Annex K: Washington County

1. Introduction

1.1. Planning Process Contact

The point of contact during the Washington County Natural Hazard Mitigation Plan (NHMP) planning process for Washington County was the Emergency Management Coordinator for the Washington County Department of Land Use and Transportation.

1.2. Annex Organization

This annex includes six sections that satisfy mitigation requirements outlined in the Code of Federal Regulations (CFR) Title 44, Part 201 (44 CFR §201):

- **Section 1:** Introduction
- **Section 2:** Planning Process
- **Section 3:** Hazard Identification and Risk Assessment
- **Section 4:** Capability Assessment
- **Section 5:** Mitigation Strategy
- **Section 6:** Action Items

This annex applies to the Washington County local government organization and focuses on the County's service area, which primarily includes the unincorporated geographic area of Washington County. Mitigation information that applies to the entire geographic area of Washington County is included in other NHMP sections, including Volumes I and III.

1.3. NHMP Adoption Process

Once the Washington County NHMP received the designation "Approvable Pending Local Adoption" from the Federal Emergency Management Agency (FEMA), the County presented the plan to the Board of County Commissioners for final public comment and local adoption. A copy of the resolution was inserted into the NHMP and is held on file in Washington County.

2. Planning Process

(In compliance with 44 CFR §201.6(c)(1))

2.1. Development and Adoption Process

To apply for certain types of federal aid, technical assistance, and most post-disaster funding, local jurisdictions and special districts must comply with 44 CFR §201.3, which sets forth the requirement that

communities develop a plan outlining their present and proposed efforts to mitigate risks from natural hazards.

County officials recognize the benefits of having a long-term, all-hazards approach to mitigating natural hazards. This approach has been implemented through the NHMP and five-year NHMP updates as required by law. This has led to a gradual decrease of hazard-associated impacts by building on risk reduction measures outlined in previous iterations of the NHMP. The County's involvement in the Washington County NHMP represents the collective efforts of the Hazard Mitigation Steering Committee members, participating local Technical Committee members, the public, and stakeholders.

Washington County developed this annex in accordance with 44 CFR §201.6(c)(5) as referenced in the Disaster Mitigation Act of 2000. The complete NHMP and this annex identify hazards and mechanisms to minimize damages associated with these hazards as they occur in Washington County, both countywide and, more specifically, in each geographic region of its planning participants.

2.2. Organizing the Planning Effort

A comprehensive approach was taken in developing this NHMP. A process was established to involve the public and all stakeholders. This provided an opportunity for everyone to become engaged throughout the planning process and share their views about perceived hazards and how best to mitigate them.

Two teams worked simultaneously throughout the development of this mitigation plan:

1. **Hazard Mitigation Steering Committee:** This committee consisted of staff members from each planning participant. The group met to discuss countywide topics, including hazards and mitigation strategies. The points of contact were the leads of their local Technical Committee.
2. **Local Technical Committee:** Each plan participant had a Technical Committee consisting of the Steering Committee representative for that jurisdiction or special district as well as designated representatives from within the organization. This team met to assess capabilities, hazards, and mitigation strategies within the planning area.

2.2.1. Washington County Technical Committee

The Washington County annex of the overall NHMP was developed by Washington County's local Technical Committee with support from IEM, a consulting firm hired to support the planning process. The County's Emergency Management Coordinator for the Department of Land Use and Transportation led the committee's efforts throughout 2022.

Table 312: Washington County Technical Committee Members for the 2023 NHMP

Job Title, Department, and Division	Role in Committee and Planning Process
Project Manager/Emergency Management Coordinator, Land Use and Transportation/Administrative Services/Office of the Director	Project Manager, general oversight and guidance
Principal Engineer, Land Use and Transportation/Operations and Maintenance/Operations	Road and bridge interests
Senior Engineer, Land Use and Transportation/Engineering, Traffic and Survey/Engineering	Floodplain and engineering

Job Title, Department, and Division	Role in Committee and Planning Process
Associate Planner, Land Use and Transportation/Planning and Development Services/Long Range Planning/Community Planning	Validation of multiple hazards and integration
Emergency Management Supervisor, Emergency Management	Emergency management review and input
Senior Program Educator, Land Use and Transportation/Capital Project Services/Capital Project Management	Public engagement and survey
Emergency Management Manager, Emergency Management	Emergency management review and input
Superintendent, Support Services/Facilities and Parks Services/Operations	Input regarding County facilities
Senior Planner, Land Use and Transportation/Planning and Development Services/Long Range Planning	Community profile review and plan input
Engineering Associate II, Land Use and Transportation/Engineering, Traffic and Survey/Engineering	Floodplain management and engineering input
Administrative Assistant, Emergency Management	Grant administration and project organization
Superintendent, Support Services/Facilities and Parks Services/Parks	Input regarding County parks
Geographic Information System (GIS) Analyst, Land Use and Transportation/Operations and Maintenance/Operations	Development of GIS data and maps
Associate Planner/Floodplain Program Manager, Land Use and Transportation/Planning and Development Services/Current Planning	Floodplain Management program review and development

IEM also supported or led the following activities associated with the development, approval, and adoption of the plan:

1. Facilitated the NHMP update process.
2. Based on committee direction and stakeholder and community input, prepared the first draft of the plan and provided technical writing assistance for plan review, editing, and formatting.
3. Submitted the proposed plan to the State of Oregon Department of Emergency Management (OEM) and FEMA for review and approval, and completed edits or revisions requested by these organizations.
4. Coordinated the plan adoption processes with the County, OEM, and FEMA.

2.3. Public Participation

Public participation is an important component of this NHMP and also a required element as outlined in 44 CFR §201.6(c)(5), FEMA's mitigation planning guidance. Public participation offered community members the opportunity to voice their ideas, interests, and opinions about hazards that affect them and the best way to mitigate hazard impacts. As the County implements the mitigation actions identified in this annex, there will be additional opportunities for public participation.

Plan participants used a survey to collect information about community perceptions of natural hazards and priorities. The Steering and Technical Committees used the results to inform their risk assessments and mitigation strategies. Community members were also provided an opportunity to comment on a draft of the NHMP. See Volume III, Appendix B for additional information about the survey and opportunities for public comment.

3. Hazard Identification and Risk Assessment

(In compliance with 44 CFR §201.6(c)(2)(i), §201.6(c)(2)(ii), §201.6(c)(2)(ii)(A), §201.6(c)(2)(ii)(B), §201.6(c)(2)(ii)(C), §201.6(c)(2)(iii), and §201.6(c)(3)(ii))

The following information serves to assist the County in determining and prioritizing appropriate mitigation action items to reduce losses from identified hazards.

3.1. Changes in Development Since Adoption of 2017 NHMP

(In compliance with 44 CFR §201.6(d)(3))

The population in Washington County as a whole grew by 13% between 2010 and 2021, and this trend is expected to continue. Oregon land use laws require land outside Urban Growth Boundaries (UGBs) to be protected for their farm, forest, and aggregate resource values. For the most part, these state land use laws limit the amount of development allowed in the rural areas. However, the UGBs may be expanded into formerly rural areas, and this may occur in the future if past development trends continue.

Current and future residential development in unincorporated Washington County will be largely contained within two past additions to the regional UGB: North Bethany and Bonny Slope West. These areas are not likely to incorporate in the foreseeable future and will house a large portion of the County's future growth in mixed-use communities as the population grows. The County completed master plans, including development code standards, for both areas. The County proactively addressed natural hazard risk in these planning processes and identified steep slopes, floodplains, and landslide hazard areas. Concept planning accounted for these risks and restricted development within areas of known risk.

- **North Bethany** was added into the regional UGB in 2002. The area underwent concept planning and in 2009, the County developed a concept plan and funding strategies to implement the plans for parks, open space, schools, infrastructure, and neighborhood services. The North Bethany Subarea Plan was adopted in 2010. As of 2022, most of the developable area in North Bethany has received development entitlements and/or has been built out.
- **Bonny Slope West** was added into the regional UGB in 2002 (while within Multnomah County) and was transferred from Multnomah County to Washington County in 2013. The area underwent concept planning starting in 2014, and the Bonny Slope West Subarea Plan was adopted in 2015. As of 2022, approximately half of the developable area in Bonny Slope West has received development entitlements and/or has been built out.
- **Urban and Rural Reserves** have been designated throughout the Metro region. (Metro is the regional government for the Oregon portion of the Portland Metropolitan area, covering portions of Clackamas, Multnomah, and Washington Counties). In 2007, the Oregon legislature authorized Metro and Metro-area counties to designate urban land that might be developed in the future, and rural land to be preserved for farming, forestry, and other rural uses.

- **Urban Reserves** are lands outside the UGB that will provide for: (a) future expansion over a long-term period; and (b) the cost-effective provision of public facilities and services within the area when these lands are included within the UGB.
- **Rural Reserves** are lands reserved to provide long-term protection for agriculture, forestry, or important natural landscape features that will limit urban development.

The most recent Metro expansions of the regional UGB occurred in 2018, when Metro approved three UGB expansion areas within Washington County. These recent expansion areas, which are each being master planned by a nearby city, are Witch Hazel Village South (currently being master planned by City of Hillsboro), Cooper Mountain (currently being master planned by City of Beaverton), and Beef Bend South (currently being master planned by the City of King City).

Extreme heat has emerged as a hazard faced by the County since the 2017 NHMP was adopted. The number of high heat days are increasing in frequency, and the high temperatures being reached are increasing in intensity. The County has also recognized poor air quality from a variety of sources, including wildland fire smoke from events outside the County, has become an increasing concern since the 2017 NHMP was adopted. This annex provides mitigation actions to decrease vulnerability to both of these natural hazards.

3.2. Community Profile

This section provides information on County-specific characteristics. Additional discussion of the planning area's community characteristics is outlined in Volume III, Appendix A of the NHMP.

Some community characteristics may suggest how natural hazards may impact communities and how communities choose to plan for natural hazard mitigation. Identifying and considering the County-specific assets during the planning process may assist in identifying appropriate measures for natural hazard mitigation.

Table 314 reflects the community demographics and vulnerable populations in the County. Population numbers for unincorporated Washington County are in Table 313. All other demographic data is for the County as a whole, including incorporated areas. This information comes from the U.S. Census, Portland State University, Washington County, and Metro (the regional government for the Oregon portion of the Portland Metropolitan area, covering portions of Clackamas, Multnomah, and Washington Counties).

Table 313: Forecasted Population Growth, Unincorporated Washington County

Unincorporated Washington County Population Data	Total	Percent Change
2010 population inside the Urban Growth Boundary[526]	188,148	
2010 population outside the Urban Growth Boundary[1]	30,451	
2021 population	241,800	+11%
2035 forecasted population inside the Urban Growth Boundary [527]	245,766	+31% from 2010
2035 forecasted population outside the Urban Growth Boundary[2]	80,686	+165% from 2010

[526] Oregon Metro. (2013, January 15). 2010 Forecast of Population by City and County. https://www.oregonmetro.gov/sites/default/files/2014/05/29/population_housing_forecasts_by_city_county.pdf
[527] Oregon Metro. (2013, January 15). 2035 Forecast of Population by City and County. https://www.oregonmetro.gov/sites/default/files/2014/05/29/population_housing_forecasts_by_city_county.pdf

Table 314: Community Demographics in Washington County*

Washington County Population Data	Total	Percent Change
2010 population[528]	529,710	
2021 population[529]	600,811	+13%
2035 forecasted population[530]	765,445	+22%
Race and Ethnicity[531]	**Total**	**Percent of Population**
White alone	438,123	74%
Hispanic/Latino/a/x of any race	100,090	17%
Asian alone	64,549	11%
Two or more races	42,887	7%
Black or African American alone	12,931	2%
American Indian and Alaska Native alone	3,456	0.6%
Native Hawaiian and Other Pacific Islander alone	2,341	0.4%
Language Spoken at Home[532]	**Percent of Population**	
English only	75.2%	
Spanish	11.9%	
Asian and Pacific Island languages	6.8%	
Indo-European languages	4.7%	
Other languages	1.4%	
Vulnerable Age Groups[533]	**Percent of Population**	
Less than 15 years of age	13%	
65 years and older	13%	

[528] United States Census Bureau. (2010, April 1). QuickFacts Washington County, Oregon. Accessed September 22, 2022, from https://www.census.gov/quickfacts/fact/table/washingtoncountyoregon/PST045221
[529] United States Census Bureau. (2021, July 1). QuickFacts Washington County, Oregon. Accessed September 22, 2022, from https://www.census.gov/quickfacts/fact/table/washingtoncountyoregon/PST045221
[530] Oregon Metro. (2013, January 15). 2035 Forecast of Population by City and County. https://www.oregonmetro.gov/sites/default/files/2014/05/29/population_housing_forecasts_by_city_county.pdf
[531] United States Census Bureau. (2021, July 1). 2016–2020 American Community Survey 5-Year Estimates, Demographic and Housing Estimates, Table DP05. Accessed September 22, 2022, from https://data.census.gov/cedsci/table?q=washington%20County%20oregon&tid=ACSDP5Y2020.DP05
[532] United States Census Bureau. (2021, July 1). 2016–2020 American Community Survey 5-Year Estimates, Language Spoken at Home, Table S1601. Accessed September 22, 2022 from https://data.census.gov/cedsci/table?q=washington%20County%20oregon%20language.
[533] United States Census Bureau. (2021, July 1). 2016–2020 American Community Survey 5-Year Estimates, Age and Sex, Table S010. Accessed September 22, 2022, from https://data.census.gov/cedsci/table?q=Washington%20County,%20oregon&tid=ACSST5Y2020.S0101

Disability Status of Non-Institutional Civilians [534]	Percent of Population
Total	10%
Less than 17 years of age	5.6%
65 years and older	70.9%

* Due to how respondents identify and answer questions there may be overlapping responses and results may equal greater than 100% of the population. Percentages are rounded.

3.2.1. Geography, Topography, and Climate

Washington County is located in the northwestern portion of Oregon, west of the City of Portland. It is the second most populous county in the state, with a 2021 population of 600,811 people. Covering 726 square miles, this total includes 724 square miles of land and 2.2 square miles of water. Most of the County is in the Tualatin Valley, formed by the Tualatin Mountains to the east and north, the Chehalem Mountains to the south, and the North Oregon Coast Range to the west and north. The northern and western portions of the County are forested, with the remainder of the County comprised of urban areas, agricultural lands, and floodplains.

The climate for Washington County is moderate. Temperatures range from a countywide average high of around 80 degrees Fahrenheit (°F) in July to an average low of 35 °F in January. On average, the County receives approximately 44 inches of rain a year. Additionally, the populated areas of the County can receive up to 5 inches of snow per year. The County receives some form of precipitation approximately 156 days per year, where accumulation of at least .01 inches is measurable.

3.2.2. Transportation, Infrastructure, and Housing

3.2.2.1. Transportation

Urban Washington County meets its current transportation needs through a mixture of municipal road systems, County roads, state and federal highways, and a regional public transportation system, TriMet.

Major highways in the County include Interstate 5; State Highway 26, which runs from southeast to northwest, linking Portland to the coast; State Highway 6, which connects smaller towns and communities on the rural west end of the County subject to wildland interface fire exposure; and State Highway 99W, which runs from Multnomah County to Yamhill County and through the City of Tigard, the County, and the City of Sherwood. State Highway 217 is a bypass route that links Interstate 5 to Highway 26. State Highway 47 runs north–south and links the western cities of Banks, Forest Grove, and Gaston to Columbia and Yamhill Counties.

Approximately 81% of commuters travel by car; eight out of nine of these individuals commute alone, and one in nine carpools. Increased commuting creates a greater dependency on roads, communications, accessibility, and, in the event of a hazard incident, emergency evacuation routes to reunite people with each other.

Several transportation modes options exist throughout the County. TriMet provides public transportation options to the urban portions of the County, connecting it to the greater Portland metropolitan area.

[534] United States Census Bureau. (2021, July 1). 2016–2020 American Community Survey 5-Year Estimates, Disability Characteristics, Table S1810. Accessed September 22, 2022, from https://data.census.gov/cedsci/table?q=washington%20county%20oregon%20s1810&tid=ACSST1Y2021.S1810

3.2.2.2. Infrastructure

The critical infrastructure and facilities listed in Table 315 below are operated by Washington County. Due to their location within identified hazard areas, these facilities are vulnerable to one or more hazards as noted in the table.

Table 315: Critical Facility and Asset Inventory

Name of Infrastructure, Facility, or Resource	Type of Asset	Address	Comments
Adams Crossing	Facility	161 NW Adams Avenue, Hillsboro, OR 97123	Vulnerable to all identified hazards except landslides, wildland fire, or dam failure.
Animal Services – Bonnie Hays Animal Shelter	Facility	1901 SE 24th Avenue, Hillsboro, OR 97123	Vulnerable to all identified hazards except landslides, wildland fire, or dam failure.
Beaverton Health Clinic, Special Supplemental Nutrition Program for Women, Infants, and Children	Facility	12550 SW 2nd Avenue, Beaverton, OR 97005	Vulnerable to all identified hazards except landslides, wildland fire, or dam failure.
Blanton (old Tualatin Valley Fire & Rescue site)	Facility	20665 SW Blanton Street, Aloha, OR 97078	Vulnerable to all identified hazards except landslides, wildland fire, or dam failure.
Central Services	Facility	214 W. Main Street, Hillsboro, OR 97123	Vulnerable to all identified hazards except landslides, wildland fire, or dam failure.
Courthouse	Facility	145 NE 2nd Avenue, Hillsboro, OR 97123	Vulnerable to all identified hazards except landslides, wildland fire, or dam failure.
Community Corrections Center	Facility	260 SW Adams Avenue, Hillsboro, OR 97123	Vulnerable to all identified hazards except landslides, wildland fire, or dam failure. Facility open 24 hours a day
Eagle Landing Park	Facility	26001 SW Rainbow Lane, Hillsboro, OR 97123	Vulnerable to all identified hazards except landslides, wildland fire, or dam failure.
Facilities Maintenance Building	Facility	169 N. 1st Avenue, Hillsboro, OR 97124	Vulnerable to all identified hazards except landslides, wildland fire, or dam failure.
Fair Complex Operations and Maintenance Facility	Facility	848 NE 28th Avenue, Hillsboro, OR 97124	Vulnerable to all identified hazards except landslides, wildland fire, or dam failure.
Scoggins Valley Park (Hagg Lake, Washington County Sheriff's Office Boathouse)	Infrastructure or Facility	50250 SW Scoggins Valley Road, Gaston, OR 97119	Vulnerable to all hazards.
Harkins House	Facility	244 W. Main Street, Hillsboro, OR 97123	Vulnerable to all identified hazards except landslides, wildland fire, or dam failure. Facility open 24 hours a day.

Name of Infrastructure, Facility, or Resource	Type of Asset	Address	Comments
Hillsboro Clinic	Infrastructure or Facility	266 W. Main Street, Hillsboro, OR 97123	Vulnerable to all identified hazards except landslides, wildland fire, or dam failure.
Justice Services	Infrastructure or Facility	150 N. 1st Avenue, Hillsboro, OR 97123	Vulnerable to all identified hazards except landslides, wildland fire, or dam failure.
Juvenile Services Building	Facility	255 N. 1st Avenue, Hillsboro, OR 97123	Vulnerable to all identified hazards except landslides, wildland fire, or dam failure.
Jail	Facility	215 SW Adams Street, Hillsboro, OR 97123	Vulnerable to all identified hazards except landslides, wildland fire, or dam failure. Facility open 24 hours a day.
Law Enforcement Center	Facility	215 SW Adams Avenue, Hillsboro, OR 97123	Vulnerable to all identified hazards except landslides, wildland fire, or dam failure. Facility open 24 hours a day.
Metzger Park	Infrastructure or Facility	8400 SW Hemlock Street, Tigard, OR 97223	Vulnerable to all identified hazards except landslides, wildland fire, or dam failure.
Washington County Auditor's Office, Washington Street Conference Center(WSCC)	Infrastructure or Facility	221 S. 1st Avenue Hillsboro, OR 97123	Vulnerable to all identified hazards except landslides, wildland fire, or dam failure.
Center for Counseling & Victim's Services (WSCC)	Infrastructure or Facility	160 SW Washington Street, Hillsboro, OR 97123	Vulnerable to all identified hazards except landslides, wildland fire, or dam failure.
Parking Garage (WSCC)	Infrastructure or Facility	225 S. 1st Avenue, Hillsboro, OR 97123	Vulnerable to all identified hazards except landslides, wildland fire, or dam failure.
Washington Street Conference Center	Facility	102 SW Washington Street, Hillsboro, OR 97123	Vulnerable to all identified hazards except landslides, wildland fire, or dam failure.
Public Safety Building (Old Jail)	Facility	146 NE Lincoln Street, Hillsboro, OR 97123	Vulnerable to all identified hazards except landslides, wildland fire, or dam failure.
Public Safety Training Center	Facility	600 SW Walnut Street, Hillsboro, OR 97124	Vulnerable to all identified hazards except landslides, wildland fire, or dam failure.
Public Service Building	Facility	155 N. 1st Street, Hillsboro, OR 97124	Vulnerable to all identified hazards except landslides, wildland fire, or dam failure.

