



# Marion County Multi-Jurisdictional Hazard Mitigation Plan

Marion County and the Cities of:  
Aumsville, Aurora, Detroit, Gates, Idanha, Keizer,  
Silverton, Stayton, Turner and Woodburn



June 2016

Volume I: Basic Plan

**Prepared for:**  
Marion County Emergency Management

**Prepared by:**  
University of Oregon  
Community Service Center  
Community Planning Workshop &  
Oregon Partnership for Disaster Resilience



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# Marion County HMP Update Steering Committees

## Marion County

| Name              | Position                           | Organization                                 |
|-------------------|------------------------------------|--|
| Bill Lawyer       | Director                           | City of Keizer Public Works                  |
| Boyd Keyser       | Superintendent                     | North Marion School District                 |
| Brandon Reich     | Senior Planner                     | Marion County Planning                       |
| Brent Stevenson   | Manager                            | Santiam Water Control District               |
| Caitlin Esping    | AmeriCorps VISTA                   | Marion County Emergency Management           |
| Dale Huitt        | Deputy Sheriff                     | Marion County Sheriff                        |
| Danielle Gonzalez | Management Analyst                 | Marion County Community Services             |
| David Sawyer      | Administrator                      | City of Turner                               |
| Derrel Lockard    | Superintendent                     | City of Aurora Public Works                  |
| Dianne Hunt       | Director                           | City of Silverton Administrative Services    |
| Don Charpillon    |                                    | East Salem Suburban Neighborhood Association |
| Ed Flick          | Emergency Manager                  | Marion County Emergency Management           |
| Jason Horton      | Communications Coordinator         | City of Woodburn                             |
| Jeff Fossholm     | Chief of Police                    | City of Silverton Police Department          |
| Jennifer Warner   | Technician                         | City of Keizer Public Works                  |
| Jim Ferraris      | Police Chief                       | Woodburn Police Department                   |
| Kathleen Silva    | Emergency Preparedness Coordinator | Marion County Emergency Management           |
| Kelly Richardson  | Manager/City Recorder              | City of Aurora City Hall Administration      |
| Kris Sallee       | Councilor                          | City of Aurora City Council                  |
| Mathias Reyes     | Project Manager                    | City of Keizer Public Works                  |
| Matt Knudsen      | Environmental Specialist           | Marion County Public Works                   |
| Michael Johnson   | Chair                              | East Salem Suburban Neighborhood Association |
| Randy Scott       | Director                           | City of Woodburn Public Works                |
| Rick Sebens       | Chief of Police                    | City of Stayton Police Department            |
| Roger Stevenson   | Emergency Manager                  | City of Salem Emergency Management           |

## City of Aumsville

- Richard Schmitz, Chief of Police
- Steve Oslie, Public Works Director

## City of Aurora

- Kris Sallee, City Council
- Kelly Richardson, City Recorder
- Derrel Lockard, Public Works Superintendent
- Boyd Keyser, Marion County School District

#### City of Detroit

- Christine Pavoni, City Recorder
- Robert Bruce, Certified Water Technician

#### City of Gates

- Jerry Marr, Mayor
- Traci Archer, Recorder
- Leeroy Davis

#### City of Idanha

- Karen Clark, Mayor
- Robert Bruce, Certified Water Technician

#### City of Keizer

- Bill Lawyer, Public Works Director
- Jennifer Warner, Public Works Technician
- Mathias Reyes, Drinking Water Technician
- Nate Brown, Community Development Director
- Elizabeth Sagmiller, Environmental Division Manager
- Sam Litke, Senior Planner
- Shane Witham, Associate Planner

#### City of Mill City

- David Kinney, Planning Advisor
- Stacie Cook, City Recorder

#### City of Silverton

- Dianne Hunt, Emergency Manager
- Jeff Fossholm, Police Chief

#### City of Stayton

- Dan Fleishman, Planning & Development Director
- Henry Porter, Mayor
- Rich Sebens, Emergency Manager
- Lance Ludwick, Public Works

#### City of Turner

- David Sawyer, City Administrator
- Garry Tiffin, Mayor
- Richard Bates
- Chuck Roberts
- Larry Lullay
- John Taylor

## City of Woodburn

- Jason Horton, Public Information Officer
- Randy Scott, Public Works Director
- Jim Ferraris, Chief of Police
- Paul Iverson, Fire District Chief

## **Community Service Center Team**

- Robert Parker, Director
- Josh Bruce, Director OPDR
- Michael Howard, Assistant Program Manager
- Aniko Drlik-Muehleck, Project Director
- Craig Wiroll, Project Manager
- Amanda Kohn, Research Associate
- Bree Nicoello, Research Associate
- Dan Lokic, Research Associate
- Tyce Herrman, Research Associate
- Mugs Scherer, Research Associate

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- Communications: Capital Community Television (CCTV), Amateur Radio Emergency Service (ARES), Marion Area Multi-Agency Emergency Telecommunications Dispatch Center (METCOM 911), Santiam Canyon Phone, Willamette Valley Communications Center (WVCC), Frontier, Verizon, Oregon Statewide Interoperability Coordinator (SWIC), Service Master of Salem, Pacific Gas and Electric Company (PGE).
- Energy: Pacific Gas and Electric.
- Transportation: City of Salem, City of Woodburn, Marion County Public Works, Marion County Sheriff's Office, ODOT, Salem Public Works, Salem-Keizer School District, Salem-Keizer Transit, Woodburn Transit Service.
- Water: City of Stayton, City of Salem, City of Keizer, City of Turner, Marion County, North Santiam Watershed Council.

## **About the Community Service Center**

The Community Service Center (CSC), a research center affiliated with the Department of Planning, Public Policy, and Management at the University of Oregon, is an interdisciplinary organization that assists Oregon communities by providing planning and technical assistance

to help solve local issues and improve the quality of life for Oregon residents. The role of the CSC is to link the skills, expertise, and innovation of higher education with the transportation, economic development, and environmental needs of communities and regions in the State of Oregon, thereby providing service to Oregon and learning opportunities to the students involved.

## **About the Oregon Partnership for Disaster Resilience**

The Oregon Partnership for Disaster Resilience (OPDR) is a coalition of public, private, and professional organizations working collectively toward the mission of creating a disaster-resilient and sustainable state. Developed and coordinated by the Community Service Center at the University of Oregon, the OPDR employs a service-learning model to increase community capacity and enhance disaster safety and resilience statewide.

## **Plan Template Disclaimer**

This Hazard Mitigation Plan is based in part on a plan template developed by the Oregon Partnership for Disaster Resilience. The template is structured to address the requirements contained in 44 CFR 201.6; where language is applicable to communities throughout Oregon, OPDR encourages the use of standardized language. As part of this regional planning initiative, OPDR provided copies of the plan templates to communities for use in developing or updating their hazards mitigation plans. OPDR hereby authorizes the use of all content and language provided to Marion County in the plan template.

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# PLAN SUMMARY

Marion County updated this Multi-Jurisdictional Hazard Mitigation Plan (HMP, MJHMP, or Plan) in an effort to prepare for the long-term effects resulting from hazards. It is impossible to predict exactly when these hazards will occur, or the extent to which they will affect the community. However, with careful planning and collaboration among public agencies, private sector organizations, and citizens within the community, it is possible to create a resilient community that will benefit from long-term recovery planning efforts.

The Federal Emergency Management Agency (FEMA) defines mitigation as “. . . the effort to reduce loss of life and property by lessening the impact of disasters . . . through risk analysis, which results in information that provides a foundation for mitigation activities that reduce risk.” Said another way, hazard mitigation is a method of permanently reducing or alleviating the losses of life, property, and injuries resulting from hazards through long and short-term strategies. Example strategies include policy changes, such as updated ordinances, projects, such as seismic retrofits to critical facilities; and education and outreach to targeted audiences, such as non-English speaking residents or the elderly. Hazard mitigation is the responsibility of the “Whole Community.” FEMA defines Whole Community as, “private and nonprofit sectors, including businesses, faith-based and disability organizations, and the general public, in conjunction with the participation of local, tribal, state, territorial, and Federal governmental partners.”

*44 CFR 201.6 – 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. . . .*

## Why Develop this Mitigation Plan?

The Disaster Mitigation Act of 2000 (DMA2K) and the regulations contained in 44 CFR 201 require that jurisdictions maintain an approved Natural Hazard Mitigation Plan (NHMP) in order to receive FEMA Hazard Mitigation Assistance funds for mitigation projects. To that end, Marion County is involved in a broad range of hazard and emergency management planning activities. In order to better understand risks and vulnerabilities, the county links natural hazards with human-caused hazards and technological threats. This approach improves mitigation planning by establishing a comprehensive all-hazard mitigation approach. The approach includes linkages and reference to hazardous materials and other non-natural hazard and emergency management plans. In this way, Marion County leverages the FEMA natural hazard mitigation planning process through a whole community, all-hazard lens. Local and federal approval of this Plan ensures that the county and listed jurisdictions will (1) remain eligible for pre- and post-disaster mitigation project grants and (2) promote local mechanisms to accomplish risk reduction strategies.

*44 CFR 201.6(a)(1) – A local government must have a mitigation plan approved pursuant to this section in order to receive HMGP project grants . . .*

## What is Mitigation?

“Any sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event.”

- U.S. Federal Emergency Management Agency

## Who Participated in Developing the Plan?

The Marion County MJHMP is the result of a collaborative effort between the county, cities, special districts, citizens, public agencies, non-profit organizations, the private sector and regional organizations. County and City steering committees guided the Plan development process.

For a list of individual county steering committee participants, refer to the acknowledgements section above. The update process included representatives from the following jurisdictions and agencies:

- Marion County
- City of Aurora
- City of Keizer
- City of Salem
- City of Silverton
- City of Turner
- City of Woodburn
- East Salem Suburban Neighborhood Association
- North Marion School District
- Santiam Water Control District
- Strategic Economic Development Corporation (SEDCOR)
- Lifeline Sector Communications: Capital Community Television (CCTV), Amateur Radio Emergency Service (ARES), Marion Area Multi-Agency Emergency Telecommunications Dispatch Center (METCOM 911), Santiam Canyon Phone, Willamette Valley Communications Center (WVCC), Frontier, Verizon, Oregon Statewide Interoperability Coordinator (SWIC), Service Master of Salem, Pacific Gas and Electric Company (PGE).
- Lifeline Sector Energy: Pacific Gas and Electric.
- Lifeline Sector Transportation: City of Salem, City of Woodburn, Marion County Public Works, Marion County Sherriff's Office, ODOT, Salem Public Works, Salem-Keizer School District, Salem-Keizer Transit, Woodburn Transit Service.
- Lifeline Sector Water: City of Stayton, City of Salem, City of Keizer, City of Turner, Marion County, North Santiam Watershed Council.

*44 CFR 201.6(c)(1) – Documentation of 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 Marion County Emergency Manager convened the planning process will take the lead in implementing, maintaining and updating the county plan. Each participating jurisdiction has named a local convener who is responsible for implementing, maintaining and updating their respective local plan addenda. Marion County is dedicated to directly involving the public in the continual review and update of the hazards mitigation plan. The county achieves this through systematic engagement of a wide variety of active groups, organizations or committees, including but not limited to: SEDCOR, public and private infrastructure partners, Oregon National Guard, watershed and neighborhood groups, THIRA committee, Mid-Willamette Emergency Communications Collaborative and numerous others. Although members of the Steering Committee represent the public to some extent, the public will also have the opportunity to continue to provide feedback about the Plan throughout the implementation and maintenance period. Throughout the plan update process, the county engaged over 200 stakeholders through a variety of meetings, workshops, presentations, interviews and focus group (see Appendix B for details).

## How Does this Mitigation Plan Reduce Risk?

The HMP is intended to assist Marion County reduce the risk from hazards by identifying resources, information, and strategies for risk reduction. It is also intended to guide and coordinate mitigation activities throughout the county. A risk assessment consists of three phases: hazard identification, vulnerability assessment, and risk analysis, as illustrated in the following graphic.

*44 CFR 201.6(c)(2) – A Risk Assessment that provides the factual basis for activities proposed in the strategy*

**Figure PS-I Understanding Risk**



Source: Oregon Partnership for Disaster Resilience.

By identifying and understanding the relationship between hazards, vulnerable systems, and existing capacity, Marion County is better equipped to identify and implement actions

aimed at reducing the overall risk to hazards. Notably, Marion County took the unique step of directly engaging representatives in four critical lifeline sectors: Communication, Energy, Transportation and water. Because these four lifeline sectors are critical to virtually all other activity in the county, this approach was used to better understand each sector’s unique vulnerabilities, threats, and hazard. The county utilized the information collected to inform specific, targeted actions aimed at reducing risks across each of the four lifeline sectors.

## What is Marion County’s Overall Risk to Hazards?

Marion County reviewed and updated their risk assessment to evaluate the probability of each hazard as well as the vulnerability of the community to that hazard. Scores are based on (1) the Marion County Hazard Analysis submitted to the Oregon Office of Emergency Management (2016), (2) Marion County Threat and Hazard Identification Risk Assessment Workshop, (3) incident history, and (4) the BOLD Tool. Table PS-1 below summarizes hazard probability and vulnerability as determined by the county steering committee (for more information see Section 2, Risk Assessment).

**Table PS-1 Hazard and Vulnerability Assessment Summary**

| Hazard Profile Summary for Emergency Operations Plan  |             |           |              |          |      |                       |
|---|-------------|-----------|--------------|----------|------|-----------------------|
| Hazard  | Probability | Magnitude | Warning Time | Duration | CPRI | Planning Significance |
| Earthquake  | 4           | 4         | 4            | 4        | 4    | High                  |
| Severe Weather/Storm  | 4           | 4         | 1            | 4        | 3.55 | High                  |
| Flood   | 3           | 4         | 2            | 4        | 3.25 | High                  |
| Landslide   | 3           | 3         | 4            | 4        | 3.25 | High                  |
| Civil Disorder / Terrorism  | 2           | 4         | 4            | 4        | 3.1  | High                  |
| Drought   | 3           | 4         | 1            | 4        | 3.1  | High                  |
| Hazardous Materials Incident  | 2           | 4         | 4            | 3        | 3    | High                  |
| Transportation Accident/Train Derailment  | 2           | 4         | 4            | 3        | 3    | High                  |
| School & Workplace Violence   | 2           | 4         | 4            | 2        | 2.9  | Moderate              |
| Wildland Interface Fire   | 2           | 3         | 4            | 4        | 2.8  | Moderate              |
| Biological Chemical, Sabotage and Cyber Incident and Explosives Radiological Attack-Terrorism | 2           | 3         | 4            | 3        | 2.7  | Moderate              |
| Power Failure   | 2           | 3         | 4            | 3        | 2.7  | Moderate              |
| Epidemic  | 2           | 4         | 1            | 4        | 2.65 | Moderate              |
| Pandemic  | 2           | 4         | 1            | 4        | 2.65 | Moderate              |
| Animal Disease Outbreak   | 2           | 3         | 2            | 4        | 2.5  | Moderate              |
| Dam or Levee Failure  | 1           | 4         | 2            | 4        | 2.35 | Moderate              |
| Extreme Weather - High Temperature  | 3           | 2         | 1            | 1        | 2.2  | Moderate              |
| Radiological Release  | 1           | 2         | 4            | 3        | 1.95 | Low                   |
| Volcanic Eruption   | 1           | 1         | 1            | 1        | 1    | Low                   |
| Tomado  | 1           | 1         | 1            | 1        | 1    | Low                   |

Source: Marion County, BOLD Planning Hazard Analysis

## What is the Plan's Mission?

The mission of the Marion County HMP is to:

**Mission:** *Create a more resilient Marion County by partnering with the whole community.*

44 CFR 201.6(c)(3)(i) – A description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

## What are the Plan Goals?

The Plan goals describe the overall direction that the participating jurisdiction's agencies, organizations, and citizens can take toward mitigating risk from all-hazards. Below is a list of the plan goals (Note: although numbered the goals are not prioritized):

**Goal 1 - Awareness & Education:** Increase awareness and education of all-hazard risks, emergency notification methods, and resources for citizen, businesses, and government agencies.

**Goal #2 - Resilience:** Increase the resilience of communities, by providing capacity to the private sector, rural/urban cities, and NGO's.

**Goal #3 - Risk Reduction:** Minimize risks to life, public and private property, infrastructure, the environment, and the economy from hazards.

**Goal #4 - Funding and Implementation:** Create a database of potential funding sources to implement mitigation projects.

**Goal #5 - Partnerships and Coordination:** Create, maintain and enhance partnerships with stakeholders, adjacent jurisdictions, and public and private agencies' risk management activities.

**Goal #6 - Natural Resources Utilization:** Use natural resources, watershed planning, and land use planning to reduce long-term costs and maximize effectiveness.

**Goal #7 - Plan Integration:** Integrate all-hazard mitigation activities, where appropriate, with existing plans and policies.

**Goal #8 - Data Collection:** Document county expenditures and benefits of hazard mitigation policy and projects.

**Goal #9 - Development Relocation:** Direct development away from identified vulnerable areas (e.g. within mapped hazard zones) where risks to people, property, and infrastructure cannot be mitigated.

**Goal 10 - Hazard Loss Reduction:** Collaborate with public, private, and non-profit sectors to create a county wide hazard loss reduction strategy.

**Goal 11 - Historic Preservation:** Retrofit and restore historical and cultural resources susceptible to damage from a hazard event.

## How are the Action Items Organized?

The action items are organized within an action matrix included within Section 3, Mitigation Strategy (full descriptions are provided in Appendix A, *Action Items*).

*44 CFR 201.6(c)(3)(ii) – A section that identifies and analyzes a comprehensive range of specific mitigation actions . . .*

Data collection, research and the public participation process resulted in the development of the action items. The Action Item Matrix portrays the overall Plan framework and identifies linkages between the plan goals and actions. The matrix documents the title of each action along with, the coordinating organization, timeline, and the Plan goals addressed. Action items particular to each of the participating cities are included at the end of the action item matrix in Section 3, Mitigation Strategy and in the addenda.

## Comprehensive Action Plan

The following lists and tables summarizes specific **priority** HMP actions. Refer to the Mitigation Strategy section for a complete list of actions. Volume III, Appendix A contains detailed information for all action items, including potential partners, implementation ideas, proposed timeline and estimated budget.

### Marion County Priority Action Items

**Multi-Hazard # 1:** Complete a disaster recovery plan for Marion County.

**Multi-Hazard # 2:** Develop a community education program such as an all hazard community outreach forum.

**Multi-Hazard # 3:** Conduct an assessment of the short and long term needs for sheltering access and functional needs populations for all hazards.

**Earthquake # 3:** Create a bridge prioritization inventory based on major lifeline routes including state highways, routes, and major road arteries before July 1, 2017.

**Earthquake # 5:** Collaborate with SEDCOR to develop relevant public-private partnerships with businesses that can contribute to mitigation, response, and recovery.

**Drought # 6:** Monitor economic impacts on recreation, tourism and agriculture communities.

**Flood #6:** Develop a program that maps and communicates real-time flood related road closures.

**Windstorm # 1:** Initiate a comprehensive program to reduce or eliminate tree hazards to all critical utilities in Marion County. This program includes a prioritization of critical facilities, an assessment of potential tree hazards, and a program to trim, and/or remove tree hazards in designated critical areas.

## Communications

**Joint Utility Liaison:** Establish a position responsible for coordinating information sharing across sector service providers. NOTE: this position could also link to or coordinate activities in other critical infrastructure sectors.

**Special Communication District:** Create a special district to generate revenue for ongoing system maintenance, equipment modernization and hazard mitigation activities.

## Transportation

**Integrate Lifeline Corridor Inventories into Transportation System Plans:** TSP's in Marion County do not currently include inventories of lifeline transportation corridors. From a plan integration standpoint this is a missed opportunity, with benefits far outweighing cost.

**Identify and Designate Priority Transportation Routes:** Develop a "hub and spoke" approach to priority route planning focused on post-event resource collection and distribution.

## Water

**Complete and Implement Drought Contingency Plan:** Ensuring success of this ongoing effort related to water quantity is the top water sector priority.

**Add Risk Assessment and Hazard Mitigation Information to Water Master Plans:** Water Master Plans in Marion County do not do a good job of integrating hazard and system vulnerability information. From a plan integration standpoint this is a missed opportunity, with benefits that outweigh cost.

## Energy

**Develop and Maintain a "No Disconnect" list:** Protect energy dependent vulnerable populations from service disruption as a result of inability to pay for service.

**Compare, Crosswalk and Maintain Critical Facilities Lists:** Increase collaboration and common operating framework between energy utilities, emergency management, and end-users by sharing and aligning critical facilities lists.

### **Table PS-3: Aumsville High Priority HMP Actions**

**TBA**

Source: Aurora HMP Steering Committee (2016)

### **Table PS-4: Aurora High Priority HMP Actions**

**TBA**

Source: Aurora HMP Steering Committee (2016)

### **Table PS-5: Detroit High Priority HMP Actions**

**TBA**

Source: Aurora HMP Steering Committee (2016)

### **Table PS-6: Gates High Priority HMP Actions**

**TBA**

Source: Aurora HMP Steering Committee (2016)



**Table PS-7: Idanha High Priority HMP Actions**

**TBA**

Source: Aurora HMP Steering Committee (2016)

**Table PS-8: Keizer High Priority HMP Actions**

**TBA**

Source: Keizer HMP Steering Committee (2016)

**Table PS-9: Silverton High Priority HMP Actions**

**TBA**

Source: Silverton HMP Steering Committee (2016)

**Table PS-10: Stayton High Priority HMP Actions**

**TBA**

Source: Stayton HMP Steering Committee (2015)

**Table PS-11: Turner High Priority HMP Actions**

**TBA**

Source: Turner HMP Steering Committee (2015)

**Table PS-12: Woodburn High Priority HMP Actions**

**TBA**

Source: Woodburn HMP Steering Committee (2015)

## How will the plan be implemented?

The plan maintenance section of this Plan details the formal process that will ensure that the Marion County HMP remains an active and relevant document. The Plan will be implemented, maintained, and updated by a designated convener. The Marion County Emergency Manager is the designated convener (Plan Convener) and is responsible for overseeing the review and implementation processes (see city addenda for city conveners).

The Plan maintenance process includes a schedule for monitoring and evaluating the Plan semi-annually and producing a plan revision every five years. The plan also includes additional meetings with lifeline sector stakeholders. This section also describes how the communities will integrate public participation throughout the plan maintenance process.

*44 CFR 201.6(c)(3)(iii) – An action plan describing how the actions . . . will be prioritized, implemented and administered . . .*

*44 CFR 201.6(c)(4) – A plan maintenance process . . .*

## Plan Adoption

Once the Plan is locally reviewed and deemed complete the Plan Convener submits it to the State Hazard Mitigation Officer at the Oregon Military Department – Office of Emergency Management (OEM). OEM reviews the Plan and submits it to the Federal Emergency Management Agency (FEMA – Region X) for review. FEMA’s review address the federal criteria outlined in FEMA Interim Final Rule 44 CFR Part 201.6. Once the Plan is pre-approved by FEMA, the county and cities formally adopt the Plan via resolution. The Marion County Plan Convener will be responsible for ensuring local adoption of the Marion County portion of the multi-jurisdictional HMP. Because this is a multi-jurisdictional plan, each of the participating cities will also adopt the plan at the local level. Once the resolutions are signed at the local level and documentation is provided to FEMA, the Plan is formally acknowledged by FEMA and the county (and participating cities) will re-establish eligibility for the Pre-Disaster Mitigation Grant Program, the Hazard Mitigation Grant Program funds, and the Flood Mitigation Assistance program funds.

*44 CFR 201.6(c)(5) – Documentation that the plan has been formally adopted by the governing body of the jurisdiction . . .*

*44 CFR 201.6(d) – Plan review [process] . . .*

The accomplishment of the HMP goals and actions depends upon regular Steering Committee participation and adequate support from county and city leadership. This plan update relies on a multi-jurisdictional approach focused on functional and access needs, lifeline infrastructure and all-hazards. Thorough familiarity with this Plan will result in the efficient and effective implementation of appropriate mitigation activities and a reduction in the risk and the potential for loss from future threat and hazard incidents.

The Steering Committees for Marion County and participating cities each met to review the Plan update process and their governing bodies adopted the HMP as shown below:

Marion County adopted the plan on **[DATE], 2016**

The City of Aumsville adopted the plan on **[DATE], 2016**

The City of Aurora adopted the plan on **[DATE], 2016**

The City of Detroit adopted the plan on **[DATE], 2016**

The City of Gates adopted the plan on **[DATE], 2016**

The City of Idanha adopted the plan on **[DATE], 2016**

The City of Keizer adopted the plan on **[DATE], 2016**

The City of Silverton adopted the plan on **[DATE], 2016**

The City of Stayton adopted the plan on **[DATE], 2016**

The City of Turner adopted the plan on **[DATE], 2016**

The City of Woodburn adopted the plan on **[DATE], 2016**

FEMA Region X approved the Marion County HMP on [DATE], 2016. With approval of this Plan, the entities listed above are now eligible to apply for the Robert T. Stafford Disaster Relief and Emergency Assistance Act's hazard mitigation project grants through [DATE], 2016.

# SECTION I: INTRODUCTION

Section I: Introduction provides a general introduction to hazard mitigation planning in Marion County. In addition, it addresses the planning process requirements contained in 44 CFR 201.6(b) thereby meeting the planning process documentation requirement contained in 44 CFR 201.6(c)(1). The section concludes with a general description of how the plan is organized.

## Background & Context

This Multi-Jurisdictional Hazards Mitigation Plan (HMP) is a framework for mitigating and preparing for the effects of hazards on the people, property, economy, and environment of Marion County. This plan was developed by Marion County in partnership with the jurisdictions of Aumsville, Aurora, Detroit, Gates, Idanha, Keizer, Silverton, Stayton, Turner and Woodburn, among many other special districts included within the Marion County limits.

