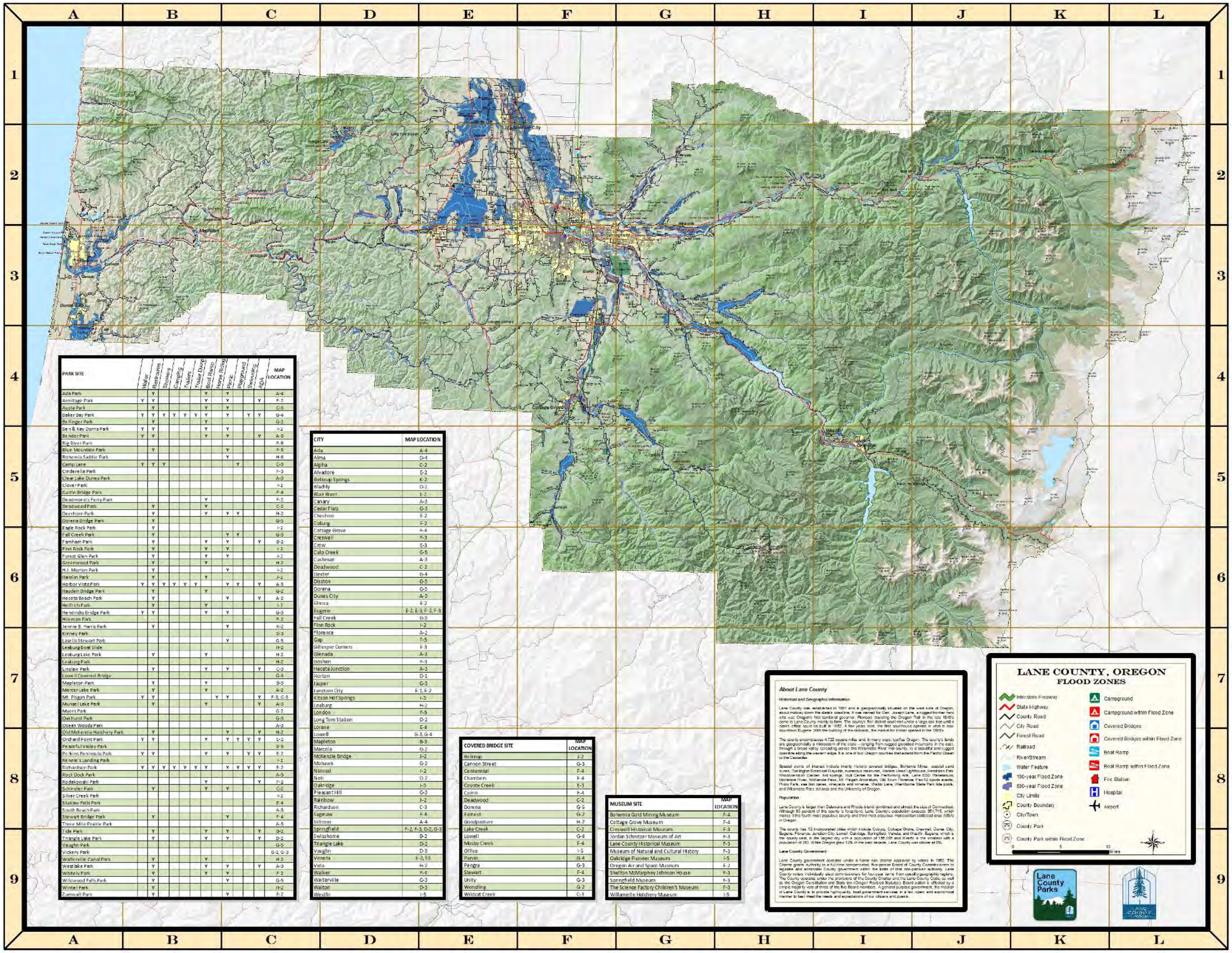


Figure 3-39 – Lane County Non-Essential Facilities in Relation to Mapped Flood Plains

Roadways and Bridges in Relation to Flood Risk

Another related concern relates to flooding on county roadways. Certain sections of roads experience some degree of flooding nearly every year. Resulting impacts include impeded access / egress by emergency response vehicles as well as public safety risk and economic disruption.

A high proportion of flooding fatalities occur when vehicles attempt to travel flooded roads. When inundated, it is difficult to judge vehicle alignment with the road surface and ditch location, as well as washouts or road hazards below the water surface.

Adding to this danger, when water is running with velocity across a roadway, it exerts hydraulic force perpendicular to the direction of travel which can sweep vehicles off the roadway and create potentially life threatening situations.

Following is a list of ten (10) high water locations that Lane County Public Works considers their highest mitigation priority.

Road Number	Road Name	Beginning Mile Post	Ending Mile Post
3110	Love Lake Road	1.45	
4335	Vaughn Road	8.35	
1628	Coleman Road	0.09	0.37
6068	Edenvale Road	0.70	1.00
5070	North Fork Siuslaw Road	5.70	
6122	Parvin Road	0.40	
5036	Sweet Creek Road	4.57	
1625	Herman Road	0.52	0.89
4093	Powell Road	0.139	
4096	Simonsen Road	0.159	

Source: Lane County

Additionally, the following is a list of covered bridges in Lane County located in Special Flood Hazard Areas as defined on FEMA Flood Insurance Rate Maps:

<u>Lane County Covered Bridges in Flood Zones</u>

Coyote Creek Covered Bridge,

Dorena Covered Bridge,

Lake Creek Covered Bridge,

Lowell Covered Bridge,

Mosby Creek Covered Bridge,

Parvin Covered Bridge,

Stewart Covered Bridge,

Wendling Covered Bridge,

Wildcat Creek Covered Bridge.

Maps of the following pages show all of the high water locations countywide that have been identified at the time of this writing. Additionally, a report discussing the results of a High Water Location Tour can be found in Appendix C.4.3. *Results of High Water Location Tour.*

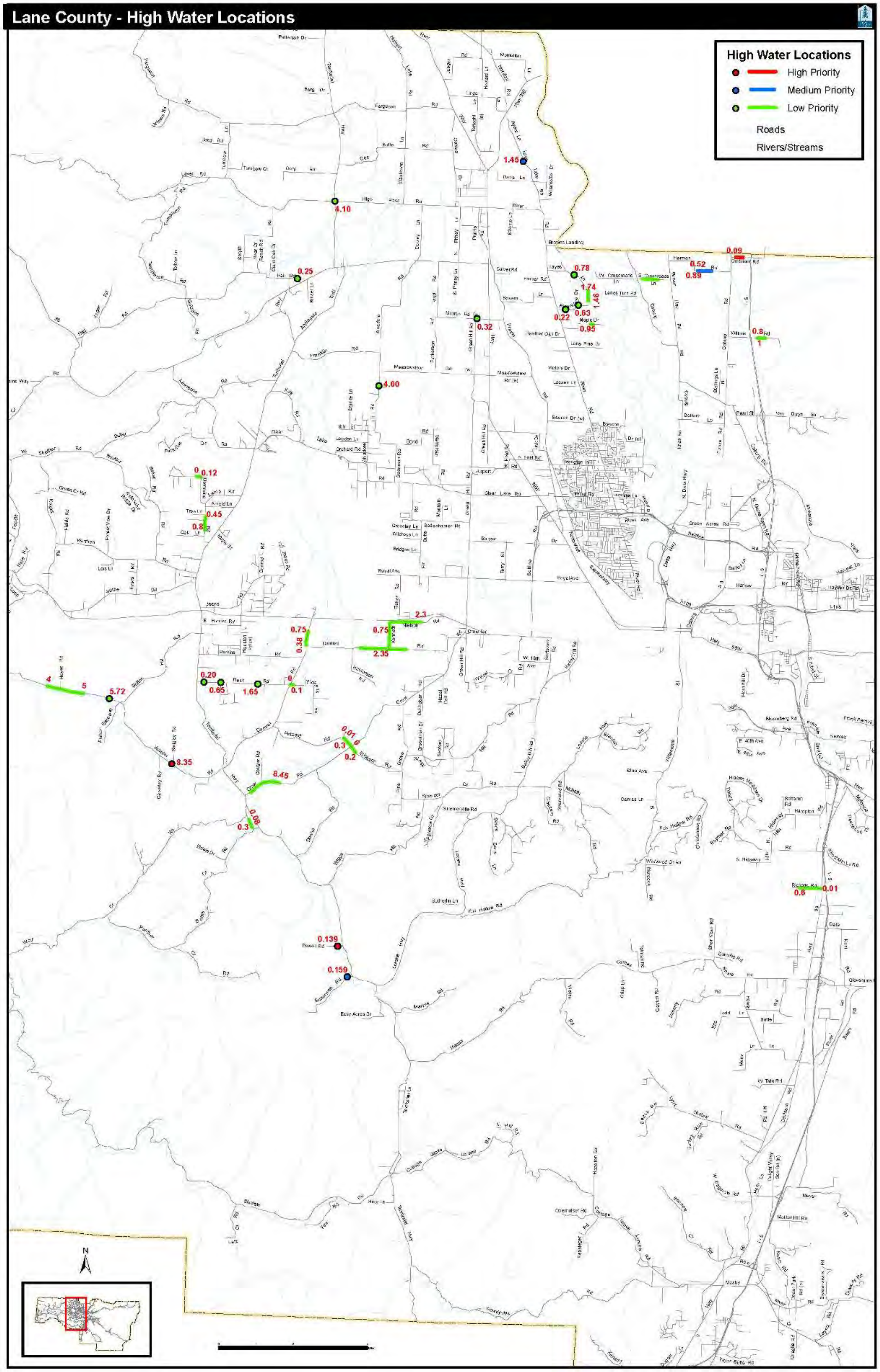


Figure 3-40 High Water Locations, Central Lane County

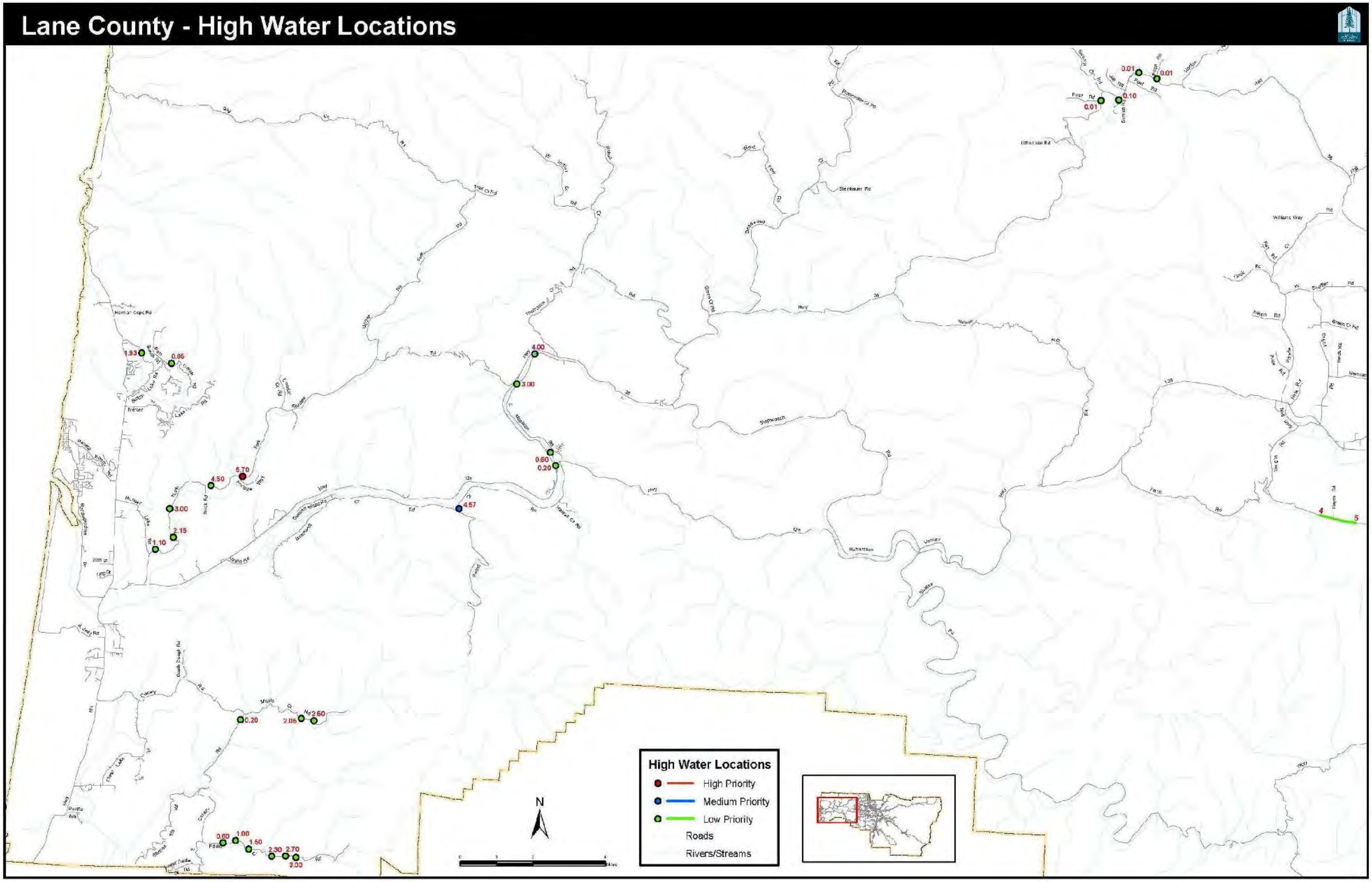


Figure 3-41 High Water Locations, Western Lane County

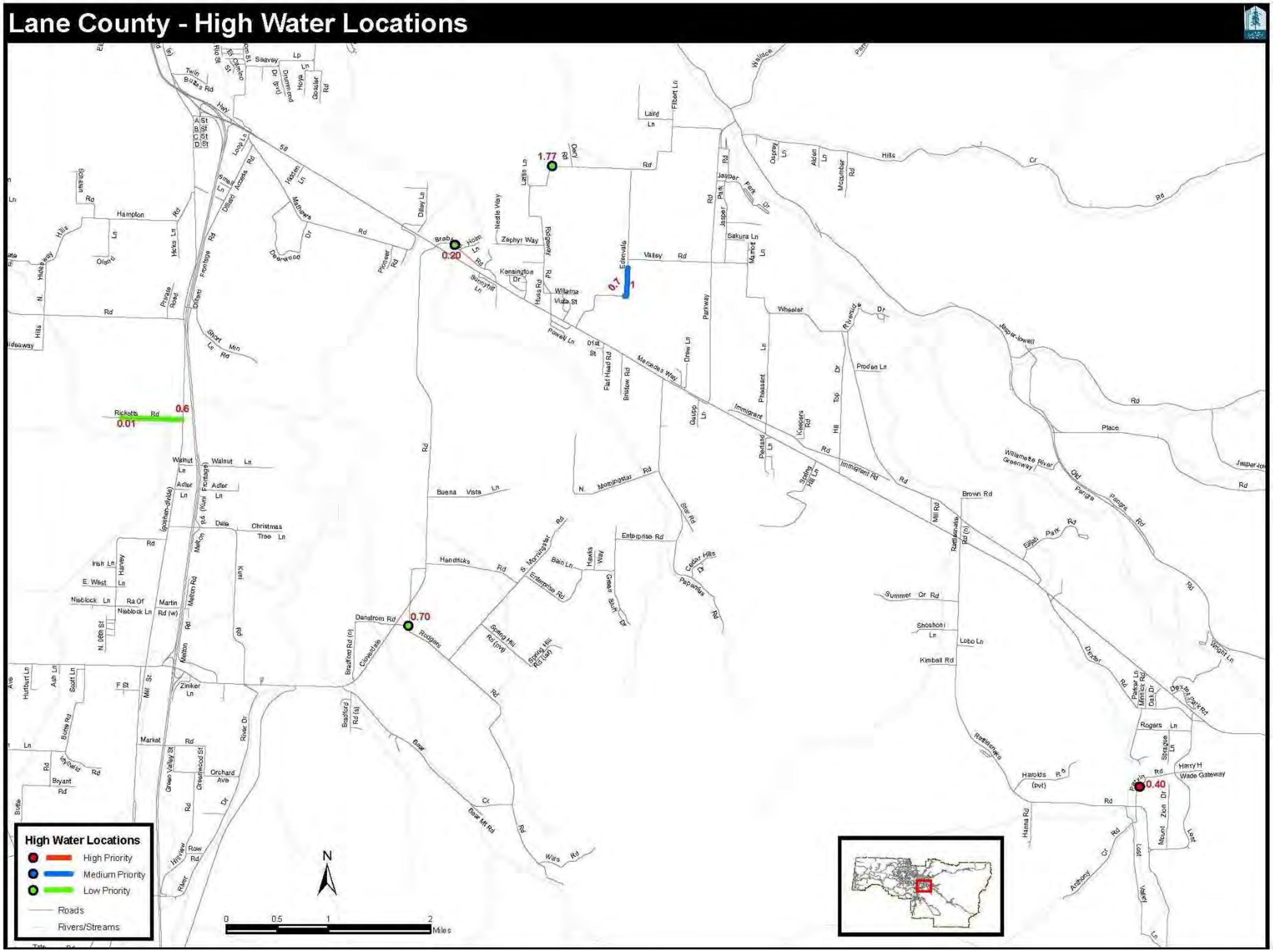


Figure 3-42 High Water Locations, Eastern Lane County

Facilities in Relation to Wildland-Urban Interface

Similar to analysis regarding facility relationship to flood risk, the following map shows critical facilities located in the wildland-urban interface (WUI). WUI areas are generally defined as geographic areas where the built environment is located in close proximity to forests and/or potential wildfire risk. Notable concentrations of facilities in the wildland-urban interface are south of the Eugene and Springfield metro areas, and in the surrounding areas of Cottage Grove, Westfir, and Oakridge.

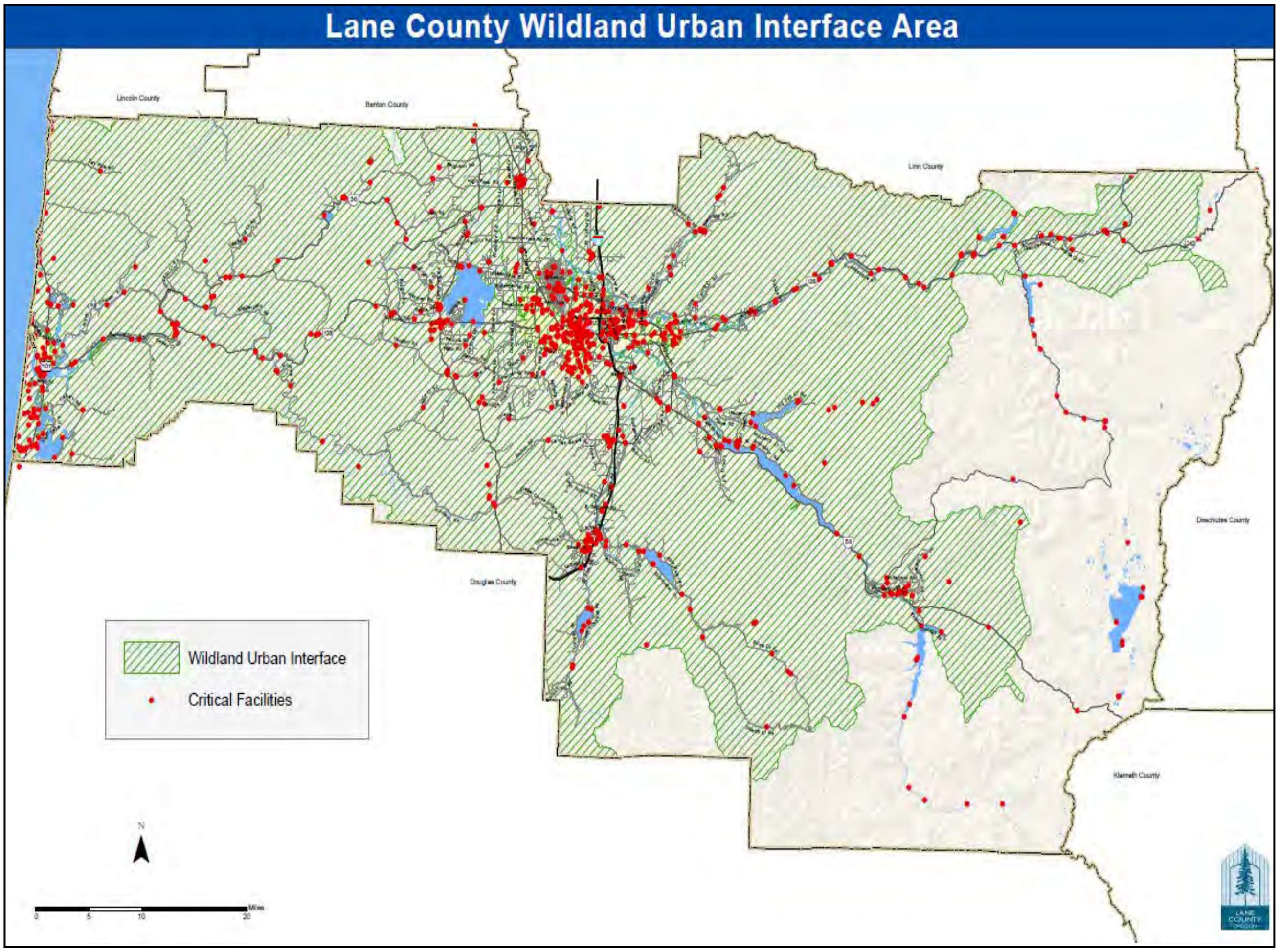


Figure 3-43 Facilities in Relation to Wildland-Urban Interface

3.3.8 Potential Dollar Loss

The following maps show distribution of land improvement (structure) values in Lane County

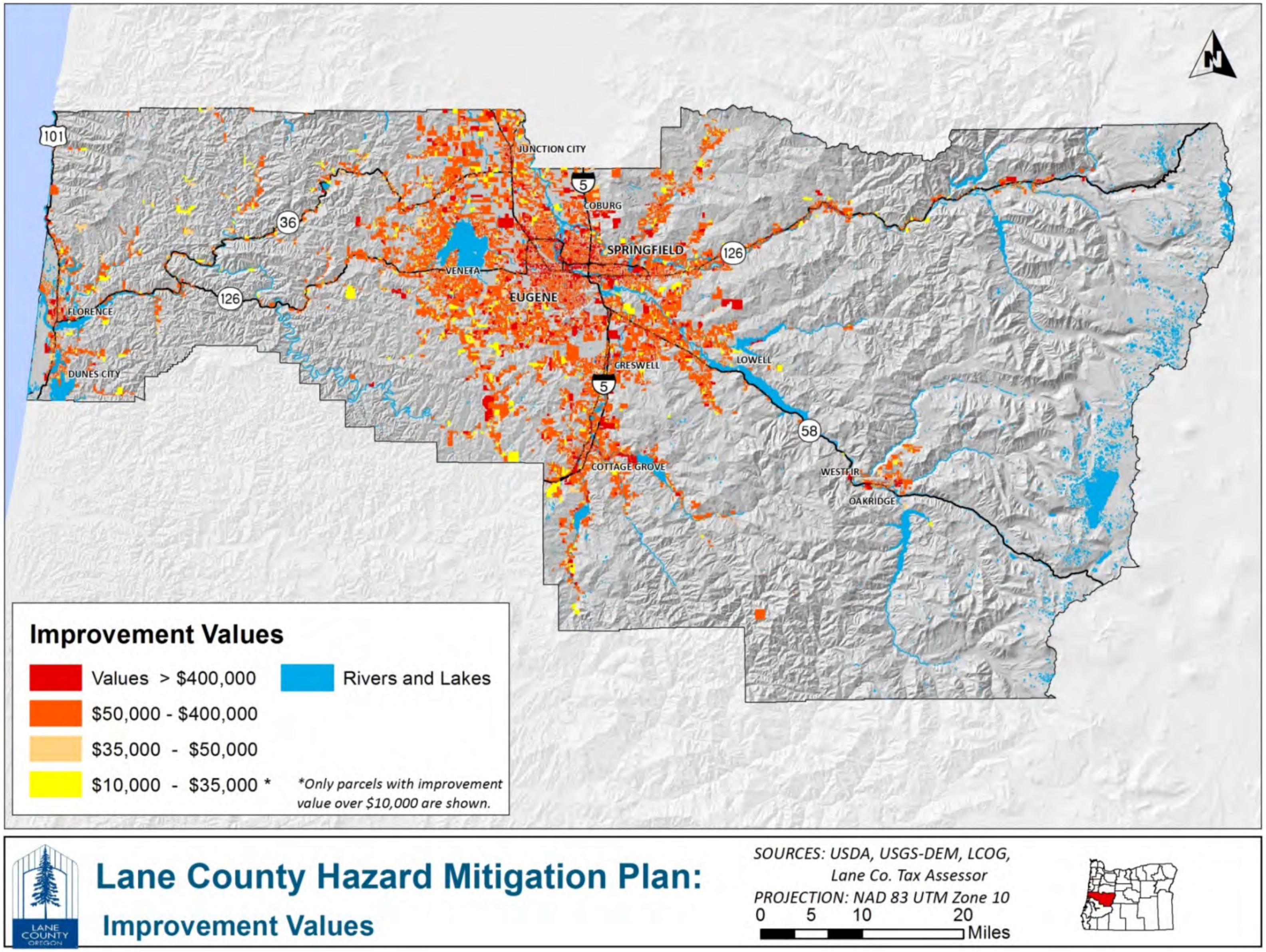
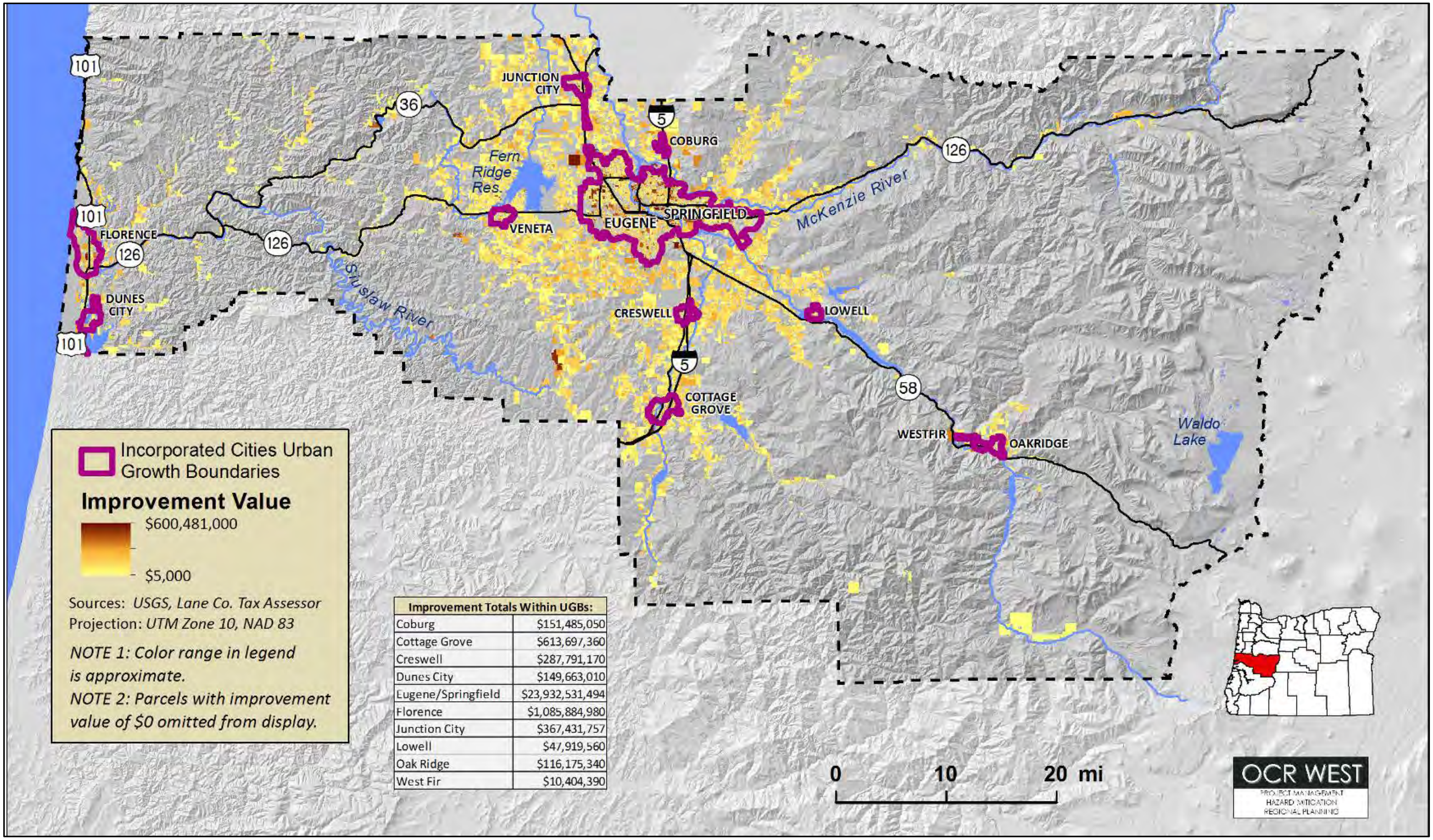


Figure 3-44 Improvement Value per Parcel; Lane County (2014 Data)



Improvement Totals Within UGBs:	
Coburg	$151,485,050
Cottage Grove	$613,697,360
Creswell	$287,791,170
Dunes City	$149,663,010
Eugene/Springfield	$23,932,531,494
Florence	$1,085,884,980
Junction City	$367,431,757
Lowell	$47,919,560
Oak Ridge	$116,175,340
West Fir	$10,404,390

Figure 3-45 Improvement Value per Parcel (Cont'd); Lane County (2014 Data)

4. MITIGATION STRATEGY

44 CFR Requirement 201.6(c) (3):
The plan shall include a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.

This chapter describes Lane County's blueprint for reducing the potential losses identified in the risk assessment and is based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools. The mitigation strategy creates a planning framework to reduce the impact of future hazard events. The structure of this mitigation strategy is intentionally straightforward:

- Establish goals
- Gather information, evaluate risk and vulnerability
- Identify a range of options to mitigate risk and vulnerability
- Implement best options
- Evaluate effectiveness
- Repeat

This chapter begins by defining the goals established early in the planning process, outlined in ***Section 4.1 (Local Hazard Mitigation Mission and Goals)***.

Section 4.2 (Mitigation Action Item Identification and Prioritization) describes the process through which mitigation actions were decided upon and ranked by relative priority.

Section 4.3 (Lane County Mitigation Action Items) lists mitigation activities to be pursued by the County. It consists of two subsections, Subsection 4.3.1 lists new action items identified during the current planning cycle, and Subsection 4.3.2 lists action items identified in the previous planning cycle and staged for implementation.

Section 4.4 (Coordination of Mitigation Planning Strategies) details methods and capabilities to implement mitigation goals and strategy via cooperative functions across departments and agencies.

4.1 LOCAL HAZARD MITIGATION MISSION AND GOALS

44 CFR Requirement §201.6(c) (3) (i): *[The hazard mitigation strategy **shall** include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.*

As stated in the Introduction, the Mission of this Plan is as follows:

Mission Statement

To promote and implement actions to eliminate or reduce long-term risk to human life and property from the effects of hazards of all types and sources, and to enhance capability to prepare, respond, and recover from such incidents.

The Hazard Mitigation & Emergency Management Steering Committee periodically reviews the Plan goals to consider additions or changes. The current iteration of Plan goals are as follows:

Goals

Goal 1: Prevent loss of life and reduce injuries and illness.

Goal 2: Minimize and prevent damage to buildings and infrastructure.

Goal 3: Reduce recovery period and minimize economic losses for the community.

Goal 4: Maintain and improve ability of Lane County, municipal governments, and critical service providers to quickly resume operations.

Goal 5: Protect natural, historic, and cultural resources.

Goal 6: Increase awareness of hazards and understanding of mitigation methods.

Goal 7: Improve attractiveness to individuals and businesses by demonstrating effectiveness in dealing with a disaster.

Lane County's mitigation goals are in similar alignment with the goals of the State of Oregon Hazard Mitigation Plan (2015).

State of Oregon Natural Hazard Mitigation Plan Goals (2015)

State Mitigation Goal #1: Protect life and reduce injuries resulting from natural hazards.

State Mitigation Goal #2: Minimize public and private property damages and the disruption of essential infrastructure and services from natural hazards.

State Mitigation Goal #3: Increase the resilience of local, regional, and statewide economies.

State Mitigation Goal #4: Minimize the impact of natural hazards while protecting, restoring, and sustaining environmental processes.

State Mitigation Goal #5: Enhance and maintain state capability to implement a comprehensive statewide hazard loss reduction strategy.

State Mitigation Goal #6: Document and evaluate Oregon's progress in achieving hazard mitigation.

State Mitigation Goal #7: Motivate the public, private sector, and government agencies to mitigate against the effects of natural hazards through information and education.

State Mitigation Goal #8: Eliminate development within mapped hazardous areas where the risks to people and property cannot be mitigated.

State Mitigation Goal #9: Minimize damage to historic and cultural resources.

State Mitigation Goal #10: Increase communication, collaboration, and coordination among agencies at all levels of government and the private sector to mitigate natural hazards.

State Mitigation Goal #11: Integrate local NHMPs with comprehensive plans and implementing measures.

4.2 COORDINATED MITIGATION STRATEGIES - IMPLEMENTATION CAPABILITIES

CFR 44 Requirement: §201.6(c) (3) (ii):
[The mitigation strategy] must also address the jurisdiction's participation in the National Flood Insurance Program (NFIP), and continued compliance with NFIP requirements, as appropriate.

A key component of the Mitigation Strategy is the coordination and implementation of measures in community planning, operations and governance which support hazard mitigation goals.

The State of Oregon has a unique but powerful system of statewide land use planning goals. Each of these goals, 17 in all, are required to be addressed in local comprehensive plans, including a state goal related to natural hazards. Oregon Department of Land Conservation (DLCD), reviews plans and oversees compliance of local comprehensive plans. Natural hazards are the subject of Goal 7, including floods, earthquakes, landslides, tsunamis, coastal erosion and wildfires. Over the years, DLCD has published significant guidance for local governments addressing planning and mitigation options for each of these hazards. It also notifies local governments when relevant new hazard information requires a local planning response, which must occur within three years.

Lane County's uses its Comprehensive Plan as the overarching plan that possesses the legal standing as a reference point for local land-development regulations. The Comprehensive Plan includes a hazards / safety element that can be reinforced in community plans and programs such as this Natural Hazards Mitigation Plan.

In addition to the Comprehensive Plan, Lane County has several means for implementing preventive measures to protect new construction from hazards and to see that future development does not create unintended consequences in the form of hazardous conditions or economic loss. There are several ordinances in Lane Code that assist with achieving hazard mitigation through these types of preventive measures. Lane County Public Works, Land Management Division administers these preventive measures through (list not exhaustive):

- National Flood Insurance Program - Floodplain Management
- Building Codes
- Wildfire Protection
- Planning and Zoning
- Land Divisions
- Parks and Open Space

Additional measures for coordinated mitigation activities include County administration and budgeting as it relates to the capital improvement plans (CIPs), the selection and direction to private contractors, and development and administration of MOU's and cooperative agreements with public utilities and special districts. See also Section 5.3 for a listing of planning mechanisms suitable for integration with the Mitigation Strategy of this plan.

4.2.1 National Flood Insurance Program Participation / Compliance

National Flood Insurance Program

In 1968, Congress passed the National Flood Insurance Act based on findings that: "(1) a program of flood insurance can promote the public interest by providing appropriate protection against the perils of flood losses and encouraging sound land use by minimizing exposure of property to flood losses; and (2) the objectives of a flood insurance program should be integrally related to a unified national program for floodplain management."

The Flood Insurance Act is administered through the National Flood Insurance Program, (NFIP). The NFIP is a voluntary program that is based upon cooperative agreements between the federal government and local participating communities. The NFIP enables property owners within participating communities to purchase flood insurance and helps to provide an insurance alternative to the rising costs of federal flood disaster relief. In return, participating communities must properly manage their floodplains by adopting and enforcing floodplain management ordinances aimed at reducing the likelihood of future flood damage to new construction.

Since 1970, Lane County has been a participating member of the NFIP. In order to participate in the NFIP, Lane County is required to adopt and enforce floodplain management ordinances aimed at reducing the likelihood of future flood damage to new construction within the regulated floodplain, also known as the Special Flood Hazard Area (SFHA). The county must manage land within SFHA in ways that meet or exceed standards set by the Federal Emergency Management Agency (FEMA). The Land Management Division is responsible for administering the day-to-day activities of the county's floodplain program, which are extensive. Specifically, the Land Management Division:

- maintains and administers Lane County's floodplain regulations
- reviews and issues floodplain development permits
- maintains elevation certificates for all new and substantially improved structures (and also maintains an extensive database of historic elevation certificates)
- ensures that encroachments do not occur within the regulated floodway
- implements measures to ensure that new and substantially improved structures are protected from flood losses
- maintains floodplain studies and maps and makes this information available to the public
- maintains a flood information website with digital flood insurance rate map (DFIRM) data
- conducts site visits to assess conditions and provide technical assistance to the public
- maintains a library of historical flood related information
- informs the public of flood insurance requirements
- conducts outreach and training about flood hazards and development within the floodplain

4.2.2 NFIP - Community Rating System (CRS)

In 1990, the National Flood Insurance Program's Community Rating System (CRS) was implemented. The CRS is sub-program within the NFIP created to recognize and encourage floodplain management practices that exceed the minimum NFIP standards.

Under the CRS, flood insurance premium rates are lowered to reflect reduced flood risk resulting from community activities that meet the objectives of the CRS. Those objectives are:

(1) Reduce flood losses, i.e.,
- protect public health and safety,
- reduce damage to buildings and contents,
- prevent increases in flood damage from new construction,
- reduce the risk of erosion damage, and
- protect natural and beneficial floodplain functions.

(2) Facilitate accurate insurance rating; and

(3) Promote the awareness of flood insurance.

As part of the Lane County Land Management Division's 2007 Long Range Planning Work Program, staff was formally directed to take actions necessary for the county to gain admittance into the CRS. Prior to submitting an application, LMD was first required by FEMA to process updates to the county's floodplain ordinances (LC 16.244 and LC 10.2.71) and to take measures necessary to address Lane County's repetitive flood loss properties. These activities were carried out during 2007 and on March 3, 2008 Lane County's CRS application and accompanying documentation was submitted to FEMA for formal review.

On July 2, 2009, Lane County received official notification of admission into the CRS, and has since maintained its standing in the CRS and is committed to continued NFIP compliance.

The current CRS rating for Lane County is a "7" on a scale from 10 (lowest) to 1 (highest). Lane County's 7 rating results in a 15 percent discount on flood insurance premiums for homes in Special Flood Hazard Areas (SFHAs).

4.2.3 Building Codes

Building codes provide one of the best methods of addressing most of the hazards in this plan. They are the primary means for protecting new property from damage by snow / ice storms, flood, windstorms, landslides and earthquakes. When properly designed and constructed according to code, the average building can withstand the impacts of most of these forces.

The mission of Lane County's Building Program is to protect public safety, health and welfare wherever hazards associated with the design, erection, repair, removal, demolition or occupancy of structures have the potential to exist within the county's jurisdiction. The Building Program endeavors to fulfill this mission through efficient, professional, and equitable administration of nationally recognized code standards and local regulations.

Code administration, which is enforcement of code standards, is very important. Adequate inspections are needed during the course of construction to ensure that the builder understands and implements the requirements. The Building Code Effectiveness Grading Schedule (BCEGS) is a national program used by the insurance industry to determine how well new construction is protected from wind, earthquake and other non-flood hazards. Building permit programs are reviewed and scored, a class 1 community is the best, and a class 10 communities has little or no program. Lane County has a BCEGS classification of 4 for residential and 3 for commercial.

The building codes in use by Lane County are as follows:

Commercial Building Codes:

- 2010 Oregon Structural Specialty Code (OSSC): 2009 International Building Code (IBC) w/ 2010 Oregon Amendments
- 2010 Oregon Mechanical Specialty Code (OMSC): 2009 International Mechanical Code (IMC) and 2009 International Fuel Gas Code (IFGC) w/ 2010 Oregon Amendments
- 2008 Oregon Plumbing Specialty Code (OPSC): 2006 Uniform Plumbing Code (UPC) w/ 2008 Oregon Amendments
- 2010 Oregon Fire Code (OFC): 2009 International Fire Code (IFC) w/ 2010 Oregon Amendments
- 2008 Oregon Electrical Specialty Code (OESC): 2008 National Electric Code (NEC) w/ 2008 Oregon Amendments
- 2010 Oregon Energy Efficiency Specialty Code (OEESC): 2009 International Energy Conservation Code (IECC) w/ 2010 Oregon Amendments

Residential Building Codes:

- 2008 Oregon Residential Specialty Code (ORSC): 2006 International Residential Code (IRC) w/ 2008 Oregon Amendments
- 2008 Oregon Electrical Specialty Code (OESC): 2008 National Electric Code (NEC) w/ 2008 Oregon Amendments
- 2008 Oregon Plumbing Specialty Code (OPSC): 2006 Uniform Plumbing Code (UPC) w/ 2008 Oregon Amendments
- 2010 Oregon Manufactured Dwelling Installation Specialty Code (OMDISC)
- 2010 Oregon Energy Efficiency Specialty Code (OEESC): 2009 International Energy Conservation Code (IECC) w/ 2010 Oregon Amendments

4.2.4 Planning & Zoning, Goal 7, Land Divisions & Open Space

The Lane County Rural Comprehensive Plan (LCRCP, 2010) notes in Section 2, Goal 2 (Land Use Planning) identifies lack (or presence) of natural hazards is a criterion for defining land use designations in unincorporated portions of the county. Additionally, Goal 7 of the LCRCP specifically focuses on natural hazards, which sets forth the following provisions and guidance (excerpted verbatim in its entirety).

GOAL SEVEN: AREAS SUBJECT TO NATURAL DIASTERS AND HAZARDS

1. The Natural Hazards Inventory, as contained in the 1982 Natural Hazards Working Paper and associated materials, shall be used as a guide for general land use decisions. Specific land use decisions shall be based upon the inventory and upon on-site or other evaluation as appropriate.

2. Development shall be commensurate with the type and degree of any natural hazard(s) present and appropriate safeguards against flooding, ponding, landslides, land slippage, erosion or other natural hazards applicable shall be assured. For purposes of evaluation and in the absence of any specific proposal, the provisions of the Oregon State Building Code shall be assumed to be the sole means of safeguard against natural hazards.

3. When extensive or drastic safeguards must be employed in conjunction with development proposals, the immediate and ultimate impact, (including financial and economic considerations) of such safeguards on the environment and the public shall be considered.

4. Lane County shall continue as a qualified participant in the Federal Flood Insurance Program through application of comprehensive flood hazards analysis and floodplain management data to general and specific land use decision.

Figure 4-1 Lane County Rural Comprehensive Plan: Goal 7 Excerpt

Source: Lane County Rural Comprehensive Plan, November 30, 2010.

Lane County has several combining zones outlined in Lane Code that help direct development away from hazardous areas by designating land uses that are more compatible to the natural conditions of the land. Among other things, these types of zoning regulations help mitigate natural hazards.

Natural Resources Conservation Combining District (Lane Code 10.250)

Natural Hazard Mitigation includes preserving protective features such as wetlands, estuarine marshes and floodplains. Protecting natural resources meets multiple objectives: preserves habitat, protects the environment and limits development in hazardous areas.

Lane County's Natural Resources Conservation Combining District applies to coastal area shorelands identified in inventory information as timber lands, agricultural lands or shorelands in dune areas. It is the purpose of the NRC District to encourage long-term human use of these coastal resources in a manner which protects the qualities of coastal water bodies and respects the natural systems. Activities which protect or enhance renewable resources are encouraged, as are recreation and public access to coastal waters.

Shorelands Mixed Development Combining Zone (Lane Code 16.241)

The Shorelands Mixed Development Combining Zone applies to coastal shore lands committed to commercial and industrial uses in proximity to the dredged channel of the Siuslaw River. Lane Code dictates that these shore lands be preserved for the expansion of existing water-dependent and water-related commercial or industrial uses. Part of the reason for doing this is to avoid geologic and hydrologic hazards and to avoid hazard to life or property.

Beaches and Dunes Combining Zone (Lane Code 16.243)

The Beaches and Dunes Combining Zone requires the completion of a Development Hazards Checklist as the initial screening process for any development proposed for Beach and Dune areas.

The Development Hazards Checklist is used to indicate certain potential hazards associated with the particular landform proposed for development including hazards associated with adjacent sites. The checklist screens for adequate protection against soil erosion from wind and surface water runoff as well as possible fire hazard or slide potential based on the existing site vegetation.

Floodplain Combining Zone (Lane Code 16.244)

The Floodplain Combining Zone outlines methods for reducing flood losses, clarifies to which lands the code applies, and specifies provisions for flood hazard reduction pertaining to foundations and anchoring, utilities, elevation for residential and non-residential structures, elevation of manufactured homes, elevation of recreational vehicles, enclosed areas, roads and subdivisions and partitions.

Specifically, Lane Code 16.244 (applicable to rural areas) and, 10.271 (applicable to areas within the Urban Growth Boundary) requires that all permit applications be reviewed to determine whether the proposed development site will be reasonably safe from flooding. If a proposed development site is in a flood hazard area, all site development activities (including grading, filling, utility installation and drainage modification), all new construction and substantial improvements (including the placement of prefabricated buildings and manufactured homes) are required to be constructed with methods, practices and materials that minimize flood damage.

Land Divisions

Lane Code 13.050 stipulates that any area determined to be dangerous for road or building development by reasons of geological conditions, unstable subsurface conditions, groundwater or seepage conditions, floodplain, inundation or erosion or any other dangerous condition shall not be divided or used for development except under special considerations and restriction. Special consideration and restriction shall consist of a detailed report by a professional engineer stating the nature and extent of the hazard and recommending means of protecting life and property from the potential hazard and/or the County shall impose limitations designed to minimize the known danger on development commensurate with the degree of hazard.

Parks and Open Space

Keeping the floodplain and other hazardous areas open and free from development is effective for preventing damage to new developments.

Lane County has preserved approximately 31,520 acres in the Severe Flood Hazard Area (SFHA) as open space with additional land preserved in a natural state.

Although natural hazard mitigation is not an explicitly stated goal in Lane County's Parks & Open Space Master Plan, Lane County owns or maintains 73 parks totaling over 4300 acres. Approximately 85% of the parks are located in a floodplain combining zone which naturally contributes to flood hazard mitigation.

4.2.5 Wildfire Protection / Firewise Program

Community Wildfire Protection Plan (CWPP)

Recent fires in Oregon and across the western United States have increased public awareness of the potential losses to life, property, and natural and cultural resources. In July of 2005, the Lane County Commissioners directed the County Departments to work with state and federal agencies, fire protection districts, and community organizations throughout the County to develop an integrated wildfire plan. The Commissioners initiated this effort to reduce wildfire risk to citizens, the environment, and quality of life within Lane County. The Lane County Community Wildfire Protection Plan provides a guide for taking a more wildfire-based approach in managing our forest lands. The Lane County CWPP also assists the county in being more competitive for federal funding programs such as the Healthy Forests Restoration Act, the National Fire Plan, and the Federal Emergency Management Agency's (FEMA) Pre-Disaster Mitigation Program.

Firewise Communities & Incentive Program

The National Firewise Communities Program is an interagency effort designed to encourage local solutions for wildfire safety by involving homeowners, planners, community leaders, developers, firefighters and others in an effort to protect people and property from the risk of wildfire – before a fire starts. The Firewise approach focuses on planning, landscaping, construction, and home maintenance to help protect people, property, and natural resources.

In 2009, Lane County adopted policies in Lane Manual Chapter 4.3 to establish a grant incentive program designed to mitigate the risk of wildfire to rural residents.

The mission of the Lane County Firewise Incentive Program is to promote home construction and landscaping techniques that will prevent *fatalities, injuries, property loss and environmental damage resulting from wildfires.*

To help achieve this mission the program provides funding to partially or wholly reimburse the costs that rural home owners incur for certain types of home and landscaping improvements. These improvements are promoted by the National Firewise Communities Program and if implemented properly have been shown to reduce the probability that a home will be damaged or destroyed in a wildfire.

Currently, grants are offered for the following types of improvements:

1. Replacement of a wood shake roof with a roof consisting of a Class-A covering or Class-A assembly (80% of costs up to $4,000)
2. Installation of non-combustible exterior siding (80% of costs up to $4,000)
3. Installation of fire resistant (and energy efficient) exterior windows and skylights made from tempered glass, multi layered glazed panels or glass block (80% of costs up to $1,500)
4. Installation of non-combustible exterior doors (80% of costs up to $300)
5. Installation of spark arrestors on chimneys ($100)
6. Installation of mesh screening on exterior ventilation or deck openings that will prevent the entry of firebrands and the accumulation of flammable debris ($100)
7. Landscaping improvements that will create a defensible space around habitable structures. Under this category funding is available for brush removal, tree pruning, chipping and the planting of approved fire-resistant plants within a 30' buffer around homes (up to $1,000 depending on site specific conditions)

To date, Lane County's Firewise Incentive program has dispersed over $700,000 to property owners living in at risk areas.

4.2.6 Public Health Emergency Preparedness

Lane County's Public Health office engages in mitigation and prevention as a standard operating procedure, in addition to monitoring and responding to public health threats from a response and recovery standpoint.

The mission of Lane County's Public Health (LCPH) is to preserve, protect and promote the health of all people in Lane County. LCPH collaborates with emergency preparedness leaders at the local, state and federal levels, developing and exercising emergency preparedness and response plans to improve local responses to bioterrorism, chemical emergencies, infectious disease outbreaks, natural disasters, and other health risks. LCPH also works with healthcare organizations and other agencies across our county to assist in preparedness education, identify community needs, and maximize existing preparedness resources and networks.

Core activities of Lane County Public Health Emergency Preparedness include:

- Public advisory on health preparedness techniques,
- Public advisory on immunization and illness prevention,
- Providing guidance to mitigate disease outbreak in post-disaster environments, such as food and water safety; protection from mold, smoke, and airborne health threats; pet and livestock considerations,
- Providing information channels for mitigating health impacts from technical hazards such as bio-terrorism, hazardous materials accident,
- Public health emergency response and prevention guidance for businesses,
- Preparedness for diverse populations such as persons with special needs, older adults and children,
- Emergency preparedness and mitigation considerations for mental health.

As a key method for coordinating mitigation strategies, the Lane County Public Health Emergency Preparedness Coordinator sits on the Hazard Mitigation & Emergency Management Steering Committee (HM&EM-SC). Additionally, Lane County Public Health provides a conduit for incorporating mitigation strategy into existing and future planning mechanisms including incorporation with Lane County's Community Health Improvement Plan (April 2013) and associated principles of 'Health in All Policies'.

4.3 ACTION ITEM IDENTIFICATION AND PRIORITIZATION

44 CFR Requirement §201.6(c) (3) (ii)
The mitigation strategy shall include a section that identifies and analyzes 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.

Pursuant to the above stated goals, the Lane County Hazard Mitigation & Emergency Management Steering Committee (HM&EM-SC) developed at least two (2) mitigation action items (measurable activities targeted at mitigating disaster events) which address each hazard type. Certain mitigation action items address more than one hazard type. Mitigation action items, implementation strategies, and methods for identification and prioritization are described in the following sections.

4.3.1 Action Item Prioritization – Vetting Process

There were several factors considered in determining the action items for the next five years. This Plan update is being written during a time that the United States is experiencing unprecedented economic hardship. Consequently, what could not be ignored is the ubiquitous problem of shrinking budgets and thinning resources. Therefore, to keep the plan meaningful, potential action items were prioritized and only those meeting the following criteria were included in the Plan:

- Does the purpose of the Action Item (AI) align with the core mission of Lane County government?
- Is there motivation to carry out the AI?
- Do we know what to do to carry out the AI?
- Does the AI address some of our most pressing challenges?
- Is implementing the AI feasible in terms of cost and resources?
- Are there tangible benefits?