Name of Infrastructure, Facility, or Resource	Type of Asset	Address	Comments
Public Services Annex	Facility	254 N. 1st Avenue, Hillsboro, OR 97124	Vulnerable to all identified hazards except landslides, wildland fire, or dam failure.
Service Center East	Facility	3700 SW Murray Boulevard, Beaverton, OR 97005	Vulnerable to all identified hazards except landslides, wildland fire, or dam failure.
Tigard Recovery	Facility	10362 SW McDonald Street, Tigard, OR 97224	Vulnerable to all identified hazards except landslides, wildland fire, or dam failure.
Veterans Memorial Gateway	Facility	3450 NE Veterans Drive, Hillsboro, OR 97224	Vulnerable to all identified hazards except landslides, wildland fire, or dam failure.
Walnut Street Center (Fleet Shop, Road Operations, Warehouse F)	Facility	1400 SW Walnut Street, Hillsboro, OR 97123	Vulnerable to all identified hazards except landslides, wildland fire, or dam failure.
West Slope Library	Infrastructure or Facility	3678 SW 78th Street, Portland, OR 97225	Vulnerable to all identified hazards except landslides, wildland fire, or dam failure.
Washington County Consolidated Communication Agency (WCCCA)	Facility	17911 NW Evergreen Parkway, Beaverton, OR 97006	Vulnerable to all identified hazards except landslides, wildland fire, or dam failure.
Washington County Consolidated Communications Agency (WCCCA new building)	Facility	5900 NE Pinefarm Court Hillsboro, OR 97124	Vulnerable to all identified hazards except landslides, wildland fire, or dam failure.
Washington County-owned roads, bridges, and other transportation infrastructure	Infrastructure	Throughout Washington County	Different localized and general sections are vulnerable to all hazards except drought.

3.2.2.3. Housing

Housing characteristics are an important factor in mitigation planning. The information below is for Washington County as a whole (including incorporated areas within cities) and shows that most housing units are owner-occupied and consist of one-unit buildings built before 1999. The older the housing, the more at risk it can be to damage from natural hazards such as earthquakes and windstorms, including tornadoes.

Table 316: Housing Characteristics*

Households	Total
Total households[535]	223,040
Units in Housing Structure[536]	**Percent of Housing**
One-unit structures	68%
Structures with two or more units	30%
Manufactured homes and all other types	2%
Year Housing Structure Built[537]	**Percent of Housing**
Pre-1979	36%
1980–1999	33%
2000 to present	32%
Housing Tenure and Vacancy	**Percent of Housing**
Owner-occupied	61%
Renter-occupied	39%
Vacant	4%

* Due to how respondents answer questions there may be overlapping responses and results may equal greater than 100%. Percentages are rounded.

3.2.3. Economy

Washington County as a whole is economically diverse with a wide range of key industries. The top industries by total employment in the County are professional and business services, trade, transportation, utilities, manufacturing, education and health services, accommodations and food services, and government. The top revenue-producing sectors in the entire County are manufacturing, wholesale trade, and retail trade. Nike's corporate headquarters is located in the unincorporated area of the County.

[535] United States Census Bureau. (2021, July 1). 2016–2020 American Community Survey 5-Year Estimates, Households and Families, Table S1101. Accessed September 6, 2022, from https://data.census.gov/cedsci/table?q=washingtonCounty%20oregon%20housing&tid=ACSST5Y2020.S1101
[536] United States Census Bureau. (2021, July 1). 2016–2020 American Community Survey 5-Year Estimates, Households and Families, Table S1101. Accessed September 6, 2022, from https://data.census.gov/cedsci/table?q=washingtonCounty%20oregon%20housing&tid=ACSST5Y2020.S1101
[537] United States Census Bureau. (2021, July 1). 2016–2020 American Community Survey 5-Year Estimates, Physical Housing Characteristics for Occupied Housing Units, Table S2504. Accessed September 7, 2022, from https://data.census.gov/cedsci/table?q=washingtonCounty%20oregon%20housing&tid=ACSST5Y2020.S2504

Washington County employers drew 49% of their workers from outside the County, according to 2019 data. The Washington County economy is a cornerstone of regional economic vitality. According to the U.S. Census Bureau's 2019 Longitudinal Employer-Household Dynamics dataset, 152,000 of the 314,000 jobs in Washington County are held by people commuting in from another county, and 161,000 are held by people living in Washington County. Of the 297,000 employees living in Washington County, 136,000, or 46%, commute out of the County.

The unincorporated portion of the County also includes a large agricultural footprint, with approximately 104,000 acres of prime farmland, according to the United States Department of Agriculture 2017 Census of Agriculture. Nurseries, hazelnuts, wine grapes, Christmas trees, vegetables, livestock, and dairy milk are all a part of this footprint.

In 2020, tourism brought in $462.1 million in direct destination spending to Washington County as a whole via its award-winning wineries, festivals, scenic parks, wetlands and wildlife preserves, and a variety of restaurants and shops.

Table 317: Income Characteristics*[538]

Households by Income Category	Percent of Households
Less than $5,000	2%
$5,000 to $9,999	1%
$10,000 to $14,999	2%
$15,000 to $19,999	2%
$20,000 to $24,999	3%
$25,000 to $34,999	6%
$35,000 to $49,999	10%
$50,000 to $74,999	17%
$75,000 to $99,999	14%
$100,000 to $149,999	21%
$150,000 or more	22%
Median Household Income	
$86,626	

* Due to how respondents answer questions, there may be overlapping responses, and results may equal greater than 100%. Percentages are rounded.

3.3. Natural Hazard Profiles

Washington County's Technical Committee utilized the OEM's hazard analysis methodology to examine hazard risk by collecting information about the four rating criteria of history, vulnerability, maximum threat, and probability. This methodology does not compare hazards to each other or rank hazards against each other. Instead, this process provides a sense of hazard priorities or relative risk and allows comparison of the same hazard across participants.

[538] United States Census Bureau. (2021, July 1). 2016–2020 American Community Survey 5-Year Estimates, Financial Characteristics, Table S2503. Accessed September 22, 2022, from https://data.census.gov/cedsci/table?q=Washington%20County%20oregon%20income&tid=ACSST5Y2020.S2503

Each of the hazards examined by this analysis was scored using a formula that incorporates the four rating criteria, a weight factor, and three levels of severity: low, medium, and high. The score range for this methodology is 24 (lowest possible) to 240 (highest possible). For additional detail about the OEM risk and hazard analysis methodology, see Volume I, Section 2.

The scores for each hazard that impacts the County are presented below. All natural hazards included in the NHMP have the potential to impact the County.

Table 318: Natural Hazard Risk Scores

Natural Hazard	History	Vulnerability	Maximum Threat	Probability	Score
Dam failure	Low	Medium	Medium	Low	83
Drought	High	High	Medium	High	186
Earthquake	Low	High	High	Medium	201
Extreme heat	High	Medium	High	High	177
Flooding, including channel migration and streambed erosion	High	Medium	Medium	High	173
Landslide	High	Low	Low	High	102
Volcanic ash	Low	Medium	High	Low	124
Wildland fire	High	Medium	High	High	191
Windstorm, including tornado	High	Medium	Medium	High	132
Winter storm	High	High	High	High	211

Full descriptions of each hazard are provided in Volume I, Section 2. The potential effects of climate change on the magnitude and frequency of natural hazard events are described in each hazard description in this annex and in Volume I, Section 2.

The timeframe of data collected during the planning process for Washington County was November 1, 2016 to February 22, 2022. Hazard events that occurred during this period and were deemed significant by the County's Technical Committee are included in this annex's hazard profiles.

The following hazard profiles are in alphabetical order and include a brief hazard description, significant events since adoption of the 2017 NHMP, if applicable, and potential impacts and vulnerabilities. The potential impacts for each hazard are presented in the same order, as applicable: populations, economies, structures, improved property, critical facilities and infrastructure, historical properties and cultural resources, and natural environments.

3.3.1. Dam Failure

The Oregon Water Resources Department has identified three high-hazard dams in Washington County—Scoggins Dam, Barney Dam, and Kay Lake Dam. A dam is rated as high hazard when loss of life is expected if the dam fails. The Scoggins Dam is the only dam within the County capable of producing a major emergency or disaster event. If Scoggins Dam failed, it is estimated that there would be 10-foot surge; however, a Scoggins Dam failure is also considered a low risk. Dam failure potential impacts and vulnerabilities are identified below.

3.3.1.1. Potential Impacts

The type, magnitude, and extent of dam failure impacts can vary based on the scale of the event. Potential impacts may include:

- Injuries or deaths.
- Public health concerns, such as the spread of infectious diseases, exposure to hazardous materials and debris, and water quality issues.
- Need for widespread search and rescue operations, including water rescues.
- Displaced residents in need of sheltering.
- Reduction or loss of water supply.
- Water use restrictions and lack of potable and irrigation water supplies.
- Delayed emergency response times and disruption of traffic due to high water, debris, blocked transportation routes, and damaged infrastructure and vehicles.
- Economic impacts to governments, including reduced future revenues, increased costs resulting from response activities, and increased future costs resulting from recovery and reconstruction activities.
- Economic impacts including loss of local revenue due to business and property tax losses, agriculture production losses, and reduced recreation and tourism activity. Interruptions to commercial transportation routes could take an economic toll on the County. Scoggins Valley Park receives one million visitors a year and could be severely damaged by a dam failure.
- Industries can experience commerce losses from power interruptions, damaged buildings and assets, and road closures. Industries can also sustain direct losses to buildings, personnel, and other vital equipment.
- Personal economic impacts of loss of income and property damage that may not be covered by insurance.
- Damage and destruction to the built environment, including above- and belowground utility lines; residential, public, and private buildings; and transportation systems.
- Erosion and flooding.
- Harm to ecosystems from loss of habitat, death and destruction of vegetation and animals, and erosion.
- Damage to crops, livestock, vegetation, and parks.

3.3.1.2. Vulnerabilities

In the event of a dam failure, many aspects of the community would be vulnerable to damage, including buildings, critical facilities, infrastructure, and the natural environment. Vulnerabilities to a dam failure event include:

- Potential impacts on agriculture use and drinking water supply, which could affect the entire County population.
- Reduction in income for those employed in water-dependent sectors, such as agriculture and recreation. Farmers, ranchers, livestock owners, farming-dependent, produce-dependent, and timber-processing businesses, and water companies could be impacted.
- Crop failures and pasture loss within the unincorporated County's agriculture and forest zoning districts, exclusive farm use zoning districts, and 10- and 20-acre future development district zoning areas that allow for agriculture uses.
- Potential inundation of unincorporated areas of Washington County, most notably Gaston, Forest Grove, Cornelius, Dilley, Hillsboro, Tigard, Tualatin, and King City.
- Potential damage to major populated areas downstream of Scoggins Dam: northeastern Gaston, southeastern Dilley, southern sections of Forest Grove, Cornelius, Hillsboro, Tualatin's business district, and homes within the 100-year FEMA floodplain.
- Damage to roadways and infrastructure located immediately downstream of dams. If Scoggins Dam were to fail, the most severe impacts would likely occur to Highway 47, Scoggins Valley Road, Old Highway 47, Patton Valley Road, Spring Hill Road, and Fern Hill Road. Highway 47 is an Emergency Transportation Route.
- Potential for floodwaters to overwhelm the residents in the Scoggins Valley flood area, as well as the communities of Gaston, Dilley, and Forest Grove. Rising waters in tributaries to the Tualatin River would also impact developed areas, bridges, and urban populations. If a dam failure were to occur during high reservoir volume times, flooding impacts could be seen as far down the Tualatin River to where it enters the Willamette River.
- Likely damage to significant properties including, but not limited to, Stimson Lumber, Portland & Western Railroad, Joint Water Commission water treatment plant, Clean Water Services' Forest Grove wastewater treatment plant, outdoor recreational sites, Highways 47 and 8, and several other arterial roads and bridges.
- Potential damage to other critical infrastructure, including communication structures and emergency generators.

3.3.2. Drought

Drought typically occurs as a regional event and often affects more than one city and County simultaneously. Drought may affect the entire Washington County planning area equally. Drought is difficult to measure, due to its diverse geographical and temporal nature. Significant drought events, potential drought impacts, and vulnerabilities to drought are identified below.

3.3.2.1. Significant Events

The County identified three significant drought events it experienced from November 1, 2016 to February 22, 2022.

- **Beginning July 24, 2018:** State agricultural drought declaration with corresponding Small Business Administration Economic Injury Disaster Loans (SBA EIDL) program implementation.
- **Beginning April 18, 2020:** State agricultural drought declaration with corresponding SBA EIDL program implementation.
- **Beginning May 11, 2021:** State agricultural drought declaration with corresponding SBA EIDL program implementation.

3.3.2.2. Potential Impacts

The potential drought impacts are identified below. The type, magnitude, and extent of impacts can vary based on the scale of the event. Potential impacts may include:

- Reduction or loss of water supply, water use restrictions, and lack of potable water supply.
- Health effects, including increased heat-related, waterborne, and cardiorespiratory illnesses, as well as mental health conditions.
- Reduced economic productivity or business closures, including agriculture, livestock, recreation, energy, tourism, timber, and fisheries.
- Supply chain restrictions, including food shortages.
- Loss of power or reduced availability of electricity due to infrastructure damage and high demand.
- Property and infrastructure damage due to expansive soils, which are clay-based soils that expand and contract based on the amount of moisture in the soil.
- Damage to natural environments, including low water levels in lakes, rivers, and other water bodies, reduced plant growth, local species reduction or extinction, increased water temperature, and deteriorated water quality, which may result in fish kills and increased waterborne pollutants.
- Concurrent hazards, including extreme heat, wildfire, flooding, and landslides.

3.3.2.3. Vulnerabilities

All populations, economies, structures, improved property, critical facilities and infrastructure, and natural environments in the County are vulnerable to drought. Vulnerabilities include:

- People with preexisting health conditions, those without access to clean water, children, pregnant women, and older adults.
- Those who are employed in water-dependent sectors, such as agriculture and recreation, may experience a reduction in income. Farmers, ranchers, livestock owners, water utilities, businesses that are farming-dependent or produce-dependent, and semi-conductor manufacturers could be impacted.

- Crop failures and pasture loss in agriculture and forest zoning districts, exclusive farm use zoning districts, and 10- and 20-acre future development district zoning areas that allow for agriculture uses are located in the unincorporated areas of the County.
- Reduction or elimination of water supply sources and negative impacts to ground and surface water quality.
    - Groundwater Limited Areas that are controlled in the event of declining ground water levels include:
        - Chehalem Mountain
        - Sherwood-Dammasch-Wilsonville
        - Parrett Mountain
        - Cooper-Bull Mountain
    - Drastic fall in water levels at Barney Reservoir and Hagg Lake could impact the unincorporated portions of the County.
- Negative impacts to natural environments throughout the County. Washington County owns and operates five natural areas that are vulnerable to drought. These natural environments may experience fish and wildlife habitat decline, the migration of wildlife, stresses on endangered species, a loss of wetlands, increased occurrence for wildland and vegetative fires, poor soil quality, and lessened hydric properties.
- Potential loss of historical, mature landscaping and trees located throughout the County, such as the Porter Sequoias at the county courthouse. At least twelve mature trees at Metzger Park have been lost due to multiple years of drought. It is anticipated that additional mature trees will be lost in upcoming years.

3.3.3. Earthquake

An earthquake is a sudden movement of rock on each side of a fault in the earth's crust that abruptly releases strain that has accumulated. The County could experience earthquakes that originate from the Cascadia Subduction Zone, Portland Hills Fault Zone, and Gales Creek Fault Zone. It could also experience liquefaction and landslides as the result of an earthquake. Potential earthquake impacts and vulnerabilities are identified below.

3.3.3.1. Potential Impacts

The potential impacts of an earthquake event are identified below. The type, magnitude, and extent of impacts can vary based on the scale of the event. Impacts may include:

- Injuries or deaths.
- Mental health impacts, including post-traumatic stress disorder.
- Public health hazards resulting from disruption of drinking water and wastewater systems.
- Need for widespread search and rescue operations.
- Displaced residents in need of sheltering.
- Delayed emergency response times due to debris, blocked transportation routes, and damaged infrastructure and vehicles.
- Economic impacts to governments, including reduced future revenues, increased costs resulting from response activities, and increased future costs resulting from recovery and reconstruction activities.
- Industries can experience commerce losses from power interruptions, damaged buildings and assets, and road closures. Industries can also sustain direct losses to buildings, personnel, and other vital equipment.
- Personal and household economic impacts of loss of income, increased medical costs, and property damage that may not be covered by insurance.
- Damage to ground utilities; residential, public, and private buildings; and transportation systems above and below.
- Disruption of essential infrastructure systems, such as power systems, public utilities, and telecommunications.
- Blocked roads and rail transportation routes due to debris from trees and damaged property, ground deformation, and liquefaction.
- Downed or damaged powerlines that can lead to wildfires.
- Power outages and natural gas leaks.
- Hazardous material releases due to infrastructure and facility damage.
- Harm to ecosystems from loss of habitat, death and destruction of vegetation and animals, and erosion.
- Change in water flows, including paths of rivers and streams.
- Damage to crops, livestock, vegetation, parks, and natural systems.
- Concurrent hazards initiated by an earthquake, including flood, wildland fire, and landslide.

3.3.3.2. Vulnerabilities

All populations, economies, structures, improved property, critical facilities and infrastructure, and natural environments in the County are vulnerable to earthquakes. These vulnerabilities include:

- County-owned critical facilities and infrastructure, including 13 administrative buildings and facilities, 9 public safety buildings, 4 medical facilities, 3 natural recreational areas, 1 fairground, and the road and bridge system.
- Other critical infrastructure, including aboveground power lines, communication structures, and emergency generators.
- Buildings with very high or high collapse potential include residential and commercial buildings constructed prior to 1990 that have not had seismic retrofits.
- Areas near the epicenter of an earthquake event are likely to incur a significant amount of damage to buildings, infrastructure, facilities, and property.
- Buildings in relatively high liquefaction-susceptible areas along Dairy Creek, Gales Creek, and the Tualatin River are at higher risk to damage from liquefaction-induced ground deformation.
- Unreinforced masonry, wood frame buildings with sill plates not bolted to foundation, cripple wall perimeter systems, and buildings on steep slopes partially supported on “stilts” are generally substantially vulnerable to major seismic damage.[539]
- Using 2022 Hazus®-MH information, it is estimated a 6.7 magnitude Gales Creek Fault earthquake event could result in 2,542 yellow-tagged buildings, 817 red-tagged buildings, and $643,401,000 in total economic losses in unincorporated Washington County.[540]
- A 2018 Oregon Department of Geology and Mineral Industries (DOGAMI) report described the following earthquake scenarios and their potential impacts on unincorporated Washington County[541]:
  - A Cascadia Subduction Zone magnitude 9.0 earthquake in “dry” soil conditions could result in $29,512,000 in building repair costs, 847,000 tons of debris, 1,788 long-term displaced residents, and up to 1,535 deaths.
  - A Cascadia Subduction Zone magnitude 9.0 earthquake in “wet” soil conditions could result in $3,913,000,000 in building repair costs, 1,395,000 tons of debris, 16,509 long-term displaced residents, and up to 3,483 deaths.
  - A Portland Hills Fault magnitude 6.8 earthquake in “dry” soil conditions could result in $5,176,000,000 in building repair costs, 1,614,000 tons of debris, 9,563 long-term displaced residents, and up to 4,410 deaths.
  - A Portland Hills Fault magnitude 6.8 earthquake in “wet” soil conditions could result in $8,584,000,000 in building repair costs, 2,603,000 tons of debris, 39,822 long-term displaced residents, and up to 8,328 deaths.
- Natural environments throughout the County.
- Historical, mature landscaping and trees located throughout the County, such as the Porter Sequoias at the county courthouse.

[539] Washington County. (2017, February). Washington County Natural Hazard Mitigation Plan. https://www.co.washington.or.us/EmergencyManagement/plans-and-agreements.cfm
[540] Oregon Department of Geology and Mineral Industries. (2022). Open-File Report O-22-04: Natural Hazard Risk Report for Washington County. https://www.oregongeology.org/pubs/ofr/O-22-04/p-O-22-04.htm
[541] Bauer, J.M., Burns, W.J., & Madin, I.P. (2018). Open-File Report O-18-02: Earthquake Regional Impact Analysis for Clackamas, Multnomah, and Washington Counties, Oregon. Oregon Department of Geology and Mineral Industries. DOGAMI Open-File Report O-18-02, Earthquake Regional Impact Analysis for Clackamas, Multnomah, and Washington Counties, Oregon (oregongeology.org)

3.3.4. Extreme Heat

Due to a rise in the frequency and severity of extreme heat events and the impacts of those events, the NHMP Steering Committee chose to include this hazard in the Washington County NHMP for the first time. Previous significant extreme heat events and the potential impacts of and vulnerabilities to extreme heat are identified below.

3.3.4.1. Significant Events

Extreme heat was not included in previous NHMPs. The County identified one significant extreme heat event and five significant heat events it experienced from November 1, 2016, to February 22, 2022.

- **June 26–29, 2021:** During this extreme heat event, a high-pressure heat dome over the region led to a stretch of intense heat, shattering records from June 26 through June 29. All-time maximum temperatures were broken by 8 °F to 10 °F. The maximum temperature reached 108 °F with a heat index of 115 °F. These temperatures of over 110 °F required activation of daytime and overnight cooling shelters. At least one death was reported.
- Significant heat events in June 2017, August 2017, July 2018, August 2019, and August 2021 were of sufficient duration to warrant activation of cooling shelters. An extreme heat event also occurred in May 2017; however, it was not severe enough to activate cooling shelters.