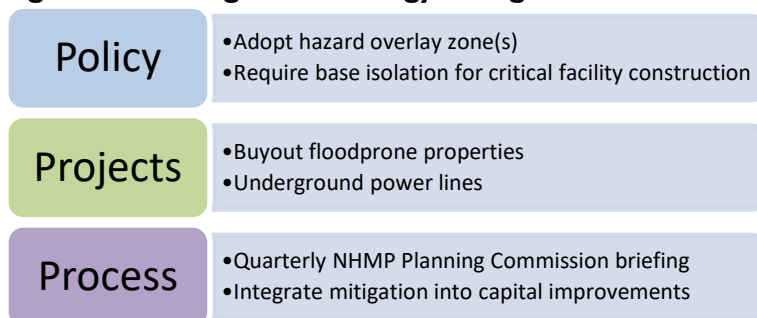
Hazards are unpredictable and vary in impact. Multi-jurisdictional collaboration is critical to achieving meaningful risk reduction and contributes to community resilience overall.

## What is Hazard Mitigation?

The Federal Emergency Management Agency (FEMA) defines mitigation as “the effort to reduce loss of life and property by lessening the impact of disasters . . . through risk analysis, which results in information that provides a foundation for mitigation activities that reduce risk.”

Hazards mitigation uses long and short-term strategies and actions to reduce the effects of hazards on the lives, property, and critical infrastructure and facilities in a community. This can be achieved through **policies**, such as adjustments to land use designation within floodplains; **projects**, such as seismic retrofits to critical facilities; and **process**, such as quarterly reporting to the Board of County Commissioners on mitigation activities (see Figure 1.1). It is the role of communities, private businesses and industries, nonprofits, school districts, and more to work with the local, state, and federal government to prepare their community for threats and hazards.

**Figure 1.1 – Mitigation Strategy Categories**



Source: Oregon Partnership for Disaster Resilience

Hazard mitigation also incorporates a “Whole Community” approach to planning, in which all parts of the community are engaged and empowered in the development and implementation of a HMP. This positions the planning team to better understand and comprehensively approach the actual needs of a community. To work well, this approach requires a diverse array of community members at the table. Stakeholders can include social and community service groups and institutions, faith-based groups, school districts, organization that work with those who have intellectual and physical disabilities, academia, professional associations, non-profit and private sectors, Native American tribes and other indigenous populations, among others.

## **Why Maintain a Mitigation Plan?**

This hazard mitigation plan is designed to assist Marion County and the communities of Aumsville, Aurora, Detroit, Gates, Idanha, Keizer, Silverton, Stayton, Turner and Woodburn in reducing the risk associated with hazards by providing information, resources, and strategies for mitigation. This plan will also assist other agencies, districts, and jurisdictions in coordinating risk reduction activities throughout Marion County. Although the plan includes information about man-made and technological hazards, many of the hazards identified are natural, recurring disasters.

The Disaster Mitigation Act of 2000 (DMA2K) and the regulations contained in Title 44 Code of Federal Regulations (CFR) Part 206 require that jurisdictions maintain an approved hazard mitigation plan (HMP) to receive federal Hazard Mitigation Assistance funding for mitigation projects. Marion County uses an “all-hazard” approach to hazard mitigation. Local and federal approval of this plan ensures that the county and participating cities will remain eligible for pre- and post-disaster mitigation project grants available through FEMA.

This plan is non-regulatory; it is strategic and does not introduce new policy. However, this plan provides a framework for coordination of and collaboration on mitigation action strategies and actions. It also meets federal requirements for qualifying for relevant FEMA assistance programs. This mitigation plan is developed and implemented in coordination with other county and city plans and programs, including the Marion County Comprehensive Plan, various Local Emergency Operations Plans (LEOP), and the State of Oregon Natural Hazards Mitigation Plan.

## **What Federal Requirements Does This Plan Address?**

The Disaster Mitigation Act of 2000 is the latest federal legislation addressing mitigation planning. This legislation reinforces the importance of mitigation planning and emphasizes planning for hazards before they occur. Specifically, DMA2K established the Pre-Disaster Mitigation (PDM) grant program and introduced new requirements for the post-disaster Hazard Mitigation Grant Program (HMGP). These two grant programs and the Flood Mitigation Assistance grants are collectively referred to by FEMA as the Hazard Mitigation Assistance program.

Section 322 of DMA2K addresses mitigation planning at the state and local levels. Chapter 44 Code of Federal Regulations (CFR), section 201.6 specifically requires that jurisdictions have an approved hazard mitigation plan in place to receive Hazard Mitigation Grant Program (HMGP) funds.<sup>1</sup> Pursuant of Chapter 44 CFR, the Natural Hazard Mitigation Plan planning processes shall

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<sup>1</sup> Code of Federal Regulations, Chapter 44. Section 201.6, subsection (a), 2015

include opportunity for the public to comment on the plan during review, and the updated Natural Hazard Mitigation Plan shall include documentation of the public planning process used to develop the plan.<sup>2</sup> The Natural Hazard Mitigation Plan update must also contain a risk assessment, mitigation strategy and a plan maintenance process that has been formally adopted by the governing body of the jurisdiction.<sup>3</sup> Lastly, the Natural Hazard Mitigation Plan must be submitted to Oregon Military Department – Office of Emergency Management (OEM) for initial plan review, and then federal approval.<sup>4</sup>

## **What is the Policy Framework for Natural Hazard Planning in Oregon?**

Planning for hazards is an integral element of Oregon’s statewide land use planning program. All Oregon cities and counties must have comprehensive plans and implementing ordinances that comply with the statewide planning goals. The challenge faced by state and local governments is to keep this network of local plans coordinated in response to the changing conditions and needs of Oregon communities. Oregon Statewide Planning Goal 7: Areas Subject to Natural Hazards requires that local governments “adopt comprehensive plans (inventories, policies and implementing measures) to reduce risk to people and property from natural hazards.”<sup>5</sup> Goal 7, along with other land use planning goals, has helped to reduce losses from natural hazards.

Through risk identification and the recommendation of risk-reduction actions, this plan aligns with the goals of Marion County’s Comprehensive Plan, and helps each jurisdiction meet the requirements of Oregon Statewide Planning Goal 7. The primary responsibility for the development and implementation of risk reduction strategies and policies lies with local jurisdictions. However, additional resources exist at the state and federal levels. Some of the key agencies in this area include Oregon Military Department–Office of Emergency Management (OEM), Oregon Building Codes Division (BCD), Oregon Department of Forestry (ODF), Oregon Department of Geology and Mineral Industries (DOGAMI), and the Department of Land Conservation and Development (DLCD).

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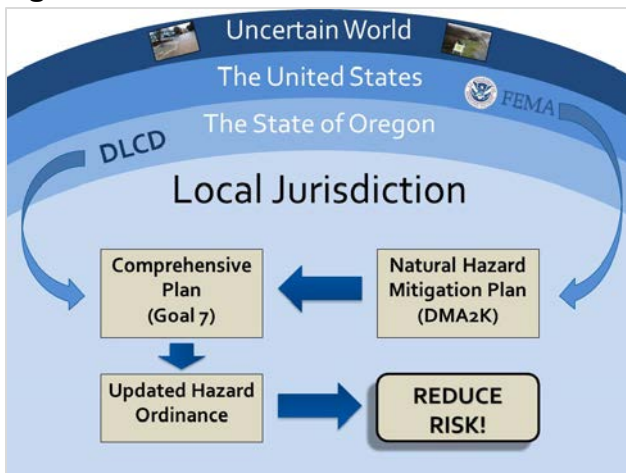
<sup>2</sup> *ibid*, subsection (b). 2015

<sup>3</sup> *ibid*, subsection (c). 2015

<sup>4</sup> *ibid*, subsection (d). 2015

<sup>5</sup> <http://www.oregon.gov/LCD/docs/goals/goal7.pdf>

Figure I.2



Source: Oregon Partnership for Disaster Resilience

## How Was the Plan Developed and Updated?

The 2016 Marion County Multi-Jurisdictional Hazards Mitigation Plan update is the result of multiple community and stakeholder engagement activities. To facilitate the HMP update, Marion County partnered with the University of Oregon's Community Service Center (CSC) to research, facilitate and complete the plan update process. As part of that process, the Marion County Emergency Management coordinated with multiple stakeholders and introduced a new methodology described below:

- **Marion County HMP steering committee.** Marion County formally convened the HMP steering committee on two occasions to discuss and revise the plan. Steering committee members contributed data and maps, and reviewed and updated the community profile, risk assessment, action items, and implementation and maintenance plan.
- **Lifeline Sector Assessment.** The UO Community Service Center conducted assessments of four Marion County identified lifeline sectors – communication, energy, transportation, and water. The assessment included review of each sector's adaptive capacity and vulnerabilities, as well as critical dependencies and interdependencies.
- **Strategic Economic Development Corporation (SEDCOR) stakeholder input.** Marion County and the CSC team briefed and solicited input from SEDCOR members at their April 13, 2016 "Secure Our Lifelines" event. This event was conducted as part of SEDCORs "Cascadia: Oregon's Greatest Natural Threat Series."
- **Threat Hazard Identification and Risk Assessment (THIRA) process.** In conjunction with the HMP update, Marion County initiated FEMA's a four step common risk assessment process known as THIRA. The process engages individuals, businesses, faith-based organizations, nonprofit groups, schools and academia and all levels of government to better understand its risks and estimate capability requirements as they relate to the 32 core capabilities.
- **North Santiam Watershed Drought Contingency Plan (DCP).** Marion County participated in the Santiam Water Control District's Bureau of Reclamation funded

Drought Planning project. Findings and recommendations of the Drought Task Force are included by reference where appropriate in the HMP.

- **Marion County Community Wildfire Protection Plan (CWPP).** During the HMP update, Marion County Emergency Management, the Fire Defense Board and the Oregon Department of Forestry initiated an update of the Marion County Community Wildfire Protection Plan. Developed to meet the requirements of the Healthy Forest Restoration Act, FEMA Disaster Mitigation Act of 2000, National Cohesive Wildland Fire Management Plan, 2010 Comprehensive Strategy, Senate Bill 360, Flame Act 2009, and the Oregon Statewide Land Use Planning Goal 4 and 7, findings and recommendations of the CWPP working group are included by reference where appropriate in the HMP.
- **Marion County Emergency Operations Plan (EOP).** During the HMP update, Marion County Emergency Management initiated an update of its Emergency Operations Plan. To ensure consistency across local hazard planning documents, the risk assessment information in the HMP is consistent with the EOP, THIRA and other emergency management assessment data and plans.
- **FEMA Risk Map Middle-Willamette Watershed Discovery.** FEMA Region X initiated the Discovery effort for the Middle Willamette Watershed in December 2015. Risk MAP Discovery is a process of data collection, hazard mapping, and cooperative information exchange with community stakeholders to understand a watershed area. FEMA Region X is deciding if a flood risk project is appropriate. If so, FEMA Region X and Marion County Emergency Management will collaborate on project planning.

The Marion County Emergency Manager is responsible for implementing, maintaining, and conducting future updates of the plan. The public will also have the opportunity to provide feedback about the plan in an ongoing fashion. The steering committee will meet on a semi-annual basis to discuss implementation of the plan, as well as updating the plan.

## How is the Plan Organized?

Each volume of the Plan provides specific information and resources to assist readers in understanding the hazard-specific issues facing county and city residents, businesses, and the environment. Combined, the sections work in synergy to create a mitigation plan that furthers the community's mission to reduce or eliminate long-term risk to people, property and the environment from hazards. This plan structure enables stakeholders to use the section(s) of interest to them.

### Volume I: Basic Plan

#### Plan Summary

The plan summary provides an overview of the FEMA requirements plans process and highlights the key elements of the risk assessment, mitigation strategy, and implementation and maintenance strategy.



## Section 1: Introduction

The Introduction describes the purpose of mitigation planning, as well as the framework for developing the plan.

## Section 2: Risk Assessment

This section provides information about the government structure and community demographics of Marion County. The Community Overview also identifies related county plans, policies, organizations, and programs. This section also contains a description of the county's ability to mitigate risk and recover from hazard incidents.

## Section 3: Mitigation Strategy

This section documents the plan's missions, goals, and actions. Actions address community vulnerabilities that are identified in the risk assessment.

## Section 4: Implementation & Maintenance

This section provides information on the implementation and maintenance of the plan. It describes the process for prioritizing strategies and includes suggested tasks for semiannual maintenance and five-year plan update processes.

## **Volume II: City/Special District Addendums**

This section contains city addenda for the cities of Aumsville, Aurora, Detroit, Gates, Idanha, Keizer, Silverton, Stayton, Turner and Woodburn. These addenda describe how each city's risk from hazards varies from that of the county and includes city-specific action items and plan implementation and maintenance strategies.

## **Volume III: Resource Appendices**

The resource appendices provide supplemental information to the Plan, as well as resources for users and interested parties.

### **Appendix A: Action Item Forms**

This appendix contains the detailed action items for each of the mitigation strategies identified in this Plan.

### **Appendix B: Planning and Public Process**

This appendix includes documentation of all the countywide public processes utilized to develop the Plan. It includes invitation lists, agendas, sign-in sheets, and summaries of Steering Committee meetings as well as any other public involvement methods.

## **Appendix C: Community Profile**

The community profile describes the county and participating cities from a number of perspectives in order to help define and understand the regions sensitivity and resilience to hazards. The information in this section represents a snapshot in time of the current sensitivity and resilience factors in the region when the Plan was updated. Sensitivity factors can be defined as those community assets and characteristics that may be impacted by hazard incidents, (e.g., special populations, economic factors, and historic and cultural resources). Community resilience factors can be defined as the community's ability to manage risk and adapt to hazard event impacts (e.g., governmental structure, agency missions and directives, and plans, policies, and programs).

## **Appendix D: Economic Analysis of Hazard Mitigation Projects**

This appendix describes the Federal Emergency Management Agency's (FEMA) requirements for benefit cost analysis in hazard mitigation, as well as various approaches for conducting economic analysis of proposed mitigation activities. The Oregon Partnership for Disaster Resilience developed this appendix. It has been reviewed and accepted by FEMA as a means of documenting how the prioritization of actions shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

## **Appendix E: Grant Programs and Resources**

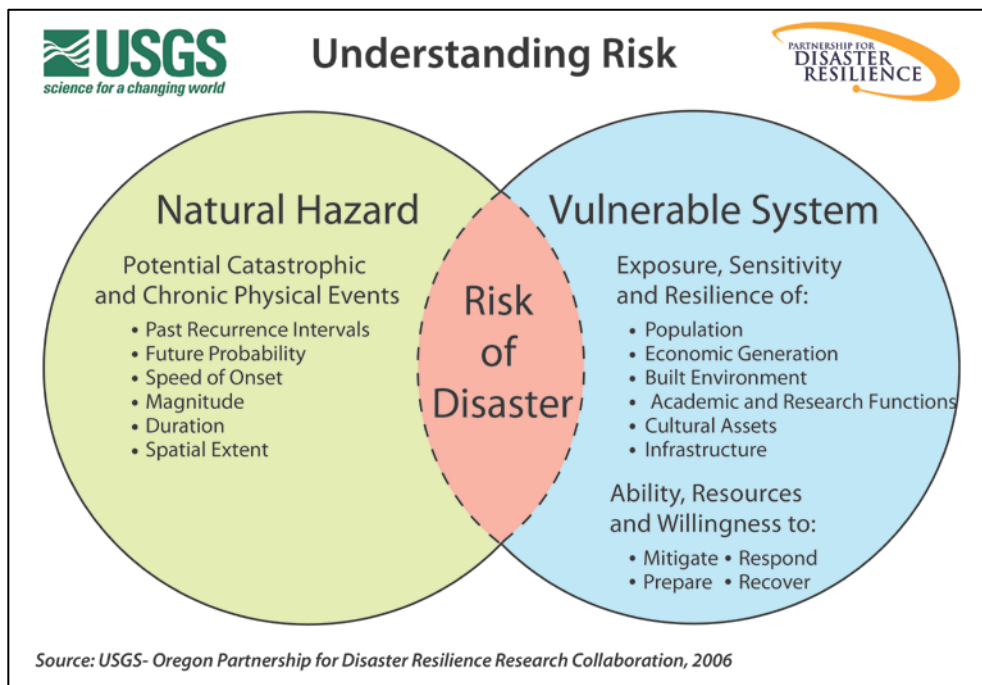
This appendix lists state and federal resources and programs by hazard.

## SECTION 2: RISK ASSESSMENT

This section of the HMP addresses 44 CFR 201.6(b)(2) - Risk Assessment. The Risk Assessment applies to Marion County and the cities of Aumsville, Aurora, Detroit, Gates, Idanha, Keizer, Silverton, Stayton, Turner and Woodburn. City specific information is called out where relevant. In addition, this chapter can assist with addressing Oregon Statewide Planning Goal 7 – Areas Subject to Natural Hazards.

The information presented below, and community characteristics presented in the Community Profile are used to inform the risk reduction actions identified in Section 3 – Mitigation Strategy. The risk assessment process is graphically depicted in Figure 2-1 below. Ultimately, the goal of hazard mitigation is to reduce the area where hazards and vulnerable systems overlap.

**Figure 2-1 Understanding Risk**



Source: Oregon Partnership for Disaster Resilience.

### Risk Assessment Approach

A risk assessment is intended to provide the, “factual basis for activities proposed in the strategy to reduce losses from identified hazards.”<sup>1</sup> To complete the risk assessment, the

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<sup>1</sup> 44 CFR 201.6(2)(i)

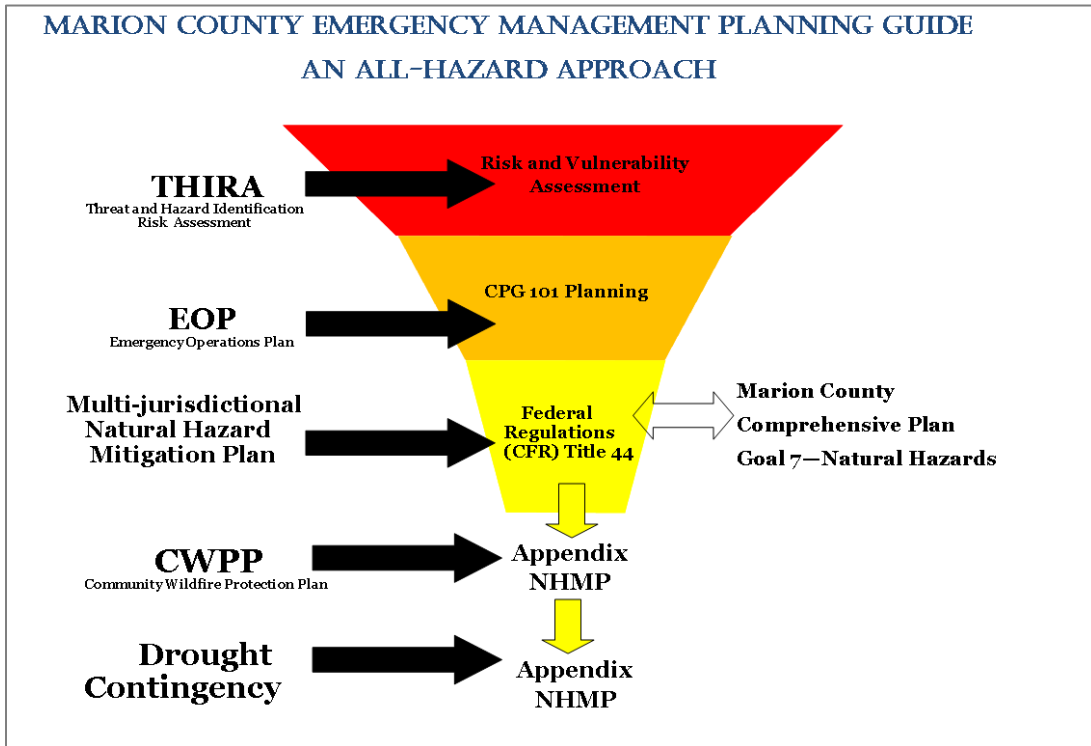
HMP update team first updated the description, type, location and extent of each hazard. Next, the team updated the vulnerability information based on each hazard’s potential impact on the community.

For this HMP update, the risk assessment also focuses on four key lifeline sectors: transportation, water, communication and energy. The lifeline sector risk assessment process included assessing each sector’s existing infrastructure, determining potential impacts and sensitivity to specific hazards, and developing risk reduction recommendations for each sector.

Finally, the risk assessment integrates relevant information and data from the Marion County Comprehensive Risk Assessment and other multi-hazard specific assessment activities.

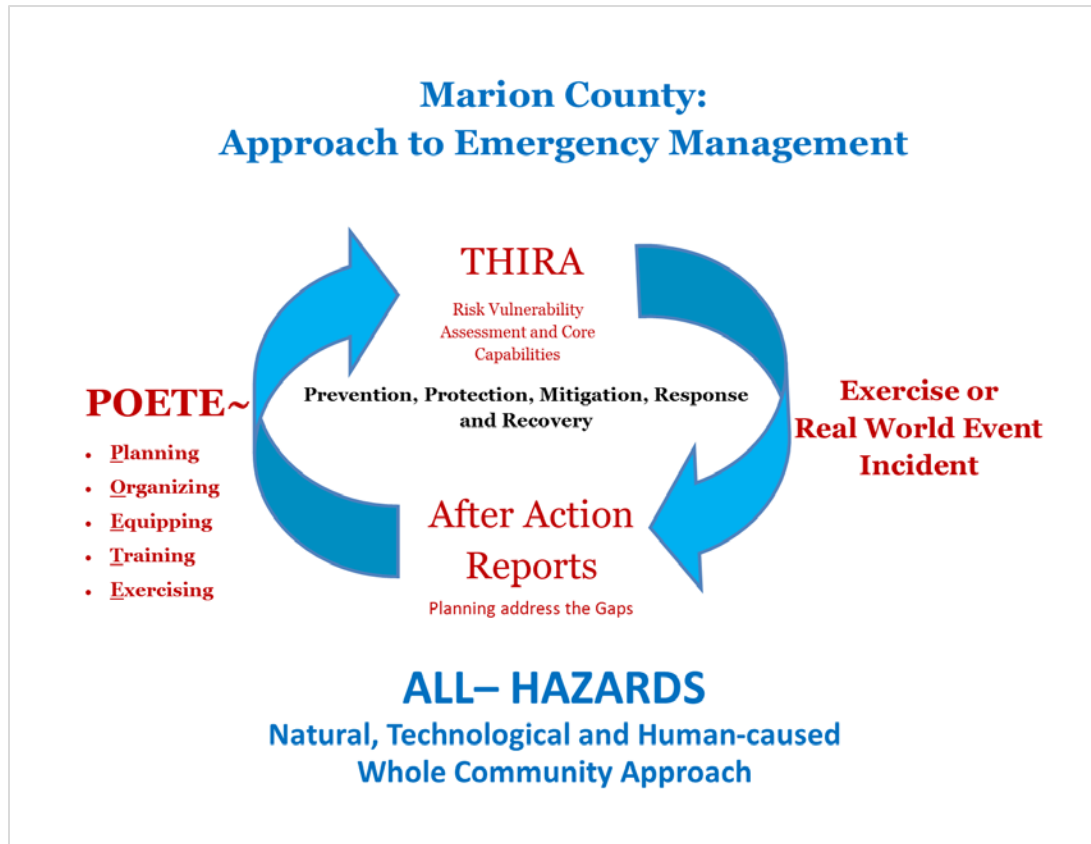
Marion County’s approach to all-hazard risk assessment is presented in Figures 2-2 and 2-3 below.

**Figure 2-2: Marion County All-Hazard Risk Assessment Process Diagram**



Source: Marion County Emergency Management

**Figure 2-3: Marion County Iterative All-Hazard Risk Assessment Approach**



Source: Marion County Emergency Management

## Risk Assessment Summary

*Multi-jurisdictional Risk Assessment - §201.6(c) (2) (iii):* For multi-jurisdictional plans, the risk assessment must assess each jurisdiction’s risks where they vary from the risks facing the entire planning area.

Marion County is vulnerable to a wide range of hazards that threaten its communities, businesses and environment. To determine the hazards that pose the greatest threat, Marion County has prepared a Threat Hazard Identification and Risk Assessment. The County has partnered with BOLD Planning<sup>2</sup> to document and maintain the county’s comprehensive risk assessment. The risk assessment is maintained as a formal annex to the Marion County Emergency Operation Plan. The applicable risk assessments for HMP identified natural hazards are incorporated herein by reference.

Marion County developed this assessment from historical data of events that have occurred. The assessment specifically examines:

1. Probability (frequency) of event

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<sup>2</sup> BOLD Planning is a consulting firm specializing in the development of actionable emergency plans. For more information, visit: <http://www.boldplanning.com/>

2. Magnitude of event
3. Expected warning time before event
4. Expected duration of event

Table 2-1 below shows the scoring values for each ranking category.

**Table 2-1 Risk Assessment Hazard Ranking Scoring Values**

| Score | Probability   | Warning Time      | Magnitude/Severity | Duration          |
|-------|---------------|-------------------|--------------------|-------------------|
| 4     | Highly Likely | Less than 6 hours | Catastrophic       | More than 1 week  |
| 3     | Likely        | 6-12 hours        | Critical           | Less than 1 week  |
| 2     | Possible      | 12-24 hours       | Limited            | Less than 1 day   |
| 1     | Unlikely      | 24+ hours         | Negligible         | Less than 6 hours |

Source: Marion County Emergency Management; BOLD Planning

For emergency management planning purposes, the critical analysis that must be undertaken is an assessment of the consequences of each hazard, including potential area of impact, population exposed and impacted, duration of the hazard, and potential economic consequences. These rankings utilize the criteria laid out in THIRA to weight them proportionally through historic data as well as future projections based on economic, demographic, the critical infrastructure information.

The assessment identifies three levels of risk: High, Moderate and Low.

**High** - High probability of occurrence; at least 50 percent or more of population at risk from hazard; significant to catastrophic physical impacts to buildings and infrastructure; major loss or potential loss of functionality to all essential facilities (hospital, police, fire, EOC and shelters).

**Moderate** - Less than 50 percent of population at risk from hazard; moderate physical impacts to buildings and infrastructure; moderate potential for loss of functionality to essential facilities.

**Low** - Low probability of occurrence or low threat to population; minor physical impacts.

A summary of the risk assessment findings and rankings is presented below.

