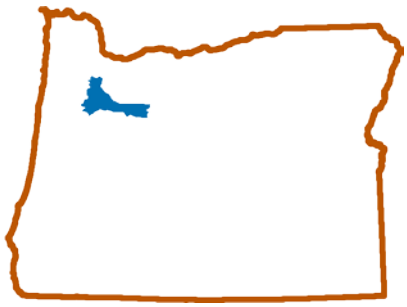
Marion County

MULTI-JURISDICTIONAL ALL- HAZARDS MITIGATION PLAN
VOLUME III: APPENDICES

- 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



- 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-Hazard 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

Marion County
OREGON

Acknowledgements

The 2022 Marion County 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.

2022 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, Eric Hlad, Kaylynn Gesner, Katrina Rothenberger, Kelly Weese, Jaden Emminger, Joaquin Ramos, Matt Knudsen, Matt Wilkinson, Scott Wilson

City of Aumsville
Matt Etzel, Richard Schmitz, Damian Flowers

City of Aurora
Stuart Rodgers, Mark Gunter

City of Detroit
Mayor Jim Trett, Kelly Galbraith, Christine Pavoni

City of Gervais
Susie Marston, Mark Chase

City of Hubbard
Melinda Olinger, Dave Rash

City of Idanha
Rebecca Stormer, Robyn Johnson, Mayor Rob Weikum

City of Jefferson
Sarah Cook, Kyle Ward

City of Keizer
Matt Reyes

City of Mill City
Gary Olson, Mayor Tim Kirsch

City of Mt. Angel
Mark Daniel

City of **Scotts Mills**
Robin Fournier, Mayor Paul Brakeman

City of Stayton
Alissa Angelo, Dave Frisendahl

City of Turner
Scott McClure, Don Taylor, Aaron Bales

City of Woodburn
Marty Pilcher, Andy Shadrin

Keizer Fire District
Jeff Cowan

Woodburn Fire District
Joe Budge

Mt. Angel Fire District
Jim Trierweiler

Interested Parties

Cherriots
Randy Navalinski

Linn County
Alyssa Boles, Ric Lentz

City of Silverton
Jim Anglemier

Aurora Fire District
Joshua Williams, Mike Corless

Jefferson Fire District
Levi Eckhardt

Pacific Gas & Electric
John Plechinger

Salem Health
Christina Bunnell, Nathan Streight

Santiam Hospital
Adam Mauer

Santiam Water Control District
Brett Stevenson

Consumer Power
Jeff Carlson, Kelley Bruneau, Billy Terry

METCOM 911
John Thompson, Mark Spross

Aumsville Fire District
Roy Hari, Brad McKenzie

Hubbard Fire District
Joe Budge, Michael Kahrmann

Marion County Fire District 1
Ron Lee, Sam Phillips

Salem Electric
JB Phillips, Britni Davidson-Cruikshank

Salem-Keizer School District
Ryan Mikesh

U.S. Forest Service
Shawn Rivera, Duane Bishop

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
Edgar Gomez

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 Appendix A: Marion County Priority Actions

The following list presents the 2022 priority mitigation actions for Marion County. The action item forms that follow present specific information for each priority action item. Also in this document are a list of ongoing mitigation actions, mitigation successes, the 2022 action item pool, and the 2017 priority action item status updates.

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 to focus attention on an achievable set of high leverage activities over the next five-years. Detailed implementation information for each priority action is listed in Appendix A-1. A pool of additional action items is presented in Appendix A-2. This plan identifies priority actions based on an evaluation of hazards, resource availability, and FEMA identified best practices.

- **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 storm water 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 Awareness month in October. Participate in activities for schools, business, and industry.

SPECIAL NOTE: There are many funding sources that might be available to assist in funding hazard mitigation projects. Funding sources include local government general budgets, state and federal grants, and foundations to name just a few. For additional information on the variety of grants visit https://www.grants.gov/web/grants/learn-grants/grants-101.html. FEMA's Building Resilient Infrastructure, and Communities (BRIC), Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance (FMA), and other Hazard Mitigation Specific Grants are the most common funding sources used for hazard mitigation projects.

1.1 2022-2027 Priority Action Item Forms

<table>
<tr><td colspan="2">Marion County Priority Action</td><td>1</td><td colspan="2">Alignment with Plan Goals:</td><td>1,2,3,5,7</td></tr>
<tr><td colspan="2">Hazard Classification:</td><td colspan="2">Multi-Hazard</td><td>Action Item Tracking #</td><td>2022-MH-1</td></tr>
<tr><td colspan="2">Proposed Action Title:</td><td colspan="4">Develop a countywide evacuation plan through an approved FEMA grant.</td></tr>
<tr><td colspan="6">Alignment with Existing Plans & Policies:</td></tr>
<tr><td colspan="6">Emergency Operations Plan and any other County Plan that pertains to Transportation Critical Infrastructure Systems.</td></tr>
<tr><td colspan="6">Rationale for Proposed Action Item:</td></tr>
<tr><td colspan="6">Following the 2020 Beachie Creek Wildland Fire, the County realized that a county wide evacuation plan is needed. With 346,000 residents throughout Marion County, the evacuation plan would provide the guidance for the whole community should a mass evacuation is needed again. The plan would be developed using an all-hazard approach.</td></tr>
<tr><td colspan="6">Ideas for Implementation:</td></tr>
<tr><td colspan="6">Maps by unincorporated areas; identify assembly areas; inventory mass care capabilities and needs.</td></tr>
<tr><td colspan="2">Coordinating Organization:</td><td colspan="4">Marion County Emergency Management</td></tr>
<tr><td colspan="3">Internal Partners</td><td colspan="3">External Partners</td></tr>
<tr><td colspan="3">Emergency Management, Marion County Sheriff’s Office, Marion County Health and Human Services, Public Works, and GIS</td><td colspan="3">Cities, Special Districts (i.e., fire districts), State, Law Enforcement, Public Transportation, PSAPS, and Hospitals</td></tr>
<tr><td>Potential Funding Source:</td><td>Estimated Cost:</td><td colspan="4">Timeline:</td></tr>
<tr><td rowspan="4">FEMA BRIC and/or HMGP</td><td rowspan="4">$200k+</td><td>☐</td><td colspan="3">Ongoing</td></tr>
<tr><td>☐</td><td colspan="3">Short Term (0-2 Years)</td></tr>
<tr><td>☐</td><td colspan="3">Mid Term (2-5 Years)</td></tr>
<tr><td>√</td><td colspan="3">Long-Term (5+ Years)</td></tr>
<tr><td>Action Item Status:</td><td colspan="5">New in 2022</td></tr>
</table>

<table>
<tr><td colspan="2">Marion County Priority Action</td><td>2</td><td colspan="2">Alignment with Plan Goals:</td><td>1, 2, 3, 5, 7, 9, 10, 11</td></tr>
<tr><td colspan="2">Hazard Classification:</td><td colspan="2">Wildfire</td><td>Action Item Tracking #</td><td>2022-WF-1</td></tr>
<tr><td colspan="2">Proposed Action Title:</td><td colspan="4">Update Marion County Community Wildfire Protection Plan (CWPP)</td></tr>
<tr><td colspan="6">Alignment with Existing Plans & Policies:</td></tr>
<tr><td colspan="6">County HMP, EOP</td></tr>
<tr><td colspan="6">Rationale for Proposed Action Item:</td></tr>
<tr><td colspan="6">Wildland fire is a high-risk hazard in Marion County. The development of the Community Wildfire Protection Plan (CWPP) provides information and guidance in helping residents and local governments in developing a community that is resistant to the impacts of wildland fires. The CWPP provides project ideas such as defensible space, fire reduction projects, development of Firewise communities, and possible funding sources to assist communities with mitigation actions.</td></tr>
<tr><td colspan="6">Ideas for Implementation:</td></tr>
<tr><td colspan="6">County NHMP, EOP</td></tr>
<tr><td colspan="2">Coordinating Organization:</td><td colspan="4">Marion County Emergency Management</td></tr>
<tr><td colspan="3">Internal Partners</td><td colspan="3">External Partners</td></tr>
<tr><td colspan="3">Sheriff’s Office, Public Works-Ops, GIS, Public Health</td><td colspan="3">Fire Defense Board, Fire Districts, Fire Departments, OSFM, USFS, BLM, Cities</td></tr>
<tr><td colspan="2">Potential Funding Source:</td><td>Estimated Cost $:</td><td colspan="3">Timeline:</td></tr>
<tr><td colspan="2" rowspan="4">General Fund, ODF & OSFM Grants</td><td rowspan="4">Staff Time</td><td>☐</td><td colspan="2">Ongoing</td></tr>
<tr><td>√</td><td colspan="2">Short Term (0-2 Years)</td></tr>
<tr><td>☐</td><td colspan="2">Mid Term (2-5 Years)</td></tr>
<tr><td>☐</td><td colspan="2">Long-Term (5+ Years)</td></tr>
<tr><td colspan="2">Action Item Status:</td><td colspan="4">Started in 2022</td></tr>
</table>

<table>
<tr><td colspan="2">Marion County Priority Action</td><td>3</td><td colspan="2">Alignment with Plan Goals:</td><td>1,2,3,5,7</td></tr>
<tr><td colspan="2">Hazard Classification:</td><td colspan="2">Wildfire</td><td>Action Item Tracking #</td><td>2022-WF-2</td></tr>
<tr><td colspan="2">Proposed Action Title:</td><td colspan="4">Implement identified "Action/Tasks" within the 2023-2028 CWPP related to wildland fire reduction.</td></tr>
<tr><td colspan="6">Alignment with Existing Plans & Policies:</td></tr>
<tr><td colspan="6">County AHHMP, EOP</td></tr>
<tr><td colspan="6">Rationale for Proposed Action Item:</td></tr>
<tr><td colspan="6">The County has a history of wildland fires, and with the support of the 2023-2028 Marion County CWPP. Find and acquire grant funding to support wildland fire reduction projects throughout the County.</td></tr>
<tr><td colspan="6">Ideas for Implementation:</td></tr>
<tr><td colspan="6">Grant funding, working with community partners, working with CWPP Advisory Committee Members, Public Outreach</td></tr>
<tr><td colspan="2">Coordinating Organization:</td><td colspan="4">Marion County Emergency Management</td></tr>
<tr><td colspan="3">Internal Partners</td><td colspan="3">External Partners</td></tr>
<tr><td colspan="3">Sheriff’s Office, Public Health, GIS, PIO</td><td colspan="3">Fire Defense Board, Fire Districts, Fire Department, OSFM, BLM, USFS, Cities</td></tr>
<tr><td colspan="2">Potential Funding Source:</td><td>Estimated Cost $:</td><td colspan="3">Timeline:</td></tr>
<tr><td colspan="2" rowspan="4">ODF and OSFM Grant opportunities</td><td rowspan="4">TBD</td><td>√</td><td colspan="2">Ongoing</td></tr>
<tr><td>☐</td><td colspan="2">Short Term (0-2 Years)</td></tr>
<tr><td>☐</td><td colspan="2">Mid Term (2-5 Years)</td></tr>
<tr><td>☐</td><td colspan="2">Long-Term (5+ Years)</td></tr>
<tr><td>Action Item Status:</td><td colspan="5">Started in ‘22</td></tr>
</table>

Marion County Priority Action	4	**Alignment with Plan Goals:**	1, 2, 3, 4, 5, 7, 8, 9, 10, 11
Hazard Classification:	Multi-Hazard	**Action Item Tracking #**	2022-MH-2
Proposed Action Title:	Develop an all-hazard recovery plan.		
Alignment with Existing Plans & Policies:			
County HMP, Comprehensive Plan, Functional Plans, Infrastructure Plans, Emergency Operations Plan			
Rationale for Proposed Action Item:			
After the 2020 Wildland Fires and the 2021 Severe Winter storm, the after-action reports highlighted the importance of a County Recovery Plan. A future recovery plan would assist in providing the framework for assisting community members and businesses with their "New Normal" following a disaster or emergency. A recovery plan that provides guidance for economic, socio-economic, individual case management, long term mass care needs, building and planning innovative projects, debris management, damage assessment, and recovery funding strategies. Further, the NDRF is guided by eight principles: □Individual and Family Empowerment; □Leadership and Local Primacy; □Pre-Disaster Recovery Planning; □Engaged Partnerships and Inclusiveness; □Unity of Effort; □Timeliness and Flexibility; □Resilience and Sustainability; and □ Psychological and Emotional Recovery.			
Ideas for Implementation:			
Recovery Planning team, the BOC, Business Services, and Community Services leading this project			
Coordinating Organization:	Marion County Emergency Management		
Internal Partners		External Partners	
BOC, Community Services, GIS, Business Services		Whole Community (i.e., local cities, state, private, non-profit, and faith-based partners).	
Potential Funding Source:	**Estimated Cost $:**	**Timeline:**	
FEMA BRIC	150-200k	☐	Ongoing
		☐	Short Term (0-2 Years)
		☐	Mid Term (2-5 Years)
		√	Long-Term (5+ Years)
Action Item Status:	New Item 2022		

Marion County Priority Action	5	**Alignment with Plan Goals:**	1,3,5,10
Hazard Classification:	Multi-Hazard	**Action Item Tracking #**	2022-MH-3
Proposed Action Title:	Begin preliminary analysis to examine potential project to add an all-hazard siren warning system within the Santiam Canyon communities.		

Alignment with Existing Plans & Policies:
Emergency Operations Plan
Rationale for Proposed Action Item:
Santiam Canyon is an isolated part of Marion County where cell phone and internet are sporadic, resulting in challenging emergency alerts and warning notification systems. This project would support emergency alerts and notifications, by providing a redundancy alerting system for the communities within Santiam Canyon.
Ideas for Implementation:
Potentially partner with Fire Districts to either update district sirens, install/upgrade siren systems in preidentified locations to augment notification systems already in place, and/or install systems on local facilities such as schools, city hall, law enforcement, communication towers, and community centers.

Coordinating Organization:	Marion County Emergency Management

Internal Partners	**External Partners**
Board of Commissioners, Business Services, Public Works, Community Services, Sheriff's Office	Fire districts within the Santiam Canyon, whole community throughout the canyon area.

Potential Funding Source:	**Estimated Cost $:**	**Timeline:**	
FEMA BRIC and/or HMGP	$200k+	☐	Ongoing
		☐	Short Term (0-2 Years)
		☐	Mid Term (2-5 Years)
		√	Long-Term (5+ Years)

Action Item Status:	New, 2022

<table>
<tr><td colspan="2">Marion County Priority Action</td><td>6</td><td colspan="2">Alignment with Plan Goals:</td><td>1,2,3,5,10</td></tr>
<tr><td colspan="2">Hazard Classification:</td><td>Drought</td><td colspan="2">Action Item Tracking #</td><td>2022-DR-1</td></tr>
<tr><td colspan="2">Proposed Action Title:</td><td colspan="4">Participate with the North Santiam Water Control District to update the North Santiam Watershed Drought Contingency Plan.</td></tr>
<tr><td colspan="6">Alignment with Existing Plans & Policies:</td></tr>
<tr><td colspan="6">County HMP, EOP</td></tr>
<tr><td colspan="6">Rationale for Proposed Action Item:</td></tr>
<tr><td colspan="6">The North Santiam Watershed Drought Contingency Plan (DCP) was developed to foster a collaborative approach to drought planning and response within the watershed. The document is intended to be a “living plan” and is under consideration to be updated in partnership with North Santiam Water Control District, City of Salem, and other community partners.</td></tr>
<tr><td colspan="6">Ideas for Implementation:</td></tr>
<tr><td colspan="6">The North Santiam Watershed Task Force is coordinating with partners; evaluating the potential for funding to support an update to the DCP in 2023.</td></tr>
<tr><td colspan="2">Coordinating Organization:</td><td colspan="4">North Santiam Watershed</td></tr>
<tr><td colspan="3">Internal Partners</td><td colspan="3">External Partners</td></tr>
<tr><td colspan="3">Board of Commissioners, Community Services, Public Works</td><td colspan="3">Whole Community (i.e., North Santiam Water Control District, City of Salem, USACE, Marion County Soil Water Conservation District,</td></tr>
<tr><td colspan="2">Potential Funding Source:</td><td>Estimated Cost $:</td><td colspan="3">Timeline:</td></tr>
<tr><td colspan="2" rowspan="4">General funds</td><td rowspan="4">TBD</td><td>√</td><td colspan="2">Ongoing</td></tr>
<tr><td>☐</td><td colspan="2">Short Term (0-2 Years)</td></tr>
<tr><td>☐</td><td colspan="2">Mid Term (2-5 Years)</td></tr>
<tr><td>☐</td><td colspan="2">Long-Term (5+ Years)</td></tr>
<tr><td colspan="2">Action Item Status:</td><td colspan="4">Started in Feb. 2023</td></tr>
</table>

Marion County Priority Action	7	**Alignment with Plan Goals:**	2,3,5,6,7,8,9,10
Hazard Classification:	Flood	**Action Item Tracking #**	2022-FL-1
Proposed Action Title:	Identify flood prone areas and develop storm water plans to target specific drainage areas to encourage community floodplain management. These actions support the county's FEMA CRS (Community Rating System) rating.		
Alignment with Existing Plans & Policies:			
County CSR, EOP, HMP			
Rationale for Proposed Action Item:			
Marion County is threatened by flooding that could occur from any of the numerous waterways the county. Marion County continues to participate in the Community Rating System (CRS) of the National Flood Insurance Program (NFIP). The CRS program recognizes the county's efforts that go beyond minimum floodplain management standards of the NFIP to protect properties from flooding by reducing flood insurance premiums for property owners in the county.			
Ideas for Implementation:			
Outreach, Surveys, economic data analysis, etc.			
Coordinating Organization:	Marion County Planning Division		

Internal Partners	**External Partners**
Emergency Management, Public Works, GIS	Mid-Willamette Valley Council of Governments

Potential Funding Source:	**Estimated Cost $:**	**Timeline:**	
FEMA BRIC, HMGP, and/or FMA	TBD	☐	Ongoing
		√	Short Term (0-2 Years)
		☐	Mid Term (2-5 Years)
		☐	Long-Term (5+ Years)

Action Item Status:	New in 2022

<table>
<tr><td colspan="2">Marion County Priority Action</td><td>8</td><td colspan="2">Alignment with Plan Goals:</td><td colspan="2">This action aligns with all goals</td></tr>
<tr><td colspan="2">Hazard Classification:</td><td colspan="2">Multi-Hazard</td><td>Action Item Tracking #</td><td colspan="2">2022-MH-4</td></tr>
<tr><td colspan="2">Proposed Action Title:</td><td colspan="5">Provide and support all-hazard public outreach campaigns.</td></tr>
<tr><td colspan="7">Alignment with Existing Plans & Policies:</td></tr>
<tr><td colspan="7">County CWPP, EOP, HMP</td></tr>
<tr><td colspan="7">Rationale for Proposed Action Item:</td></tr>
<tr><td colspan="7">An important aspect for any plan is public outreach. Public outreach is not just important for natural hazards, but all-hazards. Public outreach will provide the whole community the relative information needed to be informed about all-hazards that could impact our jurisdiction.</td></tr>
<tr><td colspan="7">Ideas for Implementation:</td></tr>
<tr><td colspan="7">Annual Public outreach campaign to community members and local partners.</td></tr>
<tr><td colspan="2">Coordinating Organization:</td><td colspan="5">Marion County Emergency Management</td></tr>
<tr><td colspan="3">Internal Partners</td><td colspan="4">External Partners</td></tr>
<tr><td colspan="3">PIO</td><td colspan="4">Whole Community (i.e., Health and Human Services, fire, law enforcement, schools, and local, state, and federal partners).</td></tr>
<tr><td colspan="2">Potential Funding Source:</td><td>Estimated Cost $:</td><td colspan="4">Timeline:</td></tr>
<tr><td colspan="2" rowspan="4">General Fund, State and non-profit (foundations) grant Opportunitys</td><td rowspan="4">Staff Time</td><td>√</td><td colspan="3">Ongoing</td></tr>
<tr><td>☐</td><td colspan="3">Short Term (0-2 Years)</td></tr>
<tr><td>☐</td><td colspan="3">Mid Term (2-5 Years)</td></tr>
<tr><td>☐</td><td colspan="3">Long-Term (5+ Years)</td></tr>
<tr><td colspan="2">Action Item Status:</td><td colspan="5">Ongoing</td></tr>
</table>

Marion County Priority Action		9	**Alignment with Plan Goals:**		This action aligns with all goals
Hazard Classification:	Earthquake		**Action Item Tracking #**		2022-EQ-1
Proposed Action Title:	Promote Great Oregon Shakeout Awareness month in October. Participate in activities with partners such as schools, business, and industry.				
Alignment with Existing Plans & Policies:					
County HMP					
Rationale for Proposed Action Item:					
Marion County participates in the National campaign Shakeout Day, which is always the third Thursday of October. We encourage our partners to participate in an earthquake drill (i.e., drop cover and hold) and share their experience on our Facebook account.					
Ideas for Implementation:					
Continue to promote the Great Oregon Shake Out drill.					
Coordinating Organization:	Marion County Emergency Management				
Internal Partners			**External Partners**		
All County Departments and PIO's			Whole Community		
Potential Funding Source:	**Estimated Cost $:**		**Timeline:**		
General Fund	Staff Time		√	Ongoing	
			☐	Short Term (0-2 Years)	
			☐	Mid Term (2-5 Years)	
			☐	Long-Term (5+ Years)	
Action Item Status:	Ongoing annual basis.				

1.2 Mitigation Success

- Flood Monitoring Infrastructure: The Mid-Willamette Valley High Water Watch https://hww.onerain.com/ is a live data tool which is the result of long-term coordination with Turner, regional partners, and the City of Salem who have a full-time staff person that maintains the website.
- Completion of the Quick Reference Guide to Emergency Management for:
  - Local Cities and Senior Elected
  - Local Partners'

1.3 Marion County Ongoing Action Items

- Develop All-Hazard and All County Evacuation Plan- POST DR4562 Hazard Mitigation Grant.
- Participate in updating the North Santiam Watershed, Drought Contingency Plan.
- Partner with Earthwise and local school districts (Salem, Keizer, Woodburn, and Stayton) to implement water conservation strategies to maximize water use in schools and educate students about water conservation.
- Continue implementing the 'Marion County Water Resource Management Plan' (portion of the Marion County Comprehensive Plan), with yearly review scheduled during the third quarter of the fiscal year.
- Continue to support Great Oregon Shakeout Awareness month in February. Participate in activities for schools, business, and industry. Participating with the Mid-Willamette Emergency Communications Collective on initiatives that are focused on household preparedness.

1.4 2022 Action Item Pool

The action item table below presents a pool of mitigation actions. Many of these actions carry forward from prior versions of this plan. This expanded list of actions is available for consideration as resources, capacity, technical expertise and/or political become available. The table includes the hazard, a hazard description, coordinating/partnering agencies, proposed timeline, and alignment with plan goals.

1.4.1 Ongoing Action Items

Table 1-1, Marion County Ongoing Action Items

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals						
					Public Awareness	Education	Risk Reduction	Funding and Implementation	Partnerships and Coordination	Natural Resource Utilization	Plan Integration
Multi-Hazard #2	Continue the community education program for all- hazards	Emergency Management	Whole Community	On-going	X	X	X				X
Earthquake #1	Promote Great Oregon Shakeout Awareness month in October. Participate in activities for schools, business, and industry.	Emergency Management	Public Works, Safety Committee, Marion County Risk, Red Cross, OEM and Media	Ongoing every October	X	X			X		

1.4.2 Short-Term Action Items

Table 1-2, Marion County Short-Term Action Items

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals						
					Public Awareness	Education	Risk Reduction	Funding and Implementation	Partnerships and Coordination	Natural Resource Utilization	Plan Integration
Drought #1	Participate in the process to update the North Santiam Water Control District, Drought Contingency Plan.	North Santiam Water Control District and the City of Salem	Marion County, North Santiam Water Council, Emergency Management, and participating agencies	12-36 months	X	X	X	X	X	X	X
Wildfire #	Implement action items contained in the 'Action Plan' section of the *Marion County Community Wildfire Protection Plan.*	Fire Defense Board	Emergency Management, Fire Marshal, Oregon Department of Forestry	12-36 months			X	X			X
Multi-Hazard #1	Develop countywide all-hazard evacuation plan through an approved FEMA grant	Emergency Management	Whole community	36-48 months	X	X	X	X	X	X	X

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals						
					Public Awareness	Education	Risk Reduction	Funding and Implementation	Partnerships and Coordination	Natural Resource Utilization	Plan Integration
Wildfire #1	Update 2017 Community Wildfire Protection Plan to the 2022-2027 CWPP	Emergency Management	County Fire Defense Board, Firefighting partners, local government	12-24 months	X	X	X		X	X	X

1.4.3 Long-Term Action Items

Table 1-3, Marion County Long-Term Action Items

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals						
					Public Awareness	Education	Risk Reduction	Funding and Implementation	Partnerships and Coordination	Natural Resource Utilization	Plan Integration
Multi-Hazard #1	Complete a disaster recovery plan for Marion County.	Emergency Management	Whole Community	60+ months	X		X				X
Flood #1	Identify flood prone areas and develop storm water plans to target specific drainage areas, which includes the FEMA CRS (Community Rating System), to encourage community floodplain management.	Planning Department	Emergency Management, Engineering Division, Public Works, Whole Community	60-120 months	X	X	X	X	X	X	

1.5 Marion County 2017 Action Item Status

Table 1-4, Marion County 2017 Action Item Status

#		Mitigation Action	Update	Coordinating Organization	Status
2017 MH-01	Multi-Hazard	Develop with private partners a critical infrastructure recovery task force that includes the four lifelines communication, transportation, energy, and water.	Continue to 22-27 Actions County has an established EMAC group that brings together partners from all	Marion County Emergency Management	Started
2017 MH-02	Multi-Hazard	Develop a community education program - such as an all-hazard community outreach forum.	Continue to 22-27 Actions County has an established EMAC group that brings together partners from all	Marion County Emergency Management	Not started/ Long term 10+ years
2017 MH-03	Multi-Hazard	Develop a community education program - such as an all-hazard community outreach forum.	Continue to 22-27 Actions	Marion County Emergency Management	Revised/ Started
2017 MH-04	Multi-Hazard	Conduct an assessment of the short and long term needs for sheltering access and functional needs populations for all hazards.	Continue to 22-27 Actions Completed a framework for mass care/shelter plan with 6 counties	Marion County Emergency Management	Completed first stage; 1-5 years
2017 MH-05	Multi-Hazard	Develop the capability to capture and analyze damage assessment data using GIS tools.		Marion County Emergency Management	Completed in 2020
2017 MH-06	Multi-Hazard	Develop an Energy Assurance Plan (Fuel Management)		Marion County Emergency Management	Completed in 2020
2017 MH-07	Multi-Hazard	Update the (EAS) Emergency Alert System Plan for 22-27 plan	Continue to 22-27 Actions; combined with MH-8 and changed to Marion-Polk Emergency Alerts System.	Marion County Emergency Management	Revised; 1–5- year timeline.
2017 MH-08	Multi-Hazard	Develop all-hazard pre-scripted messaging	Continue to 22-27 Actions; combined with MH-7 to create new action item ever the Marion-Polk Emergency Alert System for the 22-27 plan	Marion County Emergency Management	Revised/New; 1–5-year timeline.

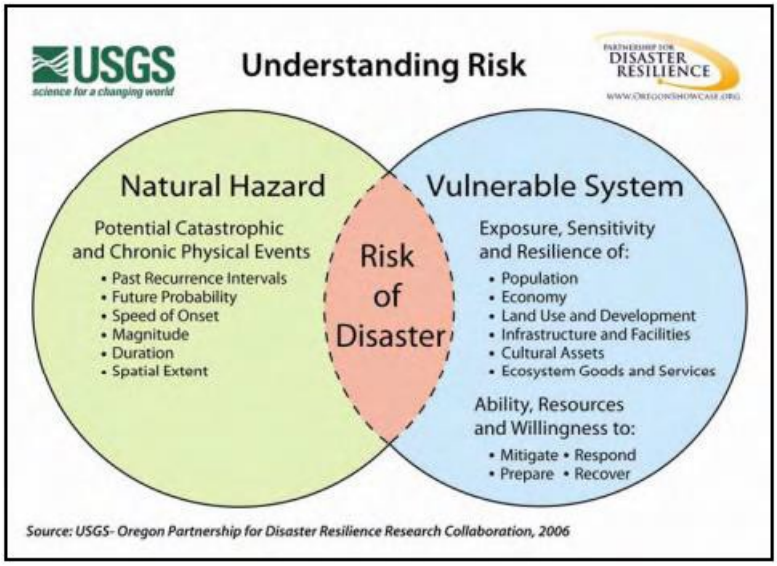
2 Appendix B: Community Profile

2.1 Community Profile

The following section provides a comprehensive description of Marion County's assets and context and helps define the county's sensitivity and resilience to hazards. Known as sensitivity factors, the community assets and characteristics listed in this section are important components and attributes of Marion County but have varying levels of vulnerability to potential hazards.

Community resilience is defined as a community's ability to manage risk and adapt to hazards. This includes government structure, agency missions and directives, and plans, policies, and programs. The information documented in this section, along with the hazard assessments located in Volume I, Section 2, is intended to support the risk reduction actions identified in Volume I, Section 3 – Mission, Goals, and Action Items.

Table 2-1, Understanding Risk



Source: Oregon Partnership for Disaster Resilience

2.2 Geography and Climate

Marion County is in northwest Oregon, covering over 1,000 square miles. The county has a diverse geography, ranging from the rainy Willamette Valley in the west to the Breitenbush Hot Springs in the east. The western half of the county, located in the Willamette Valley, is relatively flat. The eastern portion of the county has a mountainous topography and is bordered by the Cascade Mountain Range.

The average elevation for Marion County is 154 feet and elevations range from 100 feet near the Willamette River to 2400 feet in the foothills of the Cascade Mountains (Hemesath, Nunez, Roth, Burgoyne, & La Follette, 2002). Forestland covers almost half of the eastern portion of the county, and most of the water resources originate in this area (Marion County, Oregon, 2022).

Marion County spans a wide range of physiographic regions; thus, there is considerable variation in precipitation, with elevation as the largest factor in the amount of total precipitation. Marion County has a modified marine climate where winters are cool and wet, while summers are moderately warm and dry (U.S. Department of Commerce, N.d).

Table 2-2, Average Rainfall and Temperatures

Ecoregion	Mean Annual Rainfall Range (inches)	Mean Temperature Range (°F) January min/max	Mean Temperature Range (°F) July min/max
Willamette Valley			
Gallery Forrest	40-50	33/46	50/85
Prairie Terraces	40-50	33/46	51/85
Valley Foothills	45-60	32/46	50/80
Cascades			
Western Cascades Lowlands and Valleys	60-90	31/41	47/48
Western Cascades Montane Highlands	70-120	16/37	44/75
Cascade Crest Montane Forest	55-100	21/35	43/72
Cascade Subalpine/Alpine	75-140	16/31	38/65

Source, US EPA. Ecoregions of Oregon

From 1971 to 2000, the average annual precipitation in Marion County was approximately 40 inches, with the least amount of precipitation on the Willamette Valley floor, and greater amounts near the foothills of the Cascade Range. Table 2.2 shows the average annual precipitation in Marion County.

Several rivers are 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, which is 50 miles east of Salem on the North Santiam River and covers 5.6 miles. The rivers and their sub-basins are depicted in Figure 3 and 4 below.

Figure 2-1, Marion County Physiography

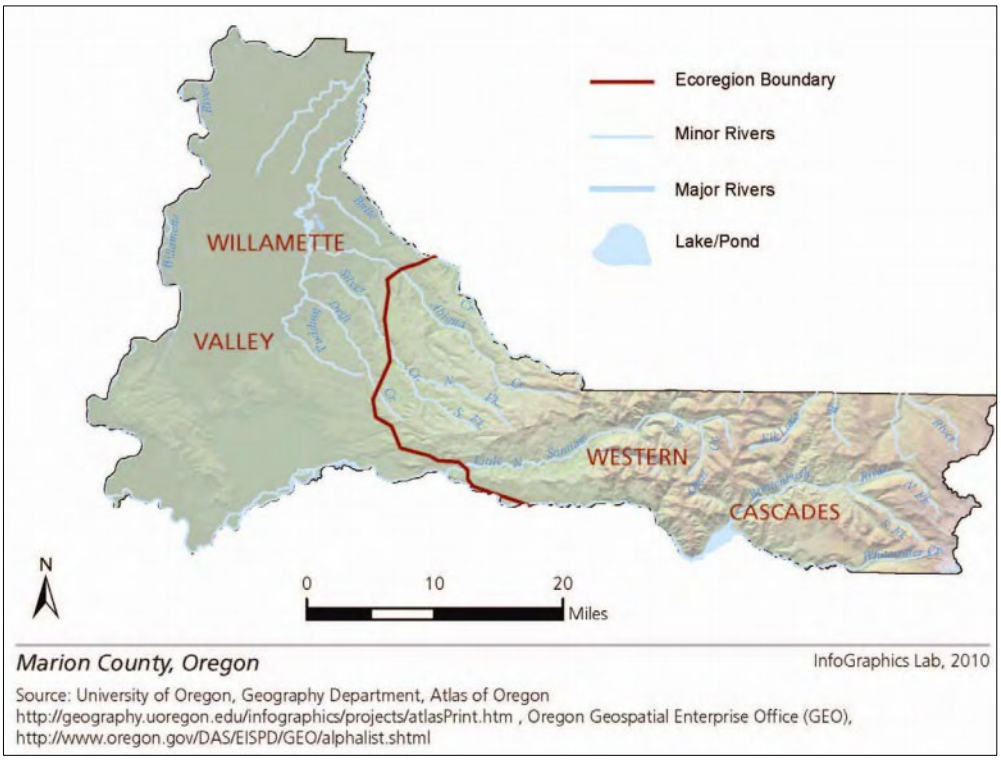


Figure 2-2, Marion County Average Annual Precipitation

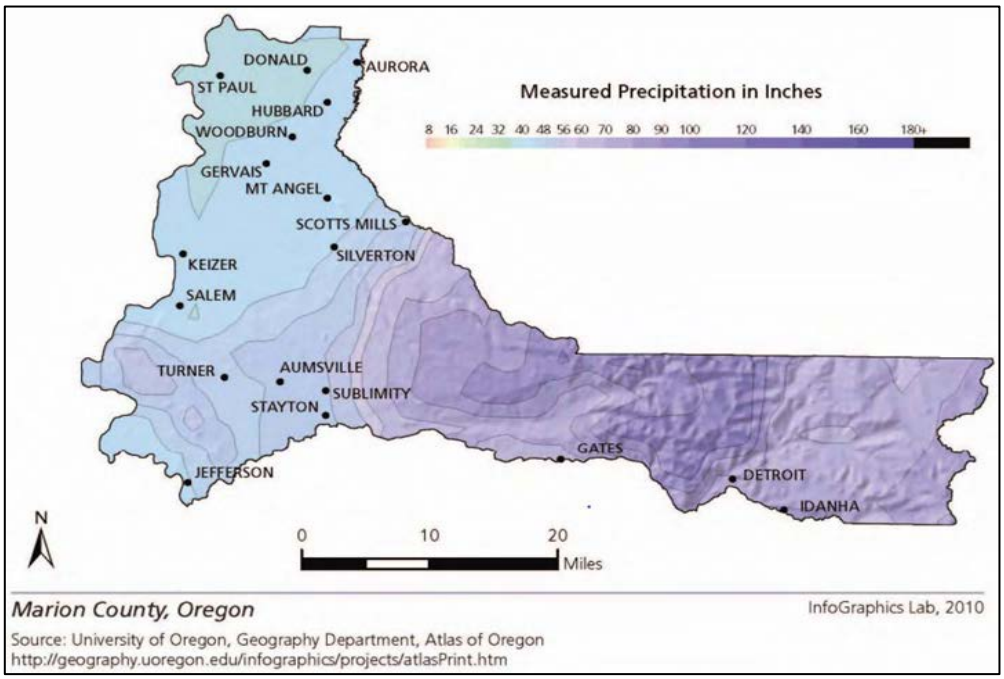
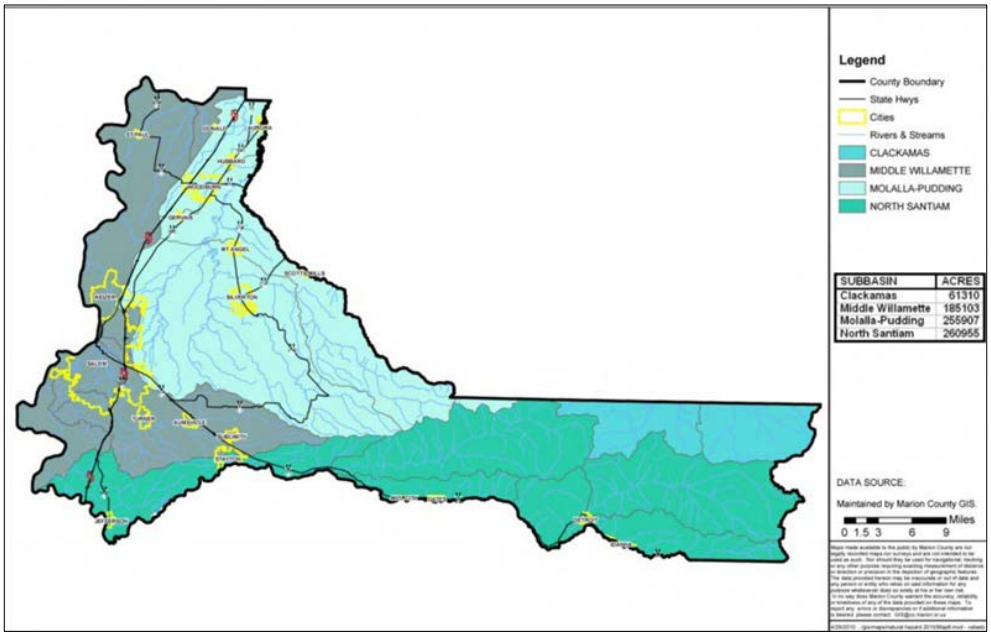


Figure 2-3, River Sub-Basins in Marion County



2.3 Population and Demographics

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. In 2020 the total population of Marion County was recorded as 345,920 (U.S. Census Bureau, 2020).

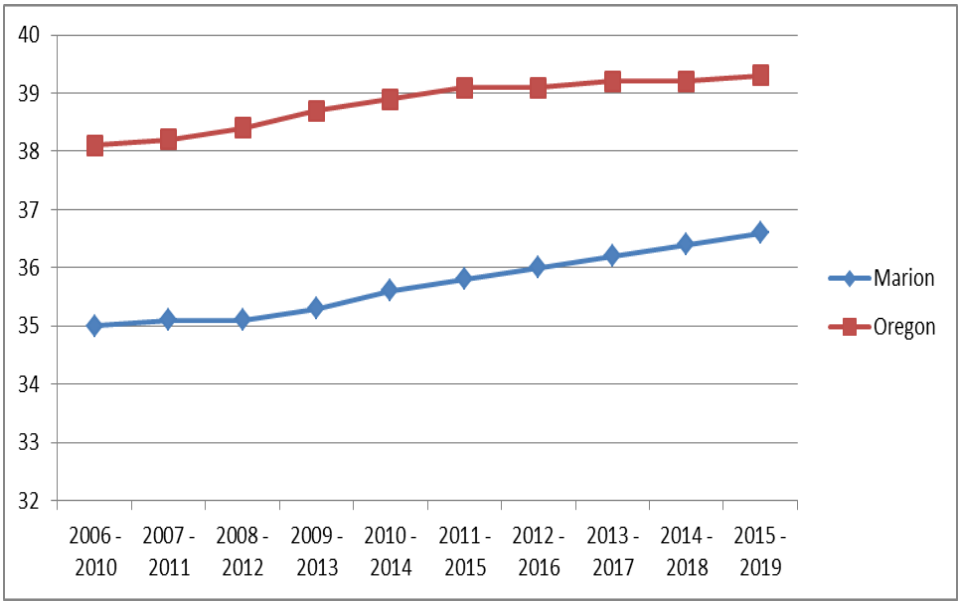
Table 2-3, Population Estimate and Forecast for Marion County Cities

	2000		2010		2020		Population Change 2000 - 2020		Average Annual Growth Rate
	Pop	% of County	Pop	% of County	Pop	% of County	Pop Change	% Change	
Marion County	284,834	100.0%	315,335	100.0%	349,121	100.0%	64,287	22.6%	1.1%
Outside Urban Growth Boundaries	46,237	16.2%	45,596	14.5%	61,285	17.6%	15,048	32.5%	1.6%
Larger Sub Areas									
Keizer	33,143	11.6%	37,335	11.8%	38,590	11.1%	5,447	16.4%	0.8%
Salem (part)*	149,299	52.4%	164,289	52.1%	177,362	50.8%	28,063	18.8%	0.9%
Silverton	8,215	2.9%	9,864	3.1%	11,050	3.2%	2,835	34.5%	1.7%
Stayton	7,260	2.5%	8,151	2.6%	8,159	2.3%	899	12.4%	0.6%
Woodburn	20,861	7.3%	25,377	8.0%	25,882	7.4%	5,021	24.1%	1.2%
Smaller Sub-Areas									
Aumsville	3,211	1.1%	3,771	1.2%	4,376	1.3%	1,165	36.3%	1.8%
Aurora	752	0.3%	1,015	0.3%	1,023	0.3%	271	36.0%	1.8%
Detroit	272	0.1%	209	0.1%	205	0.1%	-67	-24.6%	-1.2%
Donald	632	0.2%	1,013	0.3%	995	0.3%	363	57.4%	2.9%
Gates (part)*	446	0.2%	447	0.1%	498	0.1%	52	11.7%	0.6%
Gervais	2,078	0.7%	2,562	0.8%	2,624	0.8%	546	26.3%	1.3%
Hubbard	2,523	0.9%	3,393	1.1%	3,454	1.0%	931	36.9%	1.8%
Idanha (part)*	138	0.0%	80	0.0%	90	0.0%	-48	-34.8%	-1.7%
Jefferson	2,646	0.9%	3,278	1.0%	3,335	1.0%	689	26.0%	1.3%
Mill City (part)*	327	0.1%	336	0.1%	312	0.1%	-15	-4.6%	-0.2%
Mt. Angel	3,037	1.1%	3,359	1.1%	3,595	1.0%	558	18.4%	0.9%
Scotts Mills	334	0.1%	373	0.1%	387	0.1%	53	15.9%	0.8%
St. Paul	368	0.1%	413	0.1%	440	0.1%	72	19.6%	1.0%
Sublimity	1,896	0.7%	2,558	0.8%	3,050	0.9%	1,154	60.9%	3.0%
Turner	1,160	0.4%	1,918	0.6%	2,410	0.7%	1,250	107.8%	5.4%

Source: Population Research Center at the Portland State University College of Urban and Public Affairs. Coordinated Population Forecast for Marion County, its Urban Growth Boundaries (UGB), and area outside UGBs 2021 – 2071. June 30, 2021.

