



Marion County

MULTI-JURISDICTIONAL ALL- HAZARDS MITIGATION PLAN VOLUME I: BASIC PLAN

<ul style="list-style-type: none"> ■ Marion County ■ City of Aumsville ■ City of Aurora ■ City of Detroit ■ City of Gervais ■ City of Hubbard ■ City of Idanha ■ City of Jefferson ■ City of Keizer ■ Keizer Fire District 		<ul style="list-style-type: none"> ■ City of Mill City ■ City of Mt Angel ■ Mt Angel Fire District ■ City of Scotts Mills ■ City of Stayton ■ City of Sublimity ■ City of Turner ■ City of Woodburn/ Woodburn Fire District
--	--	---



FEMA

Effective April 10, 2023 through April 10, 2028

The 2023 Marion County Multi-Jurisdictional All-Hazards Mitigation Plan (HMP) is a living document that will be reviewed and updated periodically to address the requirements contained in 44 CFR 201. It will be integrated with existing plans, policies, and programs. The Disaster Mitigation Act of 2000 (DMA2K) and the regulations contained in 44 CFR 201 require that jurisdictions maintain an approved mitigation plan to receive federal funds for hazard mitigation grants. This plan meets those requirements as evidenced by FEMA approval which is effective per the cover date range of this plan.

Cover photos: (clockwise from top left): Marion County post-fire scene (2020); City of Detroit post-fire scene 10/20/2020; Tanker tipped on Hwy 22. Photos courtesy of Marion County.

Mission:

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

Comments, suggestions, corrections, and additions are encouraged to be submitted from all interested parties.

For further information and to provide comments, contact:

Marion County Emergency Management
5155 Silverton Road NE
Salem, OR 97305
Phone: 503-588-5108
Email: mcem@co.marion.or.us



O R E G O N

BEFORE THE BOARD OF COMMISSIONERS
FOR MARION COUNTY, OREGON

In the matter of adopting updates to the Marion)
County Multi-Jurisdictional All-Hazard Mitigation)
Plan.)

Resolution # 23R-5

This matter came before the Marion County Board of Commissioners at its regularly scheduled public meeting on Wednesday, April 5, 2023.

Whereas, Marion County recognizes the threat that all hazards pose to the people, property, and infrastructure within our community; and

Whereas, undertaking hazard mitigation actions will reduce the potential for harm to people, property, and infrastructure from future all hazard occurrences; and

Whereas, an adopted all hazard mitigation plan is required as a condition of future funding for mitigation projects under multiple Federal Emergency Management Agency (FEMA) pre-and post-disaster mitigation grant programs; and

Whereas, Marion County fully participated in the FEMA prescribed mitigation planning process to prepare the Marion County Multi-Jurisdictional All-Hazard Mitigation Plan (HMP); and

Whereas, the HMP is comprised of four volumes: Volume I – Basic Plan, Volume II – City Addenda, Volume III – Appendixes, and Volume 4 – DOGAMI Report for Marion County; and

Whereas, the HMP is in an on-going cycle of development and revision to improve its effectiveness; and

Whereas, the Oregon Department of Emergency Management (ODEM) and FEMA, Region X officials have reviewed the HMP and pre-approved it on Friday, March 17, 2023, contingent upon official adoption by the participating governments and entities;

Now, therefore, be it resolved, that Marion County adopts the Marion County Multi-Jurisdictional All-Hazard Mitigation Plan as an official plan; and

Be it further resolved, that the Marion County Board of Commissioners directs the Emergency Management Director to develop, approve, and implement the mitigation strategies set forth in the HMP; and

Be it further resolved, that Marion County will submit this Adoption Resolution to the ODEM and Region X to enable final approval of the Marion County Multi-Jurisdictional All-Hazard Mitigation Plan.

DATED at Salem, Oregon, this 5th day of April 2023.

Marion County Board of Commissioners



Chair



Commissioner



Commissioner

Acknowledgements

The 2023 Marion County Multi-Jurisdictional All-Hazard Mitigation Plan (HMP) update was conducted via a multi-jurisdictional partnership of Marion County and the Cities of Aumsville, Aurora, Detroit, Gates, Gervais, Hubbard, Idanha, Jefferson, Keizer, Mill City, Silverton, Stayton, Turner, and Woodburn, and the special districts of Keizer Fire District, Mt. Angel Fire District, and Woodburn Fire District.

2023 Marion County Hazard Mitigation Plan Steering Committee

Marion County

Adam Crateau, Alisa Zastoupil,
Alyssa Schrems, Brandon Reich,
Brian May, Brian Nicholas, Candace
Jamison, Chris Eppley, Dain Thomas,
Danielle Gonzalez, Dennis Mansfield,
Cmdr. Eric Hlad, Kaylynn Gesner,
Katrina Griffith, Kelly Weese, Jaden
Emminger, Joaquin Ramos, Matt
Knudsen, Sgt. Matt Wilkinson, Scott
Wilson

City of Gervais

Susie Marston, Chief Mark Chase

City of Idanha

Rebecca Stormer, Robyn Johnson,
Mayor Rob Weikum

City of Keizer

Matt Reyes

City of Mt. Angel

Chief Mark Daniel

City of Stayton

Alissa Angelo, Chief Dave Frisendahl

City of Aumsville

Matt Etzel, Chief Richard Schmitz,
Chief Damian Flowers

City of Aurora

Stuart Rodgers, Mark Gunter

City of Detroit

Mayor Jim Trett, Kelly Galbraith,
Christine Pavoni

City of Hubbard

Melinda Olinger, Chief Dave Rash

City of Jefferson

Sarah Cook, Kyle Ward

City of Mill City

Gary Olson, Mayor Tim Kirsch

City of Scotts Mills

Robin Fournier, Mayor Paul
Brakeman

City of Turner

Scott McClure, Chief Don Taylor,
Aaron Bales

City of Woodburn
Chief Marty Pilcher, Andy Shadrin

Woodburn Fire District
Chief Joe Budge

Keizer Fire District
Chief Jeff Cowan

Mt. Angel Fire District
Chief Jim Trierweiler

Interested Parties

Cherriots
Randy Navalinski

Consumer Power
Jeff Carlson, Kelley Bruneau, Billy Terry

Linn County
Alyssa Boles, Ric Lentz

METCOM 911
John Thompson, Mark Spross

City of Silverton
Chief Jim Anglemier

Aumsville Fire District
Chief Roy Hari, Captain Brad McKenzie

Aurora Fire District
Chief Joshua Williams, Mike Corless

Hubbard Fire District
Chief Joe Budge, Asst. Chief Michael Karhmann

Jefferson Fire District
Chief Levi Eckhardt

Marion County Fire District 1
Dep Fire Chief Ron Lee, Sam Phillips

Pacific Gas & Electric
John Plechinger

Salem Electric
JB Phillips, Britni Davidson-Cruikshank

Salem Health
Christina Bunnell, Nathan Streight

Salem-Keizer School District
Ryan Mikesh

Santiam Hospital
Adam Mauer

U.S. Forest Service
Shawn Rivera, Duane Bishop

Santiam Water Control District
Brett Stevenson

Agency Partners

Oregon Department of Geology and Mineral Industries (DOGAMI)
Matt C. Williams, Ian P. Madin

Federal Guidance and Review Team

**Federal Emergency Management
Agency Region X, Mitigation Division**

Erin Cooper, Supervisory Community
Planner

**Oregon Department of Emergency
Management (OEM)**

Stephen Richardson, Joseph Murray,
Jason Gately

Project Managers

Marion County

Kathleen Silva, County Emergency
Manager

Mike Hintz, Emergency Preparedness
Coordinator

**Oregon Department of Land
Conservation and Development**

Katherine Daniel, Natural Hazard
Planner Pamela Reber, Natural Hazard
Planner Tricia Sears, Natural Hazard
Planner Marian Lahav, Natural
Hazards Mitigation Planning Program
Coordinator



In 2019, the Department of Land Conservation and Development (DLCD) applied for and received a Pre-Disaster Mitigation grant.

PDMC-PL-10-OR-2019-005 from FEMA

through the Oregon Department of Emergency Management (OEM) to assist Marion County.



This page intentionally left blank.

The Marion County Multi-Jurisdictional All-Hazard Mitigation Plan (HMP) is comprised of four (4) volumes. These volumes include:

- Volume 1: Basic Plan
- Volume 2: City Addenda
- Volume 3: Appendices
- Volume 4: DOGAMI

To assist the viewer of this plan, each volume as its own table of contents.

Table of Contents

1	Introduction	1-1
1.1	Background & Context	1-1
1.2	What is Hazard Mitigation?	1-1
1.3	Why Maintain a Mitigation Plan?	1-2
1.4	What Federal Requirements Does This Plan Address?	1-3
1.5	What is the Policy Framework for Natural Hazard Planning in Oregon?	1-3
1.6	How Was the Plan Developed and Updated	1-4
1.7	How is the Plan Organized	1-6
2	Risk Assessment	2-1
2.1	Risk Assessment Approach.....	2-2
2.2	Federal Disaster and Emergency Declarations.....	2-3
2.3	Risk Assessment Summary.....	2-4
2.4	Hazard Identification and Assessment	2-14
2.5	DOGAMI Multi-Hazard Risk Assessment.....	2-15
2.6	Hazard Characterization.....	2-18
2.6.1	Drought	2-18
2.6.2	Earthquake	2-23
2.6.3	Flood.....	2-25
2.6.4	Landslide	2-30
2.6.5	Volcano	2-32
2.6.6	Wildfire	2-34
2.6.7	Severe Weather/Storm	2-37
2.7	High Hazard Potential Dams	2-42
2.8	Community Vulnerability Identification and Assessment	2-45
2.8.1	Community Characteristics	2-46
2.9	Population	2-46
2.9.1	Population Vulnerabilities	2-46
2.10	Economy	2-47
2.10.1	Economic Vulnerabilities	2-47
2.11	Environment.....	2-47
2.11.1	Environment Vulnerabilities	2-47
2.12	Housing.....	2-48
2.12.1	Housing Vulnerabilities	2-48
2.13	Critical Facilities and Infrastructure	2-48

2.13.1	Critical Facilities and Infrastructure Vulnerabilities	2-49
2.14	Lifeline Sector Analysis.....	2-50
2.14.1	Energy	2-50
2.14.2	Communications	2-52
2.14.3	Transportation	2-55
2.14.4	Water	2-58
2.15	Hazard Policy Evaluation.....	2-59
2.16	City Specific Risk Assessment	2-65
2.17	Future/Complimentary Risk Assessment Information.....	2-65
2.17.1	Threat Hazard Identification Risk Assessment (THIRA)	2-65
2.17.2	Marion County Community Wildfire Protection Plan (CWPP).....	2-74
2.17.3	North Santiam Drought Contingency Plan	2-75
3	Mitigation Strategy.....	3-1
3.1	Mitigation Plan Mission	3-1
3.2	Mitigation Plan Goals.....	3-1
3.3	Priority Mitigation Actions	3-3
3.4	Lifelines	3-4
3.5	Action Item Development Process	3-5
3.6	Priority Action Item Forms	3-6
3.7	Proposed Action Title	3-6
3.8	Alignment with Plan Goals	3-6
3.9	Alignment with Existing Plans and Policies	3-6
3.10	Rationale or Key Issue Addressed.....	3-6
3.11	Implementing through Existing Programs.....	3-6
3.12	Coordinating Organization.....	3-7
3.13	Internal and External Partners.....	3-7
3.14	Potential Funding Sources.....	3-7
3.15	Estimated Cost	3-7
3.16	Timeline	3-7
3.17	Status.....	3-7
4	Plan Implementation and Maintenance	4-1
4.1	Plan Adoption.....	4-1
4.2	Implementing the Plan.....	4-1
4.3	Convener.....	4-2

4.4	Hazard Mitigation Plan Steering Committee	4-2
4.5	Interested Parties	4-5
4.6	Programmatic Implementation.....	4-7
4.7	Plan Maintenance	4-8
4.8	Meetings	4-8
4.9	Funding Sources	4-9
4.10	Plan Integration Resources.....	4-10
4.11	Mitigation Ideas/Best Practices Resources.....	4-10
4.12	Project Prioritization Process	4-11
4.12.1	Step 1: Examine Funding Opportunities.....	4-12
4.12.2	Step 2: Complete Risk Assessment Evaluation.....	4-12
4.12.3	Step 3: HMP Steering Committee Recommendations	4-13
4.12.4	Step 4: Complete Quantitative and Qualitative Assessment and Economic Analysis. 4-13	
4.13	Continued Public Involvement and Participation.....	4-14
4.14	Five-Year Review of Plan	4-15
5	Plan Adoption.....	5-17
5.1	Final FEMA Approval Letter	5-18
5.2	FEMA APA Letter	5-18
5.3	Resolution of Approval.....	5-18
5.4	FEMA Review Tool.....	5-18
6	References	6-1

1 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.

1.1 Background & Context

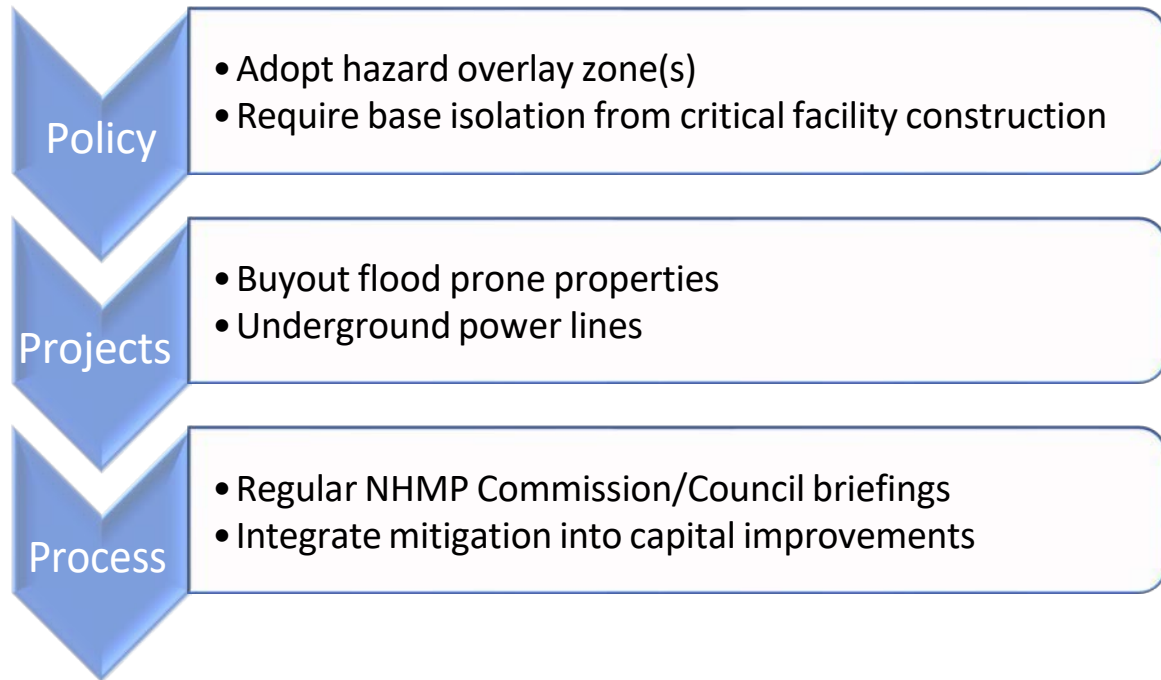
This Multi-Jurisdictional All Hazards Mitigation Plan (HMP) is a framework for mitigating and preparing for the effects of hazards on the people, property, economy, and environment of Marion County. This plan was developed by Marion County in partnership with the jurisdictions of Aumsville, Aurora, Detroit, Gervais, Idanha, Jefferson, Keizer, Keizer Fire District, Mill City, Mt. Angel Fire District, Scotts Mills, Stayton, Sublimity, Turner, Woodburn, and Woodburn Fire District, 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.

1.2 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 processes, such as regular reporting to the Board of County Commissioners and City Councils 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.



Source: Oregon Partnership for Disaster Resilience (revised by Marion County)

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 an 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. Interested parties 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, Tribal sovereign government representatives, among others.

1.3 Why Maintain a Mitigation Plan?

This hazard mitigation plan is designed to assist Marion County and the jurisdictions of Aumsville, Aurora, Detroit, Gervais, Idanha, Jefferson, Keizer, Keizer Fire District, Mill City, Mt. Angel Fire District, Scotts Mills, Stayton, Sublimity, Turner, Woodburn, and Woodburn Fire District 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 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.

1.4 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.

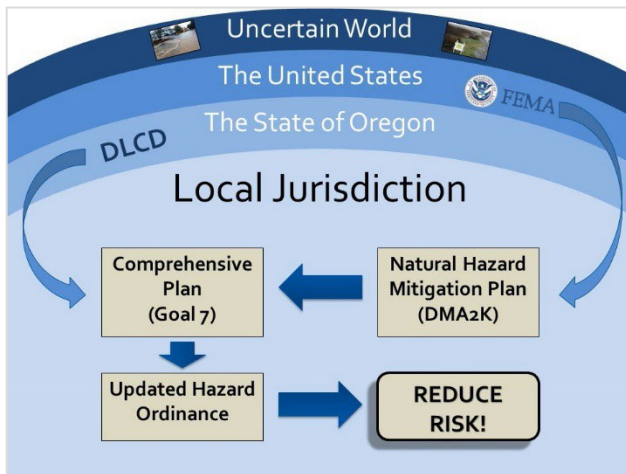
Section 322 of DMA2K addresses mitigation planning at the state and local levels. Chapter 44 Code of Federal Regulations (CFR), section 201.6 specifically requires that jurisdictions have an approved hazard mitigation plan in place to receive Hazard Mitigation Grant Program (HMGP) funds. Pursuant of Chapter 44 CFR, the Natural Hazard Mitigation Plan planning processes shall 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. 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. Lastly, the Natural Hazard Mitigation Plan must be submitted to Oregon Department of Emergency Management (OEM) for initial plan review, and then federal approval (Department of Homeland Security, Federal Emergency Management Agency, 2023).