**Table 2-2 Hazard and Vulnerability Assessment Summary**

| Hazard Profile Summary for Emergency Operations Plan  |             |           |              |          |      |                       |
|---|-------------|-----------|--------------|----------|------|-----------------------|
| Hazard  | Probability | Magnitude | Warning Time | Duration | CPRI | Planning Significance |
| Earthquake  | 4           | 4         | 4            | 4        | 4    | <b>High</b>           |
| Severe Weather/Storm  | 4           | 4         | 1            | 4        | 3.55 | <b>High</b>           |
| Flood   | 3           | 4         | 2            | 4        | 3.25 | <b>High</b>           |
| Landslide   | 3           | 3         | 4            | 4        | 3.25 | <b>High</b>           |
| Civil Disorder / Terrorism  | 2           | 4         | 4            | 4        | 3.1  | <b>High</b>           |
| Drought   | 3           | 4         | 1            | 4        | 3.1  | <b>High</b>           |
| Hazardous Materials Incident  | 2           | 4         | 4            | 3        | 3    | <b>High</b>           |
| Transportation Accident/Train Derailment  | 2           | 4         | 4            | 3        | 3    | <b>High</b>           |
| School & Workplace Violence   | 2           | 4         | 4            | 2        | 2.9  | <b>Moderate</b>       |
| Wildland Interface Fire   | 2           | 3         | 4            | 4        | 2.8  | <b>Moderate</b>       |
| Biological Chemical, Sabotage and Cyber Incident and Explosives Radiological Attack-Terrorism | 2           | 3         | 4            | 3        | 2.7  | <b>Moderate</b>       |
| Power Failure   | 2           | 3         | 4            | 3        | 2.7  | <b>Moderate</b>       |
| Epidemic  | 2           | 4         | 1            | 4        | 2.65 | <b>Moderate</b>       |
| Pandemic  | 2           | 4         | 1            | 4        | 2.65 | <b>Moderate</b>       |
| Animal Disease Outbreak   | 2           | 3         | 2            | 4        | 2.5  | <b>Moderate</b>       |
| Dam or Levee Failure  | 1           | 4         | 2            | 4        | 2.35 | <b>Moderate</b>       |
| Extreme Weather - High Temperature  | 3           | 2         | 1            | 1        | 2.2  | <b>Moderate</b>       |
| Radiological Release  | 1           | 2         | 4            | 3        | 1.95 | <b>Low</b>            |
| Volcanic Eruption   | 1           | 1         | 1            | 1        | 1    | <b>Low</b>            |
| Tornado   | 1           | 1         | 1            | 1        | 1    | <b>Low</b>            |

Source: Marion County, BOLD Planning Hazard Analysis.

## Hazard Identification and Assessment

The 2015 State of Oregon NHMP Region 3 Risk Assessment identifies potential hazards in Marion County. Table 2-1a compares the natural hazards listed in the Marion County Comprehensive Risk Assessment with those identified in the State of Oregon NHMP for the Mid/Southern Willamette Valley (Region 3). Table 2-1b identifies other hazards listed in the Marion County Threat and Hazard Identification Risk Assessment. These hazards are included for continuity with the EOP only.

**Table 2-1a Marion County Natural Hazard Identification**

| <b>Marion County Natural Hazards</b> | <b>Oregon NHMP Region 3:<br/>Mid/Southern Willamette Valley</b> |
|--------------------------------------|---|
| Drought                              | Drought   |
| Earthquake                           | Earthquake  |
| Flood                                | Flood   |
| Landslide                            | Landslide   |
| Volcanic Eruption                    | Volcano   |
| Wildland Interface Fire              | Wildfire  |
| Tornado                              | Windstorm   |
| Severe Weather/Storm                 | Winter Storm  |
| Extreme Weather - High Temperature   | N/A   |

Source: State of Oregon NHMP, (2015); Marion County DRAFT EOP, (2016); BOLD Risk Assessment Data.

**Table 2-1b Marion County Non-Natural Hazard Identification**

| <b>Marion County Other Hazards Listed in Risk Assessment, Not Covered in this HMP</b>         |
|---|
| Animal Disease Outbreak   |
| Biological Chemical, Sabotage and Cyber Incident and Explosives Radiological Attack-Terrorism |
| Civil Disorder / Terrorism  |
| Dam or Levee Failure  |
| Epidemic  |
| Hazardous Materials Incident  |
| Pandemic  |
| Power Failure   |
| Radiological Release  |
| School & Workplace Violence   |
| Transportation Accident/Train Derailment  |

Source: Marion County DRAFT EOP, (2016); BOLD Risk Assessment Data.

The following subsections list each natural hazard by type. Information presented includes descriptions developed for the 2016 Marion County THIRA and EOP update processes. Location, extent, history and probability information is summarized for each hazard.

For additional background on the hazards, vulnerabilities and general risk assessment information for Willamette Valley hazards in Oregon, refer to the State of Oregon NHMP, Region 3: Mid-Southern Willamette Valley Oregon (2015). Since the 2011 Marion County NHMP, a number of hazard events have occurred in the county. For a full hazard history, please see **Appendix G**, Hazard History.



## Drought

**Table 2-2: Drought Summary**

| <b>Hazard</b>   | <b>Drought</b>                       |
|-----------------|--------------------------------------|
| Type            | Climatic                             |
| Speed of Onset  | Slow                                 |
| Location        | Varies, County Wide                  |
| Extent          | Moderate to Severe Drought*          |
| Prior Occurance | Three > 6 months duration since 1982 |
| Probability     | ~9%                                  |

\*Defined as between -2 and -4 on the National Resource Conservation Service (NRCS) Surface Water Supply Index (SWSI)

Sources: Oregon NHMP; NRCS; analysis by OPDR

### Characteristics

A drought is a period of drier than normal conditions. Drought occurs in virtually every climatic zone, but its characteristics vary significantly from one region to another. Drought is a temporary condition; it differs from aridity, which is restricted to low rainfall regions and is a permanent feature of climate. The extent of drought events depends upon the degree of moisture deficiency, and the duration and size of the affected area. Typically, droughts occur as regional events and often affect more than one city and county.

The Marion County Emergency Operations Plan (EOP) defines the following drought sub-types as follows:

- **Meteorological drought** happens when abnormally dry weather patterns dominate an area. This can include above average air temperatures in addition to low precipitation.
- **Hydrological drought** occurs when low water supply becomes evident, especially in streams, reservoirs, and groundwater levels, usually after many months of meteorological drought. Meteorological drought can begin and end rapidly, while hydrological drought takes much longer to develop and then recover.
- **Socioeconomic drought** relates the supply and demand of various goods (e.g., agricultural commodities) and services (e.g., outdoor recreation) to drought. Sometimes “agricultural drought” is defined separately; however, for this DCP it is included under socioeconomic drought. Likewise, environmental concerns may also be included here.
- **Regulatory drought** relates to water shortages to specific water users as a result of water laws and regulations prioritizing water usage to what are deemed higher priority uses. Higher priority uses often include in-stream uses (i.e., leaving the water in the stream) to maintain environmental conditions for sensitive aquatic life. When regulatory drought occurs, those with junior water rights typically lose the use of their water first, with senior rights holders the last to be affected.

The Marion County EOP includes the following description of the drought hazard:

Drought can affect all segments of Marion County's population, particularly those employed in water-dependent activities (e.g., agriculture). Also, domestic water users may be subject to stringent conservation measures (e.g., rationing) and could be faced with significant increases in electricity rates. Water is not only a concern for drinking water, but irrigation, commercial (e.g., washing, canning), hydropower, fire suppression, habitat for fish and wildlife, recreation, and transportation. Therefore, a negative water flow could impact multiple productions. A deficiency of moisture has an adverse impact on people, animals, or vegetation over a sizeable area. The severity of a drought occurrence poses a risk for agricultural and timber losses, property damage, and disruption of water supplies and availability in urban and rural areas. In addition, water-borne transportation systems, such as the ferry in Buena Vista, could be impacted by periods of low water. Drought normally affects more people than other natural hazards, and its impact spreads over a larger geographical area. This makes it more difficult to assess impacts and to provide assistance to drought-stricken areas. In addition, drought has a direct impact on power for the Willamette Valley as there are two power sources Detroit Dam and Big Cliff that produce power.

Notably, the governor signed a drought declaration for Marion County covering the period from September 18 – December 31, 2015.<sup>3</sup>

### Location and Extent

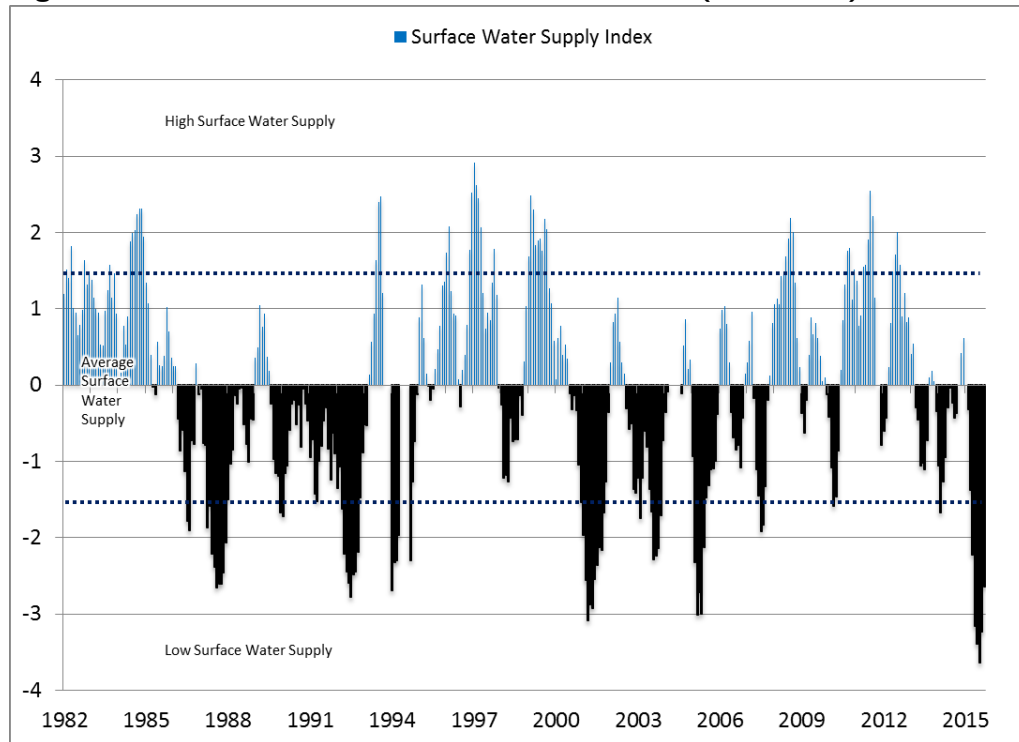
Droughts occur in every climate zone, and can vary from region to region. Drought may occur throughout Marion County and may have profound effects on the economy, particularly the municipal water, agricultural, and recreation sectors. Drought is typically measured in terms of water availability in a defined geographical area. It is common to express drought with a numerical index that ranks severity. Most federal agencies use the Palmer Method which incorporates precipitation, runoff, evaporation and soil moisture. However, the Palmer Method does not incorporate snowpack as a variable. Therefore, it is not believed to provide a very accurate indication of drought conditions in Oregon and the Pacific Northwest.

The Surface Water Supply Index (SWSI) from the Natural Resources Conservation Service is an index of current water conditions throughout the state. The index utilizes parameters derived from snow, precipitation, reservoir, and stream flow data. The data is gathered each month from key stations in each basin. The lowest SWSI value, -4.2, indicates extreme drought conditions (Low Surface Water Supply ranges from -1.6 to -4.2). The highest SWSI value, +4.2, indicates extreme wet conditions (High Surface Water Supply ranges from +1.6 to +4.2). The mid-point is 0.0, which indicates an average water supply (Average Water Supply ranges from +1.5 to -1.5). Figure 2-3 below shows the monthly history of SWSI values from February 1982 to October 2015 for the Willamette Basin which includes Marion County. Research shows that the periods of drought have fluctuated; recent drought periods occurred in 1987, 1992, 1994, 2001, 2003, 2005, and 2015.

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<sup>3</sup> Oregon Water Resources Department, Public Declaration Status Report  
[http://apps.wrd.state.or.us/apps/wr/wr\\_drought/declaration\\_status\\_report.aspx](http://apps.wrd.state.or.us/apps/wr/wr_drought/declaration_status_report.aspx).

**Figure 2-4: SWSI Values for the Willamette Basin (1982-2015)**



Source: Department of Agriculture-Natural Resources Conservation Service, “Surface Water Supply Index, Willamette Basin” [www.or.nrcs.usda.gov](http://www.or.nrcs.usda.gov). Accessed February 2016.

Additional information pertaining to the drought hazard in Marion County will be available upon adoption of the North Santiam Drought Contingency Plan, currently in development. Additional information related to Marion County’s Drought Contingency Planning efforts is discussed later in this section.

## Earthquake

**Table 2-3: Earthquake Summary Crustal**

| Hazard          | Earthquake - Crustal                      |
|-----------------|---|
| Type            | Geologic                                  |
| Location        | Multiple active faults; Willamette Valley |
| Speed of Onset  | Rapid                                     |
| Extent          | Very Strong to Severe shaking ~ 500 yrs*  |
| Prior Occurance | One over Magnitude 5 last 100 yrs**       |
| Probability     | Approximately 1% annual                   |

\*DOGAMI HazVu; \*\* PNSN - 1993 Scotts Mills just north of Marion County

Sources: DOGAMI - Oregon HazVu; Oregon NHMP; Pacific Northwest Seismic Network

**Table 2-4: Earthquake Summary Subduction**

| <b>Hazard</b>   | <b>Earthquake - Subduction</b>          |
|-----------------|---|
| Type            | Geologic                                |
| Location        | Primarily west of the Cascades; CA - BC |
| Speed of Onset  | Rapid                                   |
| Extent          | Catastrophic                            |
| Prior Occurance | One over Magnitude 9 last 500 yrs       |
| Probability     | Magnitude 9+ is 7% - 12% over 50 yrs**  |

\*DOGAMI HazVu; \*\*Oregon Natural Hazard Mitigation Plan, analysis by Oregon Department of Geology and Mineral Industries.

Sources: DOGAMI - Oregon HazVu; Oregon NHMP; Pacific Northwest Seismic Network

### Characteristics

The Pacific Northwest in general is susceptible to earthquakes from four sources: 1) the offshore Cascadia Subduction Zone; 2) deep intraplate events within the subducting Juan de Fuca Plate; 3) shallow crustal events within the North American Plate, and 4) earthquakes associated with volcanic activity. Marion County is primarily susceptible to crustal and subduction zone earthquakes.

According to the Oregon NHMP, the return period for the largest of the CSZ earthquakes (Magnitude 9.0+) is 530 years with the last CSZ event occurring 314 years ago in January of 1700. The probability of a 9.0+ CSZ event occurring in the next 50-years ranges from 7 - 12%. Notably, 10 - 20 "smaller" Magnitude 8.3 - 8.5 earthquakes occurred over the past 10,000 years that primarily affected the southern half of Oregon and northern California. The average return period for these events is roughly 240 years. The combined probability of any CSZ earthquake occurring in the next 50 years is 37 - 43%.

### Location and Extent

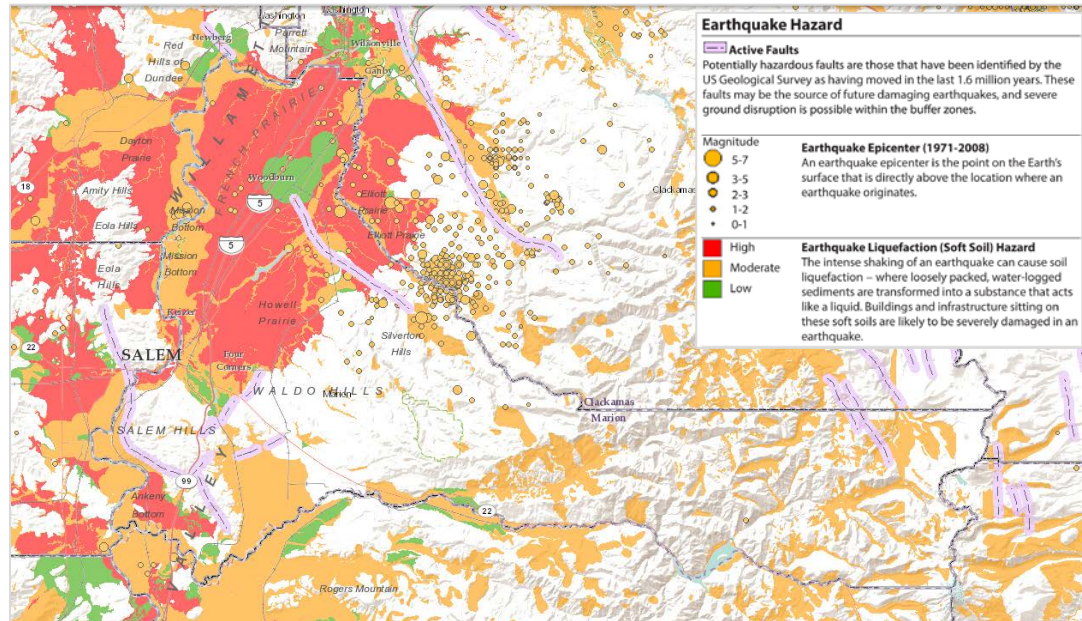
The region has also been shaken historically by crustal and intraplate earthquakes and prehistorically by subduction zone earthquakes centered off the Oregon coast. There have been multiple moderate earthquakes in Marion County in the past 100 years. Earthquakes with magnitudes of 5.0 and 4.6 occurred in Salem in 1957 and 1963 respectively. Minor damage was reported following both events. The most significant event in the region occurred near Scotts Mills in March of 1993. This magnitude 5.7 event resulted in damage throughout Marion County. In Salem, the rotunda of the state Capitol cracked, and the Golden Pioneer statue nearly rocked off its base.<sup>4</sup> In Mount Angel, authorities closed the historic St. Mary Catholic Church for fear its 200-foot bell tower could collapse. Chunks of plaster fell from the walls at the Queen of Angels Monastery. Woodburn felt the strongest effects of the quake. Officials shut down four century-old brick and mortar buildings that began to crumble. At the Wal-Mart store, fumes overcame several employees when pesticides, paints and car batteries mixed.<sup>5</sup>

<sup>4</sup> Statesman Journal. March 26, 1993.

<sup>5</sup> Ibid.

Figure 2-5 shows a generalized geologic map of Marion County including active fault locations. The historic earthquake epicenters shown in the figure below are primarily small events below M 2.0. The larger events may have been slightly felt but little to no structural/property damage resulted. Thus, the risk of damaging seismic events in Marion County arises primarily from major earthquakes on the Cascadia Subduction Zone. Smaller, crustal earthquakes in or near Marion County could be locally damaging, but would not be expected to produce widespread or major damage.

**Figure 2-5: Earthquake Epicenters (1971-2008), Active Faults, and Soft Soils**



Source: [Oregon HazVu: Statewide Geohazards Viewer \(HazVu\)](#)

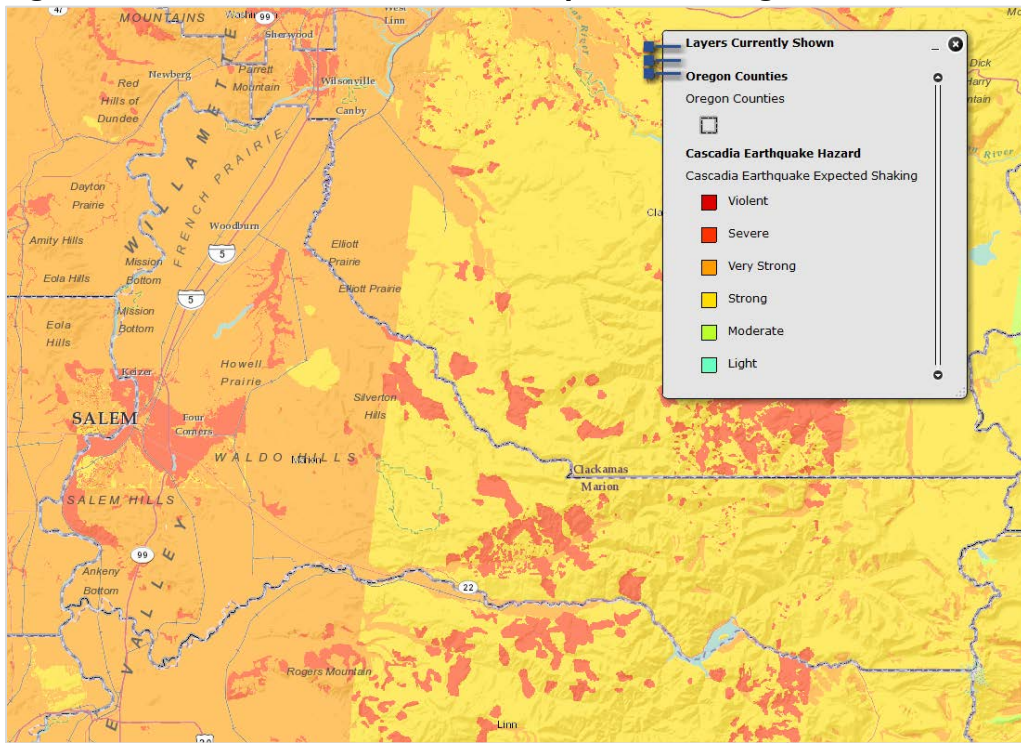
The Marion County EOP describes the Cascadia Subduction Zone threat as follows:

The 700-mile long Cascadia Subduction Zone (CSZ) runs along Interstate 5 (I-5) and divides Marion County in half. When a 9.0 magnitude earthquake takes place and lasts 4-5 minutes the impact will be wide spread. The county's population has 326,110 residents covering 1,182.33 square miles. The shaking, liquefaction, lateral spreading, and co-seismic settlement will cause significant structural and non-structural damage to homes and businesses. Prospectively experts estimate 9,000 injuries and 400 fatalities along the I-5 corridor. Critical infrastructure systems will be disrupted, including the four major lifelines communication, energy, transportation and water.

The utilities within the valley are estimated to be restored in six months to one year, water for drinking and or sewer will take one-month to one-year to be restored, transportation is estimated to have partial restoration of roads and bridges in six months to several years and communications is estimated to take two to three months to be restored. Secondary hazards, will include, but are not limited to spot fires and landslides. Population impacts are extensive as shelter services will be limited do to safety regulations of inhabited dwellings. Medically fragile patients will need to be evacuated in addition to commuters that will need reunification and may need life sustaining support. In addition, there will be major impacts on the economy and the way of life for months and even years following a catastrophic earthquake of this magnitude.

Figure 2-6 shows the expected shaking in Marion County resulting from a Cascadia Subduction Zone event.

**Figure 2-6: Cascadia Subduction Zone Expected Shaking**



Source: [Oregon HazVu: Statewide Geohazards Viewer \(HazVu\)](#)

For more information on the earthquake hazard in Marion County, refer to the following reports, incorporated herein by reference:

Geologic Map Series: [GMS-105 - Relative earthquake hazard maps of the Salem East and Salem West quadrangles, Marion and Polk Counties, Oregon](#) by Yumei Wang and William J. Leonard, 1996, 10 p., 1:24,000.

Interpretive Map Series: [IMS-006 - Water-induced landslide hazards, western portion of the Salem Hills, Marion County, Oregon](#) by Andrew F. Harvey and Gary L. Peterson, 1998, 13 p., 1:24,000.

Interpretive Map Series: [IMS-017 - Earthquake-induced slope instability; relative hazard map, western portion of the Salem Hills, Marion County, Oregon](#) by R. Jon Hofmeister, Yumei Wang, and David K. Keefer, 2000, 1:24,000

Open-File-Report: [O-2003-02 – Map of Selected earthquakes for Oregon \(1841-2002\), 2003](#)

Open-File-Report: [O-2007-02 - Statewide seismic needs assessment: Implementation of Oregon 2005 Senate Bill 2 relating to public safety, earthquakes, and seismic rehabilitation of public buildings, 2007](#)

Interpretive Map Series: [IMS-024 - Geologic hazards, earthquake and landslide hazard maps, and future earthquake damage estimates for six counties in the Mid/Southern Willamette](#)

[Valley including Yamhill, Marion, Polk, Benton, Linn, and Lane Counties, and the City of Albany, Oregon, 2008](#)

[Open-File-Report: O-2013-22 - Cascadia Subduction Zone earthquakes: A magnitude 9.0 earthquake scenario, 2013](#)

[Special Papers: SP-29, Earthquake damage in Oregon Preliminary estimates of future earthquake losses \(1999\)](#)

Additional reports are available via DOGAMI's Publications Search website:

<http://www.oregongeology.org/pubs/search.php>

Oregon Seismic Safety Policy Advisory Commission Reports:

[Oregon Resilience Plan \(2013\)](#)

## 2008 Assessment

In 2008, the Oregon Department of Geology and Mineral Industries (DOGAMI) developed regional earthquake hazard information to assess potential damages and losses for various earthquake scenarios in the Mid-Willamette Valley<sup>6</sup>. More specifically, DOGAMI:

- Identified the primary geologic hazards of Yamhill, Marion, Polk, Josephine, Linn, and Lane Counties and the City of Albany;
- Developed countywide earthquake and landslide hazard maps for each county; and
- Developed future earthquake damage estimates for each community.

Damage and loss estimates for each community were analyzed for two earthquake scenarios:

- A magnitude ~6.5 crustal fault earthquake
- A magnitude 9.0 Cascadia Subduction Zone earthquake

Information was consolidated into the Hazards U.S. Multi-Hazard methodology and computer application (HAZUS – MH), which is a federally developed program used to model various earthquake scenarios and estimate associated damage and loss. The following is a brief summary of damage and loss estimates for Marion County in a magnitude 9.0 Cascadia Subduction Zone earthquake scenario:

- Estimated fatalities during late afternoon business hours: 157
- Injuries from minor to life threatening: 2,492
- Households displaced: 5,787
- People needing shelter: 1,470
- Injuries requiring hospitalization: 638

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<sup>6</sup> Burns, William J., R. Jon Hofmeister, and Yumei Wang. Geologic Hazards, Earthquake and Landslide Hazard Maps, and Future Earthquake Damage Estimates for Six Counties in the Mid/Southern Willamette Valley including Yamhill, Marion, Polk, Josephine, Linn, and Lane Counties, and the City of Albany, Oregon. Oregon Department of Geology and Mineral Industries Interpretive Map Series IMS-24. 2008.