Marion County has a slightly younger population than the State of Oregon as a whole. Between 2015 and 2019 the median age in Marion County was 36.6, this is approximately 3 years younger than the state median of 39.3 in the same time frame (U.S. Census Bureau, 2022).

Graph: Median Age of Marion County Residents



Source: U.S. Census Bureau, American Community Survey 5-year estimates, 2006 – 2010, 2007 – 2011, 2008 – 2012, 2009 – 2013, 2010 – 2014, 2011 – 2015, 2012 – 2016, 2013 – 2017, 2014 – 2018, 2015 -

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. The proportion of the population 85 and over increased about 2% in 2010. That same age range, 85 and over, is projected to increase slightly over the next two decades. The changes can be attributed to a variety of factors including longer life expectancy, lower fertility rate, and a higher net migration of the 65 and over population. The high net migration of the 65 and over population coupled with a relatively lower migration rate in the population that is between 35 and 50 years of age can in turn impact net migration for children under 18, as they often move with their parents, who tend to be in the 35 – 50 age range (Portland State University, Population Research Center, 2021).

Those under five are particularly vulnerable to natural hazards, as well as residents who are 85 years and older. Moreover, while residents between the ages of 55 and 64 are not currently as vulnerable to potential hazards, this large cohort will be far more susceptible in the next five to ten years. Therefore, it is imperative for Marion County to have policies in place that protect both young and old residents, as well as encourage them to prepare for potential hazards.

Vulnerability to natural disasters disproportionately impacts those with intellectual and/or physical disabilities, particularly children, the elderly, children, people of color, and low-income families and individuals. 24.3% of people in Marion County are under 18 years old. In general, children are more vulnerable to extreme weather, have fewer transportation options, and require assistance to access medical help and assistance. Furthermore, 17.6% of people in Marion County under the age of 65 are living with a disability, which may lead to fewer transportation options, limited access to medicine or medical assistance,

mobility impairment, and more.

In addition, 15.3% of people in Marion County are considered elderly (someone is considered elderly when they are 65 years old and over). Elderly individuals may require special consideration due to sensitivities to extreme weather, accessibility to medical care and medications, mobility impairment, and comparative difficulty in making home modifications that reduce risk to hazards. Addressing the needs of vulnerable groups through hazard mitigation is important to improve the community's overall resilience to natural hazards.

2.3.1 Employment and Economic Capacity

Economic capacity refers to the financial resources and revenue within a community that provide a higher quality of life for residents. Income equality, housing, affordability, economic diversification, employment, and industry are all 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 employment sectors, workforce, resources, and infrastructure are interconnected within the existing economic picture.

2.4 Regional Affordability

The evaluation of regional affordability supplements the identification of socio-demographic capacity indicators (like median income) and is a critical tool for analyzing the economic status of a community. This information captures the likelihood of individuals' ability to prepare for hazards, such as retrofitting homes or purchasing insurance. If a community has high income inequality or housing cost burden levels, the potential for homeowners and renters to implement mitigation is drastically reduced. Therefore, regional affordability is a mechanism for generalizing the abilities of community residents to get back on their feet without significant public assistance.

2.4.1 Median Family Income and Poverty Status

The most recent median income in Marion County is $64,880 which is less than the median income of Oregon at $70,084 and the United States at$69,021 (U.S. Census Bureau, 2020) *Note: the median income listed here is different than the median income for Marion County in table three below, due to a difference in the years. The table below uses 5-year estimates from the American Community Survey from 2019-2015 and 2015-2019.* Based on 5-year estimates for 2010 – 2014 and 2015 – 2019 the median income for Marion County has for the most part increased since 2014. Marion County has seen its median income increase at a rate of 16.5% since 2014 which outstrips the median income growth rate of Oregon (15.0%) by 1.5%. Of the Marion County cities, only Detroit (-8.3%) had negative growth between 2014 and 2019 with the remaining 18 included in the table below having greater than 5% growth rate at the same time (U.S. Census Bureau, 2022).

Table 2-4, Median Household Income for Marion County Cities

Jurisdiction	Median Income 2010 - 2014	Median income 2015 - 2019	Percent Change
Aumsville	$50,319	$61,620	22.4%
Aurora	$72,656	$87,632	20.6%
Detroit	$45,000	$41,250	-8.3%
Donald	$63,015	$71,964	14.2%
Gates	$36,250	$42,250	16.5%
Gervais	$51,172	$74,191	44.9%
Hubbard	$48,479	$59,803	23.3%
Idanha	$33,438	$43,500	30.0%
Jefferson	$45,781	$61,935	35.2%
Keizer	$50,897	$64,638	26.4%
Mill City	$34,472	$53,243	54.4%
Mt. Angel	$41,984	$44,485	5.9%
St. Paul	$64,063	$90,179	40.7%
Salem	$46,273	$55,920	20.8%
Scotts Mills	$42,292	$51,563	20.1%
Silverton	$53,929	$64,296	19.2%
Stayton	$41,432	$63,995	54.4%
Sublimity	$53,611	$73,977	37.9%
Turner	$52,674	$82,689	56.9%
Woodburn	$43,114	$50,093	16.1%
Marion County	$47,360	$59,625	25.8%

Source: U.S. Census Bureau (n.d.). 2010-2014 & 2015-2019 S1901 American Community Survey 5-year estimates (in 2021 inflation-adjusted dollars).

In 2014 23.3% of households in Marion County received Food Stamp or SNAP benefits and 6.3% received cash public assistance. In 2019 the proportion of households receiving Food Stamps or SNAP benefits dropped to 18.2% while the proportion of households receiving cash public assistance decreased by 3% from 2014.

From 2010-2014, 19.1% of the residents in Marion County were below the poverty level. From 2015-2019, 14.2% of residents in Marion County were below the poverty level (U.S. Census Bureau, 2022).. The numbers indicate that between 2014 and 2019, according to the five-year estimates, the proportion of Marion County residents living below the poverty line decreased 4.9%.

2.5 Housing Authority

According to HUD, households that pay more than 30 percent of their income on housing are cost burdened. Between 2015 and 2019 there were a total of 46,937 households renting within Marion County. Between 2015 and 2019 there were a total of 21,145 renters who were more than 30% cost burdened, showing that nearly 45% of all renting households in Marion County were cost burdened (U.S Department of Housing and Urban Development, 2020). Within the same time frame, there were a total of 71,100 households that were homeowners. Among them 15,955 homeowners were more than 30% cost burdened. Twenty-two percent of all homeowning households in Marion County were cost burdened.

2.6 Economic Diversity

Economic diversity is a general indicator of an area's fitness for weathering difficult financial times. One method for measuring economic diversity is through use of the Herfindahl Index, a formula that compares the composition of individual county and regional economies with those of states or the nation. Using the Herfindahl Index, a diversity ranking of 1 indicates the Oregon County with the most diverse economic activity compared to the state, while a ranking of 36 corresponds with the least diverse county economy. Marion County ranks extremely high on this index, with an economy that is considered the third most diverse out of the 36 counties evaluated.

Table 2-5, Regional Herfindahl Index Scores

	2008			2013		
County	Employment	Number of Industries	State Rank	Employment	Number of Industries	State Rank
Benton	26,433	199	23	25,247	201	21
Lane	123,008	260	4	114,670	260	5
Lincoln	14,286	183	29	13,491	179	30
Linn	36,360	225	5	33,934	222	4
Marion	105,758	252	3	101,571	245	3
Polk	12,837	178	18	12,179	167	9
Yamhill	27,797	209	9	27,860	209	6

Source, Oregon Employment Department

2.7 Industry

Key industries are those that represent major employers and are significant revenue generators. Different industries face distinct vulnerabilities to natural hazards, which can impact the resiliency of certain sectors and the overall economy of a region. Identifying key industries in the region enables communities to target mitigation activities towards that industry's specific sensitivities.

This is of specific concern when the businesses belong to the "basic sector industry." Basic sector industries are those that are dependent on sales outside of the local community and bring revenue into a local community via employment. Agriculture, information and technology, and wholesale trade industries are all examples of basic industries. Non-basic sector industries are those that are dependent on local sales for their business, such as retail, construction, and health services.

2.7.1 Employment by Industry

Economic resilience to natural disasters is particularly important for the major employment industries in the region. If these industries are negatively impacted by a natural hazard, the impact is felt throughout the regional economy. Thus, understanding and addressing the sensitivities of these industries is a strategic way to increase the resiliency of the entire regional economy.

According to 2021 U.S. Census data, Marion County employes 154,291 civilians 16 years and older. The top five industry sectors in Marion County employing civilians 16 years and older are retail trade (16,941); manufacturing (16,567); professional scientific, and management, and administrative and waste management services (16,530); public administration (14,177); and arts, entertainment, and recreation and accommodation and food services (13,505). As of 2014, are 64.3% of civilians 16 years and older are employed by private companies, 3.7% are self-employed owning their own business, 7.1% are employed by private not-for profit wages or are salary workers, 18.2% are employed by either local, state, or the federal government, and 6.7% are self-employed, but do not own their own business and have unpaid family workers (U.S. Census Bureau, 2022)

The table below (Table 2.6) shows the revenue generated by economic sector (Note: not all sectors are reported). The top five industry sectors in Marion County with the most employees, as of 2014, are Managerial, Professional (30 percent); Sales and Office (24 percent); Education, Health, and Social Services (30 percent); Service (20 percent); and Production and Transport (13 percent).

While Marion County has some basic industries, such as natural resources and mining and manufacturing, none of their five largest employers are basic sector industries. Therefore, Marion County's economy is very dependent on local sales and revenue. The three sectors with the highest revenue were Retail Trade, Health Care and Social Assistance and Wholesale Trade. The table below shows the revenue generated by each economic sector (Note: not all sectors are reported). Together, these three sectors generate more than $10 billion in annual revenue for the county.

Table 2-6, Employment by Industry in Marion County

Sector	People employed	Employee of private company	Self-employed in own incorp. business	Private not-for-profit employee	Local, state, and federal government employees	Self-employed in own not incorporated business
Civilian employed population over the age of 16 in Marion County, Oregon 2020	157,530	66.1%	3.3%	7.9%	17.3%	5.4%
Agriculture, forestry, fishing and hunting, and mining	8,334	87.2%	6.6%	1.0%	1.1%	4.1%
Construction	14,021	79.1%	6.5%	0.9%	3.3%	10.3%
Manufacturing	15,722	95.1%	1.4%	1.1%	0.3%	2.15%
Wholesale Trade	3,596	94.6%	2.1%	0.9%	0.0%	2.3%
Retail Trade	19,984	92.4%	2.1%	1.6%	0.6%	3.4%
Transportation and Warehousing, and utilities	6,047	71.1%	6.4%	2.3%	16.4%	3.8%
Information	1,740	79.6%	2.4%	3.9%	5.7%	8.4%
Finance and insurance, and real estate and rental and leasing	8,452	71.4%	7.0%	12.0%	5.1%	4.6%
Professional, scientific, and management, administrative and waste management services	12,978	69.1%	7.8%	2.8%	6.8%	13.5%
Educational services, and health care and social assistance	33,753	41.8%	1.7%	21.3%	31.7%	3.6%
Arts, entertainment, and recreation, and accommodation and food services	13,476	86.4%	2.2%	3.1%	3.7%	4.5%
Other services, except public administration	6,537	39.1%	2.5%	37.5%	0.7%	20.3%
Public administration	12,890	0.0	0.0	0.0	100.0	0.0

If any of these primary sectors are impacted by a disaster, Marion County may experience a significant disruption of economic productivity. 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.

As education and social services, state government and public administration, and manufacturing are key to post-disaster recovery efforts, a region is bolstered by its key employment sectors. It is important to consider what might happen to the county economy if the largest revenue generators and employers are impacted by a disaster. Areas with high income equality, increased housing costs, and low economic diversity are factors that may contribute to slower recovery from a disaster.

2.8 Land Use and Development Patterns

Marion County is the fifth-most populous county in Oregon and contains the state capital, Salem, which is also the county seat. The county was originally named the Champooick District, after a meeting place on the Willamette River known as Champoeg. This meeting place refers to the Kalapuyan word for yampah (an important staple crop of Native Americans on the West coast of North American). In 1849, the legislation governing the growing territory renamed the county in honor of General Francis Marion, a native of South Carolina who served in the American Revolutionary War.

Marion County has the unique distinction of being one of the first districts of the Oregon Country, along with Tuality (now Washington County), Clackamas, and Yamhill counties.

The vast majority of Marion County is forestland, with smaller areas of agricultural lands. Forested lands are located along the western portion of the county, while the eastern portion of the county has a dry, Mediterranean climate. Agriculture is concentrated throughout the flat regions of the Willamette Valley. Cities and rural residential areas are heavily concentrated along the many rivers, creeks, and lakes that make up the county. Local and state policies currently direct growth away from rural lands into Urban Growth Boundaries and, to a lesser extent, into rural communities. Within the rural areas, development radiates outward from the urban areas along rivers in a pattern that is likely to continue.

2.8.1 Regulatory Context

Oregon land use laws require land outside Urban Growth Boundaries (UGBs) to be protected for farm, forest, and other resources. For the most part, this law limits the amount of development in rural areas. However, the land use designation can change from resource protection in one of two ways:

- The requested change could qualify as an exception to Statewide Planning Goals, in which case the city or county must demonstrate to the State that the change meets requirements for an exception. These lands, known as exception lands, are predominantly designated for residential use.

- Resource land can also be converted to non-resource use when a city or county demonstrates that the land is no longer suitable for farm or forest production.

Local and state policies currently direct growth away from rural lands into UGBs, and, to a lesser extent, into rural communities. If development follows historical development trends, urban areas will expand their UGBs, while rural unincorporated communities will continue to grow, and overall rural residential density will increase slightly. However, the bulk of rural lands will remain in farm and forest use. The existing pattern of development in the rural areas, which is radiating out from the urban areas along rivers and streams, is likely to continue. Most of the "easy to develop" land is already developed, in general leaving more constrained land such as land in the floodplains or on steep slopes to be developed in the future, perhaps increasing the rate at which development occurs in natural hazard areas.

Since 1973, Oregon has maintained a strong statewide program for land use planning. The foundation of that program is a set of 19 statewide planning goals that express the state's policies on land use and on related topics, such as citizen involvement, land use planning, and natural resources.

Most of the goals are accompanied by "guidelines," which are suggestions about how a goal may be applied. Oregon's statewide goals are achieved through local comprehensive planning. State law requires each county and city to adopt a comprehensive plan and the zoning and land-division ordinances needed to put the plan into effect. The local comprehensive plans must be consistent with the statewide planning goals. Plans are reviewed for such consistency by the state's Land Conservation and Development Commission (LCDC). When LCDC officially approves a local government's plan, the plan is said to be "acknowledged." It then becomes the controlling document for land use in the area covered by that plan.

Goal 7

Goal 7: Areas Subject to Natural Disasters and Hazards intents to "protect people and property from natural hazards". Goal 7 requires local governments to adopt comprehensive plans (inventories, policies and implementing measures) to reduce risk to people and property from natural hazards. Natural hazards include floods, landslides, earthquakes, tsunamis, coastal erosion, and wildfires.

As part of its compliance with Goal 7, Marion County has adopted land use codes that provide standards for development in hazard areas that seek to reduce the risk to life, and property for development in hazard areas and to minimize the impact of a hazard on property owners and businesses.

2.9 Housing

Housing type and age are important factors in hazard mitigation planning. Certain housing types tend to be less disaster resistant and warrant special attention.

Mobile homes, for example, are generally more prone to wind and water damage than standard wood-frame construction. Homes built before 1993 may also 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 (Wang & Burns, 2006). 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.

Marion County has a variety of different housing types. In 2020, 63.2 percent were detached single family homes and 22.1 percent were multifamily (3 or more units). Single family attached dwelling units, such as townhouses comprised 3.6 percent of the Marion County housing stock. A slight increase to 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. Of these housing types, 68 percent were built prior to 1990 and therefore are not built to current earthquake standards (U.S. Census Bureau, 2020). Residents of Marion County who live in mobile homes are particularly vulnerable to natural hazards such as floods, earthquakes, and windstorms because they may not be secured by a foundation. Given the large percentage of County individuals and families who reside in mobile homes, public education and outreach efforts should be targeted to these groups.

In 2020, Marion County had 128,541 housing units. Of those, 4.6 percent were vacant (5,955 units). Slightly more than 60 percent of occupied units are owner occupied (73,190 units) and 39 percent are occupied by renters (47,284 units) (U.S. Census Bureau, 2020). Typically, renters are less likely than homeowners to prepare for natural hazard events. Renters are likely to have higher turnover rate, which limits their exposure to public education and outreach around hazards. This is exacerbated by the lack of targeted education and outreach on behalf of preparedness campaign that focuses specifically on renters, despite Marion County having almost equal numbers of renters and homeowners. Moreover, renters tend to have lower incomes and fewer resources to prepare for natural disasters, as well as a lack of capacity or knowledge to invest in or request mitigation measures for rented property.

2.10 Critical Facilities

Critical facilities are those facilities that are essential to government response and recovery activities (e.g., hospitals, police, fire and rescue stations, school districts and higher education institutions). The interruption or destruction of any of these facilities would have a debilitating effect on incident management.

Critical facilities in Marion County are identified within the Risk Assessment, which can be found in Volume I, Section 2, Risk Assessment.

2.11 Community Connectivity Capacity

Community connectivity capacity places strong emphasis on social structure, trust, norms, and cultural resources within a community. In terms of community resilience, these emerging elements of social and cultural capital are drawn upon to stabilize the recovery of the community. Social and cultural capitals are present in all communities; however, it may be dramatically different from one city to the next as they reflect the specific needs and composition of each community's residents.

2.12 Social Systems and Service Providers

Social systems include community organizations and programs that provide social and community-based services, such as employment, health, senior and disabled services,

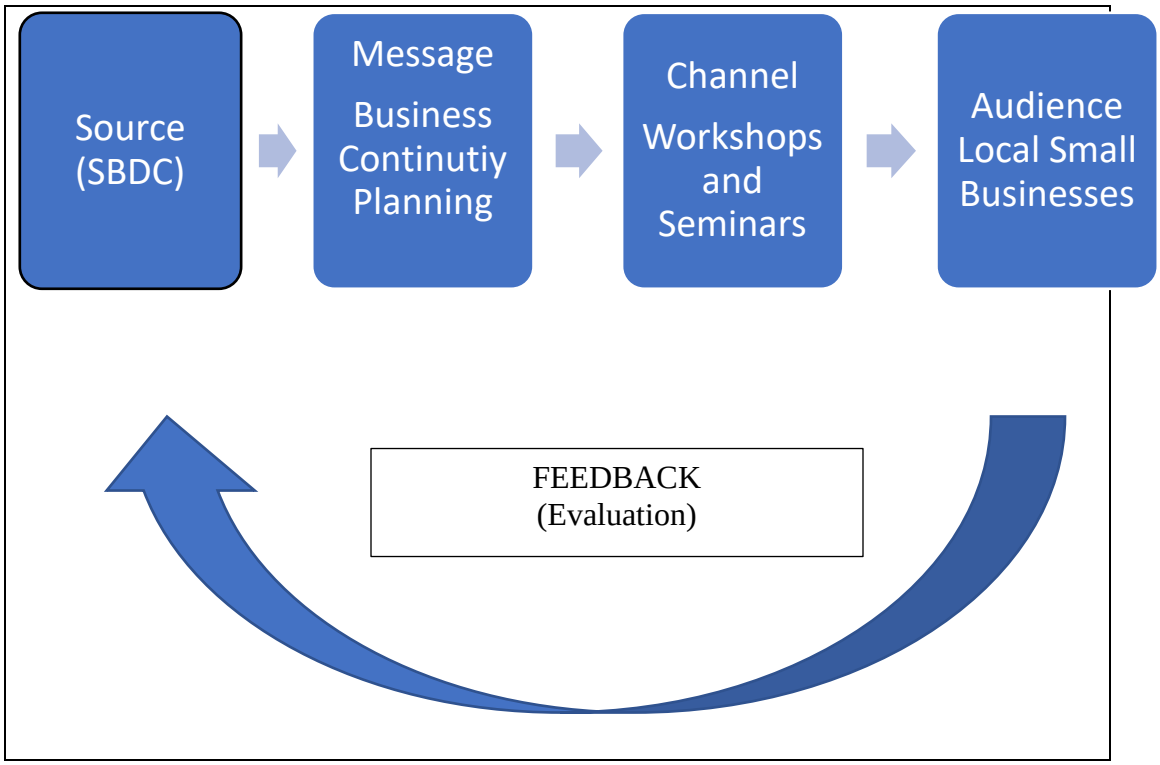
professional associations and veterans' affairs. When planning for hazard mitigation, it is important to know what social systems exist within the community because of their existing connections to the public. Often, actions identified in a plan involve communicating with the public or specific subgroups of a population (e.g. elderly, children, low income, etc.). The County can use existing social systems as resources for implementing public education and outreach because these service providers typically have existing relationships with members of the public. While the presence of these services is predominantly in urbanized areas of the county, this is synonymous with the general urbanizing trend of residents.

The following is a brief explanation of how the communication process works and how the community's existing social service providers could be used to provide hazard related messages to their clients.

There are five essential elements for communicating effectively to a target audience:

- The source of the message must be credible.
- The message must be appropriately designed.
- The channel for communicating the message must be carefully selected;
- The audience must be clearly defined.
- The recommended action must be clearly stated, and a feedback channel established for questions, comments, and suggestions.

Figure 2-4, Communication Process



Source: Adapted from the U.S. Environmental Protection Agency Radon Division's outreach program

Three potential methods for public involvement include:

- Education and outreach – organization could partner with the community to educate the public or provide outreach assistance on hazard preparedness and mitigation.
- Information dissemination – organization could partner with the community to provide hazard related information to target audiences.
- Plan/ project implementation – organization may have plans and/ or policies that may be used to implement mitigation activities or the organization could serve as the coordinating or partner organization to implement mitigation actions.

2.13 Civic Engagement

Civic engagement and involvement in local, state and national politics are important indicators of community connectivity other indicators such as volunteerism, participation in formal community networks and community charitable contributions are examples of other civic engagement that may increase community connectivity.

2.14 Cultural Resources

2.14.1 Historic Places

Historic and cultural resources, such as historic structures and landmarks, help to define a community and potentially create tourism-related revenue. Protecting these resources from the impact of disasters is important because they have an important role in defining and supporting the community. According to the object adds to the historic associations, historic architectural qualities, or archeological values for which a property is significant because it was present during the period of significance, related to the documented significance of the property, and possesses historical integrity or is capable of yielding important information about the period; or it independently meets the National Register criteria" (U.S. National Parks, N.d.). If a structure does not meet these criteria, it's considered to be non-contributing.

There are 211 eligible/significant (ES) historical sites and 1818 eligible/contributing historical sites in Marion County. Overall, there are a total of 2,029 historical sites in Marion County. For more information, visit the link below.

(http://heritagedata.prd.state.or.us/historic/index.cfm?do=reports.dsp_reportMenu)

Marion County contains the ancestral homelands of the Ahantchuyuk band of the Kalapuya, the Molalla, and the Santiam band of the Kalapuya. Descendants of these communities include members of the Confederated Tribes of Grand Ronde and Confederated Tribes of Siletz Indians.

Marion County was the site of some of the earliest European occupation of the Willamette Valley. Resources related to this include sites related to the early French-Canadian fur trappers, Champoeg State Park and cemetery, St. Louis Catholic Church, Willamette Mission State Park, Willamette Post, and the community of Butteville.

Several locations in Marion County and the City of Salem are recognized for their contributions to Oregon's provisional government and early statehood. The Geer Fruit Farm was the site of meetings regarding statehood prior to 1859. The Aurora Colony was a Christian Communal Society Farming community founded in 1856 by William Keil and John Schmit, with many original buildings still remaining in and around the city of Aurora.

As of 2022, a search of the program database Marion County has added three more Century Farms for a total of 142 Century Farms and there are 8 Sesquicentennial (150 years) farms or ranches listed as part of the Oregon Century Farm & Ranch Program (Oregon Century Farm and Ranch Program, N.d.). A number of historic farmhouses are listed on the National Register of Historic Places for their distinctive architecture or their association with significant historical events.

2.14.2 Libraries and Museums

Libraries and museums develop cultural capacity and community connectivity because they are places of knowledge and recognition, have common spaces for the community to gather, and help maintain a sense of community during a disaster. They are recognized as safe places and reflect normalcy in times of distress. *In the City of Salem, the Salem Public Library's Main Branch recently completed a major seismic upgrade.

**Please Note: Even though the City of Salem is located in Marion County, they complete their own Hazard Mitigation Plan and is not a part of the County's.*

2.14.3 Cultural Events

Other such institutions that can strengthen community connectivity are the presence of festivals and organizations that engage diverse cultural interests. These events bring revenue into the community and have the potential to both improve cultural competence and enhance a sense of place and identity. Cultural connectivity is important to community resilience, as people may be more inclined to help their neighbors in an emergency if they feel part of the community and culture.

2.15 Community Stability

2.15.1 Residential Geographic Stability

Community stability is a measure of rootedness in place. It is hypothesized that resilience to a disaster stem in part from familiarity with place, not only for navigating the community during a crisis, but also accessing services and using other supports for economic or social challenges. (Cutter, Burton, & Emrich, 2010). Fifty-five percent of Marion County residents have moved within the last five years, which makes it difficult to conduct public outreach and stay in contact with residents. While this is only 2 percent above the statewide average, it demonstrates that Marion County is an area that shifts rapidly and lacks population stability. Therefore, having public education and outreach strategies that can meet these needs is essential.

2.15.2 Homeownership

Housing tenure describes whether residents rent or own the housing units they occupy. Homeowners are typically financially stable but are at risk of greater property loss after a disaster event. People may rent because they choose not to own, lack the financial resources necessary, or are transient.

Collectively, about 60.1 percent of the occupied housing units in Marion County are owner-occupied and 39 percent are renter occupied. About 4.6 percent of Marion County's homes are vacant. In addition, seasonal or recreational housing accounts for approximately a little over 1 percent of housing units, which is below the Oregon average of 3.5 percent (U.S. Census Bureau, 2020).

Wealth increases resiliency and recovery from disasters. Renters typically do not have personal financial resources or insurance to assist them post-disaster. On the other hand, renters tend to be more mobile and have fewer assets at risk of hazards (Cutter, Boruff, & Shirley, 2003). 27 In the most extreme cases, renters lack sufficient shelter options when lodging becomes uninhabitable or unaffordable post-disaster.

Marion County has distinct social and cultural resources that work in favor to increase community connectivity and resilience. Sustaining social and cultural resources, such as social services and cultural events, is essential to preserving community cohesion and identity. The presence of larger communities makes additional resources and services available to the public. However, it is important to consider that these amenities may not be equally distributed to the rural portions of the county, which produces implications for recovery in the event of a disaster.

In the long-term, it may be of specific interest to the county to evaluate community stability. A community experiencing instability and low homeownership may hinder the effectiveness of response and recovery mechanisms.

2.16 Political Capacity

Political capacity is recognized as the government and planning structures established within the community. In terms of hazard resilience, it is essential for government and non-government entities to collaborate; as disaster losses stem from a predictable result of interactions between the physical environments, social and demographic characteristics, and the built environment (Mileti, 1999). Resilient political capital seeks to involve various stakeholders in hazard planning and works towards integrating the Hazards Mitigation Plan with other community plans, so that all planning approaches are consistent.

2.17 Government Structure

Marion County's governing jurisdiction includes all unincorporated areas that are not governed by U.S. Forest Service, Bureau of Land Management, and state-owned land. Marion County has three (3) elected County Commissioners, as well as an elected sheriff and district attorney. County departments and divisions consist of the following:

Administrative Service: serves citizen needs by providing election services, recording property documents, collecting property taxes, issuing marriage and dog licenses, and engaging the community to make Marion County a healthy environment for children and families. Administrative Services supports the internal county organization by providing business support services including payroll and accounting, information technology, budget development and oversight, and human resources services.

Assessment: responsible for assessing all properties in Marion County. The assessment department is also responsible for maps, property information, and special tax exemption designations.

Community Services: ensures that the building and land use laws of the state of Oregon and Marion County are followed in a fair and equitable manner. A one- stop permit service coordinates the issuance of permits for other county departments involved in development activities.

Health Department: works to create and sustain the conditions in which all people in the community can be healthy. To that end, public health serves three core functions: to assess the health status of the entire population, to advise policy development, and to ensure that adequate, competent services are available throughout the community.

Natural Areas and Parks: serves the interests and pursuits of Marion County residents by providing access to natural, historic, and recreational areas and conserving, restoring and developing parkland investments.

Public Works: responsible for keeping the community accessible, safe, and environmentally responsible by providing citizens with efficient road and transportation systems, rural utility services, public facilities and land use services. The Planning and Zoning Division of the Public Works Department maintains the county Flood Insurance Rate Maps (FIRM), which are used in determining vulnerability and risk of flood.

2.18 Existing Plans and Policies

Communities often have existing plans and policies that guide and influence land use, land development, and population growth. Such existing plans and policies can include comprehensive plans, zoning ordinances, and technical reports or studies. Plans and policies already in existence have support from residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, and can adapt easily to changing conditions and needs (Burby, 1998).

The Marion County Hazards Mitigation Plan includes a range of recommended action items that, when implemented, will reduce the county's vulnerability to hazards. Many of these recommendations are consistent with the goals and objectives of the county's existing plans and policies. Linking existing plans and policies to the Hazards Mitigation Plan helps identify what resources already exist that can be used to implement the action items identified in the plan.

Implementing the hazards mitigation plan's action items through existing plans and policies increases their likelihood of being supported and getting updated and maximizes the county's resources. In addition to the plans listed below the county and incorporated cities also have zoning ordinances (including floodplain development regulations) and building regulations.

Marion County's current plans and policies include the following:

Marion County Comprehensive Land Use Plan

- Date of Last Revision: 2010
- Author/ Owner: Marion County
- Description: The Comprehensive Plan is the official policy guide for decisions about growth, development, and conservation of natural resources in Marion County.
- Relationship to Natural Hazard Mitigation Planning: The Goal 7 Policies within Marion County's Comprehensive Plan are limited at best. The plan does not contain a specific section dedicated to natural hazards. Where they exist, hazard policies can provide the framework for evaluating land use actions for their exposure to potential harm from natural hazards. The policies can guide the identification of areas subject to natural hazards, regulation of development in those areas, and protection of citizens, property, and the environment from the effects of natural hazards. The protection methods prescribed by such policies include prevention and preparedness, land use regulation, use of natural systems to mitigate hazards, public education, and collaboration with other organizations. Such policies can also guide development of this natural hazards mitigation plan. Likewise, the risk assessment and mitigation action items identified within the Marion County Multi-jurisdictional Hazards Mitigation plan should also influence the comprehensive plan's findings and land use policies.

Marion County Community Wildfire Protection Plan (CWPP)

- **Date of Last Revision:** 2017 updated in 2023.
- **Author/ Owner**: Marion County Fire Defense Board, Oregon Department of Forestry, and Marion County Emergency Management
- **Description:** The mission of the Community Wildfire Protection Plan (CWPP) is to make Marion County residents, businesses, and resources less vulnerable to the negative effects of wildland fires. The vision of the CWPP is to promote awareness of the countywide wildland fire hazard and propose workable solutions to reduce the wildfire potential.
- **Relationship to Hazard Mitigation Planning**: The Community Wildfire Protection Plan (CWPP) is intended to be adopted for incorporation within the Marion County Hazards Mitigation Plan. The CWPP contains goals and actions that seek to minimize the county's risk to wildfire hazards.

Marion County Emergency Operations Plan (EOP)

- **Date of Last Revision**: 2019, revision completed and promulgated in 2020.
- **Author/ Owner**: Marion County Emergency Management
- **Description:** The Marion County Emergency Operations Plan (EOP) is based on a thorough analysis of the natural and human-made hazards that could affect the county. This analysis is the first step in planning for mitigation, response, and recovery actions. The method used in this analysis provides a sense of hazard priorities, or relative risk. It does not predict the occurrence of a particular hazard, but it does "quantify" the risk of one hazard compared with another. By doing this analysis, planning can then be focused where the risk is the greatest.
- **Relationship to Hazard Mitigation Planning**: the EOP includes information that is relevant to the Marion County Hazards Mitigation Plan and vice versa. Hazard rankings from the EOP were included in the Hazards Mitigation Plan's Hazard Chapters. Ideally, the EOP and Hazards Mitigation Plan will eventually share, and benefit from one risk assessment. As such, information from the HMP may be integrated into the EOP.

Marion County Storm Water Management Program for the Urbanized Area around Salem and Keizer

- **Date of Last Revision**: 2021
- **Author/ Owner**: Marion County Environmental Services
- **Description**: Outlines the different components of Marion County's Stormwater Management Program: (1) Public Education; (2) Public Involvement; (3) Illicit Discharge/Pollution); (4) Construction Erosion Control; (5) Post- Construction Runoff Control; (6) Municipal Operations/Pollution Prevention. The program is intended to meet the

requirements of the National Pollutant Discharge Elimination System (NPDES) Program as developed under the federal Clean Water Act.

- **Relation to Hazard Mitigation Planning**: Marion County's Stormwater Management Program develops and implements education and outreach strategies related to stormwater management. Existing connections with the public can be utilized to disseminate educational materials related to hazards mitigation. Additionally, mitigation actions that seek to reduce the hazards associated with urban flooding can be implemented through the county's Stormwater Management Program, or vice versa.

Marion County Rural Transportation System Plan (RTSP)

- **Date of Last Revision**: 2005
- **Author/ Owner**: Marion County
- **Description:** A Transportation System Plan (TSP) is required to provide a transportation system that accommodates the expected 20-year growth in population and employment resulting from implementation of the currently adopted Marion County comprehensive land use plan. In 2013, Marion County updated the Background, Goals, Facility Inventory, Traffic Projections, and Strategy sections.
- **Relation to Hazard Mitigation Planning**: Transportation systems are important in evacuating and responding to disasters. Mitigation actions that focus on strengthening the transportation system can be incorporated into the Transportation Systems Plan.

North Santiam Watershed Drought Contingency Plan (DCP)

- **Date of Development**: 2017, Update in 2023
- **Author/Owner:** Santiam Water Control District
- **Description**: The Santiam Water Control District (SWCD) has recently received funding through a Bureau of Reclamation Water SMART grant to develop and implement a Drought Contingency Plan for the North Santiam Watershed (http://www.usbr.gov/drought/). 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).

- **Relation to Hazard Mitigation Planning**: Drought is a growing issue in Marion County. Water management trade-offs include drinking water, irrigation, recreation, habitat, flooding, wildfire, and water quality considerations. The Drought Contingency Plan will help the county prioritize and manage competing water related issue in the future.

3 Appendix C: Planning and Public Process

This section describes the public process used to update the 2022 Marion County Multi-Jurisdictional Hazard Mitigation Plan.

In 2019, Marion County accepted an invitation from the Oregon Department of Land Conservation and Development (DLCD) to participate in a grant application to the FEMA Pre- Disaster Mitigation (PDM 19) planning grant. In March 2021, DLCD started working with Marion County Emergency Management to launch the HMP update process. Because Marion County was recovering from the 2020 Beachie Creek and Lionshead wildfire disasters, there was an interest in a broad and inclusive recruitment process for the many impacted communities and special districts. This resulted in a large steering committee of plan holders and many interested parties. The project kickoff meeting occurred in August 2021 and occurred each month until July 2022, except one (Feb. 2022)—a few more meetings than originally planned due to staff changes and health-related delays as the update spanned the second year of the COVID-19 pandemic.

3.1 Project Background

Marion County partnered with the University of Oregon Community Service Center (CSC) to update their 2011 Marion County Hazards Mitigation Plan (HMP). The Disaster Mitigation Act of 2000 requires communities to update their mitigation plans every five years to remain eligible for Pre-Disaster Mitigation (PDM) program funding, Flood Mitigation Assistance (FMA) program funding, and Hazard Grant Mitigation Program (HMGP) funding. A Federal Emergency Management Pre-Disaster Mitigation grant funded the CSC work with non-federal match provided by Marion County.

A total of four lifeline sector analysis sessions were held in March 2016. This analysis was then presented to the Marion County HMP steering committee, which provided hazard history and information about critical infrastructures and facilities within the county, evaluated and approved action items as a result of earlier analysis, and developed an implementation and maintenance strategy for the plan. Cities included within the Marion County HMP include Aumsville, Aurora, Detroit, Gates, Idanha, Keizer, Mill City, Silverton, Stayton, Turner and Woodburn.

3.2 2022 Plan Update Matrix

The sections below discuss major changes made to the HMPs during the 2021-2022 plan update process. Major changes include the replacement or deletion of large portions of text, the addition of material sourced from the DOGAMI multi-hazard risk report and other resources, new mitigation action items, and the addition of city and district addenda to the plan. If a section is not addressed in this memo, then no significant changes occurred.

The plan's format and organization maintained the OPDR plan template. Table C-1 below lists the 2011 and 2016 Marion County NHMP plan section names and the corresponding 2022 section names, as updated. The table below uses the 2022 plan update section names to reference any changes, additions, or deletions within the plan.