1.5 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” (State of Oregon, Department of Land Conservation and Development, N.d.) 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 Department 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).

Figure 1-1, Uncertain World of Hazard Mitigation



Source: Oregon Partnership for Disaster Resilience

1.6 How Was the Plan Developed and Updated

The 2023 Marion County Multi-Jurisdictional All-Hazards Mitigation Plan update is the result of multiple community and stakeholder engagement activities. To facilitate the HMP update, Marion County partnered with the Oregon Department of Land Conservation and Development (DLCD) to research, facilitate and complete the plan update process. As part of that process, Marion County Emergency Management coordinated with multiple stakeholders and conducted an internal process using the methodology developed by University of Oregon during the 2016 HMP update described below:

- **Marion County HMP steering committee.** Marion County formally convened the HMP steering committee on eleven occasions to discuss and revise the plan. Steering committee members contributed data, 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 previously 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. These sections were reviewed and updated as needed by DLCDC and Marion County Emergency Management.
- **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 2022 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 2016 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 Middle-Willamette Risk Map Project.** 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 determined that a flood risk project is not appropriate at this time. If this need is identified in the future, FEMA Region X and Marion County Emergency Management will collaborate on project planning.

- **Hazardous Materials: Commodity Flow Study.** In February 2016 the Marion County Emergency Management Office commissioned a Hazardous Materials Commodity Flow Study (HMCFS), to be carried out by the Center for Public Service (CPS) research team at Portland State University. PSU completed the study in accordance with recommendations from the US Department of Transportation (USDOT). The HMCFS identifies the types and amounts of hazardous materials transported through Marion County and provides a methodological approach to understanding the unique hazards that may be present. The HMCFS findings provide the data necessary to estimate risks facing the County and provide grounding for emergency response and other emergency management related plans.

The Marion County Emergency Manager is responsible for implementing, maintaining, and conducting future updates of the plan. The public will 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.

1.7 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

Section 1: Introduction

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

Section 2: Risk Assessment

The risk assessment provides the factual basis for the mitigation strategies contained in Section 3. The risk assessment includes a brief description of community sensitivities and vulnerabilities, and characteristics that may be impacted by all-hazards.

A hazard summary is provided for each of the hazards addressed in the HMP, which includes a hazard characteristic, history, probability assessment, and vulnerabilities. The following hazards are profiled in the risk assessment: Drought, Earthquake, Flood, Landslide, Volcano Eruption, Wildfire, Severe Weather.

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.

Section 5: Plan Adoption

This section describes the process taken to secure a FEMA approved plan.

Volume II: City/Special District Addendums

This section contains city addenda for the cities of Aumsville, Aurora, Detroit, Gervais, Idanha, Jefferson, Keizer, Keizer Fire District, Mill City, Mt. Angel Fire District, Scotts Mills, Stayton, Sublimity, Turner, Woodburn, and Woodburn Fire District. 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: Appendices

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

Appendix A: Marion County Priority Actions

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

Appendix B: Community Profile

The community profile describes the county and participating cities from several perspectives 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 C: Planning and Public Process

This appendix includes documentation of all the countywide public processes utilized to develop the Plan. It includes an overview of the outreach strategy used, project timeline, and shares documentation of these efforts including Steering Committee meeting agendas and notes, as well documentation of the public outreach conducted.

Appendix D: Marion County Hazard Vulnerability Survey Report

This section presents the survey and its results conducted during the 2022 HMP update process.

Appendix E: 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, but this version has been updated by DLCD with new links at the end and reformatted. 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 F: Grant Programs

This appendix lists state and federal resources and grant programs.

Appendix G: Hazard History

Past hazard events are listed, described, and documented in detail in this section.

Volume IV: DOGAMI Report

2 Risk Assessment

This section of the HMP addresses 44 CFR 201.6(c)(2) - Risk Assessment. The Risk Assessment applies to Marion County, the cities of Aumsville, Aurora, Detroit, Gervais, Hubbard, Idanha, Jefferson, Keizer, Mill City, Mt. Angel, Scotts Mills, Stayton, Sublimity, Turner and Woodburn, and the special districts of Keizer Fire District, Mt. Angel Fire District, and Woodburn Fire District. 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



2.1 Risk Assessment Approach

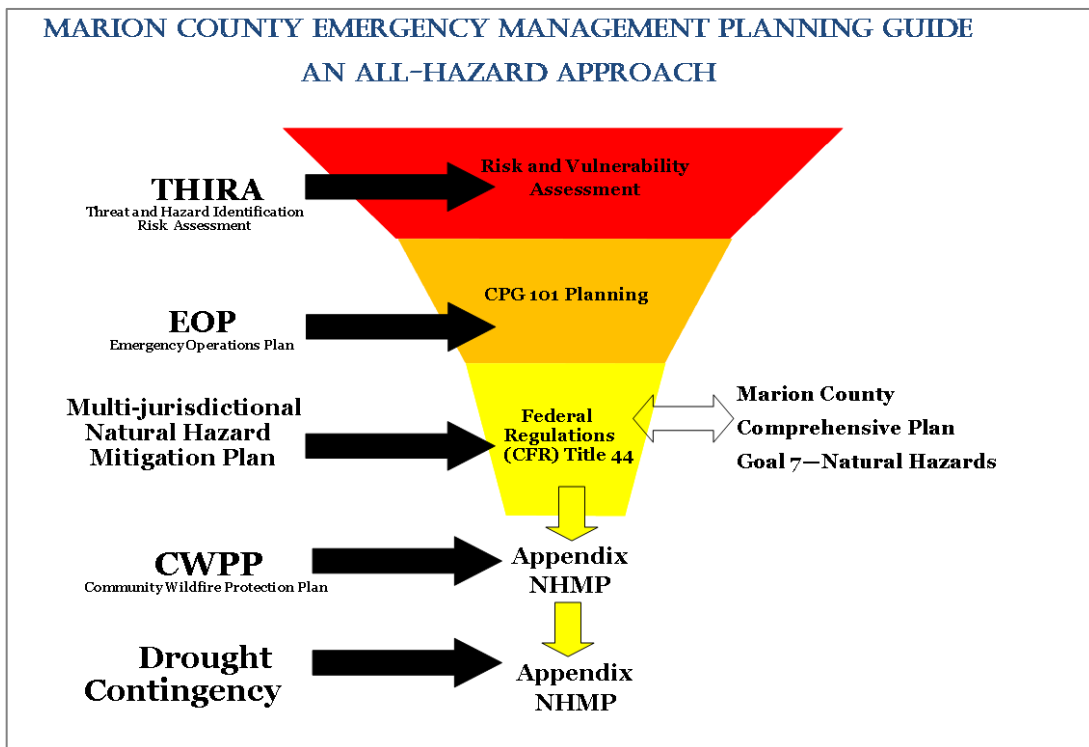
A risk assessment is intended to provide the “factual basis for activities proposed in the strategy to reduce losses from identified hazards.” To complete the risk assessment, the HMP update team first updated the description, type, location, and extent of each hazard. Next, the team updated the vulnerability information based on each hazard’s potential impact on the community. Next, the HMP update team held interviews with each community and special district stakeholder that participates in this plan, to acquire their information concerning their threats and hazards to their local communities.

For this HMP update, the risk assessment also focusses 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 Emergency Management Planning Guide



Source: Marion County Emergency Operations Plan, 2020-2025

Figure 2-3, Marion County Approach to Emergency Management



Source: Marion County Emergency Management

2.2 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 because 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 (Department of Homeland Security, Federal Emergency Management Agency, 2021). 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 2-1 summarizes the major disasters declared in Oregon that have included Marion County since 2009. 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 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.

Table 2.1, FEMA Major Disaster (DR), Emergency (EM), and Fire Management Assistance (FMA) Declarations for Marion County from 2009-2022

Declaration Number	Declaration Date	Incident Period	Incident
DR-4599-OR	May 4, 2021	February 11-15, 2021	Winter Storm
DR-4562-OR	Sept. 15, 2020	Sept. 7-Nov. 3, 2020	Wildfire and Straight-line Winds
DR-4499-OR	March 28, 2020	January 20, 2020, and continuing	COVID-19
DR-4055-OR	March 2, 2021	January 17-21, 2012	Severe Winter Storm, Flooding, Landslides and Mudslides
DR-1824-OR	March 2, 2009	Dec. 13-26, 2008	Severe Winter Storm, Record and Near Record Snow

Source: FEMA Disaster Declarations for States and Counties

2.3 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. This section contains both a risk assessment prepared by Marion County staff for risks facing the county as well as a summary of the risk assessments for all the other jurisdictions participating in this multi-hazard Hazard Mitigation Plan update.

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 utilized a method developed by BOLD Planning, Critical Priority Risk Index, 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.

Critical Priority Risk Index

The objective of any risk analysis is to minimize impact and maximize response efforts. In order to accomplish these all-relevant hazards, potential vulnerabilities and exposures for the region or jurisdiction should be assessed in a consistent way, with a clear numeric methodology. Based on this understanding of risk, communities can then develop a

strategy to identify and prioritize response, continuity, and mitigation actions.

Hazard Analysis Definitions

- **Hazard**
 - A potential source of injury, death, or damage
- **Vulnerability**
 - Susceptibility to injury, death, or damage
- **Exposure**
 - People and property within the area the potential hazard could affect.
- **Risk**
 - The likelihood of a hazard resulting in injury, death, or damage.
- **Mitigation**
 - A systematic reduction to the exposure and vulnerability to a potential hazard.

Based on the identification of potential hazards, a robust hazard profile includes data concerning previous occurrences, the probability of future occurrences and the threat to the County.

Hazards can be defined individually in each plan for specific considerations, or at the Master level where overall hazards and vulnerability do not vary greatly across the jurisdiction. Weather-related and large-scale infrastructure hazards such as drought, extreme temperatures, hail, windstorms, and utility failures can affect an entire region.

As such, these hazards are built out at the master level; however, some hazards such as dam and levee failure, flood and erosion or subsidence soils may have local variations and multiple profiles may be developed if the risk is not uniform across the jurisdiction or organization. For each identified hazard the following information should be provided in the description and impact statement sections:

- **Hazard Description**
 - A general discussion of the hazard and its outcome.
- **Hazard Location**
 - The geographic extent or location of the hazard in the County.
- **Prior Instances**
 - Information on historic incidents and their impact.
- **Associated Secondary Hazards**
 - Those hazards of a unique nature that stem from the original occurrence.
- **Probability of Future Occurrence**

- Frequency of past events used to gauge the likelihood of future occurrences.

CPRI Calculations

MCEM uses the Calculated Priority Risk Index (CPRI) methodology to prioritize each of the identified hazards across the County. CPRI rankings consider the following four elements of risk:

- Probability
- Magnitude / Severity
- Warning Time
- Duration

The following tables provide a summary for each of the risk elements, including a rationale behind each numerical ratio.

Table 2.2, CPRI Risk Elements, Probability

	Rating	Rating Criteria
Probability	4 – Highly Likely	<ul style="list-style-type: none"> ▪ Event is probable within the calendar year. ▪ Event has up to 1 out of 1 chance of occurring this year. ▪ History of events is greater than 33% likely per year.
	3 – Likely	<ul style="list-style-type: none"> ▪ Event is probable within the next 3 years. ▪ Event has up to 1 in 3 years chance of occurring. ▪ History of events is greater than 20% but less than or equal to 33% likely per year.
	2 – Intermittent	<ul style="list-style-type: none"> ▪ Event is probable within the next 5 years. ▪ Event has up to 1 in 5 years chance of occurring. ▪ History of events is greater than 10% but less than or equal to 20% likely per year.
	1 – Unlikely	<ul style="list-style-type: none"> ▪ Event is possible within the next 10 years. ▪ Event has up to 1 in 10 years chance of occurring. ▪ History of events is less than or equal to 10% likely per year.

Table 2.3, CPRI Risk Elements, Magnitude-Severity

Magnitude / Severity	Rating	Rating Criteria
	4 - Catastrophic	<ul style="list-style-type: none"> ▪ Multiple fatalities. ▪ Complete shutdown of facilities for 30 or more days. ▪ More than 50% of property is severely damaged.
	3- Critical	<ul style="list-style-type: none"> ▪ Injuries and/or fatalities result in permanent disability. ▪ Complete shutdown of critical facilities for at least two (2) weeks. ▪ 25-50% of property is severely damaged.
	2- Limited	<ul style="list-style-type: none"> ▪ Injuries and/or illnesses do not result in permanent disability. ▪ Complete shutdown of critical facilities for more than one (1) week. ▪ 10-25% of property is severely damaged.
	1- Negligible	<ul style="list-style-type: none"> ▪ Injuries and/or illnesses are treatable with first aid. ▪ Minor quality of life lost. ▪ Shutdown of critical facilities and services for 24 hours or less. ▪ Less than 10% of property is severely damaged.

Table 2.4, CPRI Risk Element-Warning Time

Warning Time	Rating	Rating Criteria
	4	Less than 6 hours
	3	6 to 12 hours
	2	12-24 hours
	1	24+ hours

Table 2.5, 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 the THIRA assessment to weight them proportionally using 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 prepared by Marion County staff and DLCDC project managers for risk facing the county is presented below.

Using the rankings described in the tables above, the following weighted formula was used to determine each hazard’s CPRI.

$$(\text{Probability} \times 0.45) + (\text{Magnitude} \times 0.30) + (\text{Warning time} \times 0.15) + (\text{Duration} \times 0.10)$$

When discussing probability, it is important to note that while many events occur frequently, they often result in little quantifiable impact. For example, lightning strikes the earth on average of 2,000,000 times per year; however, few of these strikes have adverse outcomes.

As such, when discussing the probability for each hazard, the discussion will be framed by the likelihood of that event have a measurable, large scale or detrimental impact. In addition, it is important to note that the occurrence of many, if not all, hazard event cannot be predicted with certainty. Simply because an event has occurred once prior, even if

devastating, does not significantly weight its likelihood of reoccurrence with any certainty. The CPRI values should be general indicators of response action criticality in an EOP or COOP plan. The following table details planning significance in the CPRI ranges:

Table 2.6, CPRI Rang Values

CPRI Range Values		
Impact	Low CPRI	High CPRI
High	3.0	4.0
Moderate	2.0	2.9
Low	.10	1.9

The terms high, moderate, and low indicate the level of prioritization in response efforts for each hazard, and do not indicate the potential impact of a hazard occurring. Hazards rated with moderate or high significance should be more extensively discussed due to the availability of data and historic occurrences, while those with a lower significance more generally addressed due to lack of available data and historical occurrences.

Marion County is vulnerable to a wide range of hazards that threaten its communities, businesses, and environment. To determine the hazards that poses the greatest threat,

Marion County has prepared a Threat Hazard Identification and Risk Assessment. The major findings are summarized below. The assessments were developed from historical data of events that have occurred and specifically examined.

Table 2.7, Hazard and Vulnerability Assessment Summary for Marion County - Natural Hazards

Hazard Profile Summary for Marion County Using Bold Planning Analysis Scoring						
Natural Hazard	Probability	Warning Time	Magnitude	Duration	CPRI	Planning Significance
Weight Factor	0.45	0.15	0.3	0.1		
Earthquake	4	4	4	4	4.0	High
Wildland Interface Fire	4	4	2.5	4	3.6	High
Drought	4	1	3	4	3.3	High
Flood	4	1.5	2.5	3.5	3.1	High
Dam or Levee Failure	2	3.5	4	4	3.0	High
Landslide	3	4	2.5	3	3.0	High
Extreme Weather - High Temperature	3	1	3	3.5	2.8	Moderate
Severe Weather/Storm	3	1	3	3	2.7	Moderate
Tornado	1.5	4	2.5	2.5	2.2	Moderate
Avalanche	2	4	1.5	1.5	2.1	Moderate
Volcanic Eruption	1.5	1	3	3	2.0	Moderate

Source: Marion County Emergency Management, BOLD Planning Hazard Analysis Conducted 10/14/2021

Figure 2-4, Hazard and Vulnerability Assessment Summary for Marion County - Other Hazards

Hazard Profile Summary for Marion County Using Bold Planning Analysis Scoring						
Non-Natural Hazard	Probability	Warning Time	Magnitude	Duration	CPRI	Planning Significance
Weight Factor	0.45	0.15	0.3	0.1		
Terrorism/Active Shooter/Workplace Violence	4	4	3.5	3.5	3.8	High
Hazardous Materials - Non-Transportation	4	4	3.5	3	3.8	High
Fire - Residential / Commercial (Arson)	4	4	3.5	3	3.8	High
Hazardous Materials Release - Transportation	4	4	3	3	3.6	High
Cyberterrorism	3	4	3.5	4	3.4	High
Chemical, Biological, Radiological, Nuclear, Explosive	3	4	3.5	4	3.4	High
Unauthorized Entry	3	4	2.5	2.5	3.0	High
Public Health	3	1	3.5	4	3.0	High
Agricultural Terrorism	2	1	3.5	4	2.5	Moderate

Source: Marion County Emergency Management, BOLD Planning Hazard Analysis Conducted 10/14/21

The summary table for the entities who will hold plans as part of this multi-jurisdictional hazard mitigation plan is below. The table could be reorganized to see regional differences, but here it is alphabetical. Other interested parties completed Hazard Vulnerability Assessment exercises that are incorporated throughout the risk assessment and capability analysis rather than as the tables produced during the interviews. These organizations include Salem Health, Salem Water Control District, Consumer Power, and Santiam Electric.