For more information, see: [Interpretive Map Series: IMS-024 - Geologic hazards, earthquake and landslide hazard maps, and future earthquake damage estimates for six counties in the Mid/Southern Willamette Valley including Yamhill, Marion, Polk, Josephine, Linn, and Lane Counties, and the City of Albany, Oregon, 2008](#)

More information on this hazard can be found in the Risk Assessment for Region 3, Mid-Willamette Valley, of the Oregon NHMP (2015).

## Flood

**Table 2-5: Flood Summary**

| Hazard          | Flood                               |
|-----------------|-------------------------------------|
| Type            | Climatic                            |
| Speed of Onset  | Slow to moderate                    |
| Location        | Mapped flood zones, floodplain      |
| Extent          | Moderate to severe                  |
| Prior Occurance | Nine significant events since 1964  |
| Probability     | ~18% overall; 1% annual within SFHA |

Sources: DOGAMI - Oregon HazVu; Oregon NHMP; FEMA NFIP; Oregon Risk Map

### Characteristics

Flooding results when rain and snowmelt creates water flow that exceed the carrying capacity of rivers, streams, channels, ditches, and other watercourses. In Oregon, flooding is most common from October through April when storms from the Pacific Ocean bring intense rainfall. Most of Oregon’s destructive natural disasters have been floods.<sup>7</sup> The principal types of flood that occur in Marion County include: riverine floods, shallow area floods, and urban floods.

In Marion County there are numerous streams, creeks, and rivers that provide a water source for the community. If the water volume or flow rate exceeds the capacity of the channel, flooding is possible. Flooding occurs at various frequencies and heights along the various water channels located in the county and sister counties. Nearly every community in Marion County has been affected by flooding at some point.

### Location and Extent

Floods are described in terms of their extent (including the horizontal area affected and the vertical depth of floodwaters) and the related probability of occurrence. Flood studies often use historical records, such as streamflow gages, to determine the probability of occurrence for floods of different magnitudes. The probability of occurrence is expressed in percentages as the chance of a flood of a specific extent occurring in any given year.

The magnitude of flood used as the standard for floodplain management in the United States is a flood having a probability of occurrence of one-percent in any given year. This

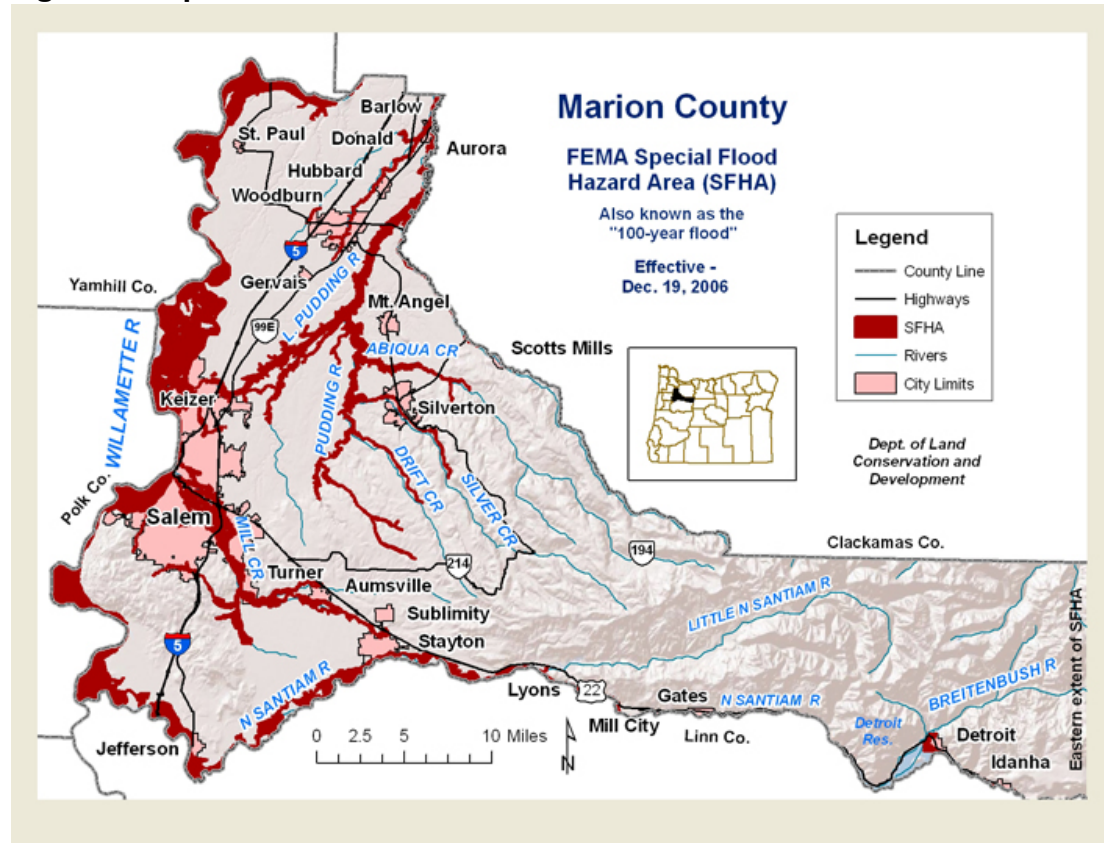
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<sup>7</sup> Taylor, George H. and Chris Hannan. *The Oregon Weather Book*. Corvallis, OR: Oregon State University Press. 1999



flood is also known as the 100-year flood or base flood. The most readily available source of information regarding the 100-year flood is the system of Flood Insurance Rate Maps (FIRMs) prepared by FEMA. These maps are used to support the National Flood Insurance Program. The FIRMs show 100-year floodplain boundaries for identified flood hazards. These areas are also referred to as Special Flood Hazard Areas (SFHAs) and are the basis for flood insurance and floodplain management requirements. The ongoing FEMA funded Risk MAP discovery process seeks to refine flood hazard information in portions of Marion County. This section will be updated as new information becomes available.

**Figure 2-7: Special Flood Hazard Area**



Source: [Oregon Risk MAP, Department of Land Conservation and Development](#)

The Marion County EOP includes the following description of the drought hazard:

Some floodplain areas in Marion County are located amongst residential dwellings and have been mapped by FEMA. These floodplain areas are located throughout the Willamette River and Santiam River, as well as areas along smaller creeks. Other portions of the Marion County, outside of the mapped floodplains, are also subject to significant, repetitive flooding from local storm water drainage. Major river basins including the Willamette, Little Pudding and North Santiam drainages run through Marion County and the Mill Creek drainage running through Salem; all these drainages are subject to flooding. Ten dams also pose a significant hazard to Marion County; the Detroit reservoir is located 20 miles east of Salem. Excessive rain through the months of October to March there is potential for increased flooding; impacting communities in low lining areas or in areas adjacent to the flood plans. The flood waters can occupy major roadways and incapacitate bridges creating a transportation standstill minimizing the

ability to rapidly respond. Of special note, in January 2012, Marion County was 1 of 7 counties that sustained flood damage from heavy rain, wind, and ice. One hundred thirty homes and seven businesses were damaged in the City of Turner; 29 streets were closed in the City of Salem; the state motor pool lost 150 vehicles and thousands of gallons of fuel; Thomas Creek in the City of Scio overtopped, damaging several buildings.<sup>8</sup> On December 18, 2015, in Turner, the Mill Creek almost flooded from a 7-8 year rain event. This was reported by a member of the NHMP steering committee.

For more information on the flood hazard in Marion County, refer to the following sources, which are incorporated herein by reference:

[Oregon Risk Map – Principal Flood Problems for Marion County](#)

[Flood Insurance Study for Marion County](#)

## Landslide

**Table 2-6: Landslide Summary**

| <b>Hazard</b>   | <b>Landslide</b>                                     |
|-----------------|--|
| Type            | Climatic/Geologic                                    |
| Speed of Onset  | Slow to rapid  |
| Location        | Steep slopes, weak geology (west Salem, east County) |
| Extent          | Minor to severe, but localized                       |
| Prior Occurance | Landslide occur annually in Marion County            |
| Probability     | 100% for minor events, ~10%-20% for severe events    |

Sources: DOGAMI - Oregon HazVu; Oregon NHMP

### Characteristics

A landslide is any detached mass of soil, rock, or debris that falls, slides or flows down a slope or a stream channel. Landslides are classified according to the type and rate of movement and the type of materials that are transported. In a landslide, two forces are at work: 1) the driving forces that cause the material to move down slope, and 2) the friction forces and strength of materials that act to retard the movement and stabilize the slope. When the driving forces exceed the resisting forces, a landslide occurs.

### Location and Extent

The severity or extent of landslides is typically a function of geology and the landslide triggering mechanism. Rainfall initiated landslides tend to be smaller, and earthquake induced landslides may be very large. Even small slides can cause property damage, result in injuries, or take lives.

The Marion County EOP includes the following description of the landslide hazard:

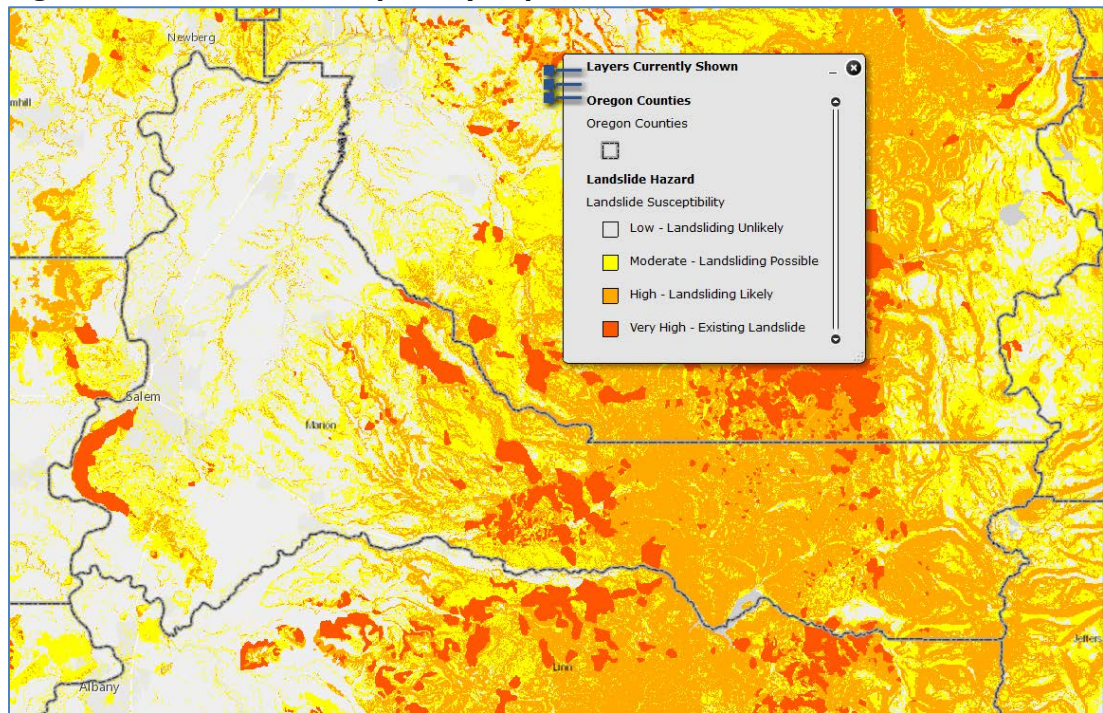
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<sup>8</sup> Taylor and Hatton (1999); National Climatic Data Center Storm Events, located at <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent~Storms> via Oregon 2015 Natural Hazards Mitigation Plan.

The landslide area within Marion County identified by the State Engineering Geologist is located on the west-facing slope of the Salem Hills and in the Cascades. The slides in this area have developed on steep slopes of soils originating from the marine sedimentary bedrock units. Landslides also occur in the canyon of Abiqua Creek about five miles east of Silverton and along the slopes of the Little North Fork of the Santiam River. In these areas, the slides are developed in deeply weathered tuffs of the Mehama Volcanics. Landslides may also occur in the clay soils overlying the Columbia River Basalt in the Salem Hills area and in the Waldo Hills-Silverton Hills area, if slopes are artificially over steepened. Steep slopes associated with landslide activity areas are themselves a deterrent to high density development. The landslides or debris flows, (mudslides), may affect buildings, roads, and utilities. Landslides are one of the most widespread and damaging natural hazards in Oregon.

Of particular note, North Fork Road experiences regular (annual) landslides and closures. This was reported by a member of the 2016 NHMP steering committee.

**Figure 2-8: Landslide Susceptibility Exposure**



Source: DOGAMI - Oregon HazVu

More detailed landslide hazard assessment at specific locations requires a site-specific analysis of the slope, soil/rock and groundwater characteristics at a specific site. Such assessments are often conducted prior to major development projects in areas with moderate to high landslide potential, to evaluate the specific hazard at the development site. Table 2-5 below shows Landslide Susceptibility and Exposure for the county and its incorporated jurisdictions. Notably, Scotts Mills and Idanha have significant percentages of landslide susceptible area with very high exposure.

**Table 2-5 Landslide Susceptibility Exposure**

| Jurisdiction  | Area, ft <sup>2</sup> | Low   | Moderate | High  | Very High |
|---------------|-----------------------|-------|----------|-------|-----------|
| Marion County | 33,185,295,063        | 42.4% | 23.0%    | 28.8% | 5.8%      |
| Aumsville     | 30,637,393            | 93.0% | 6.4%     | 0.6%  | 0.0%      |
| Aurora        | 13,534,706            | 55.7% | 35.7%    | 8.6%  | 0.0%      |
| Detroit       | 26,659,361            | 45.5% | 34.0%    | 20.6% | 0.0%      |
| Donald        | 7,787,724             | 99.2% | 0.8%     | 0.0%  | 0.0%      |
| Gates         | 7,683,876             | 50.2% | 32.3%    | 17.5% | 0.0%      |
| Gervais       | 10,716,349            | 98.7% | 1.3%     | 0.0%  | 0.0%      |
| Hubbard       | 19,587,769            | 92.7% | 5.4%     | 1.9%  | 0.0%      |
| Idanha        | 23,496,523            | 29.9% | 26.2%    | 21.0% | 23.0%     |
| Jefferson     | 22,291,901            | 90.4% | 8.8%     | 0.8%  | 0.0%      |
| Keizer        | 202,393,226           | 88.5% | 9.8%     | 1.8%  | 0.0%      |
| Mill City     | 23,105,987            | 74.5% | 16.9%    | 8.6%  | 0.0%      |
| Mt. Angel     | 29,486,393            | 89.0% | 10.5%    | 0.5%  | 0.0%      |
| Salem         | 1,368,874,853         | 69.3% | 23.3%    | 3.5%  | 3.9%      |
| Scotts Mills  | 10,197,012            | 29.6% | 10.4%    | 3.3%  | 56.8%     |
| Silverton     | 97,150,554            | 67.2% | 25.7%    | 7.0%  | 0.0%      |
| St. Paul      | 8,154,929             | 92.1% | 7.1%     | 0.8%  | 0.0%      |
| Stayton       | 81,891,198            | 84.6% | 13.4%    | 2.0%  | 0.0%      |
| Sublimity     | 25,724,506            | 93.3% | 6.5%     | 0.1%  | 0.0%      |
| Turner        | 40,337,405            | 63.7% | 24.2%    | 7.2%  | 4.8%      |
| Woodburn      | 148,853,259           | 92.0% | 7.3%     | 0.7%  | 0.0%      |

Source: DOGAMI Open-File Report, O-16-02, Landslide Susceptibility Overview Map of Oregon (2016)

For more information, refer to the following report and maps provided by DOGAMI:

- [Statewide Landslide Information Database](#)
- [Open File Report: O-16-02, Landslide Susceptibility Overview Map of Oregon](#)
- [Open-File Report: O-10-03, Digital geologic map of the southern Willamette Valley, Benton, Lane, Linn, Marion, and Polk Counties, Oregon](#)
- [Special Paper 34: Slope failures in Oregon: GIS inventory for three 1996/97 storm events, 2000](#)

## Volcano

**Table 2-7: Volcano Summary**

| Hazard          | Volcano                                       |
|-----------------|---|
| Type            | Geologic                                      |
| Speed of Onset  | Slow to rapid                                 |
| Location        | Cascade Mountains                             |
| Extent          | Moderate to severe                            |
| Prior Occurance | One significant event 1916 (Mount St. Helens) |
| Probability     | <1% annual                                    |

Sources: DOGAMI - Oregon HazVu; Oregon NHMP

## Characteristics

The Pacific Northwest, lie within the “ring of fire,” an area of very active volcanic activity surrounding the Pacific Basin. Volcanic eruptions occur regularly along the ring of fire, in part because of the movement of the Earth’s tectonic plates. The Earth’s outermost shell, the lithosphere, is broken into a series of slabs known as tectonic plates. These plates are rigid, but they float on a hotter, softer layer in the Earth’s mantle. As the plates move about on the layer beneath them, they spread apart, collide, or slide past each other. Volcanoes occur most frequently at the boundaries of these plates and volcanic eruptions occur when molten material, or magma, rises to the surface.

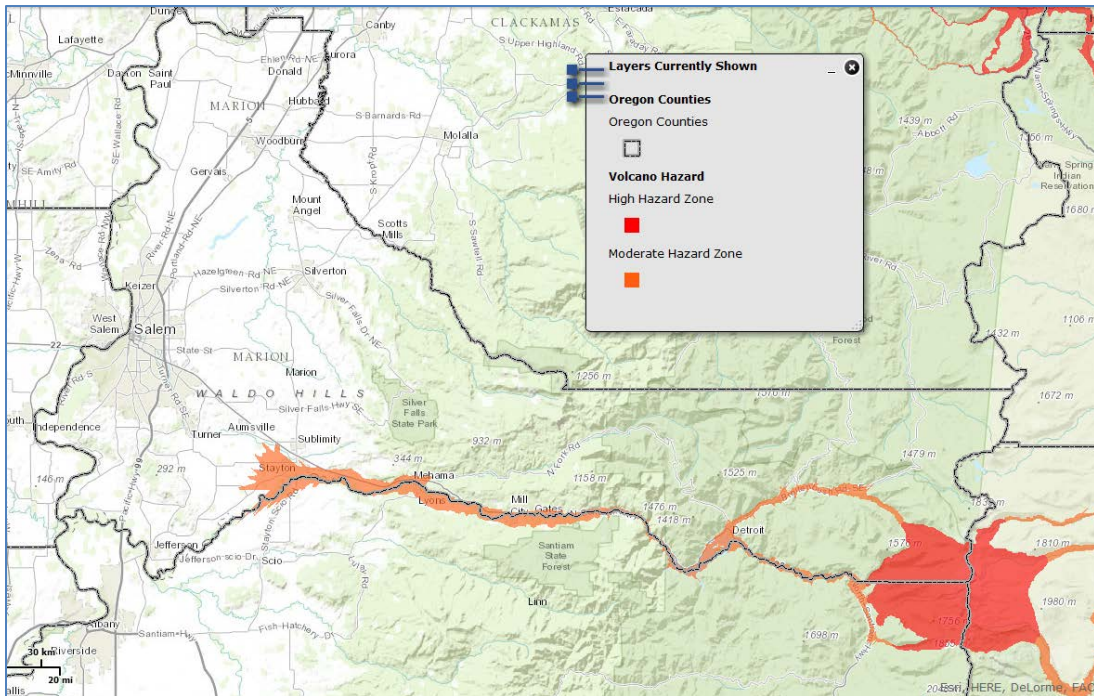
The primary threat to lives and property from active volcanoes is from violent eruptions that unleash tremendous blast forces, generate mud and debris flows, or produce flying debris and ash clouds. The immediate danger area in a volcanic eruption generally lies within a 20-mile radius of the eruption location.

## Location and Extent

Geologic hazard maps have been created for most of the volcanoes in the Cascade Range by the USGS Volcano Program at the Cascade Volcano Observatory in Vancouver, WA and are available at [http://vulcan.wr.usgs.gov/Publications/hazards\\_reports.html](http://vulcan.wr.usgs.gov/Publications/hazards_reports.html).

Oregon is located on the Pacific Rim. Tectonic movement within the earth's crust can activate dormant volcanoes in or near Marion County resulting in eruptions, lahars and ash fallout. Volcanic activity is possible from anywhere along the Cascade Range. Direct impacts from lava is possible in the southeast corner of Marion County in the Cascade Range. Lahar flows are possible along most of Marion County’s eastern boarder (see Figure 2-9). Of particular concern are communities and infrastructure throughout the Santiam Canyon has far west as Stayton. Ash fall is possible county wide with potential impacts to municipal water and transportation systems as well as sensitive mechanical and electrical equipment.

**Figure 2-9: Volcano Hazard**



Source: DOGAMI - Oregon HazVu

The Marion County EOP includes the following description of the volcano hazard:

Several Oregon and Washington volcanoes are located relatively near Marion County, including Mount St. Helens and Mt. Hood. In the past 200 years, seven of the Cascade volcanoes in the United States have erupted, including Mt. Baker, Glacier Peak, Mt. Rainier, Mount St. Helens, Mt. Hood, Mt. Shasta, and Mt. Lassen. Within Marion County, the impacts of volcanic events are likely to be only minor ash falls, lahars, and lava flow, with perhaps some impact on public water supplies, utilities and transportation including aviation. Impacts include: temporary disruption of transportation, sewer disposal, and water treatment systems; highway and road closures; power outages; clogged filters and damage to mechanical equipment and vehicles; and eye irritation. Previous history of volcanic eruption includes the 1980 Mount St. Helens eruption; ash fall from which did not cause any major problems in Marion County. Eruptions in the Cascades have occurred at an average of 1-2 per century during the last 4,000 years and future eruptions are certain. Mount Jefferson poses the greatest threat of volcanic eruption to Marion County. Located on the eastern edge of the county, Mount Jefferson presents not only a threat of lahars and lava flows, but also a threat of ash fallout. The Cascade volcanic arc in central Oregon, from Mount Jefferson to Diamond Peak, is composed of hundreds of individual volcanoes that lie among the major volcanic centers of Mount Jefferson, Three Sisters, and Newberry Volcano. The area has witnessed numerous eruptions during the past 14,000 years.

## Wildfire

**Table 2-8: Wildfire Summary**

| <b>Hazard</b>   | <b>Wildfire</b>                               |
|-----------------|---|
| Type            | Climatic, Human Caused                        |
| Speed of Onset  | Moderate to rapid                             |
| Location        | County wide, Wildland Urban Interface         |
| Extent          | Minor to extreme                              |
| Prior Occurance | 171 from 2000-2009*                           |
| Probability     | 100% for minor events, ~1% for extreme events |

\* Marion County DRAFT Community Wildfire Protection Plan

Sources: Marion County DRAFT CWPP; Oregon NHMP

Marion County is in the process of updating its Community Wildfire Protection Plan (CWPP). When adopted, the CWPP shall be incorporated herein by reference and will serve as the guiding document for wildfire mitigation activities in the county.

### Characteristics

Wildfires occur in areas with large amounts of flammable vegetation that require a suppression response due to uncontrolled burning. Fire is an essential part of Oregon's ecosystem, but can also pose a serious threat to life and property particularly in the state's growing rural communities. Wildfire can be divided into three categories: interface, wildland, and firestorms. The increase in residential development in interface areas has resulted in greater wildfire risk. Fire has historically been a natural wildland element and can sweep through vegetation that is adjacent to a combustible home. New residents in remote locations are often surprised to learn that in moving away from built-up urban areas, they have also left behind readily available fire services providing structural protection.

The Marion County Community Wildfire Protection Plan wildfire risk assessment considers:<sup>9</sup>

- **Risk:** the potential and frequency for wildfire ignitions (based on past occurrences).
- **Hazard:** the conditions that may contribute to wildfire (fuels, slope, aspect, elevation and weather).
- **Values:** the people, property, natural resources and other resources that could suffer losses in a wildfire event.
- **Protection Capability:** the ability to mitigate losses, prepares for the hazard, responds to and suppresses wildland and structural fires.
- **Structural Vulnerability:** the elements that influence the level of exposure of the hazard to the structure (roof type and building materials, access to the structure, and whether or not there is defensible space or fuels reduction around the structure.)

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<sup>9</sup> Marion County Community Wildfire Protection Plan DRAFT, Chapter 3.

## Location and Extent

Wildfire hazard areas are commonly identified in regions of the Wildland Urban Interface (WUI). The interface is the urban-rural fringe where homes and other structures are built into a densely forested or natural landscape. If left unchecked, it is likely that fires in these areas will threaten lives and property. The DRAFT Marion County CWPP identifies the areas as “Communities at Risk” due to their proximity to or location within the WUI.