Table 3-1, Changes to Plan Organization

Table C-1 Changes to Plan Organization

2011 Marion County MNHMP	2017 Marion County MJHMP	2022 Marion County MJHMP
Acknowledgements	Acknowledgements	Acknowledgements
Table of Contents	Table of Contents	Table of Contents
Approval Letter	Approval Letters and Resolutions	Approval Letters and Resolutions
	FEMA Review Tool	FEMA Review Tool
Volume I: Basic Plan	Volume I: Basic Plan	Volume I: Basic Plan
Executive Summary	Plan Summary	Plan Summary
Section 1: Introduction	Section 1: Introduction	Section 1: Introduction
Section 2: Community Overview	Appendix C: Community Profile	Appendix C: Community Profile
N/A	Section 2: Risk Assessment	Section 2: Risk Assessment
Section 3: Mission, Goals and Action Items	Section 3 Mitigation Strategy	Section 3 Mitigation Strategy
Section 4: Plan Implementation and Maintenance	Section 4: Implementation and Maintenance	Section 4: Implementation and Maintenance Section 5: Plan Review, Adoption, and Approval
Volume II: Hazard Analysis		
Dam Failure Drought Earthquake Flood Landslide Volcanic Eruption Wildfire Wind Storm Winter Storm	Volume II incorporated into Volume I, Section 2: Risk Assessment	Hazard Analysis occurs in Volume I, Section 2: Risk Assessment Hazard Analysis also occurs in Volume II, Jurisdictional Addenda. This is specific, local hazard vulnerability information, including localized hazard events and their impacts. It illustrates the basis for the city or district's HVA scores. Extreme heat, avalanche, and tornado are new hazards.
Volume II: City/Special District Addenda	Volume II: City Addenda	Volume II: City Addenda
	City of Aumsville	City of Aumsville
City of Aurora	City of Aurora	City of Aurora
	City of Detroit	City of Detroit
	City of Gates	
		City of Gervais
		City of Hubbard
	City of Idanha	City of Idanha
		City of Jefferson
		Keizer Fire District
City of Keizer	City of Keizer	City of Keizer
	City of Mill City	(City of) Mill City
		City of Mt. Angel
		Mt. Angel Fire District
		City of Scotts Mills
City of Silverton	City of Silverton	
	City of Stayton	City of Stayton
		City of Sublimity
	City of Turner	City of Turner
City of Woodburn	City of Woodburn	City of Woodburn
		Woodburn Fire District
Volume III: Resource Appendices	Volume III: Appendices	Volume III: Appendices
Appendix A: Action Item Forms	Appendix A: Action Items	Appendix A: Action Items
Appendix B: Planning and Public Process	Appendix B: Planning and Public Process	Appendix B: Planning and Public Process
Appendix C: Economic Analysis of Natural Hazard Mitigation Projects	Appendix C: Community Profile	Appendix C: Community Profile
Appendix D: Stakeholder Survey Report	Appendix D: Lifeline Sector Profile	Appendix D: Lifeline Sector Profile
Appendix E: Resource Directory	Appendix E: Economic Analysis of Hazard Mitigation Projects	Appendix E: Economic Analysis of Hazard Mitigation Projects
	Appendix F: Grant Programs	Appendix F: Grant Programs
		Appendix G: Hazard History

3.3 2022 Plan Update Changes

Due to the significant increase in plan holders for the 2022 plan update, the primary changes between the 2022 and the 2016 updates occurred in the incorporation of new technical data and new/revised jurisdictional addenda. The 2022 HMP focused the addenda by removing duplicative information, adding detailed information about each plan holder including specifics about critical facilities, mitigation action status, new and revised mitigation actions, and the incorporation of vulnerability information from the updated risk assessment report. There were six new cities and three new special districts participating the plan that did not participate in the 2016 NHMP; two cities did not have the capacity to participate in this update (cites of Gates and Silverton).

Front Pages

1. Plan cover date and style has been updated to the DLCD format.
2. Acknowledgements have been updated to include the 2022 project partners and planning participants.
3. The FEMA approval letter, review tool, and county and city resolutions of adoption are included. (will be included with the final version of the HMP)

3.3.1 Volume I: Basic Plan

Volume I provide the plan framework for the 2022 Multi-jurisdictional HMP update. Volume I include the following sections:

Plan Summary:

The 2022 HMP includes an updated plan summary that provides information about the purpose of natural hazards mitigation planning and describes how the plan will be implemented.

Section 1: Introduction

Section 1 introduces the concept of natural hazards mitigation planning and answers the question, “Why develop a mitigation plan?” it has been reformatted for efficiency and readability. The new text describes the federal requirements that the plan addresses and gives examples of the policy framework for natural hazards planning in Oregon. Section 1 summarizes the 2022 plan update process and provides an overview of how the plan is organized.

Section 2: Risk Assessment

Section 2, Risk Assessment, provides a focused assessment of hazards and vulnerabilities within a single section. The risk assessment consists of three phases: hazard identification, vulnerability assessment, and risk analysis. Hazard identification involves the identification of hazard geographic extent, its intensity, and probability of occurrence. The second phase attempts to predict how different types of property and population groups will be affected by the hazard. The third phase involves estimating the damage, injuries, and costs likely to be incurred in a geographic area over a period of time. Changes to Section 2 include:

- Hazard identification, characteristics, history, probability, vulnerability, and hazard specific mitigation activities were updated. Outdated and extraneous information was removed and links to technical reports were added as a replacement. With this update the Oregon NHMP is cited heavily as a reference to the more technical hazard material.
- Two new technical reports that form the logic basis of the risk assessment were contracted as a part of the DLCD grant for the project.
    - Williams, M.C. and I.P. Madin. (2022). MULTI-HAZARD RISK REPORT FOR MARION COUNTY, OREGON INCLUDING THE CITIES OF AUMSVILLE, AURORA, DETROIT, DONALD, GATES, GERVAIS, HUBBARD, IDANHA, JEFFERSON, KEIZER, MILL CITY, MOUNT ANGEL, SALEM, SCOTTS MILLS, SILVERTON, ST PAUL, STAYTON, SUBLIMITY, TURNER, AND WOODBURN AND THE UNINCORPORATED COMMUNITIES OF BROOKS, BUTTEVILLE, FOUR CORNERS, HAYESVILLE, LABISH VILLAGE, MARION, AND MEHAMA. : The Department of Geology and Mineral Industries (DOGAMI) conducted a multi-hazard risk assessment (Risk Report) for Marion County. The Risk Report will provide a quantitative risk assessment that informs communities of their risks related to certain natural hazards (including earthquake). The data included in this plan is the best available data, outdated information has been removed. The county and cities incorporated the risk assessment information to provide greater detail to sensitivity and exposure to the profiled hazards.
- Links to specific hazard studies and data are embedded directly into the plan where relevant and available.
- NFIP information was updated.
- The hazard vulnerability analysis/ relative risk has been updated for the county and cities (city information is included with more detail within Volume II).

Section 3: Mitigation Strategy

This section provides the basis and justification for the mission, goals, and mitigation actions identified in the HMP. Major changes to Section 3 include the following:

- The mission and goals were reviewed and revised to align with the updated 2020 State NHMP. The cities reviewed the revised mission and goals and agreed to replace their existing mission and goals with this version.
- Action items were reviewed, revised, and prioritized.

Section 4: Plan Implementation and Maintenance

Marion County Emergency Management will continue to convene and coordinate the county steering committee (documentation for the city conveners is contained within the jurisdictional addenda of Volume II).

3.3.2 Volume 2:

A significant focus of this planning effort has been to increase the involvement and participation of cities in Marion County. With 20 incorporated cities, the county is committed to a regional planning approach that emphasizes partnerships and local collaboration. DLCD spent much of their consulting time supporting the eighteen participating jurisdictions complete their jurisdictional addenda.

3.3.3 Volume 3:

Below is a summary of the appendices included in the 2022 HMP:

Appendix A: Marion County Priority Actions

Priority actions are listed in Appendix A-1. Priority action items are based upon continuous community needs, the identification of new hazards, and current needs based upon the community risk assessment. They are designed to be feasibly accomplished within the next five years. Action item forms were created for priority actions that formerly did not have them; others have been updated to account for new information. The action item forms reference the status of the action item, timeline, rationale, implementation measures, and funding sources. Coordinating and partner organizations, for Marion County, are listed in Table 3-2 within Section 3, Mitigation Strategy, and within the city addenda for each of the participating cities.

A list of other actions is provided within this appendix. These actions are not considered high priority; however, the steering committees have the option to consider all actions items for implementation at any time. This strategy allows the jurisdictions to prioritize actions that are most likely to be implemented under current circumstances yet still allows their mitigation strategies as new situations, resources, and capabilities arise (such as capitalizing on funding sources for an action item that is not currently listed as high priority). The steering committees will formally review the actions in this section during their semiannual or annual meetings. Action items may also be considered, or added, to the list of high priority actions at any time.

Appendix B: Community Profile

The community profile has been updated to conform to the OPDR template and consolidates information for Marion County and participating cities.

Appendix C: Planning and Public Process

The planning and public process appendix reflects changes made to the Marion County MJHMP and documents the 2022 planning and public process.

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 Natural Hazard Mitigation Projects

Updates are provided for the economic analysis of natural hazard mitigation projects.

Appendix F: Grant Programs

Some of the previously provided resources were deemed unnecessary since this material is covered within the Oregon NHMP and appropriate resources are provided within the Hazard Annexes of Volume II. Updates were made to the remaining grant programs and resources.

Appendix G: Hazard History

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

4 2022 HMP Public Participation Process

The following mechanisms were used to engage the public, plan holders, and interested parties throughout the 2022 Marion County HMP update process. These methods are also used when the plan undergoes review on an annual basis.

- Project Schedule
- Steering Committee
- Project Website
- Community Hazards Survey
- Social media, newsletters, emails, and other outreach.

4.1 Public Comment Matrix

The following comments were provided by the community as a part of the Marion County Hazard Mitigation Plan update.

Table 4-1, Public Comment Matrix

Open-Ended Response Comments Do you have any additional concerns or comments about hazards in your community?			
#	Commenter	Comment	Response
1	Name, location/ jurisdiction		
2	Detroit City Council via Kelly Galbraith	City of Detroit Addendum draft dated 7/27/22 was reviewed by City Council. No comments.	Thank you for taking the time to review your jurisdiction's addendum in a timely manner. We understand that no changes are requested, and the addendum is approvable as written.
3	Hubbard City Council (via Melinda Olinger, P.W. Administrative Manager)	City of Hubbard Addendum draft dated 07/12/2022 was reviewed by City Council. No comments.	Thank you for taking the time to review your jurisdiction's addendum in a timely manner. We understand that no changes are requested, and the addendum is approvable as written.
4	Woodburn C.E.R.T. (via Ulrich Reich, C.E.R.T. Coordinator)	Edits provided on the Woodburn/ Woodburn Fire Addendum clarifying details about the role and operations of Woodburn C.E.R.T.	Thank you for taking the time to review the Woodburn/ Woodburn Fire Addendum for accuracy. The value of community-based organizations cannot be overstated—thank you for your service.
5	Aurora Community Preparedness (via Laurie Boyce, Coordinator/ Former City Recorder)	Edits provided: Aurora Community Preparedness is implementing priority action item 22-MH-03 by coordinating with Red Cross and other efforts.	Thank you for taking the time to review the Aurora Addendum and helping the community to prepare for a disaster. We have accepted your proposed revisions and indicated that Aurora Community Preparedness is the City's liaison for this action item.
6			
7			
8			
9			
10			
11			
13			

Open-Ended Response Comments Do you have any additional concerns or comments about hazards in your community?			
#	Commenter	Comment	Response
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
30			

4.2 Project Flyer

On August 3, 2021 Marion County is kicking off the update to the All-Hazard Mitigation Plan. Existing All-Hazard Mitigation Plans must be updated every five years.

Marion County is collaborating with the Oregon Department of Land Conservation and Development (DLCD) to update the Multi-Jurisdictional Hazard Plan to cover all hazards.

The updates will ensure the county, cities, and special districts maintain eligibility to apply for disaster related grant funding through the Federal Emergency Management Agency (FEMA). The plan will be completed by August, 2022.

WHY ENGAGE IN HAZARD MITIGATION PLANNING?

TO AVOID DISASTERS
by reducing or eliminating long-term risk to people, property, and the environment from hazards.

TO INCREASE SAFETY
and resilience by integrating hazard mitigation into local plans, programs, and policies.

TO MAINTAIN ELIGIBILITY
for disaster-related funding.

FOR MORE INFORMATION, CONTACT
Mike Hintz | Emergency Preparedness Coordinator
mhintz@co.marion.or.us | 503.365.3136

To review the current Marion County Multi-Jurisdictional Hazard Mitigation Plan, please visit:
https://www.co.marion.or.us/PW/EmergencyManagement

Marion County
OREGON

4.3 Plan Update Schedule

Marion County Multi-Jurisdictional Hazard Mitigation Plan (MJ-HMP)

PROJECT SCHEDULE

FINAL

MONTH	ACTIVITY
Dec. 2019 – July 2021	**Project Initiation**
Steering Committee (SC): NA	• Initial project coordination conversations between DLCD and Marion County staff. • Letter of Intent from Marion County to DLCD 12/30/19. • DLCD Natural Hazards Planner/Project Manager for the Marion County NHMP reaches out to Marion County on 2/12/21 to begin focused PDM 19 pre-award work. • Discussion: grant pre- and post- award costs, Intergovernmental Agreement (IGA), Scope of Work (SOW), allocation of basic responsibilities and tasks, NHMP process, Steering Committee roster, risk assessment, critical facilities and infrastructure, project schedule, public engagement and outreach, communication protocol, and cost share. • Draft IGA, SOW, and project schedule provided from DLCD to Marion County on 4/7/21. • Continued revised copies IGA, SOW, and project schedule provided from DLCD to Marion County. • DLCD and Marion County discuss draft IGA, SOW, and project schedule. • DLCD provides example of NHMP outreach flyer, April - May 2021.
May - July 2021	**Organizational Meeting and Project Progress (Pre-Award)**
SC: NA	• DLCD provides final versions of IGA, SOW, and project schedule. Agreement between DLCD and Marian County is solidified on the allocation of basic responsibilities and tasks, communication protocol, public engagement and outreach plans. • Marion County provides: ○ Steering Committee roster; ○ Contact information for the person responsible for cost sharing tracking and reporting; ○ Contact information for the person responsible for website updates for the NHMP; and ○ Signed IGA. ○ NHMP update announcement on their website. • DLCD provides fully executed IGA on an ongoing basis as communities secure approval. • Draft NHMP outreach flyer received from Marion County to DLCD on 7/14/21. Finalized on 7/19/21. • Potentially host pre-award Steering Committee meeting.
July – August 2021	**Project Progress (Pre- to Post-Award)**
SC: 8/3/21 (in person & online)	• Pre-award work continues. Potentially host pre-award Steering Committee meeting. • DLCD and Marion County await obligation of funding from FEMA. After funds are obligated, PDM 19 post-award work can occur on the NHMP. • Cost share forms can be finalized once award is obligated. • DLCD Project Manager was notified on 9/10/21 that FEMA obligated the PDM 19 funds and the post-award period begins 9/7/21. The PDM 19 grant Period of Performance (POP) begins on the day of the acceptance of the award and ends no later than 36 months.

Marion County Multi-Jurisdictional Hazard Mitigation Plan (MJ-HMP)

PROJECT SCHEDULE

FINAL

MONTH	ACTIVITY
Sept. 2021 – March 2022	**Project Progress (Post-Award)**
SC: (all online, except 1 hybrid) 9/7/21, 10/5/21, 11/2/21, 12/7/21, 1/4/22, 3/1/22, 4/5/22, 5/4/22 (hybrid), 6/7/22, 7/5/22	• After funds are obligated from FEMA, PDM 19 post-award work can occur on the NHMP. • Monthly Steering Committee meetings will be held. • Drafts of the Risk Assessment, Mitigation Strategy, and the Implementation Plan and Plan Maintenance sections will be drafted and available for review to the SC and public. Comments received are collected, discussed, and addressed.
Sept. 2021 – March 2022	**Project Progress including Risk Assessment**
SC: (all online, except 1 hybrid) 9/7/21, 10/5/21, 11/2/21, 12/7/21, 1/4/22, 3/1/22, 4/5/22, 5/4/22 (hybrid), 6/7/22, 7/5/22	• DLCD and Marion County perform Hazard Vulnerability Analysis. • Discuss critical facilities and infrastructure and information available for the risk assessment. • DLCD provides Hazard Vulnerability Analysis Summary and NFIP-insured repetitive loss information. Discuss. Draft risk assessment. • Describe the process for integrating NHMP content into plans, policies, and programs. Describe NFIP participation and compliance. • Review mission statement and goals.
Sept. 2021 – March 2022	**Project Progress including Mitigation Strategy**
SC: (all online, except 1 hybrid) 9/7/21, 10/5/21, 11/2/21, 12/7/21, 1/4/22, 3/1/22, 4/5/22, 5/4/22 (hybrid), 6/7/22, 7/5/22	• Continue review of mission statement and goals as needed. • Review existing mitigation actions (status), retain as is or revise actions, delete actions, and add actions; and prioritize mitigation actions. • There will also be a discussion of the OCCRI Future Changing Conditions report, outreach, cost share, success stories from jurisdictions, and a review of the HVA Summary.
Sept. 2021 – March 2022	**Project Progress including Mitigation Strategy and Plan Maintenance**
SC: (all online, except 1 hybrid) 9/7/21, 10/5/21, 11/2/21, 12/7/21, 1/4/22, 3/1/22, 4/5/22, 5/4/22 (hybrid), 6/7/22, 7/5/22	• Describe the method and schedule for the NHMP maintenance during the five-year cycle. • Describe the participants' public outreach and participation during NHMP maintenance. • Continue to discuss the OCCRI Future Changing Conditions Report; cost share forms; and revisit of the timelines for the NHMP process.
Sept. 2021 – March 2022	**Project Progress including Documentation of the Planning Process**
SC: (all online, except 1 hybrid) 9/7/21, 10/5/21, 11/2/21, 12/7/21, 1/4/22, 3/1/22, 4/5/22, 5/4/22 (hybrid), 6/7/22, 7/5/22	• Continue Mitigation Strategy and Plan Maintenance draft review and discussion. • Revisit/review all topics: HVA, critical facilities list, mission statement and goals, mitigation actions, outreach activities, etc.
January – July 2022	**Project Progress**
SC: 7/5/22, 7/12/22, 8/5/22 (online/ in person)	• Draft NHMP available to Steering Committee and public for review and comment. • Comments addressed and final NHMP draft prepared.

Marion County Multi-Jurisdictional Hazard Mitigation Plan (MJ-HMP)

PROJECT SCHEDULE
FINAL

MONTH	ACTIVITY
August 2022	**Project Progress – Submittal to OEM**
SC: TBD (online/ in person)	• Submit NHMP and Local Mitigation Plan Review Tool form to OEM by 3/31/22.
Sept.-Oct 2022	**Project Progress – Review by OEM and Submittal to FEMA**
SC: As needed	• Make any changes, if requested, from OEM. If no changes are requested, submit to FEMA.
Sept.-Oct 2022	**Project Progress – Review by FEMA**
SC: As needed	• Make changes, if requested, from FEMA. • Once FEMA is ok with the NHMP, receive "Approvable Pending Adoption" (APA) from FEMA. • Schedule NHMP for adoption with County, City, Special District, and other authorities.
Oct.-Nov. 2022	**Project Progress - Adoption**
SC: As needed	• County, City, Special District and other authorities adopt the NHMP. DLCD provides copies of the resolutions to OEM and FEMA. • Receive the FEMA Final Approval letter. • DLCD provides final PDF copy of approved NHMP. • Final copy of approved NHMP is placed on the Marion County website by Marion County. Other jurisdictions may also place the NHMP on their websites.
Note 1	The Marion County MJNHMP expires on 8/16/22.
Note 2	The DLCD Project Manager, Tricia Sears, will host meetings by videoconferencing (e.g. Zoom) or in-person as conditions provide. The type of meeting will be noted on the Project Schedule as in-person or Zoom. The Project Schedule will be updated throughout the NHMP update.
Note 3	Throughout the project, the IGA and SOW tasks will be continuously discussed as needed. Outreach and public education efforts will be documented and included in the NHMP.

4.4 Steering Committee Meetings

The steering committee is directly involved in reaching out the public in the review and update of the hazard mitigation plan. Although members of the steering committee represent the public to some extent, the residents of Marion County and the participating cities are also given the opportunity to provide feedback about the HMP update.

For the 2021-2022 process with support of DLCD, Marion County Emergency Management convened the steering committee. These individual community members played a vital role in shaping the plan. The steering committee guided the update process through several steps, including updates to the hazard history, action item development and review, and determining a strategy for implementation and maintenance.

The steering committee met on the following dates:

- Meeting #1: August 3, 2021
- Meeting #2: September 7, 2021
- Meeting #3: October 5, 2021
- Meeting #4: November 2, 2021
- Meeting #5: December 7, 2021
- Meeting #6: January 4, 2022
- Meeting #7: March 1, 2022
- Meeting #8: April 5, 2022
- Meeting #9: May 4, 2022
- Meeting #10: June 7, 2022
- Meeting #11: July 5, 2022

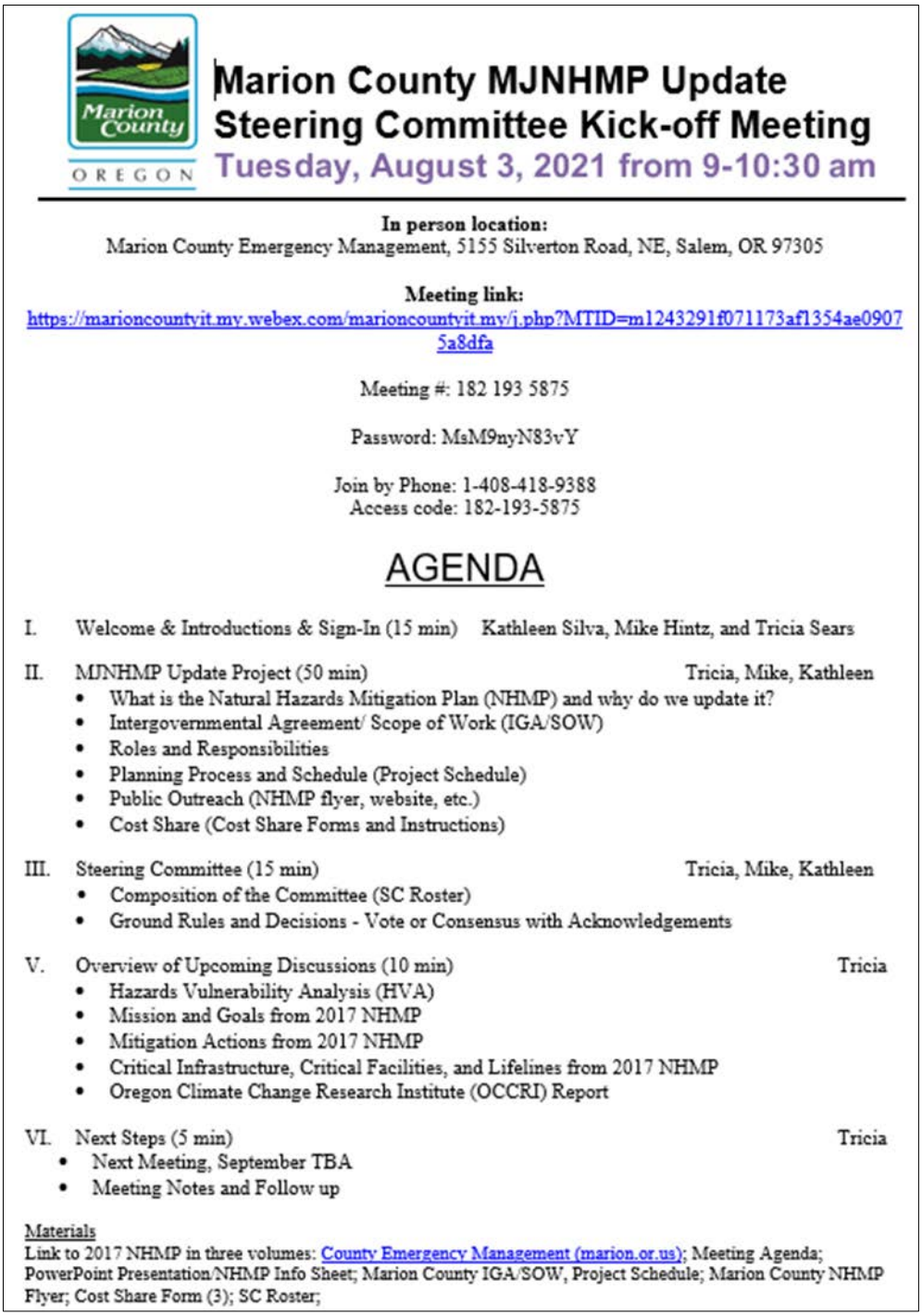
The steering committee formed under the guidance of Kathleen Silva, the Marion County Emergency Manager, and Mike Hintz, the Marion County Emergency Preparedness Coordinator. The steering committee invested considerable time into the mitigation plan. For a full list of steering committee members, see the Acknowledgments section and the table of steering committee representatives by jurisdiction in the Basic Plan of this HMP.

The following pages provide copies of meeting agendas and sign-in sheets or notes from the Marion County HMP Steering Committee meetings.

4.5 Steering Committee Meeting Documentation

4.5.1 Meeting 1, August 3, 2021

Figure 4-1, Steering Committee Meeting #1 Documentation



Marion County MJNHMP Update
Steering Committee Kick-off Meeting
Tuesday, August 3, 2021 from 9-10:30 am

In person location:
Marion County Emergency Management, 5155 Silverton Road, NE, Salem, OR 97305

Meeting link:
https://marioncountyit.my.webex.com/marioncountyit.my/j.php?MTID=m1243291f071173af1354ae09075a8dfa

Meeting #: 182 193 5875

Password: MsM9nyN83vY

Join by Phone: 1-408-418-9388
Access code: 182-193-5875

AGENDA

I. Welcome & Introductions & Sign-In (15 min) Kathleen Silva, Mike Hintz, and Tricia Sears

II. MJNHMP Update Project (50 min) Tricia, Mike, Kathleen
- What is the Natural Hazards Mitigation Plan (NHMP) and why do we update it?
- Intergovernmental Agreement/ Scope of Work (IGA/SOW)
- Roles and Responsibilities
- Planning Process and Schedule (Project Schedule)
- Public Outreach (NHMP flyer, website, etc.)
- Cost Share (Cost Share Forms and Instructions)

III. Steering Committee (15 min) Tricia, Mike, Kathleen
- Composition of the Committee (SC Roster)
- Ground Rules and Decisions - Vote or Consensus with Acknowledgements

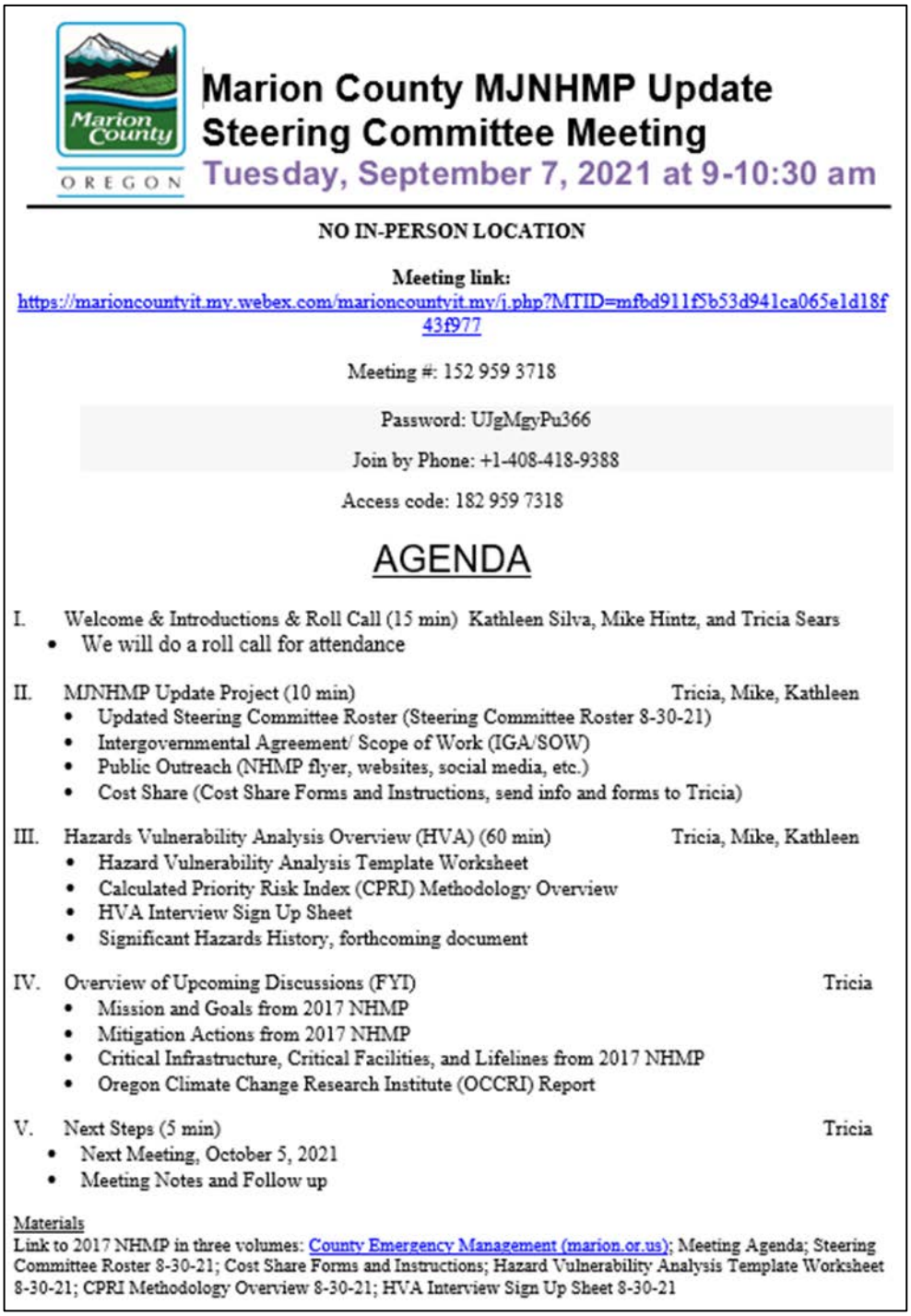
V. Overview of Upcoming Discussions (10 min) Tricia
- Hazards Vulnerability Analysis (HVA)
- Mission and Goals from 2017 NHMP
- Mitigation Actions from 2017 NHMP
- Critical Infrastructure, Critical Facilities, and Lifelines from 2017 NHMP
- Oregon Climate Change Research Institute (OCCRI) Report

VI. Next Steps (5 min) Tricia
- Next Meeting, September TBA
- Meeting Notes and Follow up

Materials
Link to 2017 NHMP in three volumes: County Emergency Management (marion.or.us); Meeting Agenda; PowerPoint Presentation/NHMP Info Sheet; Marion County IGA/SOW, Project Schedule; Marion County NHMP Flyer; Cost Share Form (3); SC Roster;

4.5.2 Meeting 2, September 7, 2021

Figure 4-2. Steering Committee Meeting #2 Documentation



Marion County MJNHMP Update
Steering Committee Meeting
Tuesday, September 7, 2021 at 9-10:30 am

NO IN-PERSON LOCATION

Meeting link:
https://marioncountyit.my.webex.com/marioncountyit.my/j.php?MTID=mfbd911f5b53d941ca065e1d18f43f977

Meeting #: 152 959 3718

Password: UJgMgyPu366

Join by Phone: +1-408-418-9388

Access code: 182 959 7318

AGENDA

I. Welcome & Introductions & Roll Call (15 min) Kathleen Silva, Mike Hintz, and Tricia Sears
- We will do a roll call for attendance

II. MJNHMP Update Project (10 min) Tricia, Mike, Kathleen
- Updated Steering Committee Roster (Steering Committee Roster 8-30-21)
- Intergovernmental Agreement/ Scope of Work (IGA/SOW)
- Public Outreach (NHMP flyer, websites, social media, etc.)
- Cost Share (Cost Share Forms and Instructions, send info and forms to Tricia)

III. Hazards Vulnerability Analysis Overview (HVA) (60 min) Tricia, Mike, Kathleen
- Hazard Vulnerability Analysis Template Worksheet
- Calculated Priority Risk Index (CPRI) Methodology Overview
- HVA Interview Sign Up Sheet
- Significant Hazards History, forthcoming document

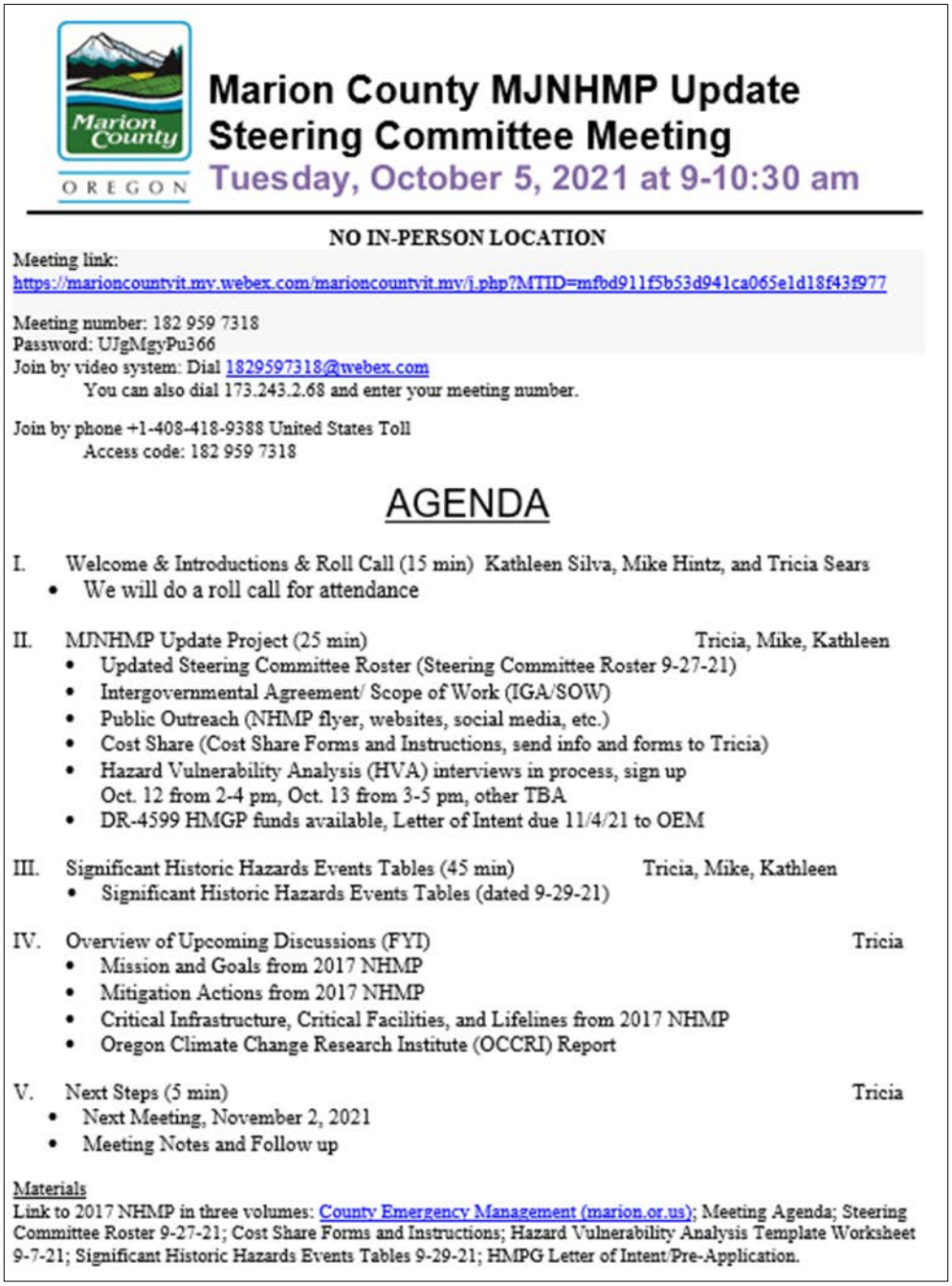
IV. Overview of Upcoming Discussions (FYI) Tricia
- Mission and Goals from 2017 NHMP
- Mitigation Actions from 2017 NHMP
- Critical Infrastructure, Critical Facilities, and Lifelines from 2017 NHMP
- Oregon Climate Change Research Institute (OCCRI) Report

V. Next Steps (5 min) Tricia
- Next Meeting, October 5, 2021
- Meeting Notes and Follow up

Materials
Link to 2017 NHMP in three volumes: County Emergency Management (marion.or.us); Meeting Agenda; Steering Committee Roster 8-30-21; Cost Share Forms and Instructions; Hazard Vulnerability Analysis Template Worksheet 8-30-21; CPRI Methodology Overview 8-30-21; HVA Interview Sign Up Sheet 8-30-21

4.5.3 Meeting 3, October 5, 2021

Figure 4-3, Steering Committee Meeting #3



Marion County MJNHMP Update
Steering Committee Meeting
Tuesday, October 5, 2021 at 9-10:30 am

NO IN-PERSON LOCATION

Meeting link:
https://marioncountyit.my.webex.com/marioncountyit.my/j.php?MTID=mf0d911f5b53d941ca065e1d18f43f977

Meeting number: 182 959 7318
Password: UJgMgyPu366
Join by video system: Dial 1829597318@webex.com
You can also dial 173.243.2.68 and enter your meeting number.

Join by phone +1-408-418-9388 United States Toll
Access code: 182 959 7318

AGENDA

I. Welcome & Introductions & Roll Call (15 min) Kathleen Silva, Mike Hintz, and Tricia Sears
- We will do a roll call for attendance

II. MJNHMP Update Project (25 min) Tricia, Mike, Kathleen
- Updated Steering Committee Roster (Steering Committee Roster 9-27-21)
- Intergovernmental Agreement/ Scope of Work (IGA/SOW)
- Public Outreach (NHMP flyer, websites, social media, etc.)
- Cost Share (Cost Share Forms and Instructions, send info and forms to Tricia)
- Hazard Vulnerability Analysis (HVA) interviews in process, sign up Oct. 12 from 2-4 pm, Oct. 13 from 3-5 pm, other TBA
- DR-4599 HMGP funds available, Letter of Intent due 11/4/21 to OEM

III. Significant Historic Hazards Events Tables (45 min) Tricia, Mike, Kathleen
- Significant Historic Hazards Events Tables (dated 9-29-21)

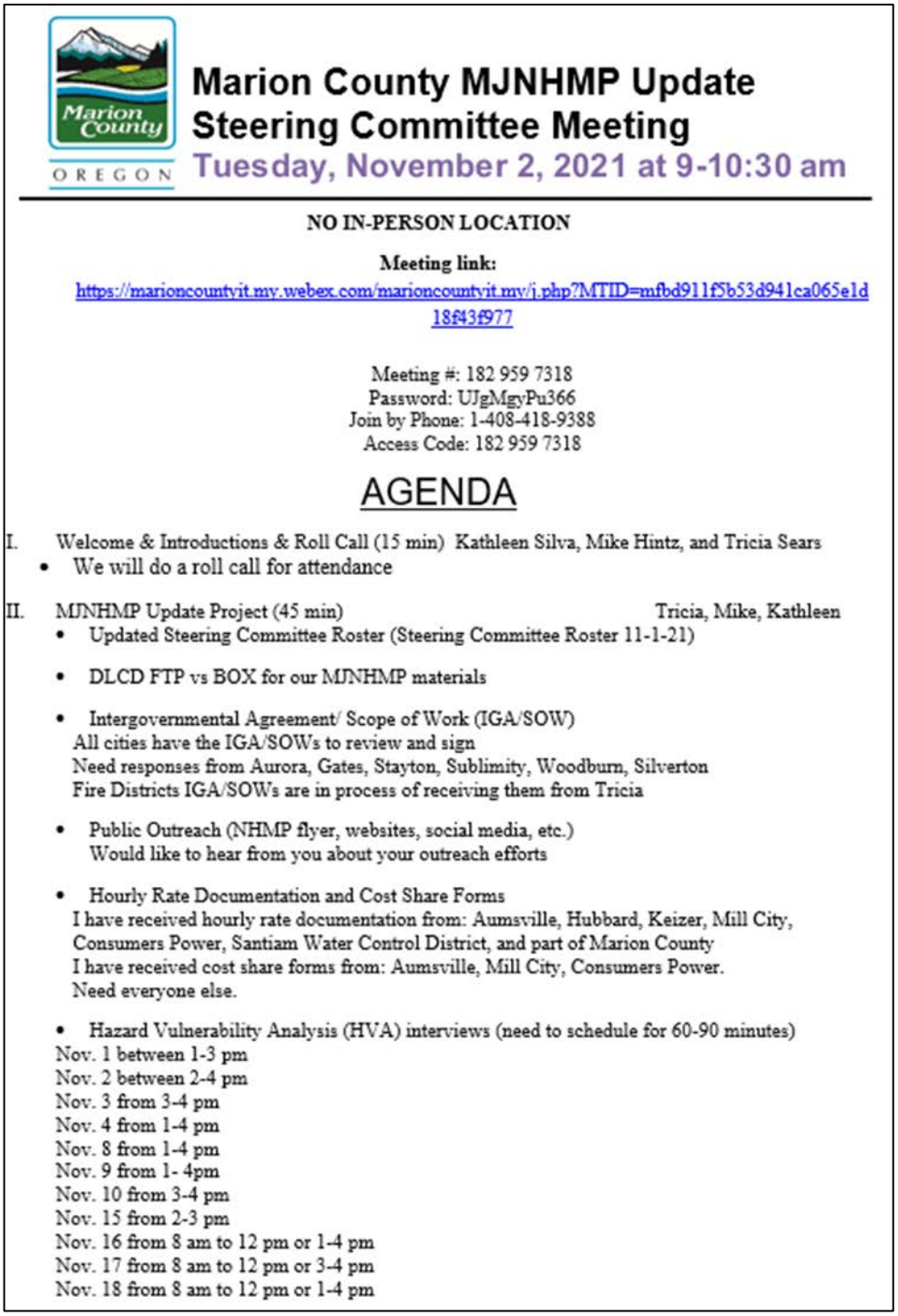
IV. Overview of Upcoming Discussions (FYI) Tricia
- Mission and Goals from 2017 NHMP
- Mitigation Actions from 2017 NHMP
- Critical Infrastructure, Critical Facilities, and Lifelines from 2017 NHMP
- Oregon Climate Change Research Institute (OCCRI) Report

V. Next Steps (5 min) Tricia
- Next Meeting, November 2, 2021
- Meeting Notes and Follow up

Materials
Link to 2017 NHMP in three volumes: County Emergency Management (marion.or.us); Meeting Agenda; Steering Committee Roster 9-27-21; Cost Share Forms and Instructions; Hazard Vulnerability Analysis Template Worksheet 9-7-21; Significant Historic Hazards Events Tables 9-29-21; HMPG Letter of Intent/Pre-Application.