Table 2.8, Summary of HVA Scores

Average of all scores in Marion County	Aumsville & Aumsville RFPD	Aurora & Aurora RFPD	Detroit	Gervais	Hubbard & Hubbard RFPD	Idanha	Jefferson	Keizer & Keizer FD	Mill City	Mt. Angel	Scotts Mills	Stayton	Sublimity	Turner RFPD	Woodburn	Average Risk Score
Natural Hazard																
Earthquake	2.8	3.5	3.7	3.6	4.0	3.6	3.6	3.3	2.8	3.6	4.0	3.6	3.3	3.4	4.0	3.5
Wildland Interface Fire	3.0	3.3	4.0	1.8	4.0	4.0	2.0	3.7	3.4	3.2	3.9	3.7	3.7	2.7	3.0	3.3
Severe Weather/Storm	3.6	2.9	2.9	2.4	3.6	3.4	2.0	2.4	3.3	3.4	3.9	2.6	4.0	3.2	3.3	3.1
Extreme Weather - High Temperature	2.4	2.4	2.1	2.3	3.4	2.8	2.0	2.4	3.0	3.0	2.4	3.1	2.6	2.6	2.7	2.6
Tornado	2.8	2.2	1.8	2.7	3.1	2.7	1.6	2.4	1.1	2.8	3.1	3.3	2.4	2.3	2.3	2.4
Drought	2.8	2.2	2.7	1.0	2.4	2.2	1.0	2.1	2.8	2.8	2.4	2.8	2.8	2.6	2.8	2.4
Flood (including dam failure)	2.1	2.2	2.0	2.4	2.4	2.1	2.4	2.4	2.0	2.1	2.7	2.4	1.0	2.7	2.8	2.2
Landslide	1.7	1.3	3.2	NA	2.2	3.2	1.0	2.1	2.4	1.3	3.6	2.0	1.0	2.1	1.7	2.1
Volcanic Eruption	1.7	2.0	2.1	2.4	1.9	1.9	1.5	2.1	1.8	2.4	2.2	2.2	1.6	1.5	1.7	2.0
Avalanche (new in 2021)	1.0	1.0	2.1	NA	1.0	2.3	1.0	1.0	1.5	1.0	1.3	NA	1.0	1.6	1.7	1.4
Other Hazards																
Hazardous Materials Release - Transportation	2.7	3.5	3.6	3.2	3.3	3.7	2.5	2.9	3.2	3.1	2.4	2.9	3.0	2.5	3.3	3.0
Public Health	1.0	2.1	3.6	3.3	4.0	3.0	2.5	3.3	2.8	3.2	3.0	3.0	2.7	3.0	2.8	2.9
Cyberterrorism	2.8	2.0	3.8	1.8	3.3	1.8	2.5	3.6	2.5	3.6	3.4	2.3	3.7	2.7	3.0	2.8
Terrorism, Active Shooter, Workplace Violence	3.1	3.1	2.4	3.1	2.5	1.8	3.1	2.7	3.1	3.1	2.4	2.5	3.1	3.0	3.0	2.8
Unauthorized Entry	2.5	2.5	2.5	2.5	3.1	2.5	2.4	3.1	2.4	3.6	2.8	2.625	2.5	2.7	2.4	2.7
Fire - Residential/ Commercial (Arson)	2.4	2.5	2.5	2.5	2.7	2.5	2.5	2.9	2.5	3.4	2.8	3.0	2.7	2.6	2.4	2.7
Chemical, Biological, Radiological, Nuclear, Explosive	1.0	3.1	2.5	3.1	3.1	2.7	2.5	3.1	2.7	2.0	2.7	1.9	2.7	3.0	2.8	2.6
Hazardous Materials - Non-Transportation	1.0	2.9	2.0	2.0	2.8	2.0	2.4	3.2	2.5	3.6	1.0	3.0	2.6	2.5	3.6	2.4
Agricultural Terrorism	1.0	1.9	2.1	1.3	2.5	1.3	2.1	2.7	1.9	2.4	2.2	2.7	2.2	2.1	2.5	2.0

Source: Work Product of DLCD Project Team, August 2022

2.4 Hazard Identification and Assessment

The 2020 State of Oregon NHMP Region 3 Risk Assessment identifies potential hazards in Marion County. Table 2.9 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 2-5 identifies other hazards listed in the Marion County Threat and Hazard Identification Risk Assessment. These hazards are included for continuity with the EOP.

Table 2.9, Marion County Natural Hazard Identification

Marion County Natural Hazards	Oregon NHMP Region 3 – Mid & Southern Willamette Valley
Drought	Droughts
Earthquake	Earthquakes
Extreme Heat / High Temperature	Extreme Heat
Flood	Floods
Landslide	Landslides
Volcanic Eruption	Volcanoes
Wildland Interface Fire	Wildfires
Tornado	Windstorms
Severe Weather / Storm (Winter)	Winter Storms
Avalanche	NA

Source: State of Oregon NHMP, 2020; BOLD Risk Assessment Data 2021

Table 2-5, Marion County Non-Natural Hazards

Marion County Non-Natural Hazards	
Cyberterrorism	Hazardous Materials – Non-Transportation Release
Hazardous Materials-Transportation Release	Unauthorized Entry
Fire – Residential or Commercial	Public Health Emergency
Terrorism, Active Shooter, or Workplace Violence	Agricultural Terrorism
Chemical, Biological, Radiological, Nuclear, Explosive (CBRNE)	

Source: *Marion County Emergency Operations Plan (2020-2025), BOLD Risk Assessment Data (2021)*

2.5 DOGAMI Multi-Hazard Risk Assessment

The Department of Geology and Mineral Industries performed a risk assessment for the communities of Marion County, Oregon, with funding provided by the Federal Emergency Management Agency (FEMA). The report, which is attached as Volume 4 DOGAMI Report, describes the methods and results of natural hazard risk assessments performed in 2021 and 2022 by the Oregon Department of Geology and Mineral Industries (DOGAMI) within the study area shown below in Table 2.10. The purpose of this project is to provide communities within the study area a detailed risk assessment of the natural hazards that affect them to enable them to compare hazards and act to reduce their risk. The risk assessment contained in this project quantifies the impacts of natural hazards to these communities and enhances the decision-making process in planning for disaster.

The DOGAMI Analyst arrived at these findings and conclusions by completing three main tasks: compiling an asset database, identifying, and using best available hazard data, and performing natural hazard risk assessment.

In the first task, they created a comprehensive asset database for the entire study area by synthesizing assessor data, U.S. Census information, Hazus-MH general building stock information, and building footprint data. This work resulted in a single dataset of building points and their associated building characteristics. With these data they were able to represent accurate spatial location and vulnerability on a building-by-building basis.

The second task was to identify and use the most current and appropriate hazard datasets for the study area. Most of the hazard datasets used in this report were created by DOGAMI; some were produced using high-resolution lidar topographic data. While not all the data sources used in the report are countywide, each hazard dataset was the best available at the time of writing.

In the third task the DOGAMI Analyst, Matt Williams, performed risk assessments using Esri® ArcGIS Desktop® software. He took two risk assessment approaches: (1) estimated loss (in dollars) to buildings from flood (recurrence intervals) and earthquake scenarios using FEMA Hazus®-MH methodology, and (2) calculated number of buildings, their value, and associated populations exposed to earthquake, and flood scenarios, or susceptible to varying levels of hazard from landslides, channel migration, wildfire, and volcanic lahar.

The findings and conclusions of this report show the potential impacts of hazards in communities within Marion County.

- While earthquake damage will occur throughout the entire county, extensive damage and losses are more probable in the northeastern portion of the county and areas of high liquefaction prone soils. Hazus-MH earthquake simulations illustrate the potential reduction in earthquake damage through seismic retrofits.
- Some communities in the study area have moderate risk from flooding, and we quantify the number of elevated structures that are less vulnerable to flood hazard. The analysis shows that new landslide mapping based on improved methods and lidar information show some communities are at risk to landslide hazard.
- Exposure to channel migration hazard is high for areas and communities along the Pudding River and Santiam and North Santiam Rivers.
- The wildfire hazard data used in this study was created prior to the unprecedented 2020 Labor Day Wildfires, however the results corresponded to the actual impacts of the 2020 Labor Day Wildfires in the county.
- Lahar hazard is a potential risk and could have significant impact for areas and the communities along the North Santiam River. The study’s findings indicate that most of the critical facilities in the study area are at high risk from an earthquake and channel migration. We found that the two biggest causes of population displacement are earthquake and landslide hazard.

Results were broken out for the following geographic areas:

Table 2.10, Geographic Study Areas

• Unincorporated Marion County (rural)	• City of Aumsville
• City of Aurora	• City of Detroit*
• City of Donald	• City of Gates*
• City of Gervais	• City of Hubbard
• City of Idanha	• City of Jefferson
• City of Keizer	• City of Mill City*
• City of Mount Angel	• City of St. Paul
• City of Salem	• *City of Salem (West Salem)
• City of Silverton	• City of Scotts Mills
• City of Stayton	• City of Sublimity
• City of Turner	• City of Woodburn
• Community of Four Corners	• Community of Hayesville
• Community of Butteville	• Community of Brooks
• Community of Labish Village	• Community of Marion
• Community of Mehama	

*Portions of the cities of Detroit, Gates, and Mill City that were within Linn County are included in this report. The City of Salem that was within Polk County was examined individually and designated as City of Salem (West Salem).

Selected Study-Wide Results

Total Buildings: 170,562

Total estimated building value: \$62 billion

*Mt. Angel Deterministic
Magnitude 6.8 Earthquake Scenario*
Red-tagged buildings: 7,479*
Yellow-tagged buildings: 17,028**
Loss estimate: \$6.7 billion

Landslide (High and Very High-Susceptibility)
Number of buildings exposed: 7,470.
Exposed building value: \$2.7 billion

Wildfire (High and Moderate Risk):
Number of buildings exposed: 2,819 Exposed
building value: \$814 million

100-year Flood
Number of buildings damaged: 2,552
Loss estimate: \$126 million.

Channel Migration Zone (30-year):
Number of buildings exposed: 826
Exposed building value: \$300 million.

Lahar (1,000 to 15,000-year):
Number of buildings exposed: 1,789
Exposed building value: \$415 million.

***Red-tagged buildings are considered uninhabitable due to complete damage.**

**** Yellow-tagged buildings are considered limited habitability due to extensive damage.**

2.6 Hazard Characterization

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 (2020). Since the 2016 Marion County NHMP, several hazard events have occurred in the county. For a full hazard history, please see Appendix G, Hazard History.

2.6.1 Drought

Table 2.11, Drought Summary

Hazard	Drought
Type	Climatic
Speed of onset	Slow
Location	Varies, County wide
Extent	Moderate to Severe*
Prior Occurrences	Three > 6-month duration since 1982
Probability	9%
*Defines as between -2 and -4 on the National Resource Conservation Service (NRCS) Surface Water Supply Index (SWSI)	

Source: 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 because 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.

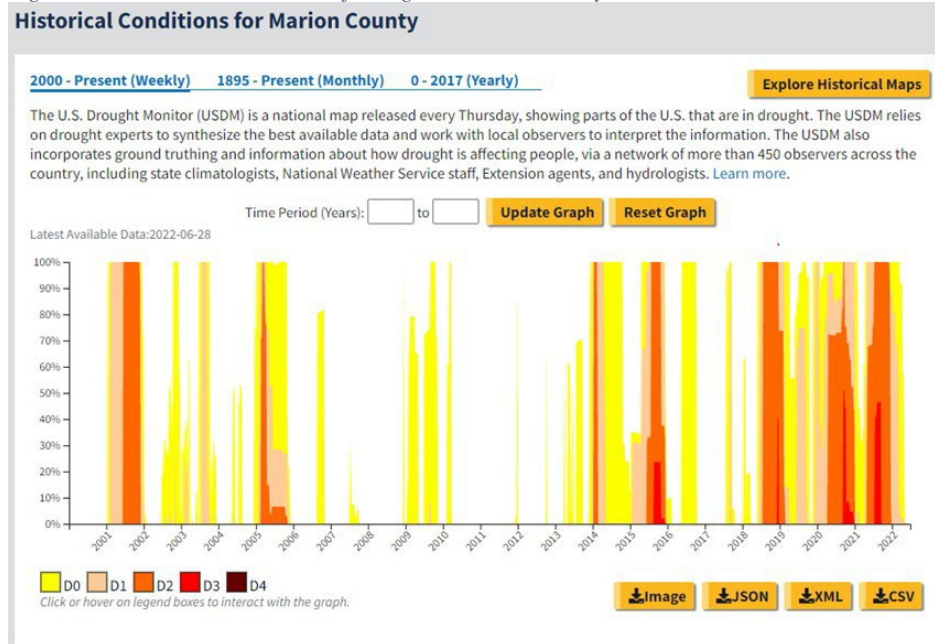
The Marion County EOP includes the following description of the drought hazard:

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 aid 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, (State of Oregon, Oregon Water Resources Department, N.d.).

Although the county saw Severe Drought conditions in 2018, 2020 and 2021 as measured by the US Drought Monitor, no other drought emergency declarations were made by the Oregon Governor. The figure below shows the increase in drought conditions in the recent past.

Figure 2-6, Historical occurrence of drought in Marion County



Source: Drought.Gov, consulted July 2022.

Location and Extent

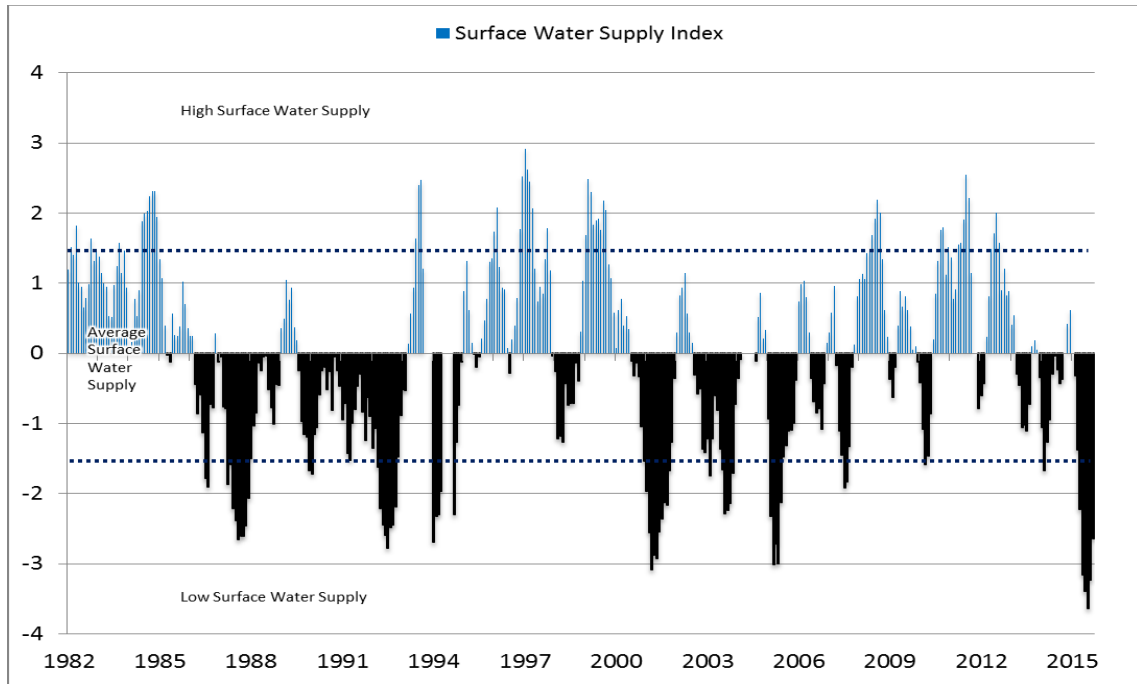
Droughts occur in every climate zone and can vary from region to region. Drought may occur throughout Marion County and may have profound effects on the economy, particularly the municipal water, agricultural, and recreation sectors. Drought is typically measured in terms of water availability in a defined 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, although it can be very useful because of its a long-term historical record of wet and dry conditions.

With climate change, snow droughts—the type of drought in which snowpack is low, but precipitation is near normal—are expected to occur more often. The 2015 drought in Oregon was a “snow drought” and serves as a good example of what future climate projections indicate may become commonplace by mid-21st century. Going forward, drought indices that can account for a changing climate, such as the Standard Precipitation-Evapotranspiration Index (SPEI), may provide a more accurate estimate of future drought risks.

In the previous Marion County NHMP (2016) the Surface Water Supply Index (SWSI) from the Natural Resources Conservation Service was used as an index of current water conditions. 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 2-9 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.