4.3.2 Action Item Prioritization – Criteria and Formula

Following the initial vetting process for action item consideration, the Hazard Mitigation & Emergency Management Steering Committee used a somewhat formulaic approach which emphasized the cost effectiveness, social effects, technical feasibility, administrative considerations, political or legal considerations, economic impacts, and environmental soundness. These criteria, organized under the STAPLE-E acronym, are listed below, followed by the method for benefit-cost review:

STAPLE E Criteria

- **S**ocial Effects
- **T**echnical Feasibility
- **A**dministrative Barriers/Considerations
- **P**olitical Considerations
- **L**egal Ramifications
- **E**conomic Impacts
- **E**nvironmental Soundness

Cost-Effectiveness Consideration

An overall evaluation of an action item's expected benefits versus costs was also considered during action item identification and prioritization. Items with estimated benefits that outweighed expected costs were generally given favorable consideration over those action items with negative benefit-cost ratios.

Prioritization Formula

The list of hazard mitigation action item ideas established in the vetting process were evaluated based on STAPLE-E criteria, benefit-cost review, and other quantitative and qualitative factors. Participants evaluated each action item and assigned a numeric equivalent according to the following formula:

- Meets at least five STAPLE-E criteria and **generally cost effective - Numeric Equivalent 4**
- Meets three or four STAPLE-E criteria **- Numeric Equivalent 2**
- Meets at least one STAPLE-E criteria and = 1:1 BCR **- Numeric Equivalent 1**

Numeric equivalent results for each action item were aggregated and ultimately used as a basis for mitigation project prioritization discussions. Order of mitigation action item listed in the section that follows (Section 4.3 Countywide Action Items) can be used to imply general priority of the action items. However, all projects listed have been vetted by the HM&EM-SC and are all considered valuable methods for reducing future disaster impacts in the planning area.

4.4 HAZARD MITIGATION ACTION ITEMS

4.4.1 Previous Mitigation Actions and Progress Report

The following list of mitigation action items were identified and prioritized in the 2006-2012 planning cycle and published in Lane County PLAN Version 2.0. They are included here for implementation tracking purposes.

Mitigation Action Item 1. Establish Mitigation Coordinating Committee

Establish committee to act as a forum for hazard mitigation issues, disseminate hazard mitigation ideas and activities to all participants, monitor implementation of the Action Items and report on progress and recommended changes to the Plan as appropriate; includes identifying opportunities to incorporate mitigation actions into other planning mechanisms, such as comprehensive or capital improvements, as appropriate.

- *Responsible Agency*: Lane County Emergency Management
- *Timeline*: June 2012 and continuing
- *Cost*: Staff time
- *Benefits*: Demonstrates a deliberative approach to planning and implementation that involves the necessary stakeholders and subject matter experts to carry out action items and incorporate them into other planning mechanisms for broader reach throughout the community.
- *Progress Report:* Excellent progress, implementation of this action item will continue

Mitigation Action Item 2. Public Education and Outreach

Conduct public outreach activities related to hazard mitigation and personal preparedness using a variety of media sponsored by various agencies, such as: community newsletters and direct mailings; news releases and public service announcements; presentations at meetings of neighborhood, civic or business groups; displays in public buildings or shopping malls; coordinated announcements on agency web pages.

- *Responsible Agency*: All Lane County Departments
- *Timeline*: June 2012 and continuing
- *Cost*: $5000/year
- *Benefits*: Increases individual preparedness, decreases demands for emergency public safety measures. General mitigation for community assets.
- *Progress Report:* Excellent progress, implementation of this action item will continue

Mitigation Action Item 3. Utilize HAZUS-MH Software

Develop in-house competency with FEMA's Risk/Vulnerability software (HAZUS-MH) so that additional loss-estimation data can be provided regarding reducing the effects of hazards on existing buildings and infrastructure.

- *Responsible Agency*: Lane County Public Works, GIS Division
- *Timeline*: Ongoing
- *Cost*: Staff time and costs associated with attending training

- *Benefits*: Informs decision makers and others interested in hazard mitigation about hazard risks and potential risk reduction measures.
- *Progress Report:* Lane County GIS attended HAZUS workshop in 2014 and hazard mitigation contractor has updated HAZUS mapping software to current FEMA version. Our GIS analyst intends to continue to attend HAZUS trainings.

Mitigation Action Item 4. Hazard Mapping

Develop a list of hazard types to be mapped; identify, locate and obtain the necessary data and create hazardous area maps. Plot critical facilities and infrastructure on the hazardous area maps to show their location within the hazard areas.

- *Responsible Agency*: Lane County Emergency Management in partnership with Public Works, GIS Division
- *Timeline*: June 2013
- *Cost*: Staff time
- *Benefits*: Informs decision makers and others interested in hazard mitigation about hazard risks and potential risk reduction measures. Can serve as a foundation for Comprehensive Plan hazard inventories.
- *Progress Report*: Completed; will be updated as needed.

Mitigation Action Item 5. Vulnerable Populations Database / Registry

Expand existing special needs population data to include detailed inventory of all at-risk communities (elderly, homeless, disabled, etc.) that are without access to transportation and communication and determine mechanisms for alert/ warning and evacuation.

- *Responsible Agency:* Lane County Public Health in partnership with the Vulnerable Populations Emergency Preparedness Coalition
- Timeline: Continuous
- *Cost:* Staff time
- *Benefits:* Potentially mitigates the impact of natural hazards on the community's most vulnerable populations.
- *Progress Report:* Significant progress, Lane County has coordinated implementation of this action item with related emergency notification projects. Implementation of this action item will continue.

Mitigation Action Item 6. Refine and Update Land Use Regulations

Review and develop recommendations to the Lane County Board of Commissioners for additions and enhancements to the Lane County Rural Comprehensive Plan (RCP) Goal 7, Natural Hazards Inventory and implementing land use regulations in Lane Code for the following known risks:

A. channel migration areas
B. dam failure inundation areas
C. expanded wildland-urban interface areas*
D. landslide / unstable slopes
E. special flood hazard areas (as updated studies and maps are produced)*
F. tsunami inundation areas
G. updated dune migration areas*

H. volcanic debris flow paths

**Adopted inventories and/or land use regulations currently exist for these hazards but may require periodic updates and refinements*

- *Responsible Agency*: Lane County Land Management Division
- *Timeline*: Continuous
- *Cost*: Staff time
- *Benefits:* By incorporating mitigation provisions into other plans and regulations, more offices will be implementing mitigation activities, hazardous areas will be avoided and new developments will be better protected.
- *Progress Report:* Significant progress, implementation of this action item will continue.

Mitigation Action Item 7. Examine Tsunami Warning Response Protocols

Implement recommendations listed in OEM's After Action Report dated August 2005 pertaining to the West Coast Tsunami Warning that was issued on June 14, 2005.

- *Responsible Agency*: Lane County Emergency Management in partnership with the West Lane Emergency Operations Group.
- *Timeline*: December 2012
- *Cost*: Staff time
- *Benefits:* Enhanced mitigation and response to tsunami warnings.
- *Progress Report:* Discontinued. The goal was to have some level of standardized and synchronized warning system up and down the coast. This has proven to be unfeasible.

Mitigation Action Item 8. Upgrade Culverts and Storm Water Drainage

For locations with repetitive flooding, flood damage, or road closures, determine and implement mitigation measures such as upsizing culverts or storm water drainage ditches.

- *Responsible Agency*: Lane County Public Works, Road Maintenance Division
- *Timeline*: Continuous
- *Cost*: \$ 75,000 - \$ 200,000
- *Benefits:* Reduced localized flooding, property damages and road closures.
- *Progress Report*: Significant progress, Lane County applied for and received HMGP funding for culvert and drainage upgrades for mitigation purposes. Implementation of this action item will continue.

Mitigation Action Item 9. Backup Power for Critical Facilities

Identify which Lane County critical facilities in Lane County need backup power and emergency operations plans to deal with power outages.

- *Responsible Agency*: All Lane County Departments via COOP
- *Timeline*: Continuous
- *Cost*: Staff time
- *Benefits:* Identify gaps in Continuity of Operations capability for county government facilities.

- *Progress Report:* Significant progress, HM&EM-SC input on this action item is ongoing, implementation will continue.

Mitigation Action Item 10. Cost-Benefit Review of Mitigation Action Items

During the next five year cycle of Plan implementation and review, conduct periodic review of prioritization and conduct cost-benefit analysis to ensure we are adapting to changing priorities and economic crisis while at the same time capitalizing on the most beneficial projects for mitigating hazards and reducing risk.

- *Responsible Agency*: Lane County Emergency Management
- *Timeline*: Continuous
- *Cost*: Staff time
- *Benefits*: Assists prioritization of mitigation activities.
- *Progress Report*: Excellent progress, Lane County HM&EM-SC utilized BCA discussion in prioritization exercises and hazard mitigation contractor has updated BCA software to current FEMA version. Implementation of this action item will continue.

Mitigation Action Item 12. Planning for Pandemic Illness and Health Hazards

Enhance emergency planning, emergency response training and equipment to address pandemic illness and other health hazards.

- *Responsible Agency*: Lane County Public Health
- *Timeline*: Continuous
- *Cost*: Staff time
- *Benefits:* Improved capability to protect the public from health hazards.
- *Progress Report:* Excellent progress, implementation of this action item will continue.

4.4.2 Lane County: New Mitigation Actions

The following are mitigation action items which will carry through the 5-year planning cycle of Version 3.0 of the Lane County Multi-Jurisdiction Hazard Mitigation Plan (2017-2022).

These action items are organized by the hazards they address, beginning with action items which address multiple hazards (multi-hazard), followed by action items pertaining to mitigation of dam failure, drought, earthquake, flood, hazardous materials incident, landslide, tsunami, wildfire, windstorm, and winter storm.

Notably, many of these mitigation action items can or will be concurrently implemented by participating cities for this multi-jurisdiction plan. Additionally, mitigation action items pertaining to individual cities are summarized in Section 4.4.4, and are detailed in the individual city annexes.

Action Item	Goals Addressed	Priority	Hazards Addressed
Multi-Hazard			
Sustain Hazard Mitigation & Emergency Management Steering Committee	1,2,3,4,5,6,7	High	All
Purpose: Continuously review, update and facilitate implementation of Plan. *Benefits (loss avoidance):* Committee oversight of this Plan will help prevent loss and maximize cost recovery after a disaster.	*Implementation Timeframe:* 16-12 months *Cost Estimate:* Staff Time	*Coordinating Departments and Outside Agencies:* Emergency Mgmt.	*Potential Funding Source:* FEMA EMPG, Local Budgets
Include publicly owned utilities in 2022 Plan Update	1,2,3,4,6,7	High	All
Purpose: Incorporate Utility Planning into County efforts. *Benefits (loss avoidance):* Reduced infrastructure damage. Increased cooperation & information sharing decreases recovery time and costs.	*Implementation Timeframe:* 12-18 months *Cost Estimate:* $40-50,000	*Coordinating Departments and Outside Agencies:* Emergency Mgmt. Utilities	*Potential Funding Source* FEMA EMPG and HMGP
Enhance Public Education about natural hazards and preparedness	1,2,3,4,5,6,7	High	All
Purpose: Increase community resilience to disasters. *Benefits (loss avoidance):* Improved community preparedness and resiliency	*Implementation Timeframe:* 1-6 months *Cost Estimate:* Staff Time	*Coordinating Departments and Outside Agencies:* All Departments All Agencies	*Potential Funding Source* Local Budgets, FEMA EMPG
Develop Emergency Water Supply Plan	1,3,4,6,7	High	All
Purpose: Mitigate water shortages, prioritize needs, and establish protocols and triggers. *Benefits (loss avoidance):* Establishing triggers to activate plans reduces response and recovery time.	*Implementation Timeframe:* 6-12 months *Cost Estimate:* Staff Time	*Coordinating Departments and Outside Agencies:* Emergency Mgmt.; County Public Works; City Emergency Mgmt.; City Public Works; Utilities; Water Districts	*Potential Funding Source* Local Budgets, FEMA EMPG

Action Item	Goals Addressed	Priority	Hazards Addressed
Multi-Hazard (Cont.)			
Hazard Mapping	1,2,3,4,5,6,7	High	All
Purpose: Identify hazards in specific locations in a usable, informative format. *Benefits (loss avoidance):* Accurate mapping will allow for better land-use choices, decreasing potential losses due to ineffective mitigation planning.	*Implementation Timeframe:* 8-12 months *Cost Estimate:* *Staff Time (GIS Analyst)*	*Coordinating Departments and Outside Agencies:* Emergency Mgmt.; Technology Services (GIS)	*Potential Funding Source* Local Budgets
Maintain Vegetation Management Standards	1,2,3,4,5,6,7	High	Wildfire, Flood
Purpose: Standards reduce wildfire fuels near structures and waterways. *Benefits (loss avoidance):* Decreased loss of structures due to wildfire hazard, decreased debris in waterways help prevent localized flooding	*Implementation Timeframe:* Ongoing	*Coordinating Departments and Outside Agencies:* County Public Works, Local Public Works Depts.	*Potential Funding Source* Local Budgets
Storm-harden Grange Facilities	2,5	High	Flood, Windstorm, Winter Storm
Purpose: There are 22 granges in rural Lane County that serve difficult to reach communities and that are willing to open their facility if needed during a disaster. Storm hardening granges will give Lane County a resource for assembly of displaced persons. *Benefits (loss avoidance)* Provides nearby location for rural residents to receive emergency assistance. Reduces use of government services when resources are already spread thin and reduces cross-county vehicular travel when roads are most hazardous. Preserves cultural and historical resource	*Implemenation Timeframe:* 1 - 2 granges per year.	*Coordinating Departments and Outside Agencies:* Lane County Emergency Mgmt.	*Potential Funding Source* HMGP

Action Item	Goals Addressed	Priority	Cost Estimate	Schedule
Dam Failure				
Load GIS layers of dam inundation areas into mass notification system	1,2,3,4,5,6,7	High	$45,000	Yes
Purpose: To accurately notify those in the path of dam inundation floodwaters in time to evacuate. *Benefits (loss avoidance):* Prevents loss of life, increases potential to decrease loss of property	*Implementation Timeframe:* 12-18 months	*Coordinating Departments and Outside Agencies:* Emergency Mgmt.; Technology Services (GIS); Alerting System Vendor	*Potential Funding Source* FEMA EMPG, Local Budgets	
Make USACE Inundation maps available for public viewing	1,2,3,4,5,6,7	Medium	Staff Time	No
Purpose: Inform the public on flood hazard. *Benefits (loss avoidance):* Decrease loss of property.	*Implementation Timeframe:* 12-24 months	*Coordinating Departments and Outside Agencies:* Emergency Mgmt.; US Army Corps of Engineers Depts.	*Potential Funding Source* FEMA EMPG, Local Budgets	

Action Item	Goals Addressed	Priority	Cost Estimate	Schedule
Drought				
Drought Public Education and Outreach	3,4,5,6,7	Medium	Staff Time	No
Purpose: Increase awareness of drought effects and provide mitigation actions for individuals. *Benefits (loss avoidance):* Improved water quality, reduced drought effects, reduced costs of water treatment and mandatory water restrictions.	*Implementation Timeframe:* 12-18 Months	*Coordinating Departments and Outside Agencies:* Emergency Mgmt.; Fire Departments and Districts; Water Districts	*Potential Funding Source* FEMA EMPG, Local Budgets	
Construct storm water detention / retention ponds	2,3,5,6,7	High	$300,000	No
Purpose: Reduce localized Flooding *Benefits (loss avoidance):* Decrease damage to road infrastructure, increase natural watershed potential	*Implementation Timeframe:* 18-24 months	*Coordinating Departments and Outside Agencies:* Emergency Mgmt.; County and City Public Works Depts.	*Potential Funding Source* Local Budgets, FEMA HMGP and PDM	

Action Item	Goals Addressed	Priority	Cost Estimate	Schedule
Earthquake				
Harden Public Works Facilities	1,2,3,4,5,6,7	High	$10-15 million	Yes
Purpose: Increase resilience to seismic forces. *Benefits (loss avoidance):* Decrease damage due to shaking/liquefaction, ability to use structure in post event response/recovery.	*Implementation Timeframe:* 18-36 months	*Coordinating Departments and Outside Agencies:* Emergency Mgmt.; County Public Works, local Public Works Depts.	*Potential Funding Source* EMPG, HMGP, PDM Local Budgets	
Participate in ODOT Bridge Seismic Resiliency Planning Project	1,2,3,4,5,6,7	High	Staff Time	Yes
Purpose: Increase bridge resiliency to seismic forces. *Benefits (loss avoidance):* Decreased loss of life, decrease loss of property. Increase resiliency of system, increase response capability.	*Implementation Timeframe:* 18 months	*Coordinating Departments and Outside Agencies:* Emergency Mgmt.; County Public Works, ODOT	*Potential Funding Source* FEMA EMPG, Local Budgets	

Action Item	Goals Addressed	Priority	Cost Estimate	Schedule
Flood				
Maintain and Enhance Community Rating System (CRS)	1,2,3,4,5,6,7	Medium	$300,000	Yes
Purpose: Increase use of CRS to decrease costs of flood Insurance. *Benefits (loss avoidance):* Decrease cost of flood response, decrease loss of property.	*Implementation Timeframe:* 12-36 months	*Coordinating Departments and Outside Agencies:* Emergency Mgmt.; County Planning Dept., Local Planning Dept's.	*Potential Funding Source* FEM EMPG, HMGP and PDM; Local budgets	
Upgrade Culverts and Storm Water Drainage Systems	1,2,3,4,5,6,7	High	$10 million	Yes
Purpose: Increase Stormwater drainage capacity. *Benefits (loss avoidance):* Decreased cost of maintenance, decreased damage to road infrastructure.	*Implementation Timeframe:* 24-36 months	*Coordinating Departments and Outside Agencies:* Emergency Mgmt.; County Planning Dept., Local Planning Dept.'s.	*Potential Funding Source* FEMA EMPG and HMGP; Local budgets	

Action Item	Goals Addressed	Priority	Cost Estimate	Schedule
Hazardous Materials Incidents				
Promote proper use and storage of chemicals	1,2,3,4,5,6,7	High	$40,000	Yes
Purpose: Reduce hazardous spills and realeases. *Benefits (loss avoidance):* Lower costs for cleanup, lower damages to environment, less loss of property, lower threat to life.	*Implementation Timeframe:* 12-18 months	*Coordinating Departments and Outside Agencies:* Emergency Mgmt.; Fire Departments and Districts; Local LEPC	*Potential Funding Source* FEMA EMPG and HMGP DOT HMEP Local budgets	
Pre-identify collection sites and services for post-flood or earthquake cleanup	1,2,3,4,5,6,7	Medium	$12,000 – 15,000	Yes
Purpose: Preplan locations for debris removal/storage, consolidate debris disposal, and recycle where possible. *Benefits (loss avoidance):* Decreases recovery time, decreases cost of debris disposal.	*Implementation Timeframe:* 12-18 months	*Coordinating Departments and Outside Agencies:* Emergency Mgmt.; County and City Public Works Depts.	*Potential Funding Source* FEMA EMPG, HMGP and PDM Local Budgets	

Action Item	Goals Addressed	Priority	Cost Estimate	Schedule
Landslide				
Construct engineered walls at key locations for stabilizing slopes	1,2,3,4,5,6,7	High	$30-50 Million	No
Purpose: Decrease landslide potential. *Benefits (loss avoidance):* Reduce loss of property, life, and reduce cost of cleanup in time and funds.	*Implementation Timeframe:* 24-48 months	*Coordinating Departments and Outside Agencies:* County Public Works ODOT	*Potential Funding Source* FEMA HMGP FHA	
Public Awareness and Education	1,2,3,4,5,6,7	High	$10,000 -15,000	Yes
Purpose: Increase public awareness. *Benefits (loss avoidance):* Reduce unintended damages by causing landslides through inappropriate land use.	*Implementation Timeframe:* 12-24 months	*Coordinating Departments and Outside Agencies:* Emergency Mgmt.; County and City Planning and Public Works Depts..	*Potential Funding Source* FEMA EMPG, HMGP and PDM Local Budgets	

Action Item	Goals Addressed	Priority	Cost Estimate	Schedule
Tsunami				
Support community-based culture of tsunami awareness, preparedness and response	1,2,3,4,5,6,7	High	$150,000 – 250,000	Yes
Purpose: Increase knowledge of the Hazard, and how to respond to it. *Benefits (loss avoidance):* Decreased loss of life.	*Implementation Timeframe:* 8-12 months	*Coordinating Departments and Outside Agencies:* Emergency Mgmt.; WLEOG DOGAMI	*Potential Funding Source* FEMA EMPG, HMGP and PDM Local budgets	
Continuously improve government proficiency in using multiple types of warning systems.	1,2,3,4,5,6,7	High	$10,000	Yes
Purpose: Increase effective use of the tools. *Benefits (loss avoidance):* Decrease loss in live and property.	*Implementation Timeframe:* 12-18 months	*Coordinating Departments and Outside Agencies:* Emergency Mgmt.; PSAP's and Dispatch Centers	*Potential Funding Source* EMPG, HMGP, PDM Local budgets	

Action Item	Goals Addressed	Priority	Cost Estimate	Schedule
Wildfire				
Promote *Firewise Communities Program* offerings	1,2,3,4,5,6,7	High	$5,000	Yes
Purpose: Increase public participation in Firewise program. *Benefits (loss avoidance):* Decrease number of human caused fires, decrease loss of life and property, decrease cost of response	*Implementation Timeframe:* 6-18 months	*Coordinating Departments and Outside Agencies:* Emergency Mgmt.; County Planning Dept.	*Potential Funding Source* EMPG, HMGP, PDM Local budgets	

Action Item	Goals Addressed	Priority	Cost Estimate	Schedule
Windstorm				
Reduce impact of tree damage from windstorms	1,2,3,4,5,6,7	High	$75,000 - 100,000	Yes
Purpose: To reduce damages caused by trees in windstorms. *Benefits (loss avoidance):* Reduced cost in loss of property, cleanup, decrease disruptions in power and transportation.	*Implementation Timeframe:* 12-24 months	*Coordinating Departments and Outside Agencies:* Emergency Mgmt.; County Public Works, ODOT, Power Utilities	*Potential Funding Source* EMPG, HMGP, PDM Local budgets	
Provide local redundancy of windstorm warnings though local media on both traditional and social platforms	1,2,3,4,5,6,7	High	$10,000	Yes
Purpose: Increase imminent windstorm alerts. *Benefits (loss avoidance):* Decrease injuries, decrease clean-up costs.	*Implementation Timeframe:* 6-12 months	*Coordinating Departments and Outside Agencies:* Emergency Mgmt.; PIO Network	*Potential Funding Source* EMPG, HMGP,PDM Local Budgets	

Action Item	Goals Addressed	Priority	Cost Estimate	Schedule
Severe Winter Storm				
Develop emergency water supply plan for power outages caused by snow / ice storms	1,2,3,4,5,6,7	High	$15,000	No
Purpose: Create a secondary water source for emergency use. *Benefits (loss avoidance):* Improved health and safety of local residences experiencing power outages.	*Implementation Timeframe:* 12-18 months	*Coordinating Departments and Outside Agencies:* Emergency Mgmt.; NGO's; Water Districts; Local Emergency Management	*Potential Funding Source* EMPG, HMGP, PDM Local budgets	
Develop emergency firewood supply plan for power outages caused by snow / ice storms	1,2,3,4,5,6,7	Medium	$10,000	Yes
Purpose: Provide a plan to supply firewood to mitigate power loss from winter storms. *Benefits (loss avoidance):* Decrease use of shelters, decrease cost of shelters, decrease in illness.	*Implementation Timeframe:* 12-18 months	*Coordinating Departments and Outside Agencies:* Emergency Mgmt.; NGO's; Water Districts; Local Emergency Management	*Potential Funding Source* EMPG, HMGP, PDM Local budgets	

4.4.4 Participating City Hazard Mitigation Actions

The following section summarizes mitigation action items developed per participating city. Detailed outlines of each mitigation project are located in City Annexes 1-7.

City of Coburg Mitigation Action Items

Mitigation Action Item (a). Retrofit or replace existing 500,000 water supply tanks, well building, and pump station for seismic and flood mitigation. Install additional 750,000 gallon water supply tank and 12" transmission line for fire suppression and general resiliency.

Mitigation Action Item (b). Storm-hardening and seismic retrofit for City Hall. Reinforce roof, windows, building veneer to withstand high-winds and general hazards.

Mitigation Action Item (c). Safe-room improvements for EOC. Create protected, contained space for city employees and EOC participants.

Mitigation Action Item (d). Storm-hardening retrofit for city park restroom, generator for staging area.

Mitigation Action Item (e). Geotechnical assessment for Old Mill Pond, Coburg Estates, integrate into Comprehensive Plan.

Mitigation Action Item (f). Develop storm water master plan.

Mitigation Action Item (g). Pursue flowage easements, develop agreements for secondary water source.

City of Creswell Mitigation Action Items

Mitigation Action Item (a). Water tower resiliency upgrades. Seismic retrofit, all-hazards resiliency. Concrete structural reinforcement and sealing, roof reinforcement and/or mitigation reconstruction converting to steel tank design. Est. cost $4 million.

Mitigation Action Item (b). South Lane Fire Creswell Station. Critical facility seismic retrofit/mitigation reconstruction. Address structural issues including non-engineered, concrete block lacking steel re-bar, bay-door dimensions. Est. cost $1.5 million.

Mitigation Action Item (c). Seismic and storm-hardening retrofit: elementary, middle, and high schools.

Mitigation Action Item (d). Storm-hardening retrofit for airport including but not limited to structural, windows, bay doors, upgrades to serve as back-up EOC.

Mitigation Action Item (e). Water system intake resiliency upgrades (flooding, debris, hazmat).

Mitigation Action Item (f). Flood risk determinations, LOMA review, eastern Creswell.

Mitigation Action Item (g). Retrofit and repurpose community center, explore options to merge with fire station.

Dunes City Mitigation Action Items

Mitigation Action Item (a). Storm-hardening and seismic retrofit for City Hall. Reinforce roof, windows, building veneer to withstand high-winds and general hazards.

Mitigation Action Item (b). Connectivity trail for west shore Woahink Lake. Aka Chet's Trail to Westlake. Assist evacuation, supply and emergency response.

Mitigation Action Item (c). Flood-proofing for City Hall. Door seals, siding reinforcement, electrical retrofit. Drainage/grading improvements for grounds and parking.

Mitigation Action Item (d). Water flow and quality monitoring for Woahink Lake.

Mitigation Action Item (e). Slope stabilization for Westlake neighborhoods.

Mitigation Action Item (f). Storm-water catch basin and culvert upgrades for North Pioneer Road.

Mitigation Action Item (g). Promote best practices for underground utilities regarding new development.

Mitigation Action Item (f). Vision clearance upgrades for Hwy 101 intersections.

Mitigation Action Item (g). Re-drafting slope requirements for new construction on slopes.

Mitigation Action Item (h). Remove waterway obstructions for boating safety.

Mitigation Action Item (i). Obtain assured access to water outlet control structure.

Florence Mitigation Action Items

Mitigation Action Item (a). Mitigation reconstruction for Public Works facility. Storm hardening, seismic resiliency.

Mitigation Action Item (b). Seismic retrofit for water supply tanks. Foundation reinforcements.

Mitigation Action Item (c). Erosion control measures for Rhododendron Drive, structural reinforcements.

Mitigation Action Item (d). Seismic reinforcements for Siuslaw Valley Fire Station #2.

Mitigation Action Item (e). Evacuation/egress coordination and improvements for eastbound travel.

Oakridge Mitigation Action Items

Mitigation Action Item (a). Retrofit for City Courtroom EOC. Create protected, contained space for city employees and EOC participants. Electrical, communications upgrades. Window, roof, and structural reinforcements, seismic upgrades.

Mitigation Action Item (b). Seismic, floodproofing, and storm-hardening retrofit for Oakridge Police Department.

Mitigation Action Item (c). Water intake upgrades for secondary surface water source as back-up to ground water system. Additional storage, treatment and transmission capability.

Mitigation Action Item (d). Retrofit/mitigation reconstruction for community center to serve as disaster recovery center, community shelter.

Mitigation Action Item (e). Emergency supply storage building for fire station.

Veneta Mitigation Action Items

Mitigation Action Item (a). Retrofit sewer lift station at Territorial/Hwy 126.

Mitigation Action Item (b). Flood mitigation for Long Tom River and tributary creeks north of Veneta.

Mitigation Action Item (c). Install generator and manual override for card-lock fueling station.

Mitigation Action Item (d). Road elevation along residential roads eastern portion of city.

Mitigation Action Item (e). Wildfire fuels reduction on undeveloped lots in eastern portion of city.

Mitigation Action Item (f). Storm hardening retrofit for city library.

Westfir Mitigation Action Items

Mitigation Action Item (a). Mitigation reconstruction for City Hall.

Mitigation Action Item (b). Defensible space fuels reduction.

Mitigation Action Item (c). Develop additional storage capability for water supply, fire suppression.

Mitigation Action Item (d). Structure elevation, mitigation reconstruction, and/or acquisition relocation for floodprone properties.

Mitigation Action Item (e). Drainage improvements for 1st/2nd Street Loop.

5. Plan Maintenance

5.1 Adoption

44 CFR Requirement §201.6(c) (5):
*[The local hazard mitigation plan **shall** include] documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commissioner, Tribal Council).*

44 CFR Requirement §201.6(c) (5):
*For multi-Jurisdiction plans, each jurisdiction requesting approval of the plan **must** document that it has been formally adopted.*

As stated in ***1. Introduction***, upon provisional approval of this Plan by Oregon Emergency Management and the Federal Emergency Management Agency, the Lane County Board of County Commissioners, the county' governing body, will formally adopt the Plan in public session. Following local adoption, copies of the local adoption instrument will be included in Appendix A of this document.

5.2 IMPLEMENTATION, MONITORING, EVALUATION, UPDATE

Requirement §201.6(c) (4) (i): *[The plan maintenance process **shall** include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.*

Plan Implementation

This Plan update aims to support Action Item owners and stakeholders in becoming more results-oriented and to improve focus on mitigating hazards and reducing disaster impacts countywide.

A great deal of effort was applied to enhancing the Hazard Profiles and Vulnerability Assessments sections of this Plan, and maximizing community input. As such, the Action Items included in this update are appropriately broad to address each hazard. However, effective implementation of the Action Items will require additional steps to zero in on the specific problem(s) each action item aims to solve and how best to go about it. Additional steps will include analyzing the following:

- Depth of ownership: How can the action item be implemented in such a way that it guides ongoing management actions and thereby engage management in owning the action item?
- Stakeholder Engagement: Who does the action item benefit or impact, and do a sufficient number of agencies and persons feel a sense of ownership of the action item?
- Problem Analysis: Do we know the root causes and major effects of problems in order to better design solutions to fully achieve the desired result of the Action Item?
- Cost Benefit Analysis: What are the strengths and weaknesses of alternatives for achieving the benefits or desired results for each Action Item?
- Results Framework: How will we know we have successfully implemented the Action Item?

Lane County Emergency Management is a single resource assigned to convene and oversee this Plan. Given this resource limitation, implementation of the Plan Action Items will rely heavily on the responsiveness of county Action Item owners and stakeholders once the Action Items have been specified in detail.

The participating jurisdictions (cities) are committed to utilizing this Plan to access mitigation grant funds to assist the implementation of action items set forth in Chapter 4 (Mitigation Strategy) section 4.4.4. Implementation of high benefit/low cost action items will be encouraged in parallel with high priority action items that require grant funding to implement. Opportunities to partner and share costs with affiliated agencies and neighboring jurisdictions for multi-objective projects are encouraged.

Monitoring

There are two levels of monitoring required for this Plan. One is for monitoring the Plan document itself by ensuring that any improvements or changes that are relevant to the Plan content are captured accordingly. The substantive content in all chapters of this Plan are subject to change over the next five year cycle. Changes could be related to: economic, political or social well-being brought on by global, national or local advances or setbacks; new studies that generate new data on hazard impacts or vulnerability; legislative changes that cause an initiative to commence or cease; action item owners and stakeholders changing mid-project.

The Lane County Emergency Manager will be responsible for coordinating with agency partners and action item owners and stakeholders for obtaining new information that is relevant to the

Plan document and updating it as appropriate. A Record of Changes will be maintained on an annual basis and posted on line as front matter to the Plan document.

The second level of Plan monitoring is related to the Action Items themselves. Each Action Item will need to be organized as a distinct project with a finite start and end date in order to monitor and evaluate results. The primary responsibility for monitoring at the project level lies with the project manager.

Evaluation

To evaluate the effectiveness of the Plan at achieving its stated purpose and goals, the Lane County Emergency Manager will seek active participation by all relevant parties to conduct semi-annual reviews of progress toward results by:

- Reviewing progress, issues and trends in the achievement of desired results of Action Items
- Making decisions on changes as needed
- Reviewing adequacy and efficiency of allocated resources
- Reviewing new information and data that could influence Action Item implementation.

In addition, the incorporation of this plan into other planning instruments will serve as an additional metric for success. This plan will ultimately be evaluated based on implementation of action items, the incorporation of mitigation principles into future public policy, improved public safety, and the overall reduction of losses for Lane County residents.

Update

Lane County Emergency Management will continue to formally update the Plan at least once every five years. Update of the Lane County Hazard Mitigation Plan was finalized in 2012 and will remain current through 2017. No later than the fourth year of the five year cycle, in accordance with 44CFR, Section 201.6, the Lane County Emergency Manager will reconvene a formal Plan update process, allowing ample time for review meetings, document drafting, revision and adoption within the required five year timeframe. At this time new mitigation measures will be added to the plan and accomplishments documented in final draft form.

5.3 INCORPORATION INTO EXISTING AND FUTURE PLANNING MECHANISMS

Requirement §201.6(c) (4) (ii): *[The plan **shall** include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.*

Mitigation is most successful when it is codified and incorporated into the functions and priorities of government, planning and future development. Incorporating mitigation strategies into other planning documents is an effective way to leverage the support of affiliated agencies and departments while ensuring mutually supportive goals and policies.

Accordingly, the goals and mitigation strategies of this Multi-Jurisdiction Hazard Mitigation Plan will be incorporated into other planning documents within the purview of participating jurisdictions as they are updated or are developed. Examples of such planning documents can be found in Section 4.4 (Coordination of Mitigation Planning Strategies).

Development of future plans or update of existing plans will include a review of this Plan for consideration and incorporation of pertinent elements. To ensure the incorporation of goals and actionable items of this plan (Mitigation Strategy), Hazard Mitigation & Emergency Management Steering Committee members will be invited to sit on future plan development or existing plan update committees, and this Plan will be cited as a technical reference and data source for future plan update processes. Adopted planning documents and mechanisms applicable to this standard include the following:

- Lane County Comprehensive Plan
- Capital Improvement Plans
- Lane County Emergency Operations Plan
- Lane County Continuity of Operations Plan
- Lane County Community Wildfire Protection Plans (various departments and districts)
- Lane County Flood Damage Prevention Order
- Building Code
- Subdivision Code
- Erosion Control
- Stormwater Management

Additional opportunities for incorporating mitigation strategy into existing and future planning mechanisms include integration with Lane County's Community Health Improvement Plan (April 2013), and associated principles of 'Health in All Policies'.

Environmental Protection Agency (EPA) publication Flood Resilience Checklist is an outgrowth of the agency's Smart Growth Implementation Assistance Program. It encourages local governments to integrate hazard mitigation planning as a key element of comprehensive planning and growth management. Future iterations of Lane County's Rural Comprehensive Plan may consider these and other planning measures to further integrate hazard mitigation strategy with the long term development patterns of the planning area.

5.4 CONTINUED PUBLIC INVOLVEMENT

***Requirement §201.6(c) (4) (iii):** [The plan maintenance process **shall** include a] discussion on how the community will continue public participation in the plan maintenance process.*

Throughout current and future planning cycles, city and county residents will be canvassed to solicit local information, continuing Lane County's dedication to involving the public directly in annual review and cyclical updates of this Plan. In addition to the annual monitoring and evaluation meetings of the HM&EM-SC, meetings will be scheduled as deemed necessary by the Lane County Emergency Manager to provide a forum for which the public can express its concerns, opinions, or ideas about the plan and/or it's implementation. The HM&EM-SC will publicize meetings under standard public notice procedures and through local media outlets.

Attendance at the HM&EM-SC meetings is just the first level of public involvement planned for the local planning process. Members of the committee were encouraged to not only invite members of the public and local experts to future meetings, but also to carry on a dialogue outside of the formal meetings to develop a more comprehensive picture of the needs and concerns of county residents related to natural hazards and mitigation planning.

Many of the effects of natural hazards can be lessened by simply educating members of the public on actions they can take to minimize danger to themselves and their possessions. It is anticipated that these strategies will help develop ownership by the public in the plan, and that future iterations of the plan will include strategies that are developed via high levels of public participation.

APPENDICES

APPENDIX A. ADOPTION DOCUMENTS

APPENDIX B. MEETING NOTES AND ANNOUNCEMENTS (2013-2017 CYCLE)

Minutes/notes from quarterly Hazard Mitigation & Emergency Management Steering Committee meetings are included in the following appendix. Most recent meeting notes are listed directly below, creating a descending timeline of materials dating back to the committee's inception.

Lane County

Hazard Mitigation/Emergency Management Steering Committee (HM&EM-SC)

July 23, 2015 Meeting

Brad, Melissa, Pete, Matt, LCSO law enforcement, Selene, Lisa, Oren, Michael

General

Walterville earthquake, July 4.

Takeaways from the New Yorker article. Good in the sense it got people talking, improved consciousness, spurred people to take proactive measures. Reaction seemed to focus on most sensational excerpts. Encourage reinforcement for foundations, water mains, gas mains, etc.

33% chance in 50 years for Big 8+. This ='s 1.5% annual chance.

10% chance in 50 years for Real Big 8.7+. This ='s 0.2% annual chance.

Exercise

Cross pollination exercise of emergency management roles: Generate conversation.

Information Services (IS)

Check systems, check the COOP, ensure 911 is running, back up data is saved, critical services, check multi-agency agreement status.

ID what is running, will we need to relocate, what infrastructure is working phone (land, cell), data. Physical data is off site, out of town, Hosted COOP, no hard copy, what about.

Public access to wifi. Oren had idea to request providers remove locks from secured wifi networks.

Fleet and General Services

ID immediate staffing availability to prepare fuel, ready fleet. Taking calls and requests for equipment, vehicles. Arranging for replacement vehicles, repair immediate damage. Logistics for fleet, where is equipment, where is it needed. Repair of equipment in heavy use.

Maintenance and service would be key, liquid transportation fuels, tank location and cooperative arrangements with other agencies. LRIG operations, EOC in logistics. Propane project underway.

Land Management

Expediting permits for shelter, flexibility to assist in EOC, front desk public info, building inspection, damage assessment (first public, then commercial, then residential). Evaluate give all clear to enter building, electrical and building inspectors, working to develop expedited building permitting (emergency permit issuance), Overall damage assessment. Will coordinate with GIS, technical assistance in EOC, general subject matter. Secured master database, updated every 6 months, drive-away kit,

HR Safety: employee safety

Communication out to staff, who is available, call to work, memo for work policies, where to report. Assess/ID essential employees. Tracking injuries, accident reports. Where is everybody, account for/muster employees. SAR for unaccounted. In EOC for duty.

Facilities

Damage assessment, fire up back-up systems (generators, etc.). 8,000 little things (power out, stuck in elevator). Triaging. 8 staff. Over 20 buildings, 3-4 public health clinics.

Making sure systems are shut down (water, gas, *electric), damage assessment, then starting things back up in prioritized order. Test function, all clear. Question about which buildings have generators (some yes, some no). Riverstone does not have back-up fuel supply. Fuel supply for generators question. Sanitary sewer operations, considerations.

Emergency Management

Coordinate emergency response, big picture, outward facing. Communication, operating EOC, coordinating with outside agencies. Central role. Public information. Monitoring response and progress, needs. ICS.

Need for Contraflow Considerations for West 126 Highway. Big picture evacuation planning needed. Public facing road closure notification is important consideration.

GIS

Information tools, parcel information, bridge location, landslide probabilities. Access to real-time data important. Do have resources for data collection PDA. Likely in EOC to help develop real time sit-rep. Data availability. EMMA.

Law enforcement

Coordination with outside agencies for man-power, SAR. Critical role in incident command/EOC, probably Police Services Captain, movement control,

Primary role is life-safety, property protections secondary, will need information about raods.

Roads

Assess damage, emergency repair, special cases of heavy equipment SAR, life-safety. Coordinating with debris management, construction, staging areas. Barricading roads, engineering controls. Concern with location of Florence shop.

417 bridges, many vulnerable, do have rail cars for emergency placement. None are officially ‘seismically sound’. Note need for printed maps, tack ups.

July 4 earthquake conducted bridge inspection process, all was clear.

Problem for inspection with one bridge closed can shut down upstream

Public Health

Activate into incident management team. Public information, attempt to control spread. No medical treatment, but coordinate with providers for information. Multi-agency coordination, sheltering considerations, food distribution monitoring. Can request assistance per MAA. Drinking water monitoring and regulation.

Lane County

Hazard Mitigation/Emergency Management Steering Committee (HM&EM-SC)

April 23, 2015 Meeting NOTES

Upcoming events

Cost Recovery Training: Well attended, main takeaway is documentation procedure, local process, (Project Worksheets) needs be well understood locally to clarify and expedite FEMA processing of 75% reimbursements. Cost of debris removal (Category A) and emergency response (Category B) should capture not just time (including overtime) but equipment use as well per FEMA equipment cost schedule. Also, fringe benefits eligible.

COOP: Updates in progress, 4 primary foci (Mission Essentials, Contact List, Relocation Team, Drive Away Kits).

Alert Sense: April 30 1:30 to 3:30.

EOC Training: currently scheduled for May 7 and 8, some conflicts, subject to reconsideration.

General Announcements

GIS/Mapping: Weather Event Response Coordination System (WERCS)

GIS application runs on desktop or mobile tablet to construct real-time situational awareness of field operations. Users can view and/or upload field reports. Provides auto-notification of field report updates/status changes. For internal use with Public Works, Utilities, Emergency Management. Working on public facing system (under development).

Hazard Mitigation Action Plan Update

Overview of current plan document, version 3.0. Introduction, Planning Process, Risk Assessment, Mitigation Strategy, Plan Maintenance.

Focus on 'new' action items (Section 4.3.1).

New Action Item #1: Generator Relocation and Hardening Retrofit for Public Services Building. Obtained additional detail, removed erroneous reference to data center relocation (not moving). Project planned for 12-24 month timeframe.

New Action Item #2: develop real-time web-based mapping interface for emergency management field operations. Substantially complete, see comments regarding GIS/Mapping: Weather Event Response Coordination System (WERCS).

New Action Item #3: Storm-harden/retrofit utilities network. Electric and communications, coordination with utilities.

New Action Item #4: Seismic retrofit/upgrade for county bridges.

New Action Item #5: Retrofit/replace underground fuel storage tank currently unrated for seismic hazard. Obtained additional detail, 6,000 gallon diesel tank below grade, under sidewalk. Purpose is to fuel emergency generator for PSB. Fiberglass material, not ideal for seismic factors. Current vent position/elevation would allow water ingress, fuel egress. Ideal replacement is steel, dual wall, 6 kgal capacity, floodproofed vents. Side-note: recently tested fuel and serviced (completed).

New Action Item #6: Develop classified annex to Hazard Mitigation Action Plan for Technical Hazards. Obtained additional guidance. Agreed to include general hazard profile for Hazardous Materials Incident in main document, and separate profile for security sensitive information in Technical Hazards annex. Agreed to focus effort on main document for now, further develop Technical Hazards annex as time permits.

Lane County

Hazard Mitigation/Emergency Management Steering Committee (HM&EM-SC)

January 22, 2015 Meeting

Attendees: Linda Cook (Convener, Emergency Management); Keir Miller (Land Development); Lisa Lacey (Risk Management); Chris Doyle (Law Enforcement); Brian Craner (Capital Projects); Matt Dupkus (Facilities); Oren Schumacher (Public Works); Mike Finch (Information Technology); Greg Wobbe (OCR West); Mike Johns (Public Works).

General Announcements

Please add the following items to your schedules and participate if at all possible.

- Emergency Operations Plan (EOP) Workshop, Feb 17
- Cost Recovery Training, Mar 11-12
- Williams Pipeline Tabletop Exercise, Mar 18.
- Oregon Prepared Workshop, March 31 – Apr 2
- Emergency Operations Center Training, May 7,8
- Cascadia Rising Statewide Exercise, June **2016**

Departmental Updates: HM&EM-SC

Risk Management: **Has been conducting violent intruder trainings (aka active shooter or ALICE training); 2 more trainings planned. A main point of emphasis is to immediately escape (run) if possible. May need to validate active shooter response plan, ensure correspondence with established procedures, EAP, etc.**

Law Enforcement: **7 personnel being sent out to deliver ALICE trainings at schools etc.**

Capital Projects: **Data center improvements, scheduled for completion in March, increased cooling redundancy to triple source. Now the weak point for data center is electrical source backup. Working to improve lighting at Riverstone Community Health Clinic (Springfield). Courthouse replacement. Surveys being circulated, working to develop a proposed scope and design plan for courthouse replacement project via needs assessment and review of best practices. Undetermined at this time whether the courthouse replacement project would encompass the PSB, or if not entirely, what effects, improvements, the replacement project would have for PSB.**

Facilities: **Order circuit boards for the updated, redundant security system. Implementing data center improvements, cooling,, etc**. .

Public Health: **Dealing with recent measles outbreak, activated ICS. Prevalent problem is lack of consistency and access to immunization records. Goal to conduct outreach to centralize immunization records. Need for a drill/exercise to monitor preparedness. COAD. Health in All Policies.**

Information Services: **Has been developing inventory of equipment, capacity, status, age, remaining functional lifespan, cost of replacement, etc. Part of larger plan to develop composite index of risk (integrated risk model which considers probability, severity, cascading effects). Internet capacity improvements planned in near future ($10k…or $80k for longer term project with Eugene). PAN network improvements proposed at $80k. Lane Transit District planning construction on Charnelton Ave., opportunity for network improvements. Ongoing work toward virtualization, cloud backup constant standby, ready to use backup.**

Public Works: **Tower on Prairie Mtn to serve north portion of county, counterpart is LRIG for south county. Purchasing more radios for Springfield. Running fiber to Veneta Shop for possible use as alternate EOC.**

Road and Bridge: **Over 400 bridges not currently reinforced for seismic event. Historic preservation funds for bridge restoration is winding down.**

Land Development, Floodplain Mgt: **Goal to pursue certified floodplain managers (CFM).training for all land development. Re. Firewise Community, staff is currently conducting home/development site visits. Intend to employ 520 classification staff for onsite, Firewise outreach activities.**

Discussion Item: Suggestions for Annual FEMA Non-Disaster Mitigation Grant Application

- Pre-Disaster Mitigation Grant Program (PDM)
- Flood Mitigation Assistance Grant Program (FMA)
- Repetitive Flood Claim (RFC) and Severe Repetitive Loss (SRL) Grant Programs

Prioritize the following projects in HMP (list is fluid, general, inclusive). a) Elevating generator to upper floor, b) removal of chilled water tank, c) retrofit for underground fuel storage tank (UST); d) bridge seismic retrofit

Discussion Item: Seismic Rehabilitation Grant Program, Facility Improvements

- Potential funding for new or refurbished facilities
- Potential for use in conjunction with courthouse replacement projects

Action item: Need to identify if bridge seismic retrofit are eligible. Also, similar retrofit projects from above: removal of chilled water tank, retrofit for underground fuel tank.

Discussion Item: National Disaster Resilience Competition

- Grant opportunity, flexible, no match
- Primary purpose is funding measure to address unmet disaster recovery needs from 2011, 2012, 2013 declarations (DR-4055, March 2012)
- Roads & Drainage Facilities, Water & Communication Improvements, Employment Training & Health Services, Housing Activities, Economic Development & Revitalization, Planning

No glaring unmet needs from DR4055 recovery, mostly focused on coastal/tsunami.

Discussion Item: Next Meeting

- 4th Thursday of every 3rd month
- Next up: Thursday, April 23, 2015
- **Coffee will be provided.**

Lane County

Hazard Mitigation/Emergency Management Steering Committee (HM&EM-SC)

October 23, 2014 Meeting

MEETING NOTES

Attendees: Linda Cook, Keir Miller, Melissa Crane, Jonna, Matt Dupkus, Pete Zugelder, Mike Finch, Oren Schumacher, Greg Wobbe

Discussion Item 1: Hazard Mitigation Action Plan updates

General

- Lane County PLAN is a FEMA sanctioned document, requirements outlined in Code of Federal Regulations, and Disaster Mitigation Act of 2000.
- Roughly at mid-point of a 5-year planning cycle, including OEM/FEMA review/approval time.
- PLAN is current and meeting all requirements, including new FEMA requirements from 2013.

Progress (Last 12 months)

- Created mission statement, updated and expanded goals.
- Developed 4 new action items.
- Completed (or significant progress on) most of the 12 current action items (credit, HM&EM-SC).
- Developed 4 new hazard profiles, a 5th in development:
    - Dam Failure
    - Drought
    - Hazardous Materials Incident
    - Pandemic
    - Volcano (currently in development)

- Updated and expanded 7 existing hazard profiles
    - Winter Storm
    - Flood
    - Windstorm
    - Wildfire
    - Earthquake (previously merged with tsunami)
    - Tsunami
    - Landslide

Committee Question: Additional hazard types to develop profiles and address in the PLAN?

Suggestion: Include terrorism, active shooter, arson profile. Due to FEMA requirements for vulnerabilities analysis for all profiled hazards, including specifics, HM&EM-SC consensus is to develop hazard profile for Terrorism, Arson, Active Shooter, & incorporate as classified appendix. See action item below.

Meeting Follow-up Question: Consider title for classified appendix 'Malicious Activity', or some other phrase? (which inclusively incorporates terrorism, active shooter, arson, vandalism)?

Suggestion: Develop Cyber-Security hazard profile. Include discussion of all potential threats to IT infrastructure, including man-made (hacking, vandalism, data theft) and natural (solar flares, etc.). See action item below.

Suggestion: Develop analysis and profile for utility companies. Identify methods of improved coordination. Seek to identify risks and mitigation opportunities. Among other shared concerns and responsibilities with utilities is water supply safety (this also relates to terrorism discussion). See action item below.

Other PLAN Notes (Last 12 months)

- Reformatted document to meet new FEMA standards published spring 2013 (new structure). Transition to living document, more or less constant state of update and currency.
- Developed appendices for new data, progress reports, project tracking, key reference tools
- Though PLAN document has roughly doubled in size, it's structured to specifically address all federal guidelines, while easy to navigate.

Action Item: develop classified annex for Terrorism, Active Shooter, etc.

Action Item: develop classified annex for Cyber-Security

Action Item: develop analysis and profile for utility companies, identify coordination opportunities.

Discussion Item 2: Update on new mitigation action item to relocate backup power and data center for Lane County Administration Building

Updated Project Description (proposed): Relocate and protect central data server location and backup power generation for county administration building. Current backup power generators, transfer switch located in basement of building and/or lower floors and vulnerable to exterior (street level) and interior (160,000 gallon(!) chilled water tank) flooding sources and seismic hazards. Project to be conducted in two phases: Phase 1: risk assessment/feasibility study, benefit-cost analysis, NEPA coordination and permitting; Phase 2: construction and implementation.

Comment: State of Oregon currently has open grant opportunity which may be suitable to fund this project. Deadline approaching.

Comment: This project may or may not fit into long-term facility plans. Current condition of public services building and sheriff's office is not ideal (many things held together w/ duct tape).

Discussion Item 3: Ebola virus update, emergency management, general notes

- General concerns, all staff should maintain awareness.
- Proactive measures, communication.

Discussion Item 4: Health in All Policies

- New County policy.
- Relationship to emergency management and hazard mitigation. Promulgation, integration with HM&EM activities and documents

Action Item: integrate Health in All Policies description into PLAN document, Section 4.4 (Coordinated Mitigation Strategy) and Section 5.3 (Incorporation into Existing and Future Planning Mechanisms)

Discussion Item 5: Department, HM&EM subject matter updates. Mitigation actions completed, proposed, and highest priorities.

Information Technology (Mike Finch)

1) Back-up cooling for the data center completed. Server network previously had no back-up cooling system.

2) Improvements to network servers, transition to pod system. Improved stability, web connectivity and data transfer.

Facilities (Matt Dupkus)

1) Fire alarm monitoring system. Established back-up account with secondary provider for seamless operation of fire alarm monitoring in event of phone system outage with primary provider. Improved preparedness & resilience of fire alarm system in case potential major event.

2) Coordination with IT on data center cooling back-up system

Public Works (Oren Schumacher)

1) Reimbursements received for Category A debris clean up per DR 4169 (public works and various departments).