4.5.4 Meeting 4, November 2, 2021

Figure 4-4, Steering Committee Meeting #4



Marion County MJNHMP Update
Steering Committee Meeting
Tuesday, November 2, 2021 at 9-10:30 am

NO IN-PERSON LOCATION

Meeting link:
https://marioncountyit.my.webex.com/marioncountyit.my/j.php?MTID=mfbd911f5b53d941ca065e1d18f43f977

Meeting #: 182 959 7318
Password: UJgMgyPu366
Join by Phone: 1-408-418-9388
Access Code: 182 959 7318

AGENDA

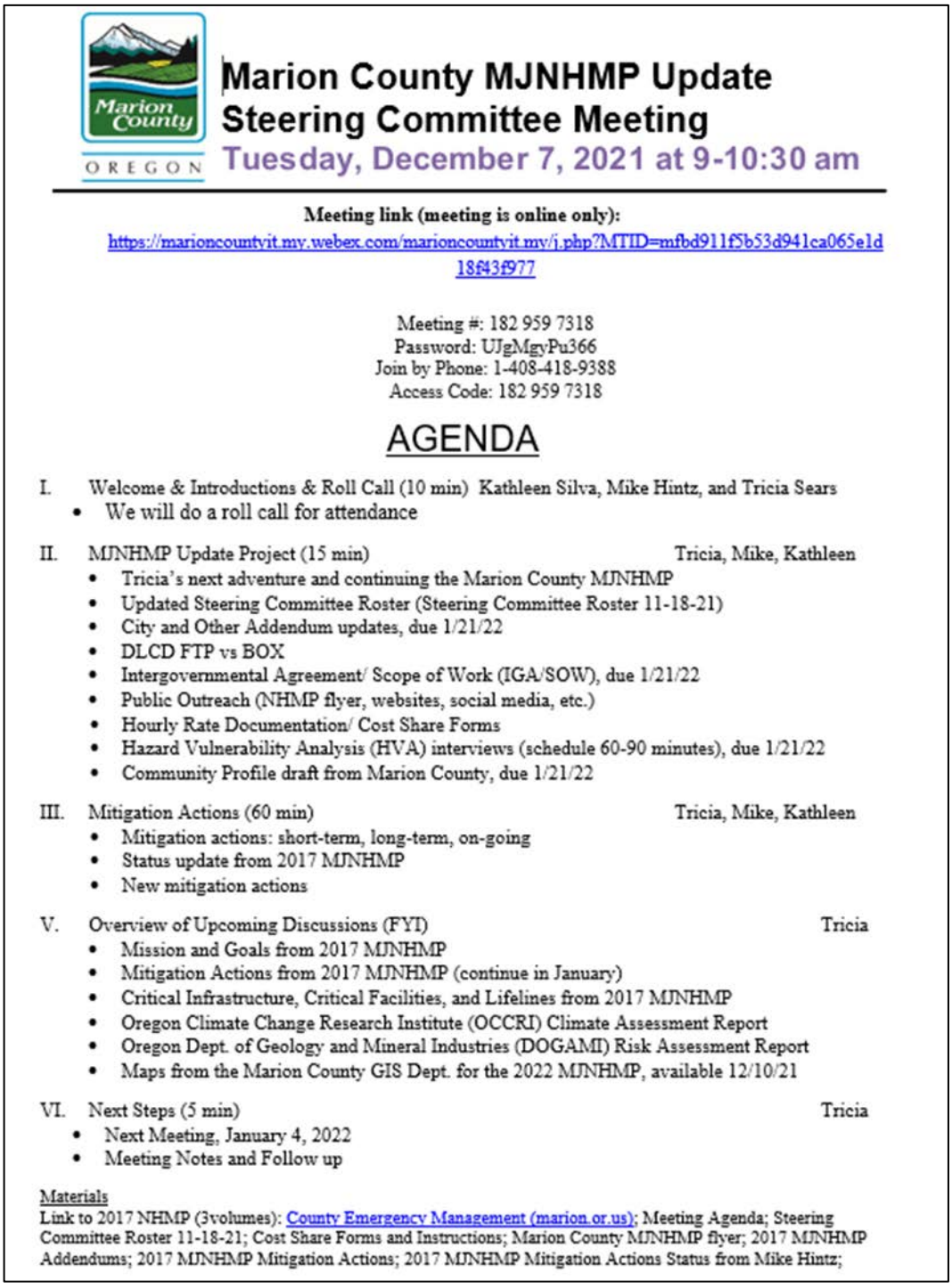
I. Welcome & Introductions & Roll Call (15 min) Kathleen Silva, Mike Hintz, and Tricia Sears
- We will do a roll call for attendance

II. MJNHMP Update Project (45 min) Tricia, Mike, Kathleen
- Updated Steering Committee Roster (Steering Committee Roster 11-1-21)
- DLCD FTP vs BOX for our MJNHMP materials
- Intergovernmental Agreement/ Scope of Work (IGA/SOW)
  All cities have the IGA/SOWs to review and sign
  Need responses from Aurora, Gates, Stayton, Sublimity, Woodburn, Silverton
  Fire Districts IGA/SOWs are in process of receiving them from Tricia
- Public Outreach (NHMP flyer, websites, social media, etc.)
  Would like to hear from you about your outreach efforts
- Hourly Rate Documentation and Cost Share Forms
  I have received hourly rate documentation from: Aumsville, Hubbard, Keizer, Mill City, Consumers Power, Santiam Water Control District, and part of Marion County
  I have received cost share forms from: Aumsville, Mill City, Consumers Power.
  Need everyone else.
- Hazard Vulnerability Analysis (HVA) interviews (need to schedule for 60-90 minutes)

Nov. 1 between 1-3 pm
Nov. 2 between 2-4 pm
Nov. 3 from 3-4 pm
Nov. 4 from 1-4 pm
Nov. 8 from 1-4 pm
Nov. 9 from 1- 4pm
Nov. 10 from 3-4 pm
Nov. 15 from 2-3 pm
Nov. 16 from 8 am to 12 pm or 1-4 pm
Nov. 17 from 8 am to 12 pm or 3-4 pm
Nov. 18 from 8 am to 12 pm or 1-4 pm

4.5.5 Meeting 5, December 7, 2021

Figure 4-5, Steering Committee Meeting #5



Marion County MJNHMP Update
Steering Committee Meeting
Tuesday, December 7, 2021 at 9-10:30 am

Meeting link (meeting is online only):
https://marioncountyit.my.webex.com/marioncountyit.my/j.php?MTID=mfbd911f5b53d941ca065e1d18f43f977

Meeting #: 182 959 7318
Password: UJgMgyPu366
Join by Phone: 1-408-418-9388
Access Code: 182 959 7318

AGENDA

I. Welcome & Introductions & Roll Call (10 min) Kathleen Silva, Mike Hintz, and Tricia Sears
- We will do a roll call for attendance

II. MJNHMP Update Project (15 min) Tricia, Mike, Kathleen
- Tricia's next adventure and continuing the Marion County MJNHMP
- Updated Steering Committee Roster (Steering Committee Roster 11-18-21)
- City and Other Addendum updates, due 1/21/22
- DLCD FTP vs BOX
- Intergovernmental Agreement/ Scope of Work (IGA/SOW), due 1/21/22
- Public Outreach (NHMP flyer, websites, social media, etc.)
- Hourly Rate Documentation/ Cost Share Forms
- Hazard Vulnerability Analysis (HVA) interviews (schedule 60-90 minutes), due 1/21/22
- Community Profile draft from Marion County, due 1/21/22

III. Mitigation Actions (60 min) Tricia, Mike, Kathleen
- Mitigation actions: short-term, long-term, on-going
- Status update from 2017 MJNHMP
- New mitigation actions

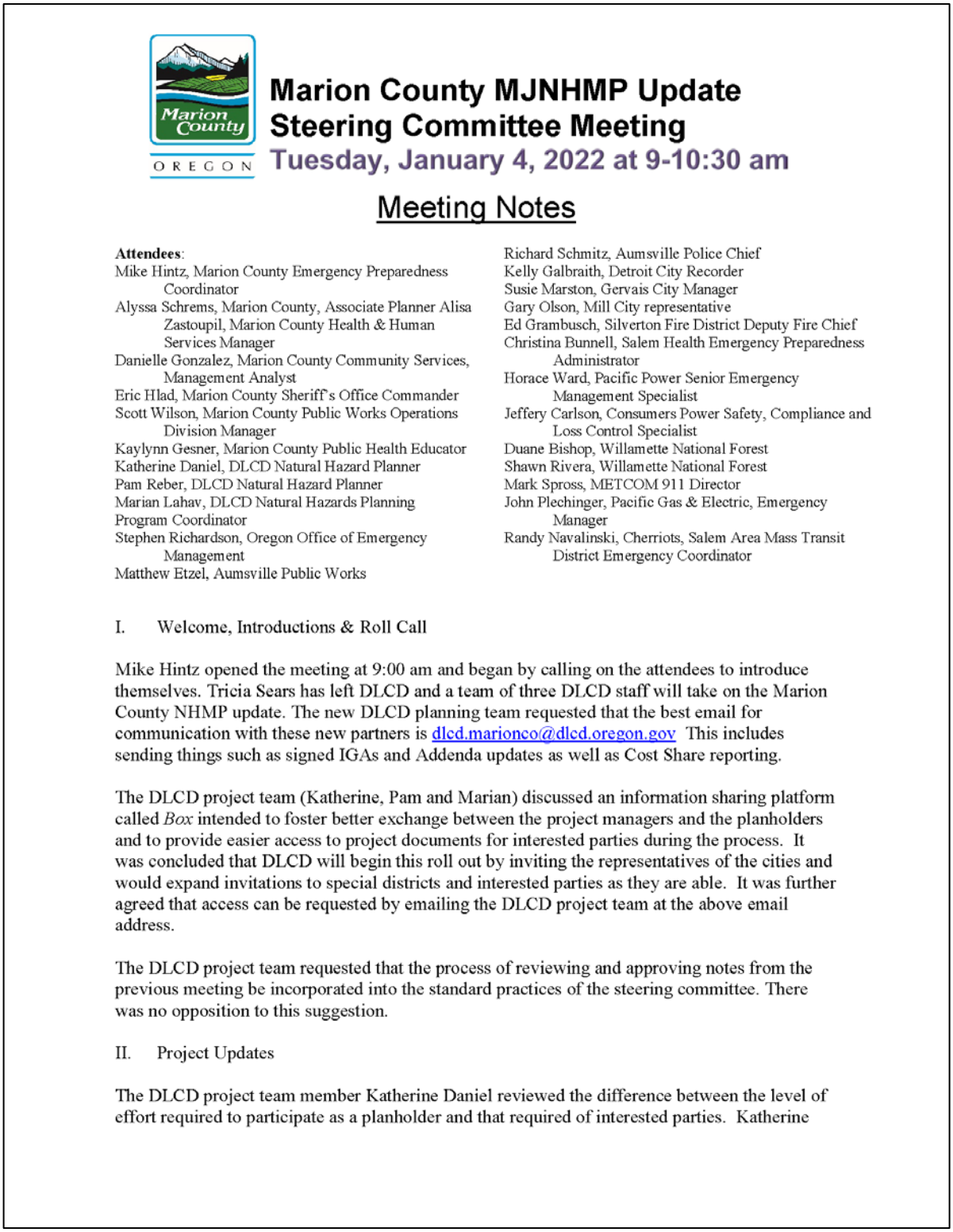
V. Overview of Upcoming Discussions (FYI) Tricia
- Mission and Goals from 2017 MJNHMP
- Mitigation Actions from 2017 MJNHMP (continue in January)
- Critical Infrastructure, Critical Facilities, and Lifelines from 2017 MJNHMP
- Oregon Climate Change Research Institute (OCCRI) Climate Assessment Report
- Oregon Dept. of Geology and Mineral Industries (DOGAMI) Risk Assessment Report
- Maps from the Marion County GIS Dept. for the 2022 MJNHMP, available 12/10/21

VI. Next Steps (5 min) Tricia
- Next Meeting, January 4, 2022
- Meeting Notes and Follow up

Materials
Link to 2017 NHMP (3volumes): County Emergency Management (marion.or.us); Meeting Agenda; Steering Committee Roster 11-18-21; Cost Share Forms and Instructions; Marion County MJNHMP flyer; 2017 MJNHMP Addendums; 2017 MJNHMP Mitigation Actions; 2017 MJNHMP Mitigation Actions Status from Mike Hintz;

4.5.6 Meeting 6, January 4, 2022

Figure 4-6, Steering Committee Meeting #6



Marion County MJNHMP Update
Steering Committee Meeting
Tuesday, January 4, 2022 at 9-10:30 am

Meeting Notes

Attendees:
Mike Hintz, Marion County Emergency Preparedness Coordinator
Alyssa Schrems, Marion County, Associate Planner Alisa Zastoupil, Marion County Health & Human Services Manager
Danielle Gonzalez, Marion County Community Services, Management Analyst
Eric Hlad, Marion County Sheriff's Office Commander
Scott Wilson, Marion County Public Works Operations Division Manager
Kaylynn Gesner, Marion County Public Health Educator
Katherine Daniel, DLCD Natural Hazard Planner
Pam Reber, DLCD Natural Hazard Planner
Marian Lahav, DLCD Natural Hazards Planning Program Coordinator
Stephen Richardson, Oregon Office of Emergency Management
Matthew Etzel, Aumsville Public Works
Richard Schmitz, Aumsville Police Chief
Kelly Galbraith, Detroit City Recorder
Susie Marston, Gervais City Manager
Gary Olson, Mill City representative
Ed Grambusch, Silverton Fire District Deputy Fire Chief
Christina Bunnell, Salem Health Emergency Preparedness Administrator
Horace Ward, Pacific Power Senior Emergency Management Specialist
Jeffery Carlson, Consumers Power Safety, Compliance and Loss Control Specialist
Duane Bishop, Willamette National Forest
Shawn Rivera, Willamette National Forest
Mark Spross, METCOM 911 Director
John Plechinger, Pacific Gas & Electric, Emergency Manager
Randy Navalinski, Cherriots, Salem Area Mass Transit District Emergency Coordinator

I. Welcome, Introductions & Roll Call

Mike Hintz opened the meeting at 9:00 am and began by calling on the attendees to introduce themselves. Tricia Sears has left DLCD and a team of three DLCD staff will take on the Marion County NHMP update. The new DLCD planning team requested that the best email for communication with these new partners is dlcd.marionco@dlcd.oregon.gov This includes sending things such as signed IGAs and Addenda updates as well as Cost Share reporting.

The DLCD project team (Katherine, Pam and Marian) discussed an information sharing platform called *Box* intended to foster better exchange between the project managers and the planholders and to provide easier access to project documents for interested parties during the process. It was concluded that DLCD will begin this roll out by inviting the representatives of the cities and would expand invitations to special districts and interested parties as they are able. It was further agreed that access can be requested by emailing the DLCD project team at the above email address.

The DLCD project team requested that the process of reviewing and approving notes from the previous meeting be incorporated into the standard practices of the steering committee. There was no opposition to this suggestion.

II. Project Updates

The DLCD project team member Katherine Daniel reviewed the difference between the level of effort required to participate as a planholder and that required of interested parties. Katherine

described the benefit of becoming a planholder. Having a current, FEMA-approved NHMP is a key factor in establishing eligibility for certain FEMA grants that fund natural hazards mitigation planning and projects.

In order to complete the NHMP efficiently, the DLCD project team is anticipating submission by January 21, 2022 of materials from prospective planholders requested by Tricia Sears prior to her departure in a December 1, 2021 email. These include signed Intergovernmental Agreements, Hazard Vulnerability interviews scheduled, Addenda reviewed and updated.

DLCD project team member, Marian Lahav, addressed the quarterly cost share reporting required of planholders. Gary Olson of Mill City asked whether time spent discussing the project by City Council members at public meetings could be counted as cost share and whether that in-kind contribution of time could be reported collectively by the City Recorder. Marian responded that yes, their time would count for cost share, and she would check on whether it could be reported collectively by the City Recorder. All jurisdictions can do this as it is a responsibility of the Steering Committee members to keep decision makers informed throughout the planning process. Marian reviewed the elements of the cost share documentation form that need to be completed and emphasized that the activity description must include specific information. For example, a good description would be "Reviewed HVA and other risk assessment documents for the Mill City Addendum" rather than simply "Reviewed documents." The question was asked whether DLCD would be reviewing previously submitted cost share documentation and asking for refinement when necessary. Marian responded that she would.

DLCD project team member, Pam Reber, discussed the Hazard Vulnerability Analysis (HVA) interview purpose and content. HVAs are a local risk assessment that assist in targeting mitigation efforts to the most critical hazards, relative to the position of the jurisdiction evaluating them. Jurisdictions are encouraged to review and update the following information alongside the HVA: hazard history and recent events, staff/population served, and buildings/assets at risk, i.e., the HVA template subjects. Discussion included Aumsville noting that they were experiencing stormwater impacts from this week's winter storm and a question about how to aggregate the HVA information that will be addressed later in the update process.

A number of HVA interviews have taken place and the remaining HVAs will be completed as jurisdictions and district planholders schedule them with the Mike Hintz and the DLCD project team.

Danielle Gonzalez, Marion County Community Services highlighted Marion County's diverse geography and hazards profile and wants to better incorporate certain hazards. She asked if the County's HVA would be a roll-up of all the HVAs or separate. She indicated that we address drought, but not lack of water. Mike Hintz responded that there was a problem with cyanotoxins that was put into a Public Health section in the new Plan, and offered that could change if the Steering Committee wants more detail. However, since water districts and other utilities are anticipated to be new plan holders, this issue could be addressed in their addenda. He further indicated that there would be significant changes to the HVA in this plan update and that there would be a county-wide meeting scheduled to address mitigation actions flowing from the risk assessment.

The Department of Geology and Mineral Industries (DOGAMI) will provide the steering committee with a risk assessment for geologic hazards and wildfire hazard. This report is expected in March. The Oregon Climate Change Research Institute (OCCRI) will produce a

report on the impact of future climate projections on natural hazards. This report is not anticipated until May. These reports will be incorporated into the risk assessment and may require changes to it, to the mitigation strategy, and additional public review.

The DLCD project team led a discussion about developing a public engagement program for the NHMP update project. Flyers were identified as an effective way to inform the public, particularly for the Marion County Planning Department. DLCD will provide a flyer for jurisdictions to use following the Hazard Vulnerability Assessment phase of the NHMP update. Mike Hintz reported that the county is working on a survey that identifies where respondents live and asks for responses to assist in updating the natural hazard mitigation plan for the county. The County has also distributed surveys addressing issues around vulnerable populations.

Questions and comments were taken during the meeting, and general public comment was invited near the end of the meeting.

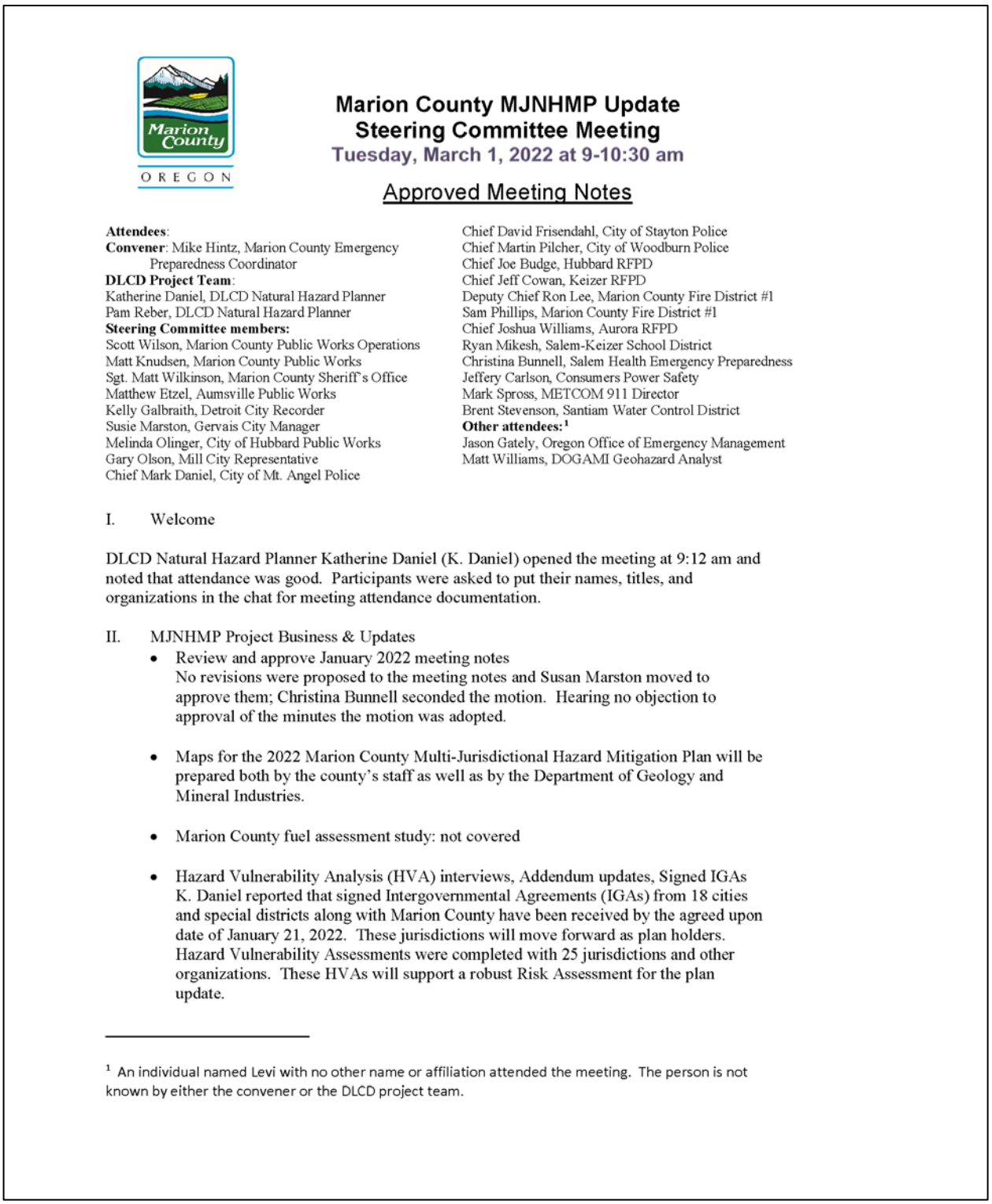
The next meeting is scheduled for February 1, 2022.

The meeting concluded at 10:15 am.

Materials
Link to 2017 NHMP in three volumes: County Emergency Management (marion.or.us);
Link to Box https://dlcd.box.com/s/urpbpxmvuj928xikygjknozz9fg3plet

4.5.7 Meeting 7, March 1, 2022

Figure 4-7, Steering Committee Meeting #7



Marion County MJNHMP Update
Steering Committee Meeting
Tuesday, March 1, 2022 at 9-10:30 am

Approved Meeting Notes

Attendees:
Convener: Mike Hintz, Marion County Emergency Preparedness Coordinator
DLCD Project Team:
Katherine Daniel, DLCD Natural Hazard Planner
Pam Reber, DLCD Natural Hazard Planner
Steering Committee members:
Scott Wilson, Marion County Public Works Operations
Matt Knudsen, Marion County Public Works
Sgt. Matt Wilkinson, Marion County Sheriff's Office
Matthew Etzel, Aumsville Public Works
Kelly Galbraith, Detroit City Recorder
Susie Marston, Gervais City Manager
Melinda Olinger, City of Hubbard Public Works
Gary Olson, Mill City Representative
Chief Mark Daniel, City of Mt. Angel Police
Chief David Frisendahl, City of Stayton Police
Chief Martin Pilcher, City of Woodburn Police
Chief Joe Budge, Hubbard RFPD
Chief Jeff Cowan, Keizer RFPD
Deputy Chief Ron Lee, Marion County Fire District #1
Sam Phillips, Marion County Fire District #1
Chief Joshua Williams, Aurora RFPD
Ryan Mikesh, Salem-Keizer School District
Christina Bunnell, Salem Health Emergency Preparedness
Jeffery Carlson, Consumers Power Safety
Mark Spross, METCOM 911 Director
Brent Stevenson, Santiam Water Control District
Other attendees:[1]
Jason Gately, Oregon Office of Emergency Management
Matt Williams, DOGAMI Geohazard Analyst

I. Welcome

DLCD Natural Hazard Planner Katherine Daniel (K. Daniel) opened the meeting at 9:12 am and noted that attendance was good. Participants were asked to put their names, titles, and organizations in the chat for meeting attendance documentation.

II. MJNHMP Project Business & Updates

- Review and approve January 2022 meeting notes
  No revisions were proposed to the meeting notes and Susan Marston moved to approve them; Christina Bunnell seconded the motion. Hearing no objection to approval of the minutes the motion was adopted.

- Maps for the 2022 Marion County Multi-Jurisdictional Hazard Mitigation Plan will be prepared both by the county's staff as well as by the Department of Geology and Mineral Industries.

- Marion County fuel assessment study: not covered

- Hazard Vulnerability Analysis (HVA) interviews, Addendum updates, Signed IGAs
  K. Daniel reported that signed Intergovernmental Agreements (IGAs) from 18 cities and special districts along with Marion County have been received by the agreed upon date of January 21, 2022. These jurisdictions will move forward as plan holders. Hazard Vulnerability Assessments were completed with 25 jurisdictions and other organizations. These HVAs will support a robust Risk Assessment for the plan update.

[1] An individual named Levi with no other name or affiliation attended the meeting. The person is not known by either the convener or the DLCD project team.

4.5.8 Meeting 8, April 15, 2022

Figure 4-8,Steering Committee Meeting #8

Marion County MJNHMP Update
Steering Committee Meeting
Tuesday, April 5, 2022 at 9-10:30 am

Meeting Notes

Attendees
Convener: Mike Hintz, Marion County Emergency Preparedness Coordinator
DLCD Project Team:
Katherine Daniel, DLCD Natural Hazard Planner
Pam Reber, DLCD Natural Hazard Planner
Guest Speakers:
Meghan Dalton, OCCRI
Dominique Bachelet, OCCRI
Steering Committee members:
Robin Fournier, Scotts Mills City Manager
Susie Marston, Gervais City Manager
Chief Jeff Cowan, Keizer RFPD
Sam Phillips, Marion County Fire District #1
Deputy Chief Ron Lee, Marion County Fire District #1
Amanda Mathis, OEM Regional Mitigation and Recovery Manager
Mark Spross, METCOM 911 Director
Brent Stevenson, Santiam Water Control District
Alyssa Schrems, Marion County Planning
Dain Thomas, Marion County GIS
Adam Crateau, Marion County GIS
Alisa Zastoupil, Marion County Health and Human Services EH and PHEP program supervisor
Sgt. Matt Wilkinson, Marion County Sheriff's Office
Chief David Frisendahl, City of Stayton Police
David Solomon, WESD
Christina Bunnell, Salem Health Emergency Preparedness/ OEMA Vice President
Jeffery Carlson, Consumers Power Safety
Chief Joshua Williams, Aurora RFPD
Chief Mark Daniel, City of Mt. Angel Police

I. Welcome & Introductions

DLCD Natural Hazard Planner Katherine Daniel opened the meeting at 9:03 am and informed the meeting participants that Meghan Dalton and Dominique Bachelet from the Oregon Climate Change Research Institute (OCCRI) which is a part of OSU's College of Earth, Ocean, and Atmospheric Sciences. Participants were asked to put their names, titles, and organizations in the chat for meeting attendance documentation.

II. MJNHMP Project Business & Updates

- Review and approve March 2022 meeting notes
  Katherine asked if there were any revisions to the notes for the 3/1 meeting. None were offered. Susie Marston, moved to approve the minutes and Pam Reber seconded the motion. There were no objections, so the notes were approved as prepared.

- Addendum updates
  Katherine informed the participants that seven addendum update meetings had been held and that six more were scheduled. That left five jurisdictions that still needed to schedule meetings with the DLCD Project team for the purpose of reviewing or creating addenda.

- Public Outreach (Survey results)
  Mike shared that the survey has concluded and there had been 281 data points collected during the survey. He will compile and summarize the results and then share them with the Steering Committee members within a couple of weeks.

- Hourly Rate Documentation/ Cost Share Forms

III. Future Conditions Report for Marion County (25 min)
by the Oregon Climate Change Research Institute (OCCRI)

Meghan Dalton, Senior Research Assistant and Dominique Bachelet, Research Associate at OCCRI presented an overview of the climate change modeling that will form the basis of their report on future climate conditions in Marion County. The presentation is available in the project Box file sharing webservice. Meghan asked the participant for feedback on the approach presented and for specific areas of concern in Marion County.

There was a question about how the drought data aligned with the Willamette Water 2100 project by the Oregon Water Resources Dept. In response, Dominique from OCCRI shared:

- Meghan mentioned 3 models the project Willamette 2100 used: High Climate Change scenario (the HadGEM2−ES climate model run with RCP 8.5); the Reference Case scenario (the MIROC5 climate model run with RCP 8.5); and the Low Climate Change scenario (the GFDL−ESM2M climate model run with RCP 4.5).
- For Meghan's assessment reports she uses the ensemble of 20 downscaled climate model data by the same methods than Willamette 2100, the MACA method by John Abatzoglou.
- Link to W2100: https://inr.oregonstate.edu/ww2100/analysis-topic/future-climate
- Link to previously published assessment reports: https://blogs.oregonstate.edu/occri/projects/dlcd/

V. Mitigation Actions
Mitigation action development & examples

Pam discussed the development of problem statements as a way to develop SMART (Specific, Measurable, Actionable, Realistic and Time Sensitive) mitigation actions that would be fundable by FEMA HMA grant programs. Working outward from existing capacity and focusing on a few priority actions were points that Pam made during this agenda item topic. Pam identified several key areas of authority FEMA expects jurisdictions to utilize including those of the Emergency Management staff, Public Works and infrastructure authorities as well as Planning and growth management authorities within development code.

VI. Preparation for Next Meeting (10 min)

Prospective plan holders were asked to prepare to discuss each jurisdiction's top three mitigation priorities at the May meeting.

VI. Next Steps (5 min)

Pam and Katherine are working with each plan holder on updating or creating addenda to serve as each prospective plan holders' NHMP that identifies the particular features of the jurisdiction distinguishing it from the county and that identifies specific measurable mitigation actions addressing each of the hazards identified.

The May Steering Committee meeting will be an in-person event and is scheduled for 5/4/22 at 9:00-10:30 am. An online link will also be provided for those who are not able to attend in person. The jurisdictions will use this time to exchange ideas and information about their priorities for mitigation.

Marion County Box folder:
https://dlcd.box.com/s/urpbpxmvuj928xikygjknozz9fg3plet

4.5.9 Meeting 9, May 4, 2022

Figure 4-9. Steering Committee Meeting #9

Marion County MJNHMP Update
Steering Committee Meeting
Hybrid – Online and In-Person
Wednesday, May 4, 2022 at 9-10:30 am

Adopted Meeting Notes

Attendees
Convener: Mike Hintz, Marion County Emergency Preparedness Coordinator
DLCD Project Team:
Katherine Daniel, DLCD Natural Hazard Planner
Pam Reber, DLCD Natural Hazard Planner
Cynthia Smidt, DLCD Natural Hazard Planner

Steering Committee members:
In the meeting room:
Tim Kirsch, Mill City Mayor
Matt Etzel, Aumsville Public Works
Matt Reyes, Keizer Project Manager
Sam Phillips, Marion Co Fire District 1
Dain Thomas, Marion Co. GIS

Online Participants:
Robin Fournier, Scotts Mills City Manager
Susie Marston, Gervais City Manager
Mark Chase, Gervais Police Chief
Alissa Angelo, City of Stayton
Joaquin Ramos, Marion Co. HHS
Melinda Olinger, Hubbard City Manager
Kaylynn Gesner, Marion Co. PHEP Coordinator
Chief Mark Daniel, City of Mt. Angel Police
Brent Stevenson, manager Santiam Water Control District
Sgt. Damian Flowers, Aumsville Police Department
Levi Eckhardt, Jefferson Fire
Scott W. Wilson, Marion Co. Public Works
Christina Bunnell, Salem Health Emergency Preparedness
Jeffery Carlson, Consumers Power Safety
Jaden Emminger, Marion Co. EM AmeriCorps

I. Map Viewing: The meeting room was open at 8:45am for participants to view maps before the start of the meeting.

II. Welcome & Introductions

The meeting began at approximately 9:05am. DLCD Natural Hazard Planner Katherine Daniel and Marion County Emergency Preparedness Coordinator worked through the logistics of setting up a hybrid meeting and then introduced the participants in the room. Online participants were asked to document their meeting attendance in the chat feature of Teams.

II. MJNHMP Project Business & Updates

- Review and approve the April 5, 2022 meeting notes.
  Katherine asked if there were any revisions to the notes for the 4/5/22 meeting. None were offered. Robin Fournier of Scotts Mills moved to approve the meeting notes; Jeffrey Carlson seconded. All say aye.

- Hourly Rate Documentation/ Cost Share Forms
  Cost share – If you have not submitted rate documentation, you may have received an email from DLCD's Ashley Edwards. Please respond and also provide cost share reporting on a quarterly basis to Kathleen Silva.

- Addendum updates

Katherine and Pam have spoken with nearly every jurisdiction who will be plan holders. They are working through revising those or creating new updates for our new participants, and we will share with you those updates as we the drafts as we get them completed. Final edits continue as jurisdictions take their addendums to staff and decision makers to affirm mitigation actions and other details.

- Public Outreach (Survey results)
  Mike Hintz provided an update on the survey results, which included an example from one community. In January 2022, Marion Co. Emergency Management issued an electronic survey to the community about hazards. From January 10th to March 31st, 208 responses were received from various parts of the county on both natural and "non-natural" (technological, etc.) hazards. The survey found that there is more preparation for winter storm and wind storm than any other hazard.

- Contact ODF Grant Coordinator for fire mitigation action funding:
  Ben Sproul, Grant Coordinator, Oregon Department of Forestry
  ben.n.sproul@odf.oregon.or.us 971-275-4395

Survey Questions

- The following questions were developed and used in the survey:
  - Where do you live?
  - Which hazard are you most concerned about?
  - How much have your prepared for each hazard?
  - If money and other resources were made available, how could it be used to lessen vulnerabilities in your community or home from natural, man-made and technological hazards?

Number of Participants by Location

Participating Communities	Number of Responses	Participating Communities	Number of Responses
Aumsivlle	22	Sublimity	1
Auron	8	Woodburn	63
Detorit	1	Turner	5
Donald	1		
Gervais	6		
Jefferson	54		
Hubbard	7		
Lyons	1		
Mill City	6		
Mt. Angel	3		
Outside Marion County	3		
Salem	17		
Silverton	50		
St. Paul	1		
Stayton	13		

IV. Mitigation Actions

The intent of the May 2022 meeting was to provide an opportunity for sharing between the plan holder jurisdictions. The focus of this effort is mitigation actions so communities can move forward together in terms of capacity building and collaboration as opportunities arise. At this meeting, the following entities shared mitigation actions: Marion County, the City of Aumsville, Mill City, City of Gervais, and the City of Scotts Mills.

Mike Hintz, Marion County Emergency Services Coordinator provided an overview of the Marion Co. Hazard Mitigation Tasks 2022-2027.

- This includes implementation of a significant amount of FEMA funding to create a new evacuation plan for the county.

Damian Flowers, Police Sergeant, and Pam Reber presented the Mitigation Priorities for the City of Aumsville.

- Several water system resilience updates are being made in Aumsville, including an assessment of the water tower and a new seismically resilient 1-million-gallon water tank.

Tim Kirsch, Mill City Mayor, presented Mitigation Priorities for Mill City and highlighted:

- Portable generators are high priority—two portable generators on trailers (FEMA grant requests).
- Four MOUs with local fuel supply sources.
- Sheltering needs: Assess short and medium terms needs for sheltering access and functional needs populations for different potential hazards. MOU with Santiam School District 129J to use facilities during hazard events. Develop MOU with Canyon Senior Center and Santiam Outreach Community Center for short term heating/cooling station during hazard events / loss of power.
- Transportation and Early Warning System are two additional priorities.

Mark Chase and Susie Marston presented the Mitigation Priorities for the City of Gervais.

- 2019 Ice Storm impacted electricity and communications, so the city is prioritizing backup power.
- Constructing a Fire House in the community in partnership with Woodburn Fire.
- Coordination of evacuation planning and seismic retrofits.

V. Map Viewing and Updates

- Dain Thomas and Adam Crateau of Marion County GIS have prepared maps that are presented in the meeting room.
- Revisions and input regarding critical and essential facilities are requested at this meeting or in follow-up. Please provide update about locally important critical facilities

VI. Meeting Wrap up and Next Steps

Marion County Box folder:
https://dlcd.box.com/s/urpbpxmvuj928xikygjknozz9fg3plet

4.5.10 Meeting 10, June 7, 2022

Figure 4-10, Steering Committee Meeting #10

Marion County MJNHMP Update
Steering Committee Meeting
Online
Tuesday, June 7, 2022 at 9-10:30 am

Meeting Notes

Attendees
Convener: Mike Hintz, Marion County Emergency Preparedness Coordinator
DLCD Project Team:
Katherine Daniel, DLCD Natural Hazard Planner
Pam Reber, DLCD Natural Hazard Planner
OCCRI staff:
Dominique Bachelet, OCCRI Climate Researcher
Meghan Dalton, OCCRI Researcher/ Report Author

Steering Committee members:
Laurie Boyce Aurora Emergency Coordinator
Susie Marston, Gervais City Manager
Sam Phillips MCFD No. 1
Scott McClure Turner City Administrator
Ron Lee, Marion County Fire District
David Frisendahl, City of Stayton
Jim Trierweiler, Mt Angel Fire
Christina E. Bunnell

Dain Thomas, Marion Co. GIS
Joaquin Ramos, Marion Co. HHS
Melinda Olinger, Hubbard PW Admin Manager
Kaylynn Gesner, Marion Co. PHEP Coordinator
Jaden Emminger, Marion Co. EM AmeriCorps

I. Welcome & Introductions

The meeting began at approximately 9:05am. Online participants were asked to document their meeting attendance in the chat feature of Teams.

II. MJNHMP Project Business & Updates

- Meeting Notes: The committee affirmed the May 4, 2022 meeting notes.
  - Motion to affirm by Jim Trierweiler, Mt Angel Fire
  - Christine Bunnell, Salem Health seconds.
  - All say aye.
- Public Review and Survey Results
  - DLCD staff shared the importance of public websites and preparing them for public review.

III. OCCRI Future Conditions Report for Marion County

OCCRI staff presented the final Future Conditions Report to the Marion County HMP Committee. This and previous reports are available online:
www.blogs.oregonstate.edu/occri/projects/dlcd/

Meghan Dalton explained the importance of and comparability of the 30-year snapshot for a historical and a future perspective that is consistent for current and future reports. Black line with gray shading is an average across 20 models of historical data. Line is the average, and the

shading is the range. There are two emissions scenarios: 1. Lower emissions by mid-century, start to level off by the middle of this century and then by the end maybe slightly decrease. 2. Higher emission scenario that assumes that global emissions continue to increase throughout the 20th century. Reality is somewhere in between there right now, closer to the higher end, but not quite as high as the higher end. The 2050 projection is nearly a 5 degree increase from the historical baseline.
OCCRI staff also explained the metrics used in the report and the anticipated trends of those metrics. Example: Hot days is defined by the number of days with maximum temperature above 90 degrees Fahrenheit. This is the number of days above 90 is projected to increase by nearly 16 days. Under the higher emission scenario, we're looking at a change of an increase of about 7 degrees Fahrenheit. So whatever the average is, the hottest day of the year was in the historical baseline by the 2050s, that average hottest day is likely to be 7 degrees hotter than it was previously.

V. Next Steps

- Finish addenda with DLCD
- Submit cost share
- Plan to coordinate HMP review internally and with the public.
- Next meeting July 5th

Marion County Box folder:
https://dlcd.box.com/s/urpbpxmvuj928xikvgjknozz9fg3plet

4.5.11 Meeting 11, July 5, 2022

Figure 4-11, Steering Committee Meeting #11

Marion County MJNHMP Update
Steering Committee Meeting
Online
Tuesday, July 5, 2022 at 9-10:30 am

Draft Meeting Notes

Attendees
Convener: Mike Hintz, Marion County Emergency Preparedness Coordinator
DLCD Project Team:
Katherine Daniel, DLCD Natural Hazard Planner
Pam Reber, DLCD Natural Hazard Planner

Steering Committee members:
Stuart Rodgers, Aurora City Recorder
Kelly Galbraith, Detroit City Recorder
Susie Marston, Gervais City Manager
Gary Olson, Mill City
Mark Daniel, Mt. Angel Police Chief
Ron Lee, Marion County Fire District Deputy Chief
Jim Trierweiler, Mt Angel Fire Chief

Michael Kueler, Marion County Health & Human Services
Dain Thomas, Marion Co. GIS
Christina Bunnell, Salem Health

I. Welcome & Introductions

II. MJNHMP Project Business & Updates

- Meeting Notes: The committee affirmed the June 7, 2022 meeting notes.
  - All say aye.