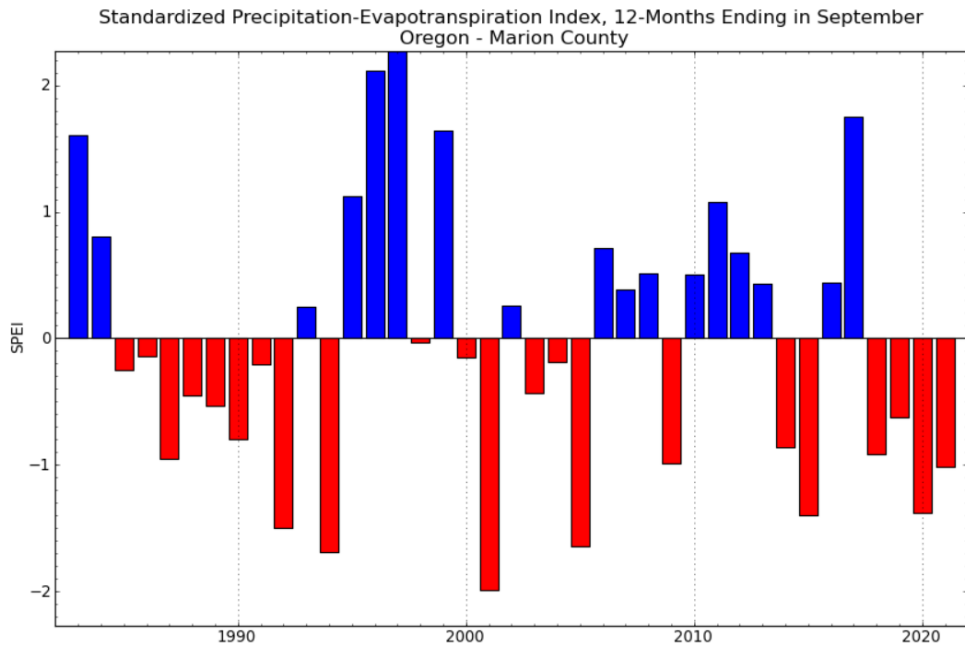
Figure 2-7, SWSI Values for the Willamette Basin (1982-2015)



Source: 2Department of Agriculture-Natural Resources Conservation Service, "Surface Water Supply Index, Willamette Basin" www.or.ncrs.usda.gov. Accessed February 2016

The 2020 Oregon NHMP uses the SPEI to estimate drought conditions and is presented below with the parameters set for 12-month time periods using the "water year" from October through September as the measure of water availability in Marion County. The time-period is set for 1982 through 2021 to mirror the data presented in the prior update.

Figure 2-8, SPEI for Marion County 1982-2021



Source: 3 West Wide Drought Tracker consulted August 2022

Additional information pertaining to the drought hazard in Marion County is available in the North Santiam Drought Contingency Plan, completed in April 2018. Additional information related to Marion County’s Drought Contingency Planning efforts is discussed later in this section.

2.6.2 Earthquake

Table 2.12, 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 years*
Prior Occurrence	One over Magnitude 5 last 100 years**
Probability	Approximately 1% annual
* DOGAMI HazVu; ** PNSN- 1993 Scotts Mills just north of Marion County	

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

Table 2.13, Earthquake Summary Subduction

Hazard	Earthquake – Subduction
Type	Geologic
Location	Primarily west of Cascades; CA-BC
Speed of Onset	Rapid
Extent	Catastrophic
Prior Occurrence	One over Magnitude 9 last 500 years*
Probability	Magnitude 9+ is 7% - 12% over 50 years**
* DOGAMI HazVu; ** Oregon Natural Hazard Mitigation Plan, analysis by Oregon Department of Geology and Mineral Industries (DOGAMI)	

Source: 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 323 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 & 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. 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.

Figure 2-11 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.

The Marion County Emergency Operations Plan (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 to 5 minutes in duration, the impact will be widespread. 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 communications, 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 due 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.

DOGAMI's Multi-hazard Risk Report for Marion County includes the following figure which shows anticipated shaking due to a magnitude 6.6 earthquake on the Mt. Angel fault or more information on the earthquake hazard in Marion County, refer to the following reports, incorporated herein by reference:

[DOGAMI - IMS-24](#), - 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.

[Interpretive Map Series: IMS-8](#) Relative earthquake hazard maps for selected urban areas in western Oregon: Canby-Barlow-Aurora, Lebanon, Silverton-Mount Angel, Stayton-Sublimity-Aumsville, Sweet Home, Woodburn-Hubbard.

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.](#)

Additional reports are available via DOGAMI’s Publications Search website: <https://www.oregongeology.org/pubs/index.htm>

Oregon Seismic Safety Policy Advisory Commission Reports: Oregon Resilience Plan (2013). https://www.oregon.gov/oem/documents/oregon_resilience_plan_final.pdf

2.6.3 Flood

Table 2.14, Flood Summary

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

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

Characteristics

Flooding results when rain and snowmelt create water flow that exceeds 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 (Taylor, Hatton, & Taylor). The principal types of flooding 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.

Within the planning period for this update three incidents of flooding were reported through the NOAA Storm Event Database. These occurred in February 2017, April 2019, and December 2020. Details of these events can be found in Appendix G.

Location & 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 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 DOGAMI Multi-hazard Risk Report for Marion County contains the following figure showing the SFHAs in Marion County following map updates in the City of Turner.

The Marion County EOP includes the following description of the flood 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 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 lying 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 (National Oceanic and Atmospheric Administration, N.d.). 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.

National Flood Insurance Program (NFIP) Vulnerability

The Marion County Flood Insurance Rate Maps (FIRMs) for unincorporated Marion County and the cities of Turner and Salem became effective in October 2019. The City of Sublimity FIRM became effective in January 2003. The remaining cities have individual FIRMs current as of January 2000. Table 2.15 below shows that as of September 14, 2022, Marion County (including the incorporated cities) has 1,563 National Flood Insurance Program (NFIP) policies in force. Of those, 826 (53%) ensure structures constructed before development of the initial FIRM. FEMA has made 396 paid claims in the county totaling \$5,878,435. Tables 2.16 show that the last Community Assistance Visit (CAV) for unincorporated Marion County occurred on July 28, 2021. Among the jurisdictions within the county the City of Keizer received the most recent CAV in the county on March 4, 2020. Unincorporated Marion County participates in the Community Rating System (CRS) as does the City of Salem. The county has a CRS rating of 6, 20% discount, 6 repetitive loss properties. The table below shows that the majority (just under 90%) of flood insurance policies are for residential structures, primarily single-family homes.

Table 2.15, Flood Insurance Participation

Community	Effective FIRM and FIS	Initial FIRM Date	Number Policies	Pre-FIRM Policies	Single Family	2-4 Family	Other Residential	Non-Residential	Minus Rated A Zone
MARION COUNTY									
MARIONCOUNTY*	10/18/2019	8/15/1979	235	124	207	1	4	23	7
AUMSVILLE, CITY OF	1/19/2000	3/1/1979	15	4	15	0	0	0	2
AURORA, CITY OF	1/19/2000	6/5/1997	2	1	2	0	0	0	0
DETROIT, CITY OF	1/19/2000	6/30/1976	1	0	1	0	0	0	0
GATES, CITY OF	1/19/2000	12/4/1979	2	1	2	0	0	0	0
GERVAIS, CITY OF	1/19/2000	6/30/1976	0	0	0	0	0	0	0
HUBBARD, CITY OF	1/19/2000	2/5/1986	0	0	0	0	0	0	0
JEFFERSON, CITY OF	1/19/2000	3/1/1979	10	4	10	0	0	0	0
MT. ANGEL, CITY OF	1/19/2000	1/19/2000	0	0	0	0	0	0	0
SALEM, CITY OF	10/18/2019	6/15/1979	723	464	440	86	54	143	32
SCOTTS MILLS, CITY OF	1/19/2000	3/1/1979	1	1	1	0	0	0	0
SILVERTON, CITY OF	1/19/2000	3/1/1979	71	30	43	5	21	2	20
ST. PAUL, CITY OF	1/19/2000	1/19/2000	0	0	0	0	0	0	0
STAYTON, CITY OF	1/19/2000	3/1/1979	17	8	15	0	0	2	0
SUBLIMITY, CITY OF	1/2/2003	1/19/2000	0	0	0	0	0	0	0
TURNER, CITY OF	10/18/2019	4/2/1979	143	34	133	7	0	3	0
WOODBURN, CITY OF	1/19/2000	3/1/1979	29	5	26	0	0	3	2
KEIZER, CITY OF	1/19/2000	8/15/1979	314	150	285	7	7	15	6
CountyTotal:			1,563	826					

Source: FEMA CIS database consulted September 2022.

Table 2.16, Flood Insurance Detail

Community	Total Coverage	Total Premium	No. of Claims	No. of Pre-FIRM claims paid	Substantial Damage Claims	Paid Claims	Repetitive Loss Structures	CRS Class Rating	Last CAV Date	Last CAC Date
MARIONCOUNTY										
MARIONCOUNTY*	\$64,663,800	\$189,154	10	76	6	\$ 1,218,648	20	6	07/28/2021	
AUMSVILLE, CITY OF	\$3,851,600	\$9,095	0	0	0	\$ 0	0	na	09/24/1997	12/28/1990
AURORA, CITY OF	\$633,000	\$2,294	0	0	0	\$ 0	0	na		12/02/1992
DETROIT, CITY OF	\$70,000	\$279	0	0	0	\$ 0	0	na	01/01/1989	04/29/2021
GATES, CITY OF	\$490,000	\$838	0	0	0	\$ 0	0	na		06/28/2021
GERVAIS, CITY OF	\$0	\$0	0	0	0	\$ 0	0	na		03/14/1991
HUBBARD, CITY OF	\$0	\$0	0	0	0	\$ 0	0	na	06/17/1991	
JEFFERSON, CITY OF	\$2,936,400	\$4,925	7	6	0	\$43,990	0	na		
MT. ANGEL, CITY OF	\$0	\$0	4	3	0	\$14,301	1	na		06/27/1991
SALEM, CITY OF	\$199,098,100	\$738,282	20	156	8	\$ 3,472,820	27	4	3/22/2017	1/26/2022
SCOTTS MILLS, CITY OF	\$144,100	\$1,714	1	1	0	\$11,254	0	na	03/31/1995	08/24/1992
SILVERTON, CITY OF	\$18,262,300	\$60,864	15	11	0	\$70,080	0	na	03/31/1995	08/24/1992
ST. PAUL, CITY OF	\$0	\$0	0	0	0	\$ 0	0	na		
STAYTON, CITY OF	\$5,760,000	\$10,086	1	0	0	\$8,200	0	na	08/09/2006	08/24/1992
SUBLIMITY, CITY OF	\$0	\$0	0	0	0	\$ 0	0	na		
TURNER, CITY OF	\$41,345,600	\$75,227	25	20	3	\$595,584	3	na	02/06/2012	02/25/1993
WOODBURN, CITY OF	\$7,667,900	\$19,384	6	3	0	\$14,781	0	na	06/24/2004	02/25/1993
KEIZER, CITY OF	\$99,857,300	\$198,812	32	20	1	\$428,778	3	na	3/4/2020	6/27/1991
CountyTotal:	\$444,780,100	\$1,310,954	39	6		\$5,878,436	54			

Source: FEMA CIS database consulted September 2022.

2.6.4 Landslide

Table 2.17, Landslide Summary

Hazard	Landslide
Type	Climate / Geologic
Location	Steep slopes, weak geology (West Salem, East County)
Speed of Onset	Slow to rapid
Extent	Minor to severe, but localized
Prior Occurrence	Landslides occur annually in Marion County
Probability	100% for minor events, 10%-20% for severe events.

Source: 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 & 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:

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 note in the 2016 Marion County Multi-Jurisdictional NHMP is North Fork Road which experiences regular (annual) landslides and closures.

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 2-18 below shows Landslide Susceptibility and Exposure for the county and its incorporated jurisdictions. Notably, Scotts Mills and Idanha have significant percentages of landslide susceptible areas with very high exposure

Table 2.18, Landslide Susceptibility Exposure in Marion County by city

Jurisdiction	Area, ft ²	Low	Moderate	High	Very High
Marion County	33,185,295,063	47.4%	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)

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

- [Introduction - SLIDO - Statewide Landslide Information Database for Oregon \(SLIDO\) - Oregon Department of Geology and Mineral Industries \(oregongeology.org\)](#)
- [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](#)

2.6.5 Volcano

Table 2.19, Volcano Summary

Hazard	Volcano
Type	Geologic
Location	Cascade Mountains
Speed of Onset	Slow too rapid
Extent	Moderate to severe
Prior Occurrence	One significant event 1980 (Mt. St. Helens)
Probability	<1% annual

Source: DOGAMI - Oregon HazVu; Oregon NHMP

Characteristics:

The Pacific Northwest lies 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 & 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.

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 are possible in the southeast corner of Marion County in the Cascade Range. Lahar flows are possible along most of Marion County’s eastern border (see Figure 2-17) as shown emanating from Mount Jefferson, the closest potential source of volcanic activity. 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.

The plate of the projected location of a lahar from Mount Jefferson into Marion County is included in the DOGAMI Multi-hazard Risk Assessment found in Volume 4.

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

Several Oregon and Washington volcanos 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.

2.6.6 Wildfire

Table 2.20, Wildfire

Hazard	Wildfire
Type	Climatic, Human Caused
Speed of onset	Moderate to rapid
Location	County wide, Wildland Urban Interface
Extent	Minor to extreme
Prior Occurrences	74 fires from 2016 through 2021; 398,354 acres burned*
Probability	100% for minor events, 1% for extreme events
*Oregon Department of Forestry Data, consulted September 2022, ODF Fire ODF Fire ODF ArcGIS Hub	

Source: DOGAMI - Oregon HazVu; Oregon NHMP

Marion County updated its Community Wildfire Protection Plan (CWPP) in 2017. The CWPP is incorporated into the NHMP 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 may now be 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:

- **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.)

Location & Extent

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 consists 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. Uncontrolled fires often occur 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 wildland fire. Losses from a fire could range as high as \$10 to \$15 million dollars. The impacts include loss of communications, utilized and compromises water quality and the transportation of goods and services to the affected communities. The fire season typically occurs between May and October. Most of the fires are caused by humans or lightning strikes.

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.

Communities at-Risk, for the purposes of this plan, are those areas within city or Rural Fire District boundaries of the fire department that provide fire protection services for the community. The Communities-at-Risk are surrounded by an additional area identified as the "Wildland Urban Interface" (WUI). The area where forest fuel can be modified to reduce fire behavior and spread so that wildland agencies can use the area to manage suppression fires more effectively from spreading to communities at risk and other important infrastructure.

Methods for identifying communities at risk require assessing residential density and location within a fire district. While several of Marion County's communities are listed as "unprotected," it is important to note that these communities are NOT without fire service. Several Rural Fire Protection Districts provide firefighting services throughout the unprotected areas of Marion County including:

- Breitenbush
- Detroit
- Drakes Crossing
- Elkhorn (Little North Fork, Santiam Canyon)
- Gates
- Idanha
- Jefferson
- Lyons
- Marion
- Mehama
- Salem (South and East)
- Scotts Mills
- Silverton
- Stayton
- Sublimity
- Turner

The Marion County CWPP update of 2017 discusses a high-level wildfire risk assessment called the West Wide Wildfire Risk Assessment (WWA). The Oregon Department of Forestry, on behalf of the Council of Western State Foresters and the Western Forestry Leadership Coalition, has conducted a wildfire risk assessment and report for the 17 western states and selected U.S. affiliated Pacific Islands. This assessment was funded by the U.S. Forest Service and is known as the West Wide Wildfire Risk Assessment, or WWRA. The WWRA is a multi-state assessment that provides multiple data sets that can be used to evaluate and weigh the relative risk of various factors that contribute to wildfire risk.

In 2021, the Oregon State Legislature passed Senate Bill (SB) 762 which required ODF to develop a new statewide wildfire risk map updating the current use of the 2018 Quantitative Wildfire Risk Assessment. The new Wildfire Risk Map was released on June 30, 2023, as part of the Oregon Explorer Natural Resources Digital Library, [Home | oregonexplorer | Oregon State University](#).

Following concerns from the public concerning the data and the impacts that this data could have on insurance, ODF made the decision to remove the Oregon Wildfire Risk Map and reevaluate the data to ensure its accuracy and impact. ODF plans to release the new updated risk map sometime in 2023.

Marion County has chosen to not include data acquired from the Oregon Wildfire Risk Map while it was available and will reexamine the new data and determine its usefulness once released by ODF.

2.6.7 Severe Weather/Storm

Table 2.21, Severe Weather/Storm

Hazard	Severe Weather / Storm
Type	Climatic
Speed of onset	Slow to moderate
Location	Countywide
Extent	Minor to severe
Prior Occurrences	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

Source: 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, Severe Weather/Storm, and Extreme Weather - High Temperature. The NOAA Storm Event Database is the source for the tables below containing records for events of many types of Severe Weather. The data are grouped showing events of Winter Storms, Winter Weather, Snowstorm, and Ice Storms in the first table. Presented separately are High Wind, Strong Wind, Funnel Cloud, and Tornado events. The final table contains reported events of Heat and Excessive Heat. The occurrences are listed in date/time order and the episodes are grouped together with banding. Note that the drought, wildfire, and flood hazards are covered under separate sections. These hazards can also be tied to severe weather events and the impact of a changing climate.