3.3.4.2. Potential Impacts

The potential impacts of an extreme heat event are identified below. The type, magnitude, and extent of impacts can vary based on the scale of the event. Potential impacts may include:

- Injuries or deaths.
- Heat illnesses, including heat rashes, heat cramps, heat exhaustion, heat stroke, and death.
- Extended operational hours of County staff and additional resources needed for response to the event, including the operation of daytime cooling centers and overnight cooling shelters.
- Strain on or loss of water supply due to increased demand.
- Industries can experience commerce losses from power interruptions, damaged buildings and assets, and road closures. Industries can also sustain direct losses to buildings, personnel, and other vital equipment.
- Economic losses from decreased worker efficiency and effectiveness and time lost on the job when workers take more frequent or longer breaks to avoid overheating.
- Economic impacts of closure of outdoor activities and events, such as farmers markets and concerts.
- Property damage, such as roof expansions, leading to warped, cracked, and leaking shingles; dry, cracked, and leaking caulking around flashing and joints; cracked foundations; excessive drying of wood structures; and melted siding.
- Disruption of essential infrastructure systems from overheated and damaged utilities, including power, water, transportation, and communication systems.
- Impacts to roadways as heat expands concrete or causes cracking and buckling. Public transit can also be impacted due to melted cables, sagging wires, and warping tracks.
- Damage to crops, livestock, vegetation, parks, and natural systems.

- Impacts to greenspaces, such as scorch and sunscald of new foliage, branches or tops of trees dying, and significant stress and die-off of native trees, particularly Douglas fir and cedar. These impacts are intensified if drought is also occurring.
- Concurrent hazards include drought and wildland fire.

3.3.4.3. Vulnerabilities

All populations, economies, structures, improved property, critical facilities and infrastructure, and natural environments in the County are vulnerable to extreme heat.

Populations substantially vulnerable to extreme heat include:

- People who work or spend a significant time outdoors, including those in construction, landscaping, farming, agriculture, maintenance and repair, and roofing.
- People who live or work in buildings without air conditioning or cooling equipment.
- People living, working, or spending time in heat islands within the County.
- People living outdoors or in the upper floors of multi-family housing units.
- People with higher heat sensitivity, including older adults, infants and children, pregnant women; people with preexisting or chronic diseases; and people who take certain medications that affect thermoregulation or block nerve impulses.
- People with limited mobility and no access to cooling systems who may not be able to travel to cooling centers or shelters.
- People who live in social isolation, including linguistic isolation, or those living alone with few social relationships.

Additional vulnerabilities to extreme heat include:

- Historically, older homes in the County that do not have air conditioning or cooling equipment installed.
- County-owned critical facilities and infrastructure, including 13 administrative buildings and facilities, 9 public safety buildings, 4 medical facilities, 3 natural recreational areas, 1 fairground, and the road and bridge system.
- Other critical infrastructure, including communication structures and emergency generators.
- Bridge infrastructure is vulnerable to thermal expansion of bridge joints and paved surfaces and deterioration of steel, asphalt, protective cladding, coats, and sealants.
- Asphalt pavement is vulnerable to accelerated deterioration through softening, rutting, and migration of liquid asphalt.
- Vehicles, including first responder vehicles, are vulnerable to engine overheating and tire deterioration.
- Aboveground utility and power lines can droop or sag and create a heightened risk for outages or fires as a result of downed or damaged lines.
- Increased reliance on cooling causes a concern for industries that use off-site servers to maintain their systems.
- Natural environments located throughout the County.
- Plants, animals, ecosystems, and natural environments are vulnerable to high rates of mortality due to excessive heat, especially during repetitive high-heat days.

3.3.5. Flooding, Including Channel Migration and Streambed Erosion

Flooding is a common occurrence in the County, and events typically occur from October through April. The main flooding events in Washington County are located within Tualatin River floodplain areas in the unincorporated County, commercial areas along Beaverton Creek and Fanno Creek, and in a significant portion of commercial areas in the City of Tualatin located along susceptible waterways. There are a few areas throughout the County dispersed along waterways that may, based on projections, experience flood damage. However, a large concentration of flood damage is not expected in any one area of the County.

3.3.5.1. Significant Events

The County identified three significant flooding events it experienced from November 1, 2016 to February 22, 2022. Heavy rain in February 2017, February 2019, and February 2022 caused minor flooding that resulted in road closures throughout the County.

3.3.5.2. Potential Impacts

The potential impacts of a flooding event are identified below. The type, magnitude, and extent of impacts can vary based on the scale of the event. Potential impacts include:

- Injuries or deaths.
- Public health concerns, such as the spread of infectious diseases, exposure to hazardous materials and debris, and water quality issues.
- Need for widespread search and rescue operations, including water rescues.
- Displaced residents in need of sheltering.
- Delayed emergency response times and disruption of traffic due to high water, debris, blocked transportation routes, and damaged infrastructure and vehicles.
- Economic impacts to governments, including reduced future revenues, increased costs resulting from response activities, and increased future costs resulting from recovery and reconstruction activities.
- Industries can experience commerce losses from power interruptions, damaged buildings and assets, and road closures. Industries can also sustain direct losses to buildings, personnel, and other vital equipment.
- Personal economic impacts of loss of income and property damage that may not be covered by insurance.
- Damage and destruction to the built environment, including above- and belowground utility lines; residential, public, and private buildings; and transportation systems.
- Disruption of essential infrastructure systems, such as power systems, public utilities, telecommunications, and transportation routes.
- Harm to ecosystems from loss of habitat, death and destruction of vegetation and animals, and erosion.
- Damage to crops, livestock, vegetation, and parks.

3.3.5.3. Vulnerabilities

All populations, economies, built environments, critical facilities and infrastructure, and natural environments within the FEMA Special Flood Hazard Area (100-year recurrence flood event) and the

Drainage Hazard Area (25-year recurrence flood event) are potentially vulnerable to a flooding event. Additional vulnerabilities include:

- Populations without access to private transportation for evacuation purposes.
- Past damage done to roads and culverts due to flooding within unincorporated Washington County include:
  - River Road culvert failure, December 2017, $57,000 replacement.
  - Martin Road culvert failure, December 2019, $92,000 replacement.
  - Pongratz Road culvert failure, October 2020, $6,700 repair.
  - Stringtown Road flooding road failure, January 2021, $2,800 repair.
- Other critical infrastructure, including communication structures and emergency generators.
- There are 36 repetitive loss (RL) properties in unincorporated Washington County as of September 30, 2021.
- Properties without flood insurance.
- Special flood hazard areas within the County.
- Portions of the unincorporated County outside of the mapped floodplains are subject to flooding from local storm water drainage and overbank flooding from streams too small to be mapped by FEMA. Buildings and infrastructure in these areas may be at flood risk.
- The following locations in unincorporated Washington County have been identified as prone to flooding. All roads listed are located in rural areas of the County, and closures impact primarily agricultural and residential land uses.
  - Fern Hill Road between Highway 47 and Geiger Road, Forest Grove
  - Bates Road between Old Highway 47 and Patton Valley Road, Gaston
  - Old Highway 47 between Highway 47 and Scoggins Valley Road, Gaston
  - West Union Road at Helvetia Road
  - Susbauer Road between Long Road and Hornecker Road, Cornelius
  - Stringtown Road between Highway 8 and Ritchey Road
  - B Street between Stringtown Road and 16th Avenue, Forest Grove
  - 334th Street between Tualatin Valley Highway and the end, Hillsboro
  - Cook Road at 334th Avenue, Hillsboro
  - Dairy Creek Road between Mountain Dale Road and the end, North Plains
- Cedar Mill Creek and Johnson Creek repeatedly flood and can impact surrounding areas.
- Flood loss estimates determined by Hazus-MH include[542]:
  - 10-year flood scenario
    - Number of buildings lost: 398
    - Loss estimate: $13,022,000

[542] Oregon Department of Geology and Mineral Industries. (2022). Open-File Report O-22-04: Natural Hazard Risk Report for Washington County. https://www.oregongeology.org/pubs/ofr/O-22-04/p-O-22-04.htm

- 50-year flood scenario
  - Number of buildings lost: 558
  - Loss estimate: $17,547,000
- 100-year flood scenario
  - Number of buildings lost: 651
  - Loss estimate: $20,649,000
- 500-year flood scenario
  - Number of buildings lost: 1,080
  - Loss estimate: $37,428,000

Table 319: Land Use Type in the 100-Year Floodplain in Unincorporated Washington County

Land Use Type	Total Parcels in 100-Year Floodplain	Total Value of Exposed Parcels	Total Area in Jurisdiction (Acres)	Total Area in the 100-Year Floodplain (Acres)	Percentage of Area in the 100-Year Floodplain
Agricultural	660	$431,494,330	110,087.50	21,341.99	19.39%
Commercial	71	$280,022,030	5,011.19	1374.14	27.42%
Forest	75	$68,831,240	174,259.30	2,799.38	1.61%
Industrial	2	$144,167,930	388.28	164.02	42.24%
Multi-Family Residential	95	$726,601,770	908.20	200.60	22.08%
Public	219	$97,396,580	77,253.60	3,899.60	5.05%
Rural	143	$86,028,930	10,357.79	473.23	4.57%
Single-Family Residential	1,299	$751,091,740	13,610.45	782.20	5.74%
Vacant	141	$12,232,050	3,933.74	303.32	7.71%
Other	124	$427,160,490	4,949.53	1,386.31	28.01%
Total	**2,829**	**$3,025,027,090**	**400,759.50**	**32,724.79**	**8.17%**

Table 320: Facilities in Unincorporated Washington County within FEMA-Mapped Floodplains

Building Classification	Buildings	Buildings within 100-Year Floodplain	Buildings within 500-Year Floodplain	Buildings within Combined 500-Year & 100-Year Floodplain
Total Buildings	104,216	1,437	1,132	2,569
Percentage of Buildings within Unincorporated Washington County	100%	1.38%	1.09%	2.47%

3.3.6. Landslide

In Washington County, the most common landslides are debris flows and shallow and deep landslides. The southern, western, and northern rural areas of Washington County with steep slopes have an increased risk of landslides. A significant landslide event, potential landslide impacts, and vulnerabilities to landslides are identified below.

3.3.6.1. Significant Event

The County identified one significant landslide event it experienced from November 1, 2016 to February 22, 2022.

- **December 7, 2021:** A landslide resulted in an emergency, long-term closure of Dixie Mountain Road from the quarry to the end of the road. The road remains closed, and an alternate access to the quarry was opened up. The response cost to the County as of June 2022 is approximately $3,000.

3.3.6.2. Potential Impacts

Potential impacts of a landslide event are identified below. The type, magnitude, and extent of impacts can vary based on the scale of the event.

- Injuries or deaths.
- Displaced residents in need of sheltering.
- Delayed emergency response times due to debris, blocked transportation routes, and damaged infrastructure and vehicles.
- Mobility or access issues for residents due to blocked or damaged transportation routes.
- Economic impacts to governments, including reduced future revenues, increased costs resulting from response activities, and increased future costs resulting from recovery and reconstruction activities.
- Industries can experience commerce losses from power interruptions, damaged buildings and assets, and road closures. Industries can also sustain direct losses to buildings, personnel, and other vital equipment.
- Personal and household economic impacts of loss of income and property damage that may not be covered by insurance.
- Debris flows.
- Damage and destruction to the built environment, including above- and belowground utility lines; residential, public, and private buildings; and transportation systems.
- Disruption of essential infrastructure systems, such as power systems, public utilities, telecommunications, and transportation routes.
- Power outages and natural gas leaks.
- Disruption of traffic due to damaged or destroyed transportation systems.
- Harm to ecosystems from loss of habitat, death and destruction of vegetation and animals, and erosion.
- Damage to crops, livestock, vegetation, and parks.

3.3.6.3. Vulnerabilities

The populations, structures, and improved property vulnerable to landslides include the following:

- Per DOGAMI, there are 2,694 buildings with a total value of $701,247,000 at very high susceptibility, 3,966 buildings with a total value of $1,176,240,000 at high susceptibility, and 36,081 buildings with a total value of $11,257,655,000 at moderate susceptibility to landslide exposure in unincorporated Washington County.[543] Additionally, a community risk profile completed by DOGAMI shows 12,441 residents may be potentially displaced due to a very high or high susceptibility landslide scenario.[544]
- The southern, western, and northern rural areas of Washington County with steep slopes have increased risk of damage from landslides.[545]
- Scoggins Valley Park in the southwestern portion of the County.
- Landslide hazard is ubiquitous in a large percentage of undeveloped land and may present challenges for future planning and mitigation efforts. Awareness of nearby areas of landslide hazard is beneficial for reducing risk for every community in Washington County.[546]

[543] Oregon Department of Geology and Mineral Industries. (2022). Open-File Report O-22-04: Natural Hazard Risk Report for Washington County. https://www.oregongeology.org/pubs/ofr/O-22-04/p-O-22-04.htm
[544] Oregon Department of Geology and Mineral Industries. (2022). Open-File Report O-22-04: Natural Hazard Risk Report for Washington County. https://www.oregongeology.org/pubs/ofr/O-22-04/p-O-22-04.htm
[545] Oregon Department of Geology and Mineral Industries. (2022). Open-File Report O-22-04: Natural Hazard Risk Report for Washington County. https://www.oregongeology.org/pubs/ofr/O-22-04/p-O-22-04.htm
[546] Oregon Department of Geology and Mineral Industries. (2022). Open-File Report O-22-04: Natural Hazard Risk Report for Washington County. https://www.oregongeology.org/pubs/ofr/O-22-04/p-O-22-04.htm

3.3.7. Volcanic Ash

Volcanic activity is possible at mountains within 60 miles of the County, including Mount St. Helens and Mount Hood. Ashfall from a volcanic eruption has the potential to impact the County, although the scale and types of impacts and vulnerabilities may differ depending on which volcano erupts, the level of eruption, and the wind direction during and after eruption. Potential ashfall impacts and vulnerabilities to volcanic ash are identified below.

3.3.7.1. Potential Impacts

Though unlikely, the impacts of a significant ashfall can be substantial, including:

- Indirect injuries and deaths, such as those sustained during ash cleanup operations or in traffic accidents.
- Short-term health effects, including respiratory effects.
- Widespread public health issues stemming from failing or damaged infrastructure, such as lack of clean water and sanitation. This includes public water systems that rely on outdoor reservoirs.
- The need to shelter individuals to protect them from poor air quality, including houseless persons and persons displaced from their residences due to poor residential air filtration systems.
- Delayed emergency response times due to decreased visibility and increased traffic hazards.
- Extended operational hours of County staff and resources needed for response to the event.
- Economic impacts to governments, including reduced future revenues, increased costs resulting from response activities, and increased future costs resulting from recovery and cleanup activities.
- Industries can experience commerce losses from power interruptions, damaged buildings and assets, and road closures. Industries can also sustain direct losses to buildings, personnel, and other vital equipment.
- Personal and household economic impacts of loss of income, increased medical costs, and property damage that may not be covered by insurance.
- Damage to the built environment, including aboveground utility lines; residential, public, and private buildings; and transportation systems.
- Disruption of essential infrastructure systems, such as power systems, public utilities, drainage systems, telecommunications, and transportation routes.
- Downed or damaged powerlines can lead to wildfires.
- Damage to crops, livestock, vegetation, parks, and natural systems.

3.3.7.2. Vulnerabilities

All populations, economies, structures, improved property, critical facilities and infrastructure, and natural environments in the County are vulnerable to volcanic ash. This includes:

- People in the County with chronic lung problems and other preexisting health conditions, children, pregnant women, and older adults.
- People without access to effective dust masks, eye protection, and drinking water and food uncontaminated by ash.

- Major employers, including electronic manufacturing companies and university and research facilities.
- County-owned critical facilities and infrastructure, including 13 administrative buildings and facilities, 9 public safety buildings, 4 medical facilities, 3 natural recreational areas, 1 fairground, and the road and bridge system.
- Other critical infrastructure, including communication structures, drainage systems, and emergency generators.
- Older buildings and infrastructure not built to withstand the weight and impacts of large amounts of volcanic ash.
- Natural environments located throughout the County.

3.3.8. Wildland Fire

Washington County has an elevated wildland fire risk within its forested areas, which are predominantly located in the southern, western, and northern portions of the County. The impacts of wildland fire are elevated in the wildland–urban interface (WUI) where a greater number of people and structures are at risk. Significant wildland fire or wildland fire smoke events, their potential impacts, and vulnerabilities to wildland fire are identified below.

3.3.8.1. Significant Events

The County identified three significant wildland fire or wildland fire smoke events it experienced from November 1, 2016 to February 22, 2022. Washington County saw one federal declaration (DR-4562), two Fire Management Assistance Grants, and one emergency declaration that included wildfire in 2020. The County has also experienced smaller, less significant non-structural fires caused by debris burning.

- **September 2017:** Wildland fire smoke from the Eagle Creek Fire in the Columbia River Gorge entered the area and required that the County take protective actions for residents.
- **September 2020:** Two wildfires burned concurrently in the County: the Powerline wildfire and the Chehalem Mountain–Bald Peak wildfire. Evacuations and shelter operations were required for both events.
    - The Powerline wildfire began on September 8 and was considered contained on September 13. The fire was started by sparks from powerlines and burned 126 to 175 acres. Day- and night-shift wildland resources assigned to the fire included 3 hand crews, 11 engines, 1 dozer, 1 excavator, 3 water tenders, and overhead personnel. A total of 109 personnel worked on the event. A Level 3 evacuation, the highest evacuation level, and an indication of current or imminent danger, was issued to approximately 150 homes, including those throughout the entire city of Cherry Grove and on Dundee Road, SW Patton Valley Road, SW Lee Road, and SW Cascara Road. It also forced the closure of Hagg Lake and Scoggins Valley Park for several days and caused unhealthy air quality.
    - The five-alarm Chehalem Mountain/Bald Peak wildfire also began on September 8 and was declared 100% contained on September 14. The fire was started by an improperly extinguished campfire on private property in unincorporated Washington County and burned approximately 875 acres in Washington and Yamhill counties. Tualatin Valley Fire & Rescue (TVF&R) conducted fire protection, suppression, and patrols throughout 1,555 acres. The fire spread quickly because of dry fuels, low humidity, high winds, and steep and rugged terrain. In some cases, fire jumped over areas, leaving unburned timber and dry fuels. A Level 3 evacuation was issued for approximately 150 people. Level 2 evacuations were issued in several areas. A Level 2 evacuation means there is significant danger to the area and residents should voluntarily relocate to either a shelter or a family or friend's home outside of the affected area. If residents choose to remain in the area, they should be ready to evacuate at a moment's notice. Three barns were destroyed in the fire and power was disrupted. No injuries or deaths were reported.
        - In response to the fire and evacuations, the following support services were established:
            - A staging site and shelter for evacuees was set up at Mountainside High School in the City of Beaverton.
            - Three comfort centers were set up at a church in the City of Newberg in Yamhill County. These centers provided air-conditioning, food, water, and showers.

- Animal shelters were set up at the Washington and Yamhill County Fairgrounds. These shelters accepted pets and livestock.
- Campsites and spots for recreational vehicles were created at the Washington County Fairground.

3.3.8.2. Potential Impacts

The potential impacts of a wildfire event are identified below. The type, magnitude, and extent of impacts can vary based on the scale of the event. Potential impacts may include:

- Injuries or deaths.
- Exposure to wildfire smoke, which can lead to eye, nose, and throat irritation and the worsening of chronic heart and lung diseases.
- Widespread public health issues stemming from failing or damaged infrastructure, such as lack of clean water and sanitation.
- Need for widespread search and rescue operations.
- Displaced residents in need of sheltering.
- Delayed emergency response times due to blocked transportation routes and debris, congested transportation routes due to evacuations, and damaged infrastructure and vehicles.
- Extended operational hours of County staff and resources needed for response to the event.
- Strain on or loss of water supply due to increased demand.
- Economic impacts to governments, including costs for fire suppression, staff, equipment, supplies, transportation and mobilization of first responders, evacuations, sheltering operations, post-fire recovery, and rebuilding costs associated with government-owned buildings, property, and infrastructure.
- Economic impacts, including loss of local revenue due to business and property tax losses, agriculture production losses, and reduced recreation and tourism activity. Scoggins Valley Park receives one million visitors a year, most during summer, which is when wildland fires tend to occur.
- Industries can experience commerce losses from power interruptions, damaged buildings and assets, and road closures. Industries can also sustain direct losses to buildings, personnel, and other vital equipment.
- Personal and household economic impacts of loss of income, increased medical costs, and property damage that may not be covered by insurance.
- Damage and destruction to the built environment, including above- and belowground utility lines; residential, public, and private buildings; and transportation systems.
- Disruption of essential infrastructure systems, such as power systems, public utilities, telecommunications, and transportation routes.
- Debris from trees and damaged property, causing blocked road and rail transportation routes.
- Downed or damaged powerlines. This impact may be compounded since powerline failures can lead to additional wildfires.
- Power outages and natural gas leaks.
- Hazardous material releases due to infrastructure and facility damage.

- Harm to ecosystems from loss of habitat, death and destruction of vegetation and animals, and erosion.
- Damage to crops, livestock, vegetation, parks, and natural systems.
- Concurrent hazards, including air and water quality issues. Landslide and erosion issues are common following a wildland fire.