2) Bridge safety/inspection following disaster event. Earthquake resiliency plan, alignment with State plan/process, rapid deployment of bridge inspection teams. Work in partnership with state, which is only 'sanctioned' inspection group. Rapid deployment inspection routes already set up via GIS. Potential problem likely to be encountered is roadway network/bridges are needed for rapid inspection/assessment.

General situation: Tens of thousands of bridges in the state, not many are seismic rated (similar for Lane County). Little Lake and Sweet Creek are two examples for county bridges. New, large bridges with federal funding generally are seismic designed.

3) Snow/ice response plan. Reviewing after-action reports, integrating lessons learned and updating response plan accordingly.

GIS (Melissa Crane)

1) Delivered crude oil train/landslide map. Useful for Senator Wyden and Merkley's roundtable forum in Eugene regarding proposed DOT rule changes.

2) Working on digitizing and preparing for publication of DOGAMI tsunami evacuation maps.

3) Assisting Deception Complex mapping.

4) Developing and delivering training on mobile mapping application for road maintenance and dispatch (downed trees and powerlines). 1st responder safety. Real-time, onsite data. In progress, roughly 80% complete. Comment: grant funding requirement is to include outward

facing, public access. Consensus is a read only interface, no public reporting/data editing method for this app (at this time).

5) Received training on RAPTOR, state emergency management mapping system (Real Time Assessment and Planning Tool for Oregon). Trained at middle level. Exploring integration with EMMA. Enhancements to EMMA.

Risk Management (Pete Zudelger)

1) Emergency Action Plans: developing for buildings that need it.

2) Evacuation/fire alarm drill last week, will send out after action report.

3) COOP work is underway (archived Webinars available on dashboard). Is there a MUA, MOU, or IGA with University, City of Eugene, etc for shared use of facilities if needed?

4) Active shooter training at Bethel, 50+ law enforcement (ALICE training, Alert-Lockdown-Inform-Counter-Evacuate). High quality, detailed training.

Dispatch (Jonna Hill)

Mobile Command trailer for dispatch. Two dedicated personnel. Re-equipped with better radio, generator obtained. Dispatch command trailer is self sufficient. Improved flexibility to use cell phone back-up for land line. Mobile was decided to be best suited for variable conditions in Lane County. Deployed for Deception Wildfire, pleased with speed of transport and set up, good drill.

Keir, Land Management

1) Engaged with Metro region. Various code amendments. Updating forest zone regs. Trying to adapt wildfire safety requirements to "Non-impacted Forest Zones". Spark arrestors for chimneys, water source for fire fight, etc. Somewhat focused on avoidance of fires starting at residences and migrating outward into timberlands.

2) Two staff attended National Flood Insurance Program week long training, intent is to increase number of CFMs in department.

3) Community Fire Protection Rating of 7 maintained in recent review.

4) FEMA Flood Insurance Rate Map (FIRM) update in progress, ongoing.

Discussion Item 5: Arrangements, Schedule for Next Meeting.

- 4th Thursday of every 3rd month
- Next up: Thursday, January 22, 2015

Lane County

Hazard Mitigation/Emergency Management Steering Committee (HM&EM-SC)

July 24, 2014 Meeting

General Announcements

Attendees: Pete Zugelder, Matt Dapkus, Melissa Crane, Selene Jaramillo, Linda Cook, Mike Finch (IT), Keir Miller

Discussion Item 1: Recent Incidents, Coordination Cell Concept

Since December four events: 2 winter storms December and February, Seneca Sawmill protest, Springfield Mill fire.

Discussion of real time mapping applications, ESRI products; suite of tools

- Moderate scale emergencies
- Seneca sawmill protests
- Springfield plywood mill fire (did not have situational awareness of hazmat, suggestion that fire marshal should have database, City of Springfield has Drinking Water Protection Overlay Zones; 1st responder safety; evacuation messages were conflicting; Linda did request and receive CRTK database, EMMA may have similar info too.
- Gauge departmental interest in coordination cells

Develop routine practice for moderate scale emergency

Identify list of major hazmat facilities to get pre-defined situational awareness real time.

Discussion about relationship of Coordination Cells to COOP and EOP

Discussion about who/what departments to assemble as standard practice

Risk management, need to monitor risk exposure

General conclusion is a long path to implementation, multi-department and agency coordination, but is a good, workable idea

Comment/question re. data center outage and how it relates to emergency public info release. Current need for redundant data server, need to explore funding opportunities.

Discussion of real time mapping applications, ESRI products; suite of tools

Suggestion for flow chart/matrix for guiding coordination activation and procedures.

Discussion Item 2: Coordinated EOC, County Departments, Utilities

Goal of improved coordination between A) county departments, and B) utilities during emergencies. Seeking better solutions from a technical standpoint. Problem of geographic disconnect between county departments, EOC, and utilities during emergency situation.

- Potential solution: During emergency, activate centralized call center, dispatch, and real-time web-based mapping interface specific to field operations with all 6 utilities in Lane County.

- Functional details: Radio and cell phone capability. Operators on standby for field reports, 2-way info sharing. Video cameras on utility vehicles with wireless feed to EOC.
- Mapping goal: Real-time overview of regional situation. Google Earth type solution discussed, ability to edit and upload web-based map in real-time showing: 1) road blockage, 2) power/communications outages, 3) repair priority, 4) dangerous conditions, 5) work crew status. Also discussed outward facing map interface, public access to report information.

Good idea, build into PLAN as action item.

Discussion Item 3: Hazard Mapping

- Mapping project: Hazardous Materials Incident Risk Assessment. Comprehensive GIS for EHS facilities. Determine which facilities have what materials. Note proximity to waterways, populations, facilities. Note roadway, railway intersections; pumps, compressor stations, transfer points; other risk of occurrence factors.

Groundwater protection zone, data is available statewide. Time of travel data/analysis

- Mapping project: Major Flood / Inundation Evacuation. USACE major flood data request.
- Mapping project: Comprehensive GIS for Utilities Network. Data collection challenges. See also discussion item 2 above.

Discussion Item 4: Departmental updates, hazard mitigation, emergency management

Capital Projects:

Emergency Services:

Facilities:

Floodplain:

Information Services:

Law Enforcement:

Mapping / GIS:

Public Health:

Public Works:

Risk Management:

Road and Bridge:

Discussion Item 5: HMGP, DR-4169

- DR-4169 (presidential disaster declaration), Oregon Winter Storms. Lane County, primary impact jurisdiction per Project Worksheets.
- Hazard Mitigation Grant Program (HMGP), planning grant application (county update, new plan for rural cities)
- OEM feedback on facility retrofit, seismic, flood mitigation project application

Discussion Item 6: Mitigation Steering, Milestones, Road Ahead

2014

- Integrating HM-EM activities into standard departmental operations and future planning.
- Continued work with GIS, et al. on Risk Assessment/mapping, Vulnerability Analysis
- Documenting mitigation activities already completed and/or underway.
- Identifying new mitigation actions (all divisions, all project types).
- Pursue funding for Multi-Jurisdiction PLAN (Incorporated Cities w/o Plan).

2015

- Secure funding and spearhead Multi-Jurisdiction PLAN process (12 months, 5-6 meetings).
- Develop grant applications for Lane County mitigation actions/projects.

2016

- Finalize Multi-Jurisdiction PLAN document and assist local adoption process
- Implement mitigation actions/projects applied for in previous year.

Discussion Item 7: Next Meeting.

- 4th Thursday of every 3rd month
- Next up: Thursday, October 23, 2014

Keir will be at Firewise Community booth at fair

GIS outputs on the agenda

Initial draft of the coordination cell

Lane County

Hazard Mitigation/Emergency Management Steering Committee

Spring Quarterly Meeting

April 24, 2014

9:00 am

LCSO Emergency Operations Center

MEETING NOTES

General Announcements

- Meeting Purpose: Mitigation Plan Maintenance, Project Implementation Updates, Departmental Reports, Steering Committee Feedback and Guidance.
- Format is discussion based, open forum.
- Desired meeting outcome: direction from committee; obtain observations, guidance from committee members.
- Purview of HM&EM-SC and PLAN includes both county gov't and also broader community including public utilities, opportunity for funding.

Discussion Item 1: Federal Disaster Declaration 4169 (DR-4169 Oregon Winter Storms)

- Review DR-4169, it's relation to the Mitigation Plan, and project grant funds availability (HMPG)
- Recap of April 16 RPA applicant briefing.
- Discussion of storm events, lessons learned. Provide direction, next steps on coordination during storm events.

Oren is meeting with FEMA to discuss public works projects. Pete Zudelger PW is handling debris clearance and roads impacts (PA). Working well.

Goal of improving coordination of A) public works and B) utilities in emergency management and response, seeking better solutions from a technical standpoint. Problem of physical disconnect during emergency management situation.

Suggestion: During emergency, activate **centralized call center, dispatch, and real-time web-based mapping interface** specific to field operations with all 6 utilities in Lane County.

Both radio and cell phone capability. Operators on standby for field reports, 2-way info sharing.

Mapping element, need for real-time overview of regional situation. Google Earth type solution suggested, ability to edit and upload web-based map in real-time showing: 1) road blockage, 2) power/communications outages, 3) repair priority, 4) dangerous conditions, 5) work crew status.

Boundaries between utilities are rough, approximate, but well understood among individual utilities

Also discussed outward facing map interface, public access to report/edit information.

Action Item 1: Research off the shelf solutions, prepare Draft 2 to propose to utilities. Incorporate into Hazard Mitigation Action Plan (PLAN).

Discussion Item 2: Major Flood / Inundation Map Update/Review

- Briefing on USACE map viewing meetings, public information campaign, next steps for evacuation planning.
- Current status, data availability, limitations, security.
- Map review, areas of interest, evacuation mapping.

Evacuation routes. Micro study areas, identify areas needing detailed study. Will be helpful to know where houses are on inundation maps. Also add county facilities, schools, hospitals, high traffic facilities.

Recommend digital solution first, phone apps, etc. Ultimately implement signage.

Discussion Item 3: Sharepoint Site

- Sharepoint site review, comments, feedback, new ideas.

System is up and running. Recently added mitigation project wish-list/update capability. Linda is going to create a Sharepoint card with log in info, directions.

Discussion Item 4: Departmental updates. Hazard Impacts. Mitigation actions completed, proposed, and highest priorities.

- Mitigation activities, departmental reports, mitigation wish list

Facilities: Completed: Roof work completed on facilities. Generator transfer switch for data system back-up power installed.

Action Item 1A) Facilities: Emergency generator and transfer switch needs to be relocated out of basement to higher elevation. Flood (internal or external source) and earthquake risk. Source of internal flood risk is 180,000 gallon steel chilled water tank. Previous architectural study recommended removal for hazard reasons.

Action Item 1B) ISO: Also looking to relocate main data servers to safer location. Considering a virtual host web solutions. Candidate for joint project with generator relocation.

Public Works: Completed/Ongoing: Network fleet. Testing interior plumbing drains. Various other activities.

Mapping: Completed: EMA has migrated to internet. Training sessions on EMA conducted. Created emergency management map for city of Cottage Grove. Ongoing: working on ways password protect certain data.

ISO: Completed: Maintaining road/address data. Ongoing: Working on firmer estimate for cost on Virtual server and proceed with application (see Action Item 1B).

Discussion Item 4: Steering, Establishing Milestones, Road Ahead

- Pursue funding for Multi-Jurisdiction PLAN (Incorporated Cities w/o Plan). This will involve outreach effort to those communities, coordination with OEM & FEMA Region X.

Update on status of Hazard Mitigation Action Plan (PLAN) for cities of Coburg, Creswell, Dunes City, Florence, Junction City, Lowell, Oakridge, Veneta, Westfir. These cities not currently covered by PLAN. HMGP for DR-4169.

Lane County

Hazard Mitigation & Emergency Management Steering Committee (HM&EM SC)

Meeting Minutes

Date: Thursday, January 23, 2014

Time: 9:00 a.m. – 10:00 a.m.

Location: Lane County Sheriff's Office, Emergency Operations Center
125 E. 8th Avenue, Eugene, OR 97401

Attendees: Linda Cook (Emergency Management), Melissa Crane (Geographic Information Systems), Brian Craner (Capital Projects), Selene Jaramillo (Public Health), John Petsch (Public Work, Roads), Greg Wobbe (Contractor, Plan Development)

Facilitator(s): Linda Cook and Greg Wobbe **Scribe:** Greg Wobbe

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Discussion Item 1: Departmental updates. Mitigation actions completed, proposed, and highest priorities.

Review of public works year-end report form. Consensus: good degree of detail, majority relevant to hazard mitigation. Can serve as guide for other departments.

Question: HM & EM SharePoint site status: Yes it is developed and ready.

Capital projects requested template to submit mitigation action/activity report on SharePoint: Greg will develop a template and deliver to Linda. (Action Item)

Capital projects/facilities:

- Automatic transfer switch: working on permanent fix back up power. (completed)
- Modernization of data center: cooling system, replacing server equipment. Improved efficiency and reliability. (completed)
- Security upgrades at the jail, striving for appropriate balance of security, public interface. Gates. (completed)

Public Works:

- Hazmat spill trailer, first responder training (proposed)
- Animal services. Question: relevant to hazard mitigation. Consensus, yes. Important relationship to emergency evacuation, pets, homeowner responsibilities.

Risk Management:

- Community Emergency Response Training (CERT). Completed and ongoing.

Public Health:

- Has a 5-year plan, Work plan, and Annual plan. Goals include public information for immunization and disease prevention.
- This is an excellent example of integration requirement, FEMA mitigation.
- Noted linkage to public health concerns resulting to flooding, other natural disasters.

GIS:

- Went live with emergency management mapping. Training (wait listed for January 30)
- Creating mapping application available to fire departments.
- Flood inundation maps. Digitizing inundation areas (generalized, based from USACE data)
- Evacuation planning mapping/modeling. Will use new transportation models/methods. More training proposed for traffic control/emergency management.
- Goal to establish 'high/dry' routes for major flood/dam failure. Noted complexity, need to create and inform public of standardized safe routes regardless of scenario.

Other discussion:

- Rural jurisdictions are reaching out to become incorporated into EOP/EAP. Suggested to use this initiative to also incorporate into PLAN. (Oakridge, Creswell, Veneta. Upper McKenzie, City of Florence, et al).
- Idea to develop, expand existing matrix of jurisdictional responsibilities to include evacuation, EOP, PLAN.
- Flood fight training in Lane County, response contractors; tentatively scheduled for spring. Possibly funded by PL 84-99 (see below).

Discussion Item 2: <u>Review Goals and Consider Revision</u>

Accepted Revision

Goal 1: Prevent loss of life and reduce injuries and illness

Accepted Revision

Goal 6: Increase awareness of hazards and understanding of mitigation methods

Discussion Item 3: <u>Steering, Establishing Milestones, Road Ahead</u>

2012

- Plan update, formal plan approval, adoption.

2013

- Established HM-EM Steering Committee and regular functions.
- Reformatted plan document: 5 chapter structure.
- Technical editing.
- Updated, expanded risk assessment, addressed new/additional hazards.

2014

- Integrating HM-EM activities into standard departmental operations and future planning.
- Continued work with GIS, et al. on Risk Assessment/mapping, Vulnerability Analysis

- Documenting mitigation activities already completed and/or underway.
- Identifying new mitigation actions (all divisions, all project types).
- Pursue funding for Multi-Jurisdiction PLAN (Incorporated Cities w/o Plan). This will involve outreach effort to those communities, coordination with OEM & FEMA Region X.

2015

- Secure funding and spearhead Multi-Jurisdiction PLAN process (12 months, 5-6 meetings).
- Develop grant applications for Lane County mitigation actions/projects.

2016

- Finalize Multi-Jurisdiction PLAN document and assist local adoption process
- Implement mitigation actions/projects applied for in previous year.

2017-2022

- Next 5-year cycle

Discussion Item 4: USACE Rehabilitation and Inspection Program (RIP)

- General information/overview: potential grant opportunity, mitigation related.

Discussion Item 5: Schedule, Future Meetings.

- Established standard quarterly meeting schedule, 4th Thursday of every 3rd month. Next meetings: April 24, July 24, etc.

Lane County

Hazard Mitigation & Emergency Management Steering Committee

Meeting Minutes

Date: Thursday, October 24, 2013

Time: 9:00 a.m. – 11:00 a.m.

Location: Lane County Sheriff's Office, Emergency Operations Center

125 E. 8th Avenue, Eugene, OR 97401

Attendees: Tony Black (Information Technology), Linda Cook (Emergency Management),

Melissa Crane (Geographic Information Systems), Brian Craner (Capital Projects),

Matt Dapkus (Facilities), Chris Doyle (Law Enforcement), Selene Jaramillo (Public Health),

Michael Johns (Public Works, Fleet), Lisa Lacey (Risk Management), Gary Luke (Geographic Information Systems), Keir Miller (Land Management, Planning), John Petsch (Public Work, Roads), Greg Wobbe (Contractor, Plan Development), Pete Zugelder (Continuity of Gov't)

Absent: Jonna Hill (Public Safety Communications)

Facilitator(s): Linda Cook and Greg Wobbe **Scribe:** Greg Wobbe

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Discussion Item Notes

Item 1: Establish mission statement Hazard Mitigation Action Plan

To promote and implement actions to eliminate or reduce long-term risk to human life and property from the effects of hazards of all types and sources, and to enhance capability to prepare, respond, and recover from such incidents.

- Motion carries to adopt mission statement, as amended.

Item 2: Review and validate Plan goals, discuss revisions and additions

The following Plan goals were discussed and approved. All Emergency Management related Plans will use the same goals as applicable.

Goal 1: Save lives and reduce injuries and illness. (Applies to PLAN, EOP, and COOP to the extent applicable to those County Departments with Emergency Operations Plan functions.)

Goal 2: Minimize and prevent damage to buildings and infrastructure (Applies to PLAN, EOP)

Goal 3: Reduce recovery period and minimize economic losses for the community. (Applies to PLAN, EOP, COOP)

Goal 4: Maintain and improve ability of Lane County, municipal governments, and critical service providers to quickly resume operations. (PLAN, EOP, COOP)

Goal 5: Protect natural, historic, and cultural resources (PLAN, EOP)

Goal 6: Increase awareness and understanding of hazards and risks (PLAN, EOP, COOP)

Goal 7: Improve attractiveness to individuals and businesses by demonstrating effectiveness in dealing with a disaster.

- Action: Develop 'Basic plan' that serves as intro to PLAN, EOP, COOP, EAP.

- Action: Group agreed to reference in action item descriptions the correlating goals being addressed.

Item 3: Ideas to engage stakeholders ('whole community' approach)

The group discussed stakeholder groups that they already work with that could be engaged in the Plan update process.

- Businesses: excavation contractors, timber contractors, Wildish (Randy Hledik), insurance companies
- Private organizations: HBLA, realtors assoc., LEPC, EWEB, EPUD, Blachly Lane, LTD, hospitals,
- Neighborhood groups: Agricultural groups, CSA's, Oregon Food Bank, Food For Lane County
- Non-profit organizations: Eugene climate change committee

- Motion: Establish 3-tiers of hazard mitigation meetings: discussed and tacitly agreed.
  - Tier 1: HM & EM Steering Committee (quarterly)
  - Tier 2: HM & EM Steering Committee, & Stakeholder Groups (annual)
  - Tier 3: HM & EM Steering Committee, Stakeholder Groups, & General Public (bi-annual).

Item 4: Ongoing discussion: how best to identify & develop action items by project type

Type - Prevention: (e.g., planning and zoning [floodplain regulations], open space preservation [parks and recreation area], land development regulations [large lot sizes], storm water management [clear ditches / larger retention basins], coastal barrier protection [building behind dunes], capital improvement planning [no infrastructure extended into hazard area], building codes.

- Floodplain management regulations are well established and documented.
- Are there analogous regulations relating to site review, development approval for Wildfire?
- Are there subdivision design standards, Firewise communities? (example: forest template dwelling application could include defensible space maintenance requirement, with liability for firefighting costs if not maintained? Good idea, bad idea?)
  - Discussion consensus: not yet, though it has been discussed in the past and could be beneficial if adopted
  - Design review for subdivision access roads does exist, though could be made more robust
  - Defensible space activities are ongoing in coordination with property owners.
  - Senate Bill 360, owner liability for fires that start on their property.
- Same question for Tsunami (e.g., are there disclaimer son property title transfer docs noting tsunami zone?)
  - Discussion consensus is that it's a good idea, but has been pushed back in the past by realtor groups, et al.
  - Discussion consensus recommends limiting critical infrastructure in Tsunami zone
- Building codes and earthquake. Assumption is that code addresses seismic factors for public and commercial buildings, but what about residential?

- o Answer: Yes, building code for residential, commercial, public, etc account for seismic, though it is noted that pre-1960 era building stock may be susceptible.
- o Consensus: ongoing effort to understand private dams better.

Type - Property Protection: acquisition, relocation, rebuilding or modifying, floodproofing;

- Acquisition in the future could expand to include wildfire, tsunami.

Type - Public Education and Awareness: providing hazard maps and other hazard information; website; outreach programs providing hazard and mitigation information; asking business owners to provide info to employees; mass mailings; notices to residences and property owners in hazard-specific areas; displays in widely used facilities; media blitz; public access tv channel programs and announcements.

- Excellent ongoing work already occurring in this area.

Type - Natural Resource Protection: erosion and sediment control; wetland protection; dune restoration; reforestation; terracing; beach nourishment, vegetation management.

- Good opportunities to satisfy multiple objectives. Is anything ongoing in this area?
  Answer: Yes, numerous activities coordinating with watershed councils-ODFW for river, stream and riparian zone enhancements, USACE floodplain function restoration, etc.

Type - Critical Facilities Protection: specific to the facility; critical facilities include police and fire stations, hospitals, nursing homes and prisons, hazardous materials production or storage facilities.

- This is another good opportunity to satisfy multiple objectives. For example, storm hardening projects. Any specific sites come to mind as candidates?
  Needs more thought and future discussion.

Type - Structural Projects: levees, culvert upsizing, high flow diversions, debris basins, channel modifications, storm sewers, road elevations.

Road elevation, culvert upsizing are relatively common and effective. Many activities of this type already occurring.

Idea to develop map for fish passage culverts showing location and river/stream miles affected. Map could show both completed projects and planned projects.

Item 5: Steering Committee Members contributed the following Action Items

Public works/roads: Educate property owners who own and are responsible for road maintenance.

GIS: Inundation maps, multiple hazard types, various risk and vulnerability assessment analysis.

Capital projects: Work with other divisions, identify needs.

Information services: Identify infrastructure and communication needs of various departments.

Facilities: Working with capital projects: Exit signs, facility improvements, emergency logistics. Removed seismic hazards, overhead planter boxes (completed).

Road and Bridge: Hosting a flood preparation and planning workshop for multiple agencies, community, utilities, etc.

Floodplain: Annual mailing, advertise flood planning workshop. Informational outreach for Firewise program (spring).

Public works: Seismic inspections, fish passage projects, 1997-ongoing.

Law Enforcement: At the jail, concrete planters for security, ballistic glass, hardening reception area (completed).

Health: Ongoing public education campaigns to increase immunization rates, and personal preparedness. Ongoing improvements to website, health/mitigation related. Review of facilities, needs assessment for Charnelton Building (too few phone lines, need more infrastructure and support capabilities, etc).

Emergency Services: CERT class ongoing. Develop preparedness standards for County employees…particularly staff with key COOP functions.

Risk Management: Ongoing work to monitor and report facilities that are underinsured.

- Action: Update PLAN and other Plan documents to include the above listed action items.

Item 6: Ongoing - develop asset inventory and loss estimations to inform priorities.

Advanced GIS analysis is planned and ongoing.

- Action: Update PLAN and other Plan documents to include the above listed action items.

Item 7: 'Recent Policy Changes – FEMA Mitigation & the NFIP'.

- Benefit Cost Analysis (BCA). New streamlined approach for acquisition of floodprone properties (August 2013). Highly technical, yet still seems like a somewhat arbitrary review process however, this new policy provides clarity.
- New methodology to account for long-term environmental benefits of open-space for acquisition projects (June 2013). This new policy brings FEMA's BCA methodology more in line with USACE and CBO.

Item 8: Idea considered to establish a single centralized website.

Instead of a single centralized website, it was decided to continue and expand use of links and cross-references amongst departmental websites, centered on Emergency Management website. Check policy, protocol for posting updates on websites.

Item 9: PLAN versions naming convention explained.

Current version 2.3 for fiscal year 2013-2014. Document version name will be updated per quarter following each HM&EM-SC meeting. Suffix a, b, c, d per fiscal year quarter. For example, the next update will be for the second quarter of Federal Fiscal Year 2014 and the naming convention for this update will be Version 2.3b

Item 10: Overview of SharePoint Site for Hazard Mitigation Action Plan:

No log in required. Plan document will typically be posted in Word doc file type for editing capability. Features explained, check out function, tasks, calendar, etc.

LANE COUNTY

HAZARD MITIGATION STEERING COMMITTEE

JULY 10, 2013

MEETING NOTES

- Quarterly meetings agreed. Next meeting set for October 24, 9:00 am, coffee yes.

- Morphing HM&EM-SC into committee with broader scope which will also oversee EOP, EAP, COOP in addition to PLAN. Invite Tony, and Lisa from risk management.

- Suggestion for a revised committee name might be HM/EMSC, for Hazard Mitigation and Emergency Management Steering Committee. Such a title would resonate with FEMA, as they occasionally make references to ‘HM&EM programs/divisions’ at state and local levels.

- It was discussed and agreed(*?)* to add health consequences analysis to hazard profiles and/or vulnerability analysis. *This is do-able and I have a plan if you concur with the idea.*

- Discussed and agreed to pursue using a SharePoint site as a promulgation/collaboration method.

- General comments from Melissa Crane indicating interest and capabilities to conduct more advanced hazard analysis mapping.

- Discussion regarding additions to PLAN goals. I think you captured them, but centered on the idea presented by Selene to add ‘disease’ and/or ‘illness’ to Goal #1. I also offered the suggestion to add ‘historical’ to Goal #5.

APPENDIX C. PREVIOUS PLANNING CYCLE (2006-2012)

The following sections outline activities from the previous planning cycle circa 2006-2012. Appendix C sub-sections include descriptions of planning meetings (C.1.1 Planning Process 2006-2012 Cycle), action item status report (C.1.2 Previous Action Item Status Report), notes and correspondence from previous planning cycle (C.1.3 Mitigation Notes and Correspondence 2006-2012), grant funded mitigation projects (C.1.4 Grant Funded Mitigation Projects), and data collection from the previous cycles (C.1.5 Data Collection 2006-2012 Cycle).

C.1 Planning Process 2006-2012 Cycle

2007

The county's Land Management Division (LMD) and Public Works GIS (PW-GIS) staff took on the development of a Community Wildfire Protection Plan (CWPP). Staff met with Oregon Department of Forestry (ODF) and the Lane County Fire Defense Board (comprised of 25 fire chiefs countywide) on several occasions to discuss the CWPP risk assessment and plan. The goal was to coordinate the use of data resulting from new structural vulnerability assessments being conducted by ODF and to evaluate new wildfire fuels/vegetation hazard data.

The Land Management Division also worked with the County Parks Department, ODF, several east Lane fire districts and the Willamette National Forest on the three fuels reduction and water supply grants that were awarded for mitigation projects.

Additionally Lane County Land Management Division submitted a 2007-2008 CWPP grant application for funding through the Lane County Legislative Committee (Title III). The proposal focused primarily on education and outreach projects and was awarded. These activities reinforced the importance of keeping public education and outreach central to the Plan.

2008

Lane County Emergency Management documented the local Flood Threat Recognition system in place as contribution to the Community Rating System (CRS) process. The Lane County Land Management Division is the lead agency in pursuing the CRS credit points for the County.

Special emphasis this year was on the earthquake hazard in Lane County. A special committee reviewed the DOGAMI report (IMS 24), identified key talking points for briefing elected officials about the hazard and, identified action items for mitigating risks.

It was further identified that special emphasis should be placed on dam vulnerability. With assistance from the Army Corps of Engineers, the most vulnerable dam identified in Lane County is Fern Ridge dam, which could be subject to liquefaction during a Cascadia Subduction Zone event. As such, a new hazard mitigation project was identified for that hazard that focuses on public education and outreach for residents living downstream of that dam.

2009

The Community Wildfire Protection Plan was presented at an East Lane Forest Protection Association meeting that included a 2009 summer tour to take an in depth look at how Senate Bill 360 gets applied across the landscape, Lane County's role in this effort and to see examples of fuels reduction on high and moderate rating sites.

The tour provided an opportunity for a group of about 30 people comprised of community members, stakeholders, government officials and elected officials to see how ODF and private landowners can work together with Lane County to reduce the threat of wild fire and to talk with the folks on the ground that make this happen.

2010

Mitigation in Year Four of the previous planning cycle centered on 4 activities in addition to general plan maintenance and integration functions: safe pharmaceutical disposal, pandemic mitigation, flood mitigation, and risk assessment for dams.

This first involved enaging the community in keeping pharmaceuticals out of the waterways. A major community-wide drug take-back event was held in March. At the time, this was the first attempt at a coordinated effort in Oregon. It provided a multi-pronged opportunity to educate the public about the importance of keeping our drinking water sources free from hazardous chemicals, keeping chemicals out of the landfill, as well as keeping pharmacetuicals out of the wrong hands. Key participants were the Eugene Water and Electric Board (EWEB); Springfield Utility Board; City of Eugene Public Works Wastewater and Eugene Police; Springfield Public Works Environmental Services, Springfield Police; Lane County Waste Mangement, Emergency Management, Sheriff's Office, Public Works Waste Manage, Public Health and Youth Services. Also involved were about ten local pharmacists who volunteered their time the day of the event. This project helped us see that unanticipated projects can emerge to help mitigate hazards that are not typically addressed by mitigation plans.

Pandemic Influenza was a major concern in 2010 and an outreach effort was undertaken to mitigate widespread disease. Mitigation included, but was not limited to, applying an anti-microbial product to all high-traffic public areas in the county public service building, courthouse and parole and probation offices to serve a dual purpose of mitigating against any intentional spread of biological agents as well as the natural spread of H1N1 and other microbials. Responding to this unanticipated event led to the inclusion of "*Action Item 12. Action Planning for Pandemic Illness and Other Health Hazards*".

The county and state worked together to identify high water locations throughout Lane County that might be suitable for a mitigation grant. In August Lane County Emergency Management, Public Works and Oregon Emergency Management representative, Phil Carpenter, toured high water locations. Mr. Carpenter produced a report that will help with identifying specific staff and funding needs.

Since Lane County is home to nine out of the thirteen US Army Corps of Engineers (USACE) dams in the Willamette River basin, there was a great deal of public interest when USACE announced the need to repair spillway gates on several dams. The high level of interest provided an excellent opportunity for collaborating on engaging the community in flood mitigation discussions. Lane County and the cities of Eugene and Springfield joined the USACE to present preparedness information at two well attended community meetings hosted by USACE in September and October. Additionally, Lane County Emergency Management hosted a Flood Planning Workshop for over 55 agency officials throughout the County followed by a Sandbagging Class presented by USACE.

Countywide Flood Workshop, Springfield Public Works, October 1, 2010


Countywide Flood Workshop, Springfield Public Works, October 1, 2010

2011
The primary focus for 2011 was an in-depth review of the PLAN to evaluate its usefulness over the long term. This led to a comprehensive update which resulted in a stand alone document that is more focused, more succinct, and easier to track than the 2006 edition. The goal is to have an easy-to-use Plan document to serve as a reference guide for all parties (public and private) engaged in mitigation activities. The intent over the next five years is to make a second attempt at an oversight committee but with a more streamlined, focused approach.

2012
In 2012 OEM and FEMA conducted review of the updated PLAN in accordance with state and federal standards. The document was approved by both agencies and adopted by the County Board by resolution.

Lane County's mitigation planning process during the 2006-2012 cycle included several efforts to seek public input into the planning process.

- A special page on the Lane County Emergency Management website was established (www.lanecounty.org/prepare) to solicit public input. The entire document is available for download and an on-line form makes it easy to submit comments.

- Plan elements were discussed during public education and outreach activities. For example, the historical occurrences of some storm events were not found in early drafts. After discussion with the attendees at outreach events about their memories of past incidents committee members were able to refine their research efforts to improve the historical record of past occurrences.

- A news release was issued on Friday, February 17, inviting all members of the public to comment on the Plan Update either via the website, via email, by attending the public meeting or by contacting Lane County Emergency Management directly.

- A public meeting was held on March 1, 2012 to solicit input to the final draft before going to the Board of County Commissioners for final approval.

C.2 Previous Action Item Status Report (2006-2012 Cycle)

The action items for the Natural Hazards Mitigation Plan were established by the committee in 2006. This section of the Plan Update provides a comprehensive review of the progress made on each of the action items. The action item status indicates if the action item has been completed, ongoing or removed from the plan. In addition, it will indicate whether the action item will be rewritten for the Plan Update.

The comprehensive plan review identified several problems with the original crafting of the action items.

- Action items were written for every type of hazard resulting in a significant amount of redundancy and overlap among the action items. In other words, one type of action item applied to many hazards and was, in essence, repeated multiple times.
- Hazards were not prioritized prior to creating the action items.
- Some action items were assigned to agencies that were not adopters of the plan and some agencies were not at the table at the time the action items were created.
- The action items did not address all of the county departments that have a role in hazard mitigation.

The Plan Update adopts a new structure for the action items. A more strategic approach will be used that allows more flexibility for achieving the intent of the action item. New funding opportunities and disasters occurring elsewhere that create a local sense of urgency can both be motivating factors for accelerating the accomplishment of an action item's intent in unanticipated ways. Therefore the Plan Update uses a broader definition for each Action Item to encourage continuous reflection and contemplation about the wide range of things that can be done to reduce hazards and to encourage more frequent status updates on each action item. Additionally, a shorter list of broad reaching action items makes it easier to keep the list of action items in front of county agencies and the public as constant reminders that we all need to do our part.

Another benefit to this approach is that it makes the county's Plan easier for cities and the local tribe to adopt. The action items could apply to all jurisdictions and with the addition of just a few jurisdiction-specific action items a small city or tribe could be on its way to implementing its own Natural Hazards Mitigation Plan.

A. Action Item No: MH #1 Amended Item No: 1

"Create and formalize a Lane County Advisory Committee to oversee implementation, identify and coordinate funding opportunities, and sustain the Lane County Natural Hazards Mitigation Plan (including the CWPP) and the Emergency Operations Plan, as a single integrated effort."

Status Update:
Various sub-committees met periodically to implement hazard mitigation projects and to secure funding opportunities. This will continue to be ongoing and improved upon during the next plan performance period.

However, sustaining the NHMP, CWPP and EOP as a single integrated effort is not feasible. Although the intent is to ensure that elements of the NHMP are integrated into and coordinated with other plans, various staff members and departments work on these plans at different times based on department priorities and work plans therefore sustaining them as a single integrated effort is impracticable. However, incorporating mitigation action items into other planning mechanisms as appropriate is reasonable and attainable.

- **This item is rewritten as follows:** Establish Mitigation Coordinating Committee to act as a forum for hazard mitigation issues, disseminate hazard mitigation ideas and activities to all participants, monitor implementation of the Action Items and report on progress and recommended changes to the Plan as appropriate. Includes identifying opportunities to incorporate mitigation actions into other planning mechanisms, such as comprehensive or capital improvements, as appropriate.

B. Action Item No's: MH #2, MH #3, MH #4, EH #1, WH #2, WH #4, WH #5, WH #7, LH #1

Amended Item No: 2

<u>Status Update:</u>
All of the items listed above pertain to some type of public education activity with some degree of overlap. Public education and outreach programs are an effective strategy for orienting community members to family preparedness and property protection measures. Every type of hazard should be mitigated in part through public outreach programs. To more broadly represent the many ways this gets accomplished, the 2011 Plan Update moves away from individual detailed activities to a more strategic approach to public outreach in general. As such, these individual action items will be replaced with a broader, overarching public outreach action item as rewritten below.

- **This item is rewritten as follows:** Conduct public outreach activities related to natural hazard mitigation and personal preparedness using a variety of media sponsored by various agencies, such as:
  - Community newsletters and direct mailings
  - News releases and public service announcements
  - Presentations at meetings of neighborhood, civic or business groups
  - Displays in public buildings or shopping malls
  - Signs in parks, along trails and on waterfronts that explain natural features (such as the river or ocean) and their relation to hazards (such as floods)
  - Brochures available in government buildings
  - Special meetings

<u>Status Update:</u>

The intent of these action items is to carry out effective public education and outreach activities. These have been achieved in many different venues by various agencies from speaking engagements, public mailers, website updates, etc. A sample listing of many of those activities is provided below.

- *Lane County Emergency Management delivers on average 8 public education presentations a year and is a regular guest on radio talk shows.*
- *Lane County has several departmental websites that help community members reduce various types of hazard risk*
- *According to a recent survey of fire service agencies in Lane County, 91% of agencies provide some form of information on how to reduce fire risk to the community.*

C. Action Item No: MH #5 Amended Item No: 3

"Provide HAZUS training opportunities for County Staff (Lane County Public Works GIS technicians)."

Status Update:

The HAZUS software has been obtained from FEMA and training classes identified. However, there is a cost associated with staff attending the training and learning the software, therefore this action item is currently cost prohibitive due to shrinking budgets and decreasing staff resources. However, Lane County Emergency Management and Lane County Public Works have entered into a Memorandum of Understanding that allows Emergency Management to contract with Public Works on an ad-hoc basis to help cover some of the costs of Emergency Management related projects; training on HAZUS software could be one of those projects. If Lane County GIS technicians are trained in HAZUS then they will be able to create maps to inform decision makers about viable risk reduction measures.

This action item will remain in the plan as on-going but rewritten for better clarity.

- **This item is rewritten as follows:** Develop in-house competency with HAZUS software so that additional loss-estimation data can be provided regarding natural hazard risks and inform decisions about potential risk reduction measures.

D. Action Item No: MH #6, MH #9, LH #2, LH #4, VH #4, DH #3, HMH #3

Amended Item No: 4

All of the action items listed above relate to mapping and overlap in their pertinence to mapping hazardous areas or creating a regional repository for hazard data. Maps, particularly digitized maps using a Geographical Information System, are a major component of effective hazard mitigation. Maps can illustrate the hazard vulnerabilities of specific areas and inform planners and policy makers on important decisions. As such, these individual action items will be replaced with two action items: one overarching mapping action item that has broader application and the second that focuses on locating critical facilities within hazardous areas.

Status Update:

One idea for implementation was to "Create and maintain a single server/location that regional users can access for accurate GIS data. This is especially important for Land Management when issuing building permits or analyzing development proposals."

Although there is regional agreement about the benefits of a centralized location for storing map related metadata, the county and most cities opt to maintain their own data. Achieving a single, regional location for accessing accurate GIS data is not a high priority for agencies facing shrinking budgets and decreasing staff resources. A regional repository would require dedicated staff to locate, update, create and maintain metadata on an on-going basis. Lane Council of Governments has twice applied for grant funding for this project but funding was not awarded. This project is repeated each year in Lane Council of Government's annual list of top five projects but remains unfunded.

Nonetheless, a major accomplishment was achieved toward the intent of this action item: the creation of a GIS Data Catalog: List of Available Data. Although this falls short of the more comprehensive idea described above, it was an achievable alternative with significant benefit. The data catalog informs plan developers of the data available for producing maps and thereby encourages better analysis of key decisions.

With regard to digitizing existing maps, two circa 1980 maps depicting the U.S. Army Corps of Engineers' inundation zones in the event of a catastrophic failure of either Hills Creek or Look Out Point dams have been digitized for evacuation planning purposes.

- **This item is rewritten as follows:**
  - Develop a list of hazard types to be mapped; identify, locate and obtain the necessary data and create hazardous area maps.
  - Plot critical facilities and infrastructure on the hazardous area maps to show their location within the hazard areas.

E. Action Item No: MH #7 Amended Item No: 5

"Expand existing special needs population data to include detailed inventory of all at-risk communities (elderly, homeless, disabled, etc.) that are without access to transportation and communication and determine mechanisms for alert/ warning and evacuation."

Status Update:

Currently this action item is considered unfeasible because of the staff time to create and maintain an inventory database of this kind. However, an alternative implementation was pursued that focuses on providing information to the agencies that serve the at-risk communities so they can, in turn, address their clientele's needs for transportation and communication.

- **This action item will remain in the plan as-is in case the opportunity emerges to complete this item. Outreach to agencies serving at-risk populations will be on-going and covered under the public outreach programs.**

F. Action Item No: MH #8 Amended Item No: 6

"Review and develop recommendations to the Lane County Board of Commissioners for additions to land use regulations such as the creation of new potential hazard overlay zones or environmental constraint overlays (in addition to existing flood and wildland-urban interface overlays) such as tsunami inundation areas, steep slope, or debris flow prone areas."

Status Update:

As a component of the Lane County Land Management Division's 2009-2010 Long-Range Planning Work Program, staff was directed to initiate a process to develop proposed amendments to the floodplain regulations of Lane Code Chapters 10.271 and 16.244. In addition, staff was directed to work with a Technical Advisory Committee to develop a "Drinking Water Protection Overlay Zone" for possible adoption by the Lane County Board of Commissioners.

These proposed code amendments were designed to achieve the following objectives:

- Protect human life, health and property.
- Minimize the potential for contamination to surface and ground waters
- Manage the alteration of flood hazard areas to minimize the immediate and cumulative impacts of development on the natural and beneficial functions of the floodplain.
- Minimize expenditure of public money on costly pollution remediation projects and emergency response operations.

On November 4, 2010 the Lane County Planning Commission voted 6-3 to cancel the public hearing on this matter and postpone indefinitely the process to review proposed floodplain regulations and a proposed drinking water overlay zone. This action followed the Lane County Board of Commissioners 3-2 vote earlier that same week to table the proposed ordinances and process.

The action by both the Board and Planning Commission ended the process and public hearings on the proposed floodplain and drinking water protection ordinances. The decisions by the two bodies were reached following significant public comment and concern about the matter.

Nonetheless, the Planning Commission voted to recommend that the Board of Commissioners prioritize the work on floodplain and drinking water regulations and put them on the Land Management Division's long-range planning work program for consideration in the future.

- **This action item will remain in the plan as on-going since it pertains to any type of hazard that could be mitigated through zoning.**

G. Action Item No's: EH #2, EH #3, EH #4
Amended Item No: N/A – Item Completed

All of the above action items relate to earthquake mitigation:

EH 2: Develop an inventory of public and commercial buildings that may be particularly vulnerable to earthquake damage;

EH 3: Complete Rapid Visual Assessments to analyze seismic vulnerability of public facilities.

EH 4: Develop and implement projects for highest priority facilities from EH 3.

Status Update:

These action items were essentially completed as a function of Oregon Senate Bill 2 (2005) Statewide Seismic Needs Assessment Using Rapid Visual Screening. Senate Bill 2 (2005) directed DOGAMI, in consultation with project partners, to develop a statewide seismic needs assessment, including seismic safety surveys of: K-12 public school buildings and community college buildings that have a capacity of 250 or more persons, hospital buildings with acute inpatient care facilities, fire stations, police stations, sheriffs' offices and other law enforcement agency buildings. Lane County has a copy of the report showing the results of facility assessments conducted in Lane County: Implementation of 2005 Senate Bill 2 Relating to Public Safety, Seismic Safety and Seismic Rehabilitation of Public Buildings; the report is available for viewing or download at:

www.http://blog.oregonlive.com/oregonianspecial/DOGAMI-SNA-05-22-07.pdf

Assessment of commercial buildings (EH 2) is outside the jurisdiction of the county or state and implementation of seismic rehabilitation projects (EH 4) is the responsibility of each individual agency.

The statewide needs assessment consists of rapid visual screenings (RVS) of these buildings in accordance with FEMA-154, 2002 Edition, or an equivalent standard adopted by DOGAMI; information gathering to supplement RVS; and ranking of RVS results into risk categories. Senate Bill 2 (2005) provides the first step in a pre-disaster mitigation strategy that is further defined in Senate Bills 3-5 (2005). Senate Bill 3 (2005) directs the Oregon Emergency Management office to create a grant program for local communities. Senate Bills 4 (2005) and 5 (2005) direct the state treasurer to issue voter approved bonds. Altogether, $1.2 billion will be appropriated to improve seismic safety statewide. Note that grant funding for seismic rehabilitation is directly related to seismic needs assessment.

- **This action item will be removed from the 2011 Plan Update because it has been completed.**

H. Action Item No: EH #5 Amended Item No: 7

“Implement recommendations listed in OEM’s After Action Report dated August 2005 pertaining to the West Coast Tsunami Warning that was issued on June 14, 2005.”

Status Update

Lane County Emergency Management created a best practices guide, Best Practices, Responding to Distant Tsunami Warning for the coastal counties in Oregon with input from those counties.

This action item will be on-going but rewritten to reflect the broader need for continued Tsunami preparedness.

- **This item is rewritten as follows:** Continuously examine opportunities to improve response to distant tsunami warnings and a coastal earthquake generating a tsunami. Implement measures as feasible.

I. Action Item No. FH #1
Amended Item No: N/A – Item Completed

“Compile data and prepare GIS maps for structures within the 100-year floodplains. Use the newly available Lane County DFIRMs (Digital Flood Insurance Rate Maps) and the nearly complete & updated parcel base to create an online application for planners, property owners and potential land buyers to quickly and easily understand flood hazards.”

Status Update

This item has been completed. Digital floodplain maps are accessible on the County’s website using the County’s Zone and Plan Map Viewer. The Zone and Plan Map Viewer is an interactive, web browser-based map tool that allows users to look up their property, zoom in and out, pan and turn on and off several different layers of map information related to planning and zoning.

- **This action item will be removed from the 20110 Plan Update because it has been completed.**

J. Action Item No. FH #3
Amended Item No: N/A – Action Completed

"Conduct study to understand relationship between NWS stream gauge data and on-the ground flood impacts felt by landowners along the forks of the Willamette River."

Status Update

This item was completed however, it was for an area along the McKenzie River (not the Willamette).

Community members were invited to a meeting in September 2010 sponsored by the Lane County Sheriff's Office, Emergency Management Division to discuss flood warning services on the lower McKenzie River. National Weather Service representative, Andy Bryant, was there to guide the community through a discussion about past flooding along the lower McKenzie and how we could improve flood warning services for that area. Based on information from the February 1996 flood and information learned at the meeting from local residents about more recent high water events, a flood stage level was established at the Walterville gage to better reflect actual conditions observed on the ground to the flood-affected area.

In addition, the National Weather Service implemented an intermediary flood level for the Mohawk and Siuslaw Rivers in Lane County. Previously only two warning levels had been defined: Flood Stage (minor flood) and Major Flood. For the Mohawk and Siuslaw rivers there is a relatively big difference (in feet) between flood stage and major flood. Therefore the National Weather Service added an in-between level, called "Moderate Flood" to enhance flood warning services:

Mohawk River-Springfield Flood Stage = 15' Moderate Flood = 22' Major Flood = 25'

Siuslaw River- Mapleton Flood Stage = 18' Moderate Flood = 22' Major Flood = 28'

- **This action item will be removed from the 2011 Plan Update because it has been completed.**

K. Action Item No. FH #4
Amended Item No: N/A – Action Completed

"Complete the inventory of locations in Lane County subject to frequent storm water flooding."

Status Update:

This action item has been completed. A copy of the inventory of high water locations and their mapped location can be found in Appendix C.

- **This action item will be removed from the 2011 Plan Update because it has been completed.**

L. Action Item No. FH #5 Amended Item No: 8

"For locations with repetitive flooding and significant damages or road closures, determine and implement mitigation measures such as upsizing culverts or storm water drainage ditches."

Status Update:

A tour of high water locations was completed in August 2010 by Emergency Management, Public Works Road Maintenance and a State mitigation contractor. A report was produced outlining the costs associated with remediating problematic areas. The inability to fund these types of major projects is the primary obstacle for completion.

- **This action item will remain in the 2011 Plan Update as on-going but low priority for funding. It is unlikely that projects will be completed from year to year on this action item.**

M. Action Item No. FH #6
Amended Item No: N/A – Action Completed

"Explore the potential for Lane County to participate in the Community Rating System (CRS) of the National Flood Insurance Program (NFIP)."

Status Update:

This action item has been completed. As part of the Lane County Land Management Division's 2007 Long Range Planning Work Program, staff was formally directed to take actions necessary for the county to gain admittance into the CRS. Prior to submitting an application, LMD was first required by FEMA to process updates to the county's floodplain ordinances (LC 16.244 and LC 10.2.71) and to take measures necessary to address Lane County's repetitive flood loss properties. These activities were carried out during 2007 and on March 3, 2008 Lane County's CRS application and accompanying documentation was submitted to FEMA for formal review.

On July 2, 2009, Lane County received official notification of admission into the CRS.

- **This action item will be removed from the 2011 Plan Update because it has been completed.**

N. Action Item No. WH #1, WH #8
Amended Item No: N/A – Action Completed

"Work with utilities to establish agreed upon standards for all utilities operating in Lane County regarding tree pruning around transmission lines and trunk distribution lines."

"Develop a hazardous tree inventory for all County properties"

<u>Status Update</u>

These action items are somewhat misguided and unnecessary. According to a recent survey of utilities in the county, tree pruning is a primary measure they perform on a regular basis to maintain reliability. Survey comments include:

> "We make sure our transmission lines are clear of encroaching trees"

> "Our utiility only owns a small amount of transmission line, but it has the right-of-way cleared and trimmed on a regular basis to insure continuity of service"

> "We have five tree crews that work year round to trim and remove trees that are near our power lines. This is the number one action we perform to maintain reliability."

> "We have a vegetation management supervisor, utility arborist, and 12 contract tree trimming crews. We try to get through the entire primary system within 5 years.

Additionally, Lane County Public Works has a process for reporting hazardous trees outlined in section 8 of the Lane County Vegetation Management Standards and Guidelines, Series 2, Top Trimming Standards. Adhering to this policy is the extent to which staff resources can be dedicated to identifying and cataloging hazardous trees.

- **This action item will be removed from the 2011 Plan Update because its basic intent (tree maintenance) is adequately addressed by Standard Operating Procedures of both Lane County Public Works and local utilities.**

O. Action Item No. WH #9
Amended Item No: N/A – Action Completed

"Consider upgrading lines and poles to improve wind/ice loading, undergrounding critical lines, and adding interconnect switches to allow alternative feed paths and disconnect switches to minimize outage areas."

Status Update

This action items pertains to local utilities; local utilities are not adopters of the county's hazard mitigation plan and the county has no control over the entities assigned to these items. However, according to a recent survey of utilities we found the following results:

- "upgrading lines and poles to improve wind / ice loading": 66.7% said they would only implement this type of measure after severe damages has occurred and 33.3% said it was either not applicable or cost prohibitive for their utility.

- "undergrounding critical lines": 33% said this had already been done; 33% said they would do so only after severe damage was incurred and; 33% said that it was not applicable or cost prohibitive for their utility.

- "adding interconnect switches to allow alternative feed paths and disconnect switches to minimize outage areas": 33% said they plan to do something along these lines in the next 1 – 5 years; 33% in the next 6 – 10 years and 33% said it not applicable or cost prohibitive for their utility.

➢ **This action item will be removed from the 2011 Plan Update because it is not specific to the county.**

P. Action Item No. WH #6 Amended Item No: 9

"Identify which critical facilities in Lane County need backup power and emergency operations plans to deal with power outages."

Status Update

This action item is on-going and in-progress. This action item will be incorporated into a new item that maps all critical facilities within hazardous areas. Those facilities will be surveyed to determine what kind of back-up power, if any, they have. This information will be depicted on the map.

- According to a recent survey of Fire Service agencies, only about half of all fire service facilities have a back-up power source.

- The Florence Events Center, a critical facility in the event of a coastal tsunami, recently purchased a back-up generator.

- The Lane County Sheriff's Office Communications Center has back-up power.

- **This action item will remain in the 2011 Plan Update as on-going**

Q. Action Item No. VH #3, DH #1, DH #2, TH #2
Amended Item No: N/A

“Upgrade physical security detection and response capability for critical facilities, including water systems.”

“Train first responders on alert/warning systems, emergency plan and evacuation routes.”

“Encourage the Corps of Engineers to complete seismic vulnerability assessments for dams upstream of heavily populated areas in Lane Countay and to make seismic improvements as necessary.”

These action items were assigned to the Eugene Water and Electric Board (EWEB) and the U.S. Army Corps of Engineers (USACOE) and are specific to their dams or facilities. Neither EWEB nor the USACOE are adopters of the county’s hazard mitigation plan and the county has no control over the agencies assigned to these items. Nonetheless, the intent of these items is valid and related activities were conducted by the county.