III. Plan Draft Review & Approval

- Highlights of the key components of and changes to the three Volumes of the draft plan were reviewed by DLCD.
  - Volume I: Basic Plan
  - Volume II: Jurisdictional Addenda
- The Marion County HMP discussed and approved the plan upon final edits being completed by Marion County and DLCD.
- All say aye.

V. Next Steps

- Finish addenda with DLCD
- Submit cost share
- Plan to coordinate HMP review internally and with the public.

Marion County Box folder:
https://dlcd.box.com/s/urpbpxmvuj928xikygjknozz9fg3plet

4.6 Public Outreach

To engage the public, Marion County, cities, and special districts (plan holders) employed multiple strategies to engage the public and whole community, summarized below:

- Marion County Website
- Marion County HMP Community Survey
- Social Media Outreach: Survey responses informed the updated County THIRA.
- Email Outreach: Survey, Steering Committee meetings.
- Marion County Emergency Management provided regular briefings to the Marion County Emergency Management Advisory Council.
- Public meeting presentation to the Marion County Board of Commissioners on May 4, 2022.
- Twenty people attended a public presentation of Hazard Mitigation Actions by participating jurisdictions occurred in a hybrid online and in-person meeting at Marion County's offices, on May 4th, 2022.
- Public Comment: Distribution was made available by public link to the Steering Committee Box account for public comment by the nineteen jurisdictions and many interested parties. Jurisdictions also were encouraged to post and distribute the link internally and externally.
    - The DRAFT Volume I of the MJHMP was posted on July 5th and comments taken until August 5th.
    - The DRAFT Volume II of the MJHMP was posted on July 27th and comments taken until August 15th.
    - The DRAFT Volume III of the MJHMP was posted on August 10th and comments taken until August 15th.
    - A revised, final draft of Volumes I-III was provided to the jurisdictions and the public for final review September 26th through October 14th, 2022.

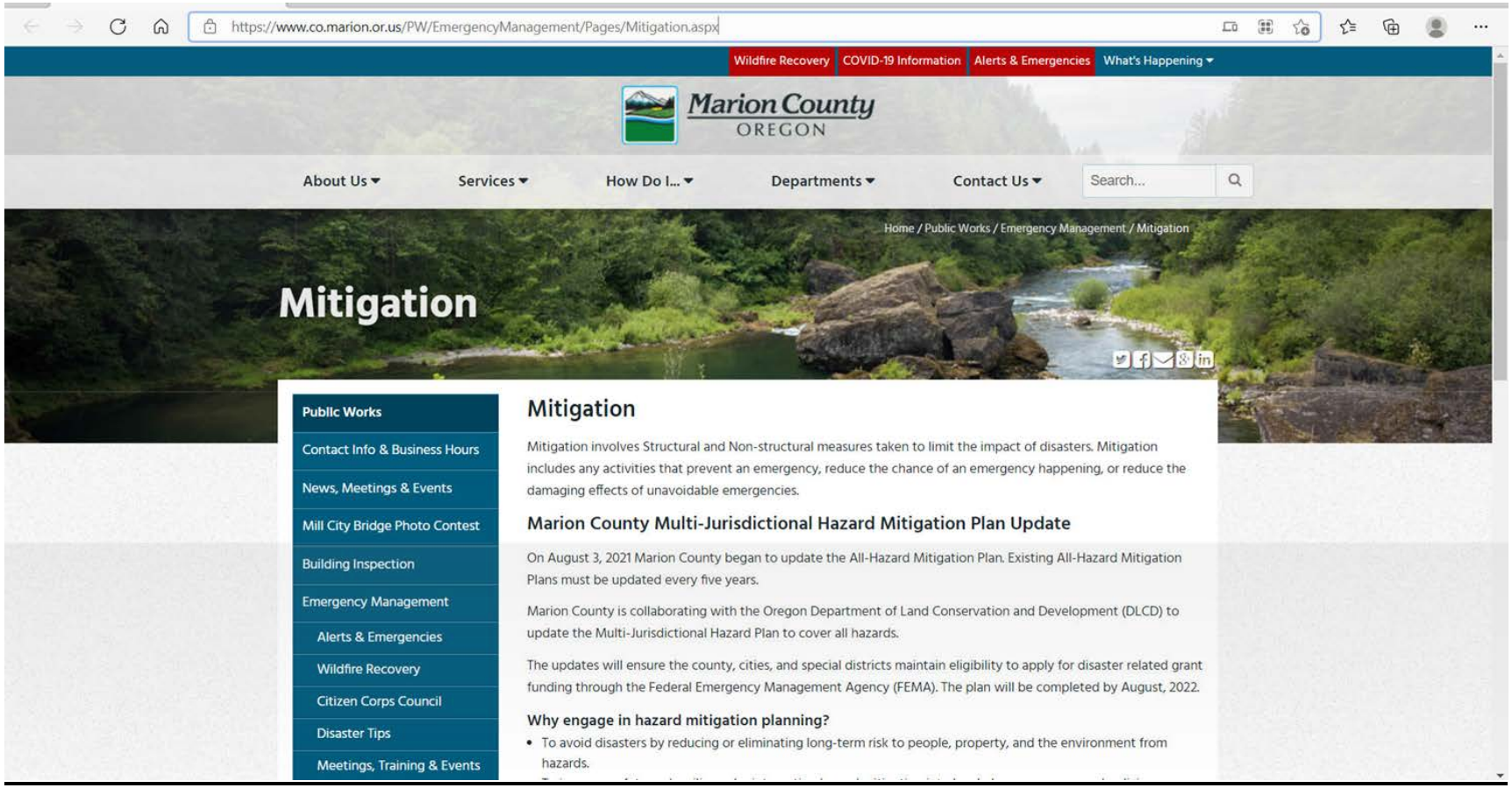
Throughout the process, Marion County collected input and feedback. Where applicable and appropriate, feedback is integrated into the document. MCEM has also considered feedback as part of ongoing enhancements to the Marion County Emergency Management program.

4.6.1 Outreach Documentation

The following pages document the web postings, newsletters, survey promotion, and social media outreach conducted by the plan holder jurisdictions and their partners.

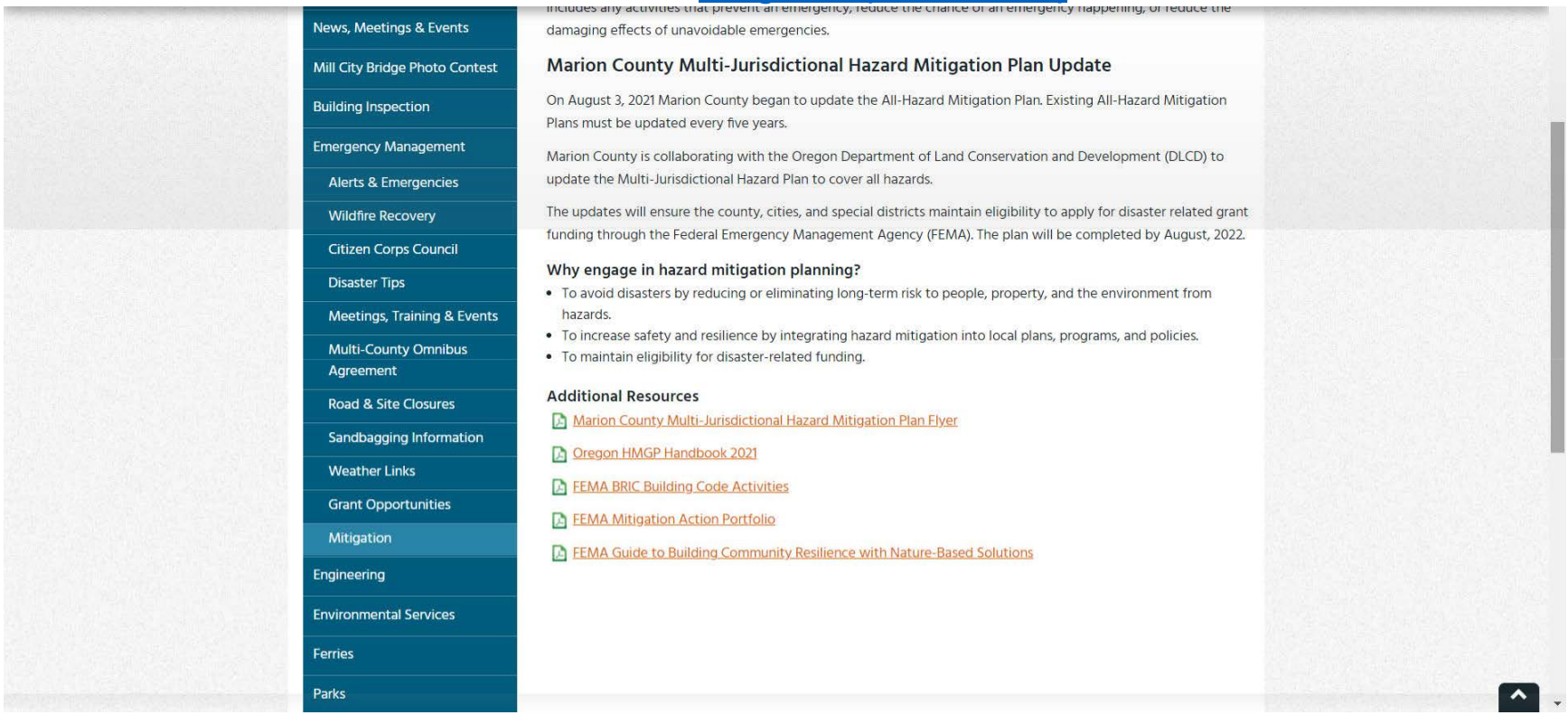
4.6.2 Marion County Emergency Management, 9/14/21

Marion County Emergency Management, 9/14/21,
Mitigation (marion.or.us)



Marion County Emergency Management 9/14/21

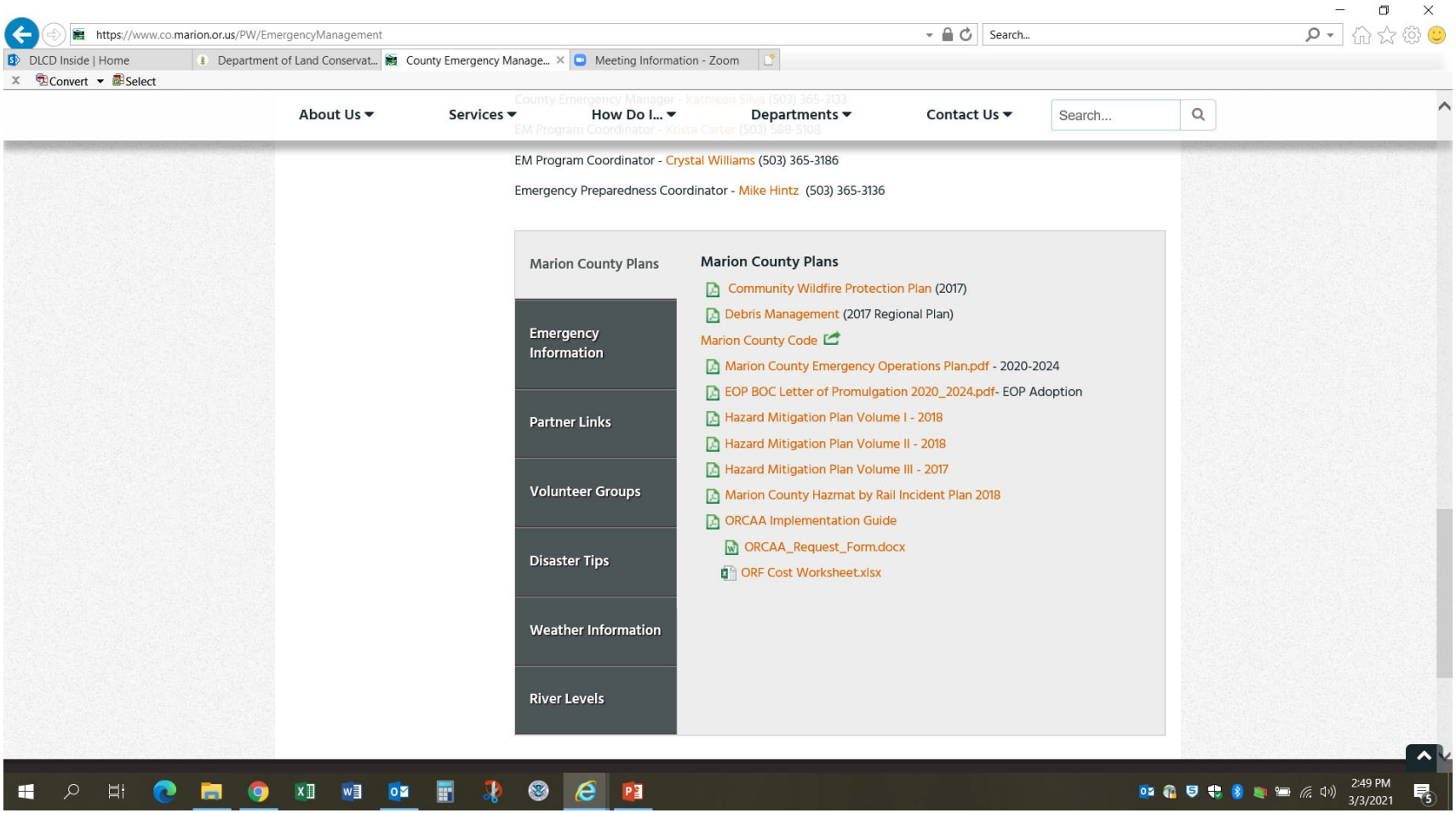
Mitigation (marion.or.us)



4.6.3 Marion County Emergency Management 3/3/21

Marion County Emergency Management Website 3/3/21

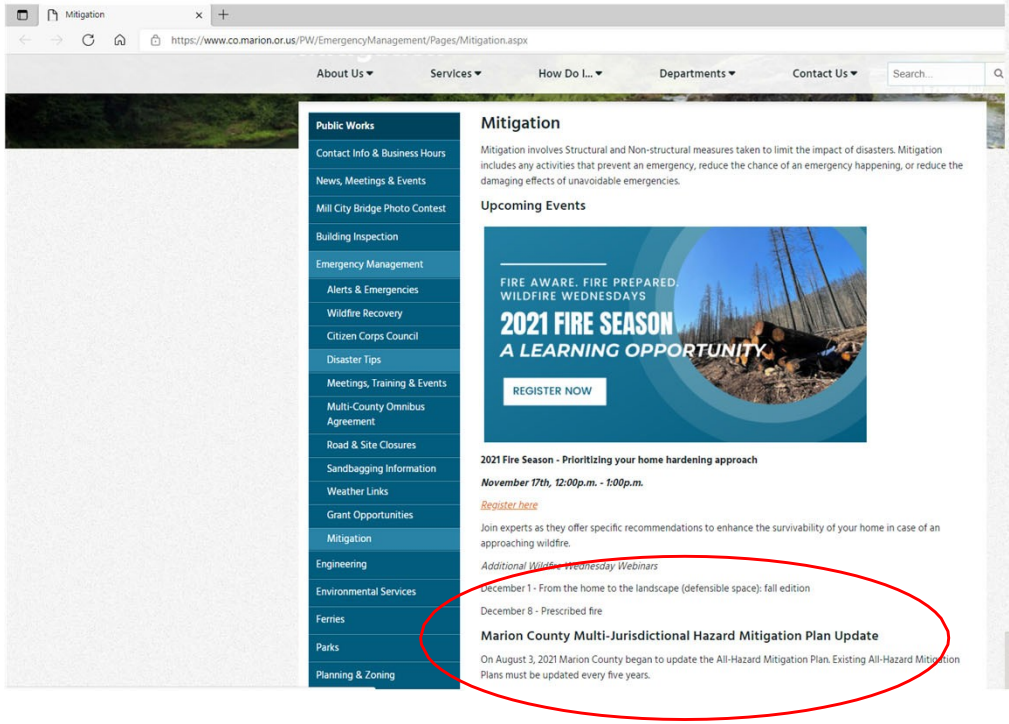
https://www.co.marion.or.us/PW/EmergencyManagement

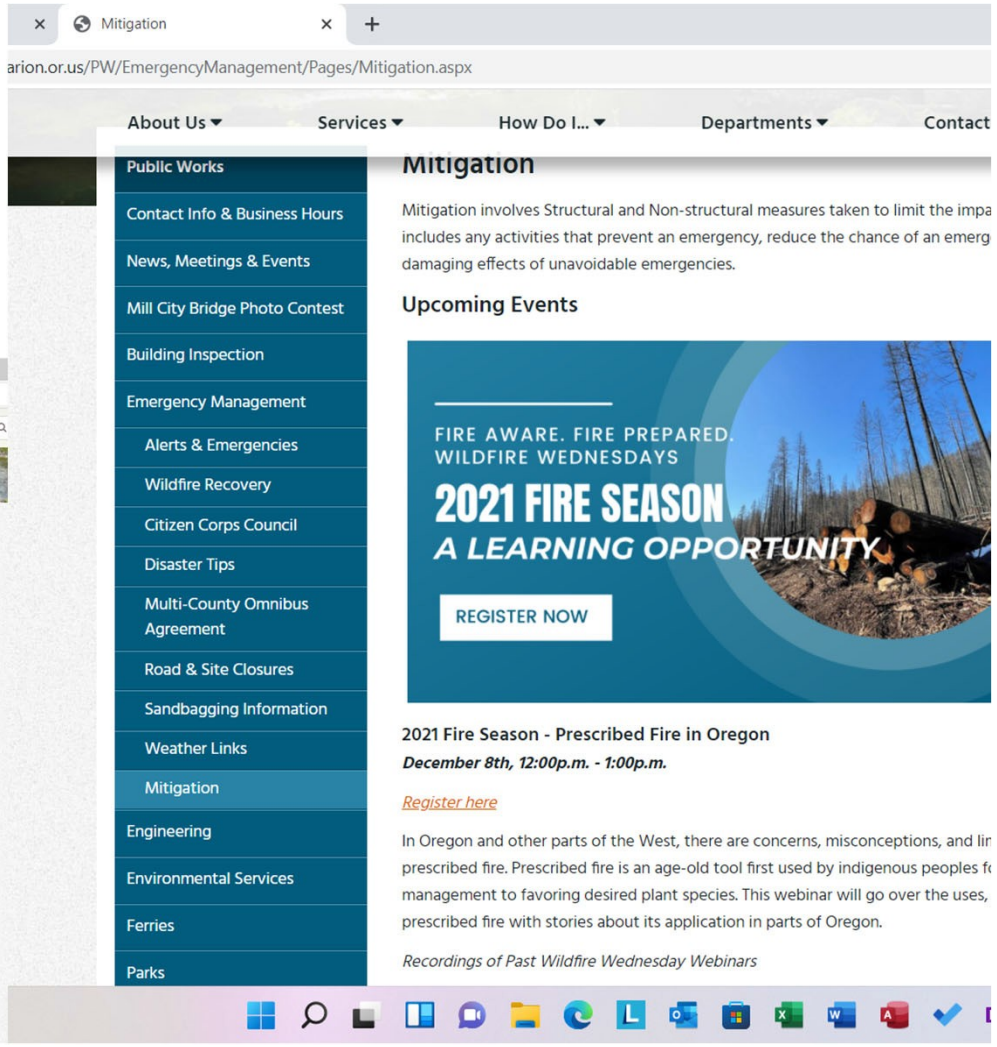


4.6.4 Marion County Emergency Management 12/5/21

Marion County Emergency Management 12/5/21

Mitigation (marion.or.us)

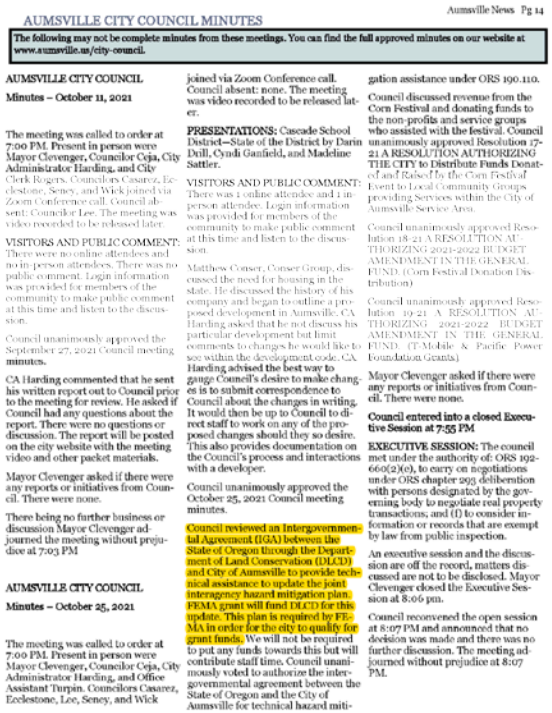




4.6.5 City of Aumsville 12/2021

City of Aumsville Newsletter 12/2021

https://www.co.marion.or.us/PW/EmergencyManagement

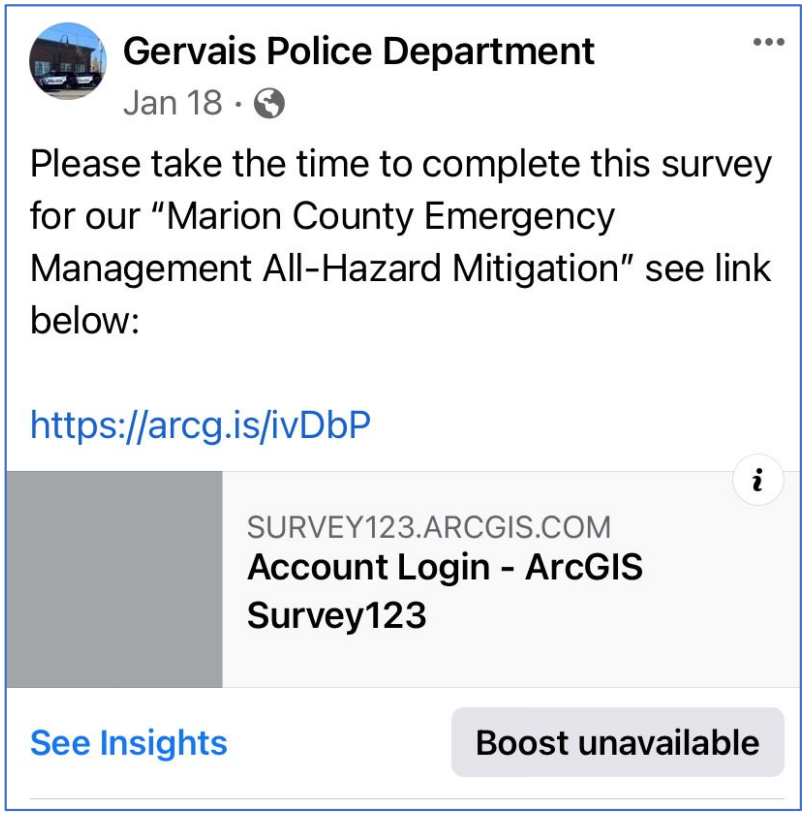


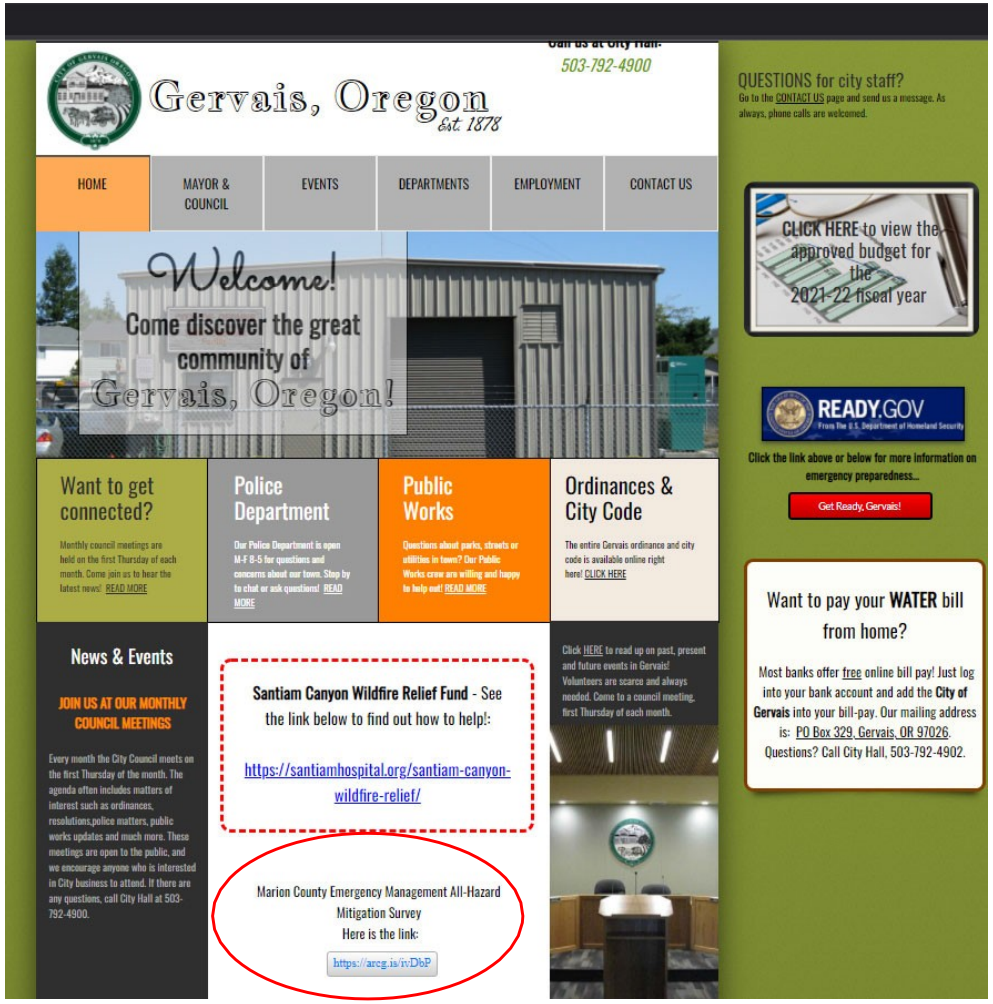
4.6.6 City of Detroit 3/31/2022

City of Detroit 3/31/2022
https://detroitoregon.us/

4.6.7 City of Gervais 1/18/2022

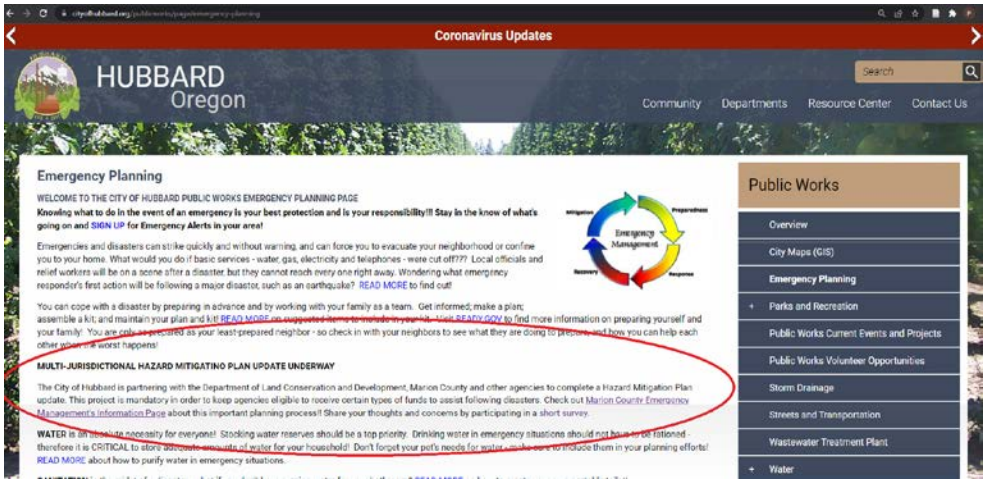
City of Gervais 1/18/2022
http://www.gervaisoregon.org/

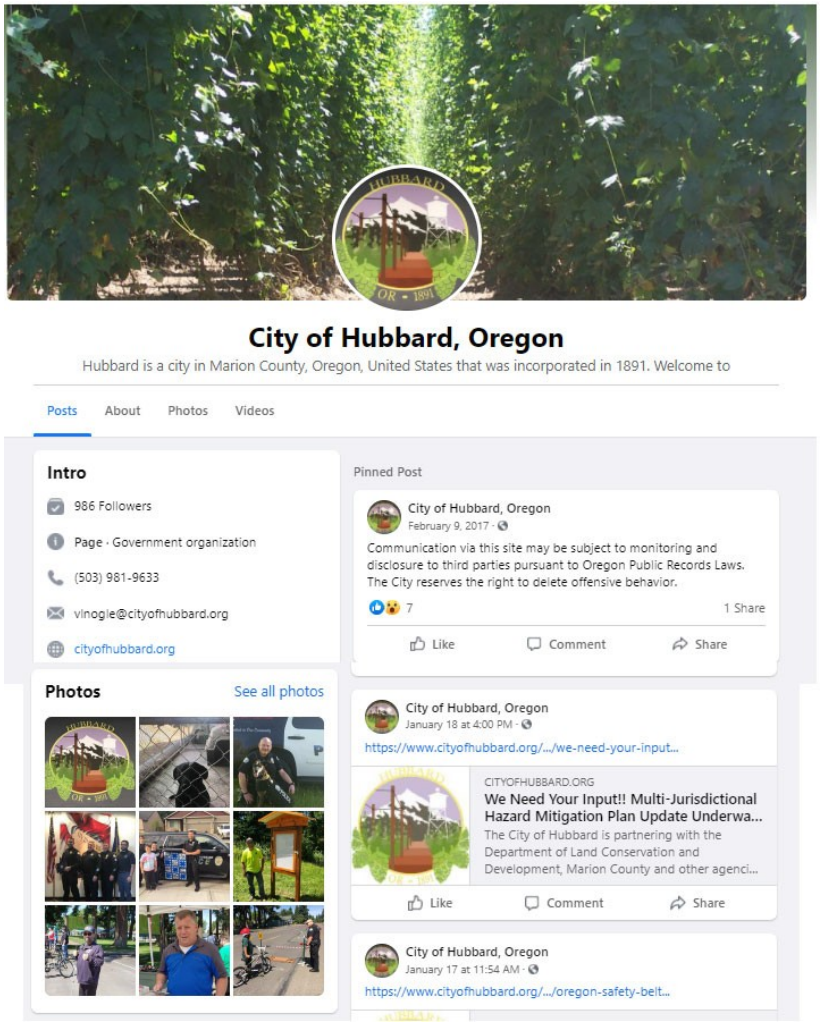




4.6.8 City of Hubbard 1/18/2022 and 2/10/22

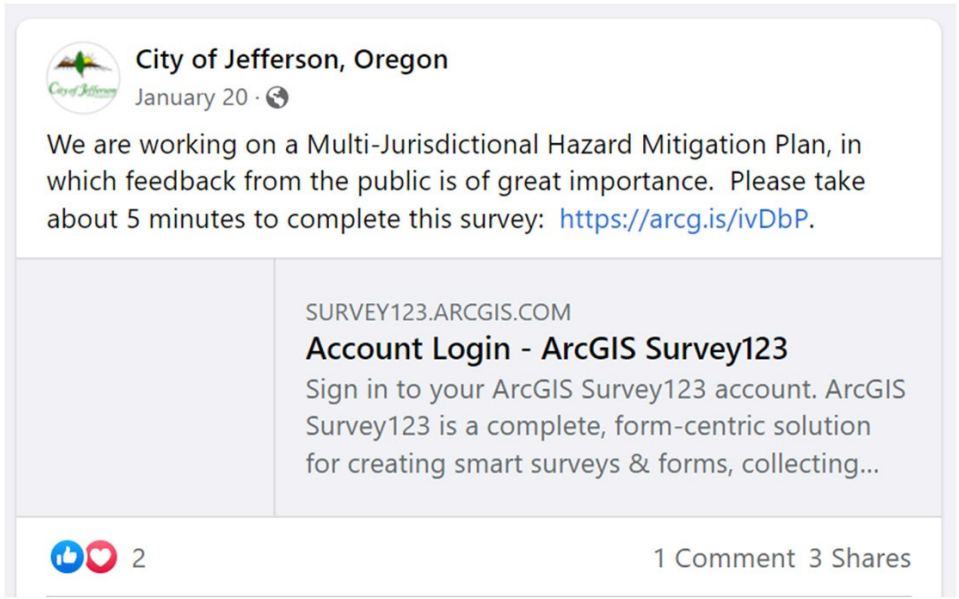
City of Hubbard 1/18/2022 & 2/10/2022
https://www.cityofhubbard.org/

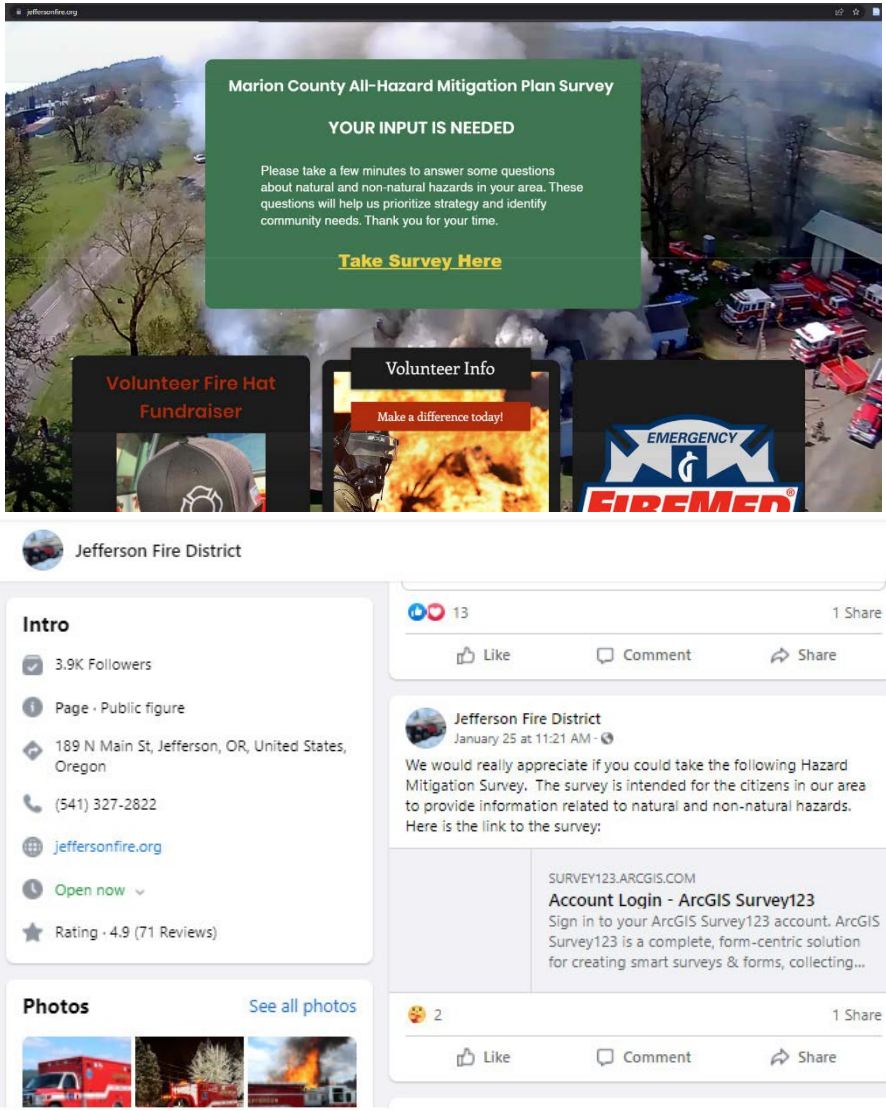




4.6.9 City of Jefferson & Jefferson Fire District 1/20/2022 and 1/15/2022

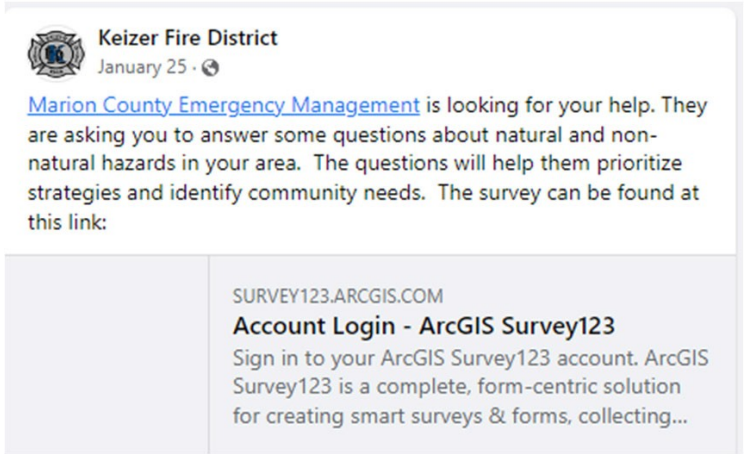
City of Jefferson 1/20/22
Jefferson Fire District 1/25/22
https://jeffersonoregon.org/
https://www.jeffersonfire.org/

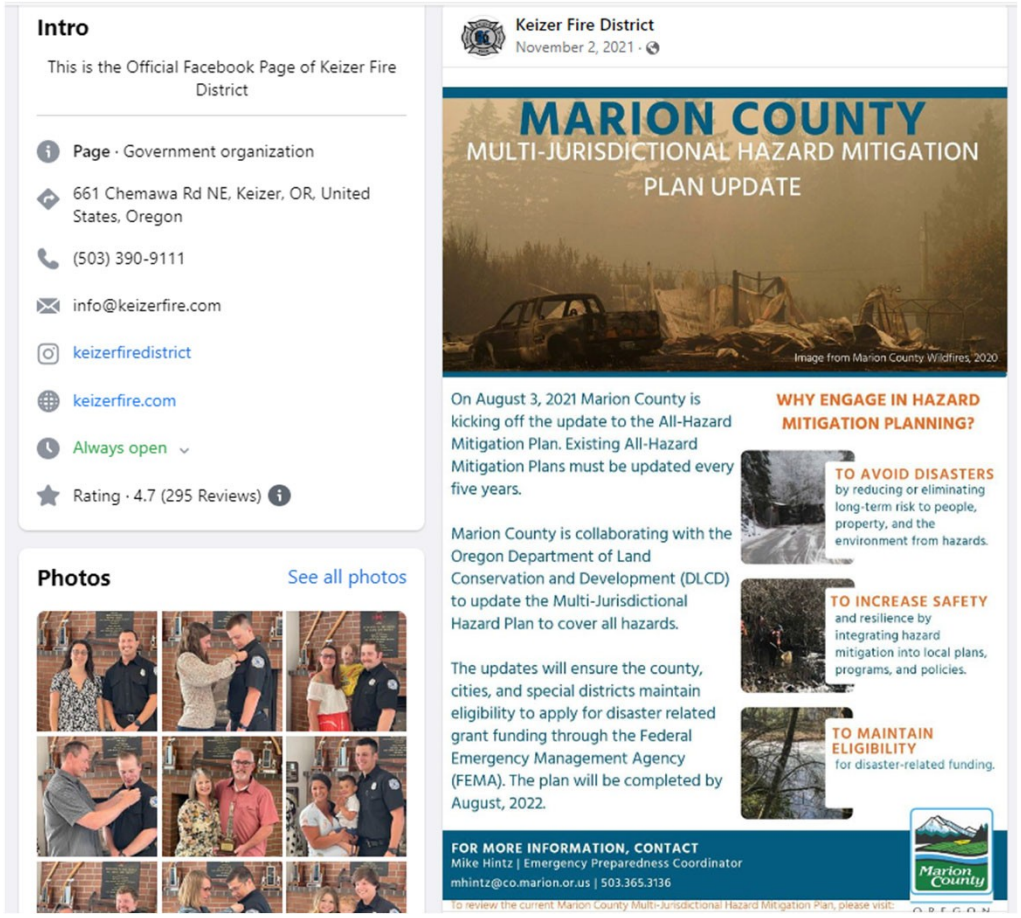




4.6.10 Keizer Fire District 11/2/2021 and 1/25/2022

Keizer Fire District 11/2/21 & 1/25/22 Facebook Posts
https://keizerfire.com/
https://www.facebook.com/KeizerFireDistrict/





4.6.11 Mill City 11/2021

Mill City Newsletter
Nov. 2021

Office Hours: M-F 8AM to 5PM
Council Meetings, Second and Fourth Tuesday of Each Month, 6:30PM
Planning Meetings, Third Friday of Each Month, 9:00AM—Hearings; Third Tuesday of Each Month, 6:30PM

CITY OF MILL CITY

444 S 1st Avenue
PO Box 256
Mill City, OR 97360

Phone: 503-897-2302
Fax: 503-897-3499
E-mail: millcity@ci.mill-city.or.us
Website: www.ci.mill-city.or.us
Facebook: City of Mill City, Oregon

Contacts

City Recorder Stacie Cook	scook@ci.mill-city.or.us
Finance Clerk Lacy Classen	lclassen@ci.mill-city.or.us
UB/Court Kimberley Johnson	kjohnson@ci.mill-city.or.us
City Clerk Tree Fredrickson	tfredrickson@ci.mill-city.or.us
Public Works Supervisor Russ Foltz	rfoltz@ci.mill-city.or.us

Mayor & Council

Tim Kirsch, Mayor	Brett N. Katlong, Water & Sanitation Commissioner
tkirsch@ci.mill-city.or.us	bkatlong@ci.mill-city.or.us
Dawn Plotts, Police Commissioner	Janet L. Zeyen-Hall, Parks Commissioner
dplotts@ci.mill-city.or.us	jzeyen-hall@ci.mill-city.or.us
Tony L. Trout Street Commissioner	Steven A. Winn, Building Commissioner
ttrout@ci.mill-city.or.us	swinn@ci.mill-city.or.us

Welcome to our Newest Team

The City of Mill City would like to welcome our newest team member, Kaitlyn Waid, who starts in our newly created Parks, Grounds & Facilities Maintenance position on February 1, 2022.