- Breitenbush
- Detroit
- Drakes Crossing
- Elkhorn (Little North Fork; Santiam Canyon)
- Gates
- Idanha
- Jefferson
- Lyons
- Marion
- Mehama
- Mill City
- Salem, south and east
- Scotts Mills
- Silverton
- Stayton
- Sublimity Fire District, outside city limits
- Turner

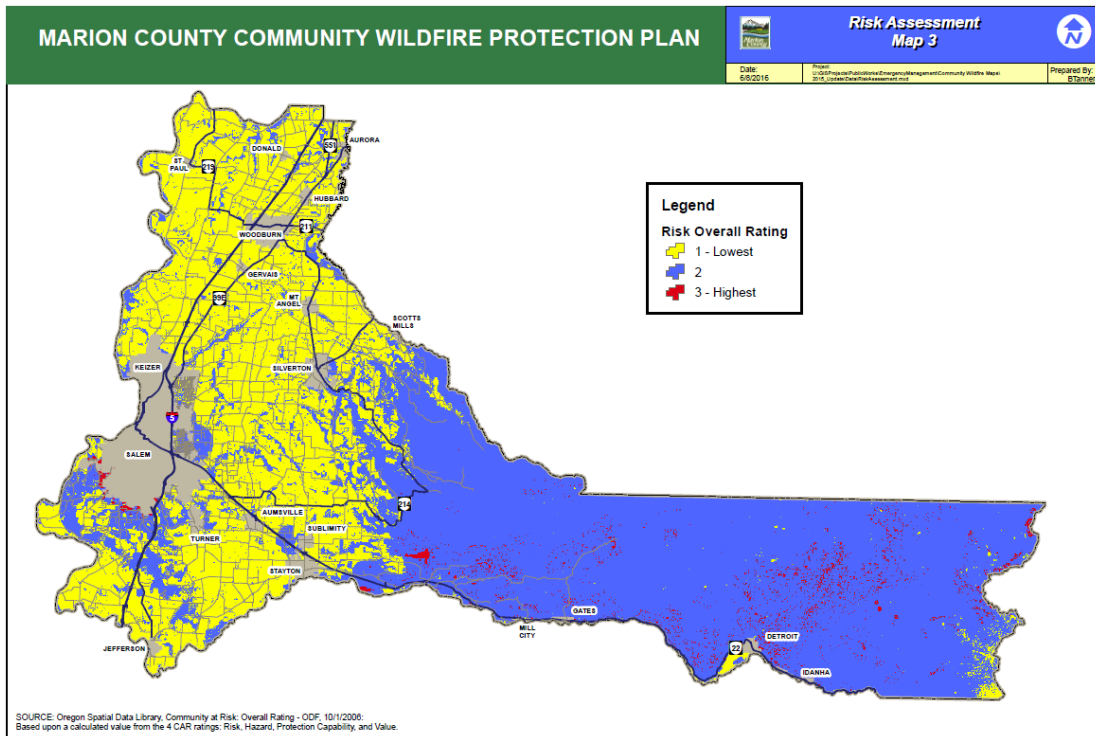
Updated high-level wildfire risk assessment information is now available through the West Wide Wildfire Risk Assessment (WWA).<sup>10</sup> This multi-state assessment provides multiple data sets that can be used to evaluate and weight the relative risk of various factors that contribute to wildfire risk. Because of the scale, modeling and assumptions that went into creating the WWA, caution is needed when interpreting the data at the local level. The ongoing CWPP update process will assess this new data and determine its relevance to wildfire risk and mitigation strategies in Marion County.

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<sup>10</sup> The Oregon Department of Forestry (ODF and Agency), on behalf of the Council of Western State Foresters (CWSF) and the Western Forestry Leadership Coalition (WFLC), has conducted a wildfire risk assessment and report for the 17 western states and selected U.S. affiliated Pacific Islands. At the highest level, this assessment is known as the West Wide Wildfire Risk Assessment, or WWA.

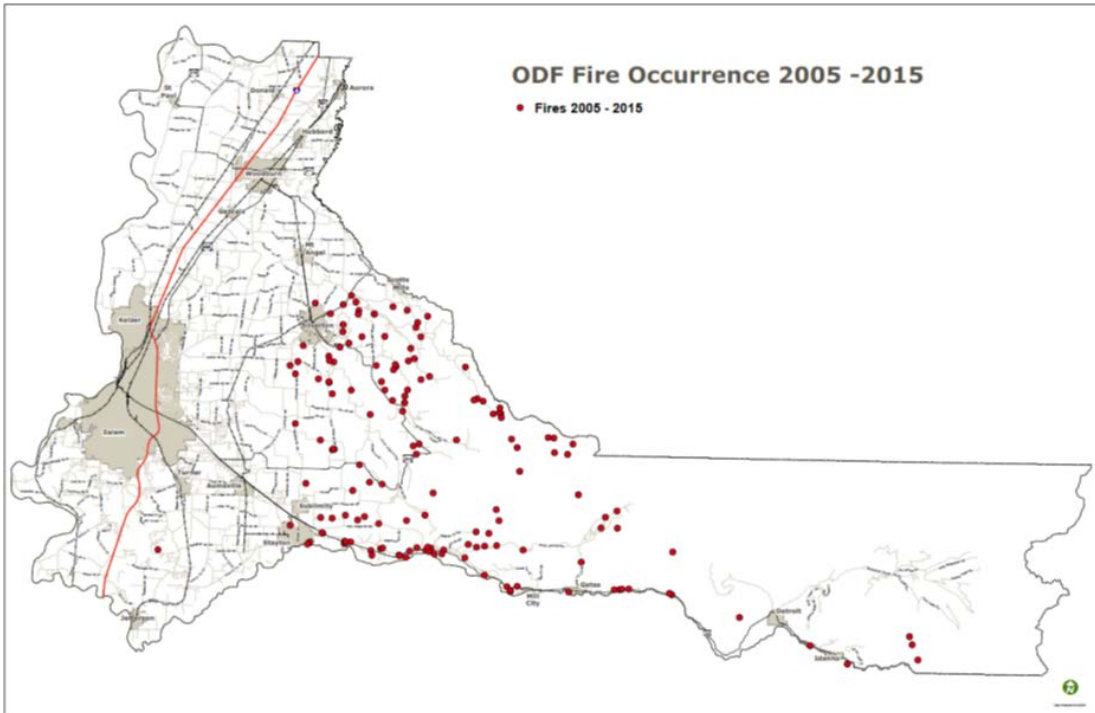


**Figure 2-11: Marion County Wildfire Risk Assessment Map**



Source: DRAFT Marion County CWPP

**Figure 2-12: Marion County Historic Fire Occurrences (ODF) 2005-2015**



The Marion County EOP includes the following description of the wildfire hazard:

The forest lands in Marion County make up about 43 percent of the eastern part of the county and are significant to the economic, recreational and environment. The eastern region of the county is suited to forest use due to the large amount of precipitation, rugged terrain, remoteness from urban areas and large ownerships. The forest cover consists predominantly of the coniferous species of Douglas Fir, Western and Mountain Hemlock, Western Red Cedar and True Firs. Deciduous species occur to a lesser extent at lower elevations and have only limited commercial value. An area located east and south of the city of Silverton and commonly referred to as the Silverton Hills consist of a mixed pattern of farm and forest land uses. The topography of this area consists of relatively level ridge tops with intervening stream canyons. Marion County remains vulnerable to wildfire events and has identified 17 areas in the county as vulnerable wildland/urban interface communities. Most of Marion County wildfires occur east of the Cascade Highway. An uncontrolled fire often occurring in wild land areas; however, can also consume houses or agricultural resources. Wildfires have been a feature of the Oregon landscape, including Marion County, for thousands of years. Within Marion County especially vulnerable areas include; Santiam Canyon area, Idanha, Detroit, Gates, Stayton, Silverton, Turner and unincorporated areas to the south and east of Salem. It is estimated that 8-10% (20-25,000 people) of the County's total population live in areas potentially subject to an interface with a wildland fire. Losses from a fire could range as high as \$10 to \$15 million dollars. The impacts include loss of communications, utilities and compromises water quality and the transportation of goods and services to the affected communities. The fire season typically occurs between May and October. A majority of the fires are caused by humans or lightning strikes.

## Severe Weather/Storm

**Table 2-8: Severe Weather/Storm Summary**

| <b>Hazard</b>   | <b>Severe Weather/Storm</b>  |
|-----------------|--|
| Type            | Climatic   |
| Speed of Onset  | Slow to moderate   |
| Location        | Countywide   |
| Extent          | Minor to severe  |
| Prior Occurance | Minor events occur annually; ~30 moderate to severe events over the past 130 years |
| Probability     | 100% for minor events, 23% for moderate to severe events                           |

Sources: Oregon NHMP; Marion HMP Hazard History

Marion County is vulnerable to multiple forms of severe weather. The Marion County Comprehensive Risk Assessment ranks the following severe weather hazards: Tornado, Winter Storm, and High Temperature. Note that the drought, wildfire and flood hazards are covered under separate sections. These hazards can also be tied to severe weather events.

To maintain consistency with previous versions of this plan and to simplify the mitigation strategy, this section focuses on wind and winter storm events and the range of conditions common to each.

## Characteristics

A windstorm is generally a short duration event involving straight-line winds and/or gusts in excess of 50-mph. The most common type of wind events affecting Marion County are straight-line winds. These events originate as a downdraft of rain-cooled air which spread out rapidly when they reach the ground. Straight-line winds can produce gusts of up to 100-mph.

Winter storms are generally characterized by a combination of heavy rains, snow, hail or ice often accompanied by high winds. This section deals primarily with the snow and ice effects of winter storms. The winter storms that affect Marion County are typically large cyclonic low-pressure systems that move in from the Pacific Ocean and affect regions within Oregon or the entire Pacific Northwest. These storms are most common from October through March.

## Location and Extent

In Marion County, the wind events occur county-wide, but are generally highest near the Willamette River. In the mountainous areas, the level of wind hazard is largely determined by topography and vegetation cover at the local level. Mountainous terrain slows down wind speed, particularly in valley areas. However, along ridge lines and other exposed areas, the wind speeds increase. Although windstorms can affect the entirety of the county, they are especially hazardous in developed areas where tree damage can impact transportation, housing and electrical infrastructure. Snow and ice events can also occur county wide. However, impacts are most common at elevations above 300-feet.

The Marion County EOP includes the following description of the wildfire hazard:

*Ice, hail, thunderstorms, and winter storm:* An ice storm within the county can be devastating and is caused by freezing rain. Even a thin layer of ice on the ground, trees, cars and other objects can impact transportation and utilities. As the ice accumulates roads become slick making it dangerous to travel and trees become compromised impacting power poles and telephone lines. Significant ice accumulations are usually accumulations of one-quarter inch or greater. Hail is relative during thunderstorms producing winds of at least 58 mph (50 knots) and/or hail at least "1-inch" (quarter size) in diameter. Near severe or strong thunderstorms typically account for wind gusts of 40-57 mph and/or for small hail less than 1-inch in diameter. *Heavy snow and blizzard storms:* A heavy snow event that produces, or forecasted to produce heavy snow accumulations. A blizzard is a winter storm with sustained or frequent winds of 35 mph or higher with considerable falling and/or blowing snow that frequently reduces visibility to one-quarter mile or less. These conditions are expected to prevail for a minimum of 3 hours. Marion County has experienced several disruptive storms including heavy snow storms and ice resulting in building and property damage, utility failures, and in some cases injury or death. The winter storms that affect Marion County are typically large cyclonic low-pressure systems that move in from the Pacific Ocean and affect large areas of Oregon and/or the whole Pacific Northwest. These storms are most common from October through March.

Notably, on March 2, 2012, FEMA issued a disaster declaration for twelve Oregon counties, including Marion, to assist with recovery from “Severe Winter Storm, Flooding, Landslides, and Mudslides.”<sup>11</sup>

## Community Vulnerability Identification and Assessment

Understanding community impacts and how they relate to its vulnerability and risk is one of the most essential components of the risk assessment. For the purposes of this HMP, the county and cities primarily utilized BOLD Planning software and analysis and results from the Marion County Threat Hazard Identification and Risk Assessment workshop to assess vulnerability. For an in-depth analysis of community characteristics in Marion County, please refer to the Community Profile in Volume III: **Appendix C**. The Marion County Risk Assessment Annex to the EOP, incorporated herein by reference, includes a risk impact assessment for each hazard.

## Community Characteristics

Vulnerability assesses the extent to which people are susceptible to injury or other impacts resulting from a hazard as well as the exposure of the built environment or other community assets (social, environmental, economic, etc.) to hazards. The exposure of community assets to hazards is critical in the assessment of the degree of risk a community has to each hazard. Identifying the populations, facilities and infrastructure at risk from various hazards can assist the county in prioritizing resources for mitigation, and can assist in directing damage assessment efforts after a hazard event has occurred. The exposure of county and city assets to each hazard and potential implications are explained in each hazard section.

Vulnerability includes the percentage of population and property likely to be affected under an “average” occurrence of the hazard. Marion County evaluated the best available vulnerability data to develop the vulnerability scores presented below.

## Population

The socio-demographic qualities of the community population such as language, race and ethnicity, age, income, and educational attainment are significant factors that can influence the community’s ability to cope, adapt to, and recover from natural disasters. Historically, 80 percent of the disaster burden falls on the public.<sup>12</sup> Of this number, a disproportionate burden is placed upon special needs groups, particularly children, the elderly, the disabled, minorities, and low-income persons. Population vulnerabilities can be reduced or eliminated with proper outreach and community mitigation planning.

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<sup>11</sup> FEMA Disaster Declarations <https://www.fema.gov/disaster/4055>.

<sup>12</sup> Hazards Workshop Session Summary #16, *Disasters, Diversity, and Equity*, University of Colorado, Boulder (2000).

## Population Vulnerabilities

- Marion County is the fifth most populous county in Oregon. The county's population has steadily increased by 10 percent between 2000 and 2010 and by 9 percent between 2010 and 2015<sup>13</sup>.
- The average age of Marion County residents is roughly 35, three years younger than the average resident in the state of Oregon<sup>14</sup>.
- Between 2000 and 2008, residents under the age of five increased by 14 percent, the number of residents between the ages of 55-59 increased by 51 percent, those in the 60-64 age group increased by 54 percent, and those aged 85 and older increased by 46 percent<sup>15</sup>.
- 22 percent of Marion County's population is between the ages of 0 and 14<sup>16</sup>.
- A little over 11 percent of residents under the age of 65 have a disability<sup>17</sup>.
- 12 percent of the population is considered elderly (over 65 years of age)<sup>18</sup>.

## Economy

Economic diversification, employment, and industry are measures of economic capacity. However, economic resilience to natural disasters is far more complex than merely restoring employment or income in the local community. Building a resilient economy requires an understanding of how the components of employment sectors, workforce, resources and infrastructure are interconnected in the existing economic picture. The current and anticipated financial conditions of a community are strong determinants of community resilience, as a strong and diverse economic base increases the ability of individuals, families and the community to absorb disaster impacts for a quick recovery.

## Economic Vulnerabilities

- Marion County has the third most diverse county out of all of the 36 counties evaluated<sup>19</sup>.
- Marion County is listed as an economically distressed community<sup>20</sup>.
- Unemployment is 2 percent higher in Marion County than the Oregon average unemployment rate<sup>21</sup>.
- The top five industry sectors in Marion County with the most employees, as of 2014, are Managerial, Professional (30 percent); Sales and Office (24 percent); Education,

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<sup>13</sup> Portland Research Center, Portland State University, 2015 Certified Oregon Population Estimates

<sup>14</sup> U.S. Census Bureau, American Community Survey

<sup>15</sup> U.S. Census Bureau, Table P12 Marion County Population by Age, 2000, 2008

<sup>16</sup> Population by Age, American Community Survey 2014

<sup>17</sup> U.S. Census Bureau, American Community Survey 2010-2014

<sup>18</sup> U.S. Census Bureau, American Community Survey 2010-2014

<sup>19</sup> Regional Herfindahl Index Scores, Oregon Employment Department

<sup>20</sup> Business Oregon – Oregon Economic Data “Distressed Communities List”

<sup>21</sup> U.S. Census Bureau, American Community Survey

Health, and Social Services (30 percent); Service (20 percent); and Production and Transport (13 percent)<sup>22</sup>.

## Environment

The capacity of the natural environment is essential in sustaining all forms of life including human life, yet it often plays an underrepresented role in community resiliency to natural hazards. The natural environment includes land, air, water, and other natural resources that support and provide space to live, work, and recreate. Natural capital such as wetlands and forested hill slopes play significant roles in protecting communities and the environment from weather-related hazards, such as flooding and landslides. When natural systems are impacted or depleted by human activities, those activities can adversely affect community resilience to natural hazard events.

## Environmental Vulnerabilities

- The western half of Marion County is located in the Willamette Valley and is relatively flat. The eastern portion of Marion County has a mountainous topography and is bordered by the Cascade Mountain Range.
- The average elevation for Marion County is 154 feet and elevations range from 100 feet near the Willamette River to 2400 feet in the foothills of the Cascade Mountains<sup>23</sup>.
- The majority of water resources originate in the eastern portion of Marion County<sup>24</sup>.
- Marion County receives 40 inches of rain annually<sup>25</sup>.
- There are a number of rivers in Marion County, including the Willamette River, North Santiam River, Pudding River, Little Pudding River, and Mill Creek.
- The largest reservoir in Marion County is Detroit Reservoir; Detroit Reservoir is located 50 miles east of Salem and covers roughly 5.5 square miles in area.

## Housing

Housing type and age are important factors in hazard mitigation planning. Certain housing types tend to be less disaster resilient and warrant special attention. Mobile homes, for example, are generally more prone to wind and water damage than standard wood-frame construction. Homes built before 1993 may be more vulnerable to earthquakes because they were built prior to the incorporation of strict earthquake standards in Oregon's building codes. Structures built in Oregon after 1993 use earthquake resistant designs and construction techniques. Additionally, in the 1970s, the Federal Emergency Management Agency (FEMA) began assisting communities with floodplain mapping and communities passed floodplain ordinances to regulate floodplain development.

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<sup>22</sup> Industry Employment as Percentage of the Employed, U.S. Census Bureau

<sup>23</sup> Pringle, Glenn-Gibson, Claggett and Mill Creeks Watershed Assessment. January 2002.

<sup>24</sup> Marion County Comprehensive Plan, 2002

<sup>25</sup> Atlas of Oregon. 2002. University of Oregon Press.

## Housing Vulnerabilities

- 68 percent of housing units in Marion County were built prior to 1990; therefore, are not built to current earthquake standards.
- Almost 60 percent of units are owner-occupied and 40 percent are occupied by renters. A little over 6 percent of Marion County's housing units are vacant.
- 8 percent of Marion County residents live in mobile homes<sup>26</sup>.
- 44 percent of renter households in Marion County are rent burdened and spend 35 percent or more of their monthly income on housing<sup>27</sup>.
- For every affordable housing unit available in Marion County, there are 16 extremely low-income households<sup>28</sup>.

## Critical Facilities and Infrastructure

Critical facilities (i.e. police, fire, and government facilities) and physical infrastructure are vital during a disaster and are essential for proper functioning and response. The lack or poor condition of infrastructure can negatively affect a community's ability to cope, respond and recover from a natural disaster. Following a disaster, communities may experience isolation from surrounding cities and counties due to infrastructure failure. These conditions force communities to rely on local and immediately available resources. For the purposes of this plan, critical facilities and infrastructure were evaluated through the lifeline sector analysis. The results of this analysis are below.

## Critical Facilities and Infrastructure Vulnerabilities

- Communication
  - Many providers share infrastructure and/or collocate their infrastructure
  - During a power outage, battery sustainability and generators would only provide limited power for two to three days.
  - The largest barriers to respond in a Cascadia event is staff ability to respond, access to facilities, time, funding, and political support.
  - After a Cascadia event, all providers anticipate a 75 to 100 percent shutdown.
- Energy
  - Generators are used as backups for critical infrastructure throughout the county, but they require access to various fuel types.
  - Oregon's fuel storage facilities are located in Portland and are susceptible to failure due to soil liquefaction. The storage capacity is six days.
  - The estimated level of electrical service interruption during a Cascadia event is approximately one to three months.
- Transportation

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<sup>26</sup> U.S. Census Bureau, "Selected Housing Characteristics: 2010-2014 American Community Survey 5-Year Estimates," American Community Survey

<sup>27</sup> U.S. Census Bureau, "Selected Housing Characteristics: 2010-2014 American Community Survey 5-Year Estimates," American Community Survey

<sup>28</sup> Oregon Housing and Community Services: LIFT Housing Program Policy Subcommittee, Available Data from OHCS and DHS, Presented October 14, 2015.

- The most critical routes in Marion County include Interstate 5 and Highway 22.
- Salem-Keizer Transit operates city and regional buses and CherryLift for people with disabilities. Yearly, they provide about 4 million rides.
- Following a Cascadia event transportation will be limited for 6-12 months.
- Per day, Salem-Keizer Public Schools transport an estimated 22,000 students.
- Water
  - Infrastructure located near rivers could be impacted from floods, wildfires, or earthquake causing service disruption.
  - People living in incorporated areas of Marion County rely on septic tanks and wells.
  - Low water reserves and river flow pose a serious threat to Marion County's water supply.
  - Damage assessments and repair of impacted facilities cannot be conducted without road access.

## Lifeline Sector Analysis

The lifeline sector analysis evaluates key resources and facilities within specific sectors through sector stakeholder feedback. Please see **Appendix D** for the full lifeline sector analysis.

## Energy

The energy sector is critical to modern life. Electricity is vital for virtually all household, business and emergency operations; liquid fuel is used for transportation, facility construction and repair, and backup power; natural gas is used for electricity generation, heating, cooking, powering vehicles, and other uses. The resilience, redundancy, and interdependencies of the energy sector will largely determine the timeline for emergency response and long-term community recovery. Diverse and redundant energy supply and distribution can significantly increase regional resilience.

### Energy Summary Table

|   |   |
|---|---|
| <p><b>Critical Interdependencies:</b><br/> <b>Systems of all types are dependent on other systems in order to function. In order to operate, the communication sector is particularly</b><br/> <b><u>DEPENDENT ON:</u></b></p> <ul style="list-style-type: none"> <li>● Transportation</li> <li>● Communication</li> </ul> <p><b>Other critical lifeline sectors that <u>DEPEND ON</u> the communication sector to operate include:</b></p> | <p><b>Critical Vulnerabilities:</b><br/> <b>Each sector is vulnerable to a variety of impacts. The energy sector is particularly vulnerable to the following:</b></p> <ul style="list-style-type: none"> <li>● Consumption consists almost entirely of one of three forms: electricity, liquid fuels, natural gas.</li> <li>● Dependence on BPA for electric power; Marion County produces very little power locally.</li> <li>● Lead time for ordering critical system components (e.g. transformers)</li> </ul> |
|---|---|



|  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• Public Safety and Emergency Management</li> <li>• Transportation</li> <li>• Water</li> <li>• Communication</li> <li>• Economy</li> </ul>  | <ul style="list-style-type: none"> <li>• Concentration of liquid fuel storage facilities in Portland; limited local fuel storage and supply.</li> <li>• Lack of capability to pump fuel locally without power.</li> <li>• Reliance on supply and distribution facilities located outside Marion County.</li> </ul> |
| <p><b>Major Findings:</b></p> <ul style="list-style-type: none"> <li>• Generators are co-located by equipment and are used at critical infrastructure throughout the county; however, require various fuel types depending on the unit.</li> <li>• Oregon’s fuel storage facilities are located in Portland and are susceptible to failure due to soil liquefaction. The storage capacity on a normal day is six days; therefore, it is anticipated that fuel will be an undersupplied commodity during a Cascadia event. It will take 3-6 weeks to reacquire fuel.</li> <li>• Energy is critically interdependent with the transportation, communication, and water sectors. For example, not having access to roads nor having the ability to communicate with responders leaves the energy sector extremely vulnerable. In addition, there is a need for energy in powering water treatment plants. These vulnerabilities are particularly heightened in areas where accesses via bridges or singular roads are susceptible to failure.</li> <li>• The EPA regulates energy in terms of emissions limiting the capacity to produce additional energy resources.</li> <li>• Damage assessments will be critical to capture the impacts to this lifeline. Downed trees, accumulating ice, and high winds can impact the resiliency of energy as a lifeline.</li> <li>• The energy sector also prepares and mitigates against human-made disasters, such as cyberattacks.</li> <li>• The energy sector grants people with uninterrupted services due to medical status during non-catastrophic events.</li> <li>• An estimated 1-3 months of electrical service interruption during a Cascadia event.</li> </ul> |  |

## Communications

The communication sector facilitates the rapid exchange of information across a broad range of systems and technologies. These include: broadcast television and radio, telephone, cellular phone, cable, internet, two-way radio, and Ham (or amateur) radio.

Communication is an essential aspect of virtually all public and private sector activities. The ability to communicate is especially critical during an emergency. Notably, FEMA’s Emergency Support Function #2 – Communications specifically supports the restoration of communications infrastructure. The scope of ESF #2 includes, “restoration of public communications infrastructure” and assisting “State, tribal, and local governments with

emergency communications and restoration of public safety communications systems and first responder networks.”<sup>29</sup>

The assessment focussed on (1) the adaptive capacity of the communications sector, (2) hazard-specific vulnerabilities to communication infrastructure, and (3) mitigation opportunities that can support uninterrupted or rapid restoration of communication capability during or following emergency or disaster event.

**Communication Sector Summary**

|  |   |
|--|---|
| <p><b>Critical Interdependencies:</b><br/> <b>Systems of all types are dependent on other systems in order to function. In order to operate, the communication sector is particularly <u>DEPENDENT ON:</u></b></p> <ul style="list-style-type: none"> <li>• Electricity</li> <li>• Energy (fuel)</li> <li>• Transportation</li> </ul> <p><b>Other critical lifeline sectors that <u>DEPEND ON</u> the communication sector to operate include:</b></p> <ul style="list-style-type: none"> <li>• Water (SCADA)</li> <li>• Electricity</li> <li>• Public Safety and Emergency Management</li> <li>• Transportation</li> <li>• Economy</li> </ul> | <p><b>Critical Vulnerabilities:</b><br/> <b>Each sector is vulnerable to a variety of impacts. The communications sector is particularly vulnerable to the following:</b></p> <ul style="list-style-type: none"> <li>• All systems rely on electricity for operation and maintain generators for backup power. Generators rely on fossil fuels to operate leading to questions about what systems and services would be prioritized for gasoline/diesel fuel use if there were a disruption to fuel supply. Also, some generators operate on propane or natural gas, neither of which are included in state or federal energy assurance plans.</li> <li>• All systems rely on infrastructure (towers, antennae) spread across large areas, often in remote locations. Road access to repair equipment is a primary concern</li> <li>• 911 service and other emergency communication relies on line-of-site microwave transmission. Even small changes in antennae alignment can disrupt transmission and require recalibration to re-establish connections between towers. Fiber infrastructure is vulnerable to earthquake damage, in particular where lines are connected to bridge spans.</li> </ul> |
|--|---|

<sup>29</sup> FEMA, Emergency Support Function #2 – Communications Annex. 2008. <https://www.fema.gov/pdf/emergency/nrf/nrf-esf-02.pdf>

**Major Findings:**

- Many providers share infrastructure and or have their infrastructure co-located.
- Stakeholders are well prepared to address winter storms and other disasters as long as there is access to their facilities. Transportation, water, and energy are equally dependent on communication infrastructure. In addition, trees, wind and ice are hazards that can impact this lifeline.
- During a power outage, battery and generator backups provide limited power for a varying duration of time depending on the fuel source and capacity. Redundancy is a needed resource for critical infrastructure that requires access and the supply of multiple fuel types, primarily gasoline and diesel. Notably, propane is a fuel source for some generators; however, propane will not be provided through state resources. Some generators operate on propane or natural gas, neither of which are included in state or federal energy assurance plans.
- All providers anticipate a 75-100% shut-down after a Cascadia event. Due to the roads and bridges being impassable, network connections could be severed.
- Largest barriers to respond in a Cascadia event include: staff ability to respond, access to facilities, shortage of supplies to repair infrastructure, time, funding, and political support.
- Stakeholders recognize that their staff and families need to be prepared. To address this need, they are supporting a proactive approach to disasters. In particular, the Communications sector is working to train employees to be prepared for disasters so they can address their own immediate needs before safely addressing the needs of the sector post-event.
- Some towers have fiber optic lines as a redundancy. However, these lines are vulnerable in a catastrophic earthquake, in particular where lines are connected to bridge spans.
- Water infrastructure systems rely on communication for operations and maintenance through a “Supervisory Control and Data Acquisition” (SCADA) system. The system provides remote monitoring and control of the water system components. Radio system capability is needed for these systems to operate effectively. Much of this infrastructure is isolated. For example, Salem’s infrastructure is located on an island.
- Amateur Radio provides critical back up to public safety radio communications in a disaster, but does not provide the necessary capacity to meet emergency management needs. Jurisdictions should consider investing in satellite voice and data capabilities.
- Local servers may be damaged in an earthquake. Jurisdictions should consider "cloud based" data storage solutions to backup vital records.