Status Update:

- Evacuation plans were discussed and development is in progress related to an impending catastrophic dam failure of the USACOE’s Hills Creek and Lookout Point dams.
- The county worked closely with USACOE on a major public education campaign to inform the public about their on-going dam maintenance program, especially work currently being done on their spillway gates.
- The county participates in EWEB’s annual exercises pertaining to their dams.

- **These action items will be removed from the 2011 Plan Update because they are not specific to the county. The intent of the action items will be incorporated into other rewritten action items.**

R. Action Item No. HMH #1, HMH #2 Amended Item No: N/A

“Enhance emergency planning, emergency response training and equipment to address hazardous materials incidents.”

“Ensure that first responders have readily available site-specific knowledge of hazardous chemical inventories in Lane County.”

These action items were assigned to the state’s Regional HazMat Team and the Oregon State Fire Marshal. Neither the Regional HazMat Team nor the State Fire Marshal are adopters of the county’s hazard mitigation plan and the county has no control over the agencies assigned to these items.

- **These action items will be removed from the 2011 Plan Update because they are not specific to the county. However, the intent of the action items will be incorporated into other rewritten action items.**

S. Action Item No. TH #1 Amended Item No: 10

“Enhance emergency planning, emergency response training and equipment to address potential terrorist incidents.”

Status Update

This is accomplished on an on-going basis through NIMS Compliancy requirements and projects funded by the State Homeland Security Grant.

- **This action item will remain in the 2011 Plan Update as on-going**

T. Action Item No. VH #1, VH #2 Amended Item No: N/A

“Update public emergency notification procedures for ash fall events.”

“Update emergency response planning for ash fall events.”

“Evaluate capability of water treatment plants to deal with high turbidity from ash falls and upgrade treatment facilities and emergency response plans to deal with ash falls.”

These action items will be removed from the 2011 Plan Update ash fall events are considered a low probability, low consequence hazard.

C.3 Notes and Correspondence (2006-2012 Cycle)

2008 Earthquake Mitigation Meeting

From: COOK Linda L
To: COOK Linda L; RIZZI Joseph D; SCHESSER Howard (SMTP); MURPHY Dennis; "Myron Smith"; BUCHANAN John (SMTP); "Oakridge Fire (oakfire@qwest.net)"; MORGAN Jacque (SMTP); "coburgfire@nu-world.com"; HOEHN Keith (SMTP); HARSHBARGER Guy (SMTP); ROSS Gary P (SMTP); GILLETTE Karen S; "Mary Bork (phnmab@comcast.net)"; WILDE Kristi J; SCHESSER Howard (SMTP); TILBY Chuck R; HOWARD Galen W; "DePew Tracy (HRSA@co.douglas.or.us)"; MURPHY Dennis; "Gerald Shorey (jerrysofd@qwest.net)"; MORGAN Jacque (SMTP); GILLETTE Karen S; "Triva N. Hazelton (Triva.Hazelton@therightbank.com)"; ANDRUS Abby; RIZZI Joseph D; MILLER Keir C; "Andre LeDuc"
Cc: HOWE Kent; "James Roddey"; TURNER Tom M
Subject: Notes from Earthquake Mitigation Meeting
Date: Monday, August 25, 2008 3:36:15 PM
Attachments: Notes from Earthquake Mitigation Meeting.doc

All,

Attached are the meeting notes from the Earthquake Mitigation Meeting held August 14. These notes are intended to prepare you for briefing local officials and others about the earthquake hazard in Lane County. The goal of the meeting was to ensure that we have a cohesive message countywide based on the most reliable information available.

Please feel free to contact me if you have any comments, questions or concerns. Thank you very much to everyone who contributed to developing these notes.
Linda
****

Linda L. Cook, PMP
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for you

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From: COOK Linda L

Sent: Wednesday, July 23, 2008 4:17 PM

To: RIZZI Joseph D; SCHESSER Howard (SMTP); MURPHY Dennis; 'Myron Smith'; BUCHANAN John (SMTP); Oakridge Fire (oakfire@qwest.net); MORGAN Jacque (SMTP); coburgfire@nu-world.com; HOEHN Keith (SMTP); HARSHBARGER Guy (SMTP); ROSS Gary P (SMTP); GILLETTE Karen S; COOK Linda L; 'Mary Bork (phnmab@comcast.net)'; WILDE Kristi J; SCHESSER Howard (SMTP); TILBY Chuck R; HOWARD Galen W; 'DePew Tracy (HRSA@co.douglas.or.us)'; MURPHY Dennis; 'Gerald Shorey (jerrysofd@qwest.net)'; MORGAN Jacque (SMTP); GILLETTE Karen S; 'Triva N. Hazelton (Triva.Hazelton@therightbank.com)'; ANDRUS Abby; RIZZI Joseph D; MILLER Keir C; 'Andre LeDuc'

Cc: HOWE Kent; 'James Roddey'; TURNER Tom M

Subject: Invitation to Earthquake Mitigation Meeting

All,

This is to invite you to a special meeting to discuss a report recently released by the Department of Geology and Mineral Industries (DOGAMI) that depicts damage and loss estimates for two types of worst case scenario earthquakes (crustal earthquake in the valley floor and a subduction zone earthquake in the Pacific ocean) for several counties, including Lane County. James Roddey, Earth Sciences Information Officer for DOGAMI, has agreed to provide an overview of the report and answer any questions. The intent is for those of us attending the meeting to better understand the risk to the communities we serve and to identify any potential actions that could be taken to mitigate the impact of such an event. Additionally, the information and discussion from the meeting should provide sufficient information for briefing our local officials, if necessary.

Date: Thursday August 14, 2008

Time: 1:30 - 3: 30 p.m.

Location: Lane County Public Service Building; Bob Straub Conference Room on second floor; 125 E. 8th Avenue, Eugene, OR 97401

Please R.S.V.P. by Monday August 11, 2008 via email reply or phone.

Thank you very much.

Linda L. Cook, PMP

Emergency Manager

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lane county:

w*o*rking

for you

Notes from Earthquake Mitigation Meeting – August 14, 2008

Attendees: Mary Bork (K-12 Schools), Jacque Morgan (City of Florence), Bob Willoughby (City of Florence), Tracy DePew (Hospital Preparedness Region 3), Brian Johnson (Lane County Public Health), Joe Rizzi (City of Eugene), John Buchanan (Siuslaw Valley Fire & Rescue), Howard Schesser (City of Cottage Grove), Amanda Ferguson (City of Cottage Grove), Jessica (City of Cottage Grove), Keir Miller (Lane County Land Management), Bill Clingman (Lane Council of Governments), Linda Cook (Lane County Emergency Management), James Roddey (OR Dept. of Geology & Mineral Industries).

Talking points for briefing local officials and others about earthquake hazard risk in Lane County.

What We Know

• Earthquakes happen in the Pacific Northwest. The seismology lab at the University of Washington records roughly 1,000 earthquakes per year in Washington and Oregon. Between one and two dozen of these cause enough ground shaking to be felt by residents. Most are in the Puget Sound region, and few cause any damage. However, based on the history of past damaging earthquakes and an understanding of the geologic history of the Pacific Northwest, we are certain that damaging earthquakes (magnitude 6 or greater) will recur in our area, although we have no way to predict whether this is more likely to be today or years from now.

• The Cascadia Subduction Zone is a very long sloping fault in the Pacific Ocean that stretches from mid-Vancouver Island to Northern California. It separates the Juan de Fuca and North America plates. New ocean floor is being created offshore of Washington and Oregon, and the ocean floor is constantly being pushed toward and beneath the continent. As more material wells up along the ocean ridge, the ocean floor is pushed toward and beneath the continent. The Cascadia Subduction Zone is where the two plates meet.

• In May 2007 DOGAMI released the Statewide Seismic Needs Assessment Data depicting the vulnerability of critical facilities (schools, police, fire, hospitals, etc.,) to seismic hazards. The assessment used methodology called Rapid Visual Screening. The results indicate that many schools throughout Lane County are vulnerable to collapse during an earthquake. More information can be found at http://www.oregongeology.com/sub/default.htm.

• In July 2008, DOGAMI released a report describing the geologic hazards in a six-county area including Lane County, and providing damage and loss estimates for future major earthquakes. More information can be found at http://www.oregongeology.com/sub/publications/ims/ims-024/ims-24.htm

• In the event of a major earthquake in Lane County, depending on the time of day, time of year and type of earthquake, it is highly likely that hundreds of people will be killed, thousands of people will be injured and, tens of thousands of households will be displaced. Response resources will be overwhelmed.

• Major losses can also be expected in the event of a major crustal earthquake, but it is likely that outside resources from other parts of Oregon will be able to reach the affected area to provide assistance. In contrast, however, in the event of a major Cascadia Subduction Zone earthquake, coastal areas will be isolated and major damage will occur over a widespread area making it very difficult for outside resources to reach the affected areas.

• Landslides caused by earthquakes are very common. It is difficult to pinpoint the exact locations where landslides might occur in Lane County, but large areas of the County are believed to be at risk.

• The Army Corps of Engineers operates several dams in Lane County that are situated upstream of the Springfield-Eugene Metropolitan Area. The primary purpose of these dams is flood control and during certain times of the year thousands of acre-feet of water can be stored in reservoirs behind them. In the event of an earthquake these dams may become vulnerable to damage or even catastrophic failure.

What We Don't Know

• Although there a no *identified* active faults in Lane County, some could exist unbeknownst to us. The Scott Mills earthquake occurred on a fault that at the time was unknown to experts.

• It is impossible to predict the extent of damages to critical infrastructure such as water systems, wastewater systems, utilities, roads, bridges, etc.

• It is unknown whether disaster recovery plans are in place in either the public or private sector. Anecdotal information suggests that most companies and government agencies in Lane County do not have Disaster Recovery or Continuity of Business / Operations Plans in place.

• It is difficult to pinpoint the exact locations of where landslides might occur in Lane County due to ongoing environmental changes. For example, a once barren hillside that was once the site of a landslide may today be covered over with brush and difficult to spot.

What Can Be Done

• Policies such as local ordinances can be put in place to regulate zoning, re-zoning and development on hillsides. The city of Salem is a good example of a local community that successfully passed such a law.

• Mitigation funding can be set aside to focus specifically on seismically retrofitting schools. In many cases there are only sections of the school that are particularly vulnerable (i.e., the cafeteria) making it cost-effective to retrofit just certain sections of the school instead of all school buildings.

• Evacuation planning could be performed to identify assembly areas and supply distribution sites.

• Topographic changes could be documented using Light Detection and Ranging (LIDAR) technology (a remote sensing system used to collect topographic data using aircraft-mounted lasers). After a baseline data set has been created, follow-up flights can be used to detect topographic changes to assist with pinpointing hazard-prone locations throughout Lane County.

• A minimal amount of funding could be provided to sustain Community Emergency Response Team (CERT) Programs. CERT Programs educate citizens about disaster preparedness for hazards that may impact their area and trains them in basic disaster response skills, such as fire safety, light search and rescue, team organization, and disaster medical operations. CERT members can assist others in their neighborhood or workplace following an event when professional responders are not immediately available to help.

• Continuity of Government / Business Plans could be developed to anticipate service interruption issues and to identify ahead of time how to be self-sustaining during an emergency or disaster.

• April is Earthquake Awareness Month. This could be an opportunity to for local governments to promote public education and outreach about earthquake preparedness.

• Participate in Cascadia Peril in April. Cascadia Peril is a statewide exercise that will simulate how communities and agencies across Oregon will be handling emergencies three days after a massive subduction zone earthquake that leaves more than 1,000 dead.

• Help support OWIN (Oregon's Wireless Interoperable Network). On June 27, 2008, the Oregon Legislature Emergency Board did not approve the $76 million in funding requested by OWIN necessary to build microwave, buildings, and towers in the Western half of Oregon in the effort to improve Oregon's outdated public safety communications capabilities. Governor Kulongoski is disappointed the funding request did not receive the majority vote necessary from the Senate members of the Emergency Board. Governor Kulongoski is planning another request for OWIN funding at the September 25-26, 2008, Emergency Board. It is important for Oregon to act now to prepare for implementation of a federal law change requiring the state to change its radio system from wideband to narrowband by 2013. Failure to do so can result in the loss of federal funding and retraction of previously approved radio frequencies resulting in significant setbacks to this effort.

• Work with the Army Corps of Engineers on understanding the latest information available regarding the current state of dams in Lane County. In particular, identify whether any dams or at greater risk than others of failure during an earthquake.

From: MORGENSTERN Karl [mailto:Karl.MORGENSTERN@eweb.org]
Sent: Monday, July 06, 2009 9:20 AM
To: STEWART Faye H
Cc: 'Cary Hart'; Paul Wagner; HEUSER Jason; MORGENSTERN Karl; COOK Linda L
Subject: RE: Forest Protection Tour

Dear Commissioner Stewart,
As a Board member for the East Lane Forest Protection Association (ELFPA) I wanted to express our sincere thanks for your continued support in understanding the importance of planning for wild fire in Lane County and being proactive to reduce these threats in wildland urban interface areas. The East Lane Forest Protection Association would like to invite you on our 2009 summer tour on July 14th at 8am (starts at ODF office in Springfield) to take an in depth look at how SB 360 gets applied across the landscape, Lane County's role in this effort and see examples of fuels reduction on high and moderate rating sites (see attached agenda). This is a good opportunity for you to see how ODF and private landowners work together with Lane County to reduce the threat of wild fire and talk with folks on the ground that make this happen. We realize this invite is for something happening next week and apologize for the tardiness (we only finalized this tour last week), but still hope you can find the time to join us. Please let us know if you plan on attending or if you have any questions. Thanks and take care…km

Karl Morgenstern
Eugene Water & Electric Board
Drinking Water Source Protection Coordinator
P.O. Box 10148
Eugene, Oregon 97440
Phone (541) 341-8552
Fax (541) 984-4724

Meeting notes

Emergency Public Health and Medical Resource Management Planning Meeting

10/05/2009
2:00 PM to 3:30 PM
Carmichael Room, Lane County Juvenile Justice Center

Attendees:	Howard Schesser, City of Cottage Grove; Jan Kinney & Linda Sherwood, Peace Health Siuslaw; Cathy Stone & Mark Groham, McKenzie Willamette; Wayne Johnson & Corinne Ginet Yeager, Peace Health Riverbend; Fred Lundgren, City of Springfield; Joe Rizzi, Eugene; Linda Cook, Lane County Emergency Management; Brian K. Johnson, Selene Jaramillo (note taker), Lane County Public Health Phone: Maury Sanders, City of Florence; Kim Gibson, Peace Health Riverbend; Candace Barr, Jana Waterman, Lane County Medical Society; Glenda Koyama, Marsha, and Susan, Cottage Grove Hospital.

Overview of appropriate process to make a request for resources from local government agencies and Public Health:

- Brian Johnson shared information he learned at regional meeting on Friday, October 3 in discussion with Randy Shaw of the Oregon Public Health Division: for public health and medical requests it is appropriate for the request to go directly to the County, with a courtesy copy to the local city government. A Declaration of Emergency is NOT required to process a resource request for consumable supplies such as N95 masks. The Sheriff, as the local emergency management director has concurred that this process will be appropriate under the current H1N1 pandemic circumstances.

  Note: It was later discussed that resource shortages leading to altered standards of care for hospitals would require an emergency declaration. Examples of such resource shortages include lack of bed space, physicians and nurses.

- Two different situations reviewed:
  - Current H1N1 Pandemic request protocol:
    - Exhaust all available options. Hospital should then contact Linda Cook, Lane County Emergency Manager, via phone and email, courtesy copy to city and Lane County Public Health. Linda will respond in timely manner and redirect request if needed.
  - In elevated disaster situations, including escalation in the current pandemic intensity or severity (circumstances leading to altered standards of care at hospitals), and other broad impact disasters (like floods and earthquakes):
    - Use protocol and forms presented by Brian Johnson:
      - Exhaust all other options, then send formal Request for Assistance to Linda Cook and copy the city emergency manager where hospital is located, and Lane County Public Health.
      - Use forms ESF 8- Resource Request Form, and ICS Form 260 or equivalent.
- The Hospital will receive a response that the request has been received, and will get a final determination that may include:
  - when the item requested will be delivered
  - alternative to item requested
  - partial fulfillment of request
  - advice that request has been forwarded to the State
  - agency is unable to fulfill the request
- Linda proposed using National Weather Alert system language to indicate the level of need or urgency of a request or resource related communication, such as Alert, Watch and Warning. Alert to indicate that the communication is for informational purposes only and no action is required. Watch to indicate that a formal request may be required in the near future; Warning to indicate need for timely action.
- It was clarified that if the County, a City or the State provide assistance with resources to a Hospital, there is an expectation that the Hospital would pay for most resources received.
- Memoranda of Agreement or Understanding between Hospitals and Cities or other Government Agencies were

2010 Flood Mitigation Meetings

Flood Mitigation Meeting

Date: Thursday, August 26, 2010

Time: 1:30 p.m. - 3:30 p.m.

Agenda:

Situation Overview: Linda Cook, Lane County Emergency Management

Weather Outlook - Tyree Wilde, National Weather Service

Mapping / GIS Update - Eric Brandt, Lane Council of Governments

Public Information - Amber Fossen, Lane County

Public Works Projects - Michael Johns, Lane County Public Works

Emergency Notification Systems - Linda Cook, Lane County Emergency Management

Preparedness Actions - Linda Cook, Lane County Emergency Management

Actual Meeting Duration: 66min.

Attendees in person at Sheriff's Office Emergency Operations Center:

Amy Echols, Army Corps of Engineers

Dustin Bengston, Army Corps of Engineers

Jonna Hill, Lane County Sheriff's Office, Communications Center

Amber Fossen, Lane County Public Information Officer

Michael Johns, Lane County Public Works

Linda Cook, Lane County Emergency Management

Abby Andrus, Lane County Emergency Management

Attendees who reported in via teleconference:

Eric Brandt, Lane Council of Governments

Kevin Cardoza, Eugene Water & Electric Board

Sonny Chickering, Oregon Department of Transportation

Bill Clingman, Lane Council of Governments

Brian Conlon, City of Springfield, Public Works

Linda Cook, Lane County Emergency Management

Karen Gillette, Lane County Public Health

Chief Keith Hoehn, Lowell Rural Fire Protection District

Roger Kline, Army Corps of Engineers

Rick Little, Oregon Department of Transportation

Keir Miller, Lane County Land Management

Joe Rizzi, City of Eugene, Emergency Management

Annette Scarle, Lane County Risk Management

Jeremy Scherer, Lane County Land Management

Adam Vellutini, Lane County Transportation Planning

Ken Vogeney, City of Springfield

Kristi Wilde, Central Lane Communications Center (Eugene Police)

Tyree Wilde, National Weather Service

Situation Overview: Linda Cook, Lane County Emergency Management

- The Army Corp of Engineers (Corps) will be repairing spillway gates that will create an increased river flow earlier and higher than normal for longer than normal. In other words, they will be releasing storm water accumulation into rivers soon after each storm causing the rivers to run higher than we are accustomed to.

- The Corps will perform flood control measures as they always do and will be working to prevent flood conditions.

- Weather conditions will ultimately determine if flooding will occur (this is a wait-and-see situation similar to last year's H1N1 flu pandemic)

Weather Outlook - Tyree Wilde, National Weather Service

- The National Weather Service (NWS) looks at sea surface temperatures in the equatorial Pacific Ocean to predict seasonal forecast. From the sea surface temperatures the NWS determines if it will be an El Niño, La Niña, or a neutral state.
- Last year we were in an El Niño state which means we were warmer and dryer than normal.

- This year we are transitioning to La Niña which means we will likely be cooler and wetter than normal. The La Nina conditions should persist until well into 2011.

- Month to month temperature and precipitation projection:

  October, November, December - Temperature (undetermined)
  Precipitation will be wetter than normal

  January, February, March - Temperature will be below normal (colder)
  Precipitation will be wetter than normal

- Last La Niña was 2007-08. There were wind storms on the coast and significant flooding in NW Oregon and in Washington State.

- 1998-2001 were al La Niña years. In 1998-99 there was a good snow pack. The other years were fairly normal…showing us that all La Niña states do NOT behave the same.

- Stay informed on weather conditions: products to help with decision making:

  Outlooks/Watches/Warnings -

  > Outlooks: 2-3 days before. If there will be heavy rains coming we let people know if possible flood potential
  >
  > Watches: 12hours before
  >
  > Warnings: when there is high confidence there will be flooding

  Get info from:

  > National Weather Service website Weather.gov/Portland or,
  >
  > There is a free email subscription service (ask Linda Cook for Tyree Wilde's contact information and he can sign you up for the email subscription service)

- Dustin Bengston, Army Corps of Engineers offered additional resources:

  > The Corp directs people to Northwest River Forecast Center. Northwest River Forecast Center (co-located with National Weather Service; Corps works with NWS on products); Monitors river levels and projected flows.
  >
  > The Corp's operations of the dam are fed back to NW River Forecast Center.
  >
  > Willamette Valley Teacup Diagram is primarily used during summer conservation but you can see real time info from Corps dams

- Open discussion for Tyree (National Weather Service):

  Joe Rizzi: Will you be doing the conference call updating that you had done in years past for larger than normal weather coming through?

  Yes. When there is a high impact event coming in then there is a conference call held for the stakeholders

  **

  Linda Cook: What happened in 1964 to make that flooding so severe?

  It was a similar setup to the '96 floods with rain on snow event. Rain on snow (both were transition from El Niño to la Niña years)

  In 1964 there were fewer reservoirs in place and less dam control

  **

Joe Rizzi: Did the 1964/1996 floods make it to the 100-yr level?

1996 flood: No

1964 flood: heaviest hit was south valley (1996 was more north valley). Flood control projects Cougar, Blue River, Foster and Green Peter dams were not online in 1964 flood

Mapping / GIS Update - Eric Brandt, Lane Council of Governments

- We are currently coordinating a group of GIS coordinators from Lane County, Eugene, and LCOG. Our goal is to identify if there is local information that would help the Corp with their project planning and to learn of data that the Corp had developed that could help us locally.
- So far we have learned that the Corp will be working on hydraulic model development with FEMA related to the 100-yr flood maps. As of now there are no hydraulic models for the mid-fork Willamette.
- Currently the Corp is referring to the FEMA maps, which represent the best available data at this time for flood planning purposes.
- Locally, no agency has their own set of models/maps.
- We do have localized and recent data including: LIDAR data, a 2008 orthophotography flight that covers the project data good and is good control data. We are happy to share the data with the Corps. We will assemble an inventory of local data assets and publish those datum but they are not useful for the lay person.

Linda Cook, Lane County Emergency Manager offered side notes.

- NO projection maps will be available (depicting flood stage 1, 2, 3 feet above flood stage) that we had hoped to get and that were discussed in previous meetings.
- In terms of maps to use for emergency planning, we will be referring the public to the 100-yr fema flood maps when determining if their residence is in the flood plain.

Public Works Projects –

Michael Johns, Lane County

- No projects currently of concern; prepared for flood
- Is there a map that could be put together as the event occurs?

Brandt: No plans exist to do that but we do have data to support putting together reasonable maps. LIDAR has limitations due to vegetation such as blackberry bushes along banks appearing as though the ground is 3 feet higher than it is. It would be best to go to own agency first to see what they can do for you…but we will talk about doing something like that.

Brian Conlon, City of Springfield

- City of Springfield has a lot of work going on in the Gateway area and we also have a Regional Hospital that was constructed post ‘1996 (flood) so we have a real interest in getting information about that area.

- Springfield Public Works will begin meeting next week with maintenance and land survey staff to get a handle on what we know so far; we will be looking at historical data of high water events in the last 20 years.

- Springfield Public Works has committed to a sandbagging planning event.
  Lane County received a donation of 90,000 seed bags that can double as sandbags. Springfield PW has agreed to store them at their facility and the Corps will host a sandbagging workshop. Friday Oct 1st Les Miller from the Corps would put on the event for public agencies and the following day would be the same thing for local citizens.

- We are taking a cautious approach not to alarm the public at this time and would like to collaborate with other local agencies before releasing any media to the public. We would like to do a combined information release.

Linda Cook, Lane County Emergency Manager offered side notes:

- Reason we are focusing on Springfield so heavily is because of the way the river runs. It runs differently through Springfield than in Eugene…in Eugene it runs through a channel whereas in Springfield it does not. Focusing on Jasper, Lowell, possibly Cedar Flats areas.

Emergency Notification Systems -

Linda Cook, Lane County Emergency Management

- The Sheriff's Office Communications Center uses the Emergency Alert System (EAS). The emergency message goes out over TV and radio. A pre-recorded script is used to launch a message. The person wishing to launch a message must be authenticated as having the authority to do so. The Emergency Alert System is used for federal and state emergencies and can also be used for local emergencies.

- Lane County is In the process of entering into an intergovernmental agreement with Benton and Linn Counties who currently do not have EAS notification systems of their own so we are going to be launching messages for them as well and so there may be some overlap in sending emergency messages…more to come on that later…

Kristi Wilde, Central Lane Communications Center

- Community Emergency Notification System (CENS) "Reverse 9-1-1" involves sending a recorded message via telephone to a specific geographic location. Gives us the ability to take a map and select a specific area or take a pre-identified area and quickly identify telephone landlines in that area and send a recorded message. Really easy to do pre-planning with the CENS system.

- Would like to pre-plan /map areas of concern for flood in advance and give them a name and put them into the system, establish thresholds and determine authority for sending out the message.

- CENS is able to notify 1000's of people within minutes.

- Hoping to use anecdotal information from local agencies for flooding from years past for establishing maps for CENS pre-plans.

- CENS does not notify Cell phone users.

Preparedness Actions - Linda Cook, Lane County Emergency Management

- Sandbagging Event October 1 and 2 (Corps and Springfield Public Works)
- Corps will work with Lane County to put on town hall meetings (deciding on 1 or 2 meetings) one in Springfield and possibly second in River Road area where there is occasional flooding. More to come on that…
- Lane County is working with the National Weather Service on a town hall meeting for the lower McKenzie River area. NWS is trying to determine a reasonable way to set a flood stage for them. Working with residents to identify what a flood stage should look like on the McKenzie River.
- Note for public agencies – it is important to keep a good accounting of any emergency response expenditures in the event that federal reimbursements become available. Need a good record of where your money is going to be eligible…just a reminder. City of Springfield has already set up a program account code for this coming storm season.

Public Information - Amber Fossen, Lane County and others

Linda Cook: In response to the Register Guard article regarding the work the Corps is doing on the spillway gates this year; the media has contacted Lane County for a news release. Should we put something out now or stand down…we have to have a unified message.   Is there anyone concerned about Lane County releasing a statement to the media?

No…just as long as all PIO's are talking with one another so we all have the same message.

Chief Hoehn: Please include the rural area as well (don't just emphasize the big cities).

Amber Fossen: Reminded the group that she is the lead contact for news releases.

Rick: ODOT …timing of news release is important in response to the Register Guard article in order to show all of the various agencies are prepared and working together. Also, we should dedicate a specific website as the go to site for all information.

Lane County Emergency Management will be the "go to" website; will work to make it more up front for weather monitoring, flood preparedness, etc.

Kier Land Management: Annual outreach by Lane County Land Management for Community Rating System; required to mail out a letter to all land owners in the flood plain, talks about flood insurance, know where your house is located, etc…will go out end of September (all over lane county). We should include something on the Corps work that will be going on…

Amy Echols: Regarding Register Guard reporter Sue Palmer, the story she ran was earlier than we had asked…she did not mention efforts for collaboration but is aware and says she will run more articles in the future. She also said she will run articles on what the public can do to prepare for a possible flooding.

Flood Planning Workshop and Hands-on Sandbag Training

Please join the City of Springfield, the Lane County Sheriff's Office and U.S. Army Corp of Engineers for a Flood Planning Workshop

Date: Same classes offered both dates – choose one or both sessions on either date
Friday October 1, 2010 / Saturday October 2, 2010

Time: Morning Session: 9 am – 12 pm / Afternoon Session: 1 pm – 3 pm

Location: City of Springfield, Public Works Maintenance Division
201 S. 18th Street, Springfield, OR 97477

*****Space is limited to 50 people per day*****

Please RSVP via email to: prepare@co.lane.or.us or call 541-682-6744

Morning Session: Managing a Flood Fight (9 am – 12 pm)

Who Should Attend: Strike team and task force leaders such as Incident Commanders, ICS Planning Chiefs, ICS Operations Chiefs, Public Works Managers and Supervisors, Public Safety Managers and Supervisors, Utility Managers, Facility Managers, Emergency Managers

What You Will Learn: How to plan and conduct a flood fight

Format: Classroom lecture and participant involvement

What to Bring: If you have them, maps showing your facility locations and flood related plans or policies

Afternoon Session: How to Sandbag (1 pm – 3 pm)

Who Should Attend: Property and business owners in flood prone areas; CERT Team leaders and other volunteer agency leaders; first responder field personnel who would be charged with leading a crew in a sandbagging effort

What You Will Learn: How to fill and use sandbags so you can lead others

Format: Classroom briefing followed by a short walk to outside hands-on training

What to Wear: Please check the weather and dress appropriately to work outside filling and moving sandbags. We will first assemble in a classroom and then take about a 4 minute walk to the sandbagging area.

What to Bring: Protective eye wear and gloves

We look forward to seeing you there!

Every year is a good year to prepare for a flood

This is a template that all attendees were asked to complete in an effort to mitigate the impacts of potential flooding and to update it each year.

Flood Response Plan for: ____________________(agency)
Prepared by: ___________________________(lead contributor)
Date ____________________________(period of time covered by plan)

Purpose

1. Purpose of this plan is to specify methods for early recognition of floods and dissemination of warnings which are accurate, timely, and reliable; and

2. To prevent injury and loss of life due to flooding and flood related causes.

3. To reduce public and private property damages from flooding and flood related causes.

Current Weather Outlook (winter 2010-2011)

- Transitioning from El Nino to La Nina conditions
- Above average rain Oct – Mar
- Cooler than normal temperatures Jan – Mar

Type of Flooding this Plan Addresses

☐ Surface Water Flooding (Drainage Systems) ☐ Coastal Flooding
☐ River and Stream Flooding ☐ Other

Collaborating Agencies: *Based on the roles of other agencies, who do you need to collaborate with to effectively accomplish your mission.*

Mutual Aid Agencies: *In the event that your resources are exhausted, who can you turn to for mutual aid?*

Monitoring Weather and Conditions

- ☐ **National Weather Service Online Tools** ________________ *(assigned to)*
- ☐ **NOAA Weather Radio** ________________ *(assigned to)*
- ☐ **Newspapers and Periodicals** ________________ *(assigned to)*
- ☐ **Ground Patrols and Observations** ________________ *(assigned to)*
- ☐ **Physical Inspections** ___________________ *(assigned to)*

Triggers for Response Actions

Vulnerabilities

Response Priorities

Resources

Notification and Alerts

COOK Linda L

From:	COOK Linda L
Sent:	Friday, February 17, 2012 3:50 PM
To:	COOK Linda L; *LC News Broadcasters; *LC Department Directors; *Lane LCSO Briefing
Subject:	For Immediate Release

LANE COUNTY SHERIFF'S OFFICE

Thomas M. Turner, Sheriff
125 E. 8th Avenue
Eugene, OR 97401
Phone: 541-682-4150
Fax: 541-682-4522
Email: sheriff's office@co.lane.or.us

NEWS RELEASE
www.lanesheriff.org

CASE NUMBER: N/A
DATE / TIME OF INCIDENT: 3:30 p.m.
DATE / TIME OF RELEASE: **Hazard Mitigation Plan Review - Public Meeting**
NATURE OF STORY:

LOCATION:

DETAILS:

Lane County Emergency Management announces the completion of the five year update to the *Lane County Natural Hazards Mitigation Plan*. This has been a year-long effort that reviewed the major hazards to which the County is exposed: snow/ice storms, flood, windstorm, wildfire, earthquake, tsunami and landslides.

A variety of measures have been identified that can reduce exposures to the dangers and damage posed by the hazards along with 12 action items to be implemented by the County. The resulting Plan is available for review on the Sheriff's Office emergency management website, www.lanecounty.org/prepare. A public meeting will be held at 10:00 a.m., Thursday, March 1, 2012 at Lane County Public Works, Training Room 3.

Comments on the Plan may be submitted via an on-line form at lanecounty.org/prepare; via email to prepare@co.lane.or.us; at the public meeting; or to:

Linda Cook
Lane County Sheriff's Office, Emergency Management
125 E. 8th Avenue
Eugene, OR 97401

The Mitigation Coordinating Committee will meet after the public meeting, review any desired changes, and recommend a final draft of the Plan Update for adoption by the Board of County Commissioners.

Prepared by: Linda L. Cook 541-914-0267

C.4 Data Collection 2006-2012 Cycle

C.4.1 Utility Providers Survey

Introduction

Lane County Emergency Management conducted a survey of the local utility companies using Survey Monkey, an on-line survey tool, in June of 2011. The goal of the survey was to collect responses regarding the hazard and mitigation measures that are/are not taken by utility companies in Lane County for inclusion in the 5-year update to the Lane County Natural Hazards Mitigation Plan.

Participants

All utility companies in Lane County were invited to participate in the survey. Three surveys were completed and the agencies are listed below:

- Blachly Lane Electric Cooperative
- Eugene Water and Electric Board
- Emerald People's Utility District (2 responders, 1 combined survey result)

Survey Results/Key Findings

- Wind and snow storms are the biggest cause for power outages and damages to the utility.
- When hazards occur, wind and ice storms have the severest impact on the utilities.
- All three of utilities believe that providing looped distribution service or other redundancies to critical facilities would be an extremely effective mitigation measure for lessening the impact of natural hazards however, one utility finds it cost prohibited while the other two utilities estimate looped distribution service will be provided in 1-5 years or 6-10 years.
- Two of the utilities believe that providing under-ground lines near business districts and critical facilities would be an extremely effective mitigation measure and the other responding utility has already done this. The two utilities who have not completed this mitigation measure find it either cost prohibited or that they can only provide it after severe damage has been done to the existing lines.
- All agencies perform regular tree maintenance around transmission lines, including monitoring the health of the trees.

Survey Questions and Responses

Each of the questions in the survey was not necessarily responded to by every survey taker, so the number of responses shown for each question varies. Some questions were multiple-choice, while other questions directed the survey taker to comment on, or mark all answers that apply. Each question below includes a “response count”, indicating how many total responses were received.

Q1: How frequently do the following natural hazards cause power outages or facility damages for your utility?

Answer Options	Never	Once per year	2-3 times per year	4 or more times per year	Response Count
Domestic Terrorism / Vandalism	0	1	1	0	2
Earthquake	2	0	0	0	2
Flood	1	1	0	0	2
Hazardous Materials Incident	1	1	0	0	2
Ice Storm	0	2	0	0	2
Landslide	1	1	0	0	2
Snow Storm	0	0	2	0	2
Wind Storm	0	0	2	0	2
Wildfire	2	0	0	0	2
Other (please specify)					1
				answered question	2
				skipped question	1

Q2: Please rate the severity of impact the hazards have on your electric facilities when they occur.

Answer Options	No Impact	Minimal Impact	Moderate Impact	Severe Impact	Response Count
Domestic Terrorism / Vandalism	0	2	0	0	2
Earthquake	2	0	0	0	2
Flood	1	1	0	0	2
Hazardous Materials Incident	1	1	0	0	2
Ice Storm	0	1	0	1	2
Landslide	1	1	0	0	2
Snow Storm	0	1	1	0	2
Wind Storm	0	0	1	1	2
Wildfire	2	0	0	0	2
Other (please specify)					1
				answered question	2
				skipped question	1

Q3: Please rate the level of effectiveness each of the following mitigation measures could have in lessening the impact

of natural hazards on your utility.

Answer Options	Already Done	Somewhat Ineffective	Somewhat Effective	Extremely Effective	N/A or Cost Prohibitive	Rating Avg	Response Count
Installing additional poles to support transformers	2	1	0	0	0	1.33	3
Installing additional guy-wires	2	0	1	0	0	1.67	3
Providing looped distribution service or other redundancies to critical facilities	0	0	0	3	0	4.00	3
Elevating pad-mounted transformers above the base flood elevation	1	1	1	0	0	2.00	3
Replacing damaged poles with higher-rated poles of the same or different material	1	0	2	0	0	2.33	3
Cross bracing on H Frame Poles	2	0	1	0	0	1.67	3
Removing large diameter communication lines	0	0	2	1	0	3.33	3
Upgrading conductors to Wind-Motion Resistant Conductors	0	0	2	0	1	3.00	3
Upgrading lines and poles for wind / ice loading	0	0	1	1	1	3.50	3
Under-grounding lines near business districts and critical facilities.	1	0	0	2	0	3.00	3
						answered question	3
						skipped question	0

Q4: If you had to estimate, at what point in time do you think your utility might implement the mitigation measures you identified as effective in the previous question?

Answer Options	Already Done	In the next 1 - 5 years	In the next 6 - 10 years	Only After Severe Damage	N/A or Cost Prohibitive	Rating Avg	Response Count
Installing additional poles to support transformers	2	0	0	0	1	1.00	3
Installing additional guy-wires	2	0	0	1	0	2.00	3
Providing looped distribution service or other redundancies to critical facilities	0	1	1	0	1	2.50	3
Elevating pad-mounted transformers above the base flood elevation	2	0	0	1	0	2.00	3
Replacing damaged poles with higher-rated poles of the same or different material	1	0	0	2	0	3.00	3

Cross bracing on H Frame Poles	2	0	0	1	0	2.00	3
Removing large diameter communication lines	0	0	0	1	2	4.00	3
Upgrading conductors to Wind-Motion Resistant Conductors	0	0	0	1	2	4.00	3
Upgrading lines and poles for wind / ice loading	0	0	0	2	1	4.00	3
Under-grounding lines near business districts and critical facilities.	1	0	0	1	1	2.50	3
						answered question	3
						skipped question	0

Q5: Please briefly describe any hazard mitigation projects your electric utility has completed in the past five years.	
Answer Options	Response Count
We have established redundancy in our distribution circuits at several substations that give us distribution ties to more than one source. We have also installed "tree wire" circuits to mitigate fallen trees in a wind storm. Significant tree trimming.	
none	
5 and 10 year capital plans designed to replace aging infrastructure.	
answered question	*3*
skipped question	*0*

Q6: Please briefly describe any hazard mitigation projects your electric utility plans to complete in the next five years.	
Answer Options	Response Count
We plan on installing more "tree wire" circuits as this has proven to withstand many of the hazards a wind storm brings. We also plan on utilizing more underground mainline throughout our system. We also have several reconducter jobs and feeder line rebuilds planned through out system.	
none	
Rebuilding the downtown network, replacing feeders, some transmission work.	
answered question	*3*
skipped question	*0*

Q7: Does your agency regularly perform tree maintenance around transmission lines?		
Answer Options	Response Percent	Response Count
Yes	100.0%	3

No	0.0%	0
Please briefly explain your answer:		
EPUD only owns a small amount of transmission line, but it has ROW cleared on a regular basis to insure continuity of service.		
We make sure our transmis'n lines are clear of encroaching trees.		
We have a vegetation management supervisor, utility arborist, and 12 contract tree trimming crews. We try to get through the entire primary system within 5 years.		
	answered question	**3**
	skipped question	**0**

Q8: Does your agency regularly evaluate the health of trees near your facilities?		
Answer Options	**Response Percent**	**Response Count**
Yes	100.0%	3
No	0.0%	0
Please briefly explain your answer		
"Danger trees" are aggressively looked at and we work with the tree owner to trim or remove the tree until it is deemed safe.		
We evaluate tree health during our annual PUC inspections.		
With the employees listed above.		
	answered question	**3**
	skipped question	**0**

Q9: Does your agency maintain a hazardous tree inventory?		
Answer Options	**Response Percent**	**Response Count**
Yes	33.3%	1
No	66.7%	2
Please briefly explain your answer		
EPUD has regular ROW inspections where "danger trees" are indentified and kept track of until the situation is corrected. Danger trees are removed within weeks of indentifying them.		
We don't have any as we remove them immediately.		
	answered question	**3**
	skipped question	**0**

Q10: Does your agency encourage property owners to prune trees near service drops?		
Answer Options	**Response Percent**	**Response Count**
Yes	33.3%	1
No	66.7%	2
Please briefly explain your answer		

But, rather than have the customer do the trimming we ask that they call us and we send a serviceman by to do the actual trimming. We also deenergize the lines when property owners are working around them. We find that customers tend to get too enthusiastic and venture too close to our other facilities; transformers, primary lines, etc.	
answered question	3
skipped question	0

Q11: Please indicate whether the following mapping activities would be useful toward mitigating hazard impacts on your utility.						
Answer Options	**Not Useful**	**Somewhat Useful**	**Very Useful**	**Unsure; Need More Info**	**Rating Avg**	**Response Count**
Access to a centralized GIS data repository for hazard data	1	0	2	0	2.33	3
Identifying areas vulnerable to landslides as a result of wildfires.	1	0	2	0	2.33	3
					answered question	3
					skipped question	0

C.4.2 Fire Service Survey

Introduction

Lane County Emergency Management conducted a two-part fire service survey using Survey Monkey, an on-line survey tool, in May of 2011. In part-one, the goal was to collect responses regarding the description and condition of fire service facilities for incorporation into FEMA's HAZUS loss estimation database for purposes of estimating losses related to disasters. In part-two, the goal of the survey was to collect qualitative information regarding risk mitigation measures for inclusion into the 5-year update to the Lane County Natural Hazards Mitigation Plan.

Participants

All fire service agencies in Lane County were invited to participate in the survey. Seventeen agencies took part in responding to the survey and are listed below:

Coburg Fire District
Dexter RFPD
Eugene Fire & EMS Department
Goshen Fire District
Hazeldell Rural Fire District
Junction City Rural Fire Protection District
Lane County Fire District #1
Lane Rural Fire/Rescue
Lowell Rural Fire Protection District
McKenzie Fire/Rescue
Oakridge Fire & EMS
Pleasant Hill Rural Fire Protection District
Santa Clara Fire District
Siuslaw Valley Fire and Rescue
South Lane County Fire & Rescue
Springfield Fire & Life Safety
Upper McKenzie Rural Fire Protection District

Survey Results/Key Findings

Part 1 – HAZUS, FEMA loss estimation database

- Majority of fire service agencies report buildings in good to excellent condition. A small percentage of responders report buildings in poor to average condition. See chart.
- The majority of service buildings are constructed of wood with slab on grade foundations.
- Only about half of all fire service facilities have a back-up power source.
- 7 out of 54 service buildings are set up to function as post-hazard shelter facilities.

Part 2 – NHMP, Risk Mitigation

- 91% of all agencies provide some form of information on how to reduce fire risk to the community.
- Information provided to the community is most commonly dispersed through the Lane County Fire Prevention Co-op, agency websites, information display boards, and agency newsletters.
- Most agencies will provide individual homeowner consultations.
- Most agencies help to educate residents on fire risk reduction measures on an annual basis.
- The most common obstacles that hinder the ability of an agency to fight fire are poor address signage and driveways that are too narrow and that have no turnabout.

Survey Questions and Responses

Each of the questions in the survey was not necessarily responded to by every survey taker, so the number of responses shown for each question varies. Some questions were multiple-choice, while other questions directed the survey taker to comment on, or mark all answers that apply. Each question below includes a “response count”, indicating how many total responses were received. Participant responses are also summarized at the end of the survey results.

Q2: Please rate the level of condition the building is currently in.							
Answer Options	Poor	Fair	Avg	Good	Very Good	Exclnt	Rating Avg
Building Exterior	2	10	7	14	9	12	4.00
Roof	3	11	6	11	10	13	3.98
Building Foundation	3	6	5	18	12	10	4.11
Building Interior	7	7	6	13	12	9	3.80
Overall Perception of Building	3	10	6	11	15	9	3.96
							answered question 54
							skipped question 0

Q3: What type of structure is this building? Check all that apply.		
Answer Options	Response Percent	Response Count
Wood	81.5%	44
Steel	38.9%	21
Reinforced Concrete	5.6%	3
Unreinforced Concrete	1.9%	1
Reinforced Masonry	18.5%	10
Unreinforced Masonry	20.4%	11
Other (please specify)	0.0%	0
	answered question	54
	skipped question	0

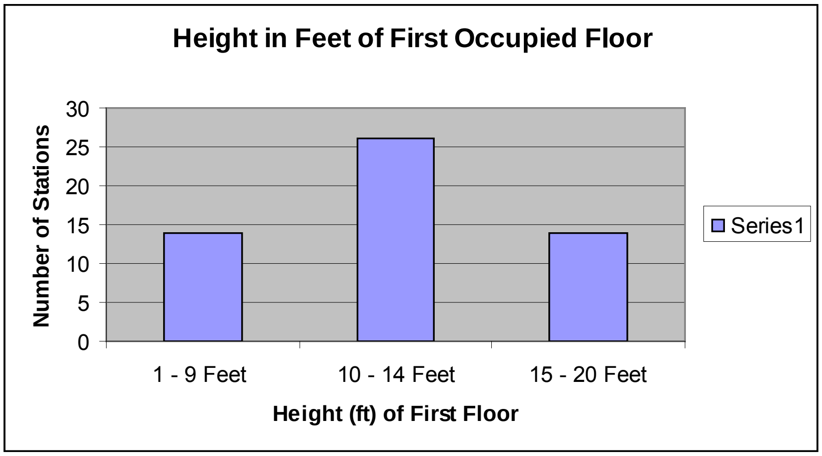
Q4: What year was the building constructed?			
Answer Comments			Response Count
1949	1974	1993	
1950	1975	1994	
1961	1975	1997	
1962	1975	1998	
1963	1975	1998	
1964	1976	1998	
1966	1978	1998	
1967	1978	1999	
1968	1980	2001	
1968	1981	2005	
1970	1981	2005	
1970	1981	2006	
1970	1984	2009	
1970	1984	2009	
1971	1985	2010	
1971	1988	2010	
1973	1993		
		answered question	51
		skipped question	3

Q5: What type of foundation does the building have? Check all that apply.		
Answer Options	Response Percent	Response Count
Pile	5.6%	3
Pier	1.9%	1
Solid Wall	1.9%	1
Basement/Yard	0.0%	0
Crawl Space	1.9%	1
Fill	1.9%	1
Slab on Grade	94.4%	51
Other (please specify)	3.7%	2
	answered question	54
	skipped question	0

Q6: What is the height (in feet) of the first occupied floor?

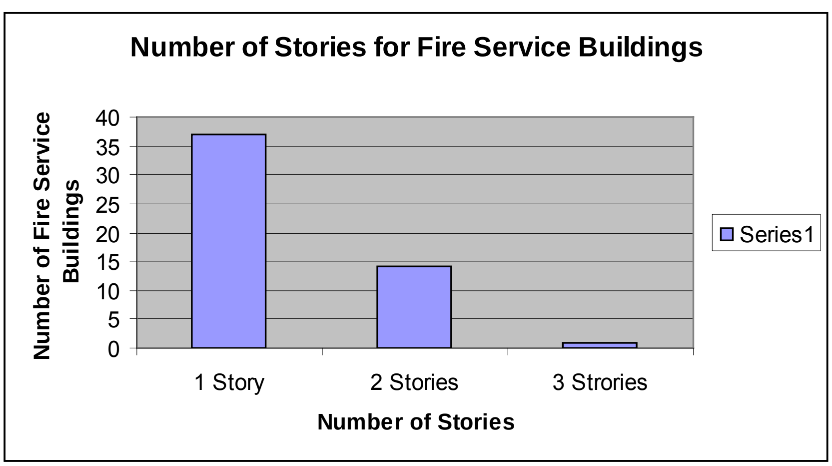
Answer Options	Response Count
See Table 6.A Below	54
answered question	**54**
skipped question	**0**

Table 6.A



Q7: How many stories does this building have?	
Answer Options	Response Count
See Table 7.A Below	54
answered question	**54**
skipped question	**0**

Table 7.A



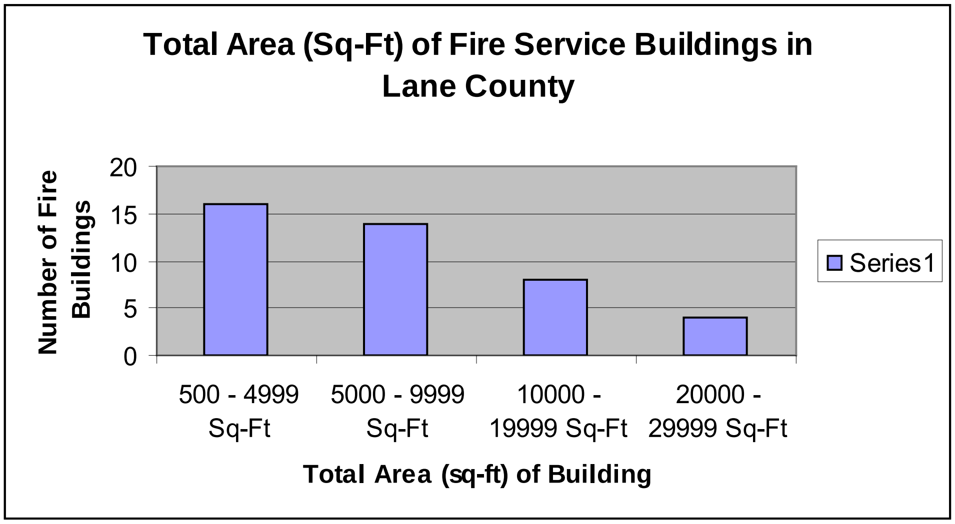
Q8: Does the building have a backup power source?		
Answer Options	Response Percent	Response Count
Yes	51.9%	28
No	48.1%	26
	answered question	54
	skipped question	0

Q9: Is your facility set-up for the function of a post-hazard shelter location? If yes, what is the shelter capacity?		
Answer Options	Response Percent	Response Count
Yes	13.0%	7
No	87.0%	47
Total Shelter Capacity:		8
	answered question	54
	skipped question	0

Q9 Cont. If yes, what is the shelter capacity?	
Station	Total Shelter Capacity:
1	50
2	50
3	100
4	10
5	75
6	100
7	50

Q10: What is the total building area in square feet?	
Answer Options	Response Count
See Table 10.A Below	43
answered question	43
skipped question	11

Table 10.A



Q11: Is this building equipped with a kitchen?		
Answer Options	**Response Percent**	**Response Count**
Yes	77.4%	41
No	22.6%	12
	answered question	**53**
	skipped question	**1**

Q12: What is the total number of vehicles housed at your facility?					
Answer Options	**1**	**2**	**3**	**4**	**Response Count**
Trucks	8	1	1	0	10
Engines	26	16	2	0	44
Medic Units	15	4	2	1	22
Tender	23	4	0	0	27
Brush	20	2	1	0	23
Boats	5	2	0	0	7
SUV	10	6	1	1	18
Other Vehicles (please specify)					28
				answered question	**49**
				skipped question	**5**

Q13: Does your agency provide information to the community about how to reduce fire risk?		
Answer Options	Response Percent	Response Count
Yes	90.9%	20
No	9.1%	2

Q14: How does your agency provide fire risk reduction information to your community. Click all that apply.		
Answer Options	Response Percent	Response Count
Community Meetings	61.9%	13
Information Display Boards	42.9%	9
Mailers	28.6%	6
Public Service Announcements provided to local media by your agency	28.6%	6
Your Agency Newsletter	33.3%	7
Through Lane County Fire Prevention Co-op	66.7%	14
Your Agency Website	57.1%	12
Not Applicable (N/A)	0.0%	0
Other (please specify)		4

Q15: Does your agency provide individual homeowner consultations about how to reduce fire risk?		
Answer Options	Response Percent	Response Count
Yes	81.8%	18
No	18.2%	4

Q16: Are homeowner consultations performed as a normal course of day-to-day business or reserved for planned outreach projects?