3.3.8.3. Vulnerabilities

The dynamic nature of wildland fires means all populations, economies, structures, improved property, critical facilities and infrastructure, and natural environments in the County are vulnerable to this hazard. These include:

- People with chronic lung problems and other preexisting health conditions, children, pregnant women, and older adults.
- Populations without access to private transportation for evacuation purposes.
- Rural populations and those within the WUI are at greater vulnerability. Isolated concentrations of rural populations with limited access for fire suppression and evacuation purposes include Bald Peak, Buxton, Cherry Grove, Dixie Mountain, Fern Hill, Pumpkin Ridge, Dairy Creek, and Timber.
- Many fire hazard mitigation strategies rely on property owner action and this capacity varies. Low-income residents will have fewer financial resources to mitigate risk.
- County-identified critical infrastructure, including several roads, bridges, and culvert crossings, are at risk in the forested and WUI hazard areas. Outside of the WUI/forested hazard area at risk to direct fire contact, the County identified the critical facilities that can be exposed to wildland smoke contaminates in Table 315.
- Other critical infrastructure, including aboveground power lines, communication structures, and emergency generators.
- Drinking water sources and water treatment infrastructure, food supplies and availability, and access to medical resources or care may also be impacted by wildfire and can cause health impacts on a large scale.
- Homes, businesses, and infrastructure adjacent to the forested areas throughout the County.
- Per analysis of the Oregon State University Extension Service Fire Program and Wildland Fire Associates dataset,[547] in unincorporated Washington County, there are:
  - 1,207 buildings with a total value of $303,478,000 at high risk of wildland fire exposure.
  - 904 buildings with a total value of $232,660,000 at moderate risk of wildland fire exposure.
  - 22,635 buildings with a total value of $6,009,638,000 at low risk of wildland fire exposure.
- A community risk profile completed by DOGAMI shows 2,874 residents could be displaced due to a high or moderate risk wildland fire scenario.[548]
- Limited-access areas that are more vulnerable to wildland fire:
  - Areas that lack multiple access routes for sending fire suppression resources or alternative evacuation routes are at risk during wildfire events.

[547] Oregon Department of Geology and Mineral Industries. (2022). Open-File Report O-22-04: Natural Hazard Risk Report for Washington County. https://www.oregongeology.org/pubs/ofr/O-22-04/p-O-22-04.htm
[548] Oregon Department of Geology and Mineral Industries. (2022). Open-File Report O-22-04: Natural Hazard Risk Report for Washington County. https://www.oregongeology.org/pubs/ofr/O-22-04/p-O-22-04.htm

  - Areas with steep slopes and waterways that flood may be more prone to landslides after wildfire events.
  - Rural private roads not maintained by the County that provide residential access to multiple properties, especially those whose terrain or condition negatively impact access.
- Natural environments throughout the County.

3.3.9. Windstorm, Including Tornado

The strongest winds in Washington County are experienced in the western portions of the County in the Coast Range, northern and eastern areas within the Tualatin Mountains, southern areas in the Chehalem Mountains, and Bull Mountain/Little Bull Mountain in the southeastern portion of the County. Tornadoes may also occur in Washington County but are typically very small Enhanced Fujita (EF) scale 0 or 1.

3.3.9.1. Potential Impacts

The potential impacts of a windstorm event are identified below. The type, magnitude, and extent of impacts can vary based on the scale of the event.

- Injuries or deaths.
- Displaced residents in need of sheltering.
- Delayed emergency response times due to debris, blocked transportation routes, and damaged infrastructure and vehicles.
- Extended operational hours of County staff and resources needed for response to the event.
- Economic impacts to governments, including reduced future revenues, increased costs resulting from response activities, and increased future costs resulting from recovery and reconstruction activities.
- Industries can experience commerce losses from power interruptions, damaged buildings and assets, and road closures. Industries can also sustain direct losses to buildings, personnel, and other vital equipment.
- Personal and household economic impacts of loss of income, increased medical costs, and property damage that may not be covered by insurance.
- Damage and destruction to the built environment, including aboveground utility lines; residential, public, and private buildings; and transportation systems. Significant damage could lead to the complete loss of structures or totaled vehicles.
- Disruption of essential infrastructure systems, such as power systems, public utilities, telecommunications, and transportation routes.
- Debris from trees and damaged property causing blocked road and rail transportation routes.
- Downed or damaged powerlines can lead to wildfires.
- Power outages.
- Harm to ecosystems from loss of habitat, and death and destruction of vegetation and animals.
- Damage to crops, livestock, vegetation, parks, and natural systems.

3.3.9.2. Vulnerabilities

All populations, economies, structures, improved property, critical facilities and infrastructure, and natural environments in the County are vulnerable to windstorms, including tornadoes. These include:

- County-owned critical facilities and infrastructure, including 13 administrative buildings and facilities, 9 public safety buildings, 4 medical facilities, 3 natural recreational areas, 1 fairground, and the road and bridge system.
- Buildings and infrastructure not built to withstand high winds, including manufactured homes and buildings. All critical County structures are maintained to current building code requirements for

wind, including roof storm straps. Therefore, non-critical County structures and privately owned buildings and infrastructure are likely to be the most vulnerable.

- Other critical infrastructure, including aboveground power lines, communication structures, and emergency generators.
- Areas of greater vulnerability include forested areas along the canyon walls where winds increase in velocity.
- Areas at elevation over 500 feet include the southern series of hills (Cooper, Bull, and Chehalem Mountains), along the northern range of the Tualatin Hills, and in the Coast Range. The County only maintains County roads in these areas. In the Coast Range, roads outside of the County's jurisdiction are privately owned or are under the State's jurisdiction.
- Natural environments located throughout the County.
- Older hardwood (oak), maple, and conifer stands along the canyon walls are more vulnerable to high winds.
- Historical, mature landscaping and trees located throughout the County, such as the Porter Sequoias at the county courthouse.

3.3.10. Winter Storm

Winter storm events occur annually in Washington County, sometimes becoming severe. Severe winter weather in the County is characterized by extreme cold, snow, ice, and sleet. Significant winter storm events, their potential impacts, and vulnerabilities to winter storms are identified below.

3.3.10.1. Significant Events

The County identified five significant winter storm events it experienced from November 1, 2016, to February 22, 2022.

- **January 7–8, 2017:** General snowfall totals of 2–4 inches were reported, with the greatest total being 4.5 inches. Major ice accumulations occurred after the snow, with several locations reporting 0.50–1.00 inches. The combination of snow and ice resulted in significant power outages and closures across the area.
- Events in February 2017, February 2018, and December 2021 had minor impacts, such as travel impacts.
- **February 11–14, 2021:** Freezing rain and heavy snow came down and gusty winds up to 50 mph occurred, resulting in a five-day ice storm. The County experienced snowy and icy roads, downed tree limbs, localized power outages, and travel impacts. The West Hills and the southeast areas in the County were primarily impacted. Multiple trees were downed at Metzger Park in unincorporated Washington County near Washington Square.

3.3.10.2. Potential Impacts

The potential impacts of a winter storm event are identified below. The type, magnitude, and extent of impacts can vary based on the scale of the event. Potential impacts may include:

- Injuries or deaths, including from carbon monoxide poisoning, falls from slick or icy conditions, frostbite, and hypothermia.
- Delayed emergency response times due to debris, blocked transportation routes, damaged infrastructure and vehicles, and difficulty using fire hydrants because of frozen or damaged water system components.
- Stranded travelers due to ice, snow, and transportation impacts.
- Extended operational hours of County staff and resources needed for response to the event.
- Economic impacts to governments, including reduced future revenues, increased costs resulting from response activities, and increased future costs resulting from recovery and reconstruction activities.
- Industries can experience commerce losses from power interruptions, damaged buildings and assets, and road closures. Industries can also sustain direct losses to buildings, personnel, and other vital equipment.
- Personal and household economic impacts of loss of income, increased medical costs, and property damage that may not be covered by insurance.
- Damage and destruction to the built environment, including aboveground utility lines; residential, public, and private buildings; and transportation systems.
- An increased number of house fires due to unsafe alternate heating methods.
- Significant property damage and loss of water due to frozen or damaged pipes or the thawing of frozen pipes.

- Disruption of essential infrastructure systems, such as power systems, public utilities, telecommunications, and transportation routes.
- Debris from trees and damaged property causing blocked road and rail transportation routes.
- Downed or damaged powerlines can lead to wildfires, and tree debris can create fuel load for wildfire.
- Power outages.
- Harm to ecosystems from loss of habitat, and death and destruction of vegetation and animals.
- Damage to crops, livestock, vegetation, parks, and natural systems.
- Concurrent hazards, including flooding.

3.3.10.3. Vulnerabilities

All populations, economies, structures, improved property, critical facilities and infrastructure, and natural environments in the County are vulnerable to winter storms. These include:

- People who do not have access to sufficient heating, insulated clothing, or dry living conditions, including unhoused populations.
- Older adults and infants, people who take certain medications, people who have certain medical conditions, and people who have been drinking alcohol are at increased risk for hypothermia.
- People in households lacking appropriate and functional heating devices.
- Populations with disabilities may be more affected due to mobility issues.
- County-owned critical facilities and infrastructure, including 13 administrative buildings and facilities, 9 public safety buildings, 4 medical facilities, 3 natural recreational areas, 1 fairground, and the road and bridge system.
- Older buildings and infrastructure not built to withstand the weight and impacts of large amounts of snow and ice.
- All roads and bridges can be impacted to a certain degree by a winter storm. However, these typically do not rise to a level beyond normal operations, such as clearing vegetation debris from roads, plowing snow, and applying deicer and sand for icy roads.
- Roads above 500 feet in elevation are more susceptible to snow and ice. Roads in forested areas are more susceptible to long-term snow and ice due to shading. Forested roads also are susceptible to debris from fallen trees and tree limbs. However, the normal maintenance program generally resolves road obstructions and hazardous conditions.
    - The County has implemented two “Snow Zones” on two significant travel routes. These Snow Zones cover areas at 500’ and above and are activated when there is snow and/or ice falling or confidently forecast. These are in addition to normal deicing, plowing, and sanding treatments.
- Natural environments throughout the County.
- Historical, mature landscaping and trees located throughout the County.

3.4. Historical Events

The timeframe of data collected during the planning process for Washington County was November 1, 2016 to February 22, 2022. Hazard events that impacted the entire planning area during these dates are detailed in Volume I, Section 2. During this period, the County experienced impacts of drought, extreme and significant heat, flooding, landslide, wildland fire and wildland fire smoke, and winter storm since adoption of the 2017 NHMP.

One Major Disaster Declaration was issued on September 7, 2020 for wildfire and straight-line winds. Two Federal Fire Management Assistance Declarations were issued on September 8, 2020, and September 10, 2020. One Emergency Declaration for Wildfire was issued on September 10, 2020.

A County disaster declaration for the COVID-19 pandemic was in effect from March 4, 2020, to April 2, 2020.[549] Although pandemic is not a hazard included in this NHMP, this declaration is noted because FEMA provided support and Hazard Mitigation Grant Program funding during the event.

3.5. Overall Vulnerability

Based on the analysis completed by the Technical Committee, winter storm, wildland fire, drought, extreme heat, and flooding present the highest relative and recurring risks to the unincorporated portion of Washington County. These hazards can create widespread events, and all populations, economies, structures, improved property, critical facilities and infrastructure, and natural environments in the County can be vulnerable to these hazards.

Areas of greatest vulnerability to these hazards within the County include:

- Populations with higher vulnerability, such as those with preexisting health conditions and/or disabilities, older adults, children, and pregnant women.
- Populations that are unhoused, do not have access to private transportation for evacuation purposes, and/or are without access to sufficient heating, cooling, and clean water.
- Populations with limited income and financial resources.
- Populations whose primary language is not English.
- Rural populations and those within the WUI are at greater vulnerability. Isolated concentrations of rural populations with limited access for fire suppression and evacuation purposes include Bald Peak, Buxton, Cherry Grove, Dixie Mountain, Dairy Creek, Fern Hill, Pumpkin Ridge, and Timber.
- Limited-access areas that are more vulnerable to wildland fire:
  - Areas that lack multiple access routes for sending fire suppression resources or alternative evacuation routes are at risk during wildfire events.
  - Areas with steep slopes and waterways that flood may be more prone to landslides after wildfire events.
  - Rural private roads not maintained by the County that provide residential access to multiple properties, especially those whose terrain or condition negatively impact access.
- There are 36 RL properties in unincorporated Washington County as of September 30, 2021.
- Industries can experience commerce losses from power interruptions, damaged buildings and assets, and road closures. Industries can also sustain direct losses to buildings, personnel, and other vital equipment.

[549] Washington County, Oregon. (2020, March 17). Emergency Declaration Extended. https://www.washingtoncountyor.gov/bcc/news/emergency-declaration-extended

- Economic impacts to the County, including loss of local revenue due to business and property tax losses, reduced future revenues, reduced recreation and tourism activity, increased costs resulting from response activities, and increased future costs resulting from recovery and reconstruction activities.
- County-owned critical facilities and infrastructure including 13 administrative buildings and facilities, 9 public safety buildings, 4 medical facilities, 3 natural recreational areas, 1 fairground, and the road and bridge system.
- Other critical infrastructure, including communication structures, emergency generators, and aboveground utility and power lines.
- The water supply sources used by the County can dry up, and ground and surface water quality can be impacted.
- Natural environments located throughout the County, and historical, mature landscaping and trees located throughout the County.

4. Capability Assessment

(In compliance with 44 CFR §201.6(c)(3))

The following capability assessment and safe growth audit examine the ability of the County to implement and manage a comprehensive approach to mitigation, also known as a mitigation strategy. Strengths, opportunities, and resources of the jurisdiction are identified to develop an effective hazard mitigation action plan. The capabilities in this assessment were collectively evaluated to determine areas for expansion and improvement that would allow the County to implement mitigation activities more effectively.

A capability questionnaire was distributed to the Washington County Technical Committee to support this assessment. The survey included questions regarding existing plans, policies, and regulations that contribute to or hinder the ability to implement hazard mitigation activities, including legal and regulatory capabilities, administrative and technical capabilities, education and outreach capabilities, and fiscal capabilities. The Technical Committee also completed a safe growth audit to identify potential gaps in growth guidance instruments and improvements that could be made to reduce vulnerability to future development.

4.1. Planning and Regulatory Assessment

Planning and regulatory capabilities include plans, policies, codes, and ordinances within the County that can prevent and reduce the impacts of hazards.

4.1.1. Types of Plans

Washington County has the following plans that address natural hazards:

- Comprehensive Framework Plan for the Urban Area: This plan includes Policy 8 (Natural Hazards), a policy to protect life and property from natural hazards that may be used to implement natural hazard mitigation actions.
- Rural/Natural Resource Plan: This plan includes Policy 8 (Natural Hazards), a policy to protect life and property from natural hazards that may be used to implement natural hazard mitigation actions.

- Emergency Operations Plan: This plan includes an adopted evacuation and shelter plan to deal with emergencies from natural hazards.
- Transportation System Plan: This plan could potentially identify projects to include in the mitigation strategy and may be used to implement mitigation actions.
  - The plan's Goal 4 (Natural Environment) addresses natural hazards in Strategy 4.2.7., which states that existing natural hazards, as well as potential future natural hazards, should be considered during the design and engineering of transportation improvements.
  - The plan's Goal 11 (Maintenance) addresses maintenance of county transportation facilities. Strategy 11.1.3 calls for the implementation of an asset management program to maintain an accurate inventory and condition rating of pavements (including sidewalks and bike lanes), bridges, culverts, gravel roads, roadside drainage facilities, and landscape areas. Additionally, the plan's Road Maintenance Priority Matrix states that the highest maintenance priority will be given to emergencies and/or hazards work related to abating or managing an immediate threat to public safety, private property, or environmental resources.

The County has a Capital Improvement Plan and a Continuity of Operations Plan that do not currently address natural hazards, do not identify projects to include in the mitigation strategy, and cannot be used to implement mitigation actions.

A Food System Plan is in place that contains the strategic initiative of ensuring local food systems are integrated into the County's emergency plans. The performance measures tied to this goal are to incorporate strategies to ensure local food accessibility in County emergency planning processes and review emergency plans for inclusion of local food accessibility issues. This plan could potentially identify projects to include in future mitigation efforts.

The County is planning to participate in updating the 2007 Community Wildfire Protection Plan (CWPP) with the Oregon Department of Forestry. Through development of the CWPP, additional mitigation actions for wildfire, the WUI hazard, and wildfire smoke hazards can be identified and potentially incorporated into this NHMP.

4.1.2. Land Use Planning and Ordinances

Multiple ordinances in the Community Development Code (CDC) are administered and enforced by Washington County staff and are effective measures for reducing hazard impacts. Land use policies discourage development or redevelopment within natural hazard areas and overlays.

- Zoning ordinances in Article III, Land Use Districts, and subdivision ordinances in Article VI, Land Divisions and Property Line Adjustments, reduce wildfire risk by implementing state land use policy to concentrate development within urban growth boundaries.
- The floodplain ordinance in Article IV, Development Standards, Section 421 (Flood Plain and Drainage Hazard Area Development) reduces flood risk by prohibiting development likely to be vulnerable to flooding or to cause increased flood risk to other development. FEMA Flood Insurance Rate Maps are referenced within this CDC section as a tool to determine lands subject to floodplain standards. Regulation of development within the FEMA floodplain maintains it as a protective ecosystem.
- CDC regulations restrict the division of land within or adjacent to natural hazard areas. The County's CDC also allows for clustering of development to conserve environmental resources through planned development and allows density transfer where hazard areas exist.
- A Parks and Natural Areas Master Plan will be developed during the next NHMP planning cycle to promote a balance of resource protection, environmental stewardship, and recreation opportunities.

4.1.3. Building Codes, Permitting, and Inspections

The Washington County Code of Ordinances applies to construction, alteration, moving, demolition, repair, maintenance, and other work associated with any building/structure, except those located in a street, alley, or parcel of land open to the outside air leading to a street or open to public use (public way).

In addition to local codes, the County utilizes and enforces the State of Oregon Building Code, including the following specialty codes:

- Structural Specialty Code: Modified in County code section 14.04.260
- Residential Specialty Code
- Plumbing Specialty Code
- Electrical Specialty Code
- Mechanical Specialty Code: Modified in County code section 14.04.270
- Manufactured Dwelling Code
- 2010 Oregon Solar Installation Specialty Code

Building Code Effectiveness Grading Schedule scores for the County are Class 3 for residential buildings and Class 2 for commercial buildings.

A site plan review is required for building permits and is adequately enforced by Building Services within the Department of Land Use and Transportation.

4.1.3.1. National Flood Insurance Program Compliance

Participation in the National Flood Insurance Program (NFIP) is based on a voluntary agreement between a community and FEMA. For communities that adopt a floodplain management ordinance to reduce flood risks to new construction, federally backed flood insurance is made available to property owners in the community. Compliance with the NFIP, however, extends beyond participation in the program. The three basic components of the NFIP include floodplain identification and mapping risk, responsible floodplain management, and flood insurance.

An RL property is a property insured under the NFIP for which the program has paid at least two claims of more than $1,000 in any 10-year period since 1978, regardless of any change(s) of ownership during that period. As of September 30, 2021, there were 36 FEMA-identified RL properties in unincorporated Washington County.

National Flood Insurance Program Details

Insurance Summary

There are currently 694 NFIP policies in the unincorporated portion of the County and $172,865,600 of coverage in effect. On average, $719,909 in premiums are paid annually by policy holders. There are no limited coverage areas, and policies are available in all locations.

Since 1978, there have been 258 claims paid for a total amount of $3,264,048, 19 of which have been substantial damage claims. There are 4,098 structures exposed to flood risk within the community.

Staff Resources

There are no barriers to running an effective NFIP program in the County. The Certified Floodplain Manager on staff assists with NFIP administration services. The County provides development permit review, building permit review, and building inspection services in the floodplain. Geographic information

system (GIS) data on floodplains is also maintained and County engineering staff has the capability to review floodplain development proposals.

Compliance History

The County is in good standing with the NFIP and there are no outstanding compliance issues. The most recent Community Assistance Visit or Community Assistance Contact was in January 2020.

The County will continue NFIP compliance during the next five years of NHMP implementation by enforcing program requirements, including permit review, building inspection services, upkeep and utilization of floodplain mapping, and undertaking any code amendments needed to maintain compliance.

Regulation

The County entered into the NFIP on January 24, 1975, and has digital flood insurance rate maps. Regulations exceed minimum FEMA and state requirements by identifying Drainage Hazard Areas beyond the FEMA-regulated floodplains. Additional regulations to mitigate flood impacts are implemented in the Drainage Hazard Areas. The Floodplain Manager reviews floodplain development permit applications with the assistance of engineering staff. Following development permit approval, the Building Services group reviews and approves building permit applications and inspects buildings.

Community Rating System

The County does not currently participate in the Community Rating System.

4.2. Administrative and Technical Assessment

This portion of the assessment includes staff, their skillsets, and tools that can be used for mitigation planning and the implementation of mitigation actions.

4.2.1. Administrative Capabilities

Administration capabilities at the County lead to effective mitigation coordination efforts, which support the execution of a strong approach to mitigation. Mitigation planning occurs across most departments in subject-specific divisions (e.g., land use planning, road operations, health and human services, facilities, parks, and emergency management).

The Washington County Planning Commission advises the Board of Commissioners on land use matters, including the adoption, revision, or repeal of portions of the Washington County Comprehensive Plan. For some plan amendments, the Planning Commission makes the final land use decisions for the County; however, Planning Commission decisions may be appealed to the Board.

The Operations and Maintenance Division of the Department of Land Use and Transportation maintains County roads including culverts, drainage ditches, and vegetation in the right of way. This division also replaces culverts, making sure to size them appropriately to manage flood events. The ongoing maintenance programs at County Parks reduce susceptibility and risk to wildfires and flooding.

Washington County is a member of the Cooperative Public Agencies of Washington County, a 24-member consortium focused on public works equipment sharing and combined training opportunities. Members may request to borrow needed equipment from each other as required, which multiplies and enhances the mitigation capabilities of each group participant.

4.2.2. Staff Capabilities

Washington County has sufficient staffing levels to enforce regulations, staff members are trained on hazards and mitigation actions, and staff coordination on mitigation initiatives is effective.

The Department of Land Use and Transportation includes:

- The County's chief Building Official.
- Planners and engineers with knowledge of land development and land management practices.
- Engineers and other professionals trained in construction practices related to buildings and infrastructure.
- Planners and engineers with an understanding of natural hazards.
- Staff with education or expertise in assessing vulnerability to hazards.
- Surveyors.
- Community planners.
- GIS technicians and coordinators.