Kaitlyn resides in Mill City and is very excited about the opportunity to work in our parks system.

Say hello and give her a gracious welcome if you see her out and about.

Hazard Mitigation Survey

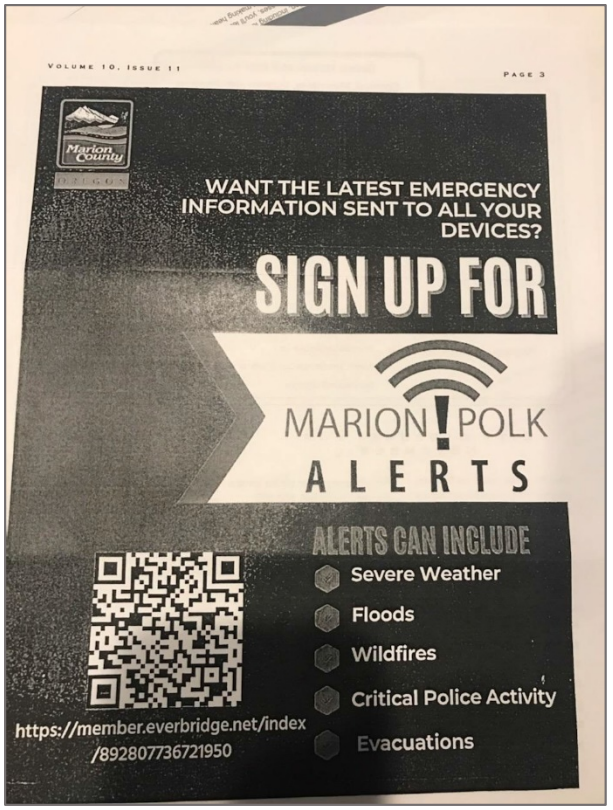
Marion County Emergency Management is updating the County's Multi-Jurisdictional All-Hazard Mitigation Plan and Mill City is partnering in the process. We need your input! Please take a few minutes to answer questions about natural and non-natural hazards in our area.

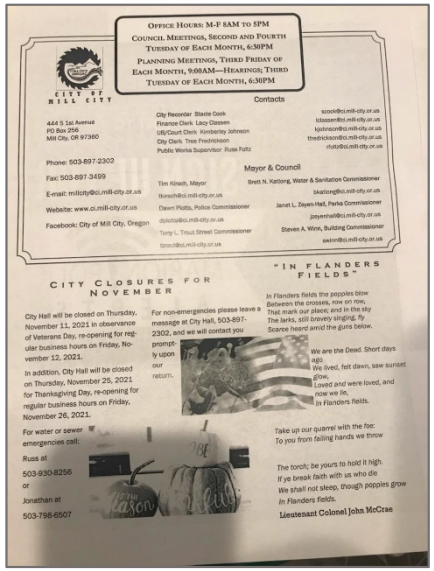
The survey can be accessed by visiting the City's website: www.ci.mill-city.or.us and using the "survey" link on the home page or by going directly to: https://arcg.is/ivDbP in your web browser.

Volunteer Opening—Park Host

City of Mill City. Seasonal to Year Round. Performs light maintenance; cleaning, debris removal, stock restrooms. Minimum 15 hr/week. Trade for free space rent, utilities. Background check required.

Application at: www.ci.mill-city.or.us. Return to City of Mill City, P.O. Box 256, Mill City, OR 97360.
(503) 897-2302. EOE.
Closing date: Open until filled.





Office Hours: M-F 8AM to 5PM
Council Meetings, Second and Fourth Tuesday of Each Month, 6:30PM
Planning Meetings, Third Friday of Each Month, 9:00AM—Hearings; Third Tuesday of Each Month, 6:30PM

CITY OF MILL CITY

444 S 1st Avenue
PO Box 256
Mill City, OR 97360

Phone: 503-897-2302
Fax: 503-897-3499
E-mail: millcity@ci.mill-city.or.us
Website: www.ci.mill-city.or.us
Facebook: City of Mill City, Oregon

Contacts

City Recorder Stacie Cook	scook@ci.mill-city.or.us
Finance Clerk Lacy Classen	lclassen@ci.mill-city.or.us
UB/Court Clerk Kimberley Johnson	kjohnson@ci.mill-city.or.us
City Clerk Tree Fredrickson	tfredrickson@ci.mill-city.or.us
Public Works Supervisor Russ Foltz	rfoltz@ci.mill-city.or.us

Mayor & Council

Tim Kirsch, Mayor	Brett N. Katlong, Water & Sanitation Commissioner
tkirsch@ci.mill-city.or.us	bkatlong@ci.mill-city.or.us
Dawn Plotts, Police Commissioner	Janet L. Zeyen-Hall, Parks Commissioner
dplotts@ci.mill-city.or.us	jzeyen-hall@ci.mill-city.or.us
Tony L. Trout Street Commissioner	Steven A. Winn, Building Commissioner
ttrout@ci.mill-city.or.us	swinn@ci.mill-city.or.us

City Closures for November

City Hall will be closed on Thursday, November 11, 2021 in observance of Veterans Day, re-opening for regular business hours on Friday, November 12, 2021.

In addition, City Hall will be closed on Thursday, November 25, 2021 for Thanksgiving Day, re-opening for regular business hours on Friday, November 26, 2021.

For water or sewer emergencies call:
Russ at 503-930-8256
or
Jonathan at 503-798-6507

For non-emergencies please leave a message at City Hall, 503-897-2302, and we will contact you promptly upon our return.

"In Flanders Fields"

In Flanders fields the poppies blow
Between the crosses, row on row,
That mark our place; and in the sky
The larks, still bravely singing, fly
Scarce heard amid the guns below.

We are the Dead. Short days ago
We lived, felt dawn, saw sunset glow,
Loved and were loved, and now we lie,
In Flanders fields.

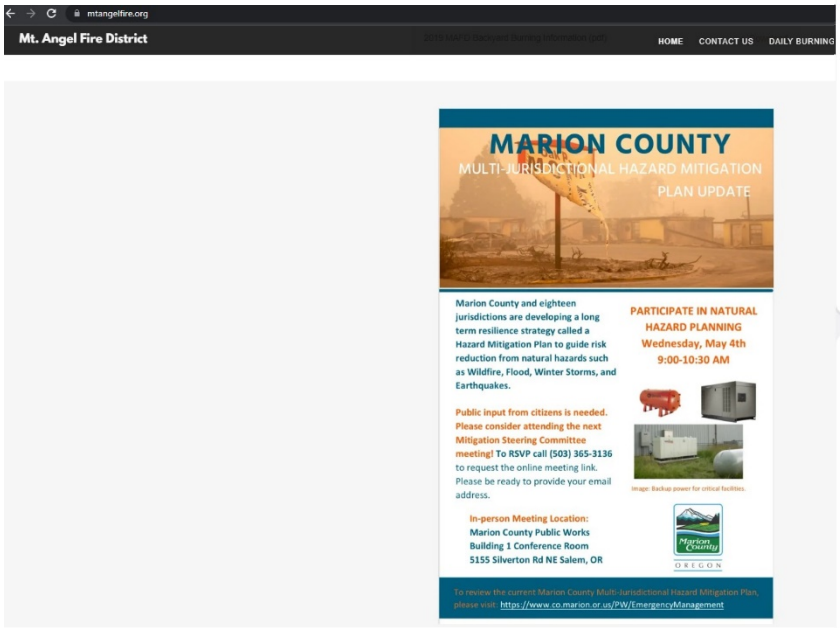
Take up our quarrel with the foe:
To you from failing hands we throw

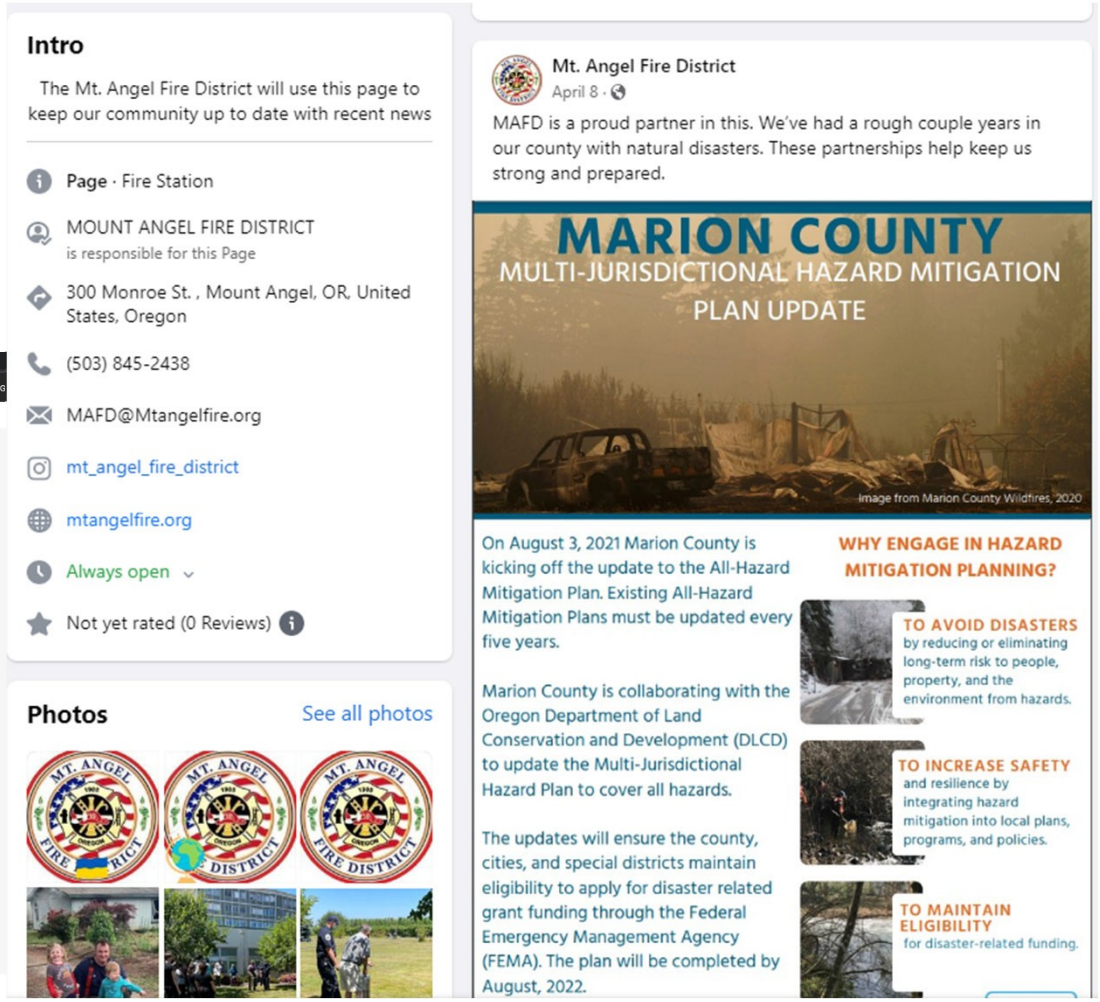
The torch; be yours to hold it high.
If ye break faith with us who die
We shall not sleep, though poppies grow
In Flanders fields.

Lieutenant Colonel John McCrae

4.6.12 Mt. Angel Fire District 4/8/2022

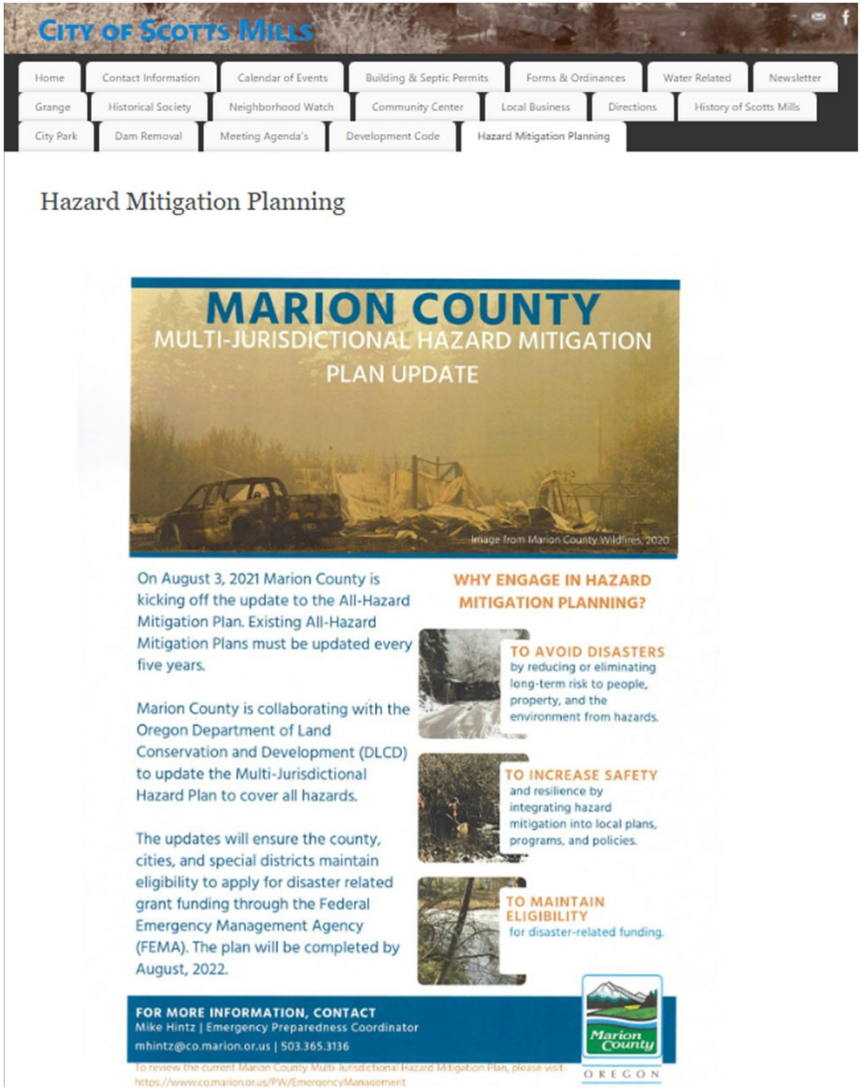
Mt. Angel Fire District
April 8, 2022
Website & Facebook
Post





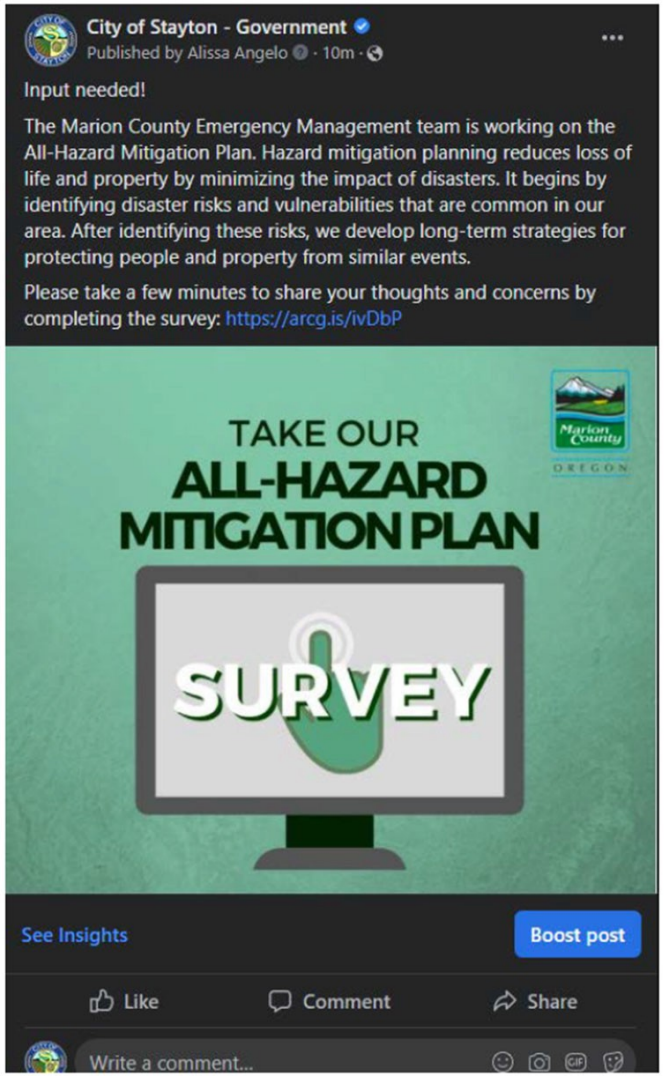
4.6.13 City of Scotts Mills 4/14/2022

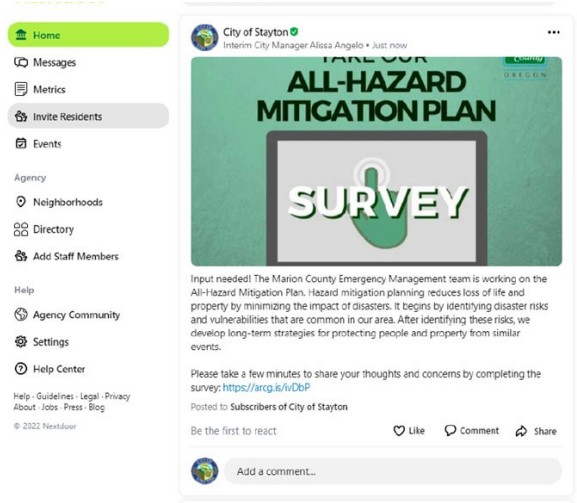
City of Scotts Mills April 14, 2022, Webpage
http://www.scottsmills.org/



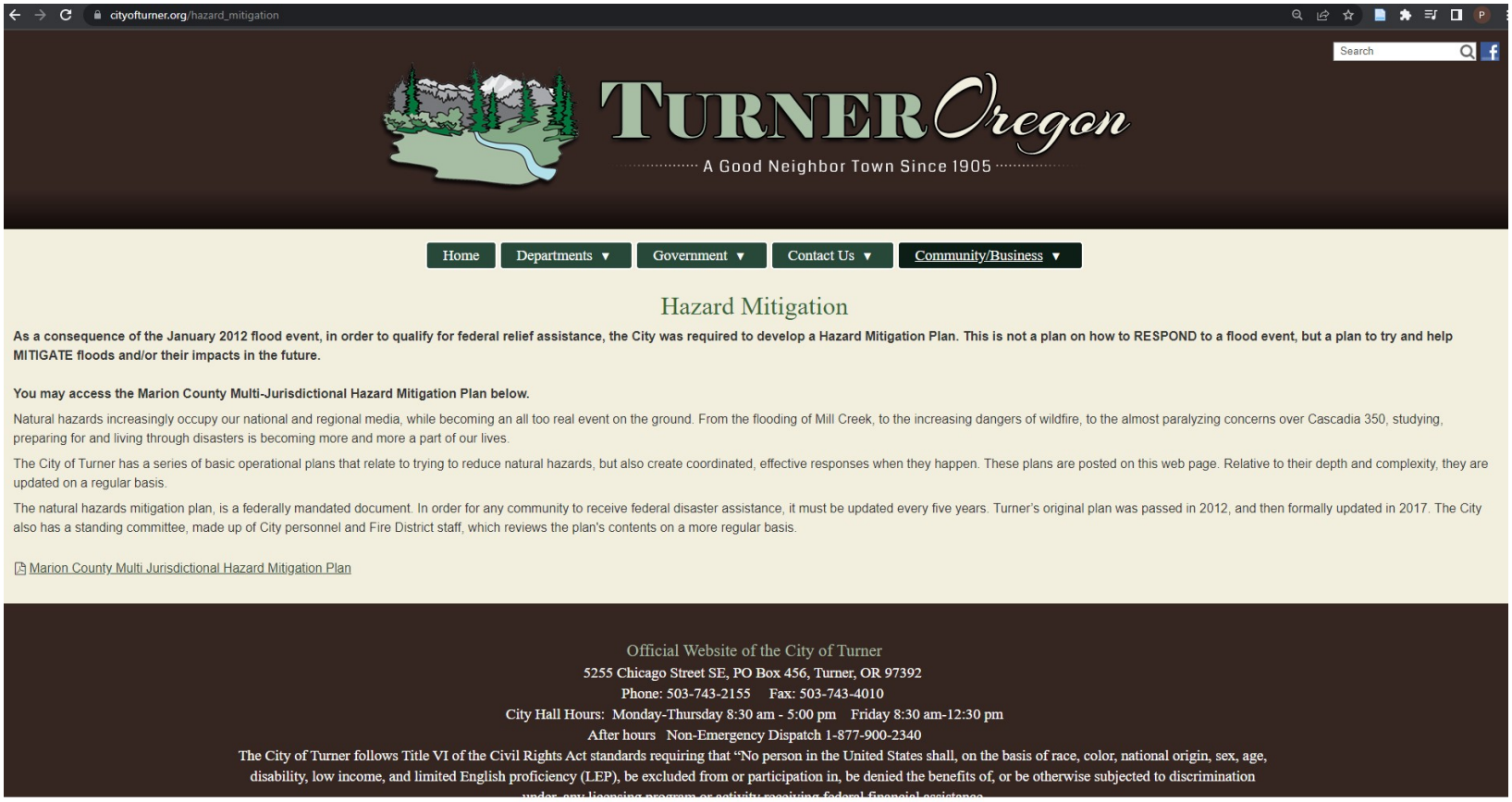
4.6.14 City of Stayton 2/2022

City of Stayton February 2022
Webpage: https://www.staytonoregon.gov/
Facebook and Nextdoor app posts



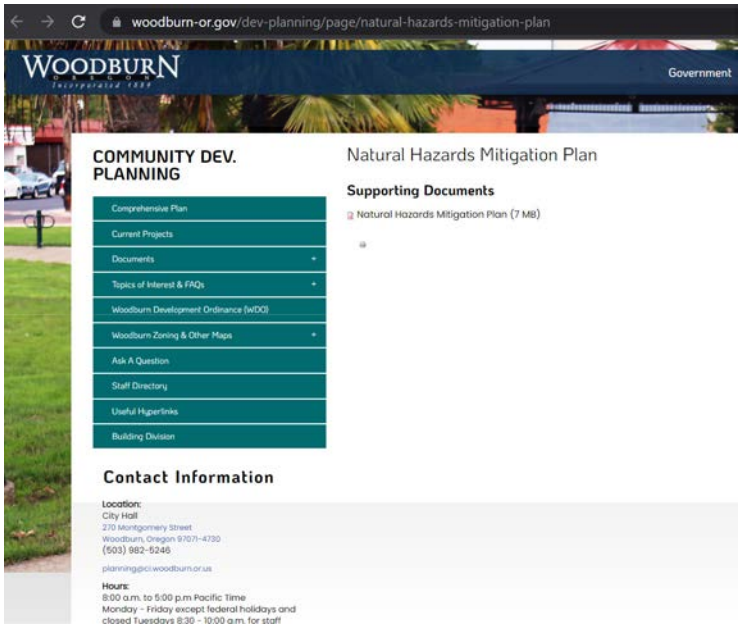


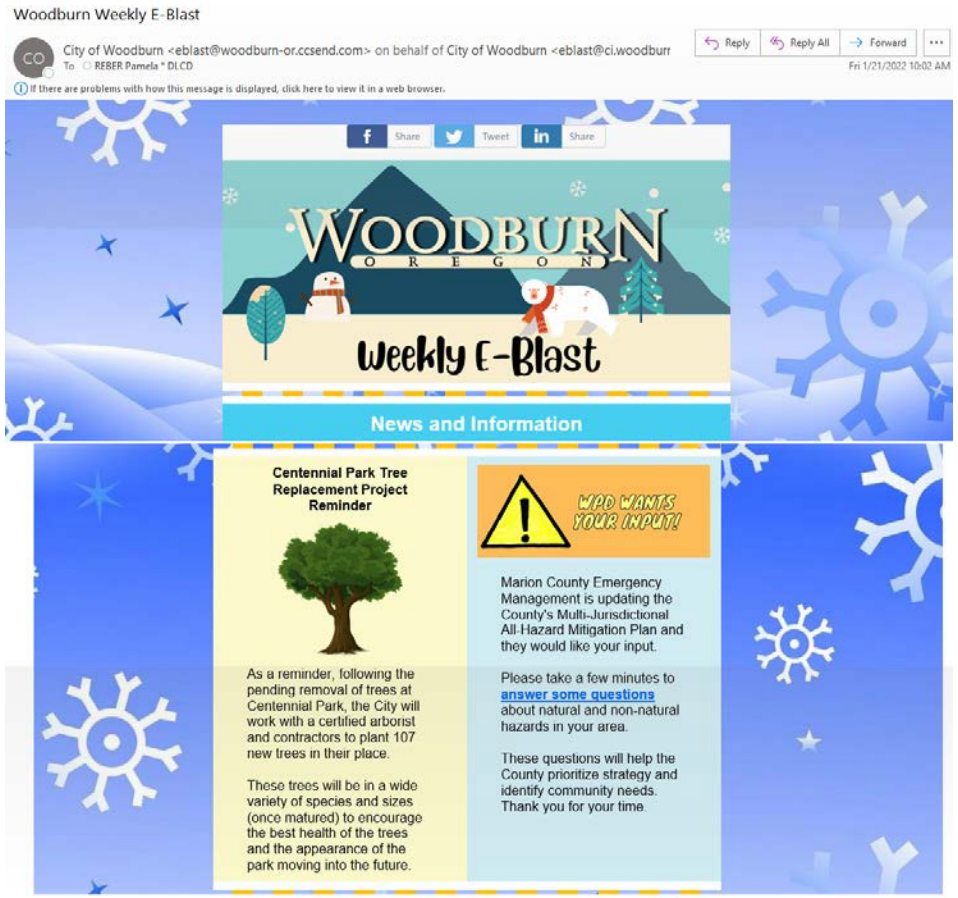
City of Turner July 5, 2022
Webpage https://www.cityofturner.org/



4.6.16 City of Woodburn 1/5/2022 & 1/21/2022

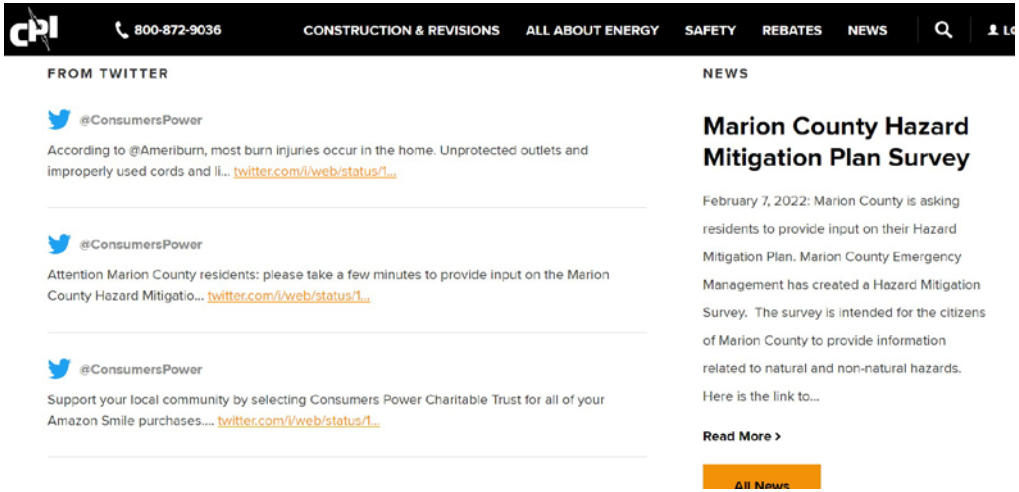
City of Woodburn
Webpage 1/5/22
https://www.woodburn-or.gov/
Weekly e-Blast 1/21/22

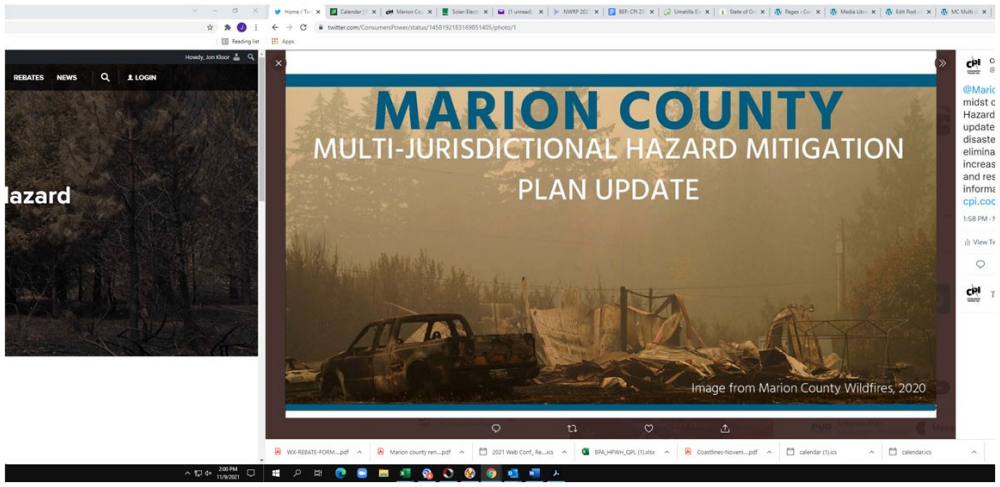




4.6.17 Consumer Power 11/9/21 & 2/7/22

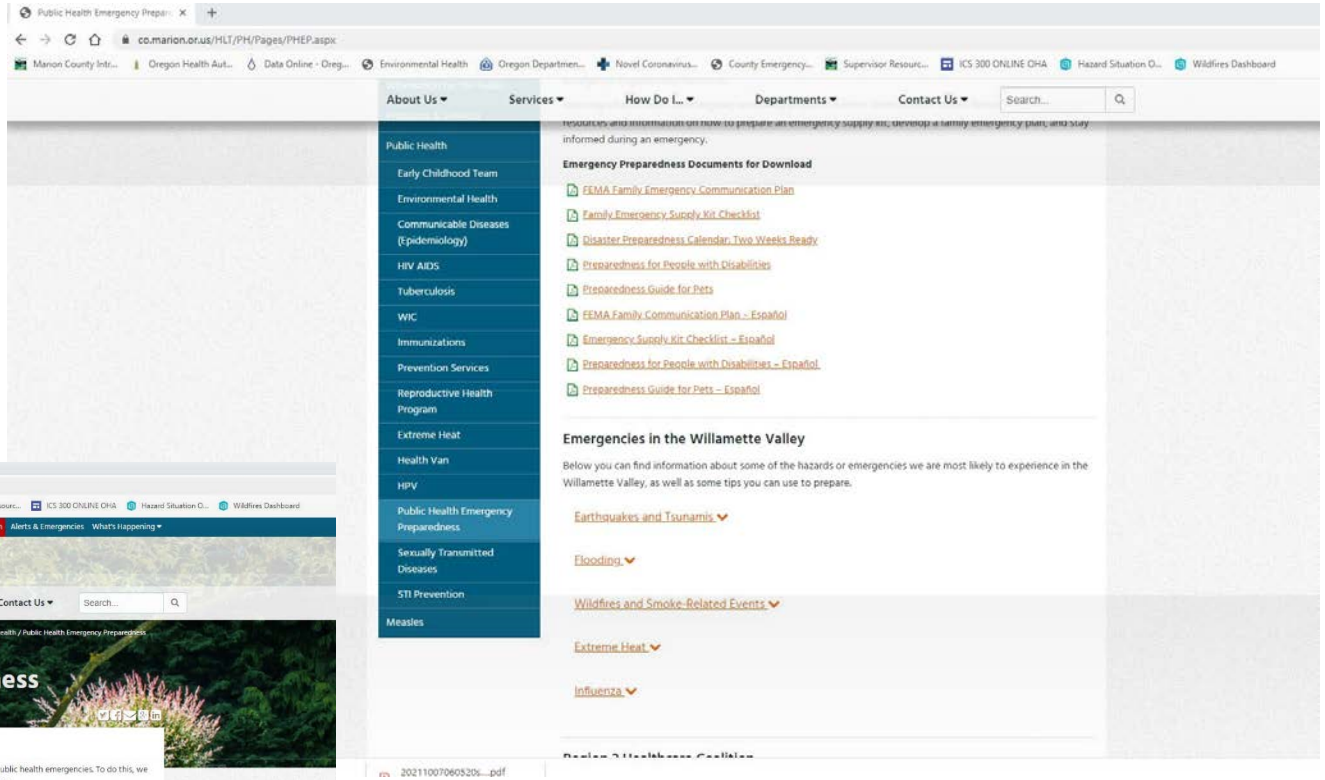
Consumers Power Inc. 11/9/21 Website, Twitter 2/7/22





4.6.18 Marion County Public Health 11/3/21

Marion County Public Health 11/3/21
Preparedness Website



5 Appendix D: Marion County Hazard Mitigation Vulnerability Survey

The 108-page Marion County Hazard Mitigation Vulnerability Survey Report follows as a hyperlink:

https://arcg.is/ivDbP

6 Appendix E: Economic Analysis of Natural Hazard Mitigation Projects

This summary was originally developed by the Oregon Partnership for Disaster Resilience (OPDR) at the University of Oregon's Community Service Center (now the Institute for Policy Research and Engagement or IPRE) and included in the 2016 Marion County HMP. It has been reviewed and accepted by the Federal Emergency Management Agency (FEMA) as a means of documenting how the prioritization of mitigation actions includes a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and associated costs. It was revised by DLCD during the 2022 Marion Co HMP update.

This appendix outlines three approaches for conducting economic analyses of natural hazard mitigation projects:

- Benefit/Cost Analysis,
- Cost-Effectiveness Analysis
- STAPLE/E Approach

The appendix describes the importance of implementing mitigation activities, different approaches to economic analysis of mitigation strategies, and methods to calculate costs and benefits associated with mitigation strategies. Information in this section is derived in part from: the Oregon Interagency Hazard Mitigation Team, State Hazard Mitigation Plan (Oregon Department of Emergency Management, 2000), and FEMA Publication 331, Report on Costs and Benefits of Natural Hazard Mitigation. The Economic Analysis is not intended to provide a comprehensive description of benefit/cost analysis, nor is it intended to evaluate local projects. It is intended to (1) raise benefit/cost analysis as an important issue, and (2) provide some background on how economic analysis can be used to evaluate mitigation projects.

6.1 Why Evaluate Mitigation Strategies?

Mitigation activities reduce the cost of disasters by minimizing property damage, injuries, and the potential for loss of life, and by reducing emergency response costs, which would otherwise be incurred. Evaluating possible hazard mitigation activities 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.

Evaluating mitigation projects is a complex and difficult undertaking, which is influenced by many variables. First, natural disasters affect all segments of the communities they strike, including individuals, businesses, and public services such as fire, law enforcement, utilities, and schools. Second, while some of the direct and indirect costs of disaster damages are measurable, some of the costs are non-financial and difficult to quantify in dollars. Third, many of the impacts of such events produce "ripple-effects" throughout the community, greatly increasing the disaster's social and economic consequences.

While not easily accomplished, there is value from a public policy perspective, in assessing the positive and negative impacts from mitigation activities and obtaining an instructive benefit/cost comparison. Otherwise, the decision to pursue or not pursue various mitigation options would not be based on an objective understanding of the net benefit or loss associated with these actions.

6.2 Mitigation Strategy Economic Analysis Approaches

The approaches used to identify the costs and benefits associated with hazard mitigation strategies, measures, or projects fall into three general categories: benefit/cost analysis, cost-effectiveness analysis and the STAPLE/E approach. The distinction between the three methods is outlined below:

6.2.1 Benefit / Cost Analysis

Benefit/cost analysis is a key mechanism used by the state Oregon Department of Emergency Management (OEM), the Federal Emergency Management Agency, and other state and federal agencies in evaluating hazard mitigation projects, and is required by the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended.

Benefit/cost analysis is used in hazards mitigation to show if the benefits to life and property protected through mitigation efforts exceed the cost of the mitigation activity. Conducting benefit/cost analysis for a mitigation activity can assist communities in determining whether a project is worth undertaking now, to avoid disaster-related damages later.

Benefit/cost analysis is based on calculating the frequency and severity of a hazard, avoiding future damages, and risk. In benefit/cost analysis, all costs and benefits are evaluated in terms of dollars, and a net benefit/cost ratio is computed to determine whether a project should be implemented. A project must have a benefit/cost ratio greater than 1 (i.e., the net benefits will exceed the net costs) to be eligible for FEMA funding.

6.2.2 Cost-Effective Analysis

Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. This type of analysis, however, does not necessarily measure costs and benefits in terms of dollars. Determining the economic feasibility of mitigating hazards can also be organized according to the perspective of those with an economic interest in the outcome. Hence, economic analysis approaches are covered for both public and private sectors as follows.

6.2.3 Invest in Public Sector Mitigation Activities

Evaluating mitigation strategies in the public sector is complicated because it involves estimating all of the economic benefits and costs regardless of who realizes them, and potentially to a large number of people and economic entities. Some benefits cannot be evaluated monetarily, but still affect the public in profound ways. Economists have developed methods to evaluate the economic feasibility of public decisions which involve a diverse set of beneficiaries and non-market benefits.

6.2.4 Investing in Private Sector Mitigation Activities

Private sector mitigation projects may occur based on one or two approaches: it may be mandated by a regulation or standard, or it may be economically justified on its own merits. A building or landowner, whether a private entity or a public agency, required to conform to a mandated standard may consider the following options:

1. Request cost sharing from public agencies.
2. Dispose of the building or land either by sale or demolition.
3. Change the designated use of the building or land and change the hazard mitigation compliance requirement.
4. Evaluate the most feasible alternatives and initiate the most cost-effective hazard mitigation alternative.

The sale of a building or land triggers another set of concerns. For example, real estate disclosure laws can be developed which require sellers of real property to disclose known defects and deficiencies in the property, including earthquake weaknesses and hazards to prospective purchases. Correcting deficiencies can be expensive and time consuming, but their existence can prevent the sale of the building. Conditions of a sale regarding the deficiencies and the price of the building can be negotiated between a buyer and seller.

6.2.5 STAPLE / E Approach

Considering detailed benefit/cost or cost-effectiveness analysis for every possible mitigation activity could be very time consuming and may not be practical. There are some alternate approaches for conducting a quick evaluation of the proposed mitigation activities which could be used to identify those mitigation activities that merit more detailed assessment.

One of those methods is the STAPLE/E approach.

Using STAPLE/E criteria, mitigation activities can be evaluated quickly by steering committees in a synthetic fashion. This set of criteria requires the committee to assess the mitigation activities based on the Social, Technical, Administrative, Political, Legal, Economic and Environmental (STAPLE/E) constraints and opportunities of implementing the mitigation item in your community. The second chapter in FEMA's How-To Guide "Developing the Mitigation Plan – Identifying Mitigation Actions and Implementation Strategies" as well as the "State of Oregon's Local Natural Hazard Mitigation Plan: An Evaluation Process" outline some specific considerations in analyzing each aspect. The following are suggestions for how to examine each aspect of the STAPLE/E approach from the "State of Oregon's Local Natural Hazard Mitigation Plan: An Evaluation Process."

Social: Community development staff, local non-profit organizations, or a local planning board can help answer these questions.

- Is the proposed action socially acceptable to the community?
- Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- Will the action cause social disruption?

Technical: The city or county public works staff and building department staff can help answer these questions.

- Will the proposed action work?
- Will it create more problems than it solves?
- Does it solve a problem or only a symptom?
- Is it the most useful action in light of other community goals?

Administrative: Elected officials or the city or county administrator, can help answer these questions.