Answer Options	Response Percent	Response Count
Day-to-Day Business	54.5%	12
Planned Outreach Projects	31.8%	7
Not Applicable (N/A)	18.2%	4

Q17: What issues do homeowner consultations most commonly address?	
Answer Comments	Response Count
Smoke Detectors	
Neighbors, clearance to vegetation and fuels	
fuel loading, defensible space & driveway information	
fuel loading & defensible space	
Combustibles to close to ignition sources, batteries dead in smoke detectors, overloaded outlets.	
vegetation, access and fire rating	
wild land issues	
driveway access	
not something we do very often only on request from the homeowner which only happens a few times a year	
Wild land Urban Interface fuels reduction and structural triage	
Defensible Space	
Access (driveways, bridges), Defensible space, Construction methods and materials	
Smoke and Co2 alarms, escape plans, portable heater safety, trip hazards, use of power cords	
	Answered Questions 13

Q18: Please indicate how often your agency helps educate residents on the following risk reduction measures. Choose the answer that is most current.					
Answer Options	At least once in the past	At least once in the past	Plan to in the next 1yr	Plan to once in the next	Response Count

	1yr	3yrs		3yrs	
Benefits of replacing wood shake roofs	11	1	6	0	18
Benefits of steel vent screening	8	1	6	0	15
Benefits of fire safe decking	10	1	6	0	17
Placing wood piles more than 30 feet from outbuildings	10	1	6	0	17
Providing 10 feet or more clearance around propane tanks	10	1	6	0	17
Removing hazardous vegetative fuel around structures	10	1	6	0	17
Other (please specify)					3

Q19: Does your agency have an evacuation plan for communities most at risk of fire?		
Answer Options	**Response Percent**	**Response Count**
Yes	40.9%	9
No	59.1%	13

Q20: How have you communicated the fire evacuation plan? Check all that apply.		
Answer Options	**Response Percent**	**Response Count**
Community meetings	19.0%	4
Mailers	9.5%	2
Information display boards	0.0%	0
In person when asked	28.6%	6
Not Applicable (N/A)	57.1%	12
Other (please specify)		7

Q21: Please indicate about how often the following obstacles interfere with your agency's ability to fight fires.						
Answer Options	**Never**	**Once every few**	**Once per**	**Two times or**	**On every**	**Response Count**

		years	year	more per year	call	
Accessing gated communities	2	14	2	4	0	22
Impassable roadways due to vegetative overgrowth	1	12	2	7	0	22
Driveways too steep for apparatus	4	12	4	2	0	22
Single lane bridges	3	12	5	2	0	22
Poor address signage	4	10	0	7	1	22
Long driveways with no turnabout	2	8	4	7	0	21
Long driveways too narrow for two vehicles	2	9	2	8	1	22
Lack of accessible water sources for fighting fires	4	12	1	4	1	22
Water delivery systems inadequate for fighting fires	7	11	1	1	2	22
Other (please specify)						0

Q22: How would you like to see these fire fighting obstacles resolved?	
Answer Comments	**Response Count**
Engage community in vegetation management and public education about wild land urban interface fires.	
Better monitoring by County of Fire Code when issuing building permits and follow up of rural areas	
Better code enforcement and plans review	
Address markers need to be purchased. Building permits not given out until proof that there is access.	
planning with input from the local community	
public education, zoning requirements	
by county ordinance and/or state fire code	
A good start would be to get county support on board with a standard enforced road standard that is enforceable no only when new construction happens but whenever the driveway begins to get overgrown or the road becomes to rough to drive on.	
The biggest obstacles are driveway clearance for height and width, enforcement of county code.	
Enforcement of driveway standards thru the building permit process	
Addressed through permit process with county and enforce rules & increase notification of district on new construction. Method to enforce current standards on older properties. Incentives to upgrade.	

5 water tenders, good enforcement of current regulations

Through education

	13

C.4.3 Results of High Water Location Tour

MEMO

To: The Record

From: Philip Carpenter

Date: August 13, 2010

Subject: Lane County Roads

On August 12, 2010, I met with Linda Cook, Emergency Manager, Lane county Sheriff's Office, and Mike Russell, Senior Engineering Associate, Lane County Department of Public Works, to discuss a potential Pre-Disaster Mitigation project related to County roads that consistently experience flooding.

Linda explained that the Corps of Engineers plans to release 15 % more of the inflow to the Middle Fork Willamette River Dexter, Lookout Point, and Hill Creek Dams during the upcoming winter season in order to repair the dam gates. She is concerned that the increased flow will cause an increase in the flooding of several of the County's roads. Dan referred to the list of County roads previously provided OEM (attached) and noted that most of the roads would not be effected by the Corps of Engineers activities.

I discussed some of the factors that would be required for the cost/benefit study including:

- frequency and nature of past flood damages,
- length and duration of detours caused by past flood events,
- past repair costs from flood events,
- traffic control costs during past flood events.
- traffic counts, and
- proposed mitigation measures with costs and timelines.

We then visited the following sites:

<u>Love Lake Road # 3110—Priority 2</u>

Low spot in road occurs under dual rail road bridges. Flood flows are from the Willamette River about ½ mile to the east and along the rail road ditches and overland across fields. Mitigation measures would probably include raising the rail roads and their approaches at great expense, constructing an overpass over the rail roads at great expense, or raising road bed of the road approaches and between the bridges to a level that would accommodate at grade crossings at somewhat less expense. Getting a favorable benefit/cost value may be difficult. See two photographs below.


VERTICAL
CLEARANCE 72"
Lane County Roads
Love Lake Road 3110
Flood area under dual rail roads
Raise rail roads, construct road
overpass, or construct fill with at
grade crossings
August 12, 2010


Lane County Roads
Love Lake Road 3110
Flooding source--Willamette River
Flood area under dual rail roads
Raise rail roads, construct road overpass, or
construct fill with at grade crossings
August 12, 2010

Hayes Lane #3120—No priority given

There are at least 3 low spots on this dead end road. One of the low spots is about ¼ mile long where the road crosses Spring Creek. Flooding is from the Willamette River and Spring Creek There are approximately 50 homes dependent on the road for normal and emergency access. The photos below show the low spots and a flood pole erected in the far end low spot. Mitigation would be to raise the road bed at the low spots and to provide culverts for cross drainage.


HIGH FLOOD
WATER
6
5
4
3
2
1
0
Lane County Roads
Hayes Lane 3120
Flood pole in low spot
August 12, 2010


4
FT
JAN 09
FT
Lane County Roads
Hayes Lane 3120
Flood pole in low spot
January 09 flood level
August 12, 2010

Riverview Drive #3135—No priority given

Typical low spot that flood from the Willamette River. Mitigation would be to raise road bed with cross drainage culverts (see typical photograph above for Hayes Lane)

Cross Road Lane West # 1650—Not on list and no priority given.

Typical low road that flood from the Willamette River. Mitigation would be to raise ½ mile (+ or -) road bed with cross drainage culverts (see typical photograph below for Coleman Road).

Herman Road #1625—Priority 2

Typical low road that flood from the Willamette River. Mitigation would be to raise ½ mile (+ or -) road bed with cross drainage culverts (see typical photograph below for Coleman Road).

Coleman Road #1628—Priority 1

Typical low road that floods. Mitigation would be to raise ½ mile (+ or -) road bed with cross drainage culverts. See photograph below.

Edenvale Road # 6068—Priority 2

Typical low road that floods from Middle Fork Willamette River. Flood issues for this portion of the road will be exacerbated due to the Corps of Engineer dam improvement work. Mitigation would be to raise ½ mile (+ or -) road bed with cross drainage culverts (see typical photograph above for Coleman Road).

Parvin Road # 6122—Priority 1

Typical low spots that flood on both sides of a historic bridge crossing Anthony Creek. The bridge is being raised 1 foot because of past floating debris damage. Mitigation would be to raise road bed with cross drainage culverts.

<u>Site visit summary</u>

Most of the flooding of the Lane County roads occurs in low spots or short segments of roads. Emergency access is the primary concern related to the periodic floodinC. Residential settlements often are located at the end of one-way roads that flood. Mitigation for these roads would be to raise the road bed and install cross culverts.

Raising low spots and/or short segments of Lane County roads will require an evaluation (E.O. 11988) of the effect on the adjacent floodplains and Environmental/Historic Preservation reviews. In some situations detailed hydraulic analysis may be required to evaluate these floodplain effects. If the roads to be raised are in mapped floodplains CLOMRs may required.

C.4.4 All-Hazard Event Summary 2006-2012

The following table shows severe weather events by year of occurrence and physiographic region affected.

Table 4. Summary Table of Significant Weather Events in Lane County.

Year	Snow / Ice Storm	Flood	Windstorm	Wildfire (at or near Lane County)	Landslide	Earth-quake	Distant Tsunami	Drought
2011	CSCD/R CSCD/F		CSCD/R CST		CST		CST	
2010	CSCD/R CSCD/F WVF		CSCD/F					
2009	CSCD/R		CSCD/R	CSCD/R				
2008	CSCD/R CSCD/F WVF			CSCD/R				
2007	CSCD/R CST/R	CST WVF	CSCD/R CSCD/F CST/R WVF					
2006	CSCD/R CSCD/F CST/R	CST WVF	CST WVF					
2005	CSCD/R CSCD/F WVF CST/R	CST WVF	WVF				CST	WVF
2004	CSCD/R CSCD/F WVF CST/R (DR 1510)		WVF (DR 1510)					
2003	CSCD/R CSCD/F WVF CST/R		CST		CST			
2002	CSCD/R CSCD/F CST/R		CST WVF (DR 1405)	CST/R				
2001	CSCD/R CSCD/F WVF CST/R		CST					
2000	CSCD/R							
1999	CSCD/R CSCD/F		WVF		CST			
1998	CSCD/R CSCD/F			CSCD/R				
1997	CSCD/R CSCD/F WVF	CST WVF (DR 1160)						
Table 3-xx Con-tinued	**Snow / Ice Storm**	**Flood**	**Windstorm**	**Wildfire (at or near Lane County)**	**Landslide**	**Earth-quake**	**Distant Tsunami**	**Drought**
1996	CSCD/R	CST	CST	CSCD/R				

	CSCD/F WVF	**WVF (DR 1099)**	**WVF (DR 1107)**					
1995	**CSCD/R**	WVF	WVF					
1994	**CSCD/R CST/R**		CST WVF					
1993	**CSCD/R WVF**		CST					
1992								
1991				CSCD/R				
1990	WVF							
1989	CST WVF		WVF					
1988				CSCD/R				
1987								
1986								
1985								
1984			WVF					
1983								
1982								
1981			WVF					
1974		**WVF (DR 413)**	WVF					
1972		**WVF (DR 319)**	WVF					
1971	WVF		WVF					
1969	WVF CST							
1968	WVF							
1964		**WVF (DR 184)**	WVF				CST	
1963			WVF					
1962			**WVF (DR 136)**					
1950	CSCD/R WVF							

CST Coast Region

CST/R Coast Range

WVF Willamette Valley Floor

CSCD/F Cascade Foothills

CSCD/R Cascade Range

(DR XXX) FEMA Disaster Declaration and Number

C.5 Grant Funded Mitigation Projects

Following pages include reports from FEMA Region X, Lessons Learned and Information Sharing and Oregon Emergency Management describing mitigation projects in Lane County funded with FEMA mitigation grants and general success stories.

LCSO Emergency Management

Mapleton Elevation: HMGP Project

Source: FEMA, Lessons Learned and Information Sharing

https://www.llis.dhs.gov/content/mapleton-elevation

Nestled in a narrow valley of Oregon's Coastal Range, Mapleton has been subject to repeated flooding from the Siuslaw River. In January 2012, the Siuslaw again rose and covered much of Mapleton, but 22 area families didn't have to muck out their homes, tear down wallboard, or toss waterlogged treasures. That is because their homes had been elevated using funding from FEMA.

After the massive 1996 floods, the Oregon Office of Emergency Management (OEM) earmarked a portion of its FEMA hazard mitigation funds to elevate homes in hard-hit areas like Mapleton. The goal was to provide long-term solutions to repetitive floods.

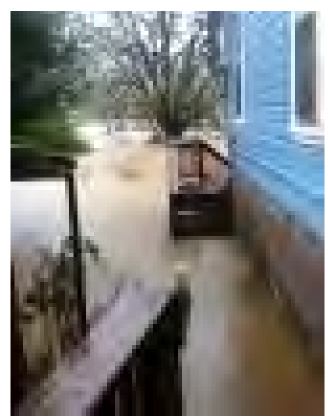
The January 2012 flooding was the first major test of the elevation projects begun 16 years ago. They passed with flying colors.

"The stress is nothing like before," said Bryan Moore, a Mapleton resident. "There was no water in the house -- that's awesome!"

Moore's wife Mashell remembers what it was like in 1996. Her husband is pastor of the church next door which "always floods." As the water rose, Bryan and the, other men in the neighborhood worked frantically to move everything in the church to higher levels. Mashell was left to deal with their 102-year-old home.

"I was by myself, trying to haul things upstairs," Mashell said. "Then the lights went out and I was working in the dark." She set out candles but the flames ended up setting a table on fire. "It wrecked everything."

When she learned about the FEMA funding, Mashell was the driving force behind elevating their home. The process took time and plenty of paperwork, but by November 1996 her home had been jacked up onto steel piers. It's a good thing, because Mapleton flooded again later that month.



Mapleton's building requirements also have changed since 1996. New construction now must be built above flood levels.

Mike McAllister engineered many of the Mapleton home elevations. A long-time resident himself, McAllister knows firsthand what his neighbors went through then and now. "We had fewer people out of their homes this time," said McAllister. "And by people I mean entire families including kids and pets." Fewer people out of their homes also meant less mess, less expense, and less disruption to the small town along the river.

Lane County Emergency Manager Linda Cook is well aware of the community's flood issues. She will be requesting additional hazard mitigation money to elevate at least one more Mapleton home and "will be on the lookout for other interested property owners to include in the application." If elevating the entire structure is not feasible or possible, "a lot of damage can be mitigated," said Cook. This could include elevating critical structures such as electrical panels, water heaters, and furnaces.

Cook also recommends people "learn the art and science of sandbagging so you can be ready to use them whenever the river reaches a certain level."

The dictionary defines elevate as "to move or raise to a higher position." It also means to raise the spirits. Both definitions apply to the Mapleton home elevations.

Notes:

FEMA Region: **FEMA Region X**

County: **Lane County, Oregon**

Project Start Date:	**07-01-1997**
Project End Date:	**07-01-2000**
Sector:	**Private**
Hazard Type:	**Flooding**
Activity/Project Type:	**Elevation, Structural, Elevation, Utilities**
Funding Source:	**Hazard Mitigation Grant Program (HMGP)**
Funding Recipient:	**Lane County**
Structure Types:	**Wood Frame**
Project Cost:	**$1,005,799.00**

Since mitigation effort began, has a disaster tested its value? **Yes**

Multiple Flood Insurance Claims? **Yes**

Ensuring Critical Communication

Harness Mountain Mitigation Project, Sub grantee: Emerald People's Utility District
Hazard Mitigation Grant Program, FEMA DR-1405-OR, Project 1405.0005

LANE COUNTY, OREGON—Loss of electricity is an inconvenience, but when critical communications that our society depends on are inoperative, it can lead to disaster. The communications facility on the 3,350-foot summit of Harness Mountain not only provides an important service for the regional communities, but it is a vital relay station for the Federal Aviation Administration (FAA) and the Oregon State Police.

Unfortunately the 12kV overhead line that serves the summit was plagued with repetitive outages and required difficult emergency measures to restore power. With shoulder deep snow, impassable roads and fallen trees, the task of restoring power could take many hours or even days. Understanding the importance of ensuring service to their customers, Emerald People's Utility District (EPUD) decided to break the cycle of emergency repairs by placing the line underground.

Harness Mountain Customers
- Federal Aviation Administration
- Oregon State Police
- Qwest
- American Tower Corp.
- Pacific Microwave
- Weyerhaeuser Company
- Douglas Forest Protection
- Pacific Power and Light
- Northwest Pipeline

Problem: EPUD 5.5-mile easement through Weyerhaeuser Co. forest was prone to repetitive outages and difficult repair.

Solution: The underground line is no longer vulnerable to wind, ice, and snow damage and acts doubly to avoid wild fire ignitions.

Having the entire line underground will virtually eliminate outages caused by snow and wind and enable Emerald PUD, for the first time since 1983, to be a dependable power source for the nine critical communication and broadcast sites.

Project cost: $176,280

Losses Avoided: Following the recent 2003-04 winter storms, Emerald PUD reported that all Harness Mountain roads were blocked from fallen timber and it would have taken ten days of work for two crews at $200 per hour per crew to repair overhead line damages. According to Craig Andrus of Emerald PUD, "This was an effective project!"

FEMA OREGON emergency management

Success Stories

WINTER STORM Safe

Disaster avoided through mitigation measures

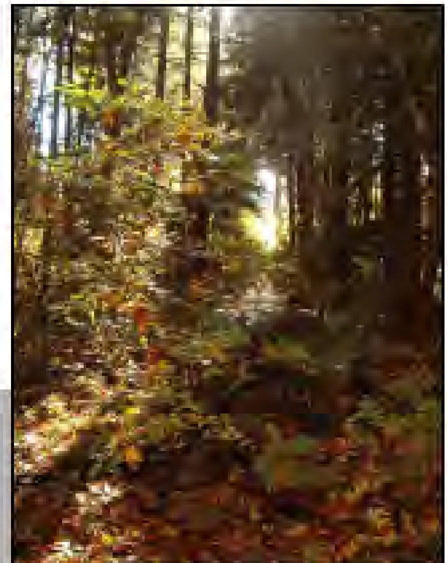
No Loss of Power, No Loss of Data

Overhead to Underground Conversion, Sub grantee: Lane Electric Cooperative
Hazard Mitigation Grant Program, FEMA DR-1405-OR, Project 1405.00011

LANE COUNTY, OREGON—The cost of repairing repetitive storm impacts adds up over time. The Lane Electric Cooperative estimates it spends $7,000 annually to repair storm damages to its overhead lines in the Blue River Reservoir area along Highway 126. Falling trees pose the greatest hazard to overhead lines. Outages sometimes occur two to three times per year and take four to eight hours to repair.

During the 2002 windstorm, the HJ Andrews Forest Research facility, which supports over 50 research scientists and 30 graduate students, lost power for seven days. The outage resulted in the loss of sensitive data from the 35 climate collection stations at the facility.

Problem: Dense snowfalls near the HJ Andrews Research facility created expensive delays in service restoration.



Problem: Falling trees along this former overhead easement caused repetitive outages.

Solution: Placing lines underground ensures reliable service to HJ Andrews' scientists and students. Underground electrical cabinet at left.

In order to provide reliable power to the HJ Andrews facility and surrounding residences, the Lane Electric Cooperative chose to place the overhead lines underground using Hazard Mitigation Grant Program funds. With the project completed in October of 2003, **no outages occurred during the recent winter storms, despite high winds and heavy snow falls.**

Project cost: $75,469

Losses avoided: Replacement to original pre-project condition would be $80,000 with annual storm damage repairs of $7,000.

FEMA   OREGON emergency management

Reducing Damage, Maintaining Service

Underground Emerald Circuit, Sub grantee: Springfield Utility Board
Hazard Mitigation Grant Program, FEMA DR-1405-OR, Project 1405.0001

SPRINGFIELD, OREGON— During the recent wind, snow and ice storms in the Willamette Valley, what was once a sure bet for power outages is now a mitigation success. By undergrounding the overhead electric line called the Emerald Circuit, the Springfield Utility Board (SUB) has strengthened their capability for future delivery of services and increased their capacity to respond to other emergency problems.

The Emerald Circuit is a main distribution line among three substations serving approximately 800 homes; assorted businesses, a fire station and two SUB water reservoirs. As a backup, this line provides power to another 400 homes, schools, a shopping center, and numerous traffic signals.

Problem: Emerald Circuit right of way showing 25' easement within 50'-90' tall wooded corridor. Note leaning small tree hazard left of line.

Solution: Same project section as above, with fallen tree. Underground line did not sustain damage from broken trees during recent winter storms.

Construction: Underground lines will minimize future emergency repairs on this steep terrain. Trench with conduit in place next to existing poles and line.

The new section of underground line essentially replaces ~2,700 feet of line that was prone to outages caused by the proximity of tall trees from the adjacent Weyerhaeuser and other private property. The lines traverse an incredibly rugged and steeply sloping landscape that required complex servicing of above ground line during wintertime conditions. The subgrantee followed best management practices and all electrical codes for the installation. A certified archaeologist was on-site during trenching operations as required by the NEPA Environmental Assessment.

Project Costs: $163,642

Losses Avoided: Estimations that a major storm damaging all poles and lines would cost $144,000 to $180,000 for replacement.
Single pole and conductor replacement: $12,000 to $15,000.

FEMA OREGON emergency management

HMGP 1405.0001, Springfield Utility Board. Julie Slevin, Dennis Sigrist and Raymond Meduna (subgrantee, along w/ Brian and Stan) conducted a preliminary final inspection of this project on August 27, 2003. All of the project construction work was completed with the new line energized and operational. Remaining project activities included hydro-seeding of the disturbed ground area (to occur when the fall rains arrive) and final reconciliation of eligible expenses/reimbursement.

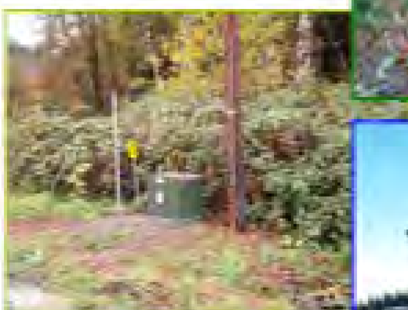
The new section of UNDERGROUND line essentially replaces ~2,700 feet of line that was prone to outages caused by the proximity of tall trees from the adjacent Weyerhaeuser and other private property. The lines traverse an incredibly rugged and steeply sloping landscape (we walked the ENTIRE length) and can appreciate the complexity of serving the above ground line during winter-time conditions. The subgrantee followed best management practices and all electrical codes for the installation. A certified archaeologist was on-site during trenching operations as required by the NEPA Environmental Assessment.

Intermediate vault (above) and termination boxes/switches at medical facility (below). Connection to main power pole off of Hwy 99 (top right).

HMGP 1405.0003, Consumers Power, Inc. (CPI). Julie Slevin and Dennis Sigrist along with James Ramseyer; Paul Rumpca and Greg Pierce (representing the subgrantee) conducted a final inspection of this project on October 15, 2003. All of the project construction work was completed with the new underground line energized and operational. The existing over-ground routing (poles) was transferred to the local telephone company as they continue to use the poles for their services. Remaining project activities include final reconciliation of eligible expenses for reimbursement. The subgrantee presented the (expected) final billing request during the project inspection.

The new section of UNDERGROUND line essentially replaces ~1,400 feet of line that was prone to outages caused by the proximity of tall trees from the adjacent buffer area (trees protected by city regulations). The new underground routing significantly improves system reliability for the 'Medical Hill' complex of hospitals, clinics and labs.

Right: Main power transmission line intermediate termination at mountaintop.



Top: Abandoned above ground line easement showing susceptibility to falling vegetation damages.

Middle: Beginning point of circuit from above ground to underground.

Right: Harness Mountain (mountaintop) and communications' facilities.

HMGP 1405.0005, Emerald People's Utility District (EPUD) - Harness Mountain Underground Electrical Line. Abby Kershaw, Julie Slevin and Dennis Sigrist along with Craig Andrus (representing the subgrantee) conducted a final inspection of this project on November 12, 2003. All of the project construction work was completed with the new underground line energized and operational. The existing over-ground routing to the mountaintop was decommissioned and all utility poles removed. Intermediate power junction boxes were installed at a number of locations (about ½ mile spacing based on the length of underground conductor per spool), *see picture, center, with replacement culvert.*

The new underground routing significantly improves system reliability to the mountaintop where a number of communications users have antennas and relay equipment, including the Oregon State Police, the Federal Aviation Administration and others.



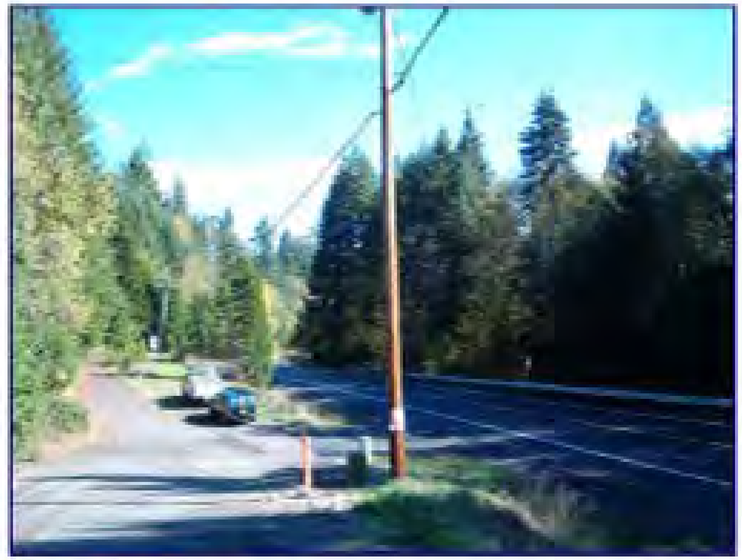






HMGP 1405.0005, Emerald People's Utility District (EPUD) - Harness Mountain Underground Electrical Line.

Culvert installation using a single back-hoe. A number of culverts were replaced when the overhead line was converted to underground (buried). Replacing the culverts were necessary to ensure safe, direct-burial of the underground 12,000 volt power line and to protect the roadway from runoff/erosion.



Right: Main power transmission line along Hwy. 126 and connection to underground (distant pole).

Top: Connection from overhead power to vault.

Right: Underground routing replaced poles that were frequently damaged by falling vegetation.

HMGP 1405.0011, Lane Electric Cooperative (LEC) - M229 Overhead to Underground Conversion. Julie Slevin and Dennis Sigrist along with Debi Wilson, Vester and Tom (representing the subgrantee) conducted a final inspection of this project on October 30, 2003. All of the project construction work was completed with the new underground line energized and operational. The existing over-ground routing to the research station (tie-in) and other users was decommissioned and replaced by direct burial underground power cable. Intermediate power junction boxes were installed at a number of locations (*see picture, below* ↓).

The new underground routing significantly improves system reliability to the research station and other uses in the area.

HMGP 1510.0010 – Lane Electric Co-op, ED Circuit Rebuild. Final project inspection on November 30, 2004; Abby Kershaw, Dennis Sigrist, Julie Slevin and Stan Prihar (OEM) with Vester Sanders and Jody Ogle representing the subgrantee.

Our field visit essentially inspected the entire circuit including the over-ground routing and the two distribution taps. Private property access did not allow complete inspection at one location (which wasn't an issue).

Project involved replacing poles, using improved/flexible insulators, and trenching two new underground distribution circuit taps in an area that was frequently impacted by outages caused by wind and winter storms. The completed mitigation project will provide benefits to a number of local users and improve the overall reliability of the ED (Eugene-Drain) transmission line that lies in a previous BPA right-of-way which is now owned by Lane Electric. This project also provided a side benefit of better equipment access to the co-op's right-of-way. Because of good project oversight and best management practices, the overall project cost was less than budgeted!

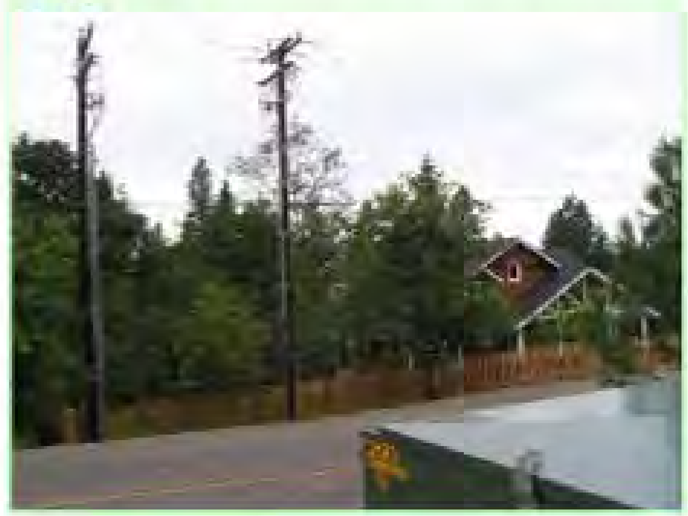
HMGP 1510.0013, City of Oakridge. Abby Kershaw and Julie Slevin inspected the City Oakridge 'roofing' project (gymnasium and kitchen area) on March 10, 2005. This HMGP project essentially replaced the leaking roof with a long-life polymer membrane and reinforcement of the roof valley with a similar material. Kevin Urban represented the sub-grantee during the inspection.

The project was completed on-schedule and within budget per the fixed-price contract between the sub-grantee and a local contractor. All documentation was reviewed and contractor payments accounted-for.

DR-1510.0014. Eugene Water and Electric Board (EWEB) – Blanton Heights Mitigation Project. Final field project inspection occurred on July 8, 2005 and included Dennis Sigrist and Stan Prihar from OEM with Teresa Siemanowski and Nancy Cueto representing EWEB. The entire project area is located along Blanton Road, Eugene in Lane County, Oregon. The new 2800 feet section of underground feeder essentially follows the same path as the existing electric overhead line, along Blanton Road with transfer switches (top photo in the background with water pumping equipment in the foreground) at each terminus (lower right photo, transfer switch in the foreground with connection to overhead power in the background) and intermediate underground vaults accessible by manhole (such as the one at 40th Ave. W. along Blanton Road, upper right photo).

The project will reduce the frequency and duration of electrical outages experienced by the Blanton Heights area customers, including nine media communication sites and multiple drinking water pump stations. The undergrounding is essentially located along existing right-of-way easements by the road, city park, and water tank/pumping facility.

The financial review of the project was also conducted at the same time as the field inspection where it was noted the project cost greatly exceeded the 25% non-federal local match as the federal (75%) share was capped at $100,000.



Update/Develop Multi-Jurisdiction Hazard Mitigation Action Plan (Ongoing)

Develop/Update Multi-Jurisdiction Hazard Mitigation Action Plan for Lane County and incorporated cities not currently covered by a FEMA sanctioned hazard mitigation plan.

Resulting planning process and multi-jurisdiction mitigation action plan document will:

- Develop new hazard mitigation plan for incorporated cities of Coburg, Creswell, Junction City, Lowell, Oakridge, Veneta, Westfir
- Update mitigation plan for Dunes City, Florence, Lane County
- Meet all Federal and State standards and requirements including Stafford Act and Disaster Mitigation Act of 2000, as amended, et al.
- Include extensive documentation of planning process
- Involve extensive public involvement and broad range of stakeholders
- Evaluate and mitigate all potential hazards including hazards not previously profiled, such as dam failure, hazardous materials incident, pandemic, and volcano
- Develop focused, detailed risk assessment and vulnerability analysis for each jurisdiction
- Establish defined goals and prioritized mitigation action items for each jurisdiction
- Outline physical mitigation projects, as well as regulatory processes and policy for each jurisdiction that support hazard mitigation goals
- Establish measures to prevent, protect and mitigate damage to both existing buildings and new and future buildings and facilities
- Promote education, proactive mitigation, and readiness measures by the general public
- Include provisions to mitigate repetitive loss properties and maintain NFIP compliance
- Include a process for plan integration with: departmental functions, operations of governance and regulatory processes, and existing and future plans
- Establish clearly defined schedule and implementation procedures for the 5-year cycle
- Be formally adopted by governing boards/councils of each jurisdiction

Responsible Agencies	Lane County, Cities of Coburg, Creswell, Dunes City, Florence, Junction City, Lowell, Oakridge, Veneta, Westfir.
Timeline	12 months
Cost	$70,000
Funding Source	HMGP DR-4169
Purpose	Creates a cohesive hazard mitigation action plan for all jurisdictions not currently covered by a Plan. Updates Plan for Lane County within 5-year cycle. Establishes new and updated risk assessment to relate latest hazard type and frequency analysis. Promotes mitigation activities and reduces repetitive losses. Reduces reliance on emergency response and encourages proactive planning on multiple levels.

ANNEXES

City of Coburg
Hazard Mitigation Reference

Version 1.0 (March 2017)

Developed as addendum to the Lane County Multi-Jurisdiction Hazard Mitigation Plan

Introduction: City of Coburg Hazard Mitigation Reference

This purpose of this annex to the Lane County Multi-Jurisdiction Hazard Mitigation Plan is to consolidate information specific to the City of Coburg and serves as an executive summary. 44 CFR 201 requirements are addressed in the main document, this annex provides supplemental information. For more information regarding Code of Federal regulations for Local Hazard Mitigation Planning see overview in Chapter 1 and citations and abstracts for Chapters 2, 3, 4, 5 of the main document.

The 2017 Lane County Multi-Jurisdiction Hazard Mitigation Plan sanctioned by OEM and FEMA is the first for which the City of Coburg has been a formal participant. Like other formal participants (Lane County, Creswell, Dunes City, Florence, Oakridge, Veneta, and Westfir), being a participant in an approved multi-jurisdiction hazard mitigation plan creates eligibility for the following important federal grants:

- Hazard Mitigation Grant Program (HMGP)
- Pre-Disaster Mitigation Grants (PDM)
- Flood Mitigation Assistance Grants (FMA)

In addition to creating eligibility for federal grants, this document serves as 5-year road map for activities with the purpose and potential to make Coburg a stronger, safer, and more resilient community.

Sub-sections of this annex to the Lane County Multi-Jurisdiction Hazard Mitigation Plan describe the following:

- Individual participants and contributors, meetings and work sessions conducted during the plan development process.
- Results of the OEM prescribed hazard quantification process for each hazard type and discussion of previous occurrences, probability of future occurrence, potential vulnerability of public and private assets, and maximum credible threat posed by each hazard.
- Details regarding mitigation projects identified as priorities, including location, photos, estimated cost, grant funding options, implementation timeframe, and hazards addressed.
- Details for mitigation project implementation, review of local program, and plan update 5-year cycle.

City of Coburg: Hazard Mitigation Meetings and Work Sessions

City of Creswell Hazard Mitigation Team

Name	Title	Agency
Petra Schuetz	City Administrator	City of Coburg
Larry Larson	Chief of Police	City of Coburg
Chad Minter	Coburg Rural Fire District Chief	Coburg Rural Fire District
Robert Butler	City of Coburg Public Works Director	City of Coburg
Greg J. Wobbe, CFM	Principal	OCR West, MPTX Associates

Individual City Work Sessions

Work sessions with individual cities were conducted following the initial project orientation meeting and intervening months between general planning group meetings. These individual work sessions are outlined below.

City of Coburg Work Sessions

Date	Location	Meeting/Work Session
July 23, 2015	Coburg City Hall	Project overview, basic data collection, risk assessment, hazard quantification
September 24, 2015	Coburg City Hall	Hazard quantification review, seismic assessment review, SRGP, FEMA mitigation grant programs
June 28, 2016	Coburg project tour	Mitigation project site tour

Subject matter discussed during work sessions included an overview of FEMA grant programs, discussion of common mitigation ideas, and specific project ideas for the City of Coburg. The result of this overall process was a thorough evaluation of risk factors and mitigation solutions. Certain hazards were highlighted with notable significance for Coburg, others found to be less relevant in a direct context. Systems and concepts considered included infrastructure resiliency, transportation network, city planning, floodplain management, public safety, public and private facilities. A range of both general and specific mitigation ideas and projects were identified and scoped in the field.

City of Coburg: Hazard Quantification

An interesting element of the hazard mitigation process is risk assessment. Risk assessment begins by identifying the full range of potential hazards which may occur in the community. Once identified, these potential hazards are evaluated to determine relative importance and aids prioritization of mitigation activities.

There are various means for evaluating hazards and the risk they present. "Hazard Quantification" is a scoring method prescribed by the State of Oregon Office of Emergency Management (OEM) is used to assist with prioritizing hazards and understanding risk. It doesn't predict the occurrence of a particular hazard, but it does "quantify" the risk of one hazard compared with another. By doing this analysis, planning can first be focused where the risk is greatest. Among other things, this hazard analysis can:

- help establish priorities for planning, capability development, and hazard mitigation;
- serve as a tool in the identification of hazard mitigation measures;
- be one tool in conducting a hazard-based needs analysis;
- serve to educate the public and public officials about hazards and vulnerabilities;
- help communities make objective judgments about acceptable risk.

One of the many strengths of the hazard quantification approach is it employs a consistent methodology with the intent of objective results and findings. The methodology was first developed by the Federal Emergency Management Agency (FEMA) circa 1983, and gradually refined by Oregon Emergency Management (OEM) over the years. The methodology produces scores that range from 24 (lowest possible) to 240 (highest possible). By applying one order of magnitude from lowest to highest, a hazard with a score of 240 is considered ten times more severe than a hazard with a rating of 24.

Maximum threat, vulnerability, and probability assessment are key components of the methodology. Maximum threat considers degree of impact under a worst case scenario, regardless of probability. Vulnerability examines potential impacts to populations, the built environment, and natural environment for 'typical' events.

Probability reviews frequency of past events as a means of predicting likelihood of future occurrence. Somewhat less vital to overall hazard quantification score (but still relevant) is history of occurrence. The four OEM prescribed hazard quantification categories are listed and described below.

Hazard Quantification Categories

1) History (previous occurrences, primarily within last century)

2) Probability (calculated likelihood of future occurrence)

3) Vulnerability (number, degree or extent of people or assets at risk per hazard)

4) Maximum threat (credible worst-case scenario)

Weight Factors

Weighting factors were developed for each of the four hazard quantification categories. This is done to emphasize certain categories over others in terms of risk assessment.

1) History (weight factor x 2)

2) Probability (weight factor x 7)

3) Vulnerability (weight factor x 5)

4) Maximum threat (weight factor x 10)

Scoring Guidelines

Scoring guidelines were developed by OEM as a method of standardizing assessment and to minimize subjectivity.

History (weight factor for category = 2). History is the record of previous occurrences. Events to include in assessing history of a hazard event for which the following types of activities were required:

- The EOC or alternate EOC was activated;
- Three or more EOP functions were implemented, e.g., alert & warning, evacuation, shelter, etc.
- An extraordinary multi-jurisdictional response was required; and/or
- A "Local Emergency" was declared.

LOW – score at 1 to 3 points based on… 0 - 1 event past 100 years

MEDIUM – score at 4 to 7 points based on… 2 - 3 events past 100 years

HIGH – score at 8 to 10 points based on… 4 + events past100 years

Probability (weight factor for category = 7)

Probability is the likelihood of future occurrence within a specified period of time.

LOW – score at 1 to 3 points based on… one incident likely within 75 to 100 years

MEDIUM – score at 4 to 7 points based on… one incident likely within 35 to 75 years

HIGH – score at 8 to 10 points based on… one incident likely within 10 to 35 years

Vulnerability (weight factor for category = 5)

Vulnerability is the percentage of population and property likely to be affected under an "average" occurrence of the hazard.

LOW – score at 1 to 3 points based on… < 1% affected

MEDIUM – score at 4 to 7 points based on… 1 - 10% affected

HIGH – score at 8 to 10 points based on… > 10% affected

Maximum Threat (weight factor for category = 10)

Maximum threat is the highest percentage of population and property that could be impacted under a worst-case scenario.

LOW – score at 1 to 3 points based on… < 5% affected

MEDIUM – score at 4 to 7 points based on… 5 - 25% affected

HIGH – score at 8 to 10 points based on… > 25% affected

To tabulate, scores for each category are multiplied by the associated weight factors to create a 'sub-score'. Adding the sub-scores for history, vulnerability, maximum threat, and probability for each hazard produces a 'total hazard quantification score' for each hazard.

The following table summarizes hazard quantification results, followed by a detailed discussion for each hazard.

City of Coburg: Hazard Quantification Results (DRAFT)

Hazard Type / Weight Factor (WF)	History WF x 2	Probability WF x 7	Vulnerability WF x 5	Maximum Threat WF x 10	Raw Score	Weighted Score	Weighted Score Rank
Haz Mat Incident	10	8	10	9	**37**	**216**	**1**
Winter Storm	8	8	8	10	**34**	**212**	**2**
Windstorm	8	8	8	5	**29**	**162**	**3**
Earthquake	3	2	10	6	**21**	**130**	**4**
Flood	2	4	8	5	**19**	**122**	**5**
Drought	0	5	3	7	**15**	**120**	**6**
Pandemic	0	2	7	7	**16**	**119**	**7**
Dam Failure	0	5	10	2	**17**	**105**	**8**
Volcano	0	2	2	1	**5**	**34**	**9**
Landslide	0	0	2	2	**4**	**30**	**10**
Wildfire	0	0	2	1	**3**	**20**	**11**
Tsunami	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Source: City of Coburg Natural Hazard Mitigation Team

Individual Hazard Discussion, City of Coburg

Hazardous Materials Incident

Hazard (Category)	Raw Score	Weighted Score
Haz Mat Incident (Overall)	37	216
Haz Mat Incident (History)	10	20
Haz Mat Incident (Probability)	8	56
Haz Mat Incident (Vulnerability)	10	50
Haz Mat Incident (Maximum Threat)	9	90

Hazardous Materials Incident notes: Hazardous materials incident is considered a technical hazard and involves different characteristics than natural hazards. Proximity to transport corridors and particularly intersections are significant geographic factor. Interstate 5 (I-5) is a major transport corridor within the State. This North/South Interstate freeway runs directly east of Coburg, and the eastern boundaries of the city coexist with westernmost edge of the freeway. An overpass offers both to and exit off the freeway in both directions at Coburg. Underground natural gas lines serve various neighborhoods. Industrial concerns line the eastern border of the city adjacent to the freeway, and may store hazardous materials.

History, probability, vulnerability are considered high relative to other hazard types. Maximum threat could involve such events as truck accidents on I-5 involving toxic release, rupture of underground natural gas lines and potentially accidents or fires located at the industrial concerns in the eastern section of the city. In the event of an occurrence, prevailing wind and proximity to waterways are important factors relating to public safety risk and environmental impacts. Overall, the risk is mitigated by excellent response capability. See also hazardous materials incident profile in Chapter 3, main document.

Winter Storm

Hazard (Category)	Raw Score	Weighted Score
Winter Storm (Overall)	34	212
Winter Storm (History)	8	16
Winter Storm (Probability)	8	56
Winter Storm (Vulnerability)	8	40
Winter Storm (Maximum Threat)	10	100

Winter Storm notes: December 5, 2016 a localized sleet storm resulted in 14 traffic accidents on I-5 near Coburg. The series of individual of incidents unfolded over a 45 minute timeframe resulting in virtual closure of the interstate for approximately 2 hours. Minor injuries reported. Winter storms resulting in snow or ice storms on the floor of the Willamette Valley in Lane County have occurred in 1950, 1968, 1969, 1971, 1989, 1993, 1996, 1997, 2001, 2003, 2004, 2005, 2008, and 2010. These events generally fall into two categories, events of snow and ice at low elevation due to very cold air trapped at the surface, and regional cold air systems. Most events seeing snow and ice on the valley floor are created by cold air trapped at the surface, with warmer, moister air at elevation. These events often occur as rain events at higher elevations.

Like most cities Coburg contains an extensive network of above ground electrical lines vulnerable to damage from falling limbs and trees during winter storms. Recent history has been frequent including notable damage and power loss in 2014 and 2015. The February 2014 storm caused a power outage that lasted three days. Wind is often a contributing factor in winter storms. A warming center has been established in Eugene to provide shelter for vulnerable populations in cold weather. Probability is considered high that patterns of previous occurrence will continue. Overall population potentially affected by winter storm is high since effects are not geographically contained. Transportation and roadways are vulnerable to closure during winter storms, though the city benefits from primarily level terrain. Maximum threat is high however due to threat of structural damage directly related to winter weather (cold, snow, ice), and difficulty in accessing needed public services. See also winter storm hazard profile in Chapter 3, main document.

Windstorm

Hazard (Category)	Raw Score	Weighted Score
Windstorm (Overall)	29	162
Windstorm (History)	8	16
Windstorm (Probability)	8	56
Windstorm (Vulnerability)	8	40
Windstorm (Maximum Threat)	5	50

Windstorm notes: Similar to winter storm, windstorm can and frequently does impact above ground electrical lines vulnerable to damage from falling limbs and trees. For Lane County at large, the two year interval sustained wind speeds range from about 37 to 47 miles per hour, generally too low to cause significant damages. The 50 year occurrence wind speeds range from 62 to 75 miles per hour. These more damaging wind storms can be expected in intervals averaging a few decades. (http://www.coburgoregon.org/sites/default/files/fileattachments/community/page/1301/2011lchazardanalysisandriskassessment.pdf) The wind storm in February 2002 snapped 30 to 40 powerlines, impacting residents and businesses in the city.

Probability is considered high that patterns of previous occurrence will continue. Overall vulnerability is considered high; roadways are notably vulnerable to closure similar to wind storms due to falling limbs, trees, and snapped powerlines. The Columbus Day storm of 1962 can serve as an example for maximum threat, with winds measured at 86 mph in Eugene and presumably similar in Coburg. A windstorm of similar magnitude to the Columbus Day Storm could potentially damage numerous of homes and businesses in city, either by direct structural damage, falling trees, or wind-blown debris. Due to its location on eastern slope of the Coburg foothills the city may have a slight protective factor from extreme wind as compared to fully exposed areas. See also windstorm hazard profile in Chapter 3, main document.

Earthquake

Hazard (Category)	Raw Score	Weighted Score
Earthquake (Overall)	21	130
Earthquake (History)	3	6
Earthquake (Probability)	2	14
Earthquake (Vulnerability)	10	50
Earthquake (Maximum Threat)	6	60

Earthquake notes: Earthquake is somewhat unique as it occurs much less frequently but has potential for significant damage and disruption. From a geographic standpoint occurrence would presumably effect the entire city uniformly. History of occurrence dates back over long time scales. Probability is low in any given year. Vulnerability is complex to assess due to varying standards of construction but most newer construction is considered relatively sound. Maximum threat is expected to involve minor-moderate damage to numerous structures. Importance of resiliency of infrastructure is notable. See also earthquake profile in Chapter 3, main document. Considered at a different scale, a Cascadia Subduction Zone Earthquake event is a very large, Pacific Northwest Region event, due to a 600 mile long subduction zone fault line approximately 70 miles off the Oregon Coast. While the source of this earthquake is quite distant to Coburg, the magnitude and scope of this hazard will impact the entire State of Oregon from the Coast to the Cascades. The shaking to be expected in Coburg

Flood

Hazard (Category)	Raw Score	Weighted Score
Flood (Overall)	19	122
Flood (History)	2	4
Flood (Probability)	4	28
Flood (Vulnerability)	8	40
Flood (Maximum Threat)	5	50

Flood notes: Flood is a geographically contained hazard and widespread impacts in Coburg are unlikely. Neighborhood flooding issues can be found to the south and southwest of the city, though the majority of potentially affected land is primarily used as agricultural land. History of flooding is low, future probability is moderate. Overall vulnerability is high as the floodplain boundary is within the corporate city boundary in the SW corner of the city. This includes the area of Abby Road where a number of residential homes have been built. Maximum threat scores are somewhat lower than the vulnerability due to elevation changes moving to the north and west, and the land is currently being used for agricultural purposes with fewer impacts to residents. Coburg Bottom Loop Road is frequently inundated per reports from local Police and Fire departments. This, and other anecdotal reporting, leads to the conclusion that the current (1999) Flood Maps of the area may be inaccurate and in need of updating. See also flood hazard profile in Chapter 3, main document.

Drought

Hazard (Category)	Raw Score	Weighted Score
Drought (Overall)	15	120
Drought (History)	0	0
Drought (Probability)	5	35
Drought (Vulnerability)	3	15
Drought (Maximum Threat)	7	70

Drought notes: Drought is neither life threatening nor presents a direct risk to structures, but does involve potential for significant disruption if dramatic water shortage were to develop. Drought can exacerbate wildfire risk as related hazards, and a water shortage would likely effect the entire city uniformly. History and probability are considered relatively low. Vulnerability is relatively low as Coburg is close to two major sources of water, the Willamette and McKenzie Rivers, helping to maintain redundancy to its water supply network. Maximum threat is moderate if an event occurred where all water supply systems go were to become inoperable or water supply unexpectedly ran short. See also drought profile in Chapter 3, main document.

Pandemic

Hazard (Category)	Raw Score	Weighted Score
Pandemic (Overall)	16	119
Pandemic (History)	0	0
Pandemic (Probability)	2	14
Pandemic (Vulnerability)	7	35
Pandemic (Maximum Threat)	7	70

Pandemic notes: Pandemic is a unique hazard which presents significant public safety risk but no potential for damage to structures. Geographic potential is uniform. History and probability are both low when considering major outbreak of disease. Vulnerability and maximum threat are moderate considering most credible scenarios. See also pandemic profile in Chapter 3, main document.

Dam Failure

Hazard (Category)	Raw Score	Weighted Score
Dam Failure (Overall)	17	105
Dam Failure (History)	0	0
Dam Failure (Probability)	5	35
Dam Failure (Vulnerability)	10	50
Dam Failure (Maximum Threat)	2	20

Dam Failure notes: There is no history of dam failure affecting Coburg and geographic location makes impact a medium probability as Coburg is near two rivers which are dam controlled waterways and part of the Willamette Valley Project run by the Army Corps of Engineers. Vulnerability to dam failure is very high, due to the geographic placement of Coburg and its relative elevation in the valley. Maximum threat is correspondingly low due to the unlikely nature of dam failure in general. See also dam failure profile in Chapter 3, main document.

Volcano

Hazard (Category)	Raw Score	Weighted Score
Volcano (Overall)	5	34
Volcano (History)	0	0
Volcano (Probability)	2	14
Volcano (Vulnerability)	2	10
Volcano (Maximum Threat)	1	10

Volcano notes: Volcano is similar to earthquake in that it occurs very infrequently. Coburg is situated approximately 60 miles from the closest volcano source, far enough to minimize probable impacts to minor ash-fall across the city if wind patterns allow. History, probability and vulnerability are relatively low, maximum threat is also considered low. See also volcano profile in Chapter 3, main document.

Landslide

Hazard (Category)	Raw Score	Weighted Score
Landslide (Overall)	4	30
Landslide (History)	0	0
Landslide (Probability)	0	0
Landslide (Vulnerability)	2	10
Landslide (Maximum Threat)	2	20

Landslide notes: Landslide is considered to have very low history, probability, and vulnerability rankings, as the majority of Coburg is situated on level terrain. Maximum threat is similarly low. Coburg, due to its flat terrain, may be susceptible to liquefaction hazard in the event of an earthquake centered nearby, or more potentially in a Cascadia Earthquake event. See also landslide profile in Chapter 3, main document.

Wildfire

Hazard (Category)	Raw Score	Weighted Score
Wildfire (Overall)	3	20
Wildfire (History)	0	0
Wildfire (Probability)	0	0
Wildfire (Vulnerability)	2	10
Wildfire (Maximum Threat)	1	10

Wildfire notes: Coburg is home to the Coburg Fire Department, a member of the Lane County Fire Defense Board. The Urban Wildfire interface is not significant in the city due to the fact it is situated in an agricultural farmland use area. Grassfires do occur, and orchards area located near the city. However this has not been a significant hazard in the past, leading to the very low historical scoring. Probability, vulnerability, and maximum threat are all similarly low. IT must be noted however, there is currently no fire suppression east of I-5, east of the city. See also wildfire hazard profile in Chapter 3, main document.

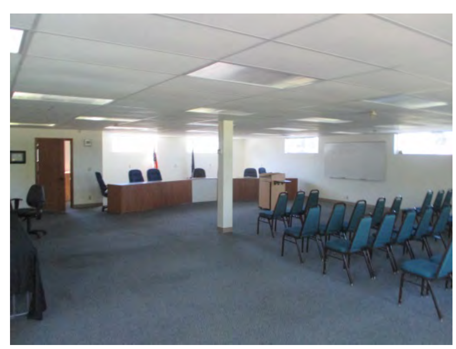
City of Coburg: Mitigation Projects

This section describes mitigation projects identified by Coburg during the planning process. See Chapter 4, main document for additional information regarding mitigation action item methodology and prioritization.

Mitigation Action Item (a): Retrofit or replace existing 500,000 gallon water supply tanks, well building, and pump station for seismic and flood mitigation. Install additional 750,000 gallon water supply tank and 12" transmission line for fire suppression and general resiliency.

Location	TBD
Coordinating Agencies	Coburg Public Works
Implementation Timeframe	18-24 months
Estimated Cost	est. $1.8 million (12" Transmission line $276K, 750K Gallon Tank $610K
Potential Funding Sources	HUD-CDBG, OR-SRGP, HMGP, PDM, FEMA PA-106,
Hazards Mitigated	Earthquake, Urban Fire
Comments	Seismic rehabilitation – Phase 1 (Assessment) Phase 2 (Construction/Retrofit) Water Tanks, well building, and pump station tower type.
Current Site Photos	 

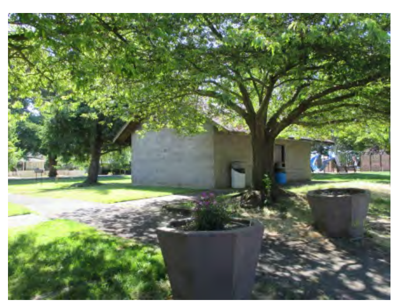
Mitigation Action Item (b): City Hall Storm Hardening Retrofit. Building façade (veneer), windows, roof.