Table 2.22, Severe Weather/Storm

Zone	Begin Date	Event Type
CENTRAL WILLAMETTE VALLEY (ZONE)	1/7/2017	Winter Storm
NORTH OREGON CASCADES FOOTHILLS (ZONE)	1/7/2017	Winter Storm
CENTRAL WILLAMETTE VALLEY (ZONE)	1/10/2017	Heavy Snow
CENTRAL WILLAMETTE VALLEY (ZONE)	3/5/2017	Heavy Snow
NORTH OREGON CASCADES (ZONE)	3/5/2017	Heavy Snow
NORTH OREGON CASCADES FOOTHILLS (ZONE)	3/5/2017	Heavy Snow
NORTH OREGON CASCADES (ZONE)	12/19/2017	Heavy Snow
NORTH OREGON CASCADES FOOTHILLS (ZONE)	2/20/2018	Heavy Snow
NORTH OREGON CASCADES (ZONE)	2/25/2018	Heavy Snow

Zone	Begin Date	Event Type
NORTH OREGON CASCADES (ZONE)	4/7/2018	Heavy Snow
NORTH OREGON CASCADES (ZONE)	12/11/2018	Winter Weather
NORTH OREGON CASCADES FOOTHILLS (ZONE)	2/8/2019	Heavy Snow
NORTH OREGON CASCADES (ZONE)	2/10/2019	Heavy Snow
NORTH OREGON CASCADES FOOTHILLS (ZONE)	2/10/2019	Heavy Snow
NORTH OREGON CASCADES (ZONE)	2/23/2019	Heavy Snow
NORTH OREGON CASCADES FOOTHILLS (ZONE)	2/23/2019	Heavy Snow
NORTH OREGON CASCADES (ZONE)	2/24/2019	Heavy Snow
NORTH OREGON CASCADES FOOTHILLS (ZONE)	2/24/2019	Heavy Snow
NORTH OREGON CASCADES (ZONE)	11/26/2019	Heavy Snow
NORTH OREGON CASCADES (ZONE)	1/10/2020	Heavy Snow
NORTH OREGON CASCADES FOOTHILLS (ZONE)	1/13/2020	Heavy Snow
NORTH OREGON CASCADES (ZONE)	3/30/2020	Heavy Snow
NORTH OREGON CASCADES (ZONE)	11/13/2020	Heavy Snow
NORTH OREGON CASCADES (ZONE)	11/13/2020	Heavy Snow
CENTRAL WILLAMETTE VALLEY (ZONE)	1/26/2021	Winter Weather
NORTH OREGON CASCADES (ZONE)	2/11/2021	Winter Storm
NORTH OREGON CASCADES FOOTHILLS (ZONE)	2/11/2021	Winter Storm
CENTRAL WILLAMETTE VALLEY (ZONE)	2/11/2021	Ice Storm*
NORTH OREGON CASCADES (ZONE)	2/25/2021	Winter Storm
NORTH OREGON CASCADES (ZONE)	12/11/2021	Heavy Snow
NORTH OREGON CASCADES (ZONE)	12/19/2021	Heavy Snow
NORTH OREGON CASCADES FOOTHILLS (ZONE)	12/19/2021	Heavy Snow
NORTH OREGON CASCADES (ZONE)	12/24/2021	Heavy Snow
NORTH OREGON CASCADES FOOTHILLS (ZONE)	12/24/2021	Heavy Snow
CENTRAL WILLAMETTE VALLEY (ZONE)	12/25/2021	Heavy Snow
NORTH OREGON CASCADES (ZONE)	1/2/2022	Heavy Snow
NORTH OREGON CASCADES FOOTHILLS (ZONE)	1/3/2022	Heavy Snow

Source: NOAA Storm Event Database, consulted September 2022, Storm Events Database - Search Page | National Centers for Environmental Information (noaa.gov)

* \$10,000,000 was the value of damage reported for this February 2021 Ice Storm.

Table 2.23, High or Strong Wind, Thunderstorm Wind, Tornado, Hail and Funnel Cloud events in Marion Co. 2016-2021

Zone	Begin Location	Begin Date	Event Type	Magnitude (mpg or inches)	Tornado Strength	Deaths	Injuries	Property Damage
CENTRALWILLAMETTE VALLEY MARION CO.		4/7/2017	High Wind	63		0	0	\$5,000
	Aurora ARPT.	10/12/2017	Tornado		EF0	0	0	\$40,000
NORTHOREGON CASCADESFOOTHILLS		3/8/2018	Strong Wind	35		0	0	\$4,000
NORTHOREGON CASCADESFOOTHILLS		4/7/2018	High Wind	50		0	0	\$3,000
CENTRALWILLAMETTE VALLEY		4/7/2018	Strong Wind	39		0	0	\$2,000
MARION CO.	JEFFERSON	10/29/2018	Tornado		EF0	0	0	\$200
MARION CO.	ST PAUL	12/1/2018	Funnel Cloud			0	0	\$0
CENTRALWILLAMETTE VALLEY		12/18/2018	Strong Wind	39		0	0	\$3,000
CENTRALWILLAMETTE VALLEY		1/5/2019	Strong Wind	47		0	0	\$100,000
NORTHOREGON CASCADES		9/7/2020	High Wind	57		0	0	\$1,000,000,000
NORTHOREGON CASCADESFOOTHILLS		9/7/2020	High Wind	61		5	0	\$2,000,000,000
MARION CO.	(SLE)MCNARY FLD	9/17/2020	Thunderstorm/Wind	45		0	0	\$2,000
MARION CO.	ST PAUL	9/18/2020	Thunderstorm/Wind	45		0	0	\$1,000
MARION CO.	SUBLIMITY	9/18/2020	Hail	0.75		0	0	\$0
CENTRALWILLAMETTE VALLEY		1/12/2021	Strong Wind	27		0	0	\$5,000
CENTRALWILLAMETTE VALLEY		5/22/2021	Strong Wind	47		0	0	\$0
CENTRALWILLAMETTE VALLEY		11/4/2021	Strong Wind	39		0	0	\$1,000
CENTRALWILLAMETTE VALLEY		12/11/2021	High Wind	53		0	0	\$0

Source: NOAA Storm Event Database, consulted September 2022, Storm Events Database - Search Page | National Centers for Environmental Information (noaa.gov)

Table 2.24, Heat and Excessive Heat Events in Marion County 2016-2021.

Zone	Begin Date	Begin Time	Event Type	Deaths
NORTH OREGON CASCADES (ZONE)	5/22/2017	1200	Heat	0
CENTRAL WILLAMETTE VALLEY (ZONE)	8/1/2017	1200	Excessive Heat	0
CENTRAL WILLAMETTE VALLEY (ZONE)	7/18/2018	700	Heat	0
CENTRAL WILLAMETTE VALLEY (ZONE)	8/16/2020	700	Heat	0
CENTRAL WILLAMETTE VALLEY (ZONE)	8/17/2020	800	Heat	0
NORTH OREGON CASCADES FOOTHILLS (ZONE)	6/26/2021	1000	Excessive Heat	2
CENTRAL WILLAMETTE VALLEY (ZONE)	6/26/2021	1200	Excessive Heat	16
CENTRAL WILLAMETTE VALLEY (ZONE)	7/29/2021	1400	Heat	0
CENTRAL WILLAMETTE VALLEY (ZONE)	8/11/2021	1400	Excessive Heat	0
NORTH OREGON CASCADES (ZONE)	8/11/2021	1400	Excessive Heat	0
NORTH OREGON CASCADES FOOTHILLS (ZONE)	8/11/2021	1400	Excessive Heat	0

Source: NOAA Storm Event Database, consulted September 2022, Storm Events Database - Search Page | National Centers for Environmental Information (noaa.gov)

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 spreads 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 & 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 severe weather hazard:

Ice, hail, thunderstorms, and winter storms: 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 blizzards 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 snowstorms 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.”

2.7 High Hazard Potential Dams

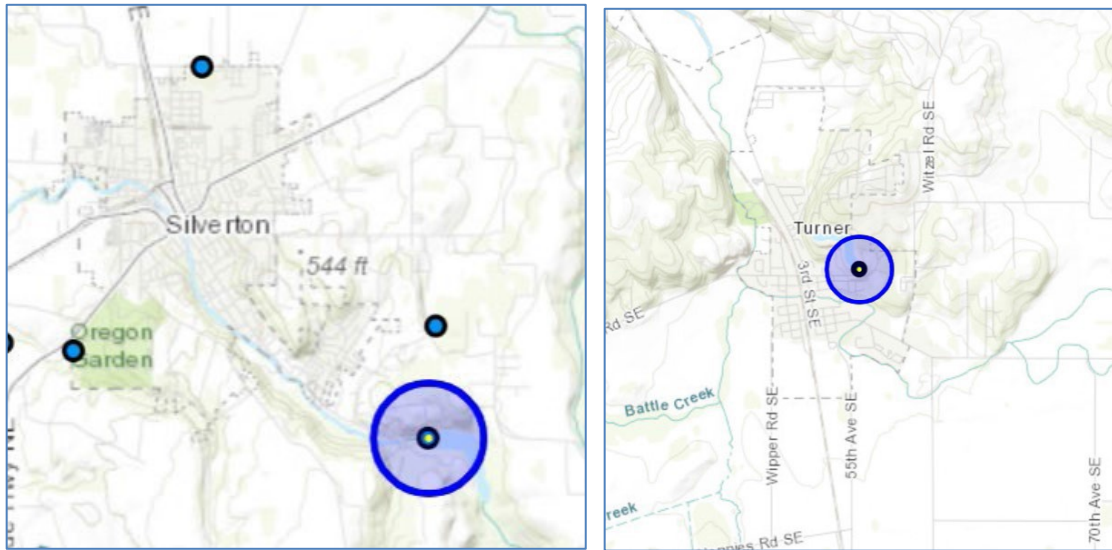
Dams that pose a high risk to life safety in the event of a failure event are called high-hazard potential dams (HHPDs). In June 2020, FEMA released new grant program guidance for Rehabilitation of High Hazard Potential Dams (Department of Homeland Security, Federal Emergency Management Agency, 2022) and new guidance for inclusion of HHPDs in Local Mitigation Planning Policy that becomes effective April 19, 2023. This information provides a basis for future planning updates (Department of Homeland Security, Federal Emergency Management Agency, 2022).

According to the National Inventory of Dams, there are a total of 40 dams in Marion County (U.S. Army Corps of Engineers, 2020). The average age of these dams is 117 years. Marion County is also subject to risk from dams outside of the county, for example, Detroit Dam in Linn County which poses a daytime risk to 77,181 people. There are thirteen dams operated by the USACE on the Willamette River, nine of which are upstream of communities in the Willamette River floodplain subject to flood risk in Marion County.

See the list below for a summary of all the dams in Marion County. Three dams pose a high risk to life safety in the event of a dam failure event, these are called High-Hazard Potential Dams (HHPD). One of these is federally regulated and produces hydropower, Big Cliff Dam. Detroit dam is also a High-Hazard Potential Dam which divides Marion and Linn Counties.

Two HHPDs that are state regulated are Franzen Dam, located in Turner but owned by the City of Salem; and Silver Creek Dam owned by the City of Silverton.

Figure 2-9, Silver Creek Dam (left) and Franzen Dam (right)



Oregon Water Resources Department regulates dams in Oregon. All the dams that pose a significant or high hazard potential are regularly inspected. As part of the 2022 plan update, the OWRD State Engineer for Water Resources/ Dam Safety Program Manager confirmed that Marion County has no dams in poor or unsatisfactory condition.

Table 2.25, Dams in Marion County (NID)

Name	Hazard Classification	Owner	Purpose
Big Cliff Dam	High	USACE, Portland District	Hydro-electric
Silver Creek	High	City of Silverton	Water Supply
Franzen	High	City of Salem	Water Supply
Koinenia Lake	Significant	Cindy Jerger	Irrigation
Neil Creek Reservoir	Significant	Dean Yeager	Irrigation
Spring Lake Estates	Significant	Spring Lake Estates	Recreation

Name	Hazard Classification	Owner	Purpose
Barnes Bros. Reservoir	Significant	Eric and Pamela Barnes	Irrigation
Funrue	Significant	City of Aurora	Irrigation

Heater Dam	Significant	Jim Heater	Irrigation
Heater Dam #2	Significant	James M. Heater	Irrigation
Lorence Lake	Significant	Greg & Kara Pilcher	Other
Peterson, Floyd	Significant	Erik Rodgers	Recreation
Fredericks Pond	Significant	Maple Leaf Lake Homeowners Association	Irrigation
Pettit Reservoir	Significant	Dr. Virgil Pettit	Other
Berger Lake	Significant	Hidden Lakes Recreation Association	Irrigation
Waldo Lake	Significant	Krautmann Family Nursery, LLC	Irrigation
Willards Pool	Low	Terry Caster	Recreation
Duck Pond Dam	Low	Douglas Fries	Recreation
Woodburn Nursery	Low	Woodburn Nursery and Azaleas	Other
S-M-S #1	Low	Cody & Barbara Duerst	Recreation
Lakewood Estates	Low	Lakewood Homeowners, Inc.	No data entered
River Bend No. 2	Low	James L. Payne	Irrigation
Tribbett Reservoir	Low	Kelly Farms	Recreation
Spada Farms #2 (Ryan)	Low	A&R Spada Nursery and Farms	Irrigation
Baker West Nursery Dam	Low	Baker West, Inc.	Fish & wildlife
Fox Reservoir	Low	Tom Fox	Irrigation
Name	Hazard Classification	Owner	Purpose
Spada Nursery Runoff #2	Low	A&R Spada Nursery and Farms	Irrigation
Westbrook Dam	Low	Krautmann Family Nursery, LLC	Fish & wildlife

Mission Creek Dam and Reservoir Company	Low	Jerry Mullen	Irrigation
Case Creek Dam 1	Low	Douglas & Patricia Krahmer	Irrigation
O.E. Loe Dam 2 Porter Place	Low	Larie Loe	Irrigation
Spada Reservoir #1 (Champoeg)	Low	A&R Spada Nursery and Farms	Irrigation
Stadeli	Low	Brooke Craeger-Stadeli	Irrigation
Mallories Dairy Lagoon #2	Low	Mallories Dairy, Inc.	Irrigation
Mckay Acres Dam	Low	Mark McKay	Irrigation
4-B Farms	Low	Butsch Properties, LLC	No data entered
Kraemer Farms Dam	Low	Kraemer Farms, Inc.	Irrigation/ Fish & wildlife
Silver Falls Log Pond	Low	Gelco Investment, LLC	Irrigation
Mallories Lagoon #1	Low	Mallories Dairy, Inc.	Irrigation
City of Mt Angel Lagoon	Low	City of Mt Angel	No data entered

Source: USACE (2022). National Inventory of Dams. <https://nid.usace.army.mil/#/>

2.8 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 utilized BOLD Planning analysis exercises and results from interviews with staff from each plan holding jurisdiction or district 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.

2.8.1 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 and within each Addendum in Volume II.

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

2.9 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. 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.

2.9.1 Population Vulnerabilities

- Marion County is the fifth most populous county in Oregon. Between 2010 and 2020 Marion County’s population increased by slightly less than 10 percent (U.S. Census Bureau, 2020).
- Between 2015-2021 the median age in Marion County was 36.6 years old, this is approximately 3 years younger than the state median of 39.3 years old at the same time-period (U.S. Census Bureau, 2022).

- As part of the 2021 Coordinated Population Forecast for Marion County, Portland State University, Population Research Center identified the following:
 - When compared to the 2000 and 2010 decennial census the portion of the population in the younger age group (e.g., those under 18) is projected to decrease in 2030 and 2040.
 - 24.3% of people in Marion County are under 18 years old.
 - 10.4% of people under the age of 65 are living with a disability.
 - 16.2% percent of the population is considered elderly (Over 65 years of age)

(Portland State University, Population Research Center, 2021).

2.10 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.

2.10.1 Economic Vulnerabilities

- Marion County has the third most diverse county out of all the 36 counties evaluated (State of Oregon, Employment Department, 2022).
- Marion County is not listed as an economically distressed community (State of Oregon, Business Oregon, 2022).
- Unemployment remains about 2 percent higher in Marion County than the Oregon average unemployment rate (State of Oregon, Employment Department, 2022).
- The top five industry sectors in Marion County with the most employees, as of the 2020 U.S. Census: (U.S. Census Bureau, 2021)
 - Educational Services, Health Care, and Social Services (20.2%)
 - Retail Trade (11%)
 - Manufacturing (10.7%)
 - Professional, Scientific, Management, and Administrative (10.7%)
 - Public Administration (9.25)

2.11 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.

2.11.1 Environment Vulnerabilities

- The western half of Marion County is 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 154 feet near the Willamette River in Salem to 2400 feet in the foothills of the Cascade

mountains.

- Most water resources originate in the eastern portion of Marion County.
- Marion County receives 40 inches of rain annually.
- There are several 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.

2.12 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.