Additional County staff who are knowledgeable about natural hazards and support mitigation efforts include those in Emergency Management, Facilities and Parks Services, and the Department of Health and Human Services. The Floodplain Manager is a part of the Department of Land Use and Transportation, Planning and Development Services Division.

4.2.3. Technical Capabilities

The County has many technical resources that have been used to assess or mitigate risk and could be used in future efforts.

Through Everbridge, the County and partner first response agencies can issue emergency alerts to the entire County or to specific, affected neighborhoods. Individuals who sign up will be alerted and receive critical information quickly in situations like severe weather, critical utility outages like boil water notices, missing persons, evacuations, and other public safety situations.

Washington County has extensive GIS capabilities, including multiple staff specializing in GIS analysis and mapmaking, and staff trained in Hazus analysis. Staff maintain GIS data on FEMA floodplains and other flood hazard areas.

Previous grant writing completed by Emergency Management has secured funding for this NHMP update and the seismic retrofit of the Public Services Building and Law Enforcement Center.

4.3. Education and Outreach Assessment

The Technical Committee assessed education and outreach capabilities that could be used to implement mitigation activities and communicate hazard-related information.

Washington County departments that regularly engage in public education and outreach activities include:

- Emergency Management
- Public Health Emergency Preparedness
- Environmental Health
- Department of Aging and Veterans Services
- Parks Services / Park Rangers

- Housing Services
- Land Use and Transportation

Additionally, there are many organizations in the County that focus on mitigation and resilience. These groups could assist in implementing future mitigation activities depending on the identification of potential activities, the ability to build relationships, and finding willing communities to partner with.

- Viva Village is a nonprofit that provides programs and services to assist older community members to connect with one another and live fulfilled lives while remaining in their homes and neighborhoods. The community they serve may have unique vulnerabilities to natural hazards.
- El Centro Cultural provides multigenerational and culturally specific services to improve the health and economic mobility of underserved communities in seven core program areas: K-12 Science, Technology, Engineering, Arts, and Mathematics (STEAM) education, workforce development, small business technical assistance, public engagement, civic advocacy, community health and wellness, transitional housing, and community-wide arts and cultural events. The community they serve may have unique vulnerabilities to natural hazards.
- The Korean American Coalition – Oregon works to foster a strong Korean American community in Oregon by promoting participation in civic, legislative, and community affairs through advocacy, community service, leadership development, and cultural education. The community they serve may have unique vulnerabilities to natural hazards.
- The Immigrant and Refugee Community Organization supports immigrants, refugees, and mainstream community members to become self-sufficient and fosters understanding, compassion, and communication between Oregon's established communities and newest arrivals. The community they serve may have unique vulnerabilities to natural hazards.
- The Muslim Educational Trust works to enrich the public's understanding of Islam and dispel common myths and stereotypes, while serving the Muslim community's educational, social, and spiritual needs. The community they serve may have unique vulnerabilities to natural hazards.
- The Tualatin River Watershed Council works to protect the Tualatin River and its tributaries. Protecting these ecosystems may mitigate flooding by providing natural floodplain storage and may mitigate extreme heat events through shade and cooling provided by tree cover.
- The Wetlands Conservancy works to protect wetlands. Protecting these ecosystems may mitigate flooding by providing natural floodplain storage and may mitigate extreme heat events through shade and cooling provided by tree cover.
- The Tualatin Riverkeepers protects and restores the Tualatin River watershed and builds watershed stewardship through engagement, advocacy, restoration, access, and education. Protecting these ecosystems may mitigate flooding by providing natural floodplain storage and may mitigate extreme heat events through shade and cooling provided by tree cover.
- Treekeepers of Washington County engages with local communities and advocates for the protection of mature trees. Protecting trees may mitigate extreme heat events through shade and cooling provided by tree cover.

Fire departments that serve the County participate in public education initiatives, including TVF&R. TVF&R publishes their *safetymatters* newsletter, which provides public education about reducing fire risks. The County could use this newsletter and a partnership with TVF&R to implement future public outreach mitigation actions if appropriate activities could be identified and the two organizations were willing and able to collaborate.

Jurisdictions and special districts within the County have natural disaster and safety-related school programs, including the two earthquake drills all Beaverton School District students and staff participate in each year. The County could use school-based programs to execute future mitigation activities,

depending on the identification of potential activities, the ability to build relationships, and finding willing communities to partner with.

Two homeowner associations in the unincorporated portion of the County have Firewise Community Certifications. This certification program could be used to assist in implementing future mitigation activities depending on the identification of potential activities, the ability to build relationships, and finding willing communities to partner with.

The Tualatin Watershed Enhancement Collaborative is a group of local governments working in partnership to mitigate flooding and erosion and enhance the health of the Cedar Mill/North Johnson Creek Basin. This public/private partnership initiative could not assist in implementing future mitigation actions, as implementation is the responsibility of member organizations; however, this group could be used as a mitigation collaboration and education opportunity for members.

4.4. Financial Assessment

The County has access to or is eligible for the following funding resources for hazard mitigation initiatives:

- **Capital improvements project funding.** Stormwater management measures, which reduce flooding impacts, are a required component of capital projects.
- **Authority to levy taxes for specific purposes.** Taxes have been used in the past to fund road maintenance and street lighting projects. Taxes could be levied for mitigation actions in the future, subject to legal requirements, including voter approval.
- **Incurrence of debt through general obligation bonds and/or special tax bonds.** Past transportation capital projects have been funded by the incurrence of debt. This funding source could be used for future mitigation projects, subject to legal requirements and County processes such as approval by the County Finance Officer and Board of Commissioners.
- **Federal funding sources,** including the Community Development Block Grant, Homeland Security Grant Program, Hazard Mitigation Assistance Grants, and transportation grants.
- **State funding programs,** although the availability of state monies for mitigation actions are limited.
- **Public or private partnership funding sources.** The County has previously partnered with Clean Water Services, the City of Hillsboro, and Tualatin Valley Water District to more efficiently construct infrastructure associated with road construction. Partnerships could be used as a funding resource for future mitigation actions depending on the mitigation project and the ability to identify partners with mutual interests.

4.5. Capability Expansion and Improvement

Actions that can expand and improve existing authorities, plans, policies, and resources for mitigation include:

- Continuing to update County plans as necessary to ensure they are current and reflect the needs of the community.
- Further development of warning systems and messaging.
- Increasing dedicated grant writing staff.

- Creating and implementing additional public education and outreach offerings and increasing the volume of translated materials.
- Ensuring grant opportunities are capitalized upon to meet goals.

5. Mitigation Strategy

(In compliance with 44 CFR §201.6(c)(3)(i), §201.6(c)(3)(ii), §201.6(c)(3)(iii), §201.6(c)(3)(iv), and §201.6(c)(4)(ii))

The mitigation strategy serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) and the above identified sections of 44 CFR require that local mitigation plans describe hazard mitigation actions a community will undertake to lessen the danger from hazards of concern and establish a strategy for implementing those actions. As such, all other requirements for a local hazard mitigation plan lead to and support the mitigation strategy.

5.1. Mitigation Goals

The Steering Committee reviewed and evaluated goals from the 2017 Washington County NHMP, 2020 City of Beaverton NHMP, 2011 Cities of Cornelius and Forest Grove NHMPs, and 2020 Oregon NHMP. The goals from each plan were grouped by topic and then synthesized to create the seven goals detailed in Volume I, Section 3. These goals are the basis of this NHMP and summarize what the Steering Committee will accomplish by implementing the plan.

5.2. Plan Incorporation and Integration into Existing Planning Mechanisms

Based on mitigation plan requirement 44 CFR §201.6(c)(4)(ii), the vulnerability and capabilities assessment for the County was carefully reviewed and considered when developing the mitigation actions for this plan. The County's Technical Committee has established a process by which the mitigation strategy, goals, objectives, and actions outlined in this plan will be incorporated into existing local planning strategies.

The committee will coordinate implementation with the responsible parties in the County and with external stakeholders as needed. The primary means for integrating mitigation strategies is through the revision, update, and implementation of current plans and regulations, such as comprehensive plans, capital improvement plans, and land development regulations, as feasible.

The members of the Washington County Technical Committee are charged with ensuring the goals and strategies of new and updated local planning documents for their jurisdictions and special districts are consistent with the goals and actions in the NHMP and will not contribute to increased hazard vulnerability.

5.2.1. Comprehensive Plan

Portions of Washington County's Comprehensive Plan include policies and regulations for development in hazard areas such as floodplains and steep slopes. In 2022, DOGAMI published new information about a variety of Washington County hazards. The information in this multi-hazard report may inform future updates to the County's Comprehensive Plan, including regulations in the Community Development Code.

The County will update regional landslide risk maps using lidar data and collaboration with DOGAMI. This updated information will support the County's work on landslide risk reduction efforts and help determine areas and buildings at risk if landslides were to occur. This information will be used to propose revisions to the County's Comprehensive Plan land use policies as necessary, and additional details about hazard mitigation will be added when applicable.

5.2.2. Public Engagement, Education, and Outreach

Washington County Emergency Management will continue to develop, enhance, and implement equitable education programs aimed at the mitigation of natural hazard impacts and reducing the risk to people and community members, private property owners, public agencies, businesses, and schools. Staff will also identify critical facilities and industries that may be affected by the natural hazards identified in this NHMP and collaborate with these facilities and industries on preparation and mitigation projects and recovery plans.

5.2.3. Day-to-Day Government Functions

County staff will assess and mitigate vulnerabilities on County roads leading into critical infrastructure, such as the Washington County Consolidated Communication Agency (WCCCA) 911 emergency communications tower site on Smoke Ranch Road, and others. Among other considerations, assessment may include limited accessibility for evacuation, integrity of access and susceptibility to landslides, and prerequisite actions to implement improvements.

The County will develop and/or participate in programs that provide advance warning to the public of imminent natural hazard events that could impact Washington County residents, such as National Weather Service's StormReady® program and the United States Geological Survey's ShakeAlert® program.

Emergency Management will develop a partnership strategy to foster natural hazard program coordination and collaboration with public and private utility providers and infrastructure owners in Washington County.

Personnel will continue to implement structural and non-structural retrofit projects of critical and essential facilities. Priority buildings include the Walnut Street Center.

Staff will evaluate County-owned parks and other County-owned properties for landscape and vegetation treatments to effectively address extreme heat islands to provide relief to persons where possible, to consider impacts of drought on landscape plans, and address other hazards as applicable. (e.g., dead/dying mature trees at County parks.)

Over the next five years, retrofit projects will be implemented on bridges identified as high priority on Washington County's bridge assessment list.

5.2.4. Floodplain Management Program and/or National Flood Insurance Program

The County will develop acquisition and management strategies to preserve open space in the floodplain, document property relocation, identify organizations in the County that manage floodplain open space (including inundation zones for dam failure), and consider combining resources into countywide projects.

Staff will partner with DOGAMI and FEMA Risk MAP to enhance data and mapping for floodplain information within the County and identify and map flood-prone areas (including inundation zones for dam failure) outside of designated floodplains.

County personnel will identify and map existing and planned critical public infrastructure and facilities located in special flood hazard areas (including inundation zones for dam failure) and highlight those facilities as a focus for mitigation and preparedness measures.

The County will ensure locations of repetitive and severe repetitive flood loss properties have been accurately registered with FEMA and work with affected property owners to remove, relocate, elevate, or otherwise mitigate non-conforming structures in flood hazard areas (including inundation zones for dam failure).

5.2.5. Emergency Plans That Address Evacuation and Sheltering

County staff will collaborate to support outreach to the public, especially to vulnerable populations, with information and resources to mitigate effects of extreme heat and cold events. Additionally, staff will provide shelter/center location support, coordinate and support efforts to deploy heating, cooling, and air filtration equipment, and increase access and transportation to these sites.

5.2.6. Other Incorporation and Integration Opportunities

County personnel will identify buildings and structures with a high-life hazard that do not meet current seismic life safety standards and would benefit from seismic retrofit projects or identification. Emphasis will be on identifying County-owned and non-County unreinforced masonry buildings, identified shelters, and other pre-seismic code assembly structures.

Staff will map, develop a GIS database, and provide signage for on-site water sources accessible by fire department apparatus and/or aircraft such as hydrants, underground storage tanks, and drafting or dipping sites on all ownerships across the County.

6. Action Items

Washington County's action items in the 2017 Washington County NHMP were determined by the 2017 planning team. The action items from the previous plan and the status of each action are provided in Section 6.1 below. The current status of these actions reflects the progress the County has made in its identified mitigation efforts and fulfills requirement 44 CFR §201.6(d)(3).

Action items for the 2023 NHMP were determined by the County's Technical Committee based on the review of its risk assessment, its existing capabilities, and the status of its previous action items. This comprehensive range of actions includes local plans and regulations, structure and infrastructure projects, natural systems protections, and education and awareness programs. A summary of these actions and full action item planning worksheets are provided in Sections 6.2 and 6.3 below. Additional information about how these actions were developed, evaluated, and prioritized is in Volume I, Section 3.

6.1. Status of Washington County Action Items from the 2017 Washington County NHMP

Table 321: Status of Action Items from the 2017 NHMP

Action Item Number*	Action Item Description	Hazard(s) Addressed	Implementation Update	Current Status
Priority #1	Participate in the Federal Emergency Management Agency (FEMA) Risk Mapping, Assessment, and Planning (Risk MAP) discovery, multi-hazard risk assessment, and resilience meeting processes.	Multi-Hazard	The Oregon Department of Geology and Mineral Industries (DOGAMI) completed the Risk MAP and is making it available for the 2023 NHMP.	Completed

Action Item Number*	Action Item Description	Hazard(s) Addressed	Implementation Update	Current Status
Priority #2	Utilize the final multi-hazard risk report and assessment currently being developed by DOGAMI to update the Washington County hazard analysis.	Multi-Hazard	Incorporated the DOGAMI Tualatin River First Order Approximation Study and lidar-corrected floodplain data into the County's base flood elevation determinations and development of permit review for Approximate Zone A flood hazard areas.	Completed
Priority #3	Utilize the final multi-hazard risk report and assessment currently being developed by DOGAMI to inform an update to the Washington County Comprehensive Plan.	Multi-Hazard	The DOGAMI multi-hazard report will potentially inform updates to the Washington County Comprehensive Plan. A mitigation action item owner will be identified in the 2023 NHMP process.	In progress
Priority #4	Update County risk assessment maps for relevant hazards using available lidar topographic data in collaboration with DOGAMI.	Multi-Hazard		Completed
Priority #5	Over the next five years, implement retrofit projects on at least two bridges identified as high priority on Washington County's bridge assessment list.	Earthquake	The Land Use and Transportation Operations and Maintenance Division continuously maintains and upgrades bridges as identified and is engaged on a project to perform an assessment of remaining inventory to prioritize mitigation and replacement.	Completed
Priority #6	Expand and complete a seismic safety inventory of public buildings (particularly critical and essential facilities) that may be vulnerable to natural hazards (particularly earthquake).	Earthquake	This action item will be continued in the 2023 NHMP.	Retain
Priority #7	Continue to implement structural and non-structural retrofit projects of critical and essential County facilities. Priority buildings include the Law Enforcement Center and the Walnut Street Center.	Earthquake	Retrofit of Public Service Building and Law Enforcement Center completed. Washington County Facilities is planning to complete earthquake mitigation work in the future. This action item will move forward into the 2023 NHMP.	Retain

Action Item Number*	Action Item Description	Hazard(s) Addressed	Implementation Update	Current Status
Priority #8	Ensure that the locations of repetitive and severe repetitive flood loss properties have been accurately registered with FEMA, and work with affected property owners to remove, relocate, elevate, or otherwise mitigate non-conforming structures in flood hazard areas.	Flood	This action item will be continued in the 2023 NHMP.	Retain
Priority #8	Update the Washington County Community Wildfire Protection Plan (CWPP). Implement actions identified in the CWPP.	Wildfire	The wildland fire hazard risk and mitigation actions will be continued in the 2023 NHMP.	Retain
Action Item Pool #1	Develop public and private partnerships to foster natural hazard program coordination and collaboration in Washington County.	Multi-Hazard	Will reassess and rescope in 2023 review.	Retain
Action Item Pool #2	Develop, enhance, and implement education programs aimed at mitigating natural hazards and reducing the risk to citizens and private property owners, public agencies, businesses, and schools.	Multi-Hazard	No owner identified; goals and objectives unclear. Will reassess and rescope in 2023 review.	Retain
Action Item Pool #3	Enhance and maintain a geographic information system (GIS) inventory of all critical facilities, large employers, public assembly areas, lifelines, and mitigation successes.	Multi-Hazard	No owner was identified to compile the data. Will reassess and rescope in 2023 review.	Retain
Action Item Pool #4	Develop a drought impact assessment for Washington County.	Drought	The County faces drought conditions in 2023 that need to be researched and addressed. This mitigation will be reevaluated during the 2023 NHMP review and update process.	Retain

Action Item Number*	Action Item Description	Hazard(s) Addressed	Implementation Update	Current Status
Action Item Pool #5	Continue groundwater recharge (aquifer storage recovery) feasibility assessments, including preliminary cost-benefit analysis where applicable.	Drought	The County faces drought conditions that need to be researched and addressed. This mitigation will be reevaluated during the 2023 NHMP review and update process.	Retain
Action Item Pool #6	Complete storage, discharge, and recharge-curve analyses for the Hagg Lake Reservoir specific to El Niño-Southern Oscillation, climate change, or other seasonal variations.	Drought	Relevancy to be determined. This mitigation will be reevaluated during the 2023 NHMP review and update process.	Retain
Action Item Pool #7	Identify critical public infrastructure and facilities located in special flood hazard areas and highlight those facilities as a focus for mitigation and preparedness measures.	Flood	Determined that this will be addressed in the 2023 update project as a deliverable in the NHMP.	Retain
Action Item Pool #8	Develop acquisition and management strategies to preserve open space in the floodplain. Document property relocation. Identify organizations in the County that manage floodplain open space. Could consider combining resources into countywide projects.	Flood	Project in constant process. No specific projects or accomplishments to report for this period. There are ongoing efforts with various County projects aiding in the preservation and management of the floodplain.	Completed and continuous
Action Item Pool #9	Develop strategies and partnerships, including Clean Water Services flood restoration plans, to enhance the use of open space within the floodplain for flood mitigation, fish habitat, and water quality issues.	Flood	Relevancy to be determined. This mitigation will be reevaluated during the 2023 NHMP review and update process.	Retain
Action Item Pool #10	Partner with DOGAMI and FEMA Risk MAP to enhance data and mapping for floodplain information within the County and identify and map flood-prone areas outside of designated floodplains.	Flood	This mitigation will be reevaluated during the 2023 NHMP review and update process.	Retain

Action Item Number*	Action Item Description	Hazard(s) Addressed	Implementation Update	Current Status
Action Item Pool #11	Flood inundation mapping tied to current stream gauge data.	Flood	This mitigation will be reevaluated during the 2023 NHMP review and update process.	Retain
Action Item Pool #12	Coordinate with the National Weather Service to add additional forecast points to the Advanced Hydrologic Prediction Service system in the Tualatin River near Tualatin and model the Gales Creek Basin.	Flood	This mitigation action will be reevaluated during the 2023 NHMP review and update process.	Retain
Action Item Pool #13	Coordinate with the Oregon Department of Land Conservation and Development and DOGAMI to model the 25-year flood hazard area.	Flood	The County can provide flow data for the 25-year model on a project-by-project basis.	Completed
Action Item Pool #14	Update regional landslide risk maps, using available lidar data, and collaborate with DOGAMI to work on landslide risk reduction efforts; determine areas and buildings at risk to landslides and propose Comprehensive Plan land use policies accordingly.	Landslide	Delivery of Risk MAP was delayed due to technical problems at DOGAMI. Projected to be available for the 2023 NHMP project. It will be carried into the 2023 NHMP review to make appropriate updates and completion.	Retain
Action Item Pool #15	Stabilize Scoggins Valley Road, which exists on an active slide.	Landslide	Final engineering was performed during this period and the project will be ready to bid soon. Repairs were delayed until funds were available. Project is still relevant and is moving forward.	In progress
Action Item Pool #16	Assess road access vulnerability to the Washington County Consolidated Communication Agency 911 repeater site.	Landslide	New mitigation action was developed for 2023 NHMP.	In progress
Action Item Pool #17	Enhance hazard-resistant construction methods where possible to reduce damage to utilities, community water systems, and critical facilities.	Severe Weather**	No owner was identified.	No longer relevant

Action Item Number*	Action Item Description	Hazard(s) Addressed	Implementation Update	Current Status
Action Item Pool #18	Identify critical facilities and industries that may be affected by ashfalls and collaborate with them on ashfall emergency response.	Volcanic Eruption**	This mitigation will be reevaluated during the 2023 NHMP review and update process.	Retain

*Number given to action item in 2017 Washington County NHMP
**Not a hazard in the 2023 Washington County NHMP

6.2. Washington County Action Items: 2023 Washington County NHMP

Table 322: Washington County Action Items

Action Item Number	Action Item Description	Hazard(s) Addressed	Priority
1	Participate in programs that provide advance warning to the public of imminent natural hazard events that will impact the people of Washington County, such as the National Weather Service StormReady and U.S. Geological Survey ShakeAlert.	Dam failure, earthquake, extreme heat, flooding, volcanic ash, windstorm, including tornado, and winter storm	High
2	Develop acquisition and management strategies to preserve open space in the floodplain; document property relocation; identify organizations in the County that manage floodplain open space (including inundation zones for dam failure); and consider combining resources into countywide projects.	Dam failure and flooding	High
3	Partner with Oregon Department of Geology and Mineral Industries (DOGAMI) and the Federal Emergency Management Agency (FEMA) Risk Mapping, Assessment, and Planning (Risk MAP) to enhance data and mapping of the floodplain within the County and identify and map flood-prone areas (including inundation zones for dam failure) outside of designated floodplains.	Dam failure and flooding	High