**Transportation**

Transportation is critical lifeline infrastructure. The transportation network facilitates the movement of people, goods, resources and commerce throughout Marion County and beyond. The transportation system consists of local, state, and federal road and highway

networks; passenger and freight rail; passenger and freight air service; pipelines; transit; dedicated bicycle and pedestrian systems; and limited water-based modes. All lifeline sectors depend on the transportation system.

Access to means of transportation is fundamental to human existence. Transportation infrastructure facilitates everything from a local trip to the park, drugstore or place of employment to international trade and commerce. Furthermore, the ability to move people, goods and services is vital before, during and after emergency events. It is no accident that FEMA’s number one Emergency Support Function is transportation. ESF #1 covers the following:

- Aviation/airspace management and control
- Transportation safety
- Restoration/recovery of transportation infrastructure
- Movement restrictions
- Damage and impact assessment

The scope of ESF #1 includes supporting, “. . . prevention, preparedness, response, recovery and **mitigation** activities among transportation stakeholders . . . [emphasis added]” and coordinating, “the restoration of the transportation systems and infrastructure.”<sup>30</sup>

Transportation lifeline sector participants identified a number of interconnected resources and elements of their operations. These include included roads, bridges, buses, and physical buildings. While this assessment focusses on infrastructure, participants noted that transportation staff and professionals are a critical resource as well.

**Transportation Summary Table**

|   |  |
|---|--|
| <p><b>Critical Interdependencies:</b><br/> <b>Systems of all types are dependent on other systems in order to function. In order to operate, the transportation sector is particularly <u>DEPENDENT ON</u>:</b></p> <ul style="list-style-type: none"> <li>• Energy and Fuel</li> <li>• Communication</li> <li>• Business and Industry</li> <li>• Public Works</li> </ul> <p><b>Other critical lifeline sectors that <u>DEPEND ON</u> the transportation sector to operate include:</b></p> <ul style="list-style-type: none"> <li>• Water</li> <li>• Electricity</li> <li>• Liquid fuel</li> </ul> | <p><b>Crucial Vulnerabilities:</b><br/> <b>Each sector has a number of vulnerabilities. The transportation sector is particularly vulnerable to the following:</b></p> <ul style="list-style-type: none"> <li>• Federal, state and local bridge infrastructure is particularly vulnerable to earthquake (especially ODOT facilities over the Willamette).</li> <li>• System relies heavily on fossil fuels for construction, operation, and maintenance.</li> <li>• Hwy 22 is the primary east-west connection; there are few redundant east-west routes.</li> <li>• Significant backlog of deferred transportation maintenance projects.</li> </ul> |
|---|--|

<sup>30</sup> FEMA, Emergency Support Function #1 – Transportation Annex. 2008. <https://www.fema.gov/pdf/emergency/nrf/nrf-esf-01.pdf>

|   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• Public Safety and Emergency Management</li> <li>• Public Works</li> <li>• Economy</li> </ul> |  |
|---|--|

**Major Findings:**

- ODOT considers I-5 and Highway 22 to be critical routes. Other critical concerns include bridges, roads, communication, and energy including power and fuel.
- Much of the existing transportation infrastructure, including those of major roadways such as I-5, Highway 22, and Mission Road, are not seismically retrofitted and will likely experience structural failures during a Cascadia event.
- Following a Cascadia event, transportation will be limited for 6-12 months; aftershocks may extend that timeframe.
- Transportation is interdependent with communication, water, and energy systems and requires coordination and collaboration during the response and recovery process.
- Although winter storms continue to impact transportation systems, stakeholders respond to these events efficiently and continue to improve plans with every winter weather event. Downed trees, debris, and accumulated ice impact the response of this lifeline.
- Salem-Keizer Transit operates city and regional buses, dial-a-ride, CherryLift for people with disabilities, and coordinates non-emergent medical transportation services. They provide about 4-million rides a year and are currently working to improve individual employee preparedness as well as existing emergency plans.
- Salem-Keizer Public Schools transports an estimated 22,000 students a day including about 2,000 medically fragile students. The top priority for this organization is student safety.
- The electricity grid in Oregon is not particularly dependent on the transportation sector to operate. However, the power generation and distribution network does rely on the transportation network for construction as well as ongoing maintenance and repairs.
- Conversely, all of the liquid fuel in the state is transported by one of three primary transportation modes: truck, rail, and pipeline. Therefore, the distribution fuel in the state is completely dependent on the transportation sector.
- Like the electric grid, the communications sector is not particularly dependent on the transportation sector to operate. However, the power generation and distribution network does rely on the transportation network for construction as well as ongoing maintenance and repairs.
- Business and industry is very dependent on the transportation sector. From the movement of raw material, to getting employees to and from work, to getting finished products to market, virtually all business and industry activity in the region is facilitated by transportation.

- Public works is dependent on transportation in two primary ways. First, the transportation sector facilitates the movement of equipment, materials, and workers. Second, significant portions or components of public works' infrastructure are collocated within transportation rights of way.

## Water

For the purposes of this assessment, the water sector includes information pertaining to drinking water, stormwater, and wastewater. Stakeholder participants included a range of local and regional infrastructure and service providers. The information provided in this summary is based on research of the county's water resources and infrastructure.

Ready access to virtually unlimited amounts of clean drinking water is often taken for granted, particularly here in the Pacific Northwest. Water is vital for basic daily living, for business and industry especially including agriculture, for fire protection and medical service provision, and for wastewater management. In addition, stormwater facilities provide critical protection from a variety of localized flood risks. FEMA Emergency Support Function #3 covers public works, including water, wastewater and stormwater services. Ensuring that all water related public works infrastructure is operational is critical to the function of any community.

### Water Summary Table

|  |  |
|--|--|
| <p><b>Critical Interdependencies:</b><br/>Systems of all types are dependent on other systems in order to function. In order to operate, the water sector is particularly <b>DEPENDENT ON:</b></p> <ul style="list-style-type: none"> <li>• Electricity</li> <li>• Communication</li> <li>• Transportation</li> <li>• Liquid Fuel</li> </ul> <p><b>Other critical lifeline sectors that <u>DEPEND ON</u> the water sector to operate include:</b></p> <ul style="list-style-type: none"> <li>• Fire and EMS</li> <li>• Business and industry</li> <li>• Electricity</li> </ul> | <p><b>Crucial Vulnerabilities:</b><br/>Each sector has a number of vulnerabilities. The transportation sector is particularly vulnerable to the following:</p> <ul style="list-style-type: none"> <li>• The water sector in Marion County consists of numerous local and regional systems.</li> <li>• Several reservoirs, transmission lines and the Salem Treatment Facility are vulnerable to multiple hazards.</li> <li>• Aquifer storage capacity not sufficient to meet need as a backup source.</li> </ul> |
| <p><b>Major Findings:</b></p> <ul style="list-style-type: none"> <li>• People living in unincorporated areas of Marion County rely on wells and septic tanks.</li> <li>• Low water reserves and low river flow pose a serious threat to the water supply.</li> <li>• Some infrastructure pertaining to water systems are old which increases the risk vulnerability to withstand a Cascadia event. Impacted infrastructure</li> </ul>  |  |

located near rivers could cause service disruptions and flooding during an event or incident. Power is vital to the water facilities.

- Generators are co-located at critical facilities and need to be maintained requiring various fuel types in order to support redundancy.
- Road access is vital to conduct damage assessments and or repair impacted facilities.

## **Hazard Policy Evaluation**

The CSC team reviewed the Marion County Comprehensive Plan to determine existing policies that shape the county's hazard mitigation activity and to better inform mitigation action items for the 2016 HMP. Table 2-9 details our findings on policies related to hazards.

Of the identified natural hazards that may impact Marion County, only floods, landslides, and wildfires are specifically addressed. To better align with Goal 7, the county should consider adding, at a minimum, policies related to earthquakes to the comprehensive plan. Adding policies related to drought, windstorms, and winter storms would also strengthen hazard mitigation efforts. Finally, the county could add more detail to existing policies in the comprehensive plan concerning flood, landslide, and wildfire.

**Table 2-9 Marion County Comprehensive Plan Policies Concerning Hazards**

| Hazard     | Policy   | Marion Comp Plan Section          |
|------------|--|-----------------------------------|
| Earthquake | None   | N/A                               |
| Flood      | Permanent structures shall not be constructed in the floodway of the floodplain. Structures constructed in the floodplain fringe shall have their lowest floor elevation at least 2 feet above the 100 year flood level or 2 feet above natural grade where the base flood level has not been established.   | Rural Development                 |
| Flood      | Marion County should strengthen watershed management to reduce affects of flooding by pursuing a regional approach for developing mitigation solutions to flooding problems that overlap individual jurisdictions.   | Rural Development                 |
| Flood      | Marion County should encourage and support local communities in their efforts to protect their water supplies from flood water contamination and turbidity from watershed runoff.  | Rural Development                 |
| Flood      | Marion County should educate citizens about the flood hazard, risks involved and mitigation measures available. The County shall ensure that information about the flood hazard in Marion County is readily available to the general public.   | Rural Development                 |
| Flood      | Development in floodplains should be restricted to balanced cut and fill, within the parcel to be developed.   | Urbanization                      |
| Flood      | Within stream or wetland buffers and areas within the 100-year FEMA floodplain natural vegetation should be retained.  | Urbanization                      |
| Flood      | The streams and watersheds of the County flow without regard to political boundaries, and their health depends on a consistent and coordinated approach throughout the County. City plans should protect streams, wetlands, riparian corridors, floodplains, and significant wildlife areas from the negative effects of development in accordance with state law.   | Urbanization                      |
| Flood      | Multiple use of lands such as those adjacent to reservoirs, land reclamation sites, power line rights-of-way, flood control areas, public transportation rights-of-way, under overpasses, etc., are encouraged as open space providing public health and safety standards are met.   | Parks and Recreation              |
| Landslide  | Construction, involving the placement of structures on or in the land surface and other such disturbances or excavations of the land surface in active or inactive landslide areas (as identified in the Background and Inventory Report) shall require specific site study by a qualified engineering geologist prior to development.   | Rural Development                 |
| Wildfire   | Strict criteria should be applied to ensure that any dwellings and accessory structures permitted on existing parcels will not interfere with accepted forest or farm management practices on adjacent lands, have adequate road access, fire protection and domestic water supply, and do not increase fire hazard.   | Forest Land and Farm/Timber Lands |
| Wildfire   | If special siting and fire hazard protection requirements are imposed dwellings may be appropriate on existing parcels with low cubic foot per acre per year productivity, on parcels with timber management limitations due to the proximity of dwellings and a highly parcelized ownership pattern, or on existing parcels of 160 acres or more created prior to January 1, 1994. Dwellings allowed under OAR 660-06-0027(1)(a), (e), and (f), as limited in the TC zone, are consistent with this policy. | Forest Land and Farm/Timber Lands |
| Wildfire   | Non-forest and non-farm uses included in OAR 660-06-0025 and OAR 660-33-120 may be allowed when the activity meets criteria that ensure there will be no significant adverse impacts on farm or forest practices occurring on nearby lands or increase risks associated with fire.   | Forest Land and Farm/Timber Lands |
| Wildfire   | Marion County shall require evidence that the level of fire protection provided by a fire district is adequate to service proposed land developments. If service is not adequate the development shall be denied or be conditioned so that necessary facilities are provided.  | Rural Development                 |
| Wildfire   | In those areas not served by a fire district, Marion County shall require evidence of fire protection by private means prior to approval of future rural subdivision, commercial or industrial development. Implementation of the fire protection program recorded in Chapter 3 of Fire Safety Consideration for Development in Forested Areas, 1978, shall be a requirement of use approval for residences located near timber land whether or not they are located in a fire district.                     | Rural Development                 |



| Hazard        | Policy  | Marion Comp Plan Section |
|---------------|---|--------------------------|
| Multi-Hazards | Provide adequate review of development of permanent structures in the identified natural hazard or damage areas to minimize potential loss of life or property.   | Urbanization             |
| Multi-Hazards | The County shall mitigate flood damage through planning and regulations by: A. Developing and maintaining links between land use, hazard mitigation and emergency operations planning throughout the County. B. Continuously seeking methods to improve management of the floodplain and landslide-prone areas of the unincorporated portion of the County. C. Considering the use of appropriate incentives, including taxes, to encourage mitigation measures by property owners. | Rural Development        |
| Other Hazards | Encourage DEQ to expand their monitoring program and increase sample areas to determine locations approaching or exceeding drinking water standards. Impacts from domestic sewage outfalls should be assessed to identify any possible hazards.   | Environment              |
| Other Hazards | In areas experiencing proven water pollution from septic tanks or inadequate water supply, encourage the provision of alternative individual treatment system or water systems to overcome health hazards or to provide a greater margin of public safety in allowable developments.  | Environment              |

Source: Marion County Comprehensive Plan.

## Federal Disaster and Emergency Declarations

Reviewing past events can provide a general sense of the hazards that have caused significant damage in the county. Where trends emerge, disaster declarations can help inform hazard mitigation project priorities.

President Dwight D. Eisenhower approved the first federal disaster declaration in May 1953 following a tornado in Georgia. Since then, federally declared disasters have been approved within every state as a result of natural hazard related events. As of May 2016, FEMA has approved a total of 30 major disaster declarations, two (2) emergency declarations, and 64 fire management assistance declarations in Oregon.<sup>31</sup> When governors ask for presidential declarations of major disaster or emergency, they stipulate which counties in their state they want included in the declaration. Table 2-10 summarizes the major disasters declared in Oregon that have included Marion County since 1955. The table shows that there have been eight (8) major disaster declarations for the county. All but two of these were related to severe wind or storm events in the county resulting primarily in flooding, landslides and wind related damage.

An Emergency Declaration is more limited in scope and without the long-term federal recovery programs of a Major Disaster Declaration. Generally, federal assistance and funding are provided to meet a specific emergency need or to help prevent a major disaster from occurring. Marion County has only one recorded Emergency Declaration related to the 2005 Hurricane Katrina evacuation.

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<sup>31</sup> FEMA, *Declared Disasters by Year or State*, [http://www.fema.gov/news/disaster\\_totals\\_annual.fema#mark5](http://www.fema.gov/news/disaster_totals_annual.fema#mark5). Accessed May 25, 2016.

**Table 2-10 FEMA Major Disaster (DR), Emergency (EM), and Fire Management Assistance (FMA) Declarations for Marion County**

| Declaration Number | Declaration Date | Incident Period |            | Incident  | Individual Assistance | Public Assistance Categories |
|--------------------|------------------|-----------------|------------|---|-----------------------|------------------------------|
|                    |                  | From            | To         |   |                       |                              |
| 184                | 12/24/1964       | 12/24/1964      | 12/24/1964 | Heavy Rains & Flooding  | Yes                   | A, B, C, D, E, F, G          |
| 413                | 1/25/1974        | 1/25/1974       | 1/25/1974  | SEVERE STORMS, SNOWMELT, FLOODING   | Yes                   | A, B, C, D, E, F, G          |
| 985                | 4/26/1993        | 3/25/1993       | 3/25/1993  | Earthquake  | No                    | A, B, C, D, E, F, G          |
| 1099               | 2/9/1996         | 2/4/1996        | 2/21/1996  | Severe Winters Storms/Flooding/Landslides/Mudslides                         | No                    | A, B, C, D, E, F, G          |
| 1510               | 2/19/2004        | 12/26/2003      | 1/14/2004  | Severe Winter Storms  | No                    | A, B, C, D, E, F, G          |
| 1824               | 3/2/2009         | 12/13/2008      | 12/26/2008 | Severe Winter Storm, Record and Near Record Snow, Landslides, and Mudslides | No                    | A, B, C, D, E, F, G          |
| 4055               | 3/2/2012         | 1/17/2012       | 1/21/2012  | Severe Winter Storm, Flooding, Landslides, and Mudslides                    | No                    | A, B, C, D, E, F, G          |
| 3228               | 9/7/2005         | 8/29/2005       | 10/1/2005  | Hurricane Katrina Evacuation  | No                    | B                            |

Source: FEMA, Oregon Disaster History. Major Disaster Declarations.

## National Flood Insurance Program (NFIP) Vulnerability

The Marion County Flood Insurance Rate Maps (FIRMs) for unincorporated Marion County and the cities of Sublimity, Turner and Salem are current as of January 2003. The remaining cities have individual FIRMs current as of January 2000. Table 2-12a below shows that as of August 21, 2016, Marion County (including the incorporated cities) has 2,067 National Flood Insurance Program (NFIP) policies in force. Of those, 1,239 (60%) were initiated before development of the initial FIRM. FEMA has made 298 paid claims in the county totaling over \$5-million. Table 2-12b shows that the last Community Assistance Visit (CAV) for unincorporated Marion County occurred on March 19, 2004. The City of Turner received the most recent CAV in the county on February 6, 2012 following flooding that winter. Unincorporated Marion County participates in the Community Rating System (CRS) as does the City of Salem. Both jurisdictions have a CRS rating of 6. There are only two severe repetitive loss properties in Marion County, both of which are located on unincorporated lands. A total of 11 repetitive loss properties exist in the county, five of which are in Salem. The table shows that the majority (just under 90%) of flood insurance policies are for residential structures, primarily single-family homes.

**Table 2-12a Flood Insurance Participation**

| Jurisdiction   | Effective FIRM and FIS  | Initial FIRM Date | Total Policies | Pre-FIRM Policies | Policies by Building Type |               |                   |                 | Minus Rated A Zone |
|----------------|-------------------------|-------------------|----------------|-------------------|---------------------------|---------------|-------------------|-----------------|--------------------|
|                |                         |                   |                |                   | Single Family             | 2 to 4 Family | Other Residential | Non-Residential |                    |
| Marion County  | -                       | -                 | 2,067          | 1,239             | 1,614                     | 115           | 105               | 232             | 97                 |
| Unincorporated | 1/2/2003                | 8/15/1979         | 333            | 184               | 287                       | 3             | 1                 | 42              | 16                 |
| Aumsville      | 1/19/2000               | 3/1/1979          | 19             | 7                 | 19                        | 0             | 0                 | 0               | 2                  |
| Aurora         | 1/19/2000               | 6/5/1997          | 2              | 1                 | 1                         | 1             | 0                 | 0               | 0                  |
| Detroit        | 1/19/2000               | 6/30/1976         | 2              | 0                 | 2                         | 0             | 0                 | 0               | 0                  |
| Donald         | none; not participating |                   |                |                   |                           |               |                   |                 |                    |
| Gates          | 1/19/2000               | 12/4/1979         | 1              | 0                 | 0                         | 0             | 0                 | 0               | 0                  |
| Gervais        | 1/19/2000               | 6/30/1976         | 0              | 0                 | 0                         | 0             | 0                 | 0               | 0                  |
| Hubbard        | 1/19/2000               | 2/5/1986          | 0              | 0                 | 0                         | 0             | 0                 | 0               | 0                  |
| Jefferson      | 1/19/2000               | 3/1/1979          | 15             | 9                 | 15                        | 0             | 0                 | 0               | 0                  |
| Keizer         | 1/19/2000               | 5/1/1985          | 440            | 215               | 398                       | 14            | 11                | 17              | 10                 |
| Mt Angel       | 1/19/2000               | 1/19/2000         | 0              | 0                 | 0                         | 0             | 0                 | 0               | 0                  |
| Salem          | 1/2/2003                | 6/15/1979         | 1,022          | 744               | 700                       | 90            | 72                | 160             | 39                 |
| Scotts Mills   | 1/19/2000               | 3/1/1979          | 1              |                   | 1                         | 0             | 0                 | 0               | 0                  |
| Silverton      | 1/19/2000               | 3/1/1979          | 81             | 37                | 51                        | 4             | 21                | 5               | 22                 |
| St Paul        | 1/19/2000               | 1/19/2000         | 0              | 0                 | 0                         | 0             | 0                 | 0               | 0                  |
| Stayton        | 1/19/2000               | 3/1/1979          | 27             |                   | 25                        | 0             | 0                 | 2               | 1                  |
| Sublimity      | 1/2/2003                | 1/19/2000         | 0              | 0                 | 0                         | 0             | 0                 | 0               | 0                  |
| Turner         | 1/2/2003                | 4/2/1979          | 71             | 26                | 65                        | 3             | 0                 | 3               | 1                  |
| Woodburn       | 1/19/2000               | 3/1/1979          | 53             | 16                | 50                        | 0             | 0                 | 3               | 6                  |

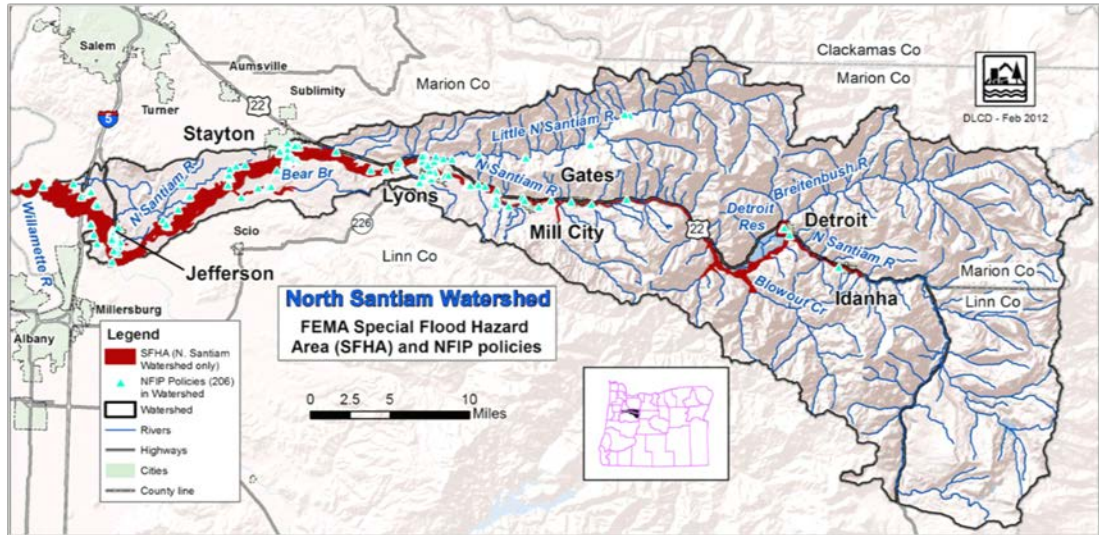
Source: Department of Land Conservation and Development, State Floodplain Coordinator, August 21, 2016.