2.12.1 Housing Vulnerabilities

- 68 percent of housing units in Marion County were built prior to 1990; therefore, are not built to current earthquake standards.
- Slightly more than 60 percent of units are owner-occupied, and 39 percent are occupied by renters. In 2020, Marion County had 128,541 housing units. Of those, 4.6 percent of Marion County's housing units are vacant (U.S. Census Bureau, 2020).
- 8.3 percent of county residents live in mobile homes and less than one percent live in boats, RV, vans, or other forms of housing (U.S. Census Bureau, 2020).
- 44 percent of renter households in Marion County are rent burdened and spend 35 percent or more of their monthly income on housing (U.S. Census Bureau, 2020).
- For every affordable housing unit available in Marion County, there are 16 extremely low-income households (State of Oregon, Oregon Housing & Community Services, N.d.).

2.13 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.

2.13.1 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

- The most critical routes in Marion County include Interstate 5 and Highway 22.
- Cherriots operates city and regional buses and Cherriots Lift 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.

2.14 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.

2.14.1 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.

Table 2.26, Energy Sector Summary

<p>Critical Interdependencies:</p> <p>Systems of all types are dependent on other systems to function. To operate, the communication sector is particularly <u>DEPENDENT ON:</u></p> <ul style="list-style-type: none"> ➤ Transportation ➤ Communication <p>Other critical lifeline sectors that <u>DEPEND ON</u> the communication sector to operate include:</p> <ul style="list-style-type: none"> ➤ Public Safety ➤ Transportation ➤ Water ➤ Communication ➤ Economy 	<p>Critical Vulnerabilities:</p> <p>Each sector is vulnerable to a variety of impacts. The energy sector is particularly vulnerable to the following:</p> <ul style="list-style-type: none"> ➤ Consumption consists almost entirely of one of three forms: electricity, liquid fuels, or natural gas. ➤ Dependence on BPA for electric power; Marion County produces very little power locally. ➤ Lead time for ordering critical system components (e.g., transformers) ➤ Concentration of liquid fuel storage facilities in Portland; limited local fuel storage and supply. ➤ Lack of capability to pump fuel locally without power. <p>Reliance on supply and distribution facilities located outside Marion County.</p>
<p>Major Findings:</p> <ul style="list-style-type: none"> ➤ Generators are co-located by equipment and are used at critical infrastructure throughout the county; however, require various fuel types depending on the unit. ➤ Oregon’s fuel storage facilities are 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. 	

- 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.
- The EPA regulates energy in terms of emissions limiting the capacity to produce additional energy resources.
- 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.
- The energy sector also prepares and mitigates against human-made disasters, such as cyberattacks.
- The energy sector grants people with uninterrupted services due to medical status during non-catastrophic events.
- An estimated 1-3 months of electrical service interruption during a Cascadia event.

2.14.2 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” (Department of Homeland Security, Federal Emergency Management Agency, 2008).

The assessment focused 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.

Table 2.27, Communication Sector Summary

<p>Critical Interdependencies:</p> <p>Systems of all types are dependent on other systems to function. To operate, communication sector is particularly <u>DEPENDENT ON:</u></p> <ul style="list-style-type: none"> ➤ Electricity ➤ Energy (Fuel) ➤ Transportation <p>Other critical lifeline sectors that <u>DEPEND ON</u> the communication sector to operate include:</p> <ul style="list-style-type: none"> ➤ Water (SCADA) ➤ Electricity ➤ Public Safety ➤ Transportation ➤ Economy 	<p>Critical Vulnerabilities:</p> <p>Each sector is vulnerable to a variety of impacts. The communication sector is particularly vulnerable to the following:</p> <ul style="list-style-type: none"> ➤ 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. ➤ All systems rely on infrastructure (towers, antennae) spread across large areas, often in remote locations. Road access to repair equipment is a primary concern. ➤ 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, where lines are connected to bridge spans.
<p>Major Findings:</p> <ul style="list-style-type: none"> ➤ Many providers share infrastructure and or have their infrastructure co-located. ➤ Stakeholders are well prepared to address winter storms and other disasters if 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% shutdown 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, 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.

2.14.3 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 and coordinating, the restoration of the transportation systems and infrastructure” (Department of Homeland Security, Federal Emergency Management Agency, N.d.).

Transportation lifeline sector participants identified several interconnected resources and elements of their operations. These include 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.

Table 2.28, Transportation Sector Summary

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

Table 2.29, Sector Summary-Transportation, Major Findings

<p>Major Findings:</p> <ul style="list-style-type: none"> ➤ 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.

- Cherriots operates city and regional buses, dial-a-ride, Cherriots Lift 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 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 are 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.

2.14.4 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.

Table 2.30, Water Sector Summary

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

- Some infrastructure pertaining to water systems are old which increases the risk vulnerability to withstand a Cascadia event. Impacted infrastructure could have secondary impacts throughout the system.
- Water infrastructure facilities located near rivers could experience service disruptions and flooding during an event or incident. Power is vital to the water facilities continued operation.
- Generators are co-located at critical facilities and need to be maintained requiring various fuel types to support redundancy.
- Road access is vital to conduct damage assessments and to enable the repair impacted infrastructure.

2.15 Hazard Policy Evaluation

In 2016, the University of Oregon Community Service Center 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 2.34 details the findings on policies related to hazards. The comprehensive plan specifically addresses floods, landslides and wildfires, the sections of the plan that address these hazards could include additional information to better support hazard mitigation. To better align with Goal 7 of the comprehensive plan, the county should consider adding policies related to earthquakes, drought, windstorms, and winter storms to strengthen hazard mitigation efforts.

Table 2.31, Marion County Comprehensive Plan Policies Concerning Hazards

Hazard	Policy	Marion Comp Plan Section
Earthquake	None	NA
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 impact 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 public.	Rural Development
Flood	Development in floodplains should be restricted to balanced cut and fill, within the parcel to be developed.	Urbanization

Hazard	Policy	Marion Comp Plan Section
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 & 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

Hazard	Policy	Marion Comp Plan Section
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 parcellated 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

Hazard	Policy	Marion Comp Plan Section
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
Multi-Hazard	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

Hazard	Policy	Marion Comp Plan Section
Multi-Hazard	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

2.16 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 and district specific risk assessments for each of the participating jurisdictions in the county.

2.17 Future/Complimentary Risk Assessment Information

Several key risk assessment tools are in development or were being updated and will be completed in conjunction with or following adoption of this HMP in 2022.

2.17.1 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*
- *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? (Department of Homeland Security, Federal Emergency Management Agency, 2021).*

Marion County conducted its latest THIRA in 2016 and is planning for a new one during this plan 5-year cycle.

Critical Priority Risk Index

The objective of any risk analysis is to minimize impact and maximize response efforts. In order to accomplish these all-relevant hazards, potential vulnerabilities and exposures for the region or jurisdiction should be assessed in a consistent way, with a clear numeric methodology. Based on this understanding of risk, communities can then develop a strategy to identify and prioritize response, continuity, and mitigation actions.

Hazard Analysis Definitions

- **Hazard**
 - A potential source of injury, death, or damage
- **Vulnerability**
 - Susceptibility to injury, death, or damage
- **Exposure**
 - People and property within the area the potential hazard could affect.
- **Risk**
 - The likelihood of a hazard resulting in injury, death, or damage
- **Mitigation**
 - A systematic reduction to the exposure and vulnerability to a potential hazard.

Based on the identification of potential hazards, a robust hazard profile includes data concerning previous occurrences, the probability of future occurrences and the threat to the County.

Hazards can be defined individually in each plan for specific considerations, or at the Master level where overall hazards and vulnerability do not vary greatly across the jurisdiction. Weather-related and large-scale infrastructure hazards such as drought, extreme temperatures, hail, windstorms, and utility failures affect can affect an entire region.

As such, these hazards are built out at the Master level. However, some hazards such as dam and levee failure, flood and erosion or subsidence soils may have local variations and multiple profiles may be developed if the risk is not uniform across the jurisdiction or organization. For each identified hazard the following information should be provided in the description and impact statement sections:

- **Hazard Description**
 - A general discussion of the hazard and its outcome.
- **Hazard Location**
 - The geographic extent or location of the hazard in the County.
- **Prior Instances**
 - Information on historic incidents and their impact
- **Associated Secondary Hazards**
 - Those hazards of a unique nature that stem from the original occurrence.
- **Probability of Future Occurrence**
 - Frequency of past events used to gauge the likelihood of future occurrences.

CPRI Calculations

MCEM uses the Calculated Priority Risk Index (CPRI) methodology to prioritize each of the identified hazards across the County. CPRI rankings consider the following four elements of risk:

- | | |
|----------------|------------------------|
| ➤ Probability | ➤ Magnitude / Severity |
| ➤ Warning Time | ➤ Duration |

The following tables provide a summary for each of the risk elements, including a rationale behind each numerical ratio.

Table 2.32, CPRI Risk Elements, Probability

	Rating	Rating Criteria
Probability	4 – Highly Likely	<ul style="list-style-type: none"> ▪ Event is probable within the calendar year. ▪ Event has up to 1 out of 1 chance of occurring this year. ▪ History of events is greater than 33% likely per year
	3 – Likely	<ul style="list-style-type: none"> ▪ Event is probable within the next 3 years. ▪ Event has up to 1 in 3 years chance of occurring. ▪ History of events is greater than 20% but less than or equal to 33% likely per year
	2 – Intermittent	<ul style="list-style-type: none"> ▪ Event is probable within the next 5 years. ▪ Event has up to 1 in 5 years chance of occurring. ▪ History of events is greater than 10% but less than or equal to 20% likely per year
	1 – Unlikely	<ul style="list-style-type: none"> ▪ Event is possible within the next 10 years. ▪ Event has up to 1 in 10 years chance of occurring. ▪ History of events is less than or equal to 10% likely per year

Table 2.33, CPRI Risk Elements, Magnitude-Severity

Magnitude / Severity	Rating	Rating Criteria
	4 - Catastrophic	<ul style="list-style-type: none"> ▪ Multiple fatalities ▪ Complete shutdown of facilities for 30 or more days ▪ More than 50% of property is severely damaged
	3- Critical	<ul style="list-style-type: none"> ▪ Injuries and/or fatalities result in permanent disability. ▪ Complete shutdown of critical facilities for at least two (2) weeks ▪ 25-50% of property is severely damaged
	2- Limited	<ul style="list-style-type: none"> ▪ Injuries and/or illnesses do not result in permanent disability. ▪ Complete shutdown of critical facilities for more than one (1) week ▪ 10-25% of property is severely damaged
	2- Negligible	<ul style="list-style-type: none"> ▪ Injuries and/or illnesses are treatable with first aid. ▪ Minor quality of life lost. ▪ Shutdown of critical facilities and services for 24 hours or less ▪ Less than 10% of property is severely damaged

Table 2.34, CPRI Risk Element-Warning Time

Warning Time	Rating	Rating Criteria
	4	Less than 6 hours
	3	6 to 12 hours
	2	12-24 hours
	1	24+ hours

Using the rankings described in the tables above, the following weighted formula was used to determine each hazard’s CPRI.

$$(\text{Probability} \times 0.45) + (\text{Magnitude} \times 0.30) + (\text{Warning time} \times 0.15) + (\text{Duration} \times 0.10)$$

When discussing probability, it is important to note that while many events occur frequently, they often result in little quantifiable impact. For example, lightning strikes the earth on average of 2,000,000 times per year; however, few of these strikes have adverse outcomes.

As such, when discussing the probability for each hazard, the discussion will be framed by the likelihood of that event have a measurable, large scale or detrimental impact. In addition, it is important to note that the occurrence of many, if not all, hazard event cannot be predicted with certainty. Simply because an event has occurred once prior, even if devastating, does not significantly weight its likelihood of reoccurrence with any certainty.

The CPRI values should be general indicators of response action criticality in an EOP or COOP plan. The following table details planning significance in the CPRI ranges:

Table 2.35, CPRI Range Values

CPRI Range Values		
Impact	Low CPRI	High CPRI
High	3.0	4.0
Moderate	2.0	2.9
Low	.10	1.9

The terms high, moderate, and low indicate the level of prioritization in response efforts for each hazard, and do not indicate the potential impact of a hazard occurring. Hazards rated with moderate or high significance should be more extensively discussed due to the availability of data and historic occurrences, while those with a lower significance more generally addressed due to lack of available data and historical occurrences.

Marion County is vulnerable to a wide range of hazards that threaten its communities, businesses, and environment. To determine the hazards that poses the greatest threat,

Marion County has prepared a Threat Hazard Identification and Risk Assessment. The major findings are summarized below. The assessments were developed from historical data of events that have occurred and specifically examined.

Table 2.36, Marion County THIRA Capability, 2016

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	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

Core Capabilities	Severe Storms	Train Derailment	School/Work Violence	Power Outage	Average Scores*
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

Core Capabilities	Severe Storms	Train Derailment	School/Work Violence	Power Outage	Average Scores*
Forensics & 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	3	-	1	1	1.66
Health and Social Services	-	-	-	-	No Data

Source: Marion County THIRA, 2016

*Average calculated based on the number of capabilities assessed

Note: Capabilities scored based on; 1-High Capability, 3-Medium Capability, and 5 low capabilities.

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 those proportionally through historic data as well as future projections based on economic, demographic, the critical infrastructure information. Three levels of risk have been identified: 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.

2.17.2 Marion County Community Wildfire Protection Plan (CWPP)

In June of 2017, Marion County issued a County Community Wildfire Protection Plan (CWPP) for review that was subsequently approved by the Marion County Board of Commissioners, the Marion County Emergency Manager, the Marion County Fire Defense Board Chief, and the Oregon Department of Forestry District Forester. 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. In 2022, the CWPP is being updated and is provided data towards this plan.

The CWPP identifies the following wildfire mitigation related objectives:

- Provide oversight to all activities related to the CWPP.
- 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 CWPP.
- Identify grant funding opportunities for possible wildfire mitigation projects.

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 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 is incorporated herein by reference as a specific wildfire supplement to the all-hazard risk assessment.

2.17.3 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.

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 item-related documents in this plan at the May 4, 2022, meeting of the 2022 plan update. Additional planning process documentation is in Appendix B.

3.1 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:

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

3.2 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 July 5, 2022, the 2023 Marion County HMP Steering Committee reviewed the revised plan goals and compared them to the 2020 State Natural Hazard Mitigation Plan goals. They retained the goals as they were aligned with current Marion County conditions and the State Natural Hazard Mitigation Plan in 2016.

All Plan goals are listed below in no 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 2022 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

Track and utilize 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.

3.3 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. This plan identifies priority actions based on an evaluation of high impact hazards, resource availability, and FEMA identified best practices.

Please refer to the individual city addenda and Appendix A-2 for city specific actions.

- **Multi-Hazard # 1:** Develop a countywide evacuation plan through an approved FEMA grant.
- **Wildfire # 1:** Update/revise 2017 Community Wildfire Protection Plan.
- **Wildfire # 2:** Implement identified "Action/Tasks" within the 2022-2027 CWPP related to wildland fire reduction.
- **Multi-Hazard # 2:** Develop an all-hazard recovery plan.
- **Multi-Hazard # 3:** Begin preliminary process to examine the potential of adding an all-hazard siren warning system within the Santiam Canyon communities.
- **Drought #1:** Participate in the Drought Contingency Plan update.
- **Flood #1:** Identify flood prone areas and develop stormwater plans to target specific drainage areas to encourage community floodplain management. These actions support the county's FEMA CRS (Community Rating System) rating.
- **Multi-Hazard # 4:** Provide and support all-hazard public outreach campaigns.
- **Earthquake #1:** Promote Great Oregon Shakeout in October. Participate in activities for schools, business, and industry.

Special Note: "The Marion County Multi-Jurisdictional All-Hazard Mitigation Plan, is non-regulatory in nature, meaning that it does not set forth any new policy. This plan is designed to be an action plan and depends upon communities and partnerships to carry it forward."

3.4 Lifelines

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.
- Communication: Examine the possibility of creating a special district to generate revenue for ongoing system maintenance and sustainability, equipment modernization and hazard mitigation activities.

Transportation

- Integrate Lifeline Corridor Inventories into Transportation System Plans: TSPs in Marion County does not currently include inventories of lifeline transportation corridors; however, we do have emergency routes that can assist county with a framework.
- Identify and Designate Priority Transportation Routes: Develop a “hub and spoke” approach to priority route planning focused on post-event resource collection and distribution.