Action Item Number	Action Item Description	Hazard(s) Addressed	Priority
4	Identify and map existing and planned critical public infrastructure and facilities located in special flood hazard areas (including inundation zone for dam failure) and focus mitigation and preparedness measures on those facilities. This includes public power, gas, roads and transportation, water, and communications infrastructure and facilities.	Dam failure and flooding	Medium
5	Fund a study to assess, with regular review and update, vulnerabilities in the solid waste system to various natural hazards.	Dam failure, earthquake, flooding, volcanic ash, wildland fire, windstorm, including tornado, and winter storm	Medium
6	Ensure locations of repetitive and severe repetitive flood loss properties have been accurately registered with FEMA, and work with affected property owners to remove, relocate, elevate, or otherwise mitigate non-conforming structures in flood hazard areas (including inundation zones from dam failure).	Dam failure and flooding	Medium
7	Evaluate County-owned parks and other County-owned properties for landscape and vegetation treatments that will effectively address extreme heat islands and provide relief to users where possible; consider impacts of drought on landscape plans and address other hazards as applicable (e.g., dead/dying mature trees at County parks).	Drought, extreme heat, and windstorm, including tornado	High
8	Continue to implement structural and non-structural retrofit projects of critical and essential County facilities. The Walnut Street Center is a priority building; additional buildings will be identified.	Earthquake	High
9	Complete a survey of County-owned bridges to determine which are seismically vulnerable and would benefit from retrofit projects; implement retrofit projects on bridges identified as high-priority as funds and time allow.	Earthquake	High

Action Item Number	Action Item Description	Hazard(s) Addressed	Priority
10	Develop an inventory and map of publicly owned buildings (schools, local government, emergency services, etc.), shelter buildings, and commercial buildings that may be particularly vulnerable to earthquake damage, including pre-1940s buildings, building with cripple wall foundations, and unreinforced masonry construction. Share with owners and assist with identifying potential projects and funding sources.	Earthquake	High
11	Assess and mitigate vulnerabilities of County roads leading to critical infrastructure, such as the Washington County Consolidated Communication Agency 911 emergency communications tower site on Buxton Lookout Road. Among other considerations, assessment can include accessibility for evacuation, integrity of access, landslide susceptibility, and prerequisite actions to implement improvements.	Earthquake, flooding, wildland fire, windstorm, including tornado, and winter storm	Medium
12	Coordinate outreach to the public, especially to vulnerable populations, with information and resources to mitigate effects of extreme heat, extreme cold, and hazardous air quality events. Coordinate support to cooling and severe winter weather shelters and centers and clean air spaces and coordinate access and transportation to these sites. Coordinate and support efforts to deploy heating, cooling, and air filtration equipment.	Extreme heat and winter storm	Medium
13	Utilize the 2022 multi-hazard risk report and assessment developed by DOGAMI to potentially inform updates to Washington County's Comprehensive Plan.	Earthquake, flooding, landslide, and wildland fire	High
14	Update regional landslide risk maps, using available lidar data, and collaborate with the DOGAMI to work on landslide risk reduction efforts; determine areas and buildings at risk to landslides; and propose revisions to the County's Comprehensive Plan and land use policies as necessary to reduce risks.	Landslide	High

Action Item Number	Action Item Description	Hazard(s) Addressed	Priority
15	Identify critical facilities and industries that may be affected by ashfall and collaborate with them on ashfall damage mitigation projects, recovery plans, and preparation projects. Include ashfall in list of hazards in public awareness and outreach materials.	Volcanic ash	Medium
16	Utilize the Broadband User Group Support for Emergency Planning, Response, and Recovery (BUG SEPRR) project to develop a GIS database of water sources in rural and wildland urban interface areas that are available for fire suppression and accessible by fire agency apparatus or aircraft, such as storage tanks and drafting or dipping sites. Sites may be publicly or privately owned. Provide data to fire service GIS providers.	Wildland fire	Low
17	Support the effort by the Oregon Department of Forestry to update the 2007 Washington County Community Wildfire Protection Plan with information and tasks within the County's authority.	Wildland fire	Low
18	Develop a partnership strategy for Washington County Emergency Management to foster natural hazard program coordination and collaboration with infrastructure owners, including public and private utility providers in Washington County.	All hazards	High
19	Develop, enhance, and implement equitable programs aimed at educating the public about mitigation of natural hazard impacts and reducing the risk to community members, private property owners, public agencies, businesses, and schools.	All hazards	High
20	Develop partnership strategy for Washington County Emergency Management to foster natural hazard program coordination and collaboration with public and private utility providers and infrastructure owners in Washington County.	All hazards	High

Action Item Number	Action Item Description	Hazard(s) Addressed	Priority
21	Provide support to develop a countywide project to coordinate GIS resources, giving the ability to all local participants to upload current and changing information regarding structures, critical facilities, water sites for fire use, vulnerable populations exposed to the elements, and support future reviews of this plan and mitigation actions.	All hazards	Medium

6.3. 2023 Mitigation Action Information Worksheets

Table 323: Advance Warning System Programs

Mitigation Action Information			
Title of action	Advance Warning System Programs (New 2023)		
Type of action	Plans/regulations ☒		Natural systems protection ☐
	Structure and infrastructure project ☐		Public education/awareness ☒
Action description	Participate in programs that provide advance warning to the public of imminent natural hazard events that will impact the people of Washington County, such as the National Weather Service's StormReady Program, USGS' ShakeAlert, and others.		
Hazard(s) addressed	Dam failure ☒	Flood ☒	Windstorm, incl. tornado ☒
	Drought ☐	Landslide ☐	Winter storm ☒
	Earthquake ☒	Volcanic ash ☒	
	Extreme heat ☒	Wildland fire ☐	
How does the action address identified current or future risks and vulnerabilities?	By participating in advance warning programs this action will help in identifying additional mitigation opportunities prior to the event occurring as well as providing early warning for responses.		
Area of action impact	Washington County at-large		
Is the action related to a critical facility or facilities?	Yes ☐ No ☒ If yes, what facility(ies)?		
Mitigation Action Integration			
Alignment with NHMP goals	Goal 1 ☒	Goal 4 ☐	Goal 7 ☐
	Goal 2 ☒	Goal 5 ☒	
	Goal 3 ☒	Goal 6 ☒	
Integration into other initiatives	NWS early warning programs USGS early warning programs		
Alignment with existing plans and policies	WC EOC EOPs for earthquake, extreme heat/cooling shelter, and flood response		
Mitigation Action Implementation Plan			
Priority	Low ☐	Medium ☐	High ☒
Lead position, office, department, or division responsible for implementation	Emergency Management		

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
WC Department of Land Use and Transportation, WC Department of Health & Human Services	Regional Disaster Preparedness Organization, FEMA, WC Emergency Management Cooperative
Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
General budget	Not Applicable
Estimated Cost	$5,000

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s) (Est. Cost x 6)**
Incorporates program elements into preparedness and response plans.	Supports public warning and alerting programs countywide.	$30,000

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term ☐ Mid-term ☒ Long-term ☐ Ongoing ☐	June 2023	December 2028

Implementation Benchmarks: How Will Success Be Measured?

- Continually monitor sources for advance warning programs and identify those with potential for implementation
- Maintain list of programs identified and indicate whether applicable or not
- Identify requirements of desired program (costs to participate, cost to implement, renewal requirements, ongoing engagement, etc.)
- Obtain County leadership buy-in and authorization
- Initiate application process to participate in desired program
- Implement desired program and incorporate into normal operations, plans and procedures
- Integrate into Everbridge EAS

Potential Challenges to Implementation

- Is the desired program applicable and beneficial?
- Is participation sustainable (interest, staffing, financially)?
- Integration into Everbridge EAS

Resources and References, if Applicable

- To be determined

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Identify and enroll in programs as applicable	$5,000	Participate in wide range of programs, incorporate into plans and procedures
Alternative #2	Identify and enroll in up to three programs	$5,000	Participate in specific programs, incorporate into plans and procedures
Alternative #3	Do not enroll in any programs	$0	Participate in no programs

Implementation Progress Report for Plan Maintenance	
Date	
What progress in implementation has been made to date?	
What challenges in implementation have been experienced?	
What are the next steps in implementation?	

Table 324: Floodplain Management Strategy

Mitigation Action Information			
Title of action	Floodplain Management Strategy (2017 Pool 8)		
Type of action	Plans/regulations ☒ Structure and infrastructure project ☐	Natural systems protection ☒ Public education/awareness ☐	
Action description	Develop acquisition and management strategies to preserve open space in the floodplain; document property relocation; identify organizations in the County that manage floodplain open space (including inundation zones for dam failure); consider combining resources into countywide projects.		
Hazard(s) addressed	Dam failure ☒ Drought ☐ Earthquake ☐ Extreme heat ☐	Flood ☒ Landslide ☐ Volcanic ash ☐ Wildland fire ☐	Windstorm, incl. tornado ☐ Winter storm ☐
How does the action address identified current or future risks and vulnerabilities?	Continues to develop a countywide strategy for reducing loss due to flooding from the Tualatin River and tributaries that traverses through many partner jurisdictions to coordinate mitigation efforts.		
Area of action impact	Flood inundation zones for the Tualatin River, Dairy Creek, Scoggins Creek, Beaverton Creek, Fanno Creek, and other lesser tributaries.		
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? To be determined along the waterways and inundation zones.		
Mitigation Action Integration			
Alignment with NHMP goals	Goal 1 ☒ Goal 2 ☒ Goal 3 ☒	Goal 4 ☒ Goal 5 ☐ Goal 6 ☐	Goal 7 ☐
Integration into other initiatives	FIRM		
Alignment with existing plans and policies	Washington County Urban Comprehensive Plan Framework Washington County Rural Comprehensive Plan Framework		
Mitigation Action Implementation Plan			
Priority	Low ☐	Medium ☐	High ☒
Lead position, office, department, or division responsible for implementation	LUT, PDS, Floodplain Manager		

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
Washington County Board of Commissioners LUT Director's Office LUT Planning and Development Services Division	Metro, Clean Water Services, Tualatin Hills Parks and Recreation District, Tualatin Soil and Water Conservation District, cities, others as identified
Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
Washington County General Fund Other jurisdiction general funds	FMA Grants
Estimated Cost	$50,000

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s) (Est. Cost x 6)**
Builds a coordinated plan and program for mitigating impacts of flooding along known RL/SRL areas		$300,000

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term ☐ Mid-term ☐ Long-term ☒ Ongoing ☐	January 2023	December 2028

Implementation Benchmarks: How Will Success Be Measured?

- Commitment in staff time and money to support development of the strategy.
- Identifying all stakeholders in the affected areas
- Drafting strategic plan

Potential Challenges to Implementation

- Available staff time and funding
- Identification and participation from stakeholders

Resources and References, if Applicable

- FEMA Mitigation Ideas Publication: F-2 Form Partnerships to Support Floodplain Management

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Fully fund staff to develop strategic plan	$20,000	A comprehensive plan is developed and adopted
Alternative #2	Hire contractor to manage project	$50,000	A comprehensive plan is developed and adopted
Alternative #3	Partially fund staff and add to workplan	$10,000	Incremental progress is made over 5 years
Implementation Progress Report for Plan Maintenance			
Date			
What progress in implementation has been made to date?			
What challenges in implementation have been experienced?			
What are the next steps in implementation?			

Table 325: Floodplain Map Update

Mitigation Action Information	
Title of action	Floodplain Map Update (2017 Pool 10)
Type of action	Plans/regulations ☒ Natural systems protection ☐ Structure and infrastructure project ☐ Public education/awareness ☐
Action description	Partner with DOGAMI and FEMA Risk MAP to enhance data and mapping of the floodplain within the County and identify and map flood-prone areas (including inundation zones for dam failure) outside of designated floodplains.
Hazard(s) addressed	Dam failure ☒ Flood ☒ Windstorm, incl. tornado ☐ Drought ☐ Landslide ☐ Winter storm ☐ Earthquake ☐ Volcanic ash ☐ Extreme heat ☐ Wildland fire ☐
How does the action address identified current or future risks and vulnerabilities?	Provides the most current information regarding known and unknown flood inundation zones, incorporates updated channel migration changes and projections. Will help to identify at-risk structures and infrastructure to evaluate mitigation actions such as buy-outs, raises, and relocations.
Area of action impact	At-risk inundation zones along rivers and creeks.
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? To be identified with the project.
Mitigation Action Integration	
Alignment with NHMP goals	Goal 1 ☐ Goal 4 ☒ Goal 7 ☐ Goal 2 ☒ Goal 5 ☐ Goal 3 ☐ Goal 6 ☒
Integration into other initiatives	FIRM
Alignment with existing plans and policies	WC Emergency Management Cooperative Support of Emergency Planning, Response and Recovery Project
Mitigation Action Implementation Plan	
Priority	Low ☐ Medium ☐ High ☒
Lead position, office, department, or division responsible for implementation	LUT, PDS, Floodplain Manager

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
LUT GIS Staff	WC Emergency Management Cooperative, Oregon Department of Agriculture, Mining and Industries
Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
General Fund	FMA and BRIC Grants
Estimated Cost	$10,000

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s) (Est. Cost x 6)**
Updates County data with the most current survey information to help with planning and other actions.	Influences building permit rule development and changes if new information is learned.	$60,000

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term ☐ Mid-term ☒ Long-term ☐ Ongoing ☐	January 2024	December 2024

Implementation Benchmarks: How Will Success Be Measured?

- New data is gathered, evaluated, and changes to any applicable County maps are made.
- Existing rules and regulations evaluated against new information and applicable updates adopted.
- New mitigation options are evaluated and proposed, accepted actions are initiated.

Potential Challenges to Implementation

Resources and References, if Applicable

- FEMA Mitigation Ideas Publication: F-5 Improve Stormwater Management Planning, F-7 Improve Flood Risk Assessment, F-22 Increase Awareness of Flood Risk and Safety
- DOGAMI 2022 Surveys

Three Alternatives Considered, Including No Action

	Action Description	Estimated Cost	Evaluation
Alternative #1	Update floodplain map with most current data	$10,000	Map updated; existing programs evaluated for changes
Alternative #2	No action	$1,000	N/A
Alternative #3			

Implementation Progress Report for Plan Maintenance	
Date	
What progress in implementation has been made to date?	
What challenges in implementation have been experienced?	
What are the next steps in implementation?	

Table 326: Public Infrastructure Flood Risk Assessment

Mitigation Action Information			
Title of action	Public Infrastructure Flood Risk Assessment (2017 Pool 7)		
Type of action	Plans/regulations ☒	Natural systems protection ☐	
	Structure and infrastructure project ☒	Public education/awareness ☐	
Action description	Identify and map existing and planned critical public infrastructure and facilities* located in special flood hazard areas (including inundation zone for dam failure) and focus mitigation and preparedness measures on those facilities. *Power, gas, roads and transportation, water, communications		
Hazard(s) addressed	Dam failure ☒	Flood ☒	Windstorm, incl. tornado ☐
	Drought ☐	Landslide ☐	Winter storm ☐
	Earthquake ☐	Volcanic ash ☐	
	Extreme heat ☐	Wildland fire ☐	
How does the action address identified current or future risks and vulnerabilities?	Identifies at-risk infrastructure and begins the process of developing additional mitigation actions such as relocating, hardening, and raising.		
Area of action impact	Critical infrastructures at risk of flooding.		
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? To be determined with the project.		
Mitigation Action Integration			
Alignment with NHMP goals	Goal 1 ☒	Goal 4 ☐	Goal 7 ☒
	Goal 2 ☒	Goal 5 ☐	
	Goal 3 ☐	Goal 6 ☒	
Integration into other initiatives	FIRM		
Alignment with existing plans and policies	WC Urban and Rural Comprehensive Plan Frameworks		
Mitigation Action Implementation Plan			
Priority	Low ☐	Medium ☒	High ☐
Lead position, office, department, or division responsible for implementation	Emergency Management		

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
LUT PDS, LUT O&M, WCEM	EMC's SEPRR Project, DOGAMI, FEMA, CWS, TVWD, TVID, TSWCD, ODOT, PGE, FGPL, WOE, Verizon, Century Link, others

Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
General Fund	FMA
Estimated Cost	$10,000

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s) (Est. Cost x 6)**
To identify critical infrastructure at risk of being flooded to then evaluate mitigation projects.		$60,000

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term ☐ Mid-term ☒ Long-term ☐ Ongoing ☐	January 2024	December 2027

Implementation Benchmarks: How Will Success Be Measured?

- Obtain most updated information on critical infrastructures in relation to flood inundation zones.
- Notify infrastructure owners and assist with finding funding opportunities for mitigation projects.

Potential Challenges to Implementation

Resources and References, if Applicable

- FEMA Mitigation Ideas Document: F-7 Improve Flood Risk Assessment, F-9 Manage the Floodplain Beyond Minimum Requirements

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Complete data gathering and communications with owners; identify funding sources	$10,000	A complete update of information and communications.
Alternative #2	No action	$1,000	N/A
Alternative #3			

Implementation Progress Report for Plan Maintenance	
Date	
What progress in implementation has been made to date?	
What challenges in implementation have been experienced?	
What are the next steps in implementation?	

Table 327: Assess Natural Hazard Risk and Vulnerabilities to the Solid Waste System

Mitigation Action Information	
Title of action	Assess Natural Hazard Risk and Vulnerabilities to the Solid Waste System
Type of action	Plans/regulations ☒ Natural systems protection ☐ Structure and infrastructure project ☒ Public education/awareness ☒
Action description	Fund a study to assess, with regular review and update, vulnerabilities in the solid waste system to various natural hazards.
Hazard(s) addressed	Dam failure ☒ Flood ☒ Windstorm, incl. tornado ☒ Drought ☐ Landslide ☒ Winter storm ☒ Earthquake ☒ Volcanic ash ☒ Extreme heat ☐ Wildland fire ☒
How does the action address identified current or future risks and vulnerabilities?	The assessment identifies vulnerabilities, allowing cities, the County, and Metro Regional Government to plan resilience investments in the system at collection, transfer and disposal levels. It allows periodic, regular review and updates to the assessment.
Area of action impact	Washington County and greater Metro region
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? Forest Grove Transfer Station, Pride Transfer station, Hillsboro Garbage Disposal re-load facility, Hillsboro landfill, numerous equipment storage facilities, including truck 'barns'
Mitigation Action Integration	
Alignment with NHMP goals	Goal 1 ☒ Goal 4 ☐ Goal 7 ☒ Goal 2 ☒ Goal 5 ☒ Goal 3 ☒ Goal 6 ☒
Integration into other initiatives	This work should be included to reflect planned regional action to identify and reduce vulnerabilities in the system. It is currently absent from the NHMP
Alignment with existing plans and policies	Metro 2030 Regional Waste Plan, Goals 17, 18 and 19, in particular action 18.6. ORS 459.017(1)(b) declares that "local government unis have the primary responsibility for solid waste management."
Mitigation Action Implementation Plan	
Priority	Low ☐ Medium ☒ High ☐
Lead position, office, department, or division responsible for implementation	Washington County Department of Health and Human Services Solid Waste & Recycling division

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
Emergency Management, Land Use and Transportation, Health and Human Services	Metro Regional Government, Washington County Cities, contracted solid waste collection companies and operators of solid waste facilities
Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
Metro Regional Government, local government franchise fee revenue, State materials management grants	BRIC and FMA FEMA grants
Estimated Cost	$125,000

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**
Identify and remove vulnerabilities.	Support regional resilience planning to maintain a functioning solid waste management system in the face of natural hazards.	More efficient response to event(s).

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term ☐ Mid-term ☒ Long-term ☐ Ongoing ☐	July 1, 2024	June 30, 2025

Implementation Benchmarks: How Will Success Be Measured?

- Development of a complete vulnerability assessment that identifies areas needed for improvement and responsible parties.

Potential Challenges to Implementation

- Regional coordination, alignment with other planning efforts at Metro and RDPO, staff bandwidth

Resources and References, if Applicable

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Rely on Metro/RDPO	$1,000	Less influence to ensure it's completed.
Alternative #2	No action	$1,000	Vulnerabilities remain
Alternative #3			

Implementation Progress Report for Plan Maintenance	
Date	
What progress in implementation has been made to date?	
What challenges in implementation have been experienced?	
What are the next steps in implementation?	