**Table 2-12b Flood Insurance Detail**

| Jurisdiction   | Insurance in Force | Total Paid Claims | Pre-FIRM Claims Paid | Substantial Damage Claims | Total Paid Amount | Repetitive Loss Structures | Severe Repetitive Loss | CRS Class Rating | Last Community Assistance |
|----------------|--------------------|-------------------|----------------------|---------------------------|-------------------|----------------------------|------------------------|------------------|---------------------------|
| Marion County  | \$ 514,268,700     | 298               | 226                  | 16                        | \$ 5,732,543      | 11                         | 2                      | -                | -                         |
| Unincorporated | \$ 81,601,500      | 72                | 54                   | 6                         | \$ 1,111,999      | 4                          | 2                      | 6                | 3/19/2004                 |
| Aumsville      | \$ 4,515,700       | 0                 | 0                    | 0                         | \$ -              | 0                          | 0                      | N/A              | none                      |
| Aurora         | \$ 700,000         | 0                 | 0                    | 0                         | \$ -              | 0                          | 0                      | N/A              | none                      |
| Detroit        | \$ 600,000         | 0                 | 0                    | 0                         | \$ -              | 0                          | 0                      | N/A              | 1/1/1990                  |
| Donald         | none               |                   |                      |                           |                   |                            |                        | N/A              |                           |
| Gates          | \$ 105,000         | 0                 | 0                    | 0                         | \$ -              | 0                          | 0                      | N/A              | none                      |
| Gervais        | \$ -               | 0                 | 0                    | 0                         | \$ -              | 0                          | 0                      | N/A              | none                      |
| Hubbard        | \$ -               | 0                 | 0                    | 0                         | \$ -              | 0                          | 0                      | N/A              | 6/17/1991                 |
| Jefferson      | \$ 3,913,800       | 4                 | 3                    | 0                         | \$ 43,991         | 0                          | 0                      | N/A              | none                      |
| Keizer         | \$ 131,321,300     | 23                | 11                   | 1                         | \$ 420,239        | 0                          | 0                      | N/A              | 7/19/2006                 |
| Mt Angel       | \$ -               | 3                 | 3                    | 0                         | \$ 14,301         | 1                          | 0                      | N/A              | none                      |
| Salem          | \$ 233,772,600     | 159               | 126                  | 6                         | \$ 3,449,614      | 5                          | 0                      | 6                | 5/4/2005                  |
| Scotts Mills   | \$ 85,800          | 1                 | 1                    | 0                         | \$ 11,254         | 0                          | 0                      | N/A              | 3/31/1995                 |
| Silverton      | \$ 19,421,300      | 12                | 8                    | 0                         | \$ 70,080         | 0                          | 0                      | N/A              | 3/31/1995                 |
| St Paul        | \$ -               | 0                 | 0                    | 0                         | \$ -              | 0                          | 0                      | N/A              | none                      |
| Stayton        | \$ 8,510,300       | 1                 | 0                    | 0                         | \$ 8,200          | 0                          | 0                      | N/A              | 8/9/2006                  |
| Sublimity      | \$ -               | 0                 | 0                    | 0                         | \$ -              | 0                          | 0                      | N/A              | none                      |
| Turner         | \$ 17,010,300      | 21                | 18                   | 3                         | \$ 588,084        | 1                          | 0                      | N/A              | 2/6/2012                  |
| Woodburn       | \$ 12,711,100      | 2                 | 2                    | 0                         | \$ 14,781         | 0                          | 0                      | N/A              | 6/24/2004                 |

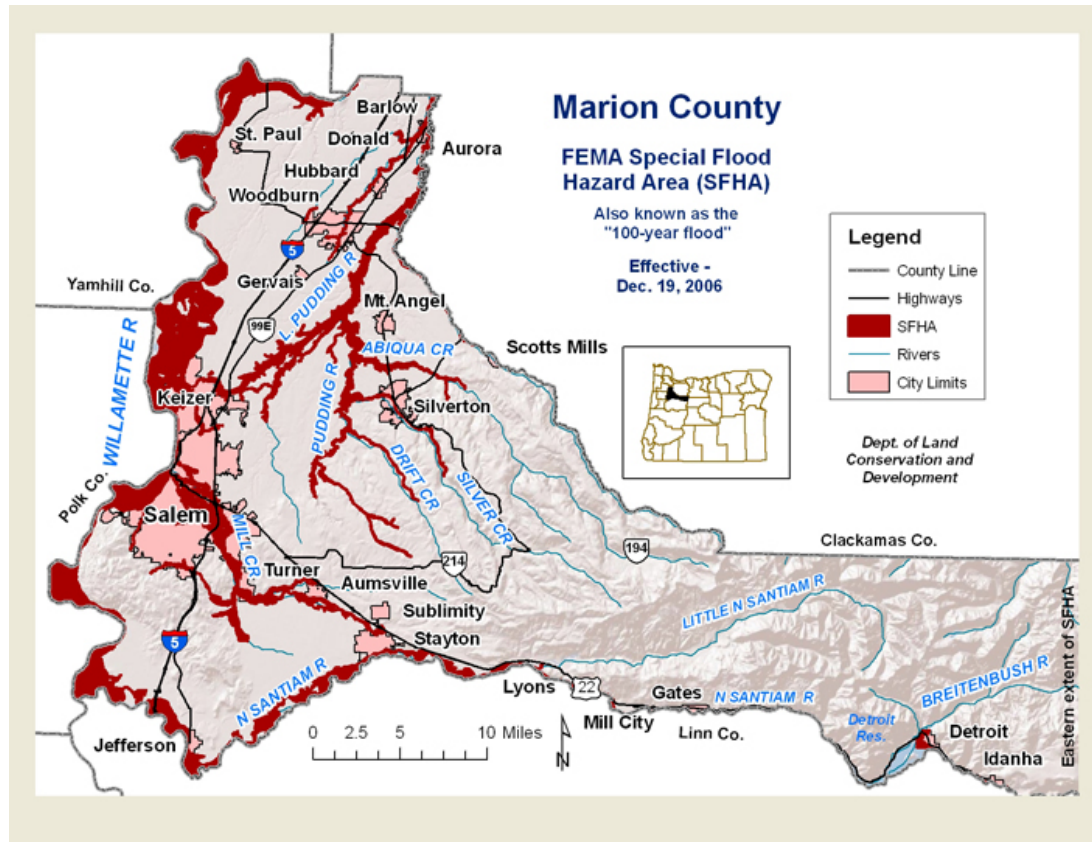
Source: Department of Land Conservation and Development, State Floodplain Coordinator, August 21, 2016.

**Figure 2-11: Repetitive and Severe Repetitive Loss Properties, North Santiam Watershed**



Source: Department of Land Conservation and Development, August 2015.

**Figure 2-12 Marion County FEMA Floodplain Map**



Source: Department of Land Conservation and Development, August 2015.

## City Specific Risk Assessment

*Multi-jurisdictional Risk Assessment - §201.6(c) (2) (iii):* For multi-jurisdictional plans, the risk assessment must assess each jurisdiction's risks where they vary from the risks facing the entire planning area. Refer to Volume II for city specific risk assessments for each of the participating jurisdictions in the county.

## Future/Complimentary Risk Assessment Information

Several key risk assessment tools are in development and will be completed in conjunction with or following adoption of this HMP in the fall of 2016.

## Threat Hazard Identification Risk Assessment (THIRA)

Threat and Hazard Identification and Risk Assessment (THIRA) is a FEMA developed method for assessing community capabilities across a range of hazards. According to the FEMA website:

The Threat and Hazard Identification and Risk Assessment (THIRA) is a 4 step common risk assessment process that helps the whole community—including individuals, businesses, faith-based organizations, nonprofit groups, schools and academia and all levels of government—understand its risks and estimate capability requirements. The THIRA process helps communities map their risks to the core capabilities, enabling them to determine whole-community informed:

- Desired outcomes,
- Capability targets, and
- Resources required to achieve their Capability targets

The outputs of this process inform a variety of emergency management efforts, including: emergency operations planning, mutual aid agreements, and hazard mitigation planning. Ultimately, the THIRA process helps communities answer the following questions:

- What do we need to prepare for?
- What shareable resources are required in order to be prepared?
- What actions could be employed to avoid, divert, lessen, or eliminate a threat or hazard?<sup>32</sup>

Marion County conducted a Threat Hazard Identification Risk Assessment (THIRA) Workshop on May 18, 2016. Following the workshop (from 04/18/2016 - 04/28/2016), Marion County Emergency Management (MCEM) administered a survey to collect additional information. The surveyed was first emailed to all invitees of the THIRA Workshop which included city emergency managers, city administrators, a council member, the city and county public works departments, Fire and Police Chief's, Sheriff's office, Chemeketa College, Oregon Department of Forestry, public health, school districts, CERT, Army Corp of Engineers, water control district, and Oregon Emergency Management. Secondly, the survey was mention at

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<sup>32</sup> <https://www.fema.gov/threat-and-hazard-identification-and-risk-assessment>.

the Emergency Management Advisory Council (EMAC). Lastly, the survey was emailed to various contacts between 04/18/2016 - 04/28/2016 for example the American Red Cross and the Marion County Soil & Water Conservation District.

Of those that received the email or attended various county meetings respectively 19 persons participated in the survey and contributed to the results you can review below.

**Table 2-X THIRA Capabilities Assessment**

| Core Capabilities   | Severe Storms | Train Derailment | School/Work Violence | Power Outage | Average Scores* |
|---|---------------|------------------|----------------------|--------------|-----------------|
| Cybersecurity   | -             | -                | -                    | 5            | 5               |
| Supply Chain Integrity and Security                       | -             | 5                | -                    | 5            | 5               |
| Long-term Vulnerability Reduction                         | 5             | 5                | 5                    | 5            | 5               |
| Planning  | 3             | 5                | 5                    | 5            | 4.5             |
| Public Information and Warning                            | 3             | 5                | 5                    | 5            | 4.5             |
| Screening, Search, and Detection                          | 5             | 5                | 3                    | 5            | 4.5             |
| Community Resilience                                      | 3             | 5                | 5                    | 5            | 4.5             |
| Fatality Management Services                              | 5             | 5                | 5                    | 3            | 4.5             |
| Public Health, Healthcare, and Emergency Medical Services | 3             | -                | 5                    | 5            | 4.33            |
| Situational Assessment                                    | 3             | -                | 5                    | 5            | 4.33            |
| Operational Coordination                                  | 5             | 1                | 5                    | 5            | 4               |
| Intelligence and Information Sharing                      | 3             | 5                | 3                    | 5            | 4               |
| Risk and Disaster Resilience Assessment                   | 3             | 3                | 5                    | 5            | 4               |
| Threats and Hazards Identification                        | 1             | 5                | 5                    | 5            | 4               |
| Infrastructure Systems                                    | 1             | 5                | 5                    | 5            | 4               |
| Mass Care Services  | 5             | -                | 5                    | 5            | 4               |
| Housing   | 5             | -                | -                    | 3            | 4               |
| Operational Communications                                | 5             | -                | 3                    | 3            | 3.66            |
| Interdiction and Disruption                               | -             | 5                | 1                    | 5            | 3.6             |
| Risk Management for Protection Programs and Activities    | -             | 3                | 3                    | 5            | 3.6             |
| Access Control and Identity Verification                  | 1             | 5                | 3                    | 5            | 3.5             |
| Physical Protective Measures                              | 1             | 5                | 3                    | 5            | 3.5             |
| Environmental Response/Health and Safety                  | 3             | 1                | 5                    | 5            | 3.5             |
| Forensics and Attribution                                 | -             | 1                | 5                    | -            | 3               |
| Critical Transportation                                   | 5             | 1                | 3                    | 3            | 3               |
| Logistics and Supply Chain Management                     | 3             | -                | 3                    | 3            | 3               |
| On-scene Security, Protection, and Law Enforcement        | 3             | 3                | 1                    | 5            | 3               |
| Economic Recovery   | 1             | 5                | -                    | 3            | 3               |
| Natural and Cultural Resources                            | 3             | -                | 3                    | 3            | 3               |
| Fire Management and Suppression                           | 1             | 1                | 3                    | 3            | 2               |
| Mass Search and Rescue Operations                         | 3             | -                | 1                    | 1            | 1.66            |
| Health and Social Services                                | -             | -                | -                    | -            | No Data         |

\* Average calculated based on the number of capabilities assessed

NOTE: Capabilities scored based on: 1 high capability, 3 medium capability, and 5 low capability

Source: Marion County THIRA.

## FEMA Risk MAP Middle Willamette Valley Discovery

FEMA Region X initiated a Risk MAP<sup>33</sup> funded “Discovery” project for the Middle Willamette Watershed in December 2015. According to FEMA, Risk MAP Discovery is a process of, “data collection, hazard mapping, and cooperative information exchange with community

<sup>33</sup> Risk MAP provides high quality flood maps and information, tools to better assess the risk from flooding and planning and outreach support to communities to help them take action to reduce (or mitigate) flood risk. Each Risk MAP flood risk project is tailored to the needs of each community and may involve different products and services. For more information visit: <http://www.fema.gov/risk-mapping-assessment-and-planning-risk-map>.

stakeholders to understand a watershed area, decide if a flood risk project is appropriate, and if so, collaborate on project planning.” In addition to the flood hazard, the Oregon Risk MAP program also includes the potential for assessment of other natural hazards. For this Discovery project, FEMA is including the following hazards: flood, wildfire, wind, earthquake, and landslide.

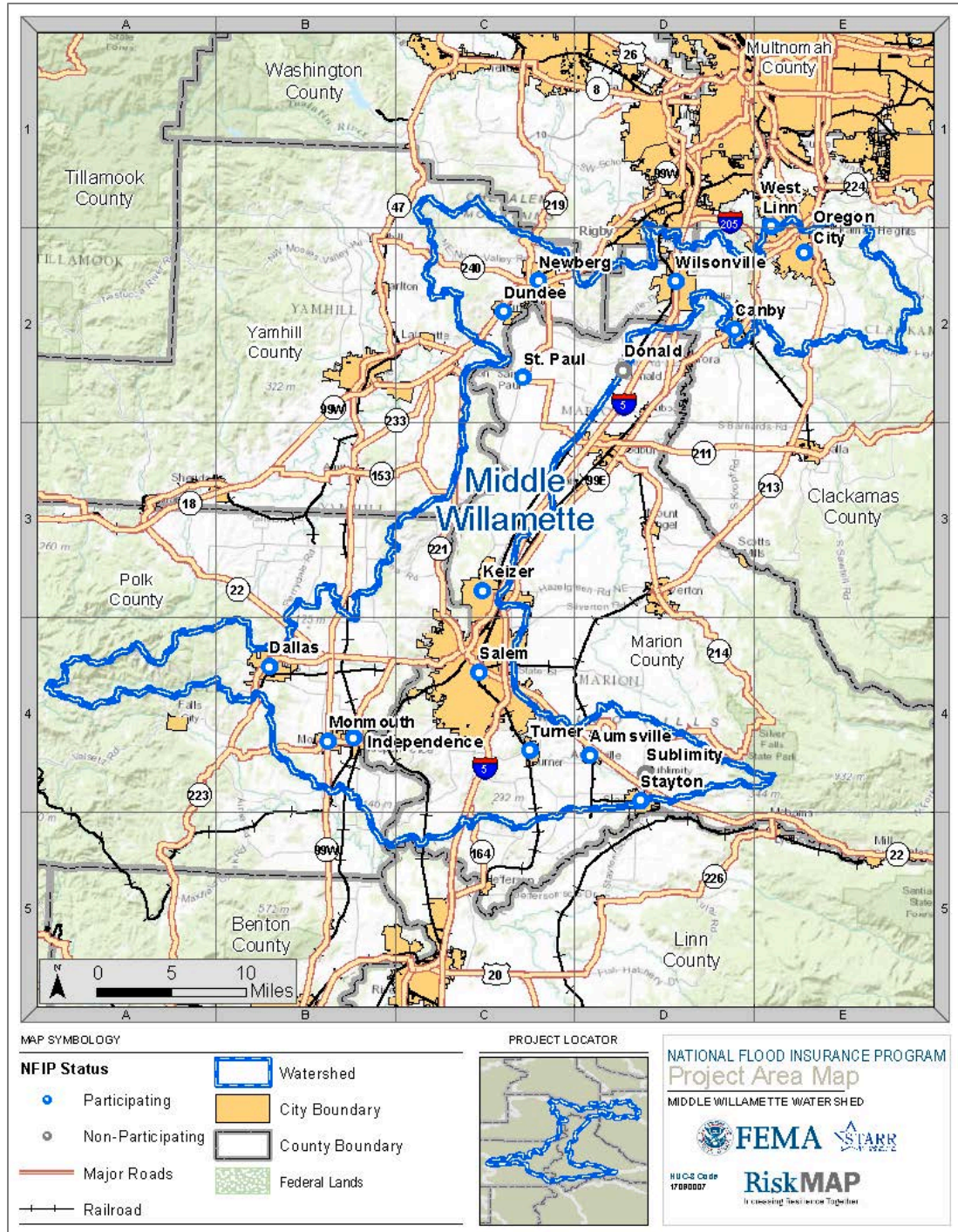
Marion County Emergency Management and the communities of Salem, Keizer, Turner, Aumsville, Stayton, Donald, St. Paul, and Sublimity are collaborating on the discovery process. The Discovery Process includes four phases:

- **Phase 1** involves is a comprehensive collection of tabular) and spatial data. This data is analyzed and developed into Community Fact Sheets and Discovery Maps.
- **Phase 2** utilizes the map products to identify specific areas of concern, locations where additional data and analysis is needed, and areas of vulnerability where mitigation projects are desired.
- **Phase 3** results in a set of “Discovery Meetings” with local representatives. The purpose of these meetings is to facilitate discussion and build consensus about study needs, mitigation project needs, desired compliance support, and local flood risk awareness efforts.
- **Phase 4** integrates the ideas gathered from community interviews and Discovery Meetings with GIS mapping and data analysis into a set of recommendations for further action. These recommendations often include specific risk-management projects, mitigation strategies for communities to consider, identification of funding sources, and suggested priorities.

In June of 2016, FEMA released a DRAFT Discovery Report for review purposes only. Preliminary review of the report identified the following potential mitigation related topics and actions in Marion County:

- Flood risk and hazard mapping needs in Aumsville, Donald, Keizer, Salem, St. Paul, Stayton, Turner and several unincorporated areas of Marion County;
- Numerous site specific vulnerabilities;
- Completion of the existing Marion County HMP priority actions;

**Figure 2-?: Middle-Willamette Risk Map Discovery Project Area**



Source: DRAFT Discovery Report, June 2016

## Marion County Community Wildfire Protection Plan

In July of 2016, Marion County issued a DRAFT County Community Wildfire Protection Plan (CWPP) for review. Developed in coordination with the Oregon Department of Forestry, the Marion County CWPP is the result of a countywide effort initiated to reduce wildland fire



risk to communities, citizens, and environmental resources in Marion County. The CWPP was developed in accordance with provisions of the Healthy Forest Restoration Act of 2003. The DRAFT CWPP identifies the following wildfire mitigation related objectives:

#### General

- Provide oversight to all activities related to the MCCWPP.
- Ensure representation and coordination between the sub-committees.
- Develop and refine goals for fire protection in Marion County.
- Develop a long-term structure for sustaining efforts of the MCCWPP.

#### Risk Assessment

- Identify and update as needed Communities-at-Risk and the Wildland-Urban Interface.
- Develop and conduct a wildland fire risk assessment.
- Identify and prioritize hazardous fuels treatment projects.

#### Fuels Reduction

- Identify strategies for coordinating fuels treatment projects at a landscape scale.
- Coordinate administration of fuels program so that it is equitable across fire districts.
- Provide low-income special need citizens with an opportunity to reduce their fuels and participate in local programs.
- Identify opportunities for marketing and utilization of smaller diameter wood products.

With respect to wildfire risk, the DRAFT CWPP identifies specific Communities at Risk. In addition, the plan includes a set of maps and data that specifically identify the location, severity, extent and probability of wildfire in Marion County. The final CWPP risk assessment, when adopted, is incorporated herein by reference as a specific wildfire supplement to the all-hazard risk assessment.

## **North Santiam Drought Contingency Plan**

Marion County is a key partner in a multi-jurisdictional, multi-stakeholder process to develop a drought contingency plan for the North Santiam Watershed. The effort includes an overall assessment of drought risk, a process for ongoing monitoring of drought in the region, and a set of mitigation strategies and recommendations to ensure coordinated management of water resources. Identified vulnerabilities by sector or asset category include: agriculture, municipal water supplies (i.e. drinking water), energy, forestry, environmental (e.g. endangered species), recreation, and socio-economic (i.e. commercial, industrial and community uses).

Various portions of the plan are in draft form. However, full integration of the Drought Contingency Plan with the HMP will need to take place during the post-adoption maintenance and implementation phase. Refer to Section 4 for more information.

## SECTION 3: MITIGATION STRATEGY

This section outlines Marion County's strategy to reduce or avoid long-term vulnerabilities to the identified hazards. Specifically, this section presents a mission and specific goals and actions thereby addressing the mitigation strategy requirements contained in 44 CFS 201.6(c). The HMP steering committee reviewed and updated the mission, goals, and action items documents in this plan. Additional planning process documentation is in Appendix B.

### Mitigation Plan Mission

The Plan mission states the purpose and defines the primary functions of Marion County's HMP. It is intended to be adaptable to any future changes made to the Plan and need not change unless the community's environment or priorities change.

The mission of the Marion County HMP is:

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**Create a more resilient Marion County by partnering with the whole community.**

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### Mitigation Plan Goals

Mitigation plan goals are specific statements of direction that Marion County citizens and public/private partners can take to reduce the county's risk from hazards. These statements of direction link the broad mission statement and particular action items. The goals listed serve as checkpoints for agencies and organizations implementing mitigation action items.

Stakeholder participation was a key aspect in developing the Plan goals. Meetings with the project steering committee and lifeline sector stakeholders served as methods to obtain information and priorities for developing goals, reducing risk, and preventing loss from hazards in Marion County.

On April 27, 2016 the 2016 Marion County HMP Steering Committee reviewed the revised plan goals and compared them to the Draft State Natural Hazard Mitigation Plan goals. They modified these goals to better align with current Marion County conditions and the State Natural Hazard Mitigation Plan.

All Plan goals are listed below in no particular order or priority. Establishing community priorities within action items neither negates nor eliminates any goals, but instead, establishes which action items to consider for implementation first. Below is a list of the 2016 revised plan goals:

#### **Goal 1: Awareness & Education**

Increase awareness and education for all hazards, emergency notification methods, and resources for citizen, businesses, and government agencies.

**Goal #2: Resilience**

Increase the resilience of communities, by providing capacity to the private sector, rural/urban cities, and NGO's.

**Goal #3: Risk Reduction**

Minimize risks to life, public and private property, infrastructure, the environment, and the economy from hazards.

**Goal #4: Funding and Implementation**

Create a database of potential funding sources to implement mitigation projects.

**Goal #5: Partnerships and Coordination**

Create, maintain and enhance partnerships with stakeholders, adjacent jurisdictions, and public and private agencies' risk management activities.

**Goal #6: Natural Resources Utilization**

Use natural resources, watershed planning, and land use planning to reduce long-term costs and maximize effectiveness.

**Goal #7: Plan Integration**

Integrate hazard mitigation activities, where appropriate, with existing plans and policies.

**Goal #8: Data Collection**

Document county expenditures and benefits of hazard mitigation policy & projects.

**Goal #9: Development Relocation**

Direct development away from areas within mapped hazardous where risks to people, property, and infrastructure cannot be mitigated.

**Goal 10: Hazard Loss Reduction**

Collaborate with public, private, and non-profit sectors to create a county wide hazard loss reduction strategy.

**Goal 11: Historic Preservation**

Retrofit and restore historical and cultural resources susceptible to damage from a hazard event.

## Action Item Development Process

Development of action items was a multi-step, iterative process that involved brainstorming, discussion, review, and revisions. Action items can be developed through a number of sources. The figure below illustrates some of these sources.

**Figure 3-I Development of Action Items**



Source: Oregon Partnership for Disaster Resilience, 2008.

The Marion County steering committee, together with OPDR, developed the action items presented in this plan. The actions were developed based upon local vulnerability information gathered during the lifeline sector and steering committee meetings. The following action items are the result of stakeholder meetings, feedback from individual steering committee members, and an analysis of local plans and reports. These action items also include deferred actions from the 2011 mitigation plan. During the update process, OPDR worked with the Marion County steering committee to identify which actions from the 2011 plan had been completed or not completed, and whether or not actions should continue to be listed in the plan. A table listing the 2011 plan’s actions and their status are listed in Appendix A.

The action items in this plan address the following hazards found in Marion County: drought, earthquake, flood, landslide, volcano, wildfire, windstorm, dam failure, and multi-hazard. In addition, the plan includes actions that address plan implementation. Each priority action item has a corresponding action item worksheet describing the activity, identifying the rationale for the project, identifying potential ideas for implementation, and assigning coordinating and partner organizations. The action item worksheets can assist the community in pre-packaging potential projects for grant funding. The worksheet components are described below. These action item worksheets are located in Appendix A.

## Priority Mitigation Actions

Action items identified through the planning process are an important part of the mitigation plan. Action items are detailed recommendations for activities that local departments, citizens, and others could engage in to reduce risk. For a more strategic approach, Marion County is listing a set of high priority actions in an effort to focus attention on an achievable set of high leverage activities over the next five-years. Detailed implementation information for each priority action is listed in Appendix A. This plan identifies priority actions based on an evaluation of high impact hazards, resource availability, and FEMA identified best practices.

**Multi-Hazard # 1:** Complete a disaster recovery plan for Marion County.

**Multi-Hazard # 2:** Develop a community education program such as an all hazard community outreach forum.

**Multi-Hazard # 3:** Conduct an assessment of the short and long term needs for sheltering access and functional needs populations for all hazards.

**Earthquake # 3:** Create a bridge prioritization inventory based on major lifeline routes including state highways, routes, and major road arteries before July 1, 2017.

**Earthquake # 5:** Collaborate with SEDCOR to develop relevant public-private partnerships with businesses that can contribute to mitigation, response, and recovery.

**Drought # 6:** Monitor economic impacts on recreation, tourism and agriculture communities.

**Flood #6:** Develop a program that maps and communicates real-time flood related road closures.

**Windstorm # 1:** Initiate a comprehensive program to reduce or eliminate tree hazards to all critical utilities in Marion County. This program includes a prioritization of critical facilities, an assessment of potential tree hazards, and a program to trim, and/or remove tree hazards in designated critical areas.

In addition to the hazard specific priority actions listed above, the lifeline sector groups identified the following priorities. The priority actions are organized by lifeline sector.

### Communications

**Joint Utility Liaison:** Establish a position responsible for coordinating information sharing across sector service providers. NOTE: this position could also link to or coordinate activities in other critical infrastructure sectors.

**Special Communication District:** Create a special district to generate revenue for ongoing system maintenance, equipment modernization and hazard mitigation activities.

### Transportation

**Integrate Lifeline Corridor Inventories into Transportation System Plans:** TSP's in Marion County do not currently include inventories of lifeline transportation corridors. From a plan integration standpoint this is a missed opportunity, with benefits far outweighing cost.

**Identify and Designate Priority Transportation Routes:** Develop a “hub and spoke” approach to priority route planning focused on post-event resource collection and distribution.

### Water

**Complete and Implement Drought Contingency Plan:** Ensuring success of this ongoing effort related to water quantity is the top water sector priority.

**Add Risk Assessment and Hazard Mitigation Information to Water Master Plans:** Water Master Plans in Marion County do not do a good job of integrating hazard and system vulnerability information. From a plan integration standpoint this is a missed opportunity, with benefits that outweigh cost.

### Energy

**Develop and Maintain a “No Disconnect” list:** Protect energy dependent vulnerable populations from service disruption as a result of inability to pay for service.

**Compare, Crosswalk and Maintain Critical Facilities Lists:** Increase collaboration and common operating framework between energy utilities, emergency management, and end-users by sharing and aligning critical facilities lists.