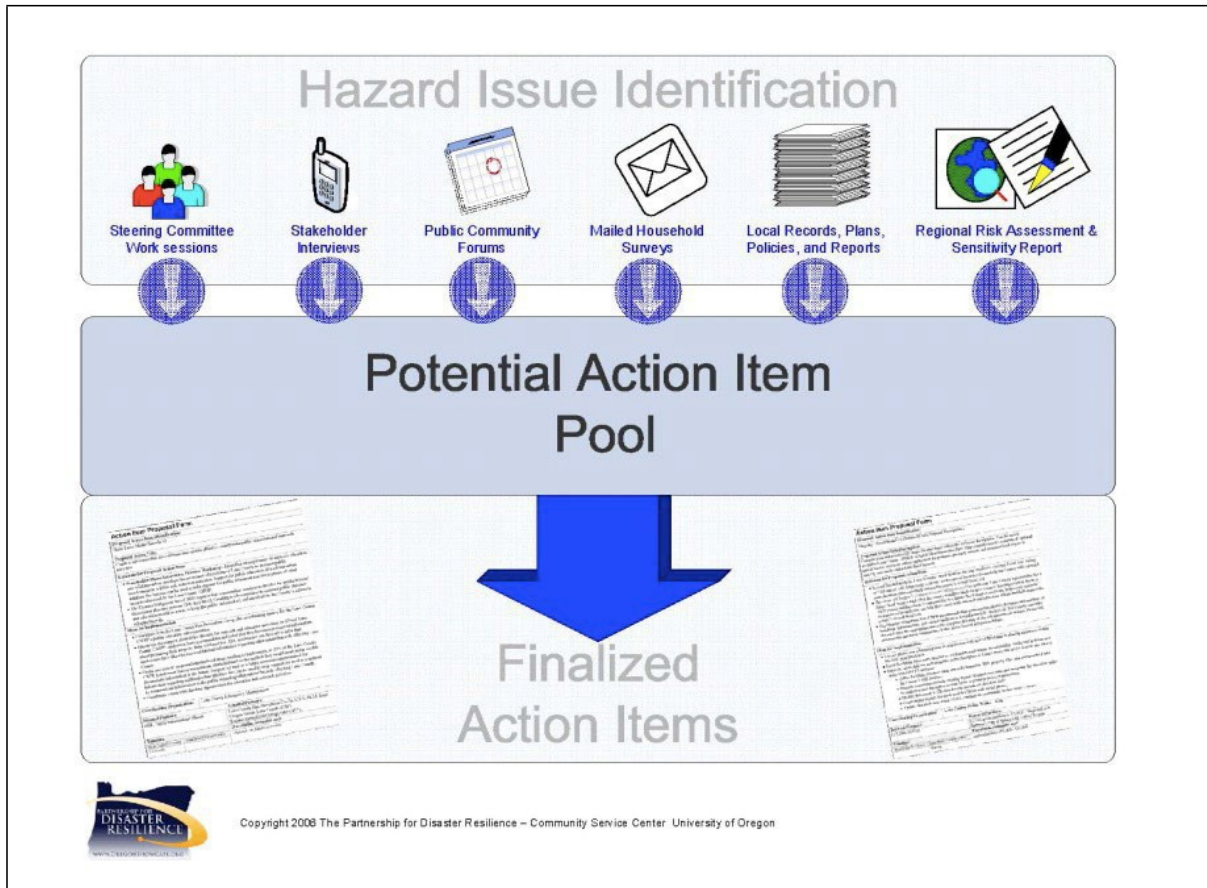
Water

- Add Risk Assessment and Hazard Mitigation Information to Water Master Plans .-
- Participate in the North Santiam Watershed Drought Contingency Plan update: Ensuring success of this ongoing effort related to water quantity is the top water sector priority.
- Continue to coordinate with utility providers in Marion County on their preparedness, mitigation, response, and recovery plans. Coordinate with utilities on Marion County’s Critical Infrastructure Systems for prioritization during outages: Increase collaboration and common operating framework between energy utilities, emergency management, and end-users by sharing and aligning critical facilities lists.

3.5 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 several sources. The figure below illustrates some of these sources.

Figure 3-1, Development of Action Items



Source: Oregon Partnership for Disaster Resilience, 2008

The Marion County steering committee, together with DLCD, 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. During the update process, DLCD worked with the Marion County steering committee to identify which actions from the 2017 plan had been completed or not completed, and whether actions should continue to be listed in the plan. A table listing the 2017 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: avalanche, drought, earthquake, extreme heat, flood, landslide, tornado, volcano, wildfire, severe weather, dam failure, and multi-hazard. In addition, the plan includes actions that address plan implementation. Each Marion County 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 forms can assist the community in pre-packaging potential projects for grant funding. The worksheet components are described below. These action item forms are in Appendix A-1.

3.6 Priority Action Item Forms

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

3.7 Proposed Action Title

The action item describes the proposed action. It can be a simplified problem statement that identifies the hazard and specific risk reduction outcomes or protected assets, infrastructure, or communities.

3.8 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.

3.9 Alignment with Existing Plans and 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. Implementation presents an opportunity for plan implementation as 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.

3.10 Rationale or Key Issue 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 several 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.

3.11 Implementing through Existing Programs

For each action item, the form is designed to solicit ideas for implementation, which serve as the starting point. The ideas for implementation offer a transition from theory to practice and serve as a starting point. This component of the action item is dynamic, this section should be used for ideas for implementation that include such things as: collaboration with relevant organizations, grant programs, tax incentives, human resources, education and outreach, research, and updates to buildings and infrastructure. FEMA requires the

identification of existing programs and other authorities that might be used to implement these action items.

3.12 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.

3.13 Internal and External Partners

The internal and external partner organizations listed in the action item forms are potential partners recommended but not necessarily contacted during the development of the Plan. The coordinating organization should contact the identified partner organizations. Internal partner organizations are departments within the 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.

3.14 Potential Funding Sources

When possible, identify potential funding sources for the action item. Example funding sources can include: the federal Building Resilient Communities and Infrastructure (BRIC) and Flood Mitigation Assistance (FMA) Grant Program; or local funding sources such as capital improvement or general funds. An action item may also have multiple funding sources. For additional information, see section 4 – Implementation and Maintenance.

3.15 Estimated Cost

Where possible, an estimate of the cost for implementing the action item is included. Making an entry is more important than having certainty of potential cost. If there is a number listed, it will provide key information for all partners to understand the scale of the project.

3.16 Timeline

During the 2022 update, an effort was made to add specific timelines using months and years to each action item. This is presented in a generic fashion in one box on the action item form in which action items are described as ongoing, short- (0-2 years), mid- (2-5 years), and long-term (5+ years) action items.

3.17 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, started, not started, discontinued, 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.

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. Implementation begins with adoption of the plan.

4.1 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 joins the DLCD Natural Hazard Planners in submitting it to the State Hazard Mitigation Officer (SHMO) at the Oregon Department 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 by resolution by the Marion County Board of Commissioners. Upon adoption, the County will gain eligibility for the Building Resilient Infrastructure and Communities (BRIC), Hazard Mitigation Grant Program funds, and Flood Mitigation Assistance program funds. The participating plan holders (cities and special districts) should convene local decision makers and adopt the Marion County Multi-Jurisdictional Hazard Mitigation Plan by resolution following adoption by the county, or concurrently.

4.2 Implementing the Plan

The success of the Marion County HMP depends on how well the outlined action items are implemented. To ensure that the activities identified are implemented, the following steps will be taken following adoption of the 2023 Marion County Multi-Jurisdictional Hazard Mitigation Plan by Marion County and each of the participating cities and special districts.

- The Hazard Mitigation Plan (HMP) Steering Committee will act as the countywide coordinating body convened annually to support action item implementation and plan maintenance.
- While the Marion County Emergency Manager is designated as the convener of the HMP, an HMP Committee representative will be determined for each of the participating cities. These representatives will act as local liaison and convener as needed.
- The HMP Steering Committee identifies mitigation planning activities, as well as specific mitigation actions which are then prioritized and evaluated.
- The plan is implemented through existing plans, programs, and policies.

4.3 Convener

The Marion County Emergency Director or his/her Designee will take responsibility for tracking and supporting plan implementation and will facilitate the Marion County Hazard Mitigation HMP Steering Committee. The Marion County Emergency Manager will share key information, grant opportunities, and FEMA requirements with members of the Hazard Mitigation Plan Committee, which may include time-sensitive requests for coordination on tasks such as updating the plan. Implementation and evaluation of the plan will be a shared responsibility among all the assigned Hazard Mitigation HMP Steering Committee members.

The Convener's responsibilities include:

- Convening the Hazard Mitigation Plan Committee annually each year in June and inviting key stakeholders.
- Organizing and notifying members of Hazard Mitigation Plan Committee meeting dates, times, locations, and agendas.
- Documenting the discussions and outcomes of committee meetings.
- Serving as a communication conduit between the Hazard Mitigation Plan Committee and the public/stakeholders.
- Identifying funding sources for natural hazard mitigation projects.
- Utilizing and communicating the findings of the Risk Assessment as a tool and factual basis for prioritizing risk reduction projects.

4.4 Hazard Mitigation Plan Steering Committee

The Marion County Convener will engage the Marion County Hazard Mitigation Plan (HMP) Steering Committee. The current process involves a single annual report out meeting in June. During this HMP update process, the Project Management team agreed on a biannual spring and fall meeting process. The Convener expressed enthusiasm for a more engaged plan maintenance process where the representatives are active participants in doing the work of the committee between biannual meetings.

The Mitigation Plan (HMP) Steering Committee is responsible for updating and implementing the HMP on behalf of their jurisdictions and in support of the collective countywide efforts.

HMP Steering Committee member responsibilities include:

- Attend future maintenance and plan update meetings (or designating a representative to serve in your place).
- Prioritize local projects and requesting funding support for hazard risk reduction projects.
- Evaluate and updating the HMP in accordance with the prescribed maintenance schedule.
- Develop and coordinate ad hoc and/or standing subcommittees as needed.
- Coordinate public involvement activities.

Table 4.1, Marion County HMP Steering Committee

Name	Position	Organization
Matthew Etzel	Assistant Public Works Director	City of Aumsville
Damian Flowers	Police Sergeant	City of Aumsville
Stuart Rodgers	City Recorder	City of Aurora
Mark Gunter	Public Works Supervisor	City of Aurora
Jim Trett	Mayor	City of Detroit
Kelly Galbraith	City Recorder	City of Detroit
Susie Marston	City Manager	City of Gervais
Mark Chase	Police Chief	City of Gervais
Melinda Olinger	Public Works Administrative Manager	City of Hubbard
Dave Rash	Police Chief	City of Hubbard
Rebecca Stormer	City Manager/Recorder	City of Idanha
Robyn Johnson	City Clerk	City of Idanha
Sarah Cook	City Manager/Recorder	City of Jefferson
Kyle Ward	Utility Foreman	City of Jefferson
Matt Reyes	Project Manager	City of Keizer
Tim Kirsch	Mayor	City of Mill City
Gary Olson	Volunteer	City of Mill City
Mark Daniel	Police Chief	City of Mt. Angel
Robin Fournier	Business Manager	City of Scott Mills

Name	Position	Organization
Dave Frisendahl	Police Chief	City of Stayton
Alissa Angelo	Interim City Manager	City of Stayton
Alan Frost	Public Works Director	City of Sublimity
Scott McClure	City Manager	City of Turner
Marty Pilcher	Police Chief	City of Woodburn
Kevin Hendricks	Fire Chief	Jefferson Fire District
Louis Gisler	Division Chief	Jefferson Fire District
Jeff Cowan	Fire Chief	Keizer RFPD
Joe Budge	Fire Chief	Woodburn Fire District
Kathleen Silva	Emergency Manager	Marion County
Mike Hintz	Emergency Preparedness Coordinator	Marion County
Danielle Gonzales	Management Analyst	Marion County Community Services
Alisa Zastoupil	Environmental Health Program Supervisor	Marion County Health & Human Services
Kaylynn Gesner	Public Health Educator	Marion County Health & Human Services

Name	Position	Organization
Joaquin Ramos	Diversity & Inclusion Strategist	Marion County Health & Human Services
Dain Thomas	GIS Analyst	Marion County Information Technology
Adam Crateau	GIS Analyst	Marion County Information Technology
Matt Knudsen	Environmental Services Supervisor	Marion County Public Works
Scott Wilson	Operations Division Manager	Marion County Public Works
Alyssa Schrems	Planning Division Associate Planner	Marion County Public Works
Eric Hlad	Division Commander	Marion County Sheriff's Office
Matt Wilkinson	Sergeant	Marion County Sheriff's Office
Jim Trierweiler	Chief	Mt. Angel Fire District

4.5 Interested Parties

To make the coordination and review of the Marion County HMP as broad and as useful as possible, the HMP Steering Committee will engage additional stakeholders and other relevant hazard mitigation organizations and agencies to implement the identified action items. Specific organizations have been identified as Interested Parties who will be included in the Marion County HMP Steering Committee meetings. See Table 4.2 Marion County HMP Interested Parties

Table 4.2, Interested Parties

Name	Position	Organization
Jeff Carlson	Safety, Compliance, Loss Control Specialist	Consumers Power
Ric Lentz	Emergency Manager	Linn County Sheriff's Office
Alyssa Boles	Planning Director	Linn County Planning & Bldg. Dept.
Mark Spross	Director	METCOM 911
John Plechinger	Emergency Manager	Pacific Gas and Electric
Randy Navalinski	Emergency Coordinator	Salem Area Mass Transit District (Cherriots)
JB Phillips	Engineering & Operations Manager	Salem Electric
Christina Bunnell	Emergency Preparedness Administrator	Salem Health
Nathan Streight	Emergency Preparedness Specialist	Salem Health
Ryan Mikesh	Emergency Management Coordinator	Salem-Keizer School District
Adam Maurer	Ambulance Director	Santiam Hospital
Brent Stevenson	District Manager	Santiam Water Control District
Shawn Rivera	District Ranger	U.S. Forest Service, Detroit RD
Duane Bishop	Deputy Forest Supervisor	U.S. Forest Service, Willamette NF

Name	Position	Organization
Ron Lee	Deputy Fire Chief	Marion County Fire District #1
Sam Phillips	Fire Management Analyst	Marion County Fire District #1
Ed Grambusch	Deputy Fire Chief	Silverton Fire District
Jim Anglemier	Police Chief	City of Silverton
Roy Hari	Fire Chief	Aumsville RFPD
Joshua Williams	Fire Chief	Aurora RFPD

4.6 Programmatic Implementation

The HMP includes a range of actions that, when implemented, reduce 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
- Emergency Management Director
- County Emergency Manager
- Emergency Preparedness Coordinator
- Emergency Management Program Coordinator II
- Emergency Management Program Coordinator I

In addition, Marion County Emergency Management utilizes federal AmeriCorps funded service volunteers 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 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 B.

4.7 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 retained in the 2022 plan update. It includes a process to ensure that regular review and updates of the Plan occur. The HMP Steering Committee, 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.

4.8 Meetings

The HMP Steering Committee will meet on a semiannual basis to complete the following tasks.

During the spring meeting, the HMP Steering Committee 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.
- Discuss methods for continued public involvement and education, such as outreach and educational workshops before the summer months begin.

During the fall meeting, the HMP Steering Committee 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.
- Update County Administrator and Board on plan progress.
- Document successes and lessons learned during the year.

These meetings are an opportunity for the cities and special districts to report back to the county on progress that has been made towards their components of the HMP. The HMP Convener or HMP Steering Committee 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 HMP Steering Committee 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.

4.9 Funding Sources

This comprehensive FEMA website provides a list of resources and information on key elements of the Building Resilient Infrastructure and Communities (BRIC) program. [Resource List for the BRIC Grant Program | FEMA.gov](#)

The Region 10 Wildfire Mitigation Funding Opportunity Guides provide state, tribes, and local officials with a wide range of application development resources for hazard mitigation grants. [Mitigation Funding Opportunity Guides | FEMA.gov](#)

This factsheet provides information on [Planning related activities from](#) The Hazard Mitigation Grant Program (HMGP). State, Tribal, and/or local governments may use planning-related funding to reduce risk and include hazard mitigation with planning. Look at this guide for information on what types of mitigation activities may help you implement your projects.

Rehabilitation Of High Hazard Potential Dam (HHPD) Grant Program: The President signed the [Water Infrastructure Improvements for the Nation Act](#) or the "WIIN Act," on December 16, 2016, which adds a new grant program under FEMA's National Dam Safety Program (33 U.S.C. 467f). Section 5006 of the Act, Rehabilitation of High Hazard Potential Dams, provides technical, planning, design, and construction assistance in the form of grants for rehabilitation of eligible high hazard potential dams. High Hazard

Potential is a classification standard for any dam whose failure or mis-operation will cause loss of human life and significant property destruction. Learn more at - <https://www.fema.gov/emergency-managers/risk-management/dam-safety/grants>

4.10 Plan Integration Resources

The **Region 10 Coffee Break Webinar on Integrating Natural Hazard Mitigation into Comprehensive Planning** is a resource specific to Region 10 states and provides examples of how communities are integrating natural hazard mitigation strategies into comprehensive planning. You can find it on FEMA's YouTube page at **The Region 10 Coffee Break Webinar on Integrating Natural Hazard Mitigation into Comprehensive Planning** is a resource specific to Region 10 states and provides examples of how communities are integrating natural hazard mitigation strategies into comprehensive planning. You can find it on FEMA's YouTube page at [Integrating Natural Hazard Mitigation Plans into Local Planning - YouTube](#) along with our other Mitigation Planning coffee break series webinars at [Natural Hazards Mitigation Planning Coffee Break Series - YouTube](#)

Plan Integration: Linking Local Planning Efforts (2015)- This step-by-step guide helps communities review local plans for possible integration and improve alignment efforts, including interagency coordination. [Plan Integration: Linking Local Planning Efforts \(2015\)](#)

The **Mitigation Planning and Community Rating System Bulletin** provides an overview of how to bring together planning efforts between the Community Rating System (CRS) and hazard mitigation plans. [Mitigation Planning and the Community Rating System: Key Topics Bulletin \(fema.gov\)](#)

4.11 Mitigation Ideas/Best Practices Resources

The **Region 10 Seismic Mitigation Showcase Guides** highlight mitigation successes in earthquake and tsunami mitigation by documenting specific locations and communities, the decision-making process, path to funding, and how partnerships were developed. [Seismic Mitigation Showcase Guides | FEMA.gov](#)

The **Mitigation Ideas: A Resource for Reducing Risk from Natural Hazards** resource presents ideas for how to mitigate the impacts of different natural hazards, from drought and sea level rise to severe winter weather and wildfire. The document also includes ideas for actions that communities can take to reduce risk to multiple hazards, such as incorporating a hazard risk assessment into the local development review process. You can find it in the FEMA Library at [Mitigation Ideas \(fema.gov\)](#)

The **Local Mitigation Planning Handbook** provides guidance to local governments on developing or updating hazard mitigation plans to meet and go above the requirements. You can find it in the FEMA Library at [Local Mitigation Planning Handbook \(fema.gov\)](#).