Table 328: Repetitive and Severe Repetitive Loss Property Registration

Mitigation Action Information	
Title of action	Repetitive and Severe Repetitive Loss Property Registration (2017 Priority 8)
Type of action	Plans/regulations ☒ Natural systems protection ☐ Structure and infrastructure project ☐ Public education/awareness ☒
Action description	Ensure the locations of repetitive and severe repetitive flood loss properties have been accurately registered with FEMA and work with affected property owners to remove, relocate, elevate, or otherwise mitigate non-conforming structures in flood hazard areas (including inundation zones from dam failure).
Hazard(s) addressed	Dam failure ☒ Flood ☒ Windstorm, incl. tornado ☐ Drought ☐ Landslide ☐ Winter storm ☐ Earthquake ☐ Volcanic ash ☐ Extreme heat ☐ Wildland fire ☐
How does the action address identified current or future risks and vulnerabilities?	To be considered for mitigation opportunities, structures must be identified as having been significantly affected by past flood events. Developing an accurate list of these structures assists local government develop mitigation strategies with a higher chance of success in order to gain efficiencies and reduce unsuccessful efforts.
Area of action impact	Structures experiencing repetitive losses from flood events.
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? Applicable structures as identified.
Mitigation Action Integration	
Alignment with NHMP goals	Goal 1 ☒ Goal 4 ☐ Goal 7 ☐ Goal 2 ☒ Goal 5 ☒ Goal 3 ☐ Goal 6 ☐
Integration into other initiatives	FMA, FIRM, and SL/RSL initiatives
Alignment with existing plans and policies	WC Comprehensive Plan
Mitigation Action Implementation Plan	
Priority	Low ☐ Medium ☒ High ☐
Lead position, office, department, or division responsible for implementation	LUT, PDS, Floodplain Manager

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
WC Facilities and Parks, WC Emergency Management	Public agencies and private property owners, DOGAMI, FEMA
Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
General fund	FEMA FMA Grant
Estimated Cost	$10,000–$50,000

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s) (Est. Cost x 6)**
Identification of eligible properties helps identify applicable mitigations.	Identifying at-risk properties can support emergency response and evacuation plans. It can also make property owners aware of risk so they can take their mitigation actions (insurance).	$60,000–$300,000

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term ☐ Mid-term ☐ Long-term ☒ Ongoing ☐	January 2023	December 2027

Implementation Benchmarks: How Will Success Be Measured?

- Over the course of five years, identifying and registering with FEMA 100% of RL/SRL properties.
- Mitigating in some way, over 20% of RL/SRL properties registered (insurance, relocation, elevation, buy-out, or other mitigation).

Potential Challenges to Implementation

- Political support to implement RL/SRL mitigation actions.
- Obtaining property owner buy-in to implement mitigation actions.
- Dedicating internal funding for staff and assigning staff time to accomplish.

Resources and References, if Applicable

- FEMA Mitigation Ideas Publication: F-7 Improve Flood Risk Assessment, F-8 Join or Improve Compliance with NFIP, F-9 Manage the Floodplain Beyond Minimum Requirements, F-22 Increase Awareness of Flood Risk and Safety, F-23 Educate Property Owners about Flood Mitigation Techniques

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Assign staff to accomplish MAI	$10,000	Fully identify and register properties, mitigate over 20%
Alternative #2	Assign staff to complete study and registration	$5,000	Fully identify and register properties
Alternative #3	Hire contractor to complete MAI	$50,000	Contractor completes MAI

Implementation Progress Report for Plan Maintenance	
Date	
What progress in implementation has been made to date?	
What challenges in implementation have been experienced?	
What are the next steps in implementation?	

Table 329: Vegetation Treatments for Mitigation

Mitigation Action Information			
Title of action	Vegetation Treatments for Mitigation (New 2023)		
Type of action	Plans/regulations ☐	Natural systems protection ☒	
	Structure and infrastructure project ☐	Public education/awareness ☐	
Action description	Evaluate County-owned parks and other County-owned properties for landscape and vegetation treatments that will effectively address extreme heat islands and provide relief to users where possible; consider impacts of drought on landscape plans and address other hazards as applicable (e.g., dead/dying mature trees at County parks).		
Hazard(s) addressed	Dam failure ☐	Flood ☐	Windstorm, incl. tornado ☒
	Drought ☒	Landslide ☐	Winter storm ☐
	Earthquake ☐	Volcanic ash ☐	
	Extreme heat ☒	Wildland fire ☐	
How does the action address identified current or future risks and vulnerabilities?	Since the 2017 NHMP, several mature trees have died at some County-owned parks. These trees are integral to providing shade (relief) to persons and animals who go to the parks. Ensuring the continuation of landscape planning will help mitigate the loss of and plan for replacement of such landscape to help support extreme heat response plans.		
Area of action impact	Parks and other properties owned and operated by Washington County, Oregon, Facilities and Parks Division		
Is the action related to a critical facility or facilities?	Yes ☐ No ☒ If yes, what facility(ies)?		
Mitigation Action Integration			
Alignment with NHMP goals	Goal 1 ☒	Goal 4 ☐	Goal 7 ☐
	Goal 2 ☐	Goal 5 ☐	
	Goal 3 ☐	Goal 6 ☐	
Integration into other initiatives	Local, State, and Federal initiatives to be identified		
Alignment with existing plans and policies	WC Environmental Plan		
Mitigation Action Implementation Plan			
Priority	Low ☐	Medium ☐	High ☒
Lead position, office, department, or division responsible for implementation	Facilities & Parks Division		

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
WC Facilities and Parks, WC Real Property Manager	Clean Water Services, partner cities, Tualatin Hills Parks and Recreation District
Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
WC general budget	BRIC Grant
Estimated Cost	$10,000–$1,000,000

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s) (Est. Cost x 6)**
To address climate change effects of increasing heat, drought, and other impacts	Improves relationships with public to increase natural vegetation use in parks, potential cost savings on energy, potentially reduce heat islands	$60,000–$6,000,000

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term ☐ Mid-term ☐ Long-term ☒ Ongoing ☐	January 2023	December 2027

Implementation Benchmarks: How Will Success Be Measured?

- Evaluation of damaged vegetation at parks and County buildings.
- Identify vegetation replacement and/or improvement projects.
- Document cost savings (energy, water conservation, etc.).

Potential Challenges to Implementation

- Prioritizing study and projects
- Funding projects

Resources and References, if Applicable

- FEMA Mitigation Ideas Publication: ET-1 Reduce Urban Heat Island Effect, D-3 Monitor Water Supply, D-4 Plan for Drought, D-7 Retrofit Water Supply Systems, D-8 Enhance Landscaping and Design Measures

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Complete evaluation of risk and needs, develop mitigation plan to resolve risks, implement mitigations on at least 20% of identified needs.	$1,000,000	Completion of objectives
Alternative #2	Completion evaluation of risks, complete mitigation on case-by-case basis of at least 50% of identified needs.	$500,000	Completion of objectives
Alternative #3	Address needs as they are identified.	$10,000	Completion of objectives

Implementation Progress Report for Plan Maintenance	
Date	
What progress in implementation has been made to date?	
What challenges in implementation have been experienced?	
What are the next steps in implementation?	

Table 330: Seismic Retrofit of County Buildings

Mitigation Action Information			
Title of action	Seismic Retrofit of County Buildings (2017 Priority 7)		
Type of action	Plans/regulations ☐		Natural systems protection ☐
	Structure and infrastructure project ☒		Public education/awareness ☐
Action description	Continue to implement structural and non-structural retrofit projects of critical and essential facilities. The Walnut Street Center is a priority building; additional buildings will be identified.		
Hazard(s) addressed	Dam failure ☐	Flood ☐	Windstorm, incl. tornado ☐
	Drought ☐	Landslide ☐	Winter storm ☐
	Earthquake ☒	Volcanic ash ☐	
	Extreme heat ☐	Wildland fire ☐	
How does the action address identified current or future risks and vulnerabilities?	The Walnut Street Center houses critical County services for the Road Operations & Maintenance Division, Fleet Services, and other divisions essential to recovery of County transportation systems after an earthquake and must be seismically retrofitted to be recovered. Other County structures housing staff and other services will be identified.		
Area of action impact	Any County building needing seismic retrofitting mitigations.		
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? Walnut Street Center		
Mitigation Action Integration			
Alignment with NHMP goals	Goal 1 ☒	Goal 4 ☐	Goal 7 ☐
	Goal 2 ☒	Goal 5 ☐	
	Goal 3 ☐	Goal 6 ☐	
Integration into other initiatives	FEMA		
Alignment with existing plans and policies	WC Facilities maintenance plans.		
Mitigation Action Implementation Plan			
Priority	Low ☐	Medium ☐	High ☒
Lead position, office, department, or division responsible for implementation	Facilities and Parks		

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
Emergency Management, various affected divisions	None
Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
General fund	BRIC Grant
Estimated Cost	$2,000,000–$10,000,000

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s) (Est. Cost x 6)**
Upgrading buildings to life safety and protection minimum codes, increasing ability for post-quake recover and reconstitution		$12,000,000–$60,000,000

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term ☐ Mid-term ☐ Long-term ☒ Ongoing ☐	January 2023	December 2027

Implementation Benchmarks: How Will Success Be Measured?

- Walnut Street Center seismic retrofit plan is completed.
- Full assessment of County structures completed to identify additional seismic retrofit projects.

Potential Challenges to Implementation

- Funding sources for retrofit and needs assessment.
- Prioritizing retrofit of Walnut Street Center compared to other priorities.

Resources and References, if Applicable

- FEMA Mitigation Ideas Publication: EQ-5 Protect Critical Facilities and Infrastructure, EQ-6 Implement Structural Mitigation Techniques

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Successful seismic retrofit of Walnut Street Center and complete evaluation of additional County structures	$2,005,000	Successful completion of retrofit and needs assessment of all other County structures
Alternative #2	Seismic retrofit of Walnut Street Center	$2,000,000	Successful retrofit of Walnut Street center
Alternative #3	Complete evaluation of seismic retrofit needs on all County structures	$5,000	Completion of needs assessment

Implementation Progress Report for Plan Maintenance	
Date	
What progress in implementation has been made to date?	
What challenges in implementation have been experienced?	
What are the next steps in implementation?	

Table 331: Seismically Vulnerable Bridge Mitigation

Mitigation Action Information	
Title of action	Seismically Vulnerable Bridge Mitigation (2017 Priority 5)
Type of action	Plans/regulations ☐ Natural systems protection ☐ Structure and infrastructure project ☒ Public education/awareness ☐
Action description	Complete a survey of County-owned bridges to determine which are seismically vulnerable and would benefit from retrofit projects; implement retrofit projects on bridges identified as high-priority resulting from the survey as funds and time allows.
Hazard(s) addressed	Dam failure ☐ Flood ☐ Windstorm, incl. tornado ☐ Drought ☐ Landslide ☐ Winter storm ☐ Earthquake ☒ Volcanic ash ☐ Extreme heat ☐ Wildland fire ☐
How does the action address identified current or future risks and vulnerabilities?	Bridges in Washington County are vitally important to maintaining access using Emergency Transportation Routes, keeping emergency and essential service accessibility for the public, and keeping commerce flowing after an earthquake for response and recovery activities.
Area of action impact	Multiple bridges on emergency and non-emergency transportation routes.
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? Several seismically vulnerable bridges
Mitigation Action Integration	
Alignment with NHMP goals	Goal 1 ☒ Goal 4 ☐ Goal 7 ☐ Goal 2 ☒ Goal 5 ☐ Goal 3 ☐ Goal 6 ☐
Integration into other initiatives	
Alignment with existing plans and policies	WC LUT O&M Bridge Maintenance and Replacement Plan
Mitigation Action Implementation Plan	
Priority	Low ☐ Medium ☐ High ☒
Lead position, office, department, or division responsible for implementation	LUT Operations Division, Principal Engineer

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
LUT's Capital Project Services	Oregon Department of Transportation; other road-system owners (cities)
Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
County Road Fund; State Road Fund	FEMA Building Resilient Communities and Infrastructure Grant; FHWA Grant Program
Estimated Cost	$50,000–$100,000,000

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s) (Est. Cost x 6)**
Identification of all seismically vulnerable bridges, begin retrofits on most essential (emergency transportation routes)	Upgrades bridge infrastructure to maintain road transportation routes for response and recovery after an earthquake.	$300,000–$600,000,000

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term ☐ Mid-term ☐ Long-term ☐ Ongoing ☒	January 2023	December 2027

Implementation Benchmarks: How Will Success Be Measured?

- Completion of bridge assessment study, identifying and prioritizing bridges needing seismic retrofit projects
- Identifying funding sources to make seismic retrofits
- Contracting to seismically retrofit bridges

Potential Challenges to Implementation

- Establishing a constant funding source to complete entirety of seismic retrofit needs

Resources and References, if Applicable

- FEMA Mitigation Ideas Publication: EQ-5 Protect Critical Facilities and Infrastructure, EQ-6 Implement Structural Mitigation Techniques

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Complete study, prioritize projects, fund projects, complete retrofit projects	$100,000,000	Completion of study, prioritization, funding, and more than 20% of retrofits within five years
Alternative #2	Complete study, prioritize projects, fund projects, complete retrofit projects	$75,000,000	Completion of study, prioritization, funding, and more than 10% of retrofits within five years
Alternative #3	Complete study, prioritize projects, fund projects complete retrofit projects	$50,000,000	Completion of study, prioritization, funding, and more than 5% of retrofits within five years

Implementation Progress Report for Plan Maintenance	
Date	
What progress in implementation has been made to date?	
What challenges in implementation have been experienced?	
What are the next steps in implementation?	

Table 332: Inventory of Public Buildings Susceptible to Damage by Earthquake

Mitigation Action Information	
Title of action	Inventory of Public Buildings Susceptible to Damage by Earthquake (2017 Priority 6)
Type of action	Plans/regulations ☐ Natural systems protection ☐ Structure and infrastructure project ☐ Public education/awareness ☐
Action description	Develop an inventory and map of publicly owned buildings (schools, local government, emergency services, etc.), shelter buildings, and commercial buildings that may be particularly vulnerable to earthquake damage, including pre-1940s buildings, building with cripple wall foundations, and unreinforced masonry construction. Share with owners and assist with identifying potential projects and funding sources.
Hazard(s) addressed	Dam failure ☐ Flood ☐ Windstorm, incl. tornado ☐ Drought ☐ Landslide ☐ Winter storm ☐ Earthquake ☒ Volcanic ash ☐ Extreme heat ☐ Wildland fire ☐
How does the action address identified current or future risks and vulnerabilities?	Identifying buildings and structures with a high-life hazard that do not meet current seismic life safety standards that would benefit from seismic retrofit projects or identification, particularly unreinforced masonry (URM) buildings, identified shelters and other pre-seismic code assembly structures. County owned and non-County structures in both public and private sectors.
Area of action impact	All of Washington County
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? To be identified with project.
Mitigation Action Integration	
Alignment with NHMP goals	Goal 1 ☒ Goal 4 ☐ Goal 7 ☐ Goal 2 ☒ Goal 5 ☐ Goal 3 ☐ Goal 6 ☐
Integration into other initiatives	
Alignment with existing plans and policies	WC EOP for shelters.
Mitigation Action Implementation Plan	
Priority	Low ☐ Medium ☐ High ☒
Lead position, office, department, or division responsible for implementation	Emergency Management

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
LUT-PDS/GIS, Facilities and Park Services, Assessment & Taxation	USGS, DOGAMI
Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
General budget	BRIC
Estimated Cost	$10,000–$100,000

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s) (Est. Cost x 6)**
Identifying specific buildings to address and mitigate for life safety needs.	Adding shelters and commercial buildings to this MAI expands our knowledge and awareness of hazards when identifying shelters and buildings important to recovery.	$60,000–$600,000

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term ☐ Mid-term ☐ Long-term ☒ Ongoing ☐	January 2023	December 2027

Implementation Benchmarks: How Will Success Be Measured?

- Successful engagement by partners in the Emergency Management Cooperative's Support for Emergency Planning, Response, and Recovery (SEPRR) Project.
- Successful contact made to owners to have discussions about mitigation needs, projects, and potential funding sources.

Potential Challenges to Implementation

- Funding for the SEPRR Project.
- Staff time to work on and develop project.
- Available information sources and studies.

Resources and References, if Applicable

- FEMA Mitigation Ideas Resource Publication: EQ-3 Map and Assess Community Vulnerability to Seismic Hazards

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Perform complete inventory and make contact with owners, identify potential needs and funding sources	$10,000	All four steps completed for 75% of identified structures
Alternative #2	Complete inventory and make results available to owners	$5,000	Both steps completed for unincorporated Washington County
Alternative #3	Hire consultant to perform all tasks	$100,000	Contractor hired to complete project.

Implementation Progress Report for Plan Maintenance	
Date	
What progress in implementation has been made to date?	
What challenges in implementation have been experienced?	
What are the next steps in implementation?	

Table 333: County Road Access to Critical Infrastructure

Mitigation Action Information			
Title of action	County Road Access to Critical Infrastructure (2017 Pool 15)		
Type of action	Plans/regulations ☒ Structure and infrastructure project ☒	Natural systems protection ☐ Public education/awareness ☐	
Action description	Assess and mitigate vulnerabilities of County roads leading to critical infrastructure, such as the WCCCA 911 emergency communications tower site on Buxton Lookout Road. Among other considerations, assessment can include accessibility for evacuation, integrity of access, landslide susceptibility, and prerequisite actions to implement improvements.		
Hazard(s) addressed	Dam failure ☐ Drought ☐ Earthquake ☒ Extreme heat ☐	Flood ☒ Landslide ☒ Volcanic ash ☐ Wildland fire ☒	Windstorm, incl. tornado ☒ Winter storm ☒
How does the action address identified current or future risks and vulnerabilities?	Access to critical infrastructure during and after a natural hazard is essential to speed recovery and being more resilient. By ensuring critical infrastructure will have at least one point of access that can withstand various natural hazards, the risk of losing accessibility to critical infrastructure will be reduced.		
Area of action impact	Where critical infrastructure is accessed by a county road, e.g., communications towers, water supply sources, sewer system pump stations, power utility sites, etc.		
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? Communications tower for 9-1-1 system, and TBD.		
Mitigation Action Integration			
Alignment with NHMP goals	Goal 1 ☒ Goal 2 ☒ Goal 3 ☐	Goal 4 ☐ Goal 5 ☐ Goal 6 ☐	Goal 7 ☐
Integration into other initiatives	Oregon's Resilience Plan		
Alignment with existing plans and policies	Seismic retrofit of bridges is an important part of this action since bridges may be a risk factor against access. A functioning transportation system is a key part of our existing plans and policies.		
Mitigation Action Implementation Plan			
Priority	Low ☐	Medium ☒	High ☐
Lead position, office, department, or division responsible for implementation	LUT Operations and Maintenance Division		

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
LUT's Capital Project Services, and Planning and Development Services Divisions, WC Emergency Management	Washington County Consolidated Communications Agency (WCCCA); public and private utility providers as applicable.
Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
County Road Fund (gas tax, registration fees)	Federal Lands Access Program, BLM BRIC Grant, FEMA
Estimated Cost	$300,000 to $100,000,000

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s) (Est. Cost x 6)**
Access to critical infrastructure will be vital to resiliency and recovery.	If access to critical infrastructure is ensured, access to non-critical but important infrastructure may all be improved.	$1,800,000–$600,000,000

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term ☐ Mid-term ☐ Long-term ☐ Ongoing ☒	01/1/2023	Ongoing

Implementation Benchmarks: How Will Success Be Measured?

- Identify impediments and significant hazards to accessing critical infrastructure from County-owned road systems.
- Develop a plan for mitigation and a funding strategy for any identified projects.
- Mitigation of any access problems on County-owned roads leading to critical infrastructure.

Potential Challenges to Implementation

- Funds may not be available to make all road more resilient.
- Critical infrastructure has been mapped but may be outdated.
- Making this work a priority over ongoing work.
- Review critical infrastructure and routes that access them.
- Restrictive land use regulations that may need to have an exemption or changes to the Comprehensive Plan to allow significant changes to road.

Resources and References, if Applicable

- To be identified as projects develop.

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Upgrade bridges only	$50,000,000	All critical infrastructure has been evaluated for access needs and deficiencies.
Alternative #2	Upgrade all portions of roadway	$100,000,000	All critical infrastructure has been evaluated for access needs and deficiencies.
Alternative #3	No action	$5,000	N/A

Implementation Progress Report for Plan Maintenance	
Date	
What progress in implementation has been made to date?	
What challenges in implementation have been experienced?	
What are the next steps in implementation?	

Table 334: Extreme Heat and Cold and Hazardous Air Quality Population Protection Program

Mitigation Action Information	
Title of action	Extreme Heat and Cold and Hazardous Air Quality Population Protection Program (New 2023)
Type of action	Plans/regulations ☒ Natural systems protection ☐ Structure and infrastructure project ☐ Public education/awareness ☒
Action description	Coordinate outreach to the public, especially to vulnerable populations, with information and resources to mitigate effects of extreme heat, extreme cold, and hazardous air quality events. Coordinate support to extreme heat and cold shelters and centers and clean air spaces and coordinate access and transportation to these sites. Purchase and deploy heating, cooling, and air filtration equipment.
Hazard(s) addressed	Dam failure ☐ Flood ☐ Windstorm, incl. tornado ☐ Drought ☐ Landslide ☐ Winter storm ☒ Earthquake ☐ Volcanic ash ☐ Extreme heat ☒ Wildland fire ☐
How does the action address identified current or future risks and vulnerabilities?	This action prepares the County to intervene in life threating heat and cold conditions for vulnerable persons in a variety of ways, including enrolling and supporting more cooling centers and warming shelters, providing equipment for home-bound persons, and other actions.
Area of action impact	All of Washington County.
Is the action related to a critical facility or facilities?	Yes ☐ No ☒ If yes, what facility(ies)?
Mitigation Action Integration	
Alignment with NHMP goals	Goal 1 ☐ Goal 4 ☐ Goal 7 ☒ Goal 2 ☒ Goal 5 ☐ Goal 3 ☒ Goal 6 ☒
Integration into other initiatives	Oregon Senate Bill 762, Section 14: https://olis.oregonlegislature.gov/liz/2021R1/Downloads/MeasureDocument/SB762/Enrolled
Alignment with existing plans and policies	WC Emergency Operations Plans for Extreme Heat and Cold Weather Responses
Mitigation Action Implementation Plan	
Priority	Low ☐ Medium ☒ High ☐
Lead position, office, department, or division responsible for implementation	Emergency Management

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
WC Health and Human Services Department, WC Housing Services	Cities in Washington County, Oregon Health Authority
Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
General fund, Oregon Health Authority (see SB762 S.14)	To be determined.
Estimated Cost	$10,000–$50,000

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s) (Est. Cost x 6)**
Supports protecting vulnerable persons with providing cooling centers and equipment, and warming shelter needs.	Opens lines of communication with individual members of the public, volunteer and religious support centers, and others to utilize in other disaster needs.	$60,000–$300,000

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term ☐ Mid-term ☐ Long-term ☒ Ongoing ☐	January 2023	December 2027

Implementation Benchmarks: How Will Success Be Measured?