Location	City Hall
Coordinating Agencies	Coburg Public Works, City Council
Implementation Timeframe	12-months
Estimated Cost	$45,000 - $75,000
Potential Funding Sources	HUD-CDBG, OR-SRGP, HMGP, PDM, FEMA PA-106
Hazards Mitigated	Structural damage prevention in storm conditions
Comments	
Current Site Photos	 

<u>Mitigation Action Item (c)</u>: Safe Room Improvements for Emergency Operation Center (EOC) enhancements, Separate space for chemical storage.

Location	City Hall
Coordinating Agencies	Coburg Public Works, City Council
Implementation Timeframe	12-18 months
Estimated Cost	$200,000
Potential Funding Sources	HUD-CDBG, OR-SRGP, HMGP, PDM, FEMA PA-106
Hazards Mitigated	Communications failure, protection of public/private property, public safety, infrastructure
Comments	Safe-room improvements for EOC. Create protected, contained space for city employees and EOC participants.
Current Site Photos	

<u>Mitigation Action Item (d):</u> Storm hardening retro-fit for a community staging area/shelter. City Park upgrades, seismic upgrade for bathroom and generator to serve as sheltering, staging area

Location	Coburg City Park (Norma Pfeiffer Park)
Coordinating Agencies	Coburg Public Works
Implementation Timeframe	12 – 18 Months
Estimated Cost	$185,000
Potential Funding Sources	HUD-CDBG, OR-SRGP, HMGP, PDM, FEMA PA-106,
Hazards Mitigated	Earthquake, flood, winter storm, wind storm. dam failure, hazmat incident
Comments	Storm-hardening retrofit for city park restroom, generator for staging area.
Current Site Photos	

<u>Mitigation Action Item (e):</u> Geotechnical Assessment: Old Mill Pond, Coburg Estates, Integrate into Comprehensive Plan

Location	Coburg Water Treatment Facility
Coordinating Agencies	Coburg Public Works
Implementation Timeframe	12 months

Estimated Cost	$25,000
Potential Funding Sources	HUD-CDBG; FEMA HMA
Hazards Mitigated	Flood, earthquake, HazMat incident
Comments	Integration of these projects into the Comprehensive plan increases funding opportunities.
Current Site Photos	

Mitigation Action Item (f): Stormwater Master Plan

Location	City of Coburg
Coordinating Agencies	Coburg Public Works
Implementation Timeframe	12 months
Estimated Cost	$25,000
Potential Funding Sources	FEMA HMA
Hazards Mitigated	Flood, earthquake, HazMat incident
Comments	Deliberate planning enables funding and project opportunities that will help to check Stormwater runoff, and treat it before it enters nearby waterways. Promotes innovative land use practices and city programs that over time improve water quality. Planning to increase the planting of appropriate trees, open spaces, wetlands, and vegetated planters benefits the community through cost-effective practices, increasing property values, and increasing revenues from tourism,
Current Site Photos	

Mitigation Action Item (g): Pursue flowage easements; develop agreements for secondary water source (EWEB)

Location	City of Coburg
Coordinating Agencies	Coburg Public Works, City Council
Implementation Timeframe	12-18 months
Estimated Cost	
Potential Funding Sources	HUD-CDBG, OR-SRGP, HMGP, PDM, FEMA PA-106
Hazards Mitigated	Earthquake, flood, drought, HazMat incident, winter storm
Comments	Pursue flowage easements; develop agreements for secondary water source. Increase of community resilience with a secondary water source.
Current Site Photos	

City of Coburg: Hazard Mitigation Plan Implementation and Maintenance

In keeping with standard practices to ensure incorporation of overall goals and strategy of the hazard mitigation plan, City of Coburg hazard mitigation team members will be invited to participate in future plan development or existing plan update committees. Additionally, this Hazard Mitigation Action Plan will be cited as a technical reference for future plan update processes. Planning documents and mechanisms applicable to this process may include the following:

- City of Coburg Comprehensive Plan
- Capital Improvement Plans
- Emergency Management Plan
- City of Coburg Floodplain Development Ordinance
- Building Code
- Subdivision Code
- Erosion Control
- Stormwater Management Plan

Additionally, progress to implement this plan will be monitored on an ongoing basis by city staff and administration. The planning process is essential in identifying weaknesses and strengths inherent in the community, and cooperatively enables coordination with various agencies and jurisdictions that might not otherwise occur. Continuing this cooperative and interactive process is exemplified by the planning process. Annual reviews and update under a 5-year cycle will be pursued. Using these methods the overarching goal of a stronger, safer, more resilient community can be attained.

ANNEX 2. CITY OF CRESWELL HAZARD MITIGATION REFERENCE

City of Creswell
Hazard Mitigation Reference

Version 1.0 (March 2017)

Introduction: City of Creswell Hazard Mitigation Reference

This purpose of this annex to the Lane County Multi-Jurisdiction Hazard Mitigation Plan is to consolidate information specific to the City of Creswell and serve as an executive summary. 44 CFR 201 requirements are addressed in the main document, this annex provides supplemental information. For more information regarding Code of Federal regulations for Local Hazard Mitigation Planning see overview in Chapter 1 and citations and abstracts for Chapters 2, 3, 4, 5 of the main document.

The 2017 Lane County Multi-Jurisdiction Hazard Mitigation Plan sanctioned by OEM and FEMA is the first for which the City of Creswell has been a formal participant. Like other formal participants (Lane County, Coburg, Dunes City, Florence, Oakridge, Veneta, and Westfir), being a participant in an approved multi-jurisdiction hazard mitigation plan creates eligibility for the following important federal grants:

- Hazard Mitigation Grant Program (HMGP)
- Pre-Disaster Mitigation Grants (PDM)
- Flood Mitigation Assistance Grants (FMA)

In addition to creating eligibility for federal grants, this document serves as 5-year road map for activities with the purpose and potential to make Creswell a stronger, safer, and more resilient community.

Sub-sections of this annex to the Lane County Multi-Jurisdiction Hazard Mitigation Plan describe the following:

- Individual participants and contributors, meetings and work sessions conducted during the plan development process.
- Results of the OEM prescribed hazard quantification process for each hazard type and discussion of previous occurrences, probability of future occurrence, potential vulnerability of public and private assets, and maximum credible threat posed by each hazard.
- Details regarding mitigation projects identified as priorities, including location, photos, estimated cost, grant funding options, implementation timeframe, and hazards addressed.
- Details for mitigation project implementation, review of local program, and plan update 5-year cycle.

City of Creswell: Hazard Mitigation Meetings and Work Sessions

Development of City of Creswell material for the hazard mitigation plan involved participation by city staff, public works, airport, school district, library, county emergency management, fire district, and law enforcement. The process followed FEMA's prescribed model for organizing resources, identifying hazards, evaluating risk, identifying mitigation options, prioritizing mitigation projects. For additional details regarding the planning process, refer to Chapter 2 (Planning Process), main document.

Specific participants are listed as follows:

City of Creswell Hazard Mitigation Team

Name	Title	Agency
Maddie Phillips	City Planner	City of Creswell
John Wooten	Fire Chief	South Lane Fire District
Cliff Bellew	Public Works Director	City of Creswell
Michelle Amborg	Planning Director	City of Creswell
Su Liudahl	City Librarian	City of Creswell
Todd Hamilton	Superintendent	Creswell School District
Shelley Humble	General Manager	Creswell Airport
Linda Cook, PMP	Emergency Manager	Lane County Sheriff's Office
Billy Halvorson	Sergeant	Lane County Sheriff's Office
Greg J. Wobbe, CFM	Principal	OCR West, MPTX Associates

Individual City Work Sessions

Work sessions with individual cities were conducted following the initial project orientation meeting and intervening months between general planning group meetings. These individual work sessions are outlined per city below.

City of Creswell Work Sessions

Date	Location	Meeting/Work Session
June 30, 2015	Creswell City Hall	Project overview, basic data collection
July 30, 2015	Creswell City Hall	Risk assessment, Hazard quantification
October 15, 2015	Creswell City Hall	Hazard quantification-seismic assessment review, SRGP, FEMA mitigation grant programs, mitigation ideas
April 26, 2016	Creswell project tour	Mitigation project site tour

An additional element of the planning process included a meeting at Lane County Sheriff's Office August 25, 2015 attended by Creswell city planning staff along with the other participating cities. Subject matter discussed included an overview of FEMA grant programs, discussion of common mitigation ideas, and specific project ideas for the City of Creswell.

The result of this overall process was a thorough evaluation of risk factors and mitigation solutions. Certain hazards were highlighted with notable significance for Creswell, others found to be less relevant in a direct context. Systems and concepts considered included infrastructure resiliency, transportation network, city planning, floodplain management, public safety, public and private facilities. A range of both general and specific mitigation ideas and projects were identified and scoped in the field.

City of Creswell: Hazard Quantification

An interesting element of the hazard mitigation process is risk assessment. Risk assessment begins by identifying the full range of potential hazards which may occur in the community. Once identified, these potential hazards are evaluated to determine relative importance and aids prioritization of mitigation activities.

There are various means for evaluating hazards and the risk they present. “Hazard Quantification” is a scoring method prescribed by the State of Oregon Office of Emergency Management (OEM) is used to assist with prioritizing hazards and understanding risk. It doesn't predict the occurrence of a particular hazard, but it does "quantify" the risk of one hazard compared with another. By doing this analysis, planning can first be focused where the risk is greatest. Among other things, this hazard analysis can:

- help establish priorities for planning, capability development, and hazard mitigation;
- serve as a tool in the identification of hazard mitigation measures;
- be one tool in conducting a hazard-based needs analysis;
- serve to educate the public and public officials about hazards and vulnerabilities;
- help communities make objective judgments about acceptable risk.

One of the many strengths of the hazard quantification approach is it employs a consistent methodology with the intent of objective results and findings. The methodology was first developed by the Federal Emergency Management Agency (FEMA) circa 1983, and gradually refined by Oregon Emergency Management (OEM) over the years. The methodology produces scores that range from 24 (lowest possible) to 240 (highest possible). By applying one order of magnitude from lowest to highest, a hazard with a score of 240 is considered ten times more severe than a hazard with a rating of 24.

Maximum threat, vulnerability, and probability assessment are key components of the methodology. Maximum threat considers degree of impact under a worst case scenario, regardless of probability. Vulnerability examines potential impacts to populations, the built environment, and natural environment for ‘typical’ events.

Probability reviews frequency of past events as a means of predicting likelihood of future occurrence. Somewhat less vital to overall hazard quantification score (but still relevant) is history of occurrence. The four OEM prescribed hazard quantification categories are listed and described below.

Hazard Quantification Categories

1) History (previous occurrences, primarily within last century)

2) Probability (calculated likelihood of future occurrence)

3) Vulnerability (number, degree or extent of people or assets at risk per hazard)

4) Maximum threat (credible worst-case scenario)

Weight Factors

Weighting factors were developed for each of the four hazard quantification categories. This is done to emphasize certain categories over others in terms of risk assessment.

1) History (weight factor x 2)

2) Probability (weight factor x 7)

3) Vulnerability (weight factor x 5)

4) Maximum threat (weight factor x 10)

Scoring Guidelines

Scoring guidelines were developed by OEM as a method of standardizing assessment and to minimize subjectivity.

History (weight factor for category = 2). History is the record of previous occurrences. Events to include in assessing history of a hazard event for which the following types of activities were required:

- The EOC or alternate EOC was activated;
- Three or more EOP functions were implemented, e.g., alert & warning, evacuation, shelter, etc.
- An extraordinary multi-jurisdictional response was required; and/or
- A "Local Emergency" was declared.

LOW – score at 1 to 3 points based on… 0 - 1 event past 100 years

MEDIUM – score at 4 to 7 points based on… 2 - 3 events past 100 years

HIGH – score at 8 to 10 points based on… 4 + events past100 years

Probability (weight factor for category = 7)

Probability is the likelihood of future occurrence within a specified period of time.

LOW – score at 1 to 3 points based on… one incident likely within 75 to 100 years

MEDIUM – score at 4 to 7 points based on… one incident likely within 35 to 75 years

HIGH – score at 8 to 10 points based on… one incident likely within 10 to 35 years

Vulnerability (weight factor for category = 5)

Vulnerability is the percentage of population and property likely to be affected under an "average" occurrence of the hazard.

LOW – score at 1 to 3 points based on… < 1% affected

MEDIUM – score at 4 to 7 points based on… 1 - 10% affected

HIGH – score at 8 to 10 points based on… > 10% affected

Maximum Threat (weight factor for category = 10)

Maximum threat is the highest percentage of population and property that could be impacted under a worst-case scenario.

LOW – score at 1 to 3 points based on… < 5% affected

MEDIUM – score at 4 to 7 points based on… 5 - 25% affected

HIGH – score at 8 to 10 points based on… > 25% affected

To tabulate, scores for each category are multiplied by the associated weight factors to create a 'sub-score'. Adding the sub-scores for history, vulnerability, maximum threat, and probability for each hazard produces a 'total hazard quantification score' for each hazard.

The following table summarizes hazard quantification results, followed by a detailed discussion for each hazard.

City of Creswell: Hazard Quantification Results

Hazard Type / Weight Factor (WF)	History WF x 2	Probability WF x 7	Vulnerability WF x 5	Maximum Threat WF x 10	Raw Score	Weighted Score	Weighted Score Rank
Winter Storm	9	10	10	10	**39**	**238**	**1**
Windstorm	10	10	8	10	**38**	**230**	**2**
Haz Mat Incident	5	9	10	10	**34**	**223**	**3**
Flood	5	6	7	7	**25**	**157**	**4**
Earthquake	0	2	6	10	**18**	**144**	**5**
Landslide	1	3	3	10	**17**	**138**	**6**
Wildfire	10	10	2	3	**25**	**130**	**7**
Drought	3	5	2	6	**16**	**111**	**8**
Dam Failure	0	1	4	8	**13**	**107**	**9**
Pandemic	2	2	4	4	**12**	**78**	**10**
Volcano	2	2	2	4	**10**	**68**	**11**
Tsunami	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Source: Creswell Hazard Mitigation Team

Individual Hazard Discussion, City of Creswell

Winter Storm

Hazard (Category)	Raw Score	Weighted Score
Winter Storm (Overall)	39	238
Winter Storm (History)	9	18
Winter Storm (Probability)	10	70
Winter Storm (Vulnerability)	10	50
Winter Storm (Maximum Threat)	10	100

<u>Winter Storm notes</u>: Winter storm involves a relatively frequent pattern of occurrence and produces transportation disruptions and electrical grid impacts. Icy roads, falling limbs and trees during winter storms are most common impacts. Probability is considered high that patterns of previous occurrence will continue.

Winter storm affects broad geographic regions and therefore population numbers potentially affected by winter storm. Creswell benefits from primarily level terrain with exception of southern portion of the city. Maximum threat is considered high, based on potential damage to roof structures resulting from heavy snow, falling trees, extended travel and power disruption, and severe cold which could pose public safety risk. See also winter storm hazard profile in Chapter 3, main document.

Windstorm

Hazard (Category)	Raw Score	Weighted Score
Windstorm (Overall)	38	230
Windstorm (History)	10	20
Windstorm (Probability)	10	70
Windstorm (Vulnerability)	8	40
Windstorm (Maximum Threat)	10	100

<u>Windstorm notes</u>: Creswell is located in a semi-exposed valley south of Camas Swale where winds can be channeled between Coast Range foothills to the west and Cascade Range

foothills to the east. Many of the windstorm events described in the main document profile affected central Lane County including Creswell, with the most severe event occurring in October 1962 (Columbus Day Storm), which carried +85mph winds across the general area and resulted in widespread damage.

In addition to windstorm events described in the main document profile, rotational winds (tornados) have occurred in Creswell and in surrounding area.

Notably on December 2, 1999, eyewitnesses reported shingles and other debris lifted 200 feet into the air by a tornado. Four roofs were damaged, one tree uprooted, and a mill slash burner was tipped over according to a report by the National Weather Service. There was one unconfirmed injury and damages estimated at over $10,000. Other rotational windstorms in the general Creswell vicinity include events in 2015 (LCC area), and 1989.

Windstorm frequently impacts above ground electrical lines vulnerable to damage from falling limbs and trees. Probability is considered high based on patterns of previous occurrence. Overall vulnerability is considered moderate-high, according to assessments of total population potentially affected.

In the intervening period since the Columbus Day Storm of 1962 overall strength and wind resilience of building stock has improved in general terms. Wind driven debris is another potential hazard related to windstorm, particularly sheet metal and tree limbs, and therefore areas surrounding industrial and agricultural operations, as well as areas of forest fringe have somewhat higher vulnerability of impact.

Overall maximum threat assessment for windstorm is considered in the upper tier of potential hazards along with winter storm and hazardous materials incident. See also windstorm hazard profile in Chapter 3, main document.

Hazardous Materials Incident

Hazard (Category)	**Raw Score**	**Weighted Score**
Hazardous Materials Incident (Overall)	34	223
Hazardous Materials Incident (History)	5	10
Hazardous Materials Incident (Probability)	9	63
Hazardous Materials Incident (Vulnerability)	5	50
Hazardous Materials Incident (Maximum Threat)	10	100

<u>Hazardous Materials Incident notes</u>: Hazardous materials incident is considered a technical hazard and involves different characteristics than natural hazards, and received the 3rd highest weighted quantification score. Maximum threat and probability scores were comparatively high (10 and 9 respectively).

Proximity to transport corridors and particularly intersections are notable geographic factor for Creswell. A rail-line runs through the center of the city with numerous at-grade crossings, and a rail bridge over a pond at Park Drive spur. Interstate 5 runs north/south through Creswell city limits. Probability considered relatively high based on geographic factors.

History and vulnerability are considered moderate relative to other hazard types. Maximum threat could involve such events as railroad or truck accident involving toxic release. Rupture of underground gas lines, or accident at fueling location or industrial site is also possible.

In the event of occurrence, prevailing wind and proximity to waterways are important factors relating to public safety risk and environmental impacts. Overall risk is mitigated by excellent response capability. See also hazardous materials incident profile in Chapter 3, main document.

Flood

Hazard (Category)	Raw Score	Weighted Score
Flood (Overall)	25	157
Flood (History)	5	10
Flood (Probability)	6	42
Flood (Vulnerability)	7	35
Flood (Maximum Threat)	7	70

Flood notes: Flooding received the 4th highest weighted hazard quantification score, with moderate-high scores for history, probability, vulnerability, and maximum threat. Eastern portions of the city are located in mapped floodplains of the Coast Fork Willamette River based on Flood Insurance Rate Maps for Creswell (FIRM 410421-1661F). Residential areas and a golf course are located in this proximity. According to analysis by LCOG in 2007 Natural Hazards Mitigation Study for Creswell, over 26.8 acres of land was located in areas defined as Floodway on FEMA Flood Insurance Rate Maps, and 211.4 acres defined as 100-Year Floodplain. The following table excerpted from the Natural Hazards Mitigation Study shows a breakdown of various land use designations per flood zone.

Plan Designation	Acres in Floodway	Acres in 100-Year Floodplain
Undesignated	0	10.2
Commercial	8.1	96
Industrial	0	109.7
Park, Open Space	0.5	36.4
Public Facilities/Government	0	2.2
Residential	18.2	46.9
TOTAL	**26.8**	**211.4**

Source: LCOG, City of Creswell Natural Hazards Mitigation Study (2007)
Note: Acreage totals reported above do not account for LOMR 15-10-1143P effective 1/15/2016 and LOMR 16-10-041 5X effective 7/5/2016.

Notably, in January and July of 2016 Letters of Map Revision (LOMRs) modified regulatory floodplain designations for residential neighborhoods in eastern Creswell. The vicinity of Hill Creek at Park Drive is designated 100-year floodplain, and to the north of the city Camas Swale Creek is another potential flooding source which can disrupt travel to and from the city on Hwy 99. Overall vulnerability for Creswell and maximum threat scores are moderated by central and western portions with lower susceptibility to flooding. See also flood hazard profile in Chapter 3, main document.

Earthquake

Hazard (Category)	Raw Score	Weighted Score
Earthquake (Overall)	18	144
Earthquake (History)	0	0
Earthquake (Probability)	2	14
Earthquake (Vulnerability)	6	30
Earthquake (Maximum Threat)	10	100

Earthquake notes: Earthquake is somewhat unique as it occurs much less frequently but has potential for significant damage and disruption. History of occurrence dates back over long time scales, and therefore probability is low in any given year. From a geographic standpoint occurrence would presumably effect the entire city uniformly. Oregon Department of Geology and Mineral Industries conducted an assessment of seismic vulnerability in 2006-2007 for public buildings in Creswell. The project entailed visual observation, basic analysis of structures and soil types. Findings included 'High' and 'Very High' collapse potential for certain structures based on FEMA-154 classifications. Newer buildings and constructed to buildings codes is considered comparatively sound.

Maximum threat is expected to involve significant damage to some structures and minor-moderate damage to numerous structures. See also earthquake profile in Chapter 3, main document.

Landslide

Hazard (Category)	Raw Score	Weighted Score
Landslide (Overall)	17	138
Landslide (History)	1	2
Landslide (Probability)	3	21
Landslide (Vulnerability)	3	15
Landslide (Maximum Threat)	10	100

Landslide notes: Weighted hazard quantification score for landslide was 6th highest out 11 hazard types evaluated. Landslide risk for Creswell is primarily contained to the southern portion of the city on slopes of Creswell Butte. The remainder of the city benefits from primarily level terrain. Infrastructure could be affected in the event of landslide at Creswell Butte, which is most likely to occur in potential combined scenario initiated by earthquake. See also landslide profile in Chapter 3, main document.

Wildfire

Hazard (Category)	Raw Score	Weighted Score
Wildfire (Overall)	25	130
Wildfire (History)	10	20
Wildfire (Probability)	10	70
Wildfire (Vulnerability)	2	10
Wildfire (Maximum Threat)	3	30

Wildfire notes: Creswell benefits from relatively small proportion of assets in forested wildland-urban interface. Primary risk factors for wildfire are forested areas in the southern portion of Creswell near Creswell Butte. Grass fire potential is also present in urban-agricultural transition areas primarily west and north of city limits.

The hazard mitigation team notes wildfires have occurred and are retain probability for future occurrence. Vulnerability is moderated by response capability, and maximum threat is relatively low. Smoke from distant wildfires is a notable factor. See also wildfire hazard profile in Chapter 3, main document.

Drought

Hazard (Category)	Raw Score	Weighted Score
Drought (Overall)	16	111
Drought (History)	3	6
Drought (Probability)	5	35
Drought (Vulnerability)	2	10
Drought (Maximum Threat)	6	60

Drought notes: Drought is neither life threatening nor presents a direct risk to structures, but does involve potential for significant disruption if dramatic water shortage were to develop. Drought can exacerbate wildfire risk as related hazards, and a water shortage would likely effect the entire city uniformly. History and probability are considered relatively low. Vulnerability is relatively low. Maximum threat is moderate. See also drought profile in Chapter 3, main document.

Dam Failure

Hazard (Category)	Raw Score	Weighted Score
Dam Failure (Overall)	13	107
Dam Failure (History)	0	0
Dam Failure (Probability)	1	7
Dam Failure (Vulnerability)	4	20
Dam Failure (Maximum Threat)	8	80

Dam Failure notes: There is no history of dam failure affecting Creswell, and probability of occurrence is considered low for any given year. The 2007 Natural Hazards Mitigation Study for Creswell (LCOG) notes failure of either Cottage Grove or Dorena Dam would cause significant flooding in the Creswell, far beyond the measured extent of a naturally occurring flood event. Based on this vulnerability is considered moderate and maximum threat relatively high. See also dam failure profile in Chapter 3, main document.

Pandemic

Hazard (Category)	Raw Score	Weighted Score
Pandemic (Overall)	12	78
Pandemic (History)	2	4
Pandemic (Probability)	2	14
Pandemic (Vulnerability)	4	20
Pandemic (Maximum Threat)	4	40

Pandemic notes: Pandemic is a unique hazard which presents significant public safety risk but no potential for damage to structures. Geographic potential is uniform. History and probability are both low when considering major outbreak of disease. Vulnerability and maximum threat are moderate considering most credible scenarios. See also pandemic profile in Chapter 3, main document.

Volcano

Hazard (Category)	Raw Score	Weighted Score
Volcano (Overall)	10	68
Volcano (History)	2	2
Volcano (Probability)	2	14
Volcano (Vulnerability)	2	10
Volcano (Maximum Threat)	4	40

Volcano notes: Volcano is similar to earthquake in that it occurs very infrequently. Creswell is situated approximately 50-60 miles from the closest volcano source, far enough to limit potential impacts to minor ash-fall across the city if wind patterns allow. History, probability and vulnerability are relatively low, maximum threat considered moderate. See also volcano profile in Chapter 3, main document.

Tsunami

Tsunami notes: Tsunami was not fully evaluated due to low probability. Notable are potential indirect effects of evacuation from coastal areas, and importance of Veneta as a staging area in tsunami scenario. See also tsunami profile in Chapter 3, main document.

The following lists of facilities was compiled in the Natural Hazards Risk Assessment for Creswell circa 2007 (LCOG). Facilities are organized by general category: Critical Facilities, Essential Facilities, and Vulnerable Populations; accompanied by definitions for each classification.

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

- City Hall
- Creswell Community Center
- Creswell Fire Station
- City Public Works Shop
- Creswell Airport
- Water Treatment Facility
- Wastewater Treatment Plant
- Sheriff's Office
- Recreation Center (note: at this time the building is vacant)

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

- Creswell High School
- Creslane Elementary School
- Creswell Middle School
- LTD Park and Ride
- Creswell Recreation Center
- Creswell Library
- Creswell Clinic (PeaceHealth)
- Creswell Post Office

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

- South Willamette Veterinary Clinic
- Creswell Veterinary Hospital
- Creswell Care Center
- Creswell Christian Child Care Center
- Growing Place Pre-School and Child Center
- Head Start of Lane County
- Over in the Meadow Child Care Center
- Cresview Villa
- Awesome Care Inc. (outside Urban Growth Boundary)
- Class 2 Adult Foster Care: Mi Casa es Su Casa, Kilwien Residential Care Home, Porch Sitters Manor, Luthe's Adult Foster Care, Avalon House

City of Creswell: Mitigation Projects

This section describes mitigation projects identified by Creswell during the planning process. See Chapter 4, main document for additional information regarding mitigation action item methodology and prioritization.

City of Creswell Mitigation Action Items

Mitigation Action Item (a). Water tower resiliency upgrades. Seismic retrofit, all-hazards resiliency. Concrete structural reinforcement and sealing, roof reinforcement. Foundation anchoring, bracing, and reinforcement, or mitigation reconstruction converting to new steel tank.

Location	43.9110N, -123.0255W	
Coordinating Agencies	Creswell Public Works	
Implementation Timeframe	18-24 months	
Estimated Cost	est. $3-4 million	
Potential Funding Sources	HUD-CDBG, OR-SRGP, HMGP, PDM, FEMA PA-106,	
Hazards Mitigated	Earthquake, Landslide	
Comments	Concrete tank reinforcement or conversion to steel.	
Current Site Photos		

Mitigation Action Item (b). South Lane Fire Creswell Station. Critical facility seismic retrofit/mitigation reconstruction. Address structural issues including non-reinforced concrete block (lacking steel re-bar), bay-door dimensions.

Location	43.9174N, -123.0202W	
Coordinating Agencies	South Lane Fire District	
Implementation Timeframe	18-24 months	
Estimated Cost	est. $1.5 million	
Potential Funding Sources	OR-SRGP, HMGP, FEMA PA-106, PDM	
Hazards Mitigated	Earthquake	
Comments	DOGAMI Rapid Visual Seismic Assessment Risk Rating 0.7, FEMA-154 Collapse Potential ‘High’.	
Current Site Photos		

Mitigation Action Item (c). Seismic and storm-hardening retrofit: elementary, middle, and high schools. Phased project: Phase 1 (Study & Scoping), Phase 2 (Construction/Retrofit).

Location	43.920N, -123.028W (Elem-Middle), 43.924N, -123.028W (High School)
Coordinating Agencies	Creswell School District
Implementation Timeframe	18-24 months
Estimated Cost	est. $200k (Phase 1), est. $2 million (Phase 2)
Potential Funding Sources	OR-SRGP, HMGP
Hazards Mitigated	Earthquake, Windstorm
Comments	DOGAMI Rapid Visual Seismic Assessment findings.
Current Site Photos	   

Mitigation Action Item (d). Storm-hardening retrofit for airport including but not limited to structural, windows, bay doors, generator, upgrades to serve as back-up EOC.

Location	43.930N, -123.008W
Coordinating Agencies	City of Creswell, Airport
Implementation Timeframe	18-24 months
Estimated Cost	est. $750,000
Potential Funding Sources	HMGP, FEMA PA-106, PDM
Hazards Mitigated	Windstorm
Comments	
Current Site Photos	 

Mitigation Action Item (e). Water system intake resiliency upgrades (flooding, debris, hazmat).

Coordinating Agencies	City of Creswell Public Works
Implementation Timeframe	12 months
Estimated Cost	est. $150,000
Potential Funding Sources	OR-SRGP, HMGP, FEMA PA-106, PDM
Hazards Mitigated	Flooding, Hazmat, Dam Failure

Mitigation Action Item (f). Flood risk determinations, LOMR review, eastern Creswell.

Coordinating Agencies	City of Creswell
Implementation Timeframe	12 months
Estimated Cost	est. $25,000
Potential Funding Sources	HMGP, PDM
Hazards Mitigated	Flooding, Dam Failure

Mitigation Action Item (g). Retrofit and repurpose community center, explore options to merge with fire station.

Coordinating Agencies	City of Creswell, South Lane Fire District
Implementation Timeframe	18-24 months
Estimated Cost	est. $1-2 million
Potential Funding Sources	HUD-CDBG, HMGP, PDM
Hazards Mitigated	Multi-hazard

City of Creswell: Hazard Mitigation Plan Implementation and Maintenance

In keeping with standard practices to ensure incorporation of overall goals and strategy of the hazard mitigation plan, City of Creswell hazard mitigation team members will be invited to participate in future plan development or existing plan update committees. Additionally, this Hazard Mitigation Action Plan will be cited as a technical reference for future plan update processes. Planning documents and mechanisms applicable to this process may include the following:

City of Creswell Comprehensive Plan

Capital Improvement Plans

Emergency Management Plan

Local Community Wildfire Protection Plans

City of Creswell Floodplain Development Ordinance

Building Code

Subdivision Code

Erosion Control

Stormwater Management

Additionally, progress to implement this plan will be monitored on an ongoing basis by city staff and administration. Annual reviews and update under a 5-year cycle will be pursued. Using these methods the overarching goal of a stronger, safer, more resilient community can be attained.

Dunes City
Hazard Mitigation Reference

Version 2.0 (March 2017)

Introduction: City of Dunes City

This purpose of this annex to the Lane County Multi-Jurisdiction Hazard Mitigation Plan is to consolidate information specific to the City of Dunes City and serve as an executive summary. 44 CFR 201 requirements are addressed in the main document, this annex provides supplemental information. For more information regarding Code of Federal regulations for Local Hazard Mitigation Planning see overview in Chapter 1 and citations and abstracts for Chapters 2, 3, 4, 5 of the main document.

The 2017 Lane County Multi-Jurisdiction Hazard Mitigation Plan sanctioned by OEM and FEMA is the first for which the City of Dunes City has been a formal participant. Like other formal participants (Lane County, Coburg, Creswell, Florence, Oakridge, Veneta, and Westfir), being a participant in an approved multi-jurisdiction hazard mitigation plan creates eligibility for the following important federal grants:

- Hazard Mitigation Grant Program (HMGP)
- Pre-Disaster Mitigation Grants (PDM)
- Flood Mitigation Assistance Grants (FMA)

In addition to creating eligibility for federal grants, this document serves as 5-year road map for activities with the purpose and potential to make Dunes City a stronger, safer, and more resilient community.

Sub-sections of this annex to the Lane County Multi-Jurisdiction Hazard Mitigation Plan describe the following:

- Individual participants and contributors, meetings and work sessions conducted during the plan development process.
- Results of the OEM prescribed hazard quantification process for each hazard type and discussion of previous occurrences, probability of future occurrence, potential vulnerability of public and private assets, and maximum credible threat posed by each hazard.
- Details regarding mitigation projects identified as priorities, including location, photos, estimated cost, grant funding options, implementation timeframe, and hazards addressed.
- Details for mitigation project implementation, review of local program, and plan update 5-year cycle.

City of Dunes City: Hazard Mitigation Meetings and Work Sessions

Development of Dunes City material for the hazard mitigation plan involved participation by city staff, public works, airport, school district, library, county emergency management, fire district, and law enforcement. The process followed FEMA's prescribed model for organizing resources, identifying hazards, evaluating risk, identifying mitigation options, prioritizing mitigation projects. For additional details regarding the planning process, refer to Chapter 2 (Planning Process), main document. Specific participants are listed as follows:

Dunes City Hazard Mitigation Team

Name	Title	Agency
Jamie Mills	City Administrator	City of Dunes City
Fred Hilden	City Recorder	
Renee Green	Administrative Assistant; Permits	City of Dunes City
Sheldon Miller	City Council President	City of Dunes City
Greg J. Wobbe, CFM	Principal	OCR West, MPTX Associates

Individual City Work Sessions

Work sessions with individual cities were conducted following the initial project orientation meeting and intervening months between general planning group meetings. These individual work sessions are outlined below.

Dunes City Work Sessions

Date	Location	Meeting/Work Session
June 24, 2015	Florence City Hall	Project overview, basic data collection
July 29, 2015	Florence City Hall	Risk assessment, Hazard quantification
September 22, 2015	Dunes City Hall	Hazard quantification-seismic assessment review, SRGP, FEMA mitigation grant programs, mitigation ideas
March 1, 2016	Dunes City project tour	Mitigation project site tour

Subject matter discussed during work sessions included an overview of FEMA grant programs, discussion of common mitigation ideas, and specific project ideas for Dunes City. The result of this overall process was a thorough evaluation of risk factors and mitigation solutions. Certain hazards were highlighted with notable significance for Dune City, others found to be less relevant in a direct context. Systems and concepts considered included infrastructure resiliency, transportation network, city planning, floodplain management, public safety, public and private facilities. A range of both general and specific mitigation ideas and projects were identified and scoped in the field.

City of Dunes City: Hazard Quantification

An interesting element of the hazard mitigation process is risk assessment. Risk assessment begins by identifying the full range of potential hazards which may occur in the community. Once identified, these potential hazards are evaluated to determine relative importance and aids prioritization of mitigation activities.

There are various means for evaluating hazards and the risk they present. “Hazard Quantification” is a scoring method prescribed by the State of Oregon Office of Emergency Management (OEM) is used to assist with prioritizing hazards and understanding risk. It doesn't predict the occurrence of a particular hazard, but it does "quantify" the risk of one hazard compared with another. By doing this analysis, planning can first be focused where the risk is greatest. Among other things, this hazard analysis can:

- help establish priorities for planning, capability development, and hazard mitigation;
- serve as a tool in the identification of hazard mitigation measures;
- be one tool in conducting a hazard-based needs analysis;
- serve to educate the public and public officials about hazards and vulnerabilities;
- help communities make objective judgments about acceptable risk.

One of the many strengths of the hazard quantification approach is it employs a consistent methodology with the intent of objective results and findings. The methodology was first developed by the Federal Emergency Management Agency (FEMA) circa 1983, and gradually refined by Oregon Emergency Management (OEM) over the years. The methodology produces scores that range from 24 (lowest possible) to 240 (highest possible). By applying one order of magnitude from lowest to highest, a hazard with a score of 240 is considered ten times more severe than a hazard with a rating of 24.

Maximum threat, vulnerability, and probability assessment are key components of the methodology. Maximum threat considers degree of impact under a worst case scenario, regardless of probability. Vulnerability examines potential impacts to populations, the built environment, and natural environment for ‘typical’ events.

Probability reviews frequency of past events as a means of predicting likelihood of future occurrence. Somewhat less vital to overall hazard quantification score (but still relevant) is history of occurrence. The four OEM prescribed hazard quantification categories are listed and described below.

Hazard Quantification Categories

1) History (previous occurrences, primarily within last century)

2) Probability (calculated likelihood of future occurrence)

3) Vulnerability (number, degree or extent of people or assets at risk per hazard)

4) Maximum threat (credible worst-case scenario)

Weight Factors

Weighting factors were developed for each of the four hazard quantification categories. This is done to emphasize certain categories over others in terms of risk assessment.

1) History (weight factor x 2)

2) Probability (weight factor x 7)

3) Vulnerability (weight factor x 5)

4) Maximum threat (weight factor x 10)

Scoring Guidelines

Scoring guidelines were developed by OEM as a method of standardizing assessment and to minimize subjectivity.

History (weight factor for category = 2). History is the record of previous occurrences. Events to include in assessing history of a hazard event for which the following types of activities were required:

- The EOC or alternate EOC was activated;
- Three or more EOP functions were implemented, e.g., alert & warning, evacuation, shelter, etc.
- An extraordinary multi-jurisdictional response was required; and/or
- A "Local Emergency" was declared.

LOW – score at 1 to 3 points based on… 0 - 1 event past 100 years

MEDIUM – score at 4 to 7 points based on… 2 - 3 events past 100 years

HIGH – score at 8 to 10 points based on… 4 + events past100 years

Probability (weight factor for category = 7)

Probability is the likelihood of future occurrence within a specified period of time.

LOW – score at 1 to 3 points based on… one incident likely within 75 to 100 years

MEDIUM – score at 4 to 7 points based on… one incident likely within 35 to 75 years

HIGH – score at 8 to 10 points based on… one incident likely within 10 to 35 years

Vulnerability (weight factor for category = 5)

Vulnerability is the percentage of population and property likely to be affected under an "average" occurrence of the hazard.

LOW – score at 1 to 3 points based on… < 1% affected

MEDIUM – score at 4 to 7 points based on… 1 - 10% affected

HIGH – score at 8 to 10 points based on… > 10% affected

Maximum Threat (weight factor for category = 10)

Maximum threat is the highest percentage of population and property that could be impacted under a worst-case scenario.

LOW – score at 1 to 3 points based on… < 5% affected

MEDIUM – score at 4 to 7 points based on… 5 - 25% affected

HIGH – score at 8 to 10 points based on… > 25% affected

To tabulate, scores for each category are multiplied by the associated weight factors to create a 'sub-score'. Adding the sub-scores for history, vulnerability, maximum threat, and probability for each hazard produces a 'total hazard quantification score' for each hazard.

The following table summarizes hazard quantification results, followed by a detailed discussion for each hazard.

Dunes City: Hazard Quantification Results (DRAFT)

Hazard Type / Weight Factor (WF)	History WF x 2	Probability WF x 7	Vulnerability WF x 5	Maximum Threat WF x 10	Raw Score	Weighted Score	Weighted Score Rank
Windstorm	10	10	10	10	**40**	**240**	**1**
Earthquake	2	9	7	10	**28**	**202**	**2**
Winter Storm	8	8	9	8	**33**	**197**	**3**
Pandemic	4	4	7	8	**23**	**151**	**4**
Drought	1	4	8	8	**21**	**150**	**5**
Haz Mat Incident	8	8	4	5	**25**	**142**	**6**
Landslide	10	8	4	4	**26**	**136**	**7**
Tsunami	1	3	3	7	**14**	**108**	**8**
Wildfire	1	3	5	5	**14**	**98**	**9**
Flood	2	2	4	4	**12**	**78**	**10**
Volcano	2	2	2	4	**10**	**68**	**11**
Dam Failure	0	2	3	3	**8**	**59**	**12**

Source: Dunes City Natural Hazard Mitigation Team

Individual Hazard Discussion, City of Dunes City

Windstorm

Hazard (Category)	Raw Score	Weighted Score
Windstorm (Overall)	40	240
Windstorm (History)	10	20
Windstorm (Probability)	10	70
Windstorm (Vulnerability)	10	50
Windstorm (Maximum Threat)	10	100

Windstorm notes: Windstorms are a yearly and familiar hazard to all coastal communities, including Dunes City, which justifies the high rating this hazard received. Windstorms often impact above ground electrical lines that are vulnerable to damage from falling limbs and trees. Recent history includes notable damage and power loss in 2015 and 2016. A winter storm in 2014 caused trees to fall on private homes due to snow and wind. The Darlings Marina Resort sustained wind and flooding damage. The Dock and jetty were also damaged forcing the closure of the Marina. Probability is also considered high, patterns of previous occurrence of windstorms on the Oregon Coast will continue. Overall vulnerability is again considered high as more than 10% of residents are often affected; roadways are vulnerable to closure due to downed trees, powerlines, and landslides which often accompany these events. The Columbus Day storm of 1962 can serve as an example for maximum threat, with winds measured at well over hurricane strength up and down the Oregon Coast. A windstorm of similar magnitude to the Columbus Day Storm could potentially damage numerous of homes in city, either by direct structural damage, falling trees, or wind-blown debris. Due to its location on the Oregon Coast, Dunes City can expect damaging windstorms in the future. Best practices for new construction are to utilize underground utilities wherever possible. See also windstorm hazard profile in Chapter 3, main document.

Earthquake

Hazard (Category)	Raw Score	Weighted Score
Earthquake (Overall)	28	202
Earthquake (History)	2	4
Earthquake (Probability)	9	63
Earthquake (Vulnerability)	7	35
Earthquake (Maximum Threat)	10	100

Earthquake notes: Earthquake is somewhat unique as it occurs much less frequently but has potential for significant damage and disruption. From a geographic standpoint occurrence will affect the entire city uniformly. History of occurrence dates back over long time scales and so must be considered low. Probability is however high, DOGAMI and the State of Oregon consider a Cascadia earthquake in the future a certainty. The only question is whether the event will be a full unzipping of the 600 mile long fault line off the coast, a southern centric event near the Oregon and California border, or a mid-zone event which would center the rupture west of Dune City and Florence. Additionally, there is a crustal earthquake fault north of Dunes City, approximately five miles directly east of Florence. Closer to Dunes City, another crustal fault lies off shore slightly to the south and west of the city. Due to the proximity of the dunes, and coupled with a liquefaction hazard, shifting sands have the potential to change the course of rivers, causing the potential for flooding.

Vulnerability is complex to assess due to varying standards of construction but newer (after 1996) construction is considered relatively sound. It is expected that 1 to 10% of the population would be affected by an average occurrence of the event – which must be taken into context depending on the type of Earthquake. A local crustal earthquake is not as likely to cause widespread impacts – magnitude ranges are generally in the range of 3 to 4 in magnitude. A Cascadia event will cause a tremendous amount of destruction and very significant disruption to the entire community. Maximum threat is expected to be high, with damage to numerous structures. In this worst case scenario, a full unzipping of Cascadia will cause widespread destruction on the coastline from Northern California into British Columbia Canada. Importance for increasing the resiliency of the community, infrastructure, water supply, and healthcare is notable. Retrofitting existing homes for earthquake would increase the resilience of the community. Liquefaction of dunes could cause river channel changes, and cause flooding. Dam failure due to earthquake could cause loss of city water supply from Woahink Lake. See also earthquake profile in Chapter 3, main document.

Winter Storm

Hazard (Category)	Raw Score	Weighted Score
Winter Storm (Overall)	33	197
Winter Storm (History)	8	16
Winter Storm (Probability)	8	56
Winter Storm (Vulnerability)	9	45
Winter Storm (Maximum Threat)	8	80

Winter Storm notes: Like most cities Dunes City contains a network of above ground electrical lines vulnerable to damage from falling limbs and trees during winter storms. Recent history has been frequent including notable damage and power loss on a yearly basis, leading to this hazards classification of high. Wind is nearly always a contributing factor. During the winter of 2016 and 2017, ice and snow were also factors causing downed tree branches, and slick dangerous roads. Probability is considered high that patterns of previous occurrence will continue. Overall population potentially affected by winter storm is high since effects are not geographically contained. Transportation and roadways are vulnerable to closure during winter storms. Maximum threat is also high due to the high threat of structural damage directly related to winter weather (cold, snow, ice, and wind). Best practices in this area lead to placing utilities such as power, telephone and cable lines underground. See also winter storm hazard profile in Chapter 3, main document.

Pandemic

Hazard (Category)	Raw Score	Weighted Score
Pandemic (Overall)	23	151
Pandemic (History)	4	8
Pandemic (Probability)	4	28
Pandemic (Vulnerability)	7	35
Pandemic (Maximum Threat)	8	80

Pandemic notes: Pandemic is a unique hazard which presents significant public safety risk but no potential for damage to structures. Geographic potential is uniform. History and probability are both medium when considering major outbreak of disease. Vulnerability is also considered medium with 1 – 10% of the population potentially affected. Maximum threat is high where in a worst case scenario, >25% of the population may be affected considering most credible scenarios. See also pandemic profile in Chapter 3, main document.

Drought

Hazard (Category)	Raw Score	Weighted Score
Drought (Overall)	21	150
Drought (History)	1	2
Drought (Probability)	4	28
Drought (Vulnerability)	8	40
Drought (Maximum Threat)	8	80

Drought notes: Drought is neither life threatening nor presents a direct risk to structures, but does involve potential for significant disruption if dramatic water shortage were to develop. Drought can exacerbate wildfire risk as related hazards, and a water shortage would likely affect the entire city uniformly. History is considered low in a region that sees 80 inches of rain a year. Probability is considered moderate with a potential event within 35 to 75 years possible. Vulnerability higher as Dune City is accustomed to dealing with too much water as opposed to too little. Should the nearby lakes be significantly affected by a long drought, water supply to the city could be impacted, affecting 1 – 10% of the population. Maximum threat is relatively high if an event occurred where all water supply systems go were to become inoperable or water supply unexpectedly ran short. See also drought profile in Chapter 3, main document.

Hazardous Materials Incident

Hazard (Category)	Raw Score	Weighted Score
Haz Mat Incident (Overall)	25	142
Haz Mat Incident (History)	8	16
Haz Mat Incident (Probability)	8	56
Haz Mat Incident (Vulnerability)	4	20
Haz Mat Incident (Maximum Threat)	5	50

Hazardous Materials Incident notes: Hazardous materials incident is considered a technical hazard and involves different characteristics than natural hazards. Proximity to transport corridors and particularly intersections are significant geographic factor. Highway 101 runs north to south just to the west of Dunes City. Underground gas lines serve various neighborhoods. History is high with more than 4 incidents over history. Probability is similarly high with another incident expected within the next 35 years. Vulnerability is considered to be moderate relative to other hazard types with the expectation that 1 to 10% of the population potentially affected. Maximum threat is similarly considered moderate, with the expectation that 5 to 25% of the population might be affected. Rupture of underground gas lines is also possible. In the event of occurrence, prevailing wind and proximity to waterways are important factors relating to public safety risk and environmental impacts. See also hazardous materials incident profile in Chapter 3, main document.

Landslide

Hazard (Category)	Raw Score	Weighted Score
Landslide (Overall)	26	136
Landslide (History)	10	20
Landslide (Probability)	8	56
Landslide (Vulnerability)	4	20
Landslide (Maximum Threat)	4	40

Landslide notes: Landslide is considered an high probability event on the Oregon coast. This common hazard is one with a high history and probability for reoccurrence. Due to proactive mitigation efforts in the past, the vulnerability to this hazard is considered moderate, as 1 to 10% of the population might be affected. Maximum threat would likely involve a slide in areas where deforstation has occurred to create views of the lake. When combined with record rainfall, roads and homes were put in some danger. Redrafting slope requirements for roads and housing has been discussed. See also landslide profile in Chapter 3, main document.

Tsunami

Hazard (Category)	Raw Score	Weighted Score
Tsunami (Overall)	14	108
Tsunami (History)	1	2
Tsunami (Probability)	3	21
Tsunami (Vulnerability)	3	15
Tsunami (Maximum Threat)	7	70

Tsunami notes: The importance of Tsunami to the Oregon Coast is of the highest order. Not all areas on the coast will be inside the expected Tsunami inundation zone; however this does not mean that areas outside that immediate impact zone will remain unaffected. Located between Woahink Lake to the north and Siltcoos Lake to the south, Dunes City is above the Tsunami Inundation zone expected by DOGAMI and the state of Oregon. In the event of a catastrophic event, the Department of Geology and Mineral Industries has identified a portion of the Westlake area as being in the tsunami inundation zone in the event of localized earthquake. Likewise, Highway 101 and the western portion of Pacific Avenue, is also in the inundation zone. This means that the people who live in the areas of Westlake that are in the inundation zone have no way to evacuate, other than to walk to City Hall. The proposed connectivity trail would provide an alternative escape route for these residents to get to higher ground, should the need arise.

The Siltcoos Dam, which is located west and south of the city on the Siltcoos River, is either very close to or inside the Tsunami Inundation Zone. Damage from either a Cascadia Event or the Tsunami certain to follow it may have a significant negative impact on the ability of Dunes City to obtain fresh water. Woahink Lake is also a source of fresh water, and is not expected to be impacted by Tsunami. As mentioned in the Earthquake notes, shifting sands and liquefaction that accompany a tsunami generating Cascadia event may lead to changes in water level in the Woahink Lake. The probability of a Tsunami in Dunes City is low, as is the vulnerability of the city. The maximum threat this hazard presents lay in the potential damage to infrastructure and Highway 101. Like much of the Oregon Coast, Dunes City will be isolated due to the damage caused by a large tsunami expected with a Cascadia Event. Travel will be correspondingly difficult. See also tsunami hazard profile in Chapter 3, main document.

Wildfire

Hazard (Category)	Raw Score	Weighted Score
Wildfire (Overall)	14	98
Wildfire (History)	1	2
Wildfire (Probability)	3	42
Wildfire (Vulnerability)	5	25
Wildfire (Maximum Threat)	5	50

Wildfire notes: Dunes City is surrounded by urban wildland interface. The coastal forest and the city's integration with it are a major attractive quality of the community. However the history of wildfire in the area is generally low. Similarly, future probability is also considered low, due in part to the mild and generally wet climate most of the year. The vulnerability of the community is moderate, as 1 to 10% of Dunes City could be affected by Wildfire. In a worst case scenario, the maximum threat is also moderate with 5 to 25% of residents and property might be impacted. See also wildfire hazard profile in Chapter 3, main document.

Flood

Hazard (Category)	Raw Score	Weighted Score
Flood (Overall)	12	78
Flood (History)	2	4
Flood (Probability)	2	14
Flood (Vulnerability)	4	20
Flood (Maximum Threat)	4	40

Flood notes: Flood is a geographically contained hazard and widespread impacts in Dunes City are unlikely. Though not considered a severe hazard, there is a history of flooding at North Pioneer. Additionally, Clear Lake Rd. has experienced inundations of the roadway and the history of flooding is well noted. Probability of a future event disrupting the community to a significant degree is considered to be low. It should be noted however that drainage issues in the area have occurred. Overall vulnerability and maximum threat scores are moderate as widespread severe damage from flooding might affect as much as 25% of population and property. Flood vulnerability exists for City Hall, which has had to deploy sandbags in the past. City Hall is a major resource for the community and needs to be available when other resources are not. See also flood hazard profile in Chapter 3, main document.

Volcano

Hazard (Category)	Raw Score	Weighted Score
Volcano (Overall)	10	68
Volcano (History)	2	4
Volcano (Probability)	2	14
Volcano (Vulnerability)	2	10
Volcano (Maximum Threat)	4	40

Volcano notes: Volcano is similar to earthquake in that it occurs very infrequently. Dunes City is situated well over 100 miles from the closest volcano source, far enough to minimize probable impacts to minor ash-fall across the city if wind patterns allow. History, probability and vulnerability are relatively low, maximum threat considered moderate. See also volcano profile in Chapter 3, main document.

Dam Failure

Hazard (Category)	Raw Score	Weighted Score
Dam Failure (Overall)	8	59
Dam Failure (History)	0	0
Dam Failure (Probability)	2	14
Dam Failure (Vulnerability)	3	30
Dam Failure (Maximum Threat)	3	60

Dam Failure notes: There is no history of dam failure affecting either dam in Dunes City, the Woahink or Siltcoos Dams. Vulnerability and maximum threat are correspondingly low. The maximum hazard this presents is also low, as the city itself is not in the path of floodwaters. Instead, the hazard presents itself in the loss of fresh water supply to the city from Woahink Lake. See also dam failure profile in Chapter 3, main document.

City of Dunes City: Mitigation Projects

This section describes mitigation projects identified by Dunes City during the planning process. See Chapter 4, main document for additional information regarding mitigation action item methodology and prioritization.