## **Action Item Matrix**

The action item matrix presents a pool of mitigation actions. The majority of these actions carry forward from prior versions of this plan. This expanded list of actions is available for local consideration as resources, capacity, technical expertise and/or political will become available. The matrix documents the related hazard, a brief description of the action, coordinating/partnering agencies, proposed timeline, and the alignment with plan goals. Appendix A, Action Item Forms provides detailed information about each of the priority action items. A blank action item form is included for use by the HMP committee as additional action items are considered for implementation.

## **Action Item Worksheets**

Each priority action item has a corresponding action item worksheet describing the activity, identifying the rationale for the project, identifying potential ideas for implementation, and assigning coordinating and partner organizations. The action item worksheets can assist the community in pre-packaging potential projects for local elected official consideration, grant applications or other implementation opportunities. The worksheet components are described below. These action item worksheets are located in Appendix A, Action Items.

## **Proposed Action Title**

Each action item includes a brief description of the proposed action.

## **Alignment with Plan Goals**

The Plan goals addressed by each action item are identified as a means for monitoring and evaluating how well the mitigation plan is achieving its goals, following implementation.

## Affected Jurisdiction

Many of the action items within this Plan apply to all of the participating cities and the county; however, some action items are specific to one city or to the County. The list of affected jurisdictions is provided on the right side of the matrix. Each city identified as an “affected jurisdiction” will contribute to accomplishing the specified action at a local level. The action item form in Appendix A provides more detailed information.

## Alignment with Existing Plans/ Policies

Identify any existing community plans and policies where the action item can be incorporated. Incorporating the mitigation action into existing plans and policies, such as comprehensive plans, will increase the likelihood that it will be implemented.

## Rationale or Key Issues Addressed

Action items should be fact-based and tied directly to issues or needs identified throughout the planning process. Action items can be developed at any time during the planning process and can come from a number of sources, including participants in the planning process, noted deficiencies in local capability, or issues identified through the risk assessment. The rationale for proposed action items is based on the information documented in Section II and the Hazard Annexes.

## Implementation through Existing Programs

For each action item, the form is designed to solicit ideas for implementation, which serve as the starting point for taking action. Ideas for implementation could include: (1) collaboration with relevant organizations, (2) alignments with the community priority areas, and (3) applications to new grant programs.

The ideas for implementation offer a transition from theory to practice and serve as a starting point for this Plan. This component of the action item is dynamic, since some ideas may prove to not be feasible, and new ideas may be added during the Plan maintenance process. Ideas for implementation include such things as: collaboration with relevant organizations, grant programs, tax incentives, human resources, education and outreach, research, and physical manipulation of buildings and infrastructure. When an action is implemented, more work will probably be needed to determine the exact course of action.

The Marion County HMP includes a range of actions that, when implemented will reduce the impact to people, property and the environment from hazard events in the County. Within the Plan, FEMA requires the identification of existing programs that might be used to implement these action items. Marion County and the participating cities currently address statewide planning goals and legislative requirements through their comprehensive land use plans, capital improvements plan, mandated standards, and building codes. To the extent possible, the jurisdictions will work to incorporate the recommended mitigation action items into existing programs and procedures.

Many of the recommendations contained in the Marion County HMP are consistent with the goals and objectives of the existing plans and policies. Where possible, Marion County and the

participating cities will implement the recommendations and actions contained in the HMP through existing plans and policies. Plans and policies already in existence have support from local residents, businesses, and policy makers. Many land-use comprehensive, and strategic plans get updated regularly, and can adapt easily to changing conditions and needs.<sup>1</sup> Implementing the action items contained in the HMP through such plans and policies increases their likelihood of being supported and implemented.

## Coordinating Organization:

The coordinating organization is the public agency with the regulatory responsibility to address natural hazards, or that is willing and able to organize resources, find appropriate funding, or oversee activity implementation, monitoring, and evaluation.

## Internal and External Partners:

The internal and external partner organizations listed in the Action Item Worksheets are potential partners recommended by the project steering Committee but not necessarily contacted during the development of the Plan. The coordinating organization should contact the identified partner organizations to see if they are capable of, and interested in, participation. This initial contact is also to gain a commitment of time and/or resources toward completion of the action items.

Internal partner organizations are departments within the county or other participating jurisdictions that may be able to assist in the implementation of action items by providing relevant resources to the coordinating organization.

External partner organizations can assist the coordinating organization in implementing the action items in various functions and may include local, regional, state, or federal agencies, as well as local and regional public and private sector organizations.

## Potential Funding Sources

When possible, identify potential funding sources for the action item. Example funding sources can include: the federal Pre-Disaster Mitigation and Flood Mitigation Grant Program; or local funding sources such as capital improvement or general funds. An action item may also have multiple funding sources.

## Estimated Cost

Where possible, an estimate of the cost for implementing the action item is included.

## Timeline

Action items include ongoing, short-, and long-term action items. Each action item includes an estimate of the timeline for implementation. *Ongoing* action items signify that work has begun and will either exist over an indefinite timeline, or an extended timeline. *Short-term action items* are activities that may be implemented with existing resources and authorities in one to two

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<sup>1</sup> Ibid.



years. *Long-term action items* may require new or additional resources and/or authorities, and may take from one to five years to implement.

## Status

As action items are implemented or new ones are created during the Plan maintenance process, it is important to indicate the status of the action item – whether it is new, ongoing, deferred, or complete. Documenting the status of the action will make reviewing and updating the mitigation Plan easier during the Plan’s five-year update, and can be used as a benchmark for progress. *Deferred* action items have yet to see any significant work begin on the particular action.

## **SECTION 4:**

# **PLAN IMPLEMENTATION AND MAINTENANCE**

The Implementation and Maintenance section details the formal process that will ensure that the Hazard Mitigation Plan (HMP) remains an active and relevant document. The implementation and maintenance process includes a schedule for monitoring and evaluating the plan semi-annually, as well as producing an updated plan every five years. Finally, this section describes how the county will integrate public participation throughout the maintenance and implementation process.

### **Implementing the Plan**

The success of the Marion County HMP depends on how well the outlined action items are implemented. In an effort to ensure that the activities identified are implemented, the following steps will be taken:

- Adoption by Marion County and each of the participating cities
- Coordinating body assigned to handle implementation and maintenance
- The Marion County Emergency Manager is designated as the convener, while a convener will also be determined for each of the participating cities
- The coordinating body identifies activities, which are then prioritized and evaluated
- The plan is implemented through existing plans, programs, and policies.

### **Plan Adoption**

The Marion County HMP was developed and will be implemented through a collaborative process. After the plan is locally reviewed and deemed complete, the Marion County Emergency Manager submits it to the State Hazard Mitigation Officer (SHMO) at the Oregon Military Department – Office of Emergency Management (OEM). OEM submits the plan to FEMA- Region X for review. This review addresses the federal criteria outlined in FEMA Interim Final Rule 44 CFR Part 201. Upon acceptance by FEMA, Marion County will adopt the plan via resolution by the Marion County Board of Commissioners. Upon adoption, the County will gain eligibility for the Pre-Disaster Mitigation Grant Program, Hazard Mitigation Grant Program funds, and Flood Mitigation Assistance program funds. Following adoption by the county, the participating jurisdictions should convene local decision makers and adopt the Marion County Multijurisdictional HMP.

### **Convener**

The Marion County Emergency Manager will take responsibility for plan implementation and will facilitate the Marion County Hazard Mitigation Coordinating Body. The Marion County Emergency Manager will assign tasks to members of the Coordinating Body, which may include tasks such as updating the plan. Implementation and evaluation of the plan will be a shared responsibility

among all of the assigned Hazard Mitigation Coordinating Body members. The Convener's responsibilities include:

- Convening the Coordinating Body in June and inviting key stakeholders;
- Organizing and notifying members of Coordinating Body meeting dates, times, locations, and agendas;
- Documenting the discussions and outcomes of committee meetings;
- Serving as a communication conduit between the Coordinating Body and the public/stakeholders;
- Identifying funding sources for natural hazard mitigation projects; and,
- Utilizing the Risk Assessment as a tool for prioritizing recommended hazard risk reduction projects.

## **Coordinating Body**

The Marion County Convener will form a Marion County Hazard Coordinating Body that is responsible for updating and implementing the HMP. The Coordinating Body responsibilities include:

- Attending future Plan maintenance and Plan update meetings (or designating a representative to serve in your place);
- Serving as the local evaluation committee for funding programs such as the Pre-Disaster Mitigation Grant Program, the Hazard Mitigation Grant Program funds, and Flood Mitigation Assistance program funds;
- Prioritizing and recommending funding for hazard risk reduction projects;
- Evaluating and updating the HMP in accordance with the prescribed maintenance schedule;
- Developing and coordinating ad hoc and/or standing subcommittees as needed; and,
- Coordinating public involvement activities.

## **Meetings**

To make the coordination and review of the Marion County HMP as broad and as useful as possible, the Coordinating Body will engage additional stakeholders and other relevant hazard mitigation organizations and agencies to implement the identified action items. Specific organizations have been identified as either internal or external partners on the individual action item forms found in Appendix A.

## **Implementation Through Existing Programs**

The HMP includes a range of actions that, when implemented, reduces losses from hazard events throughout Marion County. Within the plan, FEMA requires the identification of existing programs that might be used to implement these action items. Marion County, and the participating cities, currently address statewide planning goals and legislative requirements through their comprehensive land use plans, capital improvement plans, mandated standards, and building codes. Marion

County and cities participating in the HMP will work to incorporate the recommended mitigation action items from the HMP into existing programs and policies. In addition to specific actions related to plan integration, implementation of the Marion County HMP will be considered as part of the county budget and capital improvements planning cycles.

Marion County has significant internal capacity to implement this plan. The emergency management planning team is led by a member of the Marion County Board of Directors. This leadership structure adds significant political capacity and ensures that mitigation policies, planning and implementation needs are communicated directly to the county's elected officials. The emergency management staff team organizational structure consists of five full-time equivalent staff as follows:

- Board of Commissioners - Board Designee
- Public Works/Emergency Management Director
- County Emergency Manager
- Emergency Preparedness Coordinator
- EM Program Coordinator
- EM Program Coordinator

In addition, Marion County Emergency Management utilizes federal AmeriCorps funded service volunteers on a regular basis to supplement internal capacity and achieve mitigation outcomes. The county maintains numerous federal, state, regional, and local partnerships as well.

Many of the recommendations contained in the HMP are consistent with the goals and objectives of Marion County and participating cities' plans and policies. Where possible, Marion County, and participating cities, should implement the recommended actions contained in the HMP through existing plans and policies. Plans and policies already in existence often have support from local residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, and can adapt easily to changing conditions and needs. Implementing the action items contained in the HMP through such plans and policies increases the likelihood of these actions being supported and implemented.

For examples of plans, programs, and policies that could be used to implement mitigation actions within the HMP, please refer to the Community Profile in Appendix C.

## **Plan Maintenance**

Plan maintenance is one of the most critical components of the HMP. Proper maintenance of the plan ensures that it will maximize efforts of participating jurisdictions to reduce the risks posed by natural hazards. This section was developed by the Oregon Partnership for Disaster Resilience (OPDR) and includes a process to ensure that regular review and updates of the Plan occurs. The coordinating body, Marion County staff, and staff of participating local jurisdictions

are responsible for implementing this process. These participating stakeholders and conveners are also responsible for maintaining and updating the Plan through a series of meetings outlined in the maintenance schedule below.

## Meetings

The Coordinating Body will meet on a semiannual basis to complete the following tasks.

During the spring meeting, the Coordinating Body will:

- Document and update hazard history;
- Prioritize potential mitigation projects for the coming year;
- Review existing action items to determine appropriateness for local funding before the Marion County budget is approved in July;
- Review existing action items to determine appropriateness for any available state and federal funding opportunities; and
- Discuss methods for continued public involvement and education, such as outreach and educational workshops, before the summer months begin.

During the fall meeting, the Coordinating Body will:

- Review and update the risk assessment as needed;
- Review existing action items to determine continued appropriateness for local funding;
- Review existing action items to determine appropriateness for any available state and federal funding opportunities; and
- Update County Administrator and Board on plan progress; and
- Document successes and lessons learned during the year.

These meetings are an opportunity for the cities to report back to the county on progress that has been made towards their components of the HMP. The HMP Convener or Coordinating Body may revise the schedule as resources and events shift.

The Convener will be responsible for documenting the outcome of the semiannual meetings. The process the Coordinating Body will use to prioritize mitigation projects is detailed in the section below [this will be the next section of the plan, not included in this memo]. The plan's format allows the County and participating jurisdictions to review and update sections when new data becomes available. New data can be easily incorporated, resulting in a HMP that remains current and relevant to the participating jurisdictions.

The Convener is also responsible for scheduling meetings with stakeholders from the lifeline sectors. The lifeline sector stakeholder meetings are not bound by the same scheduling cycle as the steering committee, but the Convener should aim to schedule periodic, consistent meetings.

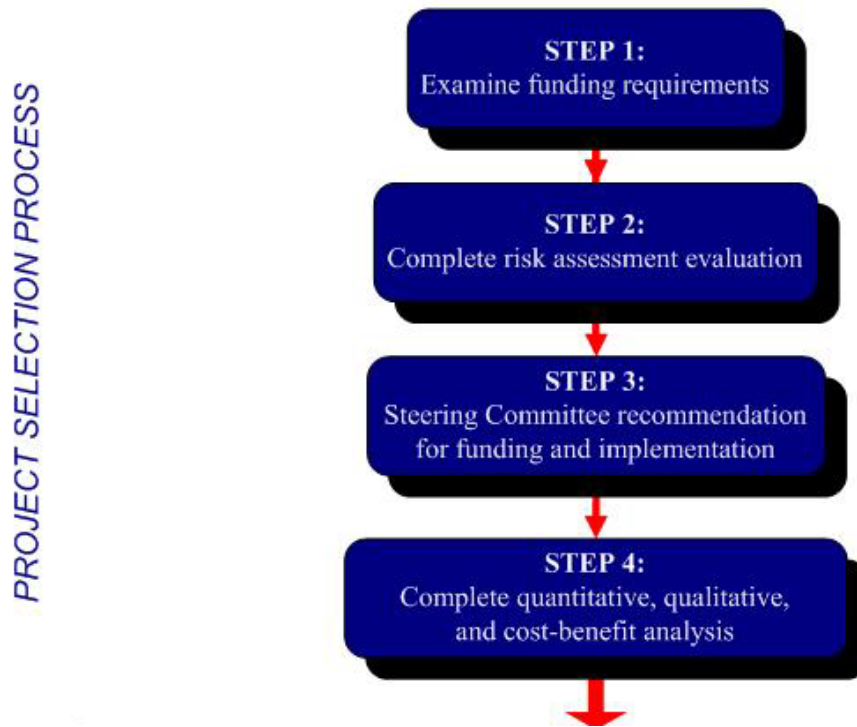
## Project Prioritization Process

Each of the participating jurisdictions has included a short list of prioritized actions. DOGAMI and FEMA are in the process of updating multi-hazard risk assessment

reports through FEMA’s Risk MAP program. Furthermore, local development or update of other hazard and risk mitigation plans including the Community Wildfire Protection Plan, Drought Contingency Plan, and Commodity Flow Study are currently underway. Future mitigation plan maintenance meetings will revisit the prioritization process based on new information and actions identified through related planning projects.

The Disaster Mitigation Act of 2000 requires that jurisdictions identify a process for prioritizing potential actions. Potential mitigation activities often come from a variety of sources; therefore, the project prioritization process needs to be flexible. Committee members, local government staff, related planning documents and efforts, or risk assessments can each be used as a means to identify projects. Figure 4-1 illustrates the project development and prioritization process.

**Figure 4-1 Action Item and Project Review Process**



Source: Oregon Partnership for Disaster Resilience.

### Step I: Examine funding requirements

The first step in prioritizing the Plan’s action items is to determine and identify potential grants and funding sources. Examples of mitigation funding sources include, but are not limited to: FEMA’s Pre-Disaster Mitigation competitive grant program (PDM), Flood Mitigation Assistance (FMA) program, Hazard Mitigation Grant Program (HMGP), National Fire Plan (NFP), Community Development Block Grants (CDBG), local general funds, and private foundations, among others. Please

see Appendix F, *Grant Programs*, for a more comprehensive list of potential grant programs.

As grant programs open and close on differing schedules, the Coordinating Body will examine upcoming funding streams' requirements to determine which mitigation activities are eligible. The Coordinating Body may consult with the funding entity, Oregon Military Department – Office of Emergency Management (OEM), or other appropriate state or regional organizations about eligibility requirements. Examination of funding sources and their requirements will take place during the Coordinating Body's semi-annual meetings.

## **Step 2: Complete risk assessment evaluation**

The second step in prioritizing the plan's action items is to examine which hazards the selected actions are associated with and where these hazards rank in terms of community risk. The Coordinating Body will determine whether or not the plan's risk assessment supports the implementation of eligible mitigation activities. This determination is based on the location of the potential activities, proximity to known hazard areas, and whether community assets are at risk. The Coordinating Body will also consider whether the selected actions have any impact on mitigation of future hazard events and essentially, measure their overall strategic effectiveness.

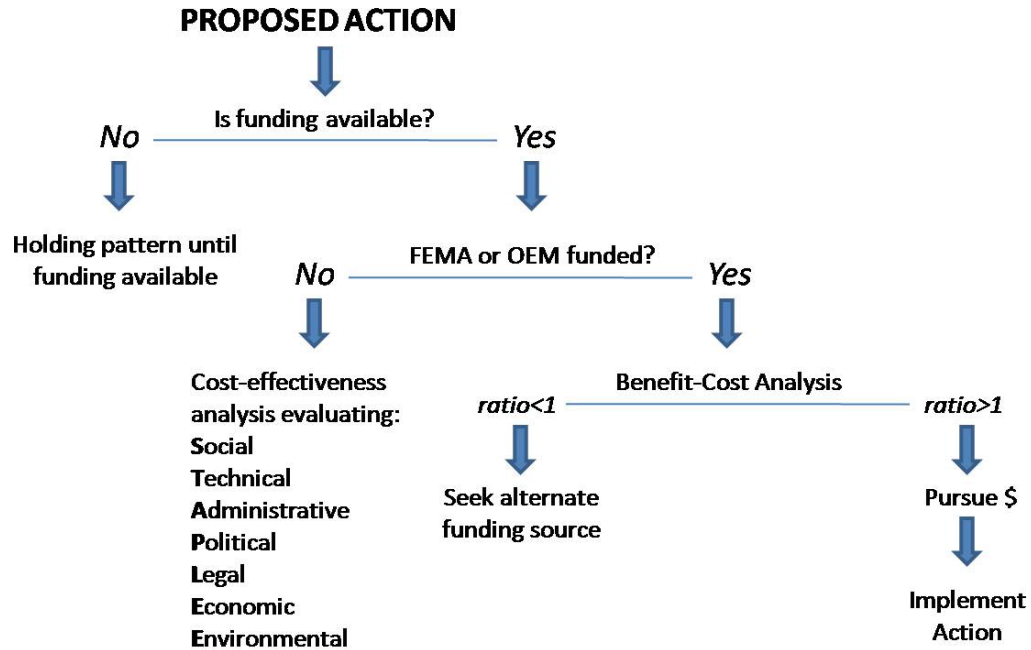
## **Step 3: Coordinating Body recommendation**

Depending on the results of the previous steps, the Coordinating Body will recommend which mitigation activities should be moved forward. If the Coordinating Body decides to move forward with an action item, the coordinating organization designated as the lead agency on the action item form is responsible for implementation and maintenance. The Coordinating Body will also convene a meeting to review the issues surrounding grant applications and to share knowledge and/or resources. This process may afford greater coordination and less competition for limited funds.

## **Step 4: Complete quantitative and qualitative assessment and economic analysis**

The fourth step is to identify the costs and benefits associated with the selected hazard mitigation strategies, measures, or projects. Two categories of analysis that are used in this step are: (1) benefit/cost analysis, and (2) cost-effectiveness analysis. Conducting benefit/cost analysis for a mitigation activity assists in determining whether a project is worth undertaking now to avoid disaster-related damages later. Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. Determining the economic feasibility of mitigating hazards provides decision makers with an understanding of the potential benefits and costs of an activity, as well as a basis upon which to compare alternative projects. Figure 4-2 shows decision criteria for selecting the appropriate method of analysis.

**Figure 4-2 Action Item and Project Review Process**



Source: Oregon Partnership for Disaster Resilience.

If the activity requires federal funding for a structural project, the Coordinating Body uses a FEMA- approved cost-benefit analysis tool to evaluate the appropriateness of the activity. A project must have a benefit/cost ratio of greater than one to be eligible for FEMA grant funding.

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

## **Continued Public Involvement and Participation**

The participating jurisdictions are dedicated to involving the public directly in the continual reshaping and updating of the Marion County HMP. Although members of the Coordinating Body represent the public to some extent, the public also has the opportunity to provide consistent feedback about the plan.

To actively encourage public engagement, participation and feedback, Marion County has embarked on an ongoing education and outreach campaign in partnership with Strategic Economic Development Corporation (SEDCOR), the Statesmen Journal, the Mid-Willamette Emergency Communications Collaborative, the American Red Cross Northwest Oregon Chapter, and other local, state and federal partners. SEDCOR is specifically partnering with emergency management



agencies to deliver a series of educational sessions and workshops to help businesses improve their resilience--ability to recover--from major disasters and other economic threats. The Statesmen Journal has also initiated an earthquake-preparedness project called *Think Big* that is, "aimed at helping the Mid-Valley become the best-prepared community on the West Coast." Emergency managers across Marion County intend to leverage these ongoing outreach efforts to periodically focus attention on hazard mitigation and risk reduction opportunities. For example, a number of members of the Mid-Willamette Emergency Communications Collaborative are making two booklets on personal readiness available for free throughout the local area and online. The public engagement and outreach activities in Marion County are some of the most robust in the state and will serve as a model for other communities moving forward.

In addition, the County and participating jurisdictions will continue to:

- Post copies of their plans on corresponding websites;
- Place articles in the local newspaper directing the public where to view and provide feedback;
- Use existing newsletters such as schools and utility bills to inform the public where to view and provide feedback; and,
- Present new and relevant information at community events such as the Marion County Fair, Oregon State Fair, St. Paul Rodeo, and Oktoberfest.

Finally, Marion County will ensure continued public involvement by posting the Marion County HMP on the County's website (<http://www.co.Marion.or.us/>). The Plan will also be archived and posted on the University of Oregon Libraries' Scholar's Bank Digital Archive (<http://scholarsbank.uoregon.edu>).

## Five-Year Review of Plan

This plan is updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. **The Marion County HMP shall be updated by DATE.** The Marion County Emergency Manager is responsible for organizing the coordinating body to address plan update needs. The coordinating body is responsible for updating any deficiencies found in the plan and ultimately, for meeting the requirements of the Disaster Mitigation Act of 2000.

The following 'toolkit' may assist the Marion County Emergency Manager in determining which plan update activities are best discussed during regularly schedule plan maintenance meeting, and which activities may require additional meetings or subcommittees.

**Figure 4-3. Natural Hazards Mitigation Plan Update Toolkit**

| Question  | Yes | No | Plan Update Action  |
|---|-----|----|---|
| Is the planning process description still relevant?   |     |    | Modify this section to include a description of the plan update process. Document how the planning team reviewed and analyzed each section of the plan, and whether each section was revised as part of the update process. (This toolkit will help you do that). |
| Do you have a public involvement strategy for the plan update process?  |     |    | Decide how the public will be involved in the plan update process. Allow the public an opportunity to comment on the plan process and prior to plan approval.   |
| Have public involvement activities taken place since the plan was adopted?  |     |    | Document activities in the "planning process" section of the plan update  |
| Are there new hazards that should be addressed?   |     |    | Add new hazards to the risk assessment section  |
| Have there been hazard events in the community since the plan was adopted?  |     |    | Document hazard history in the risk assessment section  |
| Have new studies or previous events identified changes in any hazard's location or extent?  |     |    | Document changes in location and extent in the risk assessment section  |
| Has vulnerability to any hazard changed?  |     |    | Document changes in vulnerability in the risk assessment section  |
| Have development patterns changed? Is there more development in hazard prone areas?   |     |    | Document changes in vulnerability in the risk assessment section  |
| Do future annexations include hazard prone areas?   |     |    | Document changes in vulnerability in the risk assessment section  |
| Are there new high risk populations?  |     |    | Document changes in vulnerability in the risk assessment section  |
| Are there completed mitigation actions that have decreased overall vulnerability?   |     |    | Document changes in vulnerability in the risk assessment section  |
| Did the plan document and/or address National Flood Insurance Program repetitive flood loss properties?                               |     |    | Document any changes to flood loss property status  |
| Did the plan identify the number and type of existing and future buildings, infrastructure, and critical facilities in hazards areas? |     |    | 1) Update existing data in risk assessment section, or<br>2) determine whether adequate data exists. If so, add information to plan. If not, describe why this could not be done at the time of the plan update   |
| Did the plan identify data limitations?   |     |    | If yes, the plan update must address them: either state how deficiencies were overcome or why they couldn't be addressed  |
| Did the plan identify potential dollar losses for vulnerable structures?  |     |    | 1) Update existing data in risk assessment section, or<br>2) determine whether adequate data exists. If so, add information to plan. If not, describe why this could not be done at the time of the plan update   |
| Are the plan goals still relevant?  |     |    | Document any updates in the plan goal section   |
| What is the status of each mitigation action?   |     |    | Document whether each action is completed or pending. For those that remain pending explain why. For completed actions, provide a 'success' story.  |
| Are there new actions that should be added?   |     |    | Add new actions to the plan. Make sure that the mitigation plan includes actions that reduce the effects of hazards on both new and existing buildings.   |
| Is there an action dealing with continued compliance with the National Flood Insurance Program?                                       |     |    | If not, add this action to meet minimum NFIP planning requirements  |
| Are changes to the action item prioritization, implementation, and/or administration processes needed?                                |     |    | Document these changes in the plan implementation and maintenance section   |
| Do you need to make any changes to the plan maintenance schedule?   |     |    | Document these changes in the plan implementation and maintenance section   |
| Is mitigation being implemented through existing planning mechanisms (such as comprehensive plans, or capital improvement plans)?     |     |    | If the community has not made progress on process of implementing mitigation into existing mechanisms, further refine the process and document in the plan.   |

Source: Oregon Partnership for Disaster Resilience