- Can the community implement the action?
- Is there someone to coordinate and lead the effort?
- Is there sufficient funding, staff, and technical support available?
- Are there ongoing administrative requirements that need to be met?

Political: Consult the mayor, city council or city board of commissioners, city or county administrator, and local planning commissions to help answer these questions.

- Is the action politically acceptable?
- Is there public support both to implement and to maintain the project?

Legal: Include legal counsel, land use planners, risk managers, and city council or county planning commission members, among others, in this discussion.

- Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
- Are there legal side effects? Could the activity be construed as a taking?
- Is the proposed action allowed by the comprehensive plan, or must the comprehensive plan be amended to allow the proposed action?
- Will the community be liable for action or lack of action?
- Will the activity be challenged?

Economic: Community economic development staff, civil engineers, building department staff, and the assessor's office can help answer these questions.

- What are the costs and benefits of this action?
- Do the benefits exceed the costs?
- Are initial, maintenance, and administrative costs considered?
- Has funding been secured for the proposed action? If not, what are the potential funding sources (public, non-profit, and private?)
- How will this action affect the fiscal capability of the community?
- What burden will this action place on the tax base or local economy?
- What are the budget and revenue effects of this activity?
- Does the action contribute to other community goals, such as capital improvements or economic development?
- What benefits will the action provide? (This can include dollar amount of damages prevented, number of homes protected, credit under the CRS, potential for funding under the HMGP or the FMA program, etc.)

Environmental: Watershed councils, environmental groups, land use planners and natural resource managers can help answer these questions.

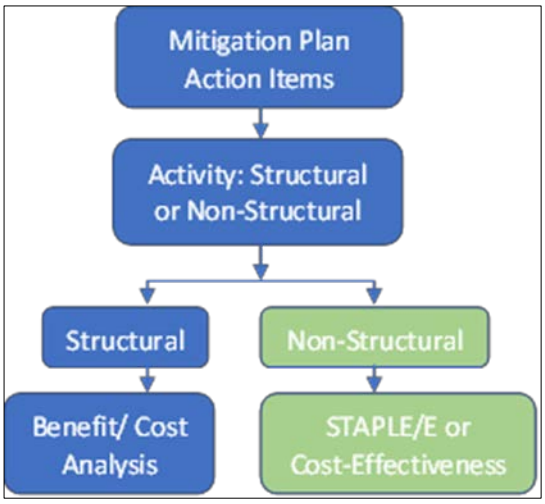
- How will the action impact the environment?
- Will the action need environmental regulatory approvals?
- Will it meet local and state regulatory requirements?
- Are endangered or threatened species likely to be affected?

The STAPLE/E approach is helpful for doing a quick analysis of mitigation projects. Most projects that seek federal funding and others often require more detailed benefit/cost analyses.

6.3 When to use the Various Approaches

It is important to realize that various funding sources require different types of economic analyses. The following figure (6-1) is to serve as a guideline for when to use the various approaches.

Figure 6-1, Economic Analysis Flowchart



Source: Oregon Partnership for Disaster Resilience. 2005; revised DLCD, 2021.

6.4 Implementing the Approaches

Benefit/cost analysis, cost-effectiveness analysis, and the STAPLE/E are important tools in evaluating whether to implement a mitigation activity. A framework for evaluating mitigation activities is outlined below. This framework should be used in further analyzing the feasibility of prioritized mitigation activities.

1. **Identify the Activities**

   Activities for reducing risk from hazards can include structural projects to enhance disaster resistance, education and outreach, and acquisition or demolition of exposed properties, among others. Different mitigation projects can assist in minimizing risk to hazards but do so at varying economic costs.

2. **Calculate the Costs and Benefits**

   Choosing economic criteria is essential to systematically calculating costs and benefits of mitigation projects and selecting the most appropriate activities. Potential economic criteria to evaluate alternatives include:

   - *Determine the project cost*. This may include initial project development costs, and repair and operating costs of maintaining projects over time.
   - *Estimate the benefits*. Projecting the benefits or cash flow resulting from a project can be difficult. Expected future returns from the mitigation effort depend on the correct specification of the risk and the effectiveness of the project, which may not be well known. Expected future costs depend on the physical durability and potential economic obsolescence of the investment. This is difficult to project. These considerations will also provide guidance in selecting an appropriate salvage value. Future tax structures and rates must be projected. Financing alternatives must be researched, and they may include retained earnings, bond and stock issues,

and commercial loans.

- *Consider costs and benefits to society and the environment*. These are not easily measured but can be assessed through a variety of economic tools including existence value or contingent value theories. These theories provide quantitative data on the value people attribute to physical or social environments. Even without hard data, however, impacts of structural projects to the physical environment or to society should be considered when implementing mitigation projects.
- *Determine the correct discount rate*. Determination of the discount rate can just be the risk-free cost of capital, but it may include the decision maker's time preference and also a risk premium. Including inflation should also be considered.

3. **Analyze and Rank the Activities**

Once costs and benefits have been quantified, economic analysis tools can rank the possible mitigation activities. Two methods for determining the best activities given varying costs and benefits include net present value and internal rate of return.

- *Net present value*. Net present value is the value of the expected future returns of an investment minus the value of the expected future cost expressed in today's dollars. If the net present value is greater than the projected costs, the project may be determined feasible for implementation. Selecting the discount rate and identifying the present and future costs and benefits of the project calculates the net present value of projects.
- *Internal rate of return*. Using the internal rate of return method to evaluate mitigation projects provides the interest rate equivalent to the dollar returns expected from the project. Once the rate has been calculated, it can be compared to rates earned by investing in alternative projects. Projects may be feasible to implement when the internal rate of return is greater than the total costs of the project. Once the mitigation projects are ranked based on economic criteria, decision-makers can consider other factors, such as risk, project effectiveness, and economic, environmental, and social returns in choosing the appropriate project for implementation.

6.5 Economic Returns on Hazard Mitigation

The estimation of economic returns, which accrue to building or land owners as a result of hazard mitigation, is difficult. Owners evaluating the economic feasibility of mitigation should consider reductions in physical damages and financial losses. A partial list follows:

- Building damages avoided
- Content damages avoided.
- Inventory damages avoided.
- Rental income losses avoided.
- Relocation and disruption expenses avoided.
- Proprietor's income losses avoided.

These parameters can be estimated using observed prices, costs, and engineering data. The difficult part is to correctly determine the effectiveness of the hazard mitigation project and the resulting reduction in damages and losses. Equally as difficult is assessing the probability that an event will occur. The damages and losses should only include those that will be borne by the owner. The salvage value of the investment can be important in determining economic feasibility. Salvage value becomes more important as the time horizon of the owner declines. This is important because most businesses depreciate assets over a period.

6.6 Additional Costs from Hazards

Property owners should also assess changes in a broader set of factors that can change because of a large disaster. These are usually termed "indirect" effects, but they can have a very direct effect on the economic value of the owner's building or land. They can be positive or negative, and include changes in the following:

- Commodity and resource prices.
- Availability of resource supplies.
- Commodity and resource demand changes.
- Building and land values.
- Capital availability and interest rates.
- Availability of labor.
- Economic structure.
- Infrastructure.
- Regional exports and imports.
- Local, state, and national regulations and policies.
- Insurance availability and rates.

Changes in the resources and industries listed above are more difficult to estimate and require models that are structured to estimate total economic impacts. Total economic impacts are the sum of direct and indirect economic impacts. Total economic impact

models are usually not combined with economic feasibility models. Many models exist to estimate total economic impacts of changes in an economy. Decision makers should understand the total economic impacts of disasters in order to calculate the benefits of a mitigation activity. This suggests that understanding the local economy is an important first step in being able to understand the potential impacts of a disaster, and the benefits of mitigation activities.

6.7 Additional Considerations

Conducting an economic analysis for potential mitigation activities can assist decision-makers in choosing the most appropriate strategy for their community to reduce risk and prevent loss from hazards. Economic analysis can also save time and resources from being spent on inappropriate or unfeasible projects. Several resources and models are listed on the following page that can assist in conducting an economic analysis for hazard mitigation activities.

Benefit/cost analysis is complicated, and the numbers may divert attention from other important issues. It is important to consider the qualitative factors of a project associated with mitigation that cannot be evaluated economically. There are alternative approaches to implementing mitigation projects. Opportunity rises to develop strategies that integrate hazard mitigation with projects related to watersheds, environmental planning, community economic development, and small business development, among others. Incorporating hazard mitigation with other community projects can increase the viability of project implementation.

6.8 Resources

These items support the development and funding of hazard mitigation actions:

Federal Emergency Management Agency. (Mar. 2007). Appendix D: Determining Cost Effectiveness; From FEMA Publication 551, Selecting Appropriate Mitigation Measures for Flood prone Structures. Available at: https://www.fema.gov/sites/default/files/2020-08/fema_551.pdf

Federal Emergency Management Agency. (Jan. 2017). Benefit Cost Toolkit Version 6.0 Available at: https://www.fema.gov/grants/guidance-tools/benefit-cost-analysis

Federal Emergency Management Agency. (Dec. 2018). DRRA - Section 1215 Management Costs FAQs. https://www.fema.gov/drra-1215-faq

Federal Emergency Management Agency. (2015). FY 2015 Hazard Mitigation Assistance Guidance and Addendum. https://www.fema.gov/media-library/assets/documents/103279

7 Appendix F: Grant Programs

The 38-page DR-4562-OR Resource Recovery Guide was compiled by Oregon Department of Emergency Management in August 2021 as part of the recovery process following the 2020 wildfires.

To view the guide, follow the link below (Double click the PDF):

DR-4562_OR
Recovery Resource C

8 Appendix G: Hazard History

8.1 2022 NHMP Hazard Histories

Local list of federal declared disasters since 2000

Oregon Winter Storm 02-13-2021 (DR-4599-OR) Incident Period: February 11, 2021 - February 15, 2021, Major Disaster Declaration declared on May 4, 2021

Oregon Wildfires and Straight-line Winds (DR-4562-OR) Incident Period: September 7, 2020 - November 3, 2020, Major Disaster Declaration declared on September 15, 2020

Oregon Covid-19 Pandemic (DR-4499-OR)
Incident Period: January 20, 2020, and continuing Major Disaster Declaration declared on March 28, 2020

Oregon Severe Winter Storm, Flooding, Landslides, and Mudslides (DR-4055-OR)
Incident Period: January 17, 2012 - January 21, 2012, Major Disaster Declaration declared on March 2, 2012

Oregon Severe Winter Storm, Record and Near Record Snow (DR-1824-OR)
Incident Period: December 13, 2008 - December 26, 2008, Major Disaster Declaration declared on March 2, 2009

Oregon Severe Winter Storms (DR-1510-OR)

Incident Period: December 26, 2003 - January 14, 2004, Major Disaster Declaration declared on February 19, 2004

8.2 History of Avalanche in Marion County

Marion County has experienced a single avalanche event since the year 2000 according to the NOAA Storm Events database (U.S. Department of Commerece, National Oceanic and Atmospheric Administration, 2022). On January 8-9, 2008 a strong and cold Pacific system brought copious amounts of new snow accumulations to the higher elevations of northwest Oregon. This system dropped snow levels considerably, leading to the first snow accumulation of the year in areas within the Columbia River Gorge and the Upper Hood River Valley. Over the course of about 18 hours, multiple avalanches occurred in the same area, over the Santiam Pass, near the intersection of Hwy. 20 and Hwy. 126. The avalanches were contributed to higher than average snow pack, and large amounts of plowed snow along the highways. The first set of avalanches occurred the morning of January 8th, the largest burying parts of US Hwy. 20 up to 15 feet deep. Three cars were trapped by the avalanche then later freed, with no injuries. The second round of avalanches occurred late at night on January 8th and wasn't cleared until the following morning. Eight commercial vehicles were trapped for a time under the snow, with no injuries reported. Both rounds closed the highways for an extended period for snow removal.

8.3 History of Dam Failure in Marion County

SPECIAL NOTE: Marion County does not own or operate any the dams that are in the county, including the three High Hazard Potential Dams.

Oregon experienced four major dam failures between 1874 and 2008 (Association of State Dam Safety Officials, 2023). The most significant event is the 1903 Willow Creek Dam failure, which nearly destroyed the town of Heppner and killed almost 250 people. Other failures within the state include Colombia River dike (1948), Simplot Wastewater Reservoir (2005), and the Geary Levee (2006).

Marion County has not experienced any dam failures. However, in 1996 Silver Creek flooded, threatening buildings on James Street and along Silver Creek in Silverton. Logs and debris threatened bridges and the base of Silver Creek dam was significantly eroded (Phillp Williams & Associates, 2000). The damage did not result in dam failure and the Silver Creek dam has since been repaired.

The National Inventory of Dams identifies three High Hazard Potential Dams in Marion County. Another such dam is in Linn County, the Detroit Dam, but is also relevant to dam safety for Marion County residents, as it divides Marion and Linn Counties. (U.S. Army Corps of Engineers, 2020).

A High Hazard Potential Dam (HHPD) is a dam located in an area where a failure may cause serious damage to inhabited homes, agricultural buildings, campgrounds, recreational facilities, industrial or commercial buildings, public utilities, main highways, or class I carrier railroads, or where environmental degradation would be significant, or

where danger to individuals exists with the potential for loss of life. It is not an assessment of the condition of the dam.

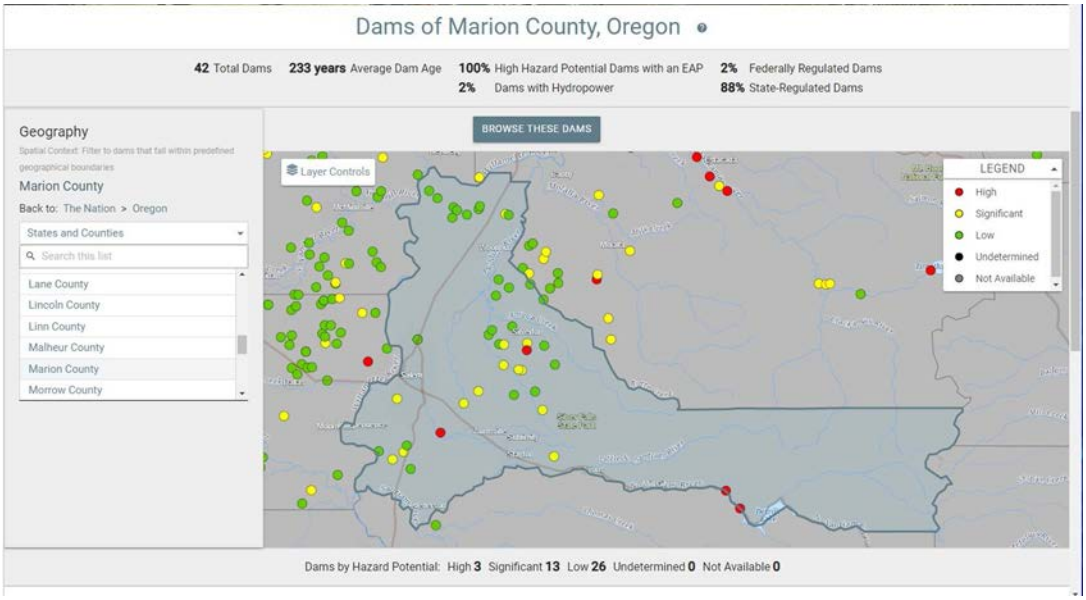
Marion County's HHPDs are listed in the table below, they are not operated nor owned by Marion County.

Table 8-1, High Hazard Dams that impact Marion County

Name	Year Completed	Storage (acre ft)	Height (ft)	Owner	Purpose	Type
Detroit Dam	1953	455,000	463	USACE	Flood Risk Reduction, Hydroelectric, Irrigation, Navigation, Recreation, Other	Gravity
Big Cliff Dam	1954	5,930	172	USACE	Hydroelectric	Gravity
Silver Creek Dam	1975	2,500	65	City of Silverton	Water Supply	Earth
Frazen Dam	1952	300	33	City of Salem	Water Supply	Earth, Rockfill

Source: National Inventory of Dams, consulted July 2022 https://nid.sec.usace.army.mil/#/

Figure 8-1, Location of all dams inventoried in the National Inventory of Dams for Marion County and vicinity.



Source: National Inventory of Dams, consulted July 2022 https://nid.sec.usace.army.mil/#/

8.4 History of Drought in Marion County

Determining Drought

Oregon Revised Statute (ORS) Chapter 536 identifies authorities available during a drought. To trigger specific actions from the Water Resources Commission and the Governor, a “severe and continuing drought” must exist or be likely to exist.

Oregon relies upon two inter-agency groups to evaluate water supply conditions, and to help assess and communicate potential drought-related impacts. The Water Supply Availability Committee (WSAC) is a technical committee chaired by the Water Resources Department. The other group—the Drought Readiness Council— is a coordinating body of state agencies co-chaired by the Water Resources Department and the Department of Emergency Management (State of Oregon, Department of Emergency Management, 2016).

Marion County experiences dry conditions annually during the summer months from June to September. The Drought Severity Index shows episodes of drought within the past five years occurring during the summer through the fall (U.S. Department of Commerece, National Ocenanic and Atmospheric Administration, N.d.). Periodically, Marion County experiences more significant drought conditions that affect the region or the state.

Disaster declarations due to drought conditions have been declared in Oregon in

Dates for significant drought events that affected Marion County include the following:

1928-1941

A significant drought affected all of Oregon from 1928 to 1941. The prolonged statewide drought created significant problems for the agriculture industry. The first of the three Tillamook Forest burns occurred during this drought in 1933 (Taylor, Hatton, & Taylor, The Oregon Weather Book: A State of Extremes, 1999).

1976-1981

During this drought period in western Oregon, low stream flows prevailed. The period between 1976 and 1977 was the single driest year of the century. The Portland Airport received only 7.19 inches of rain between October 1976 and February 1977. In the twelve-month period from September 1976 through August 1977, Corvallis received only 22.2 inches of precipitation, 52 percent of the "normal" of 42.7 inches. During the winter of that year, airborne dry ice seeding was used in Polk County as a means of enhancing winter precipitation for agricultural use.

1985-1994

A dry period lasting from 1985 to 1994 caused significant problems statewide. The peak year was 1992, when the state declared a drought emergency. Forests throughout Oregon suffered from a lack of moisture with fires common and insect pests flourishing (Taylor, Hatton, & Taylor, The Oregon Weather Book: A State of Extremes).

2005

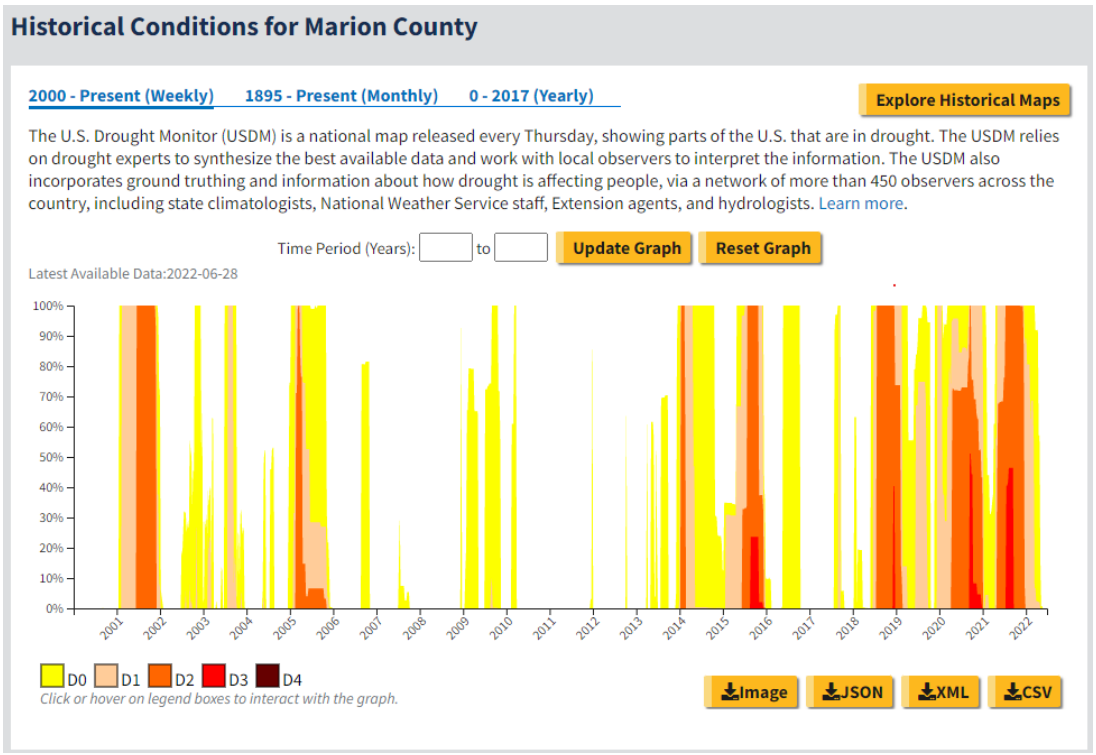
February 2005 was the driest February on record since 1977, surpassing 2001's conditions. Governor Ted Kulongoski's Office posted a State of Oregon Drought and Fire Web page. This page features weekly updates, drought and fire information, and agency links. Above normal temperatures contributed to decreased water availability for the summer. Stream and river levels dropped significantly and watermasters regulated live flow use by irrigators. Drought conditions also led to the use of stored water when it was available. However, water availability in the Willamette Valley was not as severely affected as with other parts of the state.

2015

The Marion County Board of Commissioners declared a drought emergency and requested that the Governor of Oregon declare a Drought Emergency due to low stream flow, and above normal temperatures. The most profound impacts were on recreation in the Detroit area which saw 25-30% decrease in business.

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 8-2, Historical occurrence of drought in Marion County.



Source: Drought.gov, consulted July 2022. Home | Drought.gov

8.5 History of Earthquakes in Marion County and Vicinity

8.5.1 Historical Earthquake Events

Marion County has experienced multiple earthquakes of an estimated magnitude of four and greater, with major earthquakes felt in 1941 (magnitude 7.1), 1962 (magnitude 5.2), and 2001 (magnitude 6.8). Detailed descriptions of major recent earthquakes that affected Marion County are listed below.

April 13, 1949 – Olympia, Washington – Magnitude 7.1

On April 13, 1949, Marion County residents felt an earthquake that was centered near Olympia, Washington. In Washington, this quake caused eight deaths. While Marion County was shaken by the quake, damage was minimal, and no deaths occurred. The quake rocked northwestern Oregon, extending as far south as Eugene, Coos Bay, and Reedsport, and as far east as Prineville and La Grande. In downtown Salem and West Salem and in outlying areas buildings trembled, light- fixtures swayed, dishes rattle in cupboards. Most of those who were outside at the time reported no shock. Workers in the Marion County courthouse said that filing cabinets rocked back and forth.

November 16, 1957 – Salem, Oregon – Magnitude 5.0

A quake struck near Salem in late 1957, with damage intensity estimated at 5.0. Most reports indicated only one sharp jolt or a few seconds of shaking. The earthquake caused slight damage in Salem, including cracked walls and plaster in West Salem, and furnishings shifting around. Residents also reported temporary outages to TV and electricity. This earthquake was also felt in Portland and all the way to the Oregon Coast.

April 18, 1961 – Albany, Oregon – Magnitude 4.5

A quake in April of 1961 caused little damage to the county but startled many residents. The quake was centered just south of Salem and registered 4.6 on the Richter scale. Described by most as a double shock, it shook houses and rattled dishes, but damage was very limited. Albany reported some cracked plaster.

November 5, 1962 – Vancouver, Washington – Magnitude 5.2

Three and a half weeks after the devastating Columbus Day Storm, an earthquake that measured approximately 5.2 on the Richter scale shook the Portland area. It was the largest quake to be generated by a fault under Portland and Vancouver. Reports of the earthquake came from Eugene, 110 miles south of Portland, and from Seattle, 135 miles to the north. The heaviest damage report came from Tillamook on the Oregon coast where the quake, lasting only a few seconds, cracked open barn walls and broke out windows at a local ranch.

March 7, 1963 – Salem, Oregon – Magnitude 4.6

On March 7, 1963, a quake measuring 4.6 on the Richter scale shook Marion County. Despite the low magnitude of the quake, damage still occurred – especially to older

masonry buildings. A porch was loosened from its house south of Salem, and three instances of cracked plaster were reported.

March 25, 1993 – Scotts Mills, Oregon – Magnitude 5.7

The Scotts Mills Earthquake (also known as the "Spring Break Quake") was centered in Marion County, near Woodburn and Scotts Mills. The quake originated about two miles south of Scotts Mills and twelve to thirteen miles underground.

Because of its locality to Marion County, damage was more severe in the county than the Nisqually quake. 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.

February 28, 2001, Seattle, Washington – Magnitude 6.8

The most recent earthquake to be felt in Marion County was the Nisqually earthquake, on February 28, 2001. The earthquake hit at 10:54 a.m. and was centered 35 miles southwest of Seattle. The quake registered 6.8 on the Richter Scale. In the Puget Sound area, this quake caused 400 injuries, one quake-related death, and about $2 billion dollars in damage. While the quake caused little damage in Marion County, it did temporarily close businesses and schools to assess potential damage. About 300 Salem City Hall employees went outside after the quake. About 1,000 employees evacuated the state Department of Human Services building after an employee pulled a fire alarm. Tremors were also felt in the upper floors of the Oregon State Capitol, and legislators and staff said they could feel the building swaying. Schools in Marion County also felt the Nisqually Earthquake, although county school districts found little damage. The local schools that reported the strongest tremors were mostly in northern Marion County. St. Paul and North Marion High Schools, both north of Woodburn, briefly evacuated students. Even though the quake amounted to billions of dollars in damage in Washington, the cost there could have been much higher if not for seismic retrofitting of buildings and highways.

This HMP update focuses on an historic update since 2001. In that time multiple small earthquakes have occurred in Marion County. The table below is drawn from the USGS Earthquake Catalogue and includes only those earthquakes that registered greater than magnitude 2.5.

Table 8-2, Earthquakes greater than M 2.5 in Marion County and vicinity

Date and time	Depth	Magnitude	Place
2020-04-01T15:44:24.440Z	13.62	2.57	6 km ESE of Scotts Mills, Oregon
2018-09-17T00:08:26.690Z	40.89	2.83	6 km WNW of Gervais, Oregon
2018-08-30T23:38:18.160Z	3.78	2.57	11 km NNW of Detroit, Oregon
2018-04-15T03:45:41.250Z	18.38	3.08	6 km SSE of Silverton, Oregon
2017-12-14T01:24:26.830Z	17.37	3.96	5 km E of Scotts Mills, Oregon
2017-06-01T16:02:57.740Z	22.48	2.96	9 km NW of Keizer, Oregon
2016-10-04T04:29:22.630Z	23.70	3.03	4 km WNW of Woodburn, Oregon
2014-09-24T15:17:32.450Z	28.56	2.65	3 km WSW of Molalla, Oregon
2012-09-08T04:57:45.180Z	23.81	3.54	8 km N of Scotts Mills, Oregon
2009-08-06T07:41:58.940Z	18.362	2.80	12 km SE of Molalla, Oregon
2007-09-24T06:20:54.270Z	23.43	3.60	8 km NW of Brooks, Oregon
2006-12-24T23:39:30.360Z	14.43	2.50	13 km N of Mehama, Oregon
2006-04-26T14:24:06.620Z	19.521	3.00	8 km ESE of Scotts Mills, Oregon
2003-04-28T22:25:48.130Z	14.63	2.80	12 km ESE of Molalla, Oregon

Source: USGS Earthquake Catalogue, consulted July 2022. Search Earthquake Catalog (usgs.gov)

Since completion of this draft update to the Marion County HMP two earthquakes were felt in Marion County both with epicenters south of the county.

March 18, 2022, A 2-6 magnitude earthquake occurred 16 km east southeast of Lacomb, Oregon in Linn County at a depth of 12.1 km below the surface.

October 7, 2022, A 4.6 magnitude earthquake occurred in this same location 16 km east southeast of Lacomb, Oregon at a depth of 13.2 km below the surface. This earthquake was reported felt in nearby towns including Lebanon, Corvallis, and Salem.

8.6 History of Extreme Heat in Marion County

Marion County has experienced five extreme heat events since the year 2000 according to the NOAA Storm Events database. They are as follows:

June 26-28, 2015: A strong upper-level ridge of high pressure resulted in hot temperatures across Northwest Oregon. Afternoon temperatures were in the low to mid 90s which is around 20 degrees above normal. Nighttime temperatures were in the mid-60s to low 70s which is around 15 degrees above normal. There were several new daily records set for the warmest low temperatures. A man drowned while swimming in the Santiam River on June 28th.

June 2-5, 2016: Unseasonably strong ridge of high pressure resulted in a period of early-season hot temperatures across Northwest Oregon. Temperatures of 95 to 100 in early June led to people seeking relief at local rivers. Two river drownings were reported in the Central Willamette Valley during this hot spell.

August 1-4, 2017: A ridge of high pressure aloft with a surface thermal trough over the area lead to record-breaking high temperatures across NW Oregon. The record- breaking heat led people to seek relief at local rivers. One child drowned while swimming in the Willamette River near the Wallace Marine Park.

June 26-28, 2021: A high pressure heat dome over the region led to stretch of extreme heat, shattering records. In Marion County there were three consecutive days with maximum temperatures greater than 100 degrees measured at several stations. The hottest day was on June 28 where temperatures peaked around 112 degrees. The minimum temperatures were warm as well with nighttime temperatures in the 70s on June 27 and June 28. Two heat related deaths were reported.

August 11-12, 2021: Hot weather began to develop August 9, peaking August 11- 12, but temperatures continued above normal into the weekend. Peak afternoon temperatures of 100 to 105 degrees drove people to seek relief in or near bodies of water. Heat caused slowdowns on the MAX light rail (Portland metro area) systems, and some businesses did close due to the heat. Cooling shelters were opened in several counties. In Marion County a 22-year-old California man drowned at Scotts Mill City Park on Wednesday, August 11th. The high temperature at Salem (KSLE) was 103 degrees on the 11th and 12th.

8.7 History of Floods in Marion County

The Willamette River basin has a long history of flooding. The largest flood on record on the Willamette River occurred in 1861. In 1861, town of Champoeg disappeared in the flood. Since then, however, the construction of flood control dams in the 1940s and 1950s has changed the pattern of flooding significantly.

Marion County has seen two major floods and five lesser floods during the last 45 years. One of the most memorable floods during this time, the "Christmas" flood of 1964, was rated "approximately a 100-year flood" by FEMA and was probably the most damaging in Oregon's history. Table 8-3 provides an overview of flooding history in Marion County. Major floods are discussed in more detail below.

Table 8-3, Marion County Flood History

Date	Location	Comments
December-January, 1964	The State of Oregon was declared an emergency disaster area.	In Salem, the Willamette River crested nearly 10 feet above flood stage.
January, 1974	Willamette Watershed	Heavy snow and a series of storms caused flooding conditions. Nine counties were declared disaster areas.
February, 1986	Salem Area	Heavy rain and snowmelt caused high water levels in the Willamette and Pudding Rivers
February 1996	Willamette Watershed Rivers and Creeks	Snowpack, warm temperatures, and record-breaking rains caused the streams to rise to all-time flood record levels.
November, 1996	Salem-Keizer	The heavy rains swamped the Salem-Keizer area.
January, 1997	Mid-Willamette Valley	The Willamette River crested at 29 feet, one foot above flood level.
December, 2005	Willamette Watershed	Heavy rains caused rivers to crest above flood stage
January, 2006	Willamette Watershed	Heavy rains caused road closures and damage to agricultural lands.
January, 2007	Pacific Northwest	Pacific frontal system brought widespread steady rain.
January, 2009	Northwest Oregon	Heavy rainfall combined with snowmelt runoff caused flooding.

Date	Location	Comments
December, 2010	Willamette Valley	Heavy rainfall over the area caused the Pudding River to overtop its banks.
January, 2011	Santiam River	Heavy rain that combined with snowmelt runoff to produce flooding on the Santiam River.
January, 2012	Pacific Northwest	Cold air mass in place over the Pacific Northwest, two strong and very moist Pacific weather systems brought widespread heavy rains.
February, 2014	Pacific Northwest	A series of fronts resulted in a prolonged period of rain for Northwest Oregon.
February, 2017	Northwest Oregon	A series of fronts brought moderate to heavy rainfall across Northwest Oregon.
April, 2019	Northwest Oregon	Strong atmospheric river
December, 2020	Northwest Oregon	A series of strong Pacific fronts moved across the region.

Source: Region 3 Mid/Southern Willamette Valley Regional Profile. January 2009; NOAA Storm Event Database, consulted June 2022

December-January 1964

The "Christmas" flood of 1964 was the largest flood to occur since major dam construction occurred on the upper Willamette. This flood occurred because of two storms, one on December 19, 1964, and the other on January 31, 1965. These storms brought record-breaking rainfall that exacerbated near record early season snow depths. The flooding caused ten deaths, $5 million dollars of damage to state bridges and $10 million dollars of damage in Marion County. There were hundreds of landslides, bridges and roads washed out, houses were damaged or destroyed, and thousands of people were forced to evacuate their homes (National Oceanic and Atmospheric Administration, N.d.).

Governor Mark Hatfield declared the entire state an emergency disaster area, and called the flooding, "the worst disaster ever to hit the state" (U.S. Department of the Interior, Geological Suvey, 2014). Marion County Commissioners also declared the county a disaster area as the Willamette River crested at 29.7 feet in Salem; nearly 10 feet above flood stage, and

most other streams in Marion County overflowed their banks. The floodwaters rendered sewage treatment plants in Salem inoperable causing raw sewage to be channeled directly into the Willamette River. A significant portion of Keizer was inundated, and more than a thousand people were evacuated. One hundred and twenty-one patients were evacuated from the Salem Memorial Hospital and fifteen families in the Turner/Salem area were evacuated from their homes. In Independence, thirty people were temporarily housed in City Hall to escape the floods. Further east, the entire Detroit-Idanha-Marion Forks area was isolated by massive washouts near Detroit Dam and Marion Forks. Seven homes were washed away in Idanha, and a landslide destroyed one house.

January 1974

Heavy snow and freezing rain and a series of mild storms caused snowmelt and rapid runoff. The storms resulted in two fatalities and thirteen injuries in Oregon. Nine counties in Oregon were declared disaster areas, including Marion County (Taylor, Hatton, & Taylor, The Oregon Weather Book: A State of Extremes, 1999). In Marion County, the Willamette River crested at 32 feet, four feet above flood level and two bridges were washed away on Mill Creek. Many residents experienced power outages and four Turner residents were evacuated from their homes and more than twenty roads were closed due to high water. In Salem and other communities, wastewater treatment plants exceeded capacity resulting in millions of gallons of raw sewage being discharged into the Willamette River. Total damage to Marion County was approximately $1.75 million.

February 1986

This flood, caused by a combination of heavy rains and snowmelt, caused the Willamette River to crest at just over 29 feet and within ten inches of flooding. The Pudding River crested at 24½, two-and-one-half feet above flood levels. In Salem, Minto Brown Island was closed because of high water on roads.

February 1996

In February of 1996, a combination of snowpack, warm temperatures, and record- breaking rains caused streams to rise to all-time flood record levels. Statewide, there were five flood related deaths and 150 people were evacuated from their homes. During this 25 -year flood event, overflow from the Little Pudding River inundated secondary roads, homes, and farmlands. Two state parks along the Willamette River in Marion County suffered loss during the flood. Willamette Mission State Park is located on what is known as ‘Beaver Island,’ and suffered severe damage. A large chunk of riverbank in the park disappeared with the floods. Dikes collapsed upstream from Jefferson due to high water on the South Santiam River. Serious erosion problems occurred within the South Santiam drainage basin. Claggett Creek also presented flooding problems during the February floods and was described as a 100-year storm event for the creek. Three houses with

basements flooded in the Keizer area. These homes were later removed from the floodplain with FEMA funding assistance. Marion Soil & Water Conservation District acted as pass through for $3.5 million from USDA Natural Resources Conservation Service (NRCS) to get financial assistance to farmers, who provided a 25 percent match. Flood damage from this flood event was estimated at $2.6 million for the entire Pudding/Little Pudding River Basin. In Keizer, damages reached $4.2 million. Total damage within Marion County were approximately $24 million.

November 1996

Flooding occurred in November 1996 adding to that occurred because of the February 1996 flood. Like February's storm, the "pineapple express," a weather system that draws large amounts of moisture from an area near Hawaii and deposits it on the West Coast, caused the heavy rain. Salem received about six inches of rain over a 48-hour period. The heavy rains swamped the Salem-Keizer sewer system, sent raw sewage into the Willamette River, and caused smelly backups in some Salem residents' basements. Adding to the troubles of the Salem-Keizer area, eighteen inches of water flooded a Keizer subdivision damaging several homes. Rural areas of the county were also hit hard by November's deluge. Five rural homes were evacuated, and dozens of roads were closed. One such road was Parker Road near Independence. Floodwater wiped out a 70-foot section of this road and left a fifteen-foot hole filled with rushing waters (U.S. Department of Commerece, National Oceanic and Atmospheric Administration, 2022).

January 1997

Heavy rains from the January 1997 storm caused flooding throughout the county. The Willamette River crested at 29 feet, one foot above flood level. Five thousand Mid-Willamette Valley residents lost power as high winds that accompanied the rain blew down power lines. Fallen trees and debris backed up sewer lines in Salem, and subdivisions in northeast Keizer were flooded, causing damage estimated at hundreds of thousands of dollars (U.S. Department of Commerece, National Oceanic and Atmospheric Administration, 2022).

December 2005

Heavy rains caused rivers to crest above flood stage in Polk, Marion, Linn, Lane, and Benton Counties, as well as other counties in the Willamette Valley.

January 2006

Heavy rains in January, November and December caused many rivers to crest above flood stage in the Willamette Valley, causing road closures and damage to agricultural lands.

January 2007

A strong warm Pacific frontal system brought widespread steady rain to the forecast area over a period of 36 hours. This system brought between 2 to 4 inches of rain to the Coast Range, between 1 to 3 inches to the coast and Willamette Valley, and between 2 to 5 inches to the Cascades. The Pudding River at Aurora crested at 21.9 feet on January 5th. Flood stage for this river is 22.0 feet (National Oceanic and Atmospheric Administration, N.d.).

January 2009

Heavy rainfall drenched the region to begin the new year. The heavy rainfall combined with snowmelt runoff caused flooding along multiple rivers in northwest Oregon. Heavy rain caused the Santiam River near Jefferson to overflow its banks and flood low lying areas and caused the Pudding River to overtop its banks and flood farmland (U.S. Department of Commerece, National Oceanic and Atmospheric Administration, 2022).

December 2010

On both the 14th and the 30th of the month heavy rainfall over the area caused the Pudding River to overtop its banks and flood farmland.

January 2011

From the 16th through the 18th a series of storms brought heavy rain that combined with snowmelt runoff to produce flooding on the Santiam River. The Santiam River at Jefferson crested at 15.4 feet on January 17th at 04:27 PST. The Pudding River at Aurora crested at 23.3 feet on January 19th at 13:30 PST.

January 2012

From January 19-20 with a cold air mass in place over the Pacific Northwest, two strong and very moist Pacific weather systems brought widespread heavy rains to the Willamette Valley flooding many urban and small streams.

Widespread low-land flooding occurred in Marion County, resulting in considerable flood damage to homes in southeast Salem and Turner. Residents of 300 homes in Turner had to be evacuated, including 90 residents of the Turner Retirement Home (U.S. Department of Commerece, National Oceanic and Atmospheric Administration, 2022).

February 2014

From the 16th to the 18th a series of fronts resulted in a prolonged period of rain for Northwest Oregon, and minor flooding of several of the area's rivers from February 12th through February 17th.

The Pudding River at Aurora reached flood stage at 11:30 AM on February 16th, 2014. The river crested at 22.4 feet at 5:00 AM on February 17th and fell below flood level at 9:30 AM PST on February 18th (U.S. Department of Commerece, National Oceanic and Atmospheric Administration, 2022).

February 2017

A series of fronts brought moderate to heavy rainfall across Northwest Oregon, resulting flooding on many rivers across the area from the 6th to the 12th. Heavy rain caused the Pudding River near Aurora to flood. The river crested at 24.16 feet, which is 2.16 feet above flood stage (U.S. Department of Commerece, National Oceanic and Atmospheric Administration, 2022).

April 2019

From the 8th to the 9th a particularly strong atmospheric river took aim for the south Willamette Valley, sitting over areas south of Salem for two days, producing anywhere from 2.5 to 5 inches of rain over a 48-hour period. Some areas in the Cascades and Cascade Foothills saw 5 to 7 inches of rain over that 48-hour period. Heavy rain combined with snow melt from all the snow from a few weeks prior in this same area caused flooding along most of the rivers in the area as well as along the main-stem Willamette River up to around Oregon City.

The Santiam River at Jefferson crested at 15.8 feet around 11 PM on April 8th, which is 0.8 foot above flood stage. The Pudding River at Aurora crested at 22.7 feet around 4 AM on April 11th, which is 0.7 foot above flood stage (U.S. Department of Commerece, National Oceanic and Atmospheric Administration, 2022).