Mitigation Action Item (a): Storm-hardening and seismic retrofit for City Hall. Reinforce roof, windows, building veneer to withstand high-winds and general hazards.

Location	City Hall	
Coordinating Agencies	City Hall, Dunes City Public Works	
Implementation Timeframe	Three Phases(Inspection, Plans, and Construction) 12 – 18 months	
Estimated Cost	$425,000	
Potential Funding Sources	HMGP, FEMA PA-106, PDM	
Hazards Mitigated	Wind Storm, Winter Storm	
Comments	Seismic rehabilitation (n the Fireplace stc.) and storm hardening for this city structure has great importance for the community following a disaster. It may be the main source of shelter for many town residents for some time.	
Current Site Photos		

Mitigation Item (b): Connectivity trail for west shore Woahink Lake. Aka Chet's Trail to Westlake. Assist evacuation, supply and emergency response.

Location	Trail from Westlake Shore to the area of City Hall
Coordinating Agencies	Dunes City Public Works
Implementation Timeframe	6 -12 months
Estimated Cost	$75,000
Potential Funding Sources	TGMP, HMGP
Hazards Mitigated	Earthquake, Tsunami, Winter Storm, Wind Storm, Haz-Mat Incident, Flood, Wildfire
Comments	Dunes City is a bifurcated community. A solid trail will offer residents a secondary means of reaching assistance that will be centered upon Dunes City Hall. An easement might be sought from property owner(s).
Current Site Photos	

Hazard Mitigation Item (c): Flood-proofing for City Hall. Door seals, siding reinforcement, electrical retrofit. Drainage/grading improvements for grounds and parking area.

Location	City Hall
Coordinating Agencies	Dunes City Public Works
Implementation Timeframe	12-18 months
Estimated Cost	$65,000
Potential Funding Sources	HMGP, FEMA PA-106, PDM, FMA
Hazards Mitigated	Flood, Winter Storm
Comments	Past flooding events have required sandbagging at City Hall, which is a major resource for the community when private resources have been exceeded. This project could run concurrent with the Seismic Retrofitting of the structure.
Current Site Photos	

Hazard Mitigation Item (d): Water flow and quality monitoring for Woahink Lake.

Location	North of City Hall where Woahink Creek drains into Siltcoos Lake.
Coordinating Agencies	Dunes City Public Works
Implementation Timeframe	6 – 12 months
Estimated Cost	$75,000
Potential Funding Sources	HMGP, FEMA PA-106, PDM, FMA
Hazards Mitigated	Flooding, Winter Storm, Earthquake, Drought, Haz-Mat Incident
Comments	Woahink Creek supplies Siltcoos lake with fresh water, currently under private ownership.
Current Site Photos	

Hazard Mitigation Item (e): Slope stabilization for landslide mitigation.

Location	Dunes City UGB	
Coordinating Agencies	Dunes City Public Works	
Implementation Timeframe	6 -18 months	
Estimated Cost	$185,000	
Potential Funding Sources	HMGP, FEMA PA-106, PDM	
Hazards Mitigated	Landslide, Earthquake	
Comments	Slopes have been rendered unstable due to logging on Private lands.	
Current Site Photos		

Hazard Mitigation Item (f): Storm-water catch basin and culvert upgrades for North Pioneer Road.

Location	North Pioneer Road
Coordinating Agencies	Dunes City Public Works
Implementation Timeframe	6 – 12 Months
Estimated Cost	$85,000
Potential Funding Sources	FEMA PA-106, PDM, HMGP, FMA, SRGP
Hazards Mitigated	Flooding, Winter Storm
Comments	This is a frequent location of flooding, and over a long period of time. Lack of proper drainage or a storm-water catch basin, and an undersized culvert need to be addressed.

Hazard Mitigation Item (g): Promote best practices for underground utilities regarding new development.

Location	City Hall
Coordinating Agencies	City Hall, Dunes City Public Works
Implementation Timeframe	3 - 6 months
Estimated Cost	Approx. $100
Potential Funding Sources	City Hall
Hazards Mitigated	Windstorm, Winter Storm
Comments	This can be addressed through Building and Land Use in the City Building codes, and enforced through the Permitting process.

Hazard Mitigation Item (h): Vision clearance upgrades for Hwy 101 intersections.

Location	Highway 101 roadsides
Coordinating Agencies	ODOT, Dunes City Public Works
Implementation Timeframe	6 – 12 months
Estimated Cost	$10,000
Potential Funding Sources	ODOT
Hazards Mitigated	Windstorm, Winter Storm, Haz-Mat Incident
Comments	Increasing visibility on Hwy 101 will decrease the likelihood of an accident related to reduced vision of oncoming roadway, and lower the likelihood of fallen trees and branches blocking Hwy 101.

Hazard Mitigation Item (i): Re-drafting slope requirements for new construction on slopes.

Location	City Hall
Coordinating Agencies	Dunes City Public Works, City Council
Implementation Timeframe	3 – 6 months
Estimated Cost	$3,000
Potential Funding Sources	N/A
Hazards Mitigated	Landslide, Winter Storm, Wind Storm
Comments	Re-writing existing City Code, will not incur a cost. However there may be a cost associated with a Survey Team/Engineers needed to evaluate slopes and water drainage, and recommend an appropriate set of degrees of slope for specific areas at increased risk of landslide upon development.

Hazard Mitigation Item (j): Remove waterway obstructions for boating safety.

Location	Siltcoos and Woahink Lakes, Woahink Creek and Siltcoos River
Coordinating Agencies	Dunes City Public Works, Oregon Department of Forestry
Implementation Timeframe	6-12 Months
Estimated Cost	$1,000 – 3,000
Potential Funding Sources	Community Volunteers, City of Dunes City, USACE
Hazards Mitigated	Haz-Mat impact on Water quality, Winter Storm, Flooding
Comments	Removal of snags likely to decrease flooding potential. Removal of obstructions to the waterway will improve the response capability in the event of a Haz-Mat incident impacting the lakes or creek. It also removes obstacles from the water that have the potential to cause boating accidents which have the potential to impact the water quality.

Mitigation Action Item (k). Obtain assured access to water outlet control structure.

Location	City Hall
Coordinating Agencies	Dunes City Public Works
Implementation Timeframe	3 – 6 Months
Estimated Cost	TBD
Potential Funding Sources	HMGP, FEMA PA-106, PDM, FMA
Hazards Mitigated	Flooding, Earthquake, Haz-Mat incident,
Comments	This may be a negotiating process with the owner of the of the outlet control structure to increase community access to water resources. Currently the structure is privately owned and maintained..

City of Dunes City: Hazard Mitigation Plan Implementation and Maintenance

In keeping with standard practices to ensure incorporation of overall goals and strategy of the hazard mitigation plan, Dunes City hazard mitigation team members will be invited to participate in future plan development or existing plan update committees. Additionally, this Hazard Mitigation Action Plan will be cited as a technical reference for future plan update processes. Planning documents and mechanisms applicable to this process may include the following:

- Dunes City Comprehensive Plan
- Capital Improvement Plans
- Emergency Management Plan
- Dunes City Floodplain Development Ordinance
- Building Code
- Subdivision Code
- Erosion Control
- Stormwater Management Plan

Additionally, progress to implement this plan will be monitored on an ongoing basis by city staff and administration. The planning process is essential in identifying weaknesses and strengths inherent in the community, and cooperatively enables coordination with various agencies and jurisdictions that might not otherwise occur. Continuing this cooperative and interactive process is exemplified by the planning process. Annual reviews and update under a 5-year cycle will be pursued. Using these methods the overarching goal of a stronger, safer, more resilient community can be attained.

City of Florence Hazard Mitigation Reference

Version 2.0 (March 2017)

Introduction: City of Florence

This purpose of this annex to the Lane County Multi-Jurisdiction Hazard Mitigation Plan is to consolidate information specific to the City of Coburg and serves as an executive summary. 44 CFR 201 requirements are addressed in the main document, this annex provides supplemental information. For more information regarding Code of Federal regulations for Local Hazard Mitigation Planning see overview in Chapter 1 and citations and abstracts for Chapters 2, 3, 4, 5 of the main document.

The 2017 Lane County Multi-Jurisdiction Hazard Mitigation Plan sanctioned by OEM and FEMA is the first for which the City of Florence has been a formal participant. Like other formal participants (Lane County, Creswell, Dunes City, Coburg, Oakridge, Veneta, and Westfir), being a participant in an approved multi-jurisdiction hazard mitigation plan creates eligibility for the following important federal grants:

- Hazard Mitigation Grant Program (HMGP)
- Pre-Disaster Mitigation Grants (PDM)
- Flood Mitigation Assistance Grants (FMA)

In addition to creating eligibility for federal grants, this document serves as 5-year road map for activities with the purpose and potential to make Florence a stronger, safer, and more resilient community.

Sub-sections of this annex to the Lane County Multi-Jurisdiction Hazard Mitigation Plan describe the following:

- Individual participants and contributors, meetings and work sessions conducted during the plan development process.
- Results of the OEM prescribed hazard quantification process for each hazard type and discussion of previous occurrences, probability of future occurrence, potential vulnerability of public and private assets, and maximum credible threat posed by each hazard.
- Details regarding mitigation projects identified as priorities, including location, photos, estimated cost, grant funding options, implementation timeframe, and hazards addressed.
- Details for mitigation project implementation, review of local program, and plan update 5-year cycle.

City of Florence: Hazard Mitigation Meetings and Work Sessions

Development of City of Veneta material for the hazard mitigation plan involved participation by city, county, fire district, law enforcement, and project assistants. The process followed FEMA's prescribed model for organizing resources, identifying hazards, evaluating risk, identifying mitigation options, prioritizing mitigation projects. For additional details regarding the planning process, refer to Chapter 2 (Planning Process), main document.

Specific participants are listed as follows:

City of Florence Hazard Mitigation Team

Name	Title	Agency
Megan Messmer	Asst. City Manager	City of Florence
Linda Cook	Lane County Emergency Manager	Office of Emergency Mgnt.
Greg J. Wobbe	Principal	MPTX- Associates
Wendy Farley-Campbell	Planning Director	City of Florence
Marvin Tipler	Fire Chief	West Lane Rural Fire District
Mike Miller	Public Works Director	City of Florence, Public Works
Bob Forsyth	General manager	Port of Siuslaw
Erin Reynolds	City Manager	City of Florence

Work sessions with individual cities were conducted following the initial project orientation meeting and intervening months between general planning group meetings. These individual work sessions are outlined below.

City of Florence Individual Work Sessions

Date	Location	Meeting/Work Session
June 24, 2015	Florence City Hall	Project overview, basic data collection
July 29, 2015	Florence City Hall	Risk, assessment, Hazard quantification
September 22, 2015	Florence City Hall	Hazard quantification-seismic assessment review, SRGP, FEMA mitigation grant programs, mitigation ideas
October 21, 2015	Florence project tour	Mitigation project site tour

City of Florence: Hazard Quantification

An interesting element of the hazard mitigation process is risk assessment. Risk assessment begins by identifying the full range of potential hazards which may occur in the community. Once identified, these potential hazards are evaluated to determine relative importance and aids prioritization of mitigation activities.

There are various means for evaluating hazards and the risk they present. “Hazard Quantification” is a scoring method prescribed by the State of Oregon Office of Emergency Management (OEM) is used to assist with prioritizing hazards and understanding risk. It doesn't predict the occurrence of a particular hazard, but it does "quantify" the risk of one hazard compared with another. By doing this analysis, planning can first be focused where the risk is greatest. Among other things, this hazard analysis can:

- help establish priorities for planning, capability development, and hazard mitigation;
- serve as a tool in the identification of hazard mitigation measures;
- be one tool in conducting a hazard-based needs analysis;
- serve to educate the public and public officials about hazards and vulnerabilities;
- help communities make objective judgments about acceptable risk.

One of the many strengths of the hazard quantification approach is it employs a consistent methodology with the intent of objective results and findings. The methodology was first developed by the Federal Emergency Management Agency (FEMA) circa 1983, and gradually refined by Oregon Emergency Management (OEM) over the years. The methodology produces scores that range from 24 (lowest possible) to 240 (highest possible). By applying one order of magnitude from lowest to highest, a hazard with a score of 240 is considered ten times more severe than a hazard with a rating of 24.

Maximum threat, vulnerability, and probability assessment are key components of the methodology. Maximum threat considers degree of impact under a worst case scenario, regardless of probability. Vulnerability examines potential impacts to populations, the built environment, and natural environment for ‘typical’ events.

Probability reviews frequency of past events as a means of predicting likelihood of future occurrence. Somewhat less vital to overall hazard quantification score (but still relevant) is history of occurrence. The four OEM prescribed hazard quantification categories are listed and described below.

Hazard Quantification Categories

1) History (previous occurrences, primarily within last century)

2) Probability (calculated likelihood of future occurrence)

3) Vulnerability (number, degree or extent of people or assets at risk per hazard)

4) Maximum threat (credible worst-case scenario)

Weight Factors

Weighting factors were developed for each of the four hazard quantification categories. This is done to emphasize certain categories over others in terms of risk assessment.

1) History (weight factor x 2)

2) Probability (weight factor x 7)

3) Vulnerability (weight factor x 5)

4) Maximum threat (weight factor x 10)

Scoring Guidelines

Scoring guidelines were developed by OEM as a method of standardizing assessment and to minimize subjectivity.

History (weight factor for category = 2). History is the record of previous occurrences. Events to include in assessing history of a hazard event for which the following types of activities were required:

- The EOC or alternate EOC was activated;
- Three or more EOP functions were implemented, e.g., alert & warning, evacuation, shelter, etc.
- An extraordinary multi-jurisdictional response was required; and/or
- A "Local Emergency" was declared.

LOW – score at 1 to 3 points based on… 0 - 1 event past 100 years

MEDIUM – score at 4 to 7 points based on… 2 - 3 events past 100 years

HIGH – score at 8 to 10 points based on… 4 + events past100 years

Probability (weight factor for category = 7)

Probability is the likelihood of future occurrence within a specified period of time.

LOW – score at 1 to 3 points based on… one incident likely within 75 to 100 years

MEDIUM – score at 4 to 7 points based on… one incident likely within 35 to 75 years

HIGH – score at 8 to 10 points based on… one incident likely within 10 to 35 years

Vulnerability (weight factor for category = 5)

Vulnerability is the percentage of population and property likely to be affected under an "average" occurrence of the hazard.

LOW – score at 1 to 3 points based on… < 1% affected

MEDIUM – score at 4 to 7 points based on… 1 - 10% affected

HIGH – score at 8 to 10 points based on… > 10% affected

Maximum Threat (weight factor for category = 10)

Maximum threat is the highest percentage of population and property that could be impacted under a worst-case scenario.

LOW – score at 1 to 3 points based on… < 5% affected

MEDIUM – score at 4 to 7 points based on… 5 - 25% affected

HIGH – score at 8 to 10 points based on… > 25% affected

To tabulate, scores for each category are multiplied by the associated weight factors to create a 'sub-score'. Adding the sub-scores for history, vulnerability, maximum threat, and probability for each hazard produces a 'total hazard quantification score' for each hazard.

The following table summarizes hazard quantification results, followed by a detailed discussion for each hazard.

City of Florence: Hazard Quantification Results (DRAFT)

Hazard Type / Weight Factor (WF)	History WF x 2	Probability WF x 7	Vulnerability WF x 5	Maximum Threat WF x 10	Raw Score	Weighted Score	Weighted Score Rank
Windstorm	10	10	10	10	**40**	**240**	**1**
Earthquake	2	7	7	10	**26**	**188**	**2**
Tsunami	4	7	6	10	**27**	**187**	**3**
Winter Storm	8	8	8	7	**31**	**182**	**4**
Haz Mat Incident	8	8	4	5	**25**	**142**	**5**
Landslide	10	8	4	4	**26**	**136**	**6**
Wildfire	4	5	6	6	**21**	**133**	**7**
Coastal Erosion	8	9	1	2	**20**	**104**	**8**
Drought	1	3	3	6	**13**	**98**	**9**
Flood	4	6	2	3	**15**	**90**	**10**
Dam Failure	1	1	4	5	**11**	**79**	**11**
Pandemic	2	2	4	4	**12**	**78**	**12**
Volcano	0	1	1	2	**4**	**32**	**13**

Source: City of Florence Natural Hazard Mitigation team

Individual Hazard Discussion, City of Florence

Windstorm

Hazard (Category)	Raw Score	Weighted Score
Windstorm (Overall)	40	240
Windstorm (History)	10	20
Windstorm (Probability)	10	70
Windstorm (Vulnerability)	10	50
Windstorm (Maximum Threat)	10	100

Windstorm notes: Windstorms are a normal and regular event on the Oregon Coast, they can and frequently do impact above ground electrical lines vulnerable to damage from falling limbs and trees. Notable damage and power loss occurs nearly every year. Numerous trees and tree branches fall and are a regular expectation in the region with regard to damage from windstorms. Probability is considered high that patterns of previous occurrence will continue. Overall vulnerability is also high, roadways are notably vulnerable to closure on the Oregon Coast, and are a regularly encountered hazard in the region. The Columbus Day storm of 1962 can serve as an example for maximum threat, with winds measured the neighborhood of 170 miles per hour at Florence. A windstorm of similar magnitude to the Columbus Day Storm could potentially damage numerous of homes in city, either by direct structural damage, falling trees, or by wind-blown debris. Due to its location, the City of Florence is exposed to extreme wind as compared to more sheltered areas. See also windstorm hazard profile in Chapter 3, main document.

Earthquake

Hazard (Category)	Raw Score	Weighted Score
Earthquake (Overall)	26	188
Earthquake (History)	2	4
Earthquake (Probability)	7	49
Earthquake (Vulnerability)	7	35
Earthquake (Maximum Threat)	10	100

Earthquake notes: Earthquake is somewhat unique as it occurs much less frequently but has potential for significant damage and disruption. This is particularly true on the Oregon Coast, where the region is subject to both Crustal earthquakes, and a far larger Cascadia Subduction Zone Earthquake. From a geographic standpoint occurrence will affect the entire city uniformly. History of occurrence dates back over long time scales and so must be considered low. Probability is however high, DOGAMI and the State of Oregon consider a Cascadia earthquake in the future a certainty. The only question is whether the event will be a full unzipping of the 600 mile long fault line off the coast, a southern centric event near the Oregon and California border, or a mid-zone event which would center the rupture generally west of Florence. There are 2 crustal earthquake faults nearby, approximately five miles directly east of Florence. The second is closer to Dunes City to the south and west. Due to the prevalence of sand in the geology a high liquefaction hazard exists beneath the city which will be a factor in an earthquake in the resulting damages to the community and infrastructure. The probability for an earthquake event affecting Florence is on the high end of medium, with an event expected within the next 35 to 50 years.

Vulnerability is complex to assess due to varying standards of construction but newer (after 1996) construction is considered relatively sound. It is expected that 1 to 10% of the population would be affected by an average occurrence of the event – which must be taken into context depending on the type of Earthquake. A local crustal earthquake is not as likely to cause widespread impacts – magnitude ranges are generally in the range of 3 to 5 in magnitude. A Cascadia event is on a different order of magnitude in the range of 80 to 9.0, will result in a tremendous amount of destruction, and cause significant disruptions to the entire community. A Cascadia event is not an average occurrence of earthquake in the region, however it cannot be discounted due to the fact it has not reoccurred in over 300 years. Maximum threat is expected to be high, with damage to numerous structures. In this worst case scenario, a full unzipping of Cascadia will cause widespread destruction on the coastline from Northern California into British Columbia Canada. Importance for increasing the resiliency of the community, infrastructure, water supply, and healthcare is notable. Retrofitting existing homes for earthquake would increase the resilience of the community. Liquefaction could cause river channel changes, potentially leading to flooding. Seismic assessments for the Siuslaw High School, and the Siuslaw Valley Fire and Rescue Station #2 are indicated by both age, current condition of the structures, and their potential vulnerability to either earthquake and/or tsunami. Following assessment, consideration for the relocation of these structures may be indicated. Seismic assessment and reconstruction of the Public Works facility is a noted need for the city. See also earthquake profile in Chapter 3, main document.

Tsunami

Hazard (Category)	Raw Score	Weighted Score
Tsunami (Overall)	27	187
Tsunami (History)	4	8
Tsunami (Probability)	7	49
Tsunami (Vulnerability)	6	30
Tsunami (Maximum Threat)	10	100

Tsunami notes: The importance of Tsunami to the Oregon Coast is of the highest order. Not all areas on the coast will be inside the expected Tsunami inundation zone; however this does not mean that areas outside that immediate impact zone will remain unaffected. Florence is considered to be highly vulnerable to Tsunami. Areas to the south of the city may be isolated to the south due to damage to the Hwy 101 Bridge across the Siuslaw River. The Tsunami Inundation zone according to DOGAMI and the State of Oregon Office of Emergency Management (OEM) runs from the coast inland along the shores of the Siuslaw River, flooding areas south of Rhododendron Drive inundating Bay and Laurel Streets east of Hwy 101. Siuslaw Fire and Rescue Station #2 is located in this area and consideration for its relocation outside the inundation zone should be made. Tsunami waters are expected to cover the Florence-Eugene Highway (Hwy 126) east of the city, blocking the only road east to the Coast Range Mountains and the Willamette Valley. The Cascadia earthquake and resulting tsunami may cause damage to the Hwy 126 Bridge as it crosses the north fork of the Siuslaw River, the city will be isolated from the inland east. North of the city, the Siuslaw North Jetty Park will be inundated north of North Jetty Road; the South Jetty area will be inundated well east of Sand Dune Road. Shoreline beach areas can expect to be inundated. Areas close to the water in Heceta Beach will also be impacted. Like much of the Oregon Coast, Florence will become isolated due to the damage caused by a large tsunami expected with a Cascadia Event and the resulting damage to transportation infrastructure. Proximity of a Rail Road line which travels for extended lengths along the north and then east shores of the Siuslaw River, next to or within the inundation zone, indicate that travel by rail will be interrupted by a significant Tsunami. Travel of all types will be correspondingly difficult and services of all types will be difficult to obtain. See also tsunami hazard profile in Chapter 3, main document

Winter Storm

Hazard (Category)	Raw Score	Weighted Score
Winter Storm (Overall)	31	182
Winter Storm (History)	8	16
Winter Storm (Probability)	8	56
Winter Storm (Vulnerability)	8	40
Winter Storm (Maximum Threat)	7	70

Windstorm notes: Windstorms are a yearly and familiar hazard to all coastal communities, including Florence, which justifies the high rating this hazard received. Windstorms often impact above ground electrical lines that are vulnerable to damage from falling limbs and trees. Recent history includes notable damage and power loss on a nearly yearly basis, which is generally restored quickly due to the community's familiarity with this hazard and its impacts on infrastructure. Probability is also considered high, patterns of previous occurrence of windstorms on the Oregon Coast will continue. Overall vulnerability is again considered high as more than 10% of residents are often affected; roadways are vulnerable to closure due to downed trees, powerlines, and landslides in the surrounding hills, particularly on Hwy 126 to the east, and Hwy 101 to the north of Florence, and south of Dunes City which often accompany these events. The Columbus Day storm of 1962 can serve as an example for maximum threat, with winds measured at well over hurricane strength up and down the Oregon Coast. A windstorm of similar magnitude to the Columbus Day Storm could potentially damage numerous of homes in city, either by direct structural damage, falling trees, or wind-blown debris. Due to its location on the Oregon Coast, Florence can expect damaging windstorms in the future. Best practices for new construction are to utilize underground utilities wherever possible. See also windstorm hazard profile in Chapter 3, main document.

Hazardous Materials Incident

Hazard (Category)	Raw Score	Weighted Score
Haz Mat Incident (Overall)	25	142
Haz Mat Incident (History)	8	16
Haz Mat Incident (Probability)	8	56
Haz Mat Incident (Vulnerability)	4	20
Haz Mat Incident (Maximum Threat)	5	50

Hazardous Materials Incident notes: Hazardous materials incident is considered a technical hazard and involves different characteristics than natural hazards. Proximity to transport corridors and particularly intersections are significant geographic factor. Highway 126 and a rail line run east-west along Hwy 126, crossing the Highway west of the City, just East of Rose Hill Road where it then crosses the Siuslaw River to continue heading south along the South Inlet of the Siuslaw River. Due to its proximity to the river in several locations for extended lengths, spills of hazardous materials transported by rail are of concern. Underground gas lines serve various neighborhoods. History is considered high, as there have been more than 4 incidents in the past. Probability is also considered high, with another incident considered likely to occur in the next 10 to 35 years. Vulnerability is considered moderate relative to other hazard types with an expected 1% to 10% of the population and property in the city impacted by an event. Maximum threat could involve such events as railroad or truck accident involving toxic release. Rupture of underground gas lines is also possible. In addition, the proximity of the Port of Siuslaw is also a potential source of hazardous materials, one also vulnerable to winter storms and tsunami combining into a multi-faceted event. In the event of hazardous materials incident, prevailing wind and proximity to waterways are important factors relating to public safety risk and environmental impacts. Overall risk is mitigated by excellent response capability. See also hazardous materials incident profile in Chapter 3, main document.

Landslide

Hazard (Category)	Raw Score	Weighted Score
Landslide (Overall)	26	136
Landslide (History)	10	20
Landslide (Probability)	8	56
Landslide (Vulnerability)	4	20
Landslide (Maximum Threat)	4	40

Landslide notes: Landslides are considered to be one of the characteristics of living on the Oregon Coast, and the City of Florence is no exception. Landslides are common yearly events in the region; a hazard residents, public works officials, transportation departments, and local utilities are well rehearsed in responding to. Probability of a future event is also high, with at least one event in the next 10-35 years; however, the City is prepared for yearly events. Vulnerability within the city is moderate, more often landslides impact the limited number of roads and highways leading in and out of the City. These events impact commerce, individual travel, tourism, and recreational activities. For these reasons, Maximum Threat is considered moderate with the potential to impact with 5% to 25% of the population. See also landslide profile in Chapter 3, main document.

Wildfire

Hazard (Category)	Raw Score	Weighted Score
Wildfire (Overall)	21	133
Wildfire (History)	4	8
Wildfire (Probability)	5	35
Wildfire (Vulnerability)	6	30
Wildfire (Maximum Threat)	6	60

Wildfire notes: Florence is surrounded to the north and east by significant forest lands in the Siuslaw National Forest, and privately owned lands. The city is bounded in the south by the Siuslaw River, with little in the way of threat from that direction. Major wildfires have occurred in the past in the Siuslaw National Forest and its proximity to the city and the few roadways leading into and out of the city make this a hazard during dry summer months. The hazard is mitigated by generally mild temperatures and moisture from the Pacific Ocean; however it can be exacerbated by the often constant winds. The Oregon Department of Forestry monitors the fire conditions in the area closely. This history of this hazard has seen 2 to 3 events in area in the last 100 years. Probability is similarly moderate, with the expectation of another wildfire in the area in the next 35 to 75 years. Vulnerability is also considered moderate, with the potential for 1% to 10% of the population affected. Maximum threat involves potential for damage to numerous structures and forest tracts. See also wildfire hazard profile in Chapter 3, main document.

Coastal Erosion

Hazard (Category)	Raw Score	Weighted Score
Coastal Erosion (Overall)	20	104
Coastal Erosion (History)	8	16
Coastal Erosion (Probability)	9	63
Coastal Erosion (Vulnerability)	1	5
Coastal Erosion (Maximum Threat)	2	20

Coastal Erosion Notes: Florence and the beaches which bring so many visitors to the city year round has experienced significant coastal erosion in the past. Healthy beaches protect coastline properties, and infrastructure that leads to beach access. Often a result of winter storms, waves and tides move sand out, and waves as a result climb higher. This can cause rapid changes in beaches. The Oregon Sand Dunes (South of Florence) are a significant draw for tourists and residents alike. These areas offer significant assets to wildlife, and to coastal vegetation and are considered a vulnerable habitat. History of coastal erosion is high; the characteristics of beaches often change on a frequent if not constant basis. The probability of this continuing is also high. Vulnerability is considered low in this area of the Coast, with <1% of the population affected by the hazard. The maximum threat the hazard presents is also low, with <5% of population and property impacted by a worst case scenario event of coastal erosion.

Drought

Hazard (Category)	Raw Score	Weighted Score
Drought (Overall)	13	98
Drought (History)	1	2
Drought (Probability)	3	21
Drought (Vulnerability)	3	15
Drought (Maximum Threat)	6	60

Drought notes: Drought is neither life threatening nor presents a direct risk to structures, but does involve potential for significant disruption if dramatic water shortage were to develop. Drought can exacerbate wildfire risk as related hazards, and a water shortage could impact the entire city uniformly. History is considered low in a region that sees 80 inches of rain a year. Probability is considered low with a potential event in the 75 to 100 year range. Vulnerability is also low in an area more likely to deal with too much water as opposed to too little. Maximum threat is moderate due to the city's reliance on well water. Should a long duration drought impact the region, it may potentially impact 5% to 25% of the population. See also drought profile in Chapter 3, main document.

Flood

Hazard (Category)	Raw Score	Weighted Score
Flood (Overall)	15	90
Flood (History)	4	8
Flood (Probability)	6	42
Flood (Vulnerability)	2	10
Flood (Maximum Threat)	3	30

Flood notes: Flood is a geographically contained hazard with potentially widespread impacts. The area of Florence has a moderate history of flooding, with 2 to 3 instances in the last 100 years. The geology of the coast allows for drainage of floodwaters with relative ease compared with inland areas. The probability of future occurrences is also moderate, with the expectation of future events in the range of 35 to 75 years. Overall vulnerability and maximum threat scores are low as widespread damage from flooding is not considered likely. See also flood hazard profile in Chapter 3, main document.

Dam Failure

Hazard (Category)	Raw Score	Weighted Score
Dam Failure (Overall)	11	79
Dam Failure (History)	1	2
Dam Failure (Probability)	1	7
Dam Failure (Vulnerability)	4	20
Dam Failure (Maximum Threat)	5	50

Dam Failure notes: There is no history of dam failure affecting Florence, and little probability of its occurrence in the future. Should a Dam fail east or north of the city, there are potential impacts to the Siuslaw River and properties adjacent to it. For this reason vulnerability to such an event is considered moderate. Maximum threat is also considered moderate, with 5% to 25% of the population impacted by an occurrence. See also dam failure profile in Chapter 3, main document.

Pandemic

Hazard (Category)	Raw Score	Weighted Score
Pandemic (Overall)	4	78
Pandemic (History)	2	4
Pandemic (Probability)	2	14
Pandemic (Vulnerability)	4	20
Pandemic (Maximum Threat)	4	40

Pandemic notes: Pandemic is a unique hazard which presents significant public safety risk but no potential for damage to structures. Geographic potential is uniform. History and probability are both low when considering major outbreak of disease. Vulnerability and maximum threat are moderate considering most credible scenarios. See also pandemic profile in Chapter 3, main document.

Volcano

Hazard (Category)	Raw Score	Weighted Score
Volcano (Overall)	4	32
Volcano (History)	0	0
Volcano (Probability)	1	7
Volcano (Vulnerability)	1	5
Volcano (Maximum Threat)	2	20

Volcano notes: Volcano is similar to earthquake in that it occurs very infrequently. Florence, located on the Oregon Coast is far from the Volcanos of the Cascade Mountain Range and is unlikely to suffer impacts from a volcanic event. History, probability, vulnerability, and maximum threat are relatively low. See also volcano profile in Chapter 3, main document.

City of Florence: Mitigation Projects

This section describes mitigation projects identified by the City of Florence during the planning process. See Chapter 4, main document for additional information regarding mitigation action item methodology and prioritization.

Mitigation Action Item (a): Mitigation reconstruction for Public Works facility. Storm hardening, and seismic resiliency.

Location	Florence Public Works Facility – Airport facility
Coordinating Agencies	City of Florence Public Works
Implementation Timeframe	6 to 18 months
Estimated Cost	$5.5 to 6 Million
Potential Funding Sources	HUD-CDBG, OR-SRGP, HMGP, PDM, FEMA PA-106,
Hazards Mitigated	Windstorm, winter storm, tsunami hazard, earthquake, flood
Comments	Equipment & bays from west of Administration, to the eastside. 2.5 acres of land, $20 Million lease to the city.
Current Site Photos	 

Mitigation Action Item (b): Seismic retrofit for water supply tanks and foundation reinforcements.

Location	City Reservoirs
Coordinating Agencies	City of Florence Public Works, Water Department
Implementation Timeframe	18-24 months
Estimated Cost	$1.5 million
Potential Funding Sources	HUD-CDBG, OR-SRGP, HMGP, PDM, FEMA PA-106
Hazards Mitigated	Earthquake, drought
Comments	Cribbing, foundation control; seismic lateral stability; ball joints & auto-shut off valve. 31st St.
Current Site Photos	 

Mitigation Action Item (c): Erosion control measures for Rhododendron Drive, structural reinforcements.

Location	Rhododendron Drive near New Hope Ln.	
Coordinating Agencies	City of Florence Public Works Department	
Implementation Timeframe	12-18 months	
Estimated Cost	$4.5 to 6 million	
Potential Funding Sources	HUD-CDBG, OR-SRGP, HMGP, PDM, FEMA PA-106, USACE	
Hazards Mitigated	Tsunami, flood, winter storm, windstorm Coastal erosion	
Comments	2000+ homes served by this road; ore drillings show decaying organics and wing dams have shifted the flow of the river, cutting into the bank adjacent to the roadway, This has caused a significant undercut below the compacted sand shelf.	
Current Site Photos		

Mitigation Action Item (d): Seismic reinforcements for Siuslaw Valley Fire Station #2.

Location	2nd St. Siuslaw Valley Fire Station #2	
Coordinating Agencies	City of Florence, Florence Public Works, Siuslaw Valley Fire District, Public Utilities District	
Implementation Timeframe	18-24 months	
Estimated Cost	$2 million	
Potential Funding Sources	HUD-CDBG, OR-SRGP, HMGP, PDM, FEMA PA-106	
Hazards Mitigated	Earthquake, Tsunami,	
Comments	Station #2 is in the Tsunami Inundation zone.	
Current Site Photos		

Mitigation Action Item (e): Highway 126 trestle overpass at Cushman

Location	East Florence, Cushman on Hwy 126
Coordinating Agencies	City of Florence, ODOT
Implementation Timeframe	36 Months
Estimated Cost	$20-30 million
Potential Funding Sources	HUD-CDBG, OR-SRGP, HMGP, PDM, FEMA PA-106, ODOT
Hazards Mitigated	Tsunami, earthquake, flooding
Comments	Highway overpass at Cushman Rd., over railroad trestle.

City of Florence: Hazard Mitigation Plan Implementation and Maintenance

In keeping with standard practices to ensure incorporation of overall goals and strategy of the hazard mitigation plan, City of Florence hazard mitigation team members will be invited to participate in future plan development or existing plan update committees. Additionally, this Hazard Mitigation Action Plan will be cited as a technical reference for future plan update processes. Planning documents and mechanisms applicable to this process may include the following:

City of Florence Comprehensive Plan

Capital Improvement Plans

Emergency Management Plan

City of Florence Floodplain Development Ordinance

City of Florence Building Code

City of Florence Subdivision Code

Erosion Control Plan

Stormwater Management Plan

Additionally, progress to implement this plan will be monitored on an ongoing basis by city staff and administration. The planning process is essential in identifying strengths and weaknesses inherent in the community, cooperatively enabling coordination with various agencies and jurisdictions that might not otherwise occur. Continuing this cooperative and interactive process is exemplified by the planning process. Annual reviews and update under a 5-year cycle will be pursued. Using these methods the overarching goal of a stronger, safer, more resilient community can be attained.

ANNEX 5. CITY OF OAKRIDGE HAZARD MITIGATION REFERENCE

City of Oakridge
Hazard Mitigation Reference

Version 1.0 (March 2017)

Introduction: City of Oakridge

This purpose of this annex to the Lane County Multi-Jurisdiction Hazard Mitigation Plan is to consolidate information specific to the City of Oakridge and serve as an executive summary. 44 CFR 201 requirements are addressed in the main document, this annex provides supplemental information. For more information regarding Code of Federal regulations for Local Hazard Mitigation Planning see overview in Chapter 1 and citations and abstracts for Chapters 2, 3, 4, 5 of the main document.

The 2017 Lane County Multi-Jurisdiction Hazard Mitigation Plan sanctioned by OEM and FEMA is the first for which the City of Oakridge has been a formal participant. Like other formal participants (Lane County, Coburg, Creswell, Veneta, Dunes City, Florence, and Westfir), being a participant in an approved multi-jurisdiction hazard mitigation plan creates eligibility for the following important federal grants:

- Hazard Mitigation Grant Program (HMGP)
- Pre-Disaster Mitigation Grants (PDM)
- Flood Mitigation Assistance Grants (FMA)

In addition to creating eligibility for federal grants, this document serves as 5-year road map for activities with the purpose and potential to make Oakridge a stronger, safer, and more resilient community.

Sub-sections of this annex to the Lane County Multi-Jurisdiction Hazard Mitigation Plan describe the following:

- Individual participants and contributors, meetings and work sessions conducted during the plan development process.
- Results of the OEM prescribed hazard quantification process for each hazard type and discussion of previous occurrences, probability of future occurrence, potential vulnerability of public and private assets, and maximum credible threat posed by each hazard.
- Details regarding mitigation projects identified as priorities, including location, photos, estimated cost, grant funding options, implementation timeframe, and hazards addressed.
- Details for mitigation project implementation, review of local program, and plan update 5-year cycle.

City of Oakridge: Hazard Mitigation Meetings and Work Sessions

Development of City of Veneta material for the hazard mitigation plan involved participation by city, county, fire district, law enforcement, and project assistants. The process followed FEMA's prescribed model for organizing resources, identifying hazards, evaluating risk, identifying mitigation options, prioritizing mitigation projects. For additional details regarding the planning process, refer to Chapter 2 (Planning Process), main document.

Specific participants are listed as follows:

City of Oakridge Hazard Mitigation Team

Name	Title	Agency
Louis Gomez	City of Oakridge	Oakridge City Manager
Albert Alvade	Oakridge Fire Department	Oakridge Fire Chief
Chuck Kurmick	Oakridge Public Works	Public Works Director
Susan LaDuke	Finance Director/City Recorder	City of Oakridge
Kevin Martin	Oakridge Police Department	Chief of Police
Linda Cook	Lane County Sheriff's Office	Lane County Emergency Manager
Greg J. Wobbe, CFM	Principal	OCR West, MPTX Associates

Individual City Work Sessions

Work sessions with individual cities were conducted following the initial project orientation meeting and intervening months between general planning group meetings. These individual work sessions are outlined below.

City of Oakridge Work Sessions

Date	Location	Meeting/Work Session
June 29, 2015	Oakridge City Hall	Project overview, basic data collection
July 27, 2015	Oakridge City Hall	Risk assessment, Hazard quantification
October 23, 2015	Oakridge City Hall	Hazard quantification-seismic assessment review, SRGP, FEMA mitigation grant programs, mitigation ideas
June 28, 2016	Oakridge project tour	Mitigation project site tour

City of Oakridge: Hazard Quantification

An interesting element of the hazard mitigation process is risk assessment. Risk assessment begins by identifying the full range of potential hazards which may occur in the community. Once identified, these potential hazards are evaluated to determine relative importance and aids prioritization of mitigation activities.

There are various means for evaluating hazards and the risk they present. "Hazard Quantification" is a scoring method prescribed by the State of Oregon Office of Emergency Management (OEM) is used to assist with prioritizing hazards and understanding risk. It doesn't predict the occurrence of a particular hazard, but it does "quantify" the risk of one hazard compared with another. By doing this analysis, planning can first be focused where the risk is greatest. Among other things, this hazard analysis can:

- help establish priorities for planning, capability development, and hazard mitigation;
- serve as a tool in the identification of hazard mitigation measures;
- be one tool in conducting a hazard-based needs analysis;
- serve to educate the public and public officials about hazards and vulnerabilities;
- help communities make objective judgments about acceptable risk.

One of the many strengths of the hazard quantification approach is it employs a consistent methodology with the intent of objective results and findings. The methodology was first developed by the Federal Emergency Management Agency (FEMA) circa 1983, and gradually refined by Oregon Emergency Management (OEM) over the years. The methodology produces scores that range from 24 (lowest possible) to 240 (highest possible). By applying one order of magnitude from lowest to highest, a hazard with a score of 240 is considered ten times more severe than a hazard with a rating of 24.

Maximum threat, vulnerability, and probability assessment are key components of the methodology. Maximum threat considers degree of impact under a worst case scenario, regardless of probability. Vulnerability examines potential impacts to populations, the built environment, and natural environment for 'typical' events.

Probability reviews frequency of past events as a means of predicting likelihood of future occurrence. Somewhat less vital to overall hazard quantification score (but still relevant) is history of occurrence. The four OEM prescribed hazard quantification categories are listed and described below.

Hazard Quantification Categories

1) History (previous occurrences, primarily within last century)

2) Probability (calculated likelihood of future occurrence)

3) Vulnerability (number, degree or extent of people or assets at risk per hazard)

4) Maximum threat (credible worst-case scenario)

Weight Factors

Weighting factors were developed for each of the four hazard quantification categories. This is done to emphasize certain categories over others in terms of risk assessment.

1) History (weight factor x 2)

2) Probability (weight factor x 7)

3) Vulnerability (weight factor x 5)

4) Maximum threat (weight factor x 10)

Scoring Guidelines

Scoring guidelines were developed by OEM as a method of standardizing assessment and to minimize subjectivity.

History (weight factor for category = 2). History is the record of previous occurrences. Events to include in assessing history of a hazard event for which the following types of activities were required:

- The EOC or alternate EOC was activated;
- Three or more EOP functions were implemented, e.g., alert & warning, evacuation, shelter, etc.
- An extraordinary multi-jurisdictional response was required; and/or
- A "Local Emergency" was declared.

LOW – score at 1 to 3 points based on… 0 - 1 event past 100 years

MEDIUM – score at 4 to 7 points based on… 2 - 3 events past 100 years

HIGH – score at 8 to 10 points based on… 4 + events past100 years

Probability (weight factor for category = 7)

Probability is the likelihood of future occurrence within a specified period of time.

LOW – score at 1 to 3 points based on… one incident likely within 75 to 100 years

MEDIUM – score at 4 to 7 points based on… one incident likely within 35 to 75 years

HIGH – score at 8 to 10 points based on… one incident likely within 10 to 35 years

Vulnerability (weight factor for category = 5)

Vulnerability is the percentage of population and property likely to be affected under an "average" occurrence of the hazard.

LOW – score at 1 to 3 points based on… < 1% affected

MEDIUM – score at 4 to 7 points based on… 1 - 10% affected

HIGH – score at 8 to 10 points based on… > 10% affected

Maximum Threat (weight factor for category = 10)

Maximum threat is the highest percentage of population and property that could be impacted under a worst-case scenario.

LOW – score at 1 to 3 points based on… < 5% affected

MEDIUM – score at 4 to 7 points based on… 5 - 25% affected

HIGH – score at 8 to 10 points based on… > 25% affected

To tabulate, scores for each category are multiplied by the associated weight factors to create a 'sub-score'. Adding the sub-scores for history, vulnerability, maximum threat, and probability for each hazard produces a 'total hazard quantification score' for each hazard.

The following table summarizes hazard quantification results, followed by a detailed discussion for each hazard.

City of Oakridge: Hazard Quantification Results (DRAFT)

Hazard Type / Weight Factor (WF)	History WF x 2	Probability WF x 7	Vulnerability WF x 5	Maximum Threat WF x 10	Raw Score	Weighted Score	Weighted Score Rank
Winter Storm	10	10	10	10	**40**	**240**	**1**
Flood	8	8	10	10	**36**	**222**	**2**
Windstorm	8	8	10	10	**36**	**222**	**3**
Haz Mat Incident	10	10	6	10	**36**	**220**	**4**
Wildfire	10	10	5	10	**35**	**215**	**5**
Drought	4	8	6	8	**26**	**174**	**6**
Volcano	2	2	5	10	**19**	**143**	**7**
Earthquake	2	3	2	10	**17**	**135**	**8**
Dam Failure	0	1	6	8	**15**	**117**	**9**
Landslide	1	2	4	7	**14**	**106**	**10**
Pandemic	2	2	4	4	**12**	**78**	**11**
Tsunami	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Source: City of Oakridge Hazard Mitigation Team

Individual Hazard Discussion, City of Oakridge

Winter Storm

Hazard (Category)	Raw Score	Weighted Score
Winter Storm (Overall)	40	240
Winter Storm (History)	10	20
Winter Storm (Probability)	10	70
Winter Storm (Vulnerability)	10	50
Winter Storm (Maximum Threat)	10	100

Winter Storm notes: Oakridge, like most cities in Oregon faces a regular occurrence of winter storms, which occur at least once in most years. In Oakridge, winter conditions including significant snowfall are regular occurrences due to the city's elevation. The city contains a network of above ground electrical lines vulnerable to damage from falling limbs and trees during winter storms. Recent history has seen storms causing some damage and power loss in 2014, 2015 and 2016. Wind is nearly always a contributing factor these winter storms. Probability is considered high that patterns of previous occurrence will continue. The percentage of population potentially affected by winter storm is high since effects are not geographically contained, and the city itself is situated on the western side of the Cascade Mountains where weather can intensify due to the forced uplift of air caused by the mountains surrounding the city. The result is a high vulnerability. Transportation and roadways are also vulnerable to closure during winter storms, though the city benefits from primarily level terrain with exception of western outskirts. Maximum threat is more moderate however due to somewhat limited threat of structural damage directly related to winter weather (cold, snow, ice). See also winter storm hazard profile in Chapter 3, main document.

Flood

Hazard (Category)	Raw Score	Weighted Score
Flood (Overall)	36	222
Flood (History)	8	16
Flood (Probability)	8	56
Flood (Vulnerability)	10	50
Flood (Maximum Threat)	10	100

Flood notes: Flood is a geographically contained hazard, which in the valley that is home to Oakridge, is one with real potential for occurrence. The Oakridge area is a sloped valley in the foothills of the Cascade Range surrounded by the Willamette National Forest. Five streams pass through this relatively small area between mountain ridges: Salmon Creek, Salt Creek, Hills Creek, and the Middle and North forks of the Willamette River. These five tributaries join to create the Middle fork of the Willamette River, which flows North West into Lookout Point Lake, a U.S. Corps of Engineers Willamette Valley Project Dam. Oakridge is within 5 miles of the Hills Creek Dam to the south east, another U.S. Army Corps of Engineer's project, controlling seasonal flooding in the larger Willamette Valley.

The history of flooding in Oakridge is high as the geography the city is built upon is created from repeated floods in the past over great lengths of time. It is a significant egress for melting winter snows out of the surrounding mountainside. The future probability for flooding is relatively high. Overall vulnerability and maximum threat scores are very high, widespread severe damage from flooding is likely in the future. See also flood hazard profile in Chapter 3, main document.

Windstorm

Hazard (Category)	Raw Score	Weighted Score
Windstorm (Overall)	36	222
Windstorm (History)	8	16
Windstorm (Probability)	8	56
Windstorm (Vulnerability)	10	50
Windstorm (Maximum Threat)	10	100

Windstorm notes: Similar to winter storm, windstorm can and frequently does impact above ground electrical lines vulnerable to damage from falling limbs and trees. Recent history-includes damages caused by storms in a nearly yearly basis. Probability is similarly considered high that patterns of previous occurrence will continue. Overall vulnerability is very high, with roadways notably vulnerable to closure due to downed trees, and loss of power due to damage to powerlines which in some cases traverse difficult to access terrain. The Columbus Day storm of 1962 can serve as an example for maximum threat, reports at the time noted 40 trees downed over Hwy 58, in just a single mile of roadway, trapping 19 vehicles. A windstorm of similar magnitude to the Columbus Day Storm could potentially damage numerous of homes in city, either by direct structural damage, falling trees, or wind-blown debris. Due to its location in the Cascade Mountain foothills, the city experiences significant winds as compared to other communities in Oregon. The access routes the city is dependent upon, both by road and rail, are more exposed. See also windstorm hazard profile in Chapter 3, main document.

Hazardous Materials Incident

Hazard (Category)	Raw Score	Weighted Score
Haz Mat Incident (Overall)	36	220
Haz Mat Incident (History)	10	20
Haz Mat Incident (Probability)	10	70
Haz Mat Incident (Vulnerability)	6	30
Haz Mat Incident (Maximum Threat)	10	100

<u>Hazardous Materials Incident notes</u>: Hazardous materials incident is considered a technical hazard and involves different characteristics than natural hazards. Oakridge is historically a railroad town, at one time one of the major routes between eastern Oregon and the Willamette Valley. Northern Pacific Railroad still utilizes this route for commerce and transport – including transport of hazardous materials. History of Hazardous Materials incidents is high, with more than three or four incidents in recent history requiring a response. Probability is similarly high for another incident in the near future. Vulnerability is considered moderate with 1 to 10% of the population potentially impacted. Maximum threat could involve such events as railroad or truck accident involving toxic release, and is considered to be high. Rupture of underground gas lines is also possible. In the event of occurrence, prevailing wind and proximity to waterways are important factors relating to public safety risk and environmental impacts. See also hazardous materials incident profile in Chapter 3, main document.

Wildfire

Hazard (Category)	Raw Score	Weighted Score
Wildfire (Overall)	35	215
Wildfire (History)	10	20
Wildfire (Probability)	10	70
Wildfire (Vulnerability)	5	25
Wildfire (Maximum Threat)	10	100

<u>Wildfire notes</u>: Oakridge is surrounded by the Willamette National Forest. While the valley floor is relatively clear of the tall pine trees on the mountain slopes, the community is nonetheless surrounded by country susceptible to wildfire. History of wildfire in the area of Oakridge is high, with more several instances of nearby wildfires impacting the city. The probability of this continuing in the future is high that a similar pattern will continue. Vulnerability is moderated by response capability, and the removal of vegetation from the urban-wildland interface for fire protection. Maximum threat involves potential for damage to numerous structures and forest tracts, and the potential for a rapidly moving fire to sweep through or over the city under the right conditions. See also wildfire hazard profile in Chapter 3, main document.

Drought

Hazard (Category)	Raw Score	Weighted Score
Drought (Overall)	26	174
Drought (History)	4	8
Drought (Probability)	8	56
Drought (Vulnerability)	6	30
Drought (Maximum Threat)	8	80

Drought notes: Drought is neither life threatening nor presents a direct risk to structures, but does involve potential for some disruption if dramatic water shortage were to develop. Drought can exacerbate wildfire risk as related hazards, and a water shortage may affect the entire city uniformly. History is considered moderate, with 2 to 3 events occurring over the last 100 years. The probability of this re-occurring is high, part of a normal cycle over time. Vulnerability is medium as Oakridge has access to five sources of river water, and two large reservoirs nearby. Maximum threat is moderately high, particularly when combined with an active fire season. See also drought profile in Chapter 3, main document.

Volcano

Hazard (Category)	Raw Score	Weighted Score
Volcano (Overall)	19	143
Volcano (History)	2	4
Volcano (Probability)	2	14
Volcano (Vulnerability)	5	25
Volcano (Maximum Threat)	10	100

Volcano notes: Volcano is similar to earthquake in that it occurs very infrequently. Oakridge is situated in the foothills of the Cascade Mountain Range, placing it in closer proximity to dormant Volcanos, the closest being Diamond Peak, a shield volcano approximately 30 miles from the city. History and probability are relatively low, vulnerability is medium, maximum threat considered high if Diamond Peak were to become active. The last eruption occurred over 11,000 years ago. See also volcano profile in Chapter 3, main document.

Earthquake

Hazard (Category)	Raw Score	Weighted Score
Earthquake (Overall)	17	135
Earthquake (History)	2	4
Earthquake (Probability)	3	21
Earthquake (Vulnerability)	2	10
Earthquake (Maximum Threat)	10	100

Earthquake notes: Earthquake is somewhat unique as it occurs much less frequently but has potential for significant damage and disruption. Oakridge is located near three crustal earthquake faults, and small (1-3 in magnitude) have occurred in the area, doing little damage and often going unfelt by residents. From a geographic standpoint occurrence would presumably effect the entire city uniformly, should a higher magnitude event occur. History of occurrence dates back over long time scales, and in the short term is considered low. Probability is low in any given year. Vulnerability is complex to assess due to varying standards of construction but most newer construction is considered relatively sound. Maximum threat is high in awareness of the Cascadia Subduction Zone off the Oregon Coast, Oakridge can expect to feel the shaking associated with that event, causing very strong shaking according to DOGAMI and the State of Oregon Office of Emergency Management. Minor to moderate damage to numerous structures can be expected in an event of that magnitude and scope. Importance of resiliency of infrastructure is notable. See also earthquake profile in Chapter 3, main document.