The FEMA Region 10 **Risk Mapping, Analysis, and Planning program (Risk MAP)** releases a monthly newsletter that includes information about upcoming events and training opportunities, as well as hazard and risk related news from around the Region.

Past newsletters can be viewed at [Newsletter \(starr-team.com\)](https://starr-team.com/newsletter) If you would like to receive future newsletters, email rxnewsletter@starr-team.com and ask to be included.

This Post Disaster Redevelopment Guide has guidance on how to integrate risk reduction strategies into existing local plans, policies, codes, and programs for community development or redevelopment patterns. [Planning for Post-Disaster Redevelopment \(fema.gov\)](https://www.fema.gov/plan-prevent/recovery-rebuild/post-disaster-redevelopment)

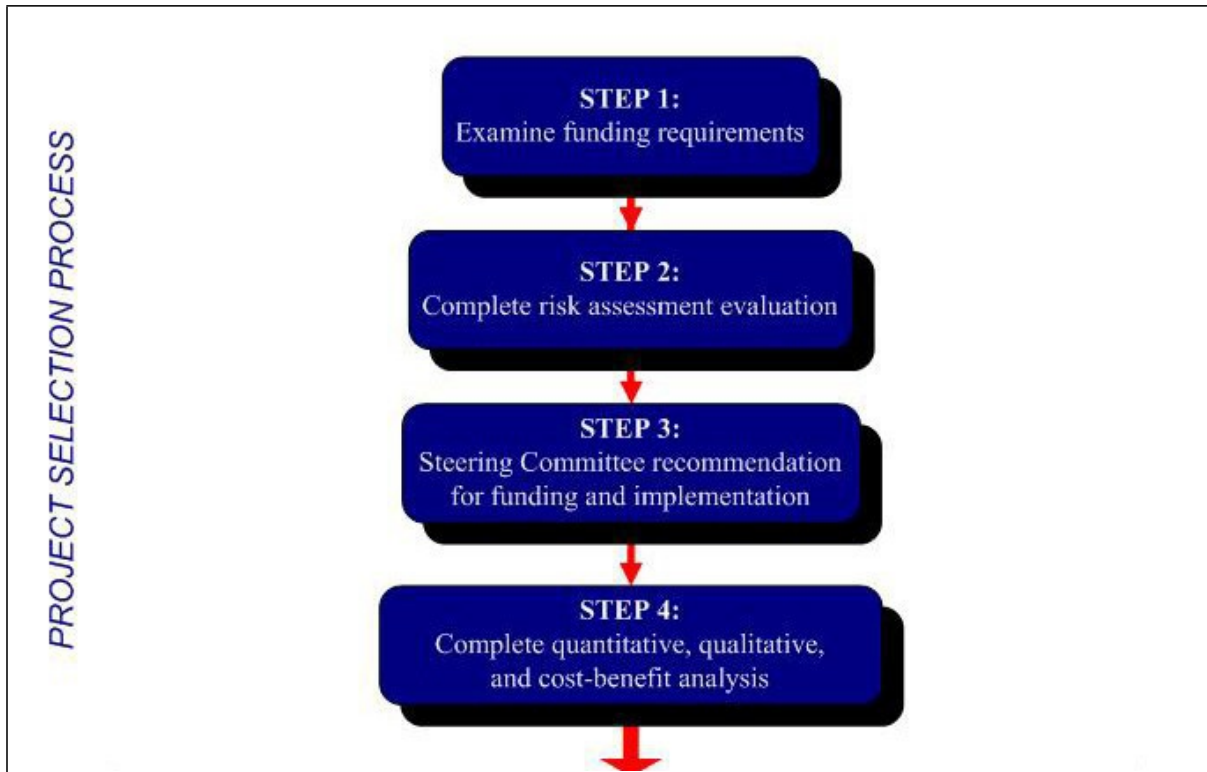
The mitigation strategy may include eligible projects to be funded through FEMA’s hazard mitigation grant programs (Building Resilient Infrastructure and Communities (BRIC), Hazard Mitigation Grant Program, and Flood Mitigation Assistance). Contact your State Hazard Mitigation Officer, Anna Feigum at: anna.f.feigum@oem.oregon.gov for more information.

4.12 Project Prioritization Process

Each of the participating jurisdictions has identified a list of mitigation actions that can be found in the addenda in Volume II. DOGAMI completed multi-hazard risk assessment reports both through FEMA’s Risk MAP program and as a part of this 2022 update. The Oregon Climate Change Research Institute’s Future Climate Projections for Marion County provides data on the impacts of climate change on future natural hazard severity. Furthermore, other local or regional hazard risk mitigation plans including the Community Wildfire Protection Plan, Drought Contingency Plan, and Commodity Flow Study. Future mitigation plan maintenance meetings will revisit the prioritization process based on new information and actions identified through these and other related planning studies or 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 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.

4.12.1 Step 1: Examine Funding Opportunities

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 HMP Steering Committee will examine upcoming funding streams’ requirements to determine which mitigation activities are eligible. The HMP Steering Committee may consult with the funding entity, Oregon Department 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 HMP Steering Committee’s semi-annual meetings.

4.12.2 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 HMP Steering Committee will determine whether 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 HMP Steering Committee will also consider whether the selected actions have any impact on mitigation of future hazard events and essentially, measure their overall strategic effectiveness.

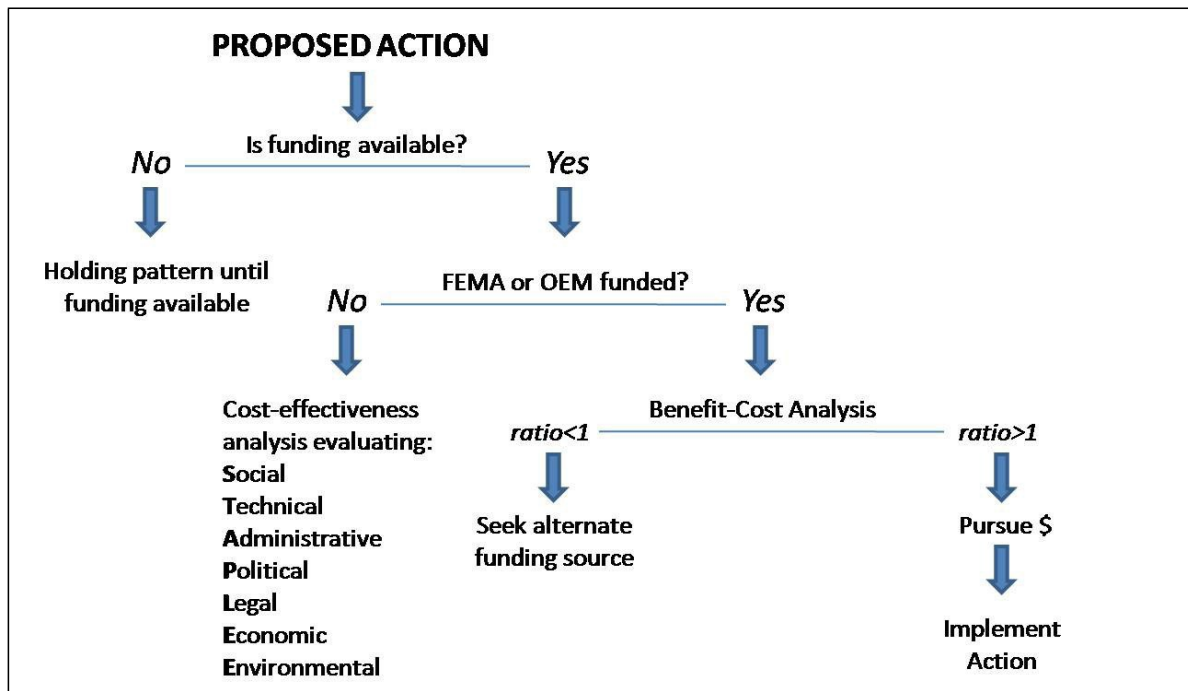
4.12.3 Step 3: HMP Steering Committee Recommendations

Depending on the results of the previous steps, the HMP Steering Committee will recommend which mitigation activities should be moved forward. If the HMP Steering Committee 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 HMP Steering Committee 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.

4.12.4 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 HMP Steering Committee 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 HMP Steering Committee will use a multivariable assessment technique called STAPLE/E to prioritize these actions. STAPLE/E stands for Social, Technical, Administrative, Political, Legal, Economic, and Environmental. Assessing projects based upon these seven variables helps define a project’s qualitative cost effectiveness.

4.13 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 HMP Steering Committee 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 American Red Cross Northwest Oregon Chapter, U.S. Geological Survey (USGS), Everbridge, Marion County Citizens Corps Council (which is a consortium of volunteers from C.E.R.T., ARES (Amateur Radio Emergency Service), Fire Rehab, and Medical Reserve Corps (MRC)) and other local, state and federal partners. Emergency managers across Marion County leverage local outreach efforts to periodically focus attention on hazard mitigation and risk reduction opportunities.

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

- Post links to the 2023 Marion County HMP on the County website and on its social media platforms.
- Place articles in the local online newspaper, the Statesman Journal, directing the public where to view the 2023 Marion County HMP and provide feedback.
- Use existing newsletters such as schools and utility bills to inform the public where to view and provide feedback.
- Present new and relevant information at community events such as the Marion County Fair, Oregon State Fair, Stayton Summer Fest, St. Paul Rodeo, and Oktoberfest.

Finally, Marion County will ensure continued public involvement by posting the Marion County HMP on the County's website (<https://emergency-management-marioncounty.hub.arcgis.com/>)

4.14 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 [Month] [Day], 2027. The Marion County Emergency Manager is responsible for organizing the HMP Steering Committee to address plan update needs. The HMP Steering Committee 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.

Table 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 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 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

5 Plan Adoption

Federal Emergency Management Agency (FEMA) mitigation program is guided by agency guidance that interprets federal regulations and the legislation that creates and amends these regulations. There are specific steps that need to be taken to secure a FEMA- approved plan, and in Oregon, these include coordination with the Oregon Department of Emergency Management. Final Steps include:

- FEMA Review Tool
 - Plan writers complete a review tool used for plan review with the plan section and page numbers where the plan addresses the FEMA criteria.
- Plan Review
 - OEM reviews the full final plan draft with Review Tool as a guide to compliance with the Code Federal Regulations (CFRs) plan must meet.
 - OEM returns the plan for final edits that will support FEMA approval.
 - The Marion County Emergency Management completes the final edits and returns the revised final plan draft to OEM for submission to FEMA.
 - OEM sends the plan to FEMA which has a 45-day statutory review period.
 - FEMA reviews the plan for compliance with the CFRs and may return for edits and resubmission, or FEMA may issue a letter of preliminary approval called an APA letter.
- “APA”
 - FEMA issues letter stating that the plan is “Approvable Pending Adoption” or APA.
- Plan Adoption
 - All participating plan holders must pass a resolution adopting the final FEMA-approved plan.
 - Plan holders submit their signed resolutions as evidence of adoption to the HMP plan to OEM or the plan writer.
- Plan Approval
 - OEM submits all the signed resolutions to FEMA.
 - FEMA issues a final approval letter.

The remainder of this section includes the completed FEMA Review Tool, the FEMA APA letter, Resolutions of Approval from all plan holding cities and special districts and the final FEMA Approval Letter.

5.1 Final FEMA Approval Letter

[ORMarionCountyApproval2023.pdf](#)

5.2 FEMA APA Letter

To review the FEMA APA Letter for Marion County, please visit:

[ORMarionCountyAPA2023.pdf](#)

5.3 Resolution of Approval

To review the signed resolution from Marion County, please visit:

[PW_Resolution_MC Hazard Mitigation Plan_Signed.pdf](#)

5.4 FEMA Review Tool

To view the FEMA Review Tool Report for Marion County, please visit:

[ORMarionCountyReview2023.pdf](#)

5.5 City & Special Districts Resolutions

- City of Gervais: [City of Gervais_Resolution No. 23-002 Adopting Updates to MCMJHMP.pdf](#)
- City of Hubbard: [City of Hubbard_RESOLUTION 747-2023 MC HAZ MIT PLAN EXECUTED.pdf](#)

6 References

- Department of Homeland Security, Federal Emergency Management Agency. (2021, August 13). *National Risk and Capability Assessment*. Retrieved from FEMA.gov: <https://www.fema.gov/emergency-managers/risk-management/risk-capability-assessment>
- Department of Homeland Security, Federal Emergency Management Agency. (2022, November 4). *Hazard Mitigation Planning*. Retrieved from FEMA.Gov: <https://www.fema.gov/emergency-managers/risk-management/hazard-mitigation-planning>
- Department of Homeland Security, Federal Emergency Management Agency. (2008). *Emergency Support Function #2 - Communications Annex*. Retrieved from FEMA.gov: <https://www.fema.gov/pdf/emergency/nrf/nrf-esf-02.pdf>.
- Department of Homeland Security, Federal Emergency Management Agency. (2021, February 25). *Disaster Declarations for States and Counties*. Retrieved from FEMA.gov: <https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties>
- Department of Homeland Security, Federal Emergency Management Agency. (2022, October 5). *Rehabilitation of High Hazard Potential Dams Grant Program Guidance & Resources*. Retrieved from FEMA.gov: <https://www.fema.gov/emergency-managers/risk-management/dam-safety/rehabilitation-high-hazard-potential-dams/resources>
- Department of Homeland Security, Federal Emergency Management Agency. (2023, January 11). *44 CFR 201.6(C) (2)(i) - Local Mitigation Plans, Subsection A*. Retrieved from Regulation and Guidance: <https://www.fema.gov/emergency-managers/risk-management/hazard-mitigation-planning/regulations-guidance>
- Department of Homeland Security, Federal Emergency Management Agency. (N.d.). *Emergency Support Function #1 - Transportation*. Retrieved from Emergency Support Functions: <https://www.fema.gov/emergency-managers/national-preparedness/frameworks/response#esf>
- National Oceanic and Atmospheric Administration. (N.d.). *Storm Event Database*. Retrieved from NOAA.gov: <https://www.ncdc.noaa.gov/stormevents/>
- Portland State University, Population Research Center. (2021). *Coordinated Population Forecast for Marion County, its Urban Growth Boundaries (UGB), and Area Outside UGBs 2021-2071*. Retrieved from <https://pdxscholar.library.pdx.edu/opfp/60/>
- State of Oregon, Business Oregon. (2022). *Distressed Counties, 2022*. Retrieved from Distressed Areas in Oregon: <https://www.oregon.gov/biz/reports/Pages/DistressedAreas.aspx>
- State of Oregon, Department of Land Conservation and Development. (N.d.). *Goal 7: Areas Subject to Natural Disasters and Hazards*. Retrieved from Oregon.gov: <https://www.oregon.gov/lcd/OP/Pages/Goal-7.aspx>
- State of Oregon, Employment Department. (2022). *Mid-Valley Local Labor, Regional Herfindahl Index Scores*. Retrieved from State of Oregon Employment Department: <https://www.qualityinfo.org/mid-valley>
- State of Oregon, Oregon Housing & Community Services. (N.d.). *Local Innovation and Task Force (LIFT) Housing Development*. Retrieved from Bond Financing & Loans: <https://www.oregon.gov/ohcs/development/Pages/bond-financing-loans.aspx>
- State of Oregon, Oregon Water Resources Department. (N.d.). *Drought Declarations*. Retrieved from Oregon.gov: https://apps.wrd.state.or.us/apps/wr/wr_drought/declaration_status_report.aspx

- Taylor, G., Hatton, R., & Taylor, G. H. (n.d.). *The Oregon Weather Book: A State of Extremes*. Oregon State University Press.
- U.S. Army Corps of Engineers. (2020). *Dams of The Nation*. Retrieved from National Inventory of Dams: <https://nid.usace.army.mil/#/>
- U.S. Census Bureau. (2020). *Housing*. Retrieved from Selected Housing Characteristics: 2020 American Community Survey 5-Year Estimates:
https://data.census.gov/profile/Marion_County,_Oregon?g=0500000US41047
- U.S. Census Bureau. (2020). *Marion County, Oregon*. Retrieved from U.S. Census Bureau :
https://data.census.gov/profile/Marion_County,_Oregon?g=0500000US41047
- U.S. Census Bureau. (2020). *Physical Housing Characteristics for Occupied Housing Units* . Retrieved from American Community Survey 5-Year Estimates:
https://data.census.gov/profile/Marion_County,_Oregon?g=0500000US41047
- U.S. Census Bureau. (2021). *Selected Economic Characteristics*. Retrieved from American Community Survey:
<https://data.census.gov/table?q=Marion+County,+Oregon+Employment&tid=ACSDP1Y2021.DP03>
- U.S. Census Bureau. (2022, December 8). *American Community Survey 5-Year Data (2009-2021)*. Retrieved from U.S. Census Bureau:
<https://www.census.gov/data/developers/data-sets/acs-5year.html>