December 2020

From the 20th to the 21st a series of strong Pacific fronts moved across the region bringing high winds to the coast with heavy rain across much of the area. The heavy rains resulted in flooding of some coastal rivers as well as small stream flooding and a debris flow. The gage on the Santiam River at Jefferson (JFFO3) crested at 15.3 feet. Flood stage is 15.0 feet. No damage was reported.

8.8 History of Landslides in Marion County

A 1998 study of the western portion of the Salem Hills completed by the Department of Geology and Mineral Industries (DOGAMI) indicates that slopes nearest to the Willamette River contain the greatest risk of landslide in Marion County. This area is near a dense population and poses significant risks to life and property. While no recent landslides have occurred in the area, the geologic setting of the Salem Hills illustrates a historic pattern of landslides. Many prominent features that help identify the ancient landslide terrain are hummocky topography, disrupted drainage patterns, sag ponds, springs, back-tilted bedrock blocks, and subdued head scarps (Harvey & Peterson, 1998).

In the southeastern portion of the county, the Little North Fork Road experiences annual landslide events. The hillside where Highway 22 narrows near Mill City sloughs off three or four times a year, closing the highway for up to three hours until the Oregon Department of Transportation (ODOT) can clear the road of debris.

In February 1996, November 1996, and December 1996/January 1997 the Willamette Valley experienced heavy rainfall and snowmelt which led to widespread landslide events throughout the state. Disaster declarations were issued for Marion County for the February 1996 and December 1996/January 1997 storms. During these storms, many landslides occurred in the eastern portion of the state and are too numerous to list here. In 2000,

DOGAMI mapped the historical instances of landslide events throughout the Willamette Valley for the 1996-1997 storms, including Marion County.

In February 1996, November 1996, and December 1996/January 1997 the Willamette Valley experienced heavy rainfall and snowmelt which led to widespread landslide events throughout the state. Disaster declarations were issued for Marion County for the February 1996 and December 1996/January 1997 storms. During these storms, many landslides occurred in the eastern portion of the state and are too numerous to list here. In 2000, DOGAMI mapped the historical instances of landslide events throughout the Willamette Valley for the 1996-1997 storms, including Marion County.

8.9 History of Severe Winter Storms in Marion County

The State of Oregon has a long history of severe winter storms. The most significant storms which have affected Marion County are listed below.

December 1892

From December 20 to 23, 1892, substantial snow fell across most of northern Oregon, with the greatest snowfall reported over northwestern Oregon, where storm totals ranged from 15 to 30 inches (Taylor, Hatton, & Taylor, The Oregon Weather Book: A State of Extremes).

January 1916

This winter storm affected the entire state. On January 6 through January 10, heavy snow fell in mountainous areas. During the second storm of January 11 through 15, every reporting station in western Oregon, except for the southwestern interior and the coastal areas, recorded storm totals of at least five inches and most locations had eight inches or more. McMinnville had the most snow in one day, with eleven inches falling on January 12. Higher elevations in the Cascades received very heavy snowfall (State of Oregon, Department of Emergency Management, N.d.).

December 1919

The December 1919 snowstorm was recorded as the third heaviest snowfall- producing storm in Oregon. The Columbia River froze over, closing the river to navigation from the confluence with the Willamette River upstream. The snowstorm affected nearly every part of the state, with heavy snow falling over a widespread area (State of Oregon, Department of Emergency Management, N.d.).

December 1924

In December 1924, temperatures stayed near or below the freezing mark for eleven days. At the time it was the coldest December ever in Oregon. Most streams and rivers were frozen and blocked with ice. People drove their automobiles across the Willamette River. In addition to the cold weather, four inches of snow fell over much of the Willamette Valley. The weight of the snow downed 400 telephone lines in Salem, and this weather event caused 21 car accidents in Salem. The freezing temperatures formed ice in the Willamette River that crushed a steamboat and caused several thousand dollars of damage to the Dennison Bath House.

January 1937

The storms that hit Marion County in January 1937 broke an eighteen-year record for snowfall in Salem with 27 inches and caused $50,000 in property damage. Much of the damage occurred as structures collapsed from the weight of the snow. For example, in Salem, four storefront marquees collapsed, a shed fell on five vehicles in a lumberyard, the Salem Ferry Street Tabernacle collapsed and six structures at the Marion County Fairgrounds were damaged (National Oceanic and Atmospheric Administration, N.d.).

January 1950

The entire month of January 1950 was cold and frequent snowstorms occurred statewide. Snowfall and precipitation including freezing rain was heaviest from January 9th through the 18th. During this time, Marion County experienced wind gusts up to 80 mph and sustained winds up to 25 mph. Thirty-nine inches of snow fell on Salem over the course of the month, 54 inches fell in Detroit and 122 inches blanketed Detroit Dam. In Salem, Mill Creek flooded onto airport roads and in Detroit, a rod-and-gun club's roof collapsed under the weight of 20 inches of snow. The severe weather caused power outages in Mt. Angel and cut telephone service in Silverton. Schools throughout the county were sporadically closed and at least two weather-related traffic fatalities occurred in Oregon, one in Lyons (Taylor, Hatton, & Taylor, The Oregon Weather Book: A State of Extremes, 1999).

January 1957

The cold weather in January 1957 was the result of an arctic air mass that moved into Eastern Oregon and spread west toward the coast. The cold temperatures brought four inches of snow to Lyons and eleven inches to Detroit, as well as icy roads throughout Marion County. Temperatures in Marion County during this seven-day period were in the mid-teens, not considering the wind-chill created by 21 mph wind gusts. The cold snap cut electricity for 100 Salem residents and froze water pipes in many homes. Dozens of fires were reported in Salem from overheated chimneys and stoves, or from blowtorches used to thaw pipes. The cold temperatures also caused the Bonneville Power Authority to cut interruptible power to the regions' industrial customers because ice behind the dam slowed water flow and limited the ability to generate power (Taylor, Hatton, & Taylor, The Oregon Weather Book: A State of Extremes, 1999).

March 1960

The first week of March 1960 was marked by a winter storm that brought more snow to Marion County than any time since 1950. Salem received 8.5 inches of snow and higher elevations received as much as 11 inches. This storm was responsible for two fatalities in Oregon, and 100 storm-related accidents in Marion County. In addition, most schools throughout the county were closed for several days (Taylor, Hatton, & Taylor, The Oregon Weather Book: A State of Extremes, 1999).

January 1963

Cold temperatures and snow showers created hazardous driving conditions in Marion County during the last days of January 1963. Four inches of snow were recorded at McNary Field in Salem, Detroit recorded thirteen inches and Stayton reported that slush had frozen on area roadways.

January 1978

During the early days of January 1978, a layer of cold air was driven into the Willamette Valley from Eastern Oregon via the Columbia Gorge. Rain from a higher warm air mass fell through the cold air below causing it to freeze. The cold temperatures and freezing rain iced roads throughout Marion County and the Willamette Valley causing eight traffic fatalities and dozens of traffic accidents.

February 1989

The February 1989 storm dropped seven inches of snow on Marion County and saw temperatures as low as zero degrees Fahrenheit with a wind-chill factor dipping to 75 degrees below zero. The storm led to accidents on Interstate 5 that closed the highway between Salem and Albany. Near Woodburn, an overturned truck spilled 1,000 gallons of oil. There was also a storm related, four-vehicle accident on Highway 22 near Silverton. Hospitals in Salem reported 25 snow related injuries.

The Oregon Department of Transportation estimated $25,000 in additional costs were necessary for wages and supplies to deal with the storm's effects. In Salem, the adverse weather cost $40,000 to keep streets open, $10,000 more than the city budgeted for the storm. In addition, the extreme cold damaged 20 to 40 percent of the county's cranberry crop, forced mills to send home thousands of employees, and froze or burst 200 Salem residents' water pipes.

February 1993

This storm event dropped nearly twelve inches of snow in Salem between February 18th and 19th; the greatest amount of snowfall ever recorded in a 24- hour period in Salem. As a result of the storm 2,100 Silverton area residents and 1,500 residents on Highway 99E north of Salem lost power. There were also several minor, storm- related injuries reported by Salem hospitals.

February 1996

Like the 1978 event, this storm began with a mass of cold air trapped in western Oregon followed by a warmer front that blew over the top of the cold air mass. Once the two fronts collided, they created a severe ice storm. Traffic accidents and power outages plagued the Willamette Valley.

Freezing rain fell for two days, causing a 100-car pileup between Clackamas County and Salem, and a 22-car pile-up on Highway 22 near Eola. One fatality occurred in a different traffic accident (Taylor, Hatton, & Taylor, The Oregon Weather Book: A State of Extremes, 1999).

December 2003 – January 2004

The winter snowstorm that blew through northwest Oregon at the end of December turned into an ice storm in January. According to state climatologist George Taylor, snowstorms that swept through the region beginning December 26, 2003, resulted in the snowiest, coldest winter since 1923. The storm resulted from the collision of a mass of moisture from the Pacific with an arctic cold front. Climatologists considered this the worst storm to pelt the west side of Oregon's Cascade Range since 1992. According to the National Weather Service, Salem received three inches of snow on January 6th. The storm's impact at Portland International Airport had thousands of passengers stranded for several days after the freezing rain cancelled flights. The runway conditions were among the worst in recorded history (U.S. Department of Commerece, National Oceanic and Atmospheric Administration, 2022)

The hardest hit areas are the eastern and southern sections of the service territory, including east Multnomah County, Oregon City, Estacada, Molalla and Mulino, and the Salem area. Champoeg State Heritage Area lost historic trees i.e., oaks estimated to be around 200 years old. During the winter storm, campers at the Heritage Area were trapped for a day because trees fell across the road, and park staff could not get to the park. The Heritage Area qualified for FEMA funding, and it took four to five months to make repairs. Fir and filbert trees were decimated at Willamette Mission State Park, but walnut trees withstood the storm. Willamette Mission State Park suffered over $30,000 in damage (U.S. Department of Commerece, National Oceanic and Atmospheric Administration, 2022).

For the Cascades, this storm was a typical storm (versus on the valley floor where it was severe), although residents in the Santiam Canyon experienced problems with services (e.g., gas stations and stores closed) and power (e.g., disruption in electricity service). In the Cascades, a severe winter storm means that typically four to five feet of snow falls in a short period of time.

January-February 2008

Over several weeks in early 2008, the foothills of eastern Marion County received unusually high amounts of snow from a series of storms. While the Marion County towns of Idanha and Detroit commonly receive heavy snowfall each winter, they were both buried by 12 feet of snow over these two months. Three dozen National Guard soldiers, along with snow removal equipment, inmate crews, and engineers, were sent by the State into the towns to remove snow and help those in need (Salem-News, 2008).

December 2008

A prolonged snowstorm hit the region during the 2008-2009 winter season, with its worst effects felt from December 20-26, 2008. During this time, Salem received over a foot of snow. Lafayette, near the border of Marion County received almost two feet of snow, while Portland airport received a record 18.9 inches. A disaster for this snowstorm, and its associated landslides and mudslides, was declared on March 2, 2009. Per capita damages for Marion County were estimated at $43.94 (U.S. Department of Commerece, National Oceanic and Atmospheric Administration, 2022).

8.10 History of Tornadoes in Marion County

The following list describes known tornados occurring in Marion County from 1925 through present. The National Climate Data Center (NCDC) storm events database (https://www.ncdc.noaa.gov/stormevents/) was the primary source of information for this history. *Note*: that OPDR removed two tornados listed in the previously adopted version of the Marion County NHMP (the Sandy tornados) from the history as further review determined that neither event directly impacted Marion County. Between 1960 and 2006, tornados in Marion County caused approximately $50,000 in property damage collectively. The December 2010 Aumsville tornado event is expected to result in damages exceeding $1 million.

Salem area - November 11, 1925, 11:00 am

Tornado with estimated beginning lat/long 44°52'/123°11'116

NW Donald - October 26, 1984, 12:30 pm

Estimated beginning lat/long 45°14' 122°53'.

Aumsville – March 8, 1960, 5:15 pm

A small F1 tornado with an estimated beginning lat/long 45°01' 122°53' and width of seven yards traveled approximately one mile. There were no reports of injuries. The event resulted in $2,500 in property damage to several farms and uprooted several trees.

Aurora – October 26, 1984, 12:30 PM

A small F0 tornado reportedly struck six miles west of the town of Aurora. It had a path length of one-half mile and width of 67 yards. The tornado "destroyed a small machine shed on the Leighton Whitsett Case Road NE farm" and scattered its pieces over a half-mile area. Estimated damage from the storm was $4,000.

E Keizer - May 31, 1997, 10:10 am

An F0 tornado touched down approximately one mile east of Keizer. The 50-yard-wide funnel traveled approximately 1.5 miles to a point roughly three-miles east- south-east of Keizer. According to the NCDC report, several witnesses reported seeing the tornado on the ground for about two minutes. The storm uprooted 30- 40-foot-tall trees and damaged a barn resulting in $15,000 in repair costs.

SW Turner - September 17, 1997, 10:35 am

An F0 tornado touched down two miles southwest of Turner resulting in $10,000 in minor damage to a rural subdivision. Damage was limited to fences, windows, and trees. The tornado impacted an area 50-yards wide and one mile long.

N Aumsville - September 17, 1997, 11:05 am

A small tornado estimated at 10-yards wide, and a half-mile long touched down near Aumsville. There were no reports of injuries or property damage.

Silverton – November 12, 1997

This tornado damaged a barn. Several timber units tumbled down in the Detroit Ranger District of the Willamette National Forest during this windstorm, which was cyclonic in nature in the eastern portion of the Santiam Canyon.

Silverton October 3, 1998, 2:30 pm

A Silverton Police officer reported seeing a small tornado touch down near Silverton. There were no reports of damage or injury.

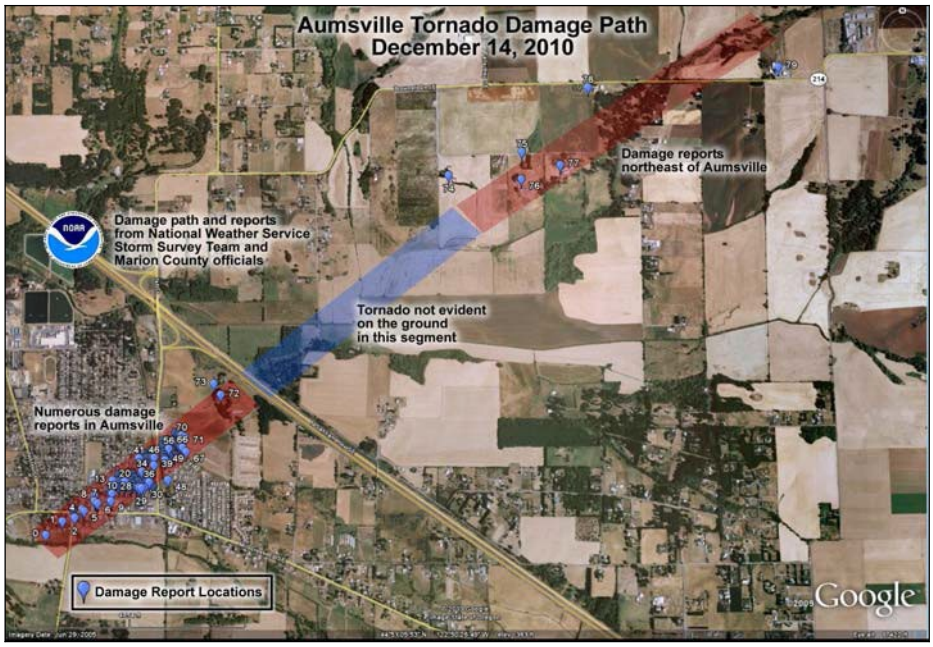
NE Salem December 16, 2006, 3:00 pm

Immediately following a thunderstorm with frequent lightning and small hail, an F0 tornado touched down approximately eight miles northeast of Salem. The 50-yard-wide funnel traveled approximately two-miles over rural agricultural land. Reports indicate that the tornado crossed an acre and a half of floodwater up to three feet deep and sucked all the water up into the funnel. The tornado then continued and picked up a 12-inch diameter cedar tree and tossed it into a barn. After changing direction, the tornado picked up an RV causing it to land on its side. There were no injuries reported.

Aumsville December 14, 2010, 11:44 am

An EF2 tornado with wind speeds between 110 and 120 mph touched down on Main Street near the southerly boundary of the City of Aumsville. This was the largest tornado recorded in Marion County to date and the second largest in the state since 1950. According to a December 23, 2010, NOAA storm survey report, the tornado traveled in a northeasterly direction and had a path length of approximately five miles. An on-sight ground assessment concluded that the tornado did not appear to be on the ground for the entire five-mile path length (refer to Figure 8-3 below). The tornado damaged numerous residential and commercial structures, downed power, and light poles uprooted or snapped of over 30 large (average 18–24-inch diameter breast height) trees and resulted in two minor injuries from flying debris. The initial damage assessment conducted by Marion County Emergency Management in collaboration with local and state partners estimate total losses from the storm at over $1.1 million. Damage included the destruction of two homes and one business and major damage to an additional six homes and one business. In all, 63 dwellings, seven business, eight outbuildings and several public facilities were impacted by this storm. At the time of this report, response and recovery activities in Aumsville are still underway; final damage reports and the extent of resources made available from local, state, and federal sources are pending.

Figure 8-3, Aumsville Tornado Damage Path



Aurora Airport October 12, 2017, 2:39 pm

An EF0 tornado 0.62 miles long and 50 yards wide. The tornado started on Boones Ferry Rd NE, west of the Aurora airport. Greenhouses in the area sustained damage, and the tornado continued to travel east across the airport property. Two planes were flipped at Willamette Aviation Services. The tornado ended near Airport Rd NE.

Jefferson, October 29, 2018, 2:30 pm

An EF0 tornado 0.1 miles long and 10 yards wide. There was damage to multiple small shrubby trees just north of the railroad track along Libby Ln. There was also a sign knocked over at the NW corner of Libby Ln and Jefferson-Marion Rd, but whether it was caused by a tornado could not be determined. The tornado was likely on the ground for one minute or less.

8.11 History of Volcanic Eruption in Marion County

There are five active volcanoes that could potentially impact Marion County. These include: Mount Jefferson, Three Sisters and Broken Top, Mount Hood, Mount St. Helens, and Mount Rainier. However, only one of these volcanoes, Mount St. Helens, has impacted Marion County within the past 30 years. The closest volcano to Marion County, Mount Jefferson, has the potential to impact Marion County directly, but it has not been active for at least the past 15,000 years.

Mount St. Helens

Mount St. Helens, located in southwestern Washington about 70 miles northeast of Marion County, is approximately 2,200 years old according to the U.S. Geology Survey. On May 18th, 1980, Mount St. Helens "exploded violently after two months of intense earthquake activity and intermittent, relatively weak eruptions, causing the worst volcanic disaster in the recorded history of the United States" (United States Department of the Interior, Geological Survey, N.d.). Damage to the built environment within the immediate hazard vicinity in Washington included twenty-seven bridges, about two hundred homes, more than 185 miles of highways and roads, and fifteen miles of railways. Ash from the eruption column and cloud spread across the United States in three days and circled around the Earth in fifteen days. Detectable amounts of ash were noted in an area covering 22,000 square miles. In Marion County, volcanic ash affected air filters on the RFPD No.1's equipment. No Oregon roads were closed, although fallout of volcanic ash restricted visibility and produced slippery roads and ash-clogged windshields. Debris flows from the eruption quickly filled the Toutle and Cowlitz Rivers and ultimately flowed into the Columbia River at Longview, Washington. The debris blocked the main shipping channel in the Columbia, stranded ships in port, and closed the ports of Portland, Vancouver, and Kalama for over a month. Several water and sewage treatment facilities were also damaged or destroyed. The estimated damage attributed to the eruption was $1.1 billion (United States Department of the Interior, Geological Survey, N.d.).

The May 18, 1980, eruption was preceded by about two months of precursor activity, including dome building, minor earthquakes, and venting of gasses. The lateral blast, debris avalanche, and mudflow associated with the eruptions caused extensive loss of life and widespread destruction of property. The eruption triggered a magnitude 5.1 earthquake about one mile beneath the volcano. In the six-year period after the initial eruption, hundreds of small ash emissions at Mount St. Helens occurred. The 1980 eruption of Mount St. Helens took the lives of 57 people and nearly 7,000 big game animals. All birds and most small mammals in the area were killed, as were twelve million Chinook and Coho salmon fingerlings that perished when their hatcheries were destroyed. The May 18, 1980, eruption was followed by five smaller explosive eruptions over a period of five months (U.S. Department of Interior, Geological Survey, N.d.).

A series of sixteen dome-building eruptions constructed the new, 880 foot high, lava dome in the crater formed by the May 18, 1980, eruption. An eruption occurring in 1480 A.D. was approximately five times larger than the May 18, 1980, event. On the night of March 8, 2005, a plume of ash and steam spewed nearly seven miles high into the air. Glowing tendrils of lava were spotted inside the mountain's crater following the explosion. The plume rose nearly twice as high as one produced by the last eruption in October 2004. Ten small earthquakes were measured in the area on Tuesday leading up to the eruption. The largest appeared to be a magnitude 2.5, according to the USGS (U.S. Department of Interior, Geological Survey, N.d.).

Three Sisters and Broken Top

The Three Sisters are located about 40 miles southeast of Marion County. Recently, volcanic activity has been found on the South Sister. Satellite images have indicated upward movement of land near the volcano. The surface moved toward the satellite (mostly upward) by as much as ten centimeters (about four inches) sometime between August 1996 and October 2000. The most likely cause is magma accumulation in the Earth's crust, a process that has been observed with radar interferometry at several other volcanoes worldwide. As of 2005 and 2006 USGS found that the rate of ground deformation in the South Sister has slowed There is no immediate danger of a volcanic eruption or other hazardous activity. The potential exists, however, that further activity could increase danger. South Sister, Middle Sister, and Broken Top are major composite volcanoes clustered southeast of Marion County in Deschutes County. These volcanoes have erupted repeatedly over tens of thousands of years and may erupt explosively in the future. In contrast, mafic volcanoes, which range from small cinder cones to large shield volcanoes like the North Sister, are typically short-lived (weeks to centuries) and erupt less explosively than do composite volcanoes (U.S. Department of Interior, Geology Survey, N.d.).

Mount Hood

Mount Hood is located about 60 miles northeast of Marion County. It has been recurrently active over the past 50,000 years. It has had two significant eruptive periods in geologically recent times, one about 1,500 years ago and another about 200 years ago. While Mount Hood has shown no recent signs of volcanic activity, scientists predict the next eruption will consist of small explosions generating pyroclastic flows, ash clouds, and lahars (mud and debris flows). In the event of an eruption, Marion County would likely be affected by ash fall (U.S. Department of Interior, Geology Survey, N.d.).

Mount Rainier

Mount Rainier is located approximately 100 miles north of Marion County. Mount Rainier stands at 14,410 feet and dominates the surrounding landscape as the tallest land feature. The primary hazard posed to Marion County is ash fallout from Mount Rainier. Mount Rainier is an active volcano that first erupted about half a million years ago. Because of Rainier's great height and northerly location, glaciers have cut deeply into its lavas, making it appear deceptively older than it is. Mount Rainier is known to have erupted as recently as in the 1840s, and large eruptions took place as recently as about 1,000 and 2,300 years ago. An eruption from Mount Rainier would likely impact Marion County only through ash fall (U.S. Department of Interior, Geology Survey, N.d.).

8.12 History of Wildfire in Marion County

Marion County has experienced three large fires since Euro-American settlement and several smaller fires that occur almost annually. The largest fire to date was the 1865 Silverton fire that burned 988,000 acres of forest near Silverton. However, due to the few settlements in Oregon at that time, there was little damage to property that occurred.

The B&B complex fire in 2003 caused extensive damage in eastern Marion County, Deschutes County, and Jefferson County. The B&B complex fire was characterized by extreme plume-dominated behavior grew to 80,000 acres in September 2003 as the Booth and Bear Butte fires merged. The entire community of Camp Sherman, approximately 300 residents, was evacuated twice to avoid the fire's danger and Highway 20 was temporarily closed. A total of 2,205 personnel, 82 fire engines and 10 helicopters were employed to battle the fire. Governor Kulongoski invoked the Conflagration Act for the east side of the B&B Complex. The B & B Complex fire burned into a portion of Marion County.

In September 2020, Marion County was impacted by the Beachie Creek and Lionshead fires with merged in Marion County and by the Riverside Fire in the northern part of the county. The Beachie Creek fire burned 193,565 acres of land in Linn, Marion and Clackamas counties including portions of the City of Mill City. The Beachie Creek wildfire started around 11:00 PDT on August 16, 2020, in the Opal Creek Wilderness, Marion County, OR at coordinates 44.821, -122.188. The fire remained in a remote location through the month then grew rapidly in September. It was not contained until December. The cause of the fire is unknown.

After a period of upper-level ridging brought a return to above normal temperatures in early September, very strong easterly downslope and offshore winds off the Cascades and Coastal Ranges occurred. Winds increased rapidly during the afternoon and evening of September 7 with the passage of an unseasonably strong backdoor cold front and persisted through much of the following day. This resulted in extremely critical fire weather conditions when the strong winds combined with extremely low relative humidity and exceptionally dry existing fuel conditions. The result was explosive growth of ongoing wildfires, and the new start and explosive spread of numerous new wildfires. Widespread wind gusts from 50-70 mph were common on ridge tops and numerous other in exposed areas, including portions of the greater Portland metro area, the Willamette Valley, and areas of the Oregon coast. Strong winds caused widespread damage to trees, and downed numerous power lines across the region, which started at least 13 additional wildfires. Large portions of the cities of Detroit, Mehama, and Gates were destroyed, and significant portions of Idanha, Mill City, and Lyons also burned (U.S. Department of Commerece, National Oceanic and Atmospheric Administration, 2022).

Resultant large wildfires included these named incidents - In Oregon: Beachie Creek, Chehalem Mountain/Bald Peak, Riverside, and Lionshead, and in Washington: Big Hollow. Rapidly spreading wildfires resulted in multiple fatalities, hundreds of displaced persons for many weeks, and billions of dollars in damage (U.S. Department of Commerece, National Oceanic and Atmospheric Administration, 2022).

During the wildfire, evacuation routes were restricted due to the wildfire movement. Following the wildfire, the impact of smoke and poor air quality affected residents who remained in the area. Long term impacts to the local economy persist.

Marion County commonly experiences smaller fires. Data available through ODF shows that of the 74 wildfires that occurred in Marion County from January 1, 2016, through December 31, 2021, thirty-six fires burned 0.25 acres or less, thirty-three fires burned between 0.26 acres and 10 acres. There were two fires that burned between 10 acres and 30 acres; the Stout Fire in 2018 burned 17.7 acres and the Silver Creek Fire in 2019 burned 27 acres. Also in 2019, the Santiam Park fire burned just over 184 acres. In 2020 two very large fires, Beachie Creek and Lionshead Fires burned nearly 400,000 acres (398,035 acres) in Marion County. An inventory in the prior plan showed that the majority of wildfires were human caused with only 8% attributable to lightning.

8.13 History of Windstorms in Marion County

Windstorms have historically been a threat to Marion County. The following storms, though not exclusive to Marion County, caused particularly severe damage to the county.

January 9, 1880

This windstorm was a major blow down event in the region and for Marion County and was the most severe windstorm to strike the region until the Columbus Day Windstorm in 1962. Winds in Salem gusted up to 80 mph, blowing down many acres of trees, and damaging the roof of the Statehouse, Willamette University, and many other buildings. The City of Hubbard, in the North part of Marion County, saw a 10 acre woodlot completely flattened. It was reported that almost all property owners in Salem likely lost at least some vegetation. There were several reports of injuries throughout western Oregon of injuries due to flying debris. Following the storm, seven inches of snow fell in Salem.

April 1931

This storm, with winds up to 40 mph and gales up to 75 mph, blew moving vehicles off roadways in Salem and Woodburn. The storm consisted of northeastern winds that blew tons of dust from Eastern Oregon down the Columbia Gorge where it then settled over much of the Willamette Valley. The dust reduced visibility to distances less than one mile. The sediment- filled winds also felled hundreds of trees causing road closures between Mill City and Detroit. The winds also caused several devastating fires. In Mehama, several buildings burned completely: including homes, a large store, and the Stayton Bank. There were 22 home fires in the Salem area and throughout the Willamette Valley forest fires, as large as 3,000 acres in Linn County, were whipped up by the winds.

December 1951

This mid-century storm with winds recorded at 57 mph and gusts up to 76 mph resulted in four Oregon deaths. Power outages for up to a day were recorded at Union Hill, Waldo Hill, Victor Point, Scotts Mills, Silverton Hills and Marquam. The North and South Santiam highways and the Siuslaw highway were closed due to fallen trees.

October 12, 1962 (The Columbus Day Storm)

The Columbus Day storm in 1962 produced sustained winds in Salem of 58 mph and gusts as high as 90 mph. It was the most destructive windstorm ever recorded in Oregon, both in terms of loss of life and property damage. Damage was most severe in the Willamette Valley where the storm killed 38 people and was responsible for two deaths in Salem and four injuries in Silverton. The storm caused upwards of $200 million in damage (over $800 million in today's dollars) statewide. Approximately $4 million (in 1962 dollars) in damage occurred in Salem, while that number doubled to $8 million worth of damage in Marion County as a whole. Hundreds of thousands of homes were without power for short periods of time, while others were without power for two to three weeks. More than 50,000 homes were seriously damaged, and nearly 100 were destroyed. In Salem, 40 schools were closed, and 7,000 residents lost phone service. The storm destroyed fruit and nut orchards and killed scores of livestock (Taylor, Hatton, & Taylor, The Oregon Weather Book: A State of Extremes, 1999).

March 25-26, 1971

This March windstorm produced winds up to 50 mph and hit the Hubbard and Scotts Mills area particularly hard while also causing power outages for approximately 60 homes in the Salem area.

November 13-15, 1981

November 1981 saw two successive windstorms on the 13th and 14th. Sustained winds in Salem reached 52 mph and gusts were recorded at 71 mph. Eleven people were killed and $50 million in damage was reported because of the two storms. Numerous injuries resulted from wind-blown debris in western Washington and Oregon. Across the Pacific Northwest, hundreds of downed trees and power lines caused massive power outages and roof damage. The storm caused 500,000 Oregon residents to lose power,163 20,000 in the Salem area alone. The storm toppled 23 power poles on the Silverton Road and power outages in Salem resulted in seven school closures (Taylor, Hatton, & Taylor, The Oregon Weather Book: A State of Extremes, 1999).

December 12, 1995

This windstorm caused such widespread damage from downed trees and power and communication outages that Governor Kitzhaber declared a state of emergency for all western Oregon and called 150 National Guard Troops to assist residents and public utility crews. The storm caused three deaths, one in Marion County. The windstorm resulted in $800,000 of damage in Marion County, $500,000 of which occurred in Woodburn alone. Some of this damage included environmental damage as "millions of gallons of raw sewage" flowed into Salem area creeks and the Willamette River.

In Salem, the National Weather Service reported average winds of 40 mph with gusts up to 59 mph. In the region between Salem and Corvallis, 7,500 people lost phone service. In the Salem area, including Silverton and Woodburn, 20,000 people lost power; in the Stayton and Mill City area, that number was 10,000. In addition to power and phone outages, Interstate 5 was shut down to truck traffic for several hours and Highway 22 at Valley Junction was closed.

February 7, 2002

The most recent of large windstorm events arrived in the Willamette Valley with wind gusts up to 70 mph causing 27,000 power outages statewide. The severity of this storm prompted President Bush to issue major disaster declarations for five Oregon counties. Nine other Oregon counties, including Marion County, were named contiguous counties, allowing family farmers to receive loans to address storm related damage. Eastern Marion County was one of the areas hardest hit by this storm. In Gates, the wind blew off the post office roof and Highway 22 east of Mehama was closed after trees blocked the roadway. A downed tree blocked Highway 99 near Jefferson and the Interstate 5 corridor between Salem and the Highway 34 exit experienced storm-related congestion (U.S. Department of Commerece, National Oceanic and Atmospheric Administration, 2022).

July 2003

A major windstorm in Marion County caused approximately $15,000 in property damage.

December 2004

A windstorm causes $6,250 in property damage in Marion, Lane, and Polk Counties (U.S. Department of Commerece, National Oceanic and Atmospheric Administration, 2022).

January 2005

Windstorms cause $6,000 worth of property damage in Linn and Marion Counties. A storm total of $15,000 in damages was spread out among Linn, Marion, Clackamas, Multnomah, and Washington Counties.

February 2006

A windstorm with gusts up to 77 mph caused $227,000 in damages in Linn, Lane, Marion, Benton, Polk, and Yamhill Counties.

May 2007

A hailstorm causes $5,000 in damages in Marion County.

March 2008

Heavy winds measured at 40 mph causes $15,000 in damage near Woodburn.

June 2009

A strong windstorm with 80 mph winds, and followed by a thunderstorm, brought down numerous trees along Highway 22 and caused approximately $2,000 in damage.

9 References

Association of State Dam Safety Officials. (2023). *Dam Failures and Incidents*. Retrieved from Awareness Center: https://damsafety.org/dam-failures#:~:text=The%20ASDSO%20Dam%20Failures%20website,be%20minimized%20in%20the%20future.

Burby, R. J. (1998). *Cooperating with Nature: Confronting Natural Hazards with Land-Use Planning for Sustainable Communities.* Washington , DC: Joseph Henry Press. doi:https://doi.org/10.17226/5785

City of Gervais. (2019). *Stormwater Master Plan.* Tetra Tech. Retrieved from http://nebula.wsimg.com/1e229ec1f511c1f70cb8105724aefa06?AccessKeyId=F062AE05BD597D7A5EB5&disposition=0&alloworigin=1

City of Mill City. (N.d.). City of Mill City Comprehensive Plan.

City of Turner. (N.d.). *Welcome to Turner*. Retrieved from Turner Oregon: https://turneroregon.gov/

City of Woodburn. (N.d.). *Comprhensive Plan*. Retrieved from Community Development Planning: https://www.woodburn-or.gov/dev-planning/page/comprehensive-plan

Cutter, S. L., Boruff, B. J., & Shirley, W. L. (2003). Social Vulnerability to Environment Hazards. *Social Science Quarterly, 84*(2), 242-261. doi:http://www.jstor.org/stable/42955868

Cutter, S. L., Burton, C. G., & Emrich, C. T. (2010, August 4). *Disaster Resilience Indicators for Benchmarking Baseline Conditions*. doi:https://doi.org/10.2202/1547-7355.1732

Department of Homeland Security, Federal Emeregncy Managemetn 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 Emeregncy Managemetn 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 - Local Mitigaiton 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 Managemetn Agency. (N.d.). *Emergency Support Function #1 - Transportation*. Retrieved from Emergency Support Functions: https://www.fema.gov/emergency-managers/national-

preparedness/frameworks/response#esf
Harvey, A., & Peterson, G. (1998). *Water-Induced Landslide Hazards, Western Portion of the Salem Hills, Marion County, Oregon*. Retrieved from Oregon Department of Geology and Mineral Industries: https://www.oregongeology.org/pubs/ims/IMS-006.pdf
Hemesath, L., Nunez, T., Roth, B., Burgoyne, C., & La Follette, C. (2002, January). *Pringle, Glenn-Gibson, Claggett and Mill Creeks Watershed Assessment*. Retrieved from Pringle Creek Watershed Council: pringlecreek.watershedcouncils.net/CoverTitleTOC.pdf
Hubbard Rural Fire Protection District. (2022, April 6). *Hubbard Fire*. Retrieved from Hubbard Fire District: https://www.hubbardfire.com/hubbard-fire-district-overview/
Marion County, Oregon. (2022, October). *Marion County Comprehensive Land Use Plan*. Retrieved from Marion County Code: https://www.codepublishing.com/OR/MarionCounty/#!/MarionCompNT.html
Mileti, D. (1999). *Disasters by Design: A Reassessment of Natural Hazards in the United States*. The National Academics Press.
National Oceanic and Atmospheric Administration. (N.d.). *Storm Event Database*. Retrieved from NOAA.gov: https://www.ncdc.noaa.gov/stormevents/
Oregon Century Farm and Ranch Program. (N.d.). *Honorees*. Retrieved from Oregon Farm Bureau: https://centuryfarm.oregonfb.org/
Oregon Encyclopedia. (2022, September 22). *"City of Mt. Angel"*. Retrieved from A Prjoect of the Oregon Historical Society: https://www.oregonencyclopedia.org/articles/city_of_mt_angel/#.Y-AZpy_MK3B
Phillp Williams & Associates. (2000, January 18). *Silver Creek Dam Break Analysis*. Retrieved from City of Silverton: http://www.97381.com/dam/dam01.html
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/
Salem-News. (2008, February 5). *Oregon National Guard Aids Detroit and Idanha Communities*. Retrieved from Salem-News.com: http://salem-news.com/articles/february052008/guard_detroit_2-5-08.php
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 Emergency Management. (2016, January). *Drought Annex*. Retrieved from State of Oregon Emeregncy Operations Plan: https://www.oregon.gov/oem/Documents/2015_OR_EOP_IA_01_drought.pdf
State of Oregon, Department of Emergency Management. (N.d.). *Volume I - Natural Hazard Mitigation Plan (NHMP)*. Retrieved from Comprhensive Emergency Management Plan: https://www.oregon.gov/oem/emresources/Plans_Assessments/Pages/CEMP.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. R., & Taylor, G. H. (1999). *The Oregon Weather Book: A State of Extremes.* Oregon State University Press.
Taylor, G., Hatton, R., & Taylor, G. H. (n.d.). The Oregon Weather Book: A State of Extremes. Oregon State University Press.
Turner Fire District. (2018). *About*. Retrieved from Turner Fire District: https://www.turnerfire.com/
U.S Department of Housing and Urban Development. (2020). *Consolidated Planning / CHAS Data*. Retrieved from Dataset: https://www.huduser.gov/PORTAL/datasets/cp.html#2000
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. (2020). *Detroit City, Oregon*. Retrieved from U.S. Census: https://data.census.gov/profile?g=1600000US4119100
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
U.S. Department of Commerce. (N.d). *Northwest River Forecase Center*. Retrieved from National Oceanic and Atmospheric Administration, National Weather Service: https://www.nwrfc.noaa.gov/rfc/
U.S. Department of Commerce, National Oceanic and Atmospheric Administration. (N.d). *Drought Conditions for Marion County*. Retrieved from Drought.gov: https://www.drought.gov/states/Oregon/county/Marion
U.S. Department of Commerce, National Oceanic and Atmospheric Administration. (2022, October). *Storm Events Database*. Retrieved from National Centers for Environmental Information: https://www.ncdc.noaa.gov/stormevents/
U.S. Department of Commerce, National Ocenanic and Atmospheric Administration. (N.d.). *Regional Climate Maps*. Retrieved from National Weather Service Climate Prediction Center: https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/regional_monitoring/
U.S. Department of Interior Geology Survey. (N.d.). *Modern Deformation and Uplift in the Sister Region*. Retrieved from Three Sisters: https://www.usgs.gov/volcanoes/three-sisters

U.S. Department of Interior, Geological Survey. (N.d.). *Volcanic Hazards at Mount St. Helens*. Retrieved from Mount St. Helens: https://www.usgs.gov/volcanoes/mount-st.-helens/volcanic-hazards-mount-st-helens

U.S. Department of Interior, Geology Survey. (N.d.). *Mount Hood*. Retrieved from Cascade Volcano Observatory - Volcanoes: https://www.usgs.gov/volcanoes/mount-hood

U.S. Department of Interior, Geology Survey. (N.d.). *Mount Rainer*. Retrieved from Cascades Volcano Observatory - Volcanoes: https://www.usgs.gov/volcanoes/mount-rainier

U.S. Department of Interior, Geology Survey. (N.d.). *Three Sisters*. Retrieved from Cascade Volcano Observatory - Volcanoes: https://www.usgs.gov/volcanoes/three-sisters

U.S. Department of the Interior, Geological Suvey. (2014, January 11). *The Christmas Flood of 1964*. Retrieved from USGS: https://www.usgs.gov/news/featured-story/christmas-flood-1964#:~:text=The%20Christmas%20flood%20of%201964%20was%20driven%20by,frozen%20ground%20caused%20extreme%20runoff%2C%20erosion%20and%20flooding.

U.S. National Parks. (N.d.). *National Register Forms*. Retrieved from National Register of Historic Places: https://www.nps.gov/subjects/nationalregister/national-register-forms.htm

United States Department of the Interior, Geological Survey. (N.d.). *Volcano Hazards*. Retrieved from USGS Programs: https://www.usgs.gov/programs/VHP

Wang, Y., & Burns, B. (2006). CASE HISTORY ON THE OREGON GO BOND TASK FORCE: PROMOTING. *8th National Earthquake Conference.* San Fransico, CA. Retrieved from https://www.oregongeology.org/rvs/EERI-GO-Bond-text.pdf