Dam Failure

Hazard (Category)	Raw Score	Weighted Score
Dam Failure (Overall)	15	117
Dam Failure (History)	0	0
Dam Failure (Probability)	1	7
Dam Failure (Vulnerability)	6	30
Dam Failure (Maximum Threat)	8	80

Dam Failure notes: There is no history of dam failure affecting Oakridge and geographic location makes impact low probability. Vulnerability is moderate considering the proximity of the Hills Creek Dam located less than 5 miles from the city to the south east. Maximum threat is high, as warning time may be very short due to proximity to the dam itself. See also dam failure profile in Chapter 3, main document.

Landslide

Hazard (Category)	Raw Score	Weighted Score
Landslide (Overall)	14	106
Landslide (History)	1	2
Landslide (Probability)	2	14
Landslide (Vulnerability)	4	20
Landslide (Maximum Threat)	7	70

Landslide notes: Landslide is considered to have very low history and probability in Oakridge itself, though it is higher in the surrounding hillsides. Vulnerability is moderate due to the potential for closures of Hwy 58. Maximum threat is a high medium for the same reason, transportation infrastructure could be affected. See also landslide profile in Chapter 3, main document.

Pandemic

Hazard (Category)	Raw Score	Weighted Score
Pandemic (Overall)	12	78
Pandemic (History)	2	4
Pandemic (Probability)	2	14
Pandemic (Vulnerability)	4	20
Pandemic (Maximum Threat)	4	40

Pandemic notes: Pandemic is a unique hazard which presents significant public safety risk but no potential for damage to structures. Geographic potential is uniform. History and probability are both low when considering major outbreak of disease. Vulnerability and maximum threat are moderate considering most credible scenarios. See also pandemic profile in Chapter 3, main document.

City of Oakridge: Mitigation Projects

This section describes mitigation projects identified by Oakridge during the planning process. See Chapter 4, main document for additional information regarding mitigation action item methodology and prioritization.

<u>Mitigation Action Item (a):</u> Safe room retrofit for City Courtroom EOC. Create protected, contained space for city employees and EOC participants. Electrical, communications upgrades. Window, roof, and structural reinforcements, seismic upgrades.

Location	City Hall
Coordinating Agencies	Oakridge City Council, Oakridge Public Works
Implementation Timeframe	12-18 Months
Estimated Cost	$1.5 million
Potential Funding Sources	HUD-CDBG, OR-SRGP, HMGP, PDM, FEMA PA-106
Hazards Mitigated	Earthquake, flood, winter storm, windstorm, dam failure, wild fire
Comments	City Hall is the location for both Emergency Operation Center, and Continuity of Government
Current Site Photos	 

<u>Mitigation Action Item (b):</u> Seismic, flood-proofing, and storm-hardening retrofit for Oakridge Police Department.

Location	Oakridge Police Department
Coordinating Agencies	Oakridge City Council, Oakridge Police Department, Oakridge Public Works, Oakridge City Administrator
Implementation Timeframe	18-24 months
Estimated Cost	$1 million
Potential Funding Sources	HUD-CDBG, OR-SRGP, HMGP, PDM, FEMA PA-106
Hazards Mitigated	Earthquake, flood, winter storm, windstorm
Comments	The Police Department is the Lower floor of City Hall.
Current Site Photos	 

Mitigation Action Item (c): Water intake upgrades for secondary surface water source as back-up to ground water system. Additional storage, treatment and transmission capability.

Location	Oakridge wellfield
Coordinating Agencies	Oakridge Public Works
Implementation Timeframe	12-18 months
Estimated Cost	$1.5 million
Potential Funding Sources	HUD-CDBG-DR, HMGP, PDM, FEMA PA-406
Hazards Mitigated	Drought, hazardous materials incident
Comments	Secondary water source needed as backup for existing surface water system
Current Site Photos	  

Mitigation Action Item (d): Retrofit/mitigation reconstruction for community center to serve as disaster recovery center, community safe room. Install secure communications and generator, space heaters and emergency shelter/staging area.

Location	
Coordinating Agencies	City of Oakridge, Oakridge Public Works
Implementation Timeframe	24-36 Months
Estimated Cost	$800,000-900,000
Potential Funding Sources	FEMA, OSRGP
Hazards Mitigated	Earthquake, wildfire, windstorm, flood, HAZMAT incident, winter storm
Comments	
Current Site Photos	

Mitigation Action Item (e): Emergency supply storage building for fire station.

Location	Oakridge Fire Department
Coordinating Agencies	City of Oakridge, Oakridge Public Works, Oakridge Fire Department
Implementation Timeframe	24-36 Months
Estimated Cost	$400,000-500,000
Potential Funding Sources	FEMA
Hazards Mitigated	Earthquake, wildfire, windstorm, flood, HAZMAT incident, winter storm
Comments	
Current Site Photos	

City of Oakridge: Hazard Mitigation Plan Implementation and Maintenance

In keeping with standard practices to ensure incorporation of overall goals and strategy of the hazard mitigation plan, City of Oakridge hazard mitigation team members will be invited to participate in future plan development or existing plan update committees. Additionally, this Hazard Mitigation Action Plan will be cited as a technical reference for future plan update processes. Planning documents and mechanisms applicable to this process may include the following:

- City of Oakridge Comprehensive Plan
- Oakridge Capital Improvement Plans
- Emergency Management Plan
- Local Community Wildfire Protection Plans
- City of Oakridge Floodplain Development Ordinance
- Building Code
- Subdivision Code
- Erosion Control
- Stormwater Management

Additionally, progress to implement this plan will be monitored on an ongoing basis by city staff and administration. Annual reviews and update under a 5-year cycle will be pursued. Using these methods the overarching goal of a stronger, safer, more resilient community can be attained.

City of Veneta
Hazard Mitigation Reference

VENETA oregon Inc.1962

Version 1.0 (March 2017)

Introduction: City of Veneta Hazard Mitigation Reference

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The 2017 Lane County Multi-Jurisdiction Hazard Mitigation Plan sanctioned by OEM and FEMA is the first for which the City of Veneta has been a formal participant. Like other formal participants (Lane County, Coburg, Creswell, Dunes City, Florence, Oakridge, Westfir), being a participant in an approved multi-jurisdiction hazard mitigation plan creates eligibility for the following important federal grants:

- Hazard Mitigation Grant Program (HMGP)
- Pre-Disaster Mitigation Grants (PDM)
- Flood Mitigation Assistance Grants (FMA)

In addition to creating eligibility for federal grants, this document serves as 5-year road map for activities with the purpose and potential to make Veneta a stronger, safer, and more resilient community.

Sub-sections of this annex to the Lane County Multi-Jurisdiction Hazard Mitigation Plan describe the following:

- Individual participants and contributors, meetings and work sessions conducted during the plan development process.
- Results of the OEM prescribed hazard quantification process for each hazard type and discussion of previous occurrences, probability of future occurrence, potential vulnerability of public and private assets, and maximum credible threat posed by each hazard.
- Details regarding mitigation projects identified as priorities, including location, photos, estimated cost, grant funding options, implementation timeframe, and hazards addressed.
- Details for mitigation project implementation, review of local program, and plan update 5-year cycle.

City of Veneta: Hazard Mitigation Meetings and Work Sessions

Development of City of Veneta material for the hazard mitigation plan involved participation by city, county, fire district, law enforcement, and project assistants. The process followed FEMA's prescribed model for organizing resources, identifying hazards, evaluating risk, identifying mitigation options, prioritizing mitigation projects. For additional details regarding the planning process, refer to Chapter 2 (Planning Process), main document.

Specific participants are listed as follows:

City of Veneta Hazard Mitigation Team

Name	Title	Agency
Ric Ingham	City Administrator	City of Veneta
Terry Ney	Fire Chief	Lane Fire Authority
Kyle Schauer	Public Works Director	City of Veneta
Kay Bork	Planning Director	City of Veneta
Julie Reid, MPH	Emergency Preparedness Specialist	City of Veneta
Leah Borns	Graduate Intern	City of Veneta
Linda Cook, PMP	Emergency Manager	Lane County Sheriff's Office
Billy Halvorson	Sergeant	Lane County Sheriff's Office
Greg J. Wobbe, CFM	Principal	OCR West, MPTX Associates
Kaylon McAlister	GIS Tech	OCR West, MPTX Associates

Individual City Work Sessions

Work sessions with individual cities were conducted following the initial project orientation meeting and intervening months between general planning group meetings. These individual work sessions are outlined below.

City of Veneta Work Sessions

Date	Location	Meeting/Work Session
June 24, 2015	Veneta City Hall	Project overview, basic data collection
July 29, 2015	Veneta City Hall	Risk assessment, Hazard quantification
September 23, 2015	Veneta City Hall	Hazard quantification-seismic assessment review, SRGP, FEMA mitigation grant programs, mitigation ideas
November 23, 2015	Veneta City Hall	Identifying mitigation projects
January 27, 2016	Veneta project tour	Mitigation project site tour

An additional element of the planning process included a meeting at Lane County Sheriff's Office August 25, 2015 attended by planning director and public works director, along with the other participating cities. Subject matter discussed included an overview of FEMA grant programs, discussion of common mitigation ideas, and specific project ideas for the City of Veneta.

The result of this overall process was a thorough evaluation of risk factors and mitigation solutions. Certain hazards were highlighted with notable significance for the City of Veneta, others found to be less relevant in a direct context. Systems and concepts considered included infrastructure resiliency, transportation network, public safety, public and private facilities. A range of both general and specific mitigation ideas and projects were identified and scoped in the field.

City of Veneta: Hazard Quantification – Risk Assessment

An interesting element of the hazard mitigation process is risk assessment. Risk assessment begins by identifying the full range of potential hazards which may occur in the community. Once identified, these potential hazards are evaluated to determine relative importance and aids prioritization of mitigation activities.

There are various means for evaluating hazards and the risk they present. "Hazard Quantification" is a scoring method prescribed by the State of Oregon Office of Emergency Management (OEM) is used to assist with prioritizing hazards and understanding risk. It doesn't predict the occurrence of a particular hazard, but it does "quantify" the risk of one hazard compared with another. By doing this analysis, planning can first be focused where the risk is greatest. Among other things, this hazard analysis can:

- help establish priorities for planning, capability development, and hazard mitigation;
- serve as a tool in the identification of hazard mitigation measures;
- be one tool in conducting a hazard-based needs analysis;
- serve to educate the public and public officials about hazards and vulnerabilities;
- help communities make objective judgments about acceptable risk.

One of the many strengths of the hazard quantification approach is it employs a consistent methodology with the intent of objective results and findings. The methodology was first developed by the Federal Emergency Management Agency (FEMA) circa 1983, and gradually refined by Oregon Emergency Management (OEM) over the years. The methodology produces scores that range from 24 (lowest possible) to 240 (highest possible). By applying one order of magnitude from lowest to highest, a hazard with a score of 240 is considered ten times more severe than a hazard with a rating of 24.

Maximum threat, vulnerability, and probability assessment are key components of the methodology. Maximum threat considers degree of impact under a worst case scenario, regardless of probability. Vulnerability examines potential impacts to populations, the built environment, and natural environment for 'typical' events.

Probability reviews frequency of past events as a means of predicting likelihood of future occurrence. Somewhat less vital to overall hazard quantification score (but still relevant) is history of occurrence. The four OEM prescribed hazard quantification categories are listed and described below.

Hazard Quantification Categories

1) History (previous occurrences, primarily within last century)

2) Probability (calculated likelihood of future occurrence)

3) Vulnerability (number, degree or extent of people or assets at risk per hazard)

4) Maximum threat (credible worst-case scenario)

Weight Factors

Weighting factors were developed for each of the four hazard quantification categories. This is done to emphasize certain categories over others in terms of risk assessment.

1) History (weight factor x 2)

2) Probability (weight factor x 7)

3) Vulnerability (weight factor x 5)

4) Maximum threat (weight factor x 10)

Scoring Guidelines

Scoring guidelines were developed by OEM as a method of standardizing assessment and to minimize subjectivity.

History (weight factor for category = 2). History is the record of previous occurrences. Events to include in assessing history of a hazard event for which the following types of activities were required:

- The EOC or alternate EOC was activated;
- Three or more EOP functions were implemented, e.g., alert & warning, evacuation, shelter, etc.
- An extraordinary multi-jurisdictional response was required; and/or
- A "Local Emergency" was declared.

LOW – score at 1 to 3 points based on… 0 - 1 event past 100 years

MEDIUM – score at 4 to 7 points based on… 2 - 3 events past 100 years

HIGH – score at 8 to 10 points based on… 4 + events past100 years

Probability (weight factor for category = 7)

Probability is the likelihood of future occurrence within a specified period of time.

LOW – score at 1 to 3 points based on… one incident likely within 75 to 100 years

MEDIUM – score at 4 to 7 points based on… one incident likely within 35 to 75 years

HIGH – score at 8 to 10 points based on… one incident likely within 10 to 35 years

Vulnerability (weight factor for category = 5)

Vulnerability is the percentage of population and property likely to be affected under an "average" occurrence of the hazard.

LOW – score at 1 to 3 points based on… < 1% affected

MEDIUM – score at 4 to 7 points based on… 1 - 10% affected

HIGH – score at 8 to 10 points based on… > 10% affected

Maximum Threat (weight factor for category = 10)

Maximum threat is the highest percentage of population and property that could be impacted under a worst-case scenario.

LOW – score at 1 to 3 points based on… < 5% affected

MEDIUM – score at 4 to 7 points based on… 5 - 25% affected

HIGH – score at 8 to 10 points based on… > 25% affected

To tabulate, scores for each category are multiplied by the associated weight factors to create a 'sub-score'. Adding the sub-scores for history, vulnerability, maximum threat, and probability for each hazard produces a 'total hazard quantification score' for each hazard.

The following table summarizes hazard quantification results, followed by a detailed discussion for each hazard.

City of Veneta: Hazard Quantification Results (DRAFT)

Hazard Type / Weight Factor (WF)	History WF x 2	Probability WF x 7	Vulnerability WF x 5	Maximum Threat WF x 10	Raw Score	Weighted Score	Weighted Score Rank
Wildfire	8	10	5	8	**31**	**191**	**1**
Winter Storm	10	8	8	6	**32**	**176**	**2**
Windstorm	10	7	5	7	**29**	**164**	**3**
Flood	10	7	4	5	**26**	**139**	**4**
Haz Mat Incident	4	4	4	5	**17**	**106**	**5**
Earthquake	2	2	5	6	**15**	**103**	**6**
Drought	1	1	2	7	**11**	**89**	**7**
Pandemic	2	2	4	4	**12**	**78**	**8**
Volcano	1	2	2	4	**9**	**66**	**9**
Landslide	0	1	2	3	**6**	**47**	**10**
Dam Failure	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Tsunami	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Source: City of Veneta Hazard Mitigation Team

Individual Hazard Discussion, City of Veneta

Wildfire

Hazard (Category)	Raw Score	Weighted Score
Wildfire (Overall)	31	191
Wildfire (History)	8	16
Wildfire (Probability)	10	70
Wildfire (Vulnerability)	5	25
Wildfire (Maximum Threat)	8	80

Wildfire notes: Veneta benefits from excellent response capability (Lane Fire Authority headquarters and ODF station). A significant number of structures/properties exist near wildland-urban interface, particularly west and south quadrant. This also includes forested areas and wildfire fuels (slash) in eastern portion and along railroad, near residential development and public works headquarters. Drought conditions in recent years has resulted in tree mortality in surrounding area, particularly young Douglas fir and madrone species creating increase in standing and down flammable fuels. History primarily limited to minor fires, probability high similar pattern will continue. Vulnerability is moderated by response capability, though maximum threat involves potential for damage to numerous structures and forest tracts. See also wildfire hazard profile in Chapter 3, main document.

Winter Storm

Hazard (Category)	Raw Score	Weighted Score
Winter Storm (Overall)	32	176
Winter Storm (History)	10	20
Winter Storm (Probability)	8	56
Winter Storm (Vulnerability)	8	40
Winter Storm (Maximum Threat)	6	60

Winter Storm notes: Like most cities Veneta contains an extensive network of above ground electrical lines vulnerable to damage from falling limbs and trees during winter storms. Recent history has been frequent including notable damage and power loss in 2014 and 2015. Wind was contributing factor in recent winter storms. A warming center has been established to provide shelter for vulnerable populations in cold weather. Probability is considered high that patterns of previous occurrence will continue. Overall population potentially affected by winter storm is high since effects are not geographically contained. Transportation and roadways are vulnerable to closure during winter storms, though the city benefits from primarily level terrain with exception of western outskirts. Maximum threat is more moderate however due to somewhat limited threat of structural damage directly related to winter weather (cold, snow, ice). See also winter storm hazard profile in Chapter 3, main document.

Windstorm

Hazard (Category)	Raw Score	Weighted Score
Windstorm (Overall)	29	164
Windstorm (History)	10	20
Windstorm (Probability)	7	49
Windstorm (Vulnerability)	5	35
Windstorm (Maximum Threat)	7	70

Windstorm notes: Similar to winter storm, windstorm can and frequently does impact above ground electrical lines vulnerable to damage from falling limbs and trees. Recent history includes notable damage and power loss in 2014 and 2015. Numerous large trees fell at the city park in December 2015 windstorm, also damaging roof of city library. Emergency measures were taken to fall a tree threatening the city library. This same event resulted in residential structure damage in western portion of city. Probability is considered moderate-high that patterns of previous occurrence will continue. Overall vulnerability is considered moderate, roadways are notably vulnerable to closure similar to winter storms. The Columbus Day storm of 1962 can serve as an example for maximum threat, with winds measured at 86 mph in Eugene and presumably similar in Veneta. A windstorm of similar magnitude to the Columbus Day Storm could potentially damage numerous of homes in city, either by direct structural damage, falling trees, or wind blown debris. Due to its location on eastern slope of Coast Range foothills the city may have a slight protective factor from extreme wind as compared to fully exposed areas. See also windstorm hazard profile in Chapter 3, main document.

Flood

Hazard (Category)	Raw Score	Weighted Score
Flood (Overall)	26	139
Flood (History)	10	20
Flood (Probability)	7	49
Flood (Vulnerability)	4	20
Flood (Maximum Threat)	5	50

Flood notes: Flood is a geographically contained hazard and widespread impacts in Veneta are unlikely. Neighborhood flooding issues at Cherry Lane-Oak Island Drive, and Territorial Hwy-Cheney Drive are notable. Though located just outside city limits, road inundation on Territorial Hwy north of the city is relatively frequent concern and Long Tom River floodplain in similar vicinity. History of flooding is well noted, future probability relatively high. Overall vulnerability and maximum threat scores are somewhat lower as widespread severe damage from flooding has relatively low probability. See also flood hazard profile in Chapter 3, main document.

Hazardous Materials Incident

Hazard (Category)	Raw Score	Weighted Score
Hazardous Materials Incident (Overall)	17	106
Hazardous Materials Incident (History)	4	8
Hazardous Materials Incident (Probability)	4	28
Hazardous Materials Incident (Vulnerability)	4	20
Hazardous Materials Incident (Maximum Threat)	5	50

Hazardous Materials Incident notes: Hazardous materials incident is considered a technical hazard and involves different characteristics than natural hazards. Proximity to transport corridors and particularly intersections are significant geographic factor. Highway 126 and a rail line run east-west through Veneta. History, probability, vulnerability are considered moderate relative to other hazard types. Maximum threat could involve such events as railroad or truck accident involving toxic release. Rupture of underground gas lines is also possible. In the event of occurrence, prevailing wind and proximity to waterways are important factors relating to public safety risk and environmental impacts. Overall risk is mitigated by excellent response capability. See also hazardous materials incident profile in Chapter 3, main document.

Earthquake

Hazard (Category)	Raw Score	Weighted Score
Earthquake (Overall)	15	103
Earthquake (History)	2	4
Earthquake (Probability)	2	14
Earthquake (Vulnerability)	5	20
Earthquake (Maximum Threat)	6	60

Earthquake notes: Earthquake is somewhat unique as it occurs much less frequently but has potential for significant damage and disruption. From a geographic standpoint occurrence would presumably effect the entire city uniformly. History of occurrence dates back over long time scales. Probability is low in any given year. Vulnerability is complex to assess due to varying standards of construction but most newer construction is considered relatively sound. Maximum threat is expected to involve minor-moderate damage to numerous structures. Importance of resiliency of infrastructure is notable. See also earthquake profile in Chapter 3, main document.

Drought

Hazard (Category)	Raw Score	Weighted Score
Drought (Overall)	11	89
Drought (History)	1	2
Drought (Probability)	1	7
Drought (Vulnerability)	2	10
Drought (Maximum Threat)	7	70

Drought notes: Drought is neither life threatening nor presents a direct risk to structures, but does involve potential for significant disruption if dramatic water shortage were to develop. Drought can exacerbate wildfire risk as related hazards, and a water shortage would likely effect the entire city uniformly. History and probability are considered relatively low. Vulnerability is relatively low as Veneta maintains redundancy to its water supply network. Maximum threat is relatively high if an event occurred where all water supply systems go were to become inoperable or water supply unexpectedly ran short. See also drought profile in Chapter 3, main document.

Pandemic

Hazard (Category)	Raw Score	Weighted Score
Pandemic (Overall)	12	78
Pandemic (History)	2	4
Pandemic (Probability)	2	14
Pandemic (Vulnerability)	4	20
Pandemic (Maximum Threat)	4	40

Pandemic notes: Pandemic is a unique hazard which presents significant public safety risk but no potential for damage to structures. Geographic potential is uniform. History and probability are both low when considering major outbreak of disease. Vulnerability and maximum threat are moderate considering most credible scenarios. See also pandemic profile in Chapter 3, main document.

Volcano

Hazard (Category)	Raw Score	Weighted Score
Volcano (Overall)	9	66
Volcano (History)	1	2
Volcano (Probability)	2	14
Volcano (Vulnerability)	2	10
Volcano (Maximum Threat)	4	40

Volcano notes: Volcano is similar to earthquake in that it occurs very infrequently. Veneta is situated approximately 80 miles from the closest volcano source, far enough to minimize probable impacts to minor ash-fall across the city if wind patterns allow. History, probability and vulnerability are relatively low, maximum threat considered moderate. See also volcano profile in Chapter 3, main document.

Landslide

Hazard (Category)	Raw Score	Weighted Score
Landslide (Overall)	6	47
Landslide (History)	0	0
Landslide (Probability)	1	7
Landslide (Vulnerability)	2	10
Landslide (Maximum Threat)	3	30

Landslide notes: Landslide is considered to have very low history, probability, and vulnerability rankings, as the majority of Veneta is situated on level terrain. Maximum threat would likely involve a slide in Bolton Hill area on south-western portion of city. Infrastructure could be affected, but most likely in combined scenario initiated by earthquake. See also landslide profile in Chapter 3, main document.

Dam Failure

Hazard (Category)	Raw Score	Weighted Score
Dam Failure (Overall)	n/a	n/a
Dam Failure (History)	n/a	n/a
Dam Failure (Probability)	n/a	n/a
Dam Failure (Vulnerability)	n/a	n/a
Dam Failure (Maximum Threat)	n/a	n/a

Dam Failure notes: Dam failure was not fully evaluated due to low probability of impact or occurrence. There is no history of dam failure affecting Veneta and geographic location and relative elevation makes direct impact under credible scenarios impossible. Vulnerability and maximum threat are considered non-applicable. See also dam failure profile in Chapter 3, main document.

Tsunami

Tsunami notes: Tsunami was not fully evaluated due to low probability. Notable are potential indirect effects of evacuation from coastal areas, and importance of Veneta as a staging area in tsunami scenario. See also tsunami profile in Chapter 3, main document.

City of Veneta: Mitigation Projects

This section describes mitigation projects identified by Veneta during the planning process. See Chapter 4, main document for additional information regarding mitigation action item methodology and prioritization.

Veneta Mitigation Action Items

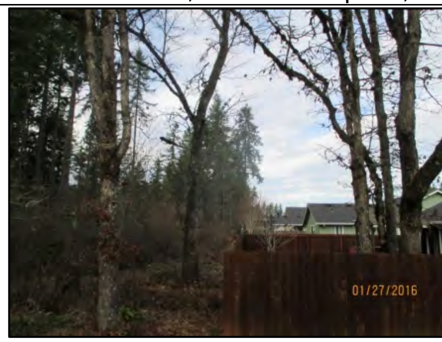
Mitigation Action Item (a). Retrofit Jeans Road Lift Station sewer lift station at Territorial/Hwy 126. Construct above grade housing, install new elevated pumps, install generator.

Location	44.05465N, -123.35283W	
Coordinating Agencies	Veneta Public Works	
Implementation Timeframe	6-18 months	
Estimated Cost	est. $80,000 – 140,000	
Potential Funding Sources	HUD-CDBG, FEMA PA-106	
Hazards Mitigated	Flooding, Winter Storm, Windstorm	
Comments	Mitigate flooding and storm related impacts. Action is identified in City Master Plan. Flooding of pump bays can damage pump motor, Winter/windstorm related power failure can cause sewage to back up within 45 minutes. Above grade, storm-hardened elevated structure and system with emergency back-up power source will mitigate potential impact.	
Current Site Photos		

Mitigation Action Item (b.1). Install generator and manual override for card-lock fueling stations. (2). Install generators at public health and emergency shelter facilities including but not limited to: clinic, senior center/food bank, church/shelter, Veneta Elementary School, Community Center.

Location	44.05581N, -123.35119W	
Coordinating Agencies	City of Veneta, Lane Fire Authority, CFN	
Implementation Timeframe	12 months	
Estimated Cost	est. $30,000 – 40,000	
Potential Funding Sources	FEMA	
Hazards Mitigated	Windstorm, winter storm	
Comments	Establish disaster resilient fuel source for first responder and city vehicles. Ensure power source for emergency and shelter related facilities.	
Current Site Photo		

Mitigation Action Item (c). Wildfire fuels reduction at locations including but not limited to: undeveloped lots in eastern portion of city, East Hunter Road, east of Public Works, west side exposure of Bolton Hill.

Location	44.04878N, -123.34126W // 44.05112N, -123.34488W	
Coordinating Agencies	Lane Fire Authority, ODF, City of Veneta	
Implementation Timeframe	12 months	
Estimated Cost	Est. $60,000 – 70,000	
Potential Funding Sources	FEMA, ODF	
Hazards Mitigated	Flooding	
Comments	Fuels reduction, defensible space, east Veneta.	
Current Site Photo		

Mitigation Action Item (d). Seismic retrofit, Bolton Hill / Dogwood Water Storage and Conveyance System

Location	44.04213N, -123.36417W	
Coordinating Agencies	City of Veneta	
Implementation Timeframe	18-24 months	
Estimated Cost	Est. $30,000 – 40,000 (Phase 1: tank base); Est. $3,000,000 – 4,000,000 (Phase 2: main trunk lines)	
Potential Funding Sources	FEMA, HUD-CDBG, OSRGP	
Hazards Mitigated	Earthquake	
Comments	Phase 1: install tank base reinforcement flange, anchoring. Phase 2: main trunk lines, seismic retrofit.	
Current Site Photo		

Mitigation Action Item (e). Elevate low sections of East Hunter Road and roadway / bridge north of Veneta.

Location	Eastern and northern portions of city including Territorial State Hwy extending beyond city limits.
Coordinating Agencies	City of Veneta, ODOT, USACE,
Implementation Timeframe	12-36 months
Estimated Cost	est. $2,000,000 – 4,000,000
Potential Funding Sources	FEMA, DOT, USACE
Hazards Mitigated	Flooding
Comments	Mitigate flooding impacts, road inundation. Rock frequently washes out on East Hunter Road. Territorial Road inundation causes long detour around Suttle Road or Trail Hill Road.
Current Site Photo	 

Mitigation Action Item (f). Storm hardening retrofit for Emergency Shelter / community center.

Location	44.05003N, -123.34695W
Coordinating Agencies	City of Veneta
Implementation Timeframe	12-24 months
Estimated Cost	est. $20,000 – 40,000
Potential Funding Sources	FEMA
Hazards Mitigated	Windstorm, winter storm
Comments	Reinforce roof and general structure for wind resiliency / mitigation.
Current Site Photo	

Mitigation Action Item (g). Residential floodproofing, elevation, mitigation reconstruction: Cheney Drive / Territorial Hwy.

Location	44.04168N, -123.35190W
Coordinating Agencies	City of Veneta
Implementation Timeframe	12-24 months
Estimated Cost	est. $10,000 – 150,000
Potential Funding Sources	FEMA
Hazards Mitigated	Flooding
Comments	Mitigate residential flooding, possible mitigation reconstruction.

Mitigation Action Item (h). Public education, outreach, community preparedness and resiliency.

Location	44.0513N, -123.3608W
Coordinating Agencies	City of Veneta
Implementation Timeframe	12 months
Estimated Cost	est. $20,000 –30,000
Potential Funding Sources	FEMA
Hazards Mitigated	All hazards
Comments	Educate community on preparedness measures, hazard mitigation activities. The City has recently taken steps toward community resiliency and preparedness through the promotion of emergency water bottles, service organization presentations, local festival display, promotion of the Community Emergency Notification System, and staff training.

Mitigation Action Item (i). Purchase portable 1000-2000 gallon lightweights tanks that can be transported if necessary on a flatbed truck or trailer. Purchase distribution equipment that will transfer water from tanks to water jugs.

Location	City of Veneta
Coordinating Agencies	City of Veneta
Implementation Timeframe	12 months
Estimated Cost	est. $30,000 – 60,000
Potential Funding Sources	FEMA
Hazards Mitigated	All hazards
Comments	Veneta has Well 4 and Well 12 that can be pumped for potable water. However, the City lacks the mechanism necessary for dispersal. Drought, wildfire, and general emergency mitigation.

City of Veneta: Hazard Mitigation Plan Implementation and Maintenance

To ensure the incorporation of the overall goals and strategy of the hazard mitigation plan, City of Veneta hazard mitigation team members will be invited to participate in future plan development or existing plan update committees. Additionally, this Hazard Mitigation Action Plan will be cited as a technical reference for future plan update processes. Planning documents and mechanisms applicable to this process may include the following:

City of Veneta Comprehensive Plan

Capital Improvement Plans

Emergency Management Plan

Land Development Ordinance(s)

- Floodplain
- Stormwater
- Erosion Control

Additionally, progress to implement this plan will be monitored on an ongoing basis by city administration. Annual reviews and update under a 5-year cycle will be pursued. Using these methods the overarching goal of a stronger, safer, more resilient community can be attained.

City of Westfir
Hazard Mitigation Reference

A quiet little town in a beautiful place

Version 1.0 (March 2017)

Introduction: City of Westfir

This purpose of this annex to the Lane County Multi-Jurisdiction Hazard Mitigation Plan is to consolidate information specific to the City of Westfir and serve as an executive summary. 44 CFR 201 requirements are addressed in the main document, this annex provides supplemental information. For more information regarding Code of Federal regulations for Local Hazard Mitigation Planning see overview in Chapter 1 and citations and abstracts for Chapters 2, 3, 4, 5 of the main document.

The 2017 Lane County Multi-Jurisdiction Hazard Mitigation Plan sanctioned by OEM and FEMA is the first for which the City of Westfir has been a formal participant. Like other formal participants (Lane County, Coburg, Creswell, Veneta, Dunes City, Florence, and Oakridge), being a participant in an approved multi-jurisdiction hazard mitigation plan creates eligibility for the following important federal grant programs:

- Hazard Mitigation Grant Program (HMGP)
- Pre-Disaster Mitigation Grants (PDM)
- Flood Mitigation Assistance Grants (FMA)

In addition to creating eligibility for federal grants, this document serves as 5-year road map for activities with the purpose and potential to make Westfir a stronger, safer, and more resilient community.

Sub-sections of this annex to the Lane County Multi-Jurisdiction Hazard Mitigation Plan describe the following:

- Individual participants and contributors, meetings and work sessions conducted during the plan development process.
- Results of the OEM prescribed hazard quantification process for each hazard type and discussion of previous occurrences, probability of future occurrence, potential vulnerability of public and private assets, and maximum credible threat posed by each hazard.
- Details regarding mitigation projects identified as priorities, including location, photos, estimated cost, grant funding options, implementation timeframe, and hazards addressed.
- Details for mitigation project implementation, review of local program, and plan update 5-year cycle.

City of Westfir: Hazard Mitigation Meetings and Work Sessions

Development of City of Veneta material for the hazard mitigation plan involved participation by city, county, fire district, law enforcement, and project assistants. The process followed FEMA's prescribed model for organizing resources, identifying hazards, evaluating risk, identifying mitigation options, prioritizing mitigation projects. For additional details regarding the planning process, refer to Chapter 2 (Planning Process), main document.

Specific participants are listed as follows:

City of Oakridge Hazard Mitigation Team

Name	Title	Agency
Heidi Weiland	City Recorder	City of Westfir
Larisa Worthington	City Recorder	City of Westfir
Jackson Stone	Public Works Manager	City of Westfir
Matt Meske	Mayor	City of Westfir
Linda Cook, PMP	Emergency Manager	Lane County Sheriff's Office
Greg J. Wobbe, CFM	Principal	OCR West, MPTX Associates

Individual City Work Sessions

Work sessions with individual cities were conducted following the initial project orientation meeting and intervening months between general planning group meetings. These individual work sessions are outlined below.

City of Westfir Work Sessions

Date	Location	Meeting/Work Session
June 29, 2015	Westfir City Hall	Project overview, basic data collection
July 27, 2015	Westfir City Hall	Risk assessment, Hazard quantification
September 23, 2015	Westfir City Hall	Hazard quantification-seismic assessment review, SRGP, FEMA mitigation grant programs, mitigation ideas
January 4, 2016	Westfir City Hall	City council, mitigation project discussion
June 27, 2016	Westfir City Hall	Mitigation project review

City of Westfir: Hazard Quantification

An interesting element of the hazard mitigation process is risk assessment. Risk assessment begins by identifying the full range of potential hazards which may occur in the community. Once identified, these potential hazards are evaluated to determine relative importance and aids prioritization of mitigation activities.

There are various means for evaluating hazards and the risk they present. "Hazard Quantification" is a scoring method prescribed by the State of Oregon Office of Emergency Management (OEM) is used to assist with prioritizing hazards and understanding risk. It doesn't predict the occurrence of a particular hazard, but it does "quantify" the risk of one hazard compared with another. By doing this analysis, planning can first be focused where the risk is greatest. Among other things, this hazard analysis can:

- help establish priorities for planning, capability development, and hazard mitigation;
- serve as a tool in the identification of hazard mitigation measures;
- be one tool in conducting a hazard-based needs analysis;
- serve to educate the public and public officials about hazards and vulnerabilities;
- help communities make objective judgments about acceptable risk.

One of the many strengths of the hazard quantification approach is it employs a consistent methodology with the intent of objective results and findings. The methodology was first developed by the Federal Emergency Management Agency (FEMA) circa 1983, and gradually refined by Oregon Emergency Management (OEM) over the years. The methodology produces scores that range from 24 (lowest possible) to 240 (highest possible). By applying one order of magnitude from lowest to highest, a hazard with a score of 240 is considered ten times more severe than a hazard with a rating of 24.

Maximum threat, vulnerability, and probability assessment are key components of the methodology. Maximum threat considers degree of impact under a worst case scenario, regardless of probability. Vulnerability examines potential impacts to populations, the built environment, and natural environment for 'typical' events.

Probability reviews frequency of past events as a means of predicting likelihood of future occurrence. Somewhat less vital to overall hazard quantification score (but still relevant) is history of occurrence. The four OEM prescribed hazard quantification categories are listed and described below.

Hazard Quantification Categories

1) History (previous occurrences, primarily within last century)

2) Probability (calculated likelihood of future occurrence)

3) Vulnerability (number, degree or extent of people or assets at risk per hazard)

4) Maximum threat (credible worst-case scenario)

Weight Factors

Weighting factors were developed for each of the four hazard quantification categories. This is done to emphasize certain categories over others in terms of risk assessment.

1) History (weight factor x 2)

2) Probability (weight factor x 7)

3) Vulnerability (weight factor x 5)

4) Maximum threat (weight factor x 10)

Scoring Guidelines

Scoring guidelines were developed by OEM as a method of standardizing assessment and to minimize subjectivity.

History (weight factor for category = 2). History is the record of previous occurrences. Events to include in assessing history of a hazard event for which the following types of activities were required:

- The EOC or alternate EOC was activated;
- Three or more EOP functions were implemented, e.g., alert & warning, evacuation, shelter, etc.
- An extraordinary multi-jurisdictional response was required; and/or
- A "Local Emergency" was declared.

LOW – score at 1 to 3 points based on… 0 - 1 event past 100 years

MEDIUM – score at 4 to 7 points based on… 2 - 3 events past 100 years

HIGH – score at 8 to 10 points based on… 4 + events past100 years

Probability (weight factor for category = 7)

Probability is the likelihood of future occurrence within a specified period of time.

LOW – score at 1 to 3 points based on… one incident likely within 75 to 100 years

MEDIUM – score at 4 to 7 points based on… one incident likely within 35 to 75 years

HIGH – score at 8 to 10 points based on… one incident likely within 10 to 35 years

Vulnerability (weight factor for category = 5)

Vulnerability is the percentage of population and property likely to be affected under an “average” occurrence of the hazard.

LOW – score at 1 to 3 points based on… < 1% affected

MEDIUM – score at 4 to 7 points based on… 1 - 10% affected

HIGH – score at 8 to 10 points based on… > 10% affected

Maximum Threat (weight factor for category = 10)

Maximum threat is the highest percentage of population and property that could be impacted under a worst-case scenario.

LOW – score at 1 to 3 points based on… < 5% affected

MEDIUM – score at 4 to 7 points based on… 5 - 25% affected

HIGH – score at 8 to 10 points based on… > 25% affected

To tabulate, scores for each category are multiplied by the associated weight factors to create a ‘sub-score’. Adding the sub-scores for history, vulnerability, maximum threat, and probability for each hazard produces a ‘total hazard quantification score’ for each hazard.

The following table summarizes hazard quantification results, followed by a detailed discussion for each hazard.

City of Westfir: Hazard Quantification Results (DRAFT)

Hazard Type / Weight Factor (WF)	History WF x 2	Probability WF x 7	Vulnerability WF x 5	Maximum Threat WF x 10	Raw Score	Weighted Score	Weighted Score Rank
Wildfire	10	10	8	10	**38**	**230**	**1**
Winter Storm	7	10	8	9	**34**	**214**	**2**
Drought	5	8	9	9	**31**	**201**	**3**
Windstorm	8	8	7	7	**30**	**177**	**4**
Flood	6	8	4	8	**26**	**168**	**5**
Haz Mat Incident	4	2	9	9	**24**	**157**	**6**
Volcano	1	1	3	6	**11**	**84**	**7**
Landslide	1	3	4	4	**12**	**83**	**8**
Pandemic	2	2	4	4	**12**	**78**	**9**
Earthquake	1	1	2	5	**9**	**69**	**10**
Dam Failure	0	1	4	4	**9**	**67**	**11**
Tsunami	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Source: City of Westfir Hazard Mitigation Team

Individual Hazard Discussion, City of Westfir

Wildfire

Hazard (Category)	Raw Score	Weighted Score
Wildfire (Overall)	38	230
Wildfire (History)	10	20
Wildfire (Probability)	10	70
Wildfire (Vulnerability)	8	40
Wildfire (Maximum Threat)	10	100

Wildfire notes: Wildfire is a significant risk to the City of Westfir, which is largely bounded by the urban wildland interface, and exposed to wildfire. A significant number of structures and properties lay near this wildland-urban interface, particularly along Westfir Rd. and Westfir Oakridge Rd. History of wildfires in the area is high with several events occurring over time. Probability is high that conditions for wildfires will reoccur in the future. Vulnerability is also high, with a significant percentage of structures in the city on the urban-wildland interface. Maximum threat is high, involving potential for damage to numerous structures and forest tracts. See also wildfire hazard profile in Chapter 3, main document.

Winter Storm

Hazard (Category)	Raw Score	Weighted Score
Winter Storm (Overall)	34	214
Winter Storm (History)	7	14
Winter Storm (Probability)	10	70
Winter Storm (Vulnerability)	8	40
Winter Storm (Maximum Threat)	9	90

Winter Storm notes: Westfir, like most cities in Oregon faces a regular occurrence of winter storms, which occur at least once in most years. This is undoubtedly true for Westfir where the city is regularly impacted by snow due to the city's elevation, making it something of a normal occurrence, with a moderate history of occurrence. The city contains a network of above ground electrical lines vulnerable to damage from falling limbs and trees during winter storms. Recent history has seen storms causing some damage and power loss in 2014, 2015 and 2016. Wind is nearly always a contributing factor in winter storms. Probability is considered high that patterns of previous occurrence will continue. The percentage of population vulnerable to winter storm is high as the effects are not geographically contained, and the city itself is situated in a geographic area where weather can intensify. Transportation and roadways are also vulnerable to closure during winter storms. Maximum threat is also high due to the threat of structural damage directly related to winter weather (cold, snow, ice). See also winter storm hazard profile in Chapter 3, main document.

Drought

Hazard (Category)	Raw Score	Weighted Score
Drought (Overall)	31	201
Drought (History)	5	10
Drought (Probability)	8	56
Drought (Vulnerability)	9	45
Drought (Maximum Threat)	9	90

Drought notes: Drought is neither life threatening nor presents a direct risk to structures, but does involve potential for some disruption if dramatic water shortage were to develop. Drought can exacerbate wildfire risk as related hazards, and a water shortage may affect the entire city uniformly. History is considered moderate, with 2 to 3 events occurring over the last 100 years. The probability of this re-occurring is high, part of a normal cycle over time. Vulnerability is high, in part due to the sensitivity of the surrounding forests to drought and the potential for increased fire hazards and the proximity of the urban-wildland interface all around the city. Maximum threat is high, particularly when combined with an active fire season. See also drought profile in Chapter 3, main document.

Windstorm

Hazard (Category)	Raw Score	Weighted Score
Windstorm (Overall)	30	177
Windstorm (History)	8	16
Windstorm (Probability)	8	56
Windstorm (Vulnerability)	7	35
Windstorm (Maximum Threat)	7	70

Windstorm notes: Similar to winter storm, windstorm can and frequently does impact above ground electrical lines vulnerable to damage from falling limbs and trees. Recent history-includes damage caused by storms in a nearly yearly basis. Probability is similarly considered high that patterns of previous occurrence will continue. Overall vulnerability is moderate with fewer structures fully exposed to extremely high winds. It should be noted that roadways are vulnerable to closure due to downed trees, and loss of power from damaged powerlines which in some cases traverse terrain difficult to access. The Columbus Day storm of 1962 can serve as an example for maximum threat, reports at the time noted 40 trees downed over Hwy 58, in just a single mile of roadway, trapping 19 vehicles. A windstorm of similar magnitude to the Columbus Day Storm could potentially damage numerous of homes in city, either by direct structural damage, falling trees, or wind-blown debris. The access routes the city is dependent upon, both by road and rail, are more exposed. See also windstorm hazard profile in Chapter 3, main document.

Flood

Hazard (Category)	Raw Score	Weighted Score
Flood (Overall)	26	168
Flood (History)	6	12
Flood (Probability)	8	56
Flood (Vulnerability)	4	20
Flood (Maximum Threat)	8	80

Flood notes: Flood is a geographically contained hazard, which in the valley that is home to Westfir, is one with real potential for occurrence. The area is a sloped valley in the foothills of the Cascade Range surrounded by the Willamette National Forest. Five streams pass through this relatively small area between mountain ridges: Salmon Creek, Salt Creek, Hills Creek, and the Middle and North forks of the Willamette River. These five tributaries join to create the Middle fork of the Willamette River, North West into Lookout Point Lake, a U.S. Corps of Engineers Willamette Valley Project Dam. The North Fork of the Willamette River flows through Westfir, to join with the Middle Fork of the Willamette River in the middle of town. Westfir is within 10 miles of the Hills Creek Dam to the south east, another U.S. Army Corps of Engineer's project, controlling seasonal flooding in the larger Willamette Valley.

The history of flooding in Westfir is moderate as the geography the city is built upon is created from repeated floods in the past over great lengths of time. It is a significant egress for melting winter snows out of the surrounding mountainside. The future probability for flooding is relatively high. Vulnerability is moderate with 1 to 10% of the population vulnerable to flood. Maximum threat is high, with significant damage from flooding possible in a worst case scenario. See also flood hazard profile in Chapter 3, main document.

Hazardous Materials Incident

Hazard (Category)	Raw Score	Weighted Score
Haz Mat Incident (Overall)	24	157
Haz Mat Incident (History)	4	8
Haz Mat Incident (Probability)	2	14
Haz Mat Incident (Vulnerability)	9	45
Haz Mat Incident (Maximum Threat)	9	90

Hazardous Materials Incident notes: Hazardous materials incident is considered a technical hazard and involves different characteristics than natural hazards. Nearby Oakridge is historically a railroad town, at one time one of the major routes between eastern Oregon and the Willamette Valley. Northern Pacific Railroad still utilizes this route for commerce and transport – including transport of hazardous materials. The Northern Pacific runs just north of Westfir, north of the North Fork Willamette and east of the Middle Fork Willamette north of the confluence of the rivers. Highway 58 is a major transport thoroughfare from Eastern Oregon to the Willamette Valley, which of course includes the road transport of hazardous materials. History of Hazardous Materials incidents is moderate, two to three incidents in recent history requiring a response. Probability is low another incident in the near future. Vulnerability is considered high, potentially affecting 10% of the population. Maximum threat could involve such events as railroad or truck accident involving toxic release, and is considered to be high. Rupture of underground gas lines is also possible. In the event of occurrence, prevailing wind and proximity to waterways are important factors relating to public safety risk and environmental impacts. See also hazardous materials incident profile in Chapter 3, main document.

Volcano

Hazard (Category)	Raw Score	Weighted Score
Volcano (Overall)	11	84
Volcano (History)	1	2
Volcano (Probability)	1	7
Volcano (Vulnerability)	3	15
Volcano (Maximum Threat)	6	60

Volcano notes: Volcano is similar to earthquake in that it occurs very infrequently. Westfir is situated in the foothills of the Cascade Mountain Range, placing it in closer proximity to dormant Volcanos, the closest being Diamond Peak, a shield volcano approximately 35 miles from the city to the south east. History and probability are relatively low, vulnerability is low, maximum threat considered moderate should it occur nearby. The last eruption at Diamond Peak occurred over 11,000 years ago. See also volcano profile in Chapter 3, main document.

Landslide

Hazard (Category)	Raw Score	Weighted Score
Landslide (Overall)	12	83
Landslide (History)	1	2
Landslide (Probability)	3	21
Landslide (Vulnerability)	4	20
Landslide (Maximum Threat)	4	40

Landslide notes: Landslide is considered to have very low history and probability in Westfir itself, though it is higher in the surrounding hillsides. Vulnerability is moderate due to the potential for closures of Hwy 58. Maximum threat is also moderate for the same reason - transportation infrastructure could be affected. See also landslide profile in Chapter 3, main document.

Pandemic

Hazard (Category)	Raw Score	Weighted Score
Pandemic (Overall)	12	78
Pandemic (History)	2	4
Pandemic (Probability)	2	14
Pandemic (Vulnerability)	4	20
Pandemic (Maximum Threat)	4	40

Pandemic notes: Pandemic is a unique hazard which presents significant public safety risk but no potential for damage to structures. Geographic potential is uniform. History and probability are both low when considering major outbreak of disease. Vulnerability and maximum threat are moderate considering most credible scenarios. See also pandemic profile in Chapter 3, main document.

Earthquake

Hazard (Category)	Raw Score	Weighted Score
Earthquake (Overall)	9	69
Earthquake (History)	1	2
Earthquake (Probability)	1	7
Earthquake (Vulnerability)	2	10
Earthquake (Maximum Threat)	5	50

Earthquake notes: Earthquake is somewhat unique as it occurs much less frequently but has potential for significant damage and disruption. Westfir, like Oakridge, is located near three crustal earthquake faults, and small (1-3 in magnitude) have occurred in the area, doing little damage and often going unfelt by residents. From a geographic standpoint occurrence would presumably affect the entire city uniformly, should a higher magnitude event occur. History of occurrence dates back over long time scales, and in the short term is considered low. Probability is low in any given year. Vulnerability is complex to assess due to varying standards of construction but most new and newer construction is considered relatively sound. Maximum threat is moderate in awareness of the Cascadia Subduction Zone off the Oregon Coast; Westfir can expect to feel the shaking associated with that event, causing very strong shaking according to DOGAMI and the State of Oregon Office of Emergency Management. Minor to moderate damage to numerous structures can be expected in an event of that magnitude and scope. Importance of resiliency of infrastructure is notable. See also earthquake profile in Chapter 3, main document.

Dam Failure

Hazard (Category)	Raw Score	Weighted Score
Dam Failure (Overall)	9	67
Dam Failure (History)	0	0
Dam Failure (Probability)	1	7
Dam Failure (Vulnerability)	4	20
Dam Failure (Maximum Threat)	4	40

Dam Failure notes: There is no history of dam failure affecting Westfir and geographic location makes impacts a low probability. Vulnerability is moderate considering the proximity of the Hills Creek Dam located less than 10 miles from the city to the south east. Maximum threat is moderate. See also dam failure profile in Chapter 3, main document.

City of Westfir: Mitigation Project Details

This section describes mitigation projects identified by the City of Westfir during the planning process. See Chapter 4, main document for additional information regarding mitigation action item methodology and prioritization.

Mitigation Action Item (a): Mitigation reconstruction for City Hall.

Location	City Hall
Coordinating Agencies	Westfir City Hall, Westfir Public Works
Implementation Timeframe	24-36 month
Estimated Cost	$450,000 – 500,000
Potential Funding Sources	HUD-CDBG, OR-SRGP, HMGP, PDM, FEMA PA-106
Hazards Mitigated	Winter storm, windstorm, earthquake
Comments	Current location vulnerable to hazmat incident due to proximity to railroad line. Current structure is additionally vulnerable to wildfire, windstorm, earthquake and winter storm impacts.

Mitigation Action Item (b): Defensible space fuels reduction.

Location	Various – reduction of wildfire fuels
Coordinating Agencies	Westfir Public Works
Implementation Timeframe	12 – 24 months
Estimated Cost	$40,000
Potential Funding Sources	ODFW, HUD-CDBG, OR-SRGP, HMGP, PDM, FEMA PA-106
Hazards Mitigated	Wildfire
Comments	Reduction of fuels around structures in the city to reduce fire hazards

Mitigation Action Item (c): Develop additional storage capability for water supply, fire suppression.

Location	TBD
Coordinating Agencies	Westfir Public Works
Implementation Timeframe	12-24 months
Estimated Cost	$50,000
Potential Funding Sources	OR-SRGP, HMGP, PDM, FEMA, PA-106
Hazards Mitigated	Wildfire, drought
Comments	Current storage capacity is inadequate, upgrades needed.

Mitigation Action Item (d): Structure elevation, mitigation reconstruction, and/or acquisition relocation for flood prone properties.

Location	City of Westfir Special Flood Hazard Area (SFHA)
Coordinating Agencies	Westfir, OEM, FEMA, NFIP
Implementation Timeframe	12-18 months
Estimated Cost	$750,000
Potential Funding Sources	FEMA HMA, FMA
Hazards Mitigated	Flooding
Comments	

<u>Mitigation Action Item (e):</u> Drainage improvements for 1st/2nd Street Loop.

Location	Central Westfir
Coordinating Agencies	OEM, Westfir, Lane County Public Works
Implementation Timeframe	12-18 months
Estimated Cost	$80,000
Potential Funding Sources	OR-SRGP, HMGP, PDM, FEMA PA-106
Hazards Mitigated	Flood
Comments	Neighborhood in central Westfir experiences frequent flooding of certain homes due to elevation of structures and surrounding terrain.

City of Westfir: Hazard Mitigation Plan Implementation and Maintenance

To ensure the incorporation of the overall goals and strategy of the hazard mitigation plan, City of Westfir hazard mitigation team members will be invited to participate in future plan development or existing plan update committees. Additionally, this Hazard Mitigation Action Plan will be cited as a technical reference for future plan update processes. Planning documents and mechanisms applicable to this process may include the following:

City of Westfir Comprehensive Plan

Emergency Operations Plan

Local Community Wildfire Protection Plans

City of Westfir Floodplain Development Regulations

Building Code

Additionally, progress to implement this plan will be monitored on an ongoing basis by city administration. Annual reviews and update under a 5-year cycle will be pursued. Using these methods the overarching goal of a stronger, safer, more resilient community can be attained.