- Develop strategic team to identify specific actions and purchases to consider.
- Identify internal and external funding sources for each action and purchase.
- Garner support and participation from city and community partners.
- Purchase heating/cooling equipment and develop deployment plan.

Potential Challenges to Implementation

- Finding funding sources to make purchases of equipment.
- Enlisting private sector partners to participate in program.

Resources and References, if Applicable

- FEMA Mitigation Ideas Publication: ET-3 Assist Vulnerable Populations

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Purchase equipment, enlist private partners, fund emergency transportation vouchers, improve access to information	$50,000	Enlist and support at least five private partners, establish cache of air conditioners and heaters, establish emergency transportation voucher pool, improve access
Alternative #2	Improve access to information, enlist private partners	$20,000	Establish and maintain website and public notifications, enlist at least five private partners
Alternative #3	Improve access to information and warning	$10,000	Establish and maintain website and notification process

Implementation Progress Report for Plan Maintenance	
Date	
What progress in implementation has been made to date?	
What challenges in implementation have been experienced?	
What are the next steps in implementation?	

Table 335: Review of Washington County Comprehensive Plan

Mitigation Action Information	
Title of action	Review of New Hazard Data for Potential Washington County Comprehensive Plan (2017 Priority 3)
Type of action	Plans/regulations ☒ Natural systems protection ☐ Structure and infrastructure project ☐ Public education/awareness ☐
Action description	Utilize the 2022 multi-hazard risk report and assessment developed by DOGAMI to potentially inform updates to Washington County's Comprehensive Plan.
Hazard(s) addressed	Dam failure ☐ Flood ☒ Windstorm, incl. tornado ☐ Drought ☐ Landslide ☒ Winter storm ☐ Earthquake ☒ Volcanic ash ☐ Extreme heat ☐ Wildland fire ☒
How does the action address identified current or future risks and vulnerabilities?	Portions of the Washington County Comprehensive Plan contain policies and regulations for development in hazard areas such as flood zones and steep slopes. In 2022, DOGAMI published new information about a variety of Washington County hazards. This action will determine whether the new information identifies any needed updates to land use rules for protection of people and property.
Area of action impact	County-wide community development planning
Is the action related to a critical facility or facilities?	Yes ☐ No ☒ If yes, what facility(ies)?
Mitigation Action Integration	
Alignment with NHMP goals	Goal 1 ☐ Goal 4 ☒ Goal 7 ☐ Goal 2 ☒ Goal 5 ☐ Goal 3 ☐ Goal 6 ☒
Integration into other initiatives	Oregon Statewide Planning Goal 7, Areas Subject to Natural Hazards
Alignment with existing plans and policies	Washington County Comprehensive Framework Plan for the Urban Area, Policy 8, Natural Hazards; Washington County Rural/Natural Resource Plan, Policy 8, Natural Hazards; portions of the Community Development Code
Mitigation Action Implementation Plan	
Priority	Low ☐ Medium ☐ High ☒
Lead position, office, department, or division responsible for implementation	LUT, Planning and Development Services

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
Building Services Division; Flood Plain Manager in cooperation with Engineering	Clean Water Services
Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
General Fund; Department of Land Conservation and Development Technical Assistance Grant	Not applicable
Estimated Cost	$10,000

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s) (Est. Cost x 6)**
Determining whether new hazard information identifies needed updates to land use rules for protection of people and property .		$60,000

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term ☐ Mid-term ☐ Long-term ☒ Ongoing ☐	January 2025	December 2027

Implementation Benchmarks: How Will Success Be Measured?

- Review and evaluation of DOGAMI report and identify whether Comprehensive Plan policies and/or regulations need changes. If so, identify the specific changes needed. If specific changes are needed, a future Mitigation Action Item would be development of proposed changes and their presentation to Planning Commission and County Commissioners.

Potential Challenges to Implementation

Board prioritization of this item as a Tier 1 task on Long Range Planning's Work Program would be necessary to authorize staff to begin work on this task. A potential challenge is if Board does not prioritize this item as a Tier 1 task (i.e., if they prioritize other projects and tasks ahead of this one).

Resources and References, if Applicable

Oregon Statewide Planning Goal 7 (Areas Subject to Natural Hazards); Washington County Comprehensive Plan, including Comprehensive Framework Plan for the Urban Area, Policy 8 (Natural Hazards); Rural/Natural Resource Plan, Policy 8 (Natural Hazards); and the Community Development Code.

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Staff completes review of DOGAMI report and determines whether changes to Comprehensive Plan are warranted	$25,000	Review completed
Alternative #2	Third party is retained to complete review of DOGAMI report and Comprehensive Plan to determine if changes are warranted	$50,000	Any suggested changes are presented to staff for review
Alternative #3	No Action	N/A	N/A

Implementation Progress Report for Plan Maintenance	
Date	
What progress in implementation has been made to date?	
What challenges in implementation have been experienced?	
What are the next steps in implementation?	

Table 336: Landslide Data and Mitigation Strategy

Mitigation Action Information	
Title of action	Landslide Data and Mitigation Strategy (2017 Pool 14)
Type of action	Plans/regulations ☒ Natural systems protection ☐ Structure and infrastructure project ☐ Public education/awareness ☐
Action description	Update regional landslide risk maps, using available LIDAR data and collaborate with the Oregon Department of Geology and Mineral Industries to work on landslide risk reduction efforts; determine areas and buildings at risk to landslides and propose revisions to the County's Comprehensive Plan and land use policies necessary to reduce risks.
Hazard(s) addressed	Dam failure ☐ Flood ☐ Windstorm, incl. tornado ☐ Drought ☐ Landslide ☒ Winter storm ☐ Earthquake ☐ Volcanic ash ☐ Extreme heat ☐ Wildland fire ☐
How does the action address identified current or future risks and vulnerabilities?	Each landslide has very localized impacts. Some impact areas have potentially serious life safety risks, and some potentially have significant threats to County roadways and other infrastructure. This project will update data to identify potential landslide areas, can identify structures and infrastructure at risk, and can provide information to develop mitigation projects.
Area of action impact	The entire county will be evaluated, and specific landslide potential risks identified.
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? Potentially roadways and bridges. Others to be identified.
Mitigation Action Integration	
Alignment with NHMP goals	Goal 1 ☒ Goal 4 ☐ Goal 7 ☐ Goal 2 ☐ Goal 5 ☐ Goal 3 ☐ Goal 6 ☐
Integration into other initiatives	To be determined.
Alignment with existing plans and policies	Washington County Comprehensive Plan
Mitigation Action Implementation Plan	
Priority	Low ☐ Medium ☐ High ☒
Lead position, office, department, or division responsible for implementation	LUT, PDS

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
Emergency Management, WC Department of Land Use and Transportation, WC Facilities and Parks.	DOGAMI, RDPO, additional cities and special districts.
Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
General fund, Regional Disaster Preparedness Organization managed grants	FEMA BRIC
Estimated Cost	$10,000–$5,000,000

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s) (Est. Cost x 6)**
Identify and maps past landslides to project future potential. Identify at-risk properties. Identify mitigation options.		$60,000–$30,000,000

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term ☐ Mid-term ☐ Long-term ☒ Ongoing ☐	January 2023	December 2027

Implementation Benchmarks: How Will Success Be Measured?

- Completion of hazard and risk assessments to identify specific prone areas and properties
- Formation of a mitigation strategy
- Initiate mitigation actions on at least 20% of identified properties at significant risk

Potential Challenges to Implementation

- Staff assigned to work on completion of hazard and risk assessments
- Forming a group to develop a landslide mitigation strategy
- Implementing mitigation actions on identified at-risk properties

Resources and References, if Applicable

- FEMA Mitigation Ideas Publication: LS-1 Map and Assess Vulnerability to Landslides, LS-2 Manage Development in Landslide Hazard Areas
- LS-3 Prevent Impacts to Roadways

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Complete hazard & risk assessments, form strategic plan, implement mitigation actions	$5,000,000	All objectives completed within life of plan
Alternative #2	Completion of hazard & risk assessments, form strategic plan	$20,000	Completion of assessments and form plan
Alternative #3	Complete hazard & risk assessments and publish results	$10,000	Completion of assessments and publishing results

Implementation Progress Report for Plan Maintenance	
Date	
What progress in implementation has been made to date?	
What challenges in implementation have been experienced?	
What are the next steps in implementation?	

Table 337: Volcanic Ash Damage Mitigation Strategy

Mitigation Action Information			
Title of action	Volcanic Ash Damage Mitigation Strategy (2017 Pool 18)		
Type of action	Plans/regulations ☒		Natural systems protection ☐
	Structure and infrastructure project ☒		Public education/awareness ☒
Action description	Identify critical facilities and industries that may be affected by ash fallout and collaborate with them on ash fall damage mitigation projects, recovery plans, and preparation projects. Include ash fallout in list of hazards in public awareness and outreach materials.		
Hazard(s) addressed	Dam failure ☐	Flood ☐	Windstorm, incl. tornado ☐
	Drought ☐	Landslide ☐	Winter storm ☐
	Earthquake ☐	Volcanic ash ☒	
	Extreme heat ☐	Wildland fire ☐	
How does the action address identified current or future risks and vulnerabilities?	Brings awareness of potential to property owners and may assist in preparation activities such as protection of HVAC and AHU systems.		
Area of action impact	All of Washington County is at risk of exposure to volcanic ash fallout.		
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? All critical structures/facilities are at risk		
Mitigation Action Integration			
Alignment with NHMP goals	Goal 1 ☒	Goal 4 ☐	Goal 7 ☒
	Goal 2 ☒	Goal 5 ☐	
	Goal 3 ☐	Goal 6 ☐	
Integration into other initiatives	To be identified.		
Alignment with existing plans and policies	WC Emergency Operations Plan		
Mitigation Action Implementation Plan			
Priority	Low ☐	Medium ☒	High ☐
Lead position, office, department, or division responsible for implementation	Emergency Management		

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
WC Facilities and Parks, WC Health Services	
Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
General fund, private property owners	BRIC Grant
Estimated Cost	$10,000–$50,000

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s) (Est. Cost x 6)**
Bring awareness to encourage preparation and mitigation actions by individual public and private property owners	Informs the public at large of risk and protective actions; can assist in developing early notification/warning and response plans	$60,000–$300,000

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term ☐ Mid-term ☒ Long-term ☐ Ongoing ☐	January 2023	December 2026

Implementation Benchmarks: How Will Success Be Measured?

- Research on risk volcanic ash poses to people and properties.
- Develop and publish public awareness information materials.
- Assist eligible parties in identifying funding for implementing mitigation actions.

Potential Challenges to Implementation

- Finding information relevant to ash fallout hazards.
- Identifying multiple mitigation actions relevant to ash fallout hazards.
- Obtaining buy-in from public and private sector property owners to implement mitigation actions.

Resources and References, if Applicable

- FEMA Mitigation Ideas Publication: MU-9 Create Local Funding Mechanisms for Hazard Mitigation, MU-14 Increase Hazard Education and Risk Awareness, MU-16 Promote Private Mitigation Efforts

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Develop and publish public awareness information, reach out to critical infrastructure owners, identify potential mitigation actions, identify potential funding sources	$50,000	Completion of all objectives within life of plan
Alternative #2	Develop and publish public awareness information	$10,000	Completion of objectives in safe harbor languages
Alternative #3	No action	$1,000	

Implementation Progress Report for Plan Maintenance	
Date	
What progress in implementation has been made to date?	
What challenges in implementation have been experienced?	
What are the next steps in implementation?	

Table 338: WUI Fire Water Supply GIS Data Project

Mitigation Action Information	
Title of action	WUI Fire Water Supply GIS Data Project (New 2023)
Type of action	Plans/regulations ☒ Natural systems protection ☐ Structure and infrastructure project ☐ Public education/awareness ☐
Action description	Utilize the BUG SEPRR project to develop a GIS database of water sources in rural and wildland interface areas which are available for fire suppression and accessible by fire department apparatus or aircraft such as storage tanks and drafting or dipping sites. Sites may be publicly or privately owned. Provide data to fire service GIS provider.
Hazard(s) addressed	Dam failure ☐ Flood ☐ Windstorm, incl. tornado ☐ Drought ☐ Landslide ☐ Winter storm ☐ Earthquake ☐ Volcanic ash ☐ Extreme heat ☐ Wildland fire ☒
How does the action address identified current or future risks and vulnerabilities?	Supports wildfire suppression response by fire agencies. Supports wildfire response plans implemented by local fire districts and the Oregon Department of Forestry Fire Protection Program.
Area of action impact	Rural and Wildland Urban Interface areas of Washington County
Is the action related to a critical facility or facilities?	Yes ☐ No ☒ If yes, what facility(ies)?
Mitigation Action Integration	
Alignment with NHMP goals	Goal 1 ☒ Goal 4 ☐ Goal 7 ☐ Goal 2 ☐ Goal 5 ☒ Goal 3 ☐ Goal 6 ☒
Integration into other initiatives	2022 NHMP MAI Map Community Risk
Alignment with existing plans and policies	Fire response plans
Mitigation Action Implementation Plan	
Priority	Low ☒ Medium ☐ High ☐
Lead position, office, department, or division responsible for implementation	Emergency Management

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
Facilities (Parks), EM, WCSO, WC Broadband User Group's Support of Emergency Response and Recovery (SEPRR) project	Fire officials/Local Fire Districts, Oregon Department of Forestry's Fire Protection Program
Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
General Fund, Oregon Department of Forestry	To be determined
Estimated Cost	$10,000

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s) (Est. Cost x 6)**
Increase information available to fire-suppression agencies and improve access to water supply for fire suppression in response situations.	Reduce response time finding water supplies during fire responses, helps with pre-incident planning.	$60,000

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term ☐ Mid-term ☒ Long-term ☐ Ongoing ☐	January 2023	December 2025

Implementation Benchmarks: How Will Success Be Measured?

- Assess completeness of current mapping and identify remaining sites to be mapped.
- WC BUG SEPRR project coordinates obtaining and documenting site information and prepares data layers for fire district/department integration to the Intterra mapping software.
- Local fire districts/departments establish program to maintain information and access to sites.

Potential Challenges to Implementation

- Availability of BUG SEPRR person to work on project.
- Availability of fire district/department staff to work on project.
- Willingness of property owners to participate and allow use of sites.

Resources and References, if Applicable

- Fire department operating procedures.

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Utilize SEPRR project to complete map, fire agencies participate, property owners participate	$10,000	Complete project objectives within five years (12/2027)
Alternative #2	Utilize SEPRR project to identify potential sites and turn information over to fire agencies to implement	$5,000	Complete objective and hand-off to fire agencies
Alternative #3	No action	$1,000	N/A

Implementation Progress Report for Plan Maintenance	
Date	
What progress in implementation has been made to date?	
What challenges in implementation have been experienced?	
What are the next steps in implementation?	

Table 339: Wildland Urban Interface Plan CWPP

Mitigation Action Information			
Title of action	Wildland Urban Interface Plan CWPP (2017 Priority 9)		
Type of action	Plans/regulations ☒	Natural systems protection ☐	
	Structure and infrastructure project ☐	Public education/awareness ☐	
Action description	Support the effort by the Oregon Department of Forestry to update the 2007 Community Wildfire Protection Plan (CWPP) with information and tasks within the County's authority.		
Hazard(s) addressed	Dam failure ☐	Flood ☐	Windstorm, incl. tornado ☐
	Drought ☐	Landslide ☐	Winter storm ☐
	Earthquake ☐	Volcanic ash ☐	
	Extreme heat ☐	Wildland fire ☒	
How does the action address identified current or future risks and vulnerabilities?	This will identify communities and areas at risk in the wildland fire interface such as Cherry Grove, North Plains, Timber, etc.; meet requirements for additional grant funding for mitigation efforts such as land clearing for defensible space and establishing Firewise Communities.		
Area of action impact	Properties in and along the wildland urban interface.		
Is the action related to a critical facility or facilities?	Yes ☐ No ☒ If yes, what facility(ies)?		
Mitigation Action Integration			
Alignment with NHMP goals	Goal 1 ☒	Goal 4 ☐	Goal 7 ☒
	Goal 2 ☒	Goal 5 ☐	
	Goal 3 ☒	Goal 6 ☒	
Integration into other initiatives	Oregon Department of Forestry project to update the Washington County CWPP.		
Alignment with existing plans and policies	Update of the 2007 CWPP led by the Oregon Department of Forestry.		
Mitigation Action Implementation Plan			
Priority	Low ☒	Medium ☐	High ☐
Lead position, office, department, or division responsible for implementation	Emergency Management		

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
Emergency Management, Land Use and Transportation	Oregon Department of Forestry, Tualatin Valley Fire & Rescue, Banks Fire District, Forest Grove Fire & Rescue
Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
Local general fund	USDA Community Wildfire Defense Grant, FEMA BRIC
Estimated Cost	$80,000

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s) (Est. Cost x 6)**
Refines the WUI/CWPP mitigation needs and solutions, meets grant requirements	Successful projects may reduce fuel loading in at-risk areas; may improve community evacuation and access	$160,000

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term ☐ Mid-term ☒ Long-term ☐ Ongoing ☐	January 1, 2023	December 31, 2025

Implementation Benchmarks: How Will Success Be Measured?

- Develop scope of County's authority and capability to support.
- Identify and develop any CWPP-specific implementable mitigation actions.
- Adopt CWPP for Washington County.

Potential Challenges to Implementation

- Funding for staff participation.
- Limited authority and jurisdiction of the County.
- Political support.

Resources and References, if Applicable

- USDA/USFS Community Wildfire Defense Grant criteria.
- DOGAMI/USGS study data.
- 2023 Washington County NHMP.
- 2007 Washington County CWPP.

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Assist/support ODF in updating the 2007 CWPP; implement County MAI for CWPP	$20,000	All goals met by 12/31/2025
Alternative #2	No action	$1,000	N/A
Alternative #3			

Implementation Progress Report for Plan Maintenance	
Date	
What progress in implementation has been made to date?	
What challenges in implementation have been experienced?	
What are the next steps in implementation?	

Table 340: Develop Partnership Strategy for Public/Private Infrastructure Owners and Managers

Mitigation Action Information	
Title of action	Develop Partnership Strategy for Public/Private Infrastructure Owners and Managers (2017 Pool 1)
Type of action	Plans/regulations ☒ Natural systems protection ☐ Structure and infrastructure project ☐ Public education/awareness ☒
Action description	Develop partnership strategy for WC Emergency Management to foster natural hazard program coordination and collaboration with infrastructure owners including public and private utility providers in Washington County.
Hazard(s) addressed	Dam failure ☒ Flood ☒ Windstorm, incl. tornado ☒ Drought ☒ Landslide ☒ Winter storm ☒ Earthquake ☒ Volcanic ash ☒ Extreme heat ☒ Wildland fire ☒
How does the action address identified current or future risks and vulnerabilities?	This will improve the County's relationships with water providers, wastewater treatment agency, electrical service providers, communications providers, solid waste programs and others to connect them to funding sources for mitigation and infrastructure hardening and construction projects.
Area of action impact	This will focus on providers in unincorporated Washington County but will also assist utilities crossing multiple jurisdictions.
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? Water systems, sewer and surface collection systems, electrical systems, solid waste haulers and facility owners, and others?
Mitigation Action Integration	
Alignment with NHMP goals	Goal 1 ☒ Goal 4 ☐ Goal 7 ☒ Goal 2 ☒ Goal 5 ☒ Goal 3 ☒ Goal 6 ☐
Integration into other initiatives	To be identified by the utilities that are assisted.
Alignment with existing plans and policies	Washington County Urban Comprehensive Framework Plan Washington County Rural Comprehensive Framework Plan
Mitigation Action Implementation Plan	
Priority	Low ☐ Medium ☐ High ☒
Lead position, office, department, or division responsible for implementation	Emergency Management

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
WC Planning and Development Services Division	Clean Water Services, Tualatin Valley Water District, other utilities as identified
Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
WC General Fund	BRIC and FMA grants through FEMA Rural Development Assistance, USDA
Estimated Cost	$10,000

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s) (Est. Cost x 6)**
Identifying funding resources for infrastructure projects; improving relationships for planning and emergency response	Greater awareness and making contacts	$60,000

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term ☐ Mid-term ☐ Long-term ☒ Ongoing ☐	January 2024	December 2027

Implementation Benchmarks: How Will Success Be Measured?

- Establishing a point of contact with each utility provider in Washington County.
- Outlining goal of identifying mitigation and constructions projects needing funding.
- Assisting utilities with applying for and securing funding where applicable and desired.

Potential Challenges to Implementation

- Establishing relationships with utilities that will lead to collaborative work.
- Identifying applicable funding options and securing them.

Resources and References, if Applicable

- FEMA Mitigation Ideas Publication: MU-9 Create Local Funding Mechanisms for Hazard Mitigation.

Three Alternatives Considered, Including No Action

	Action Description	Estimated Cost	Evaluation
Alternative #1	Establishing relations with all utilities	$5,000	Complete contact list and needs assessment
Alternative #2	Establishing relations with only major utilities	$5,000	Contact list and needs assessment
Alternative #3	No action	$1,000	N/A

Implementation Progress Report for Plan Maintenance	
Date	
What progress in implementation has been made to date?	
What challenges in implementation have been experienced?	
What are the next steps in implementation?	

Table 341: Public Education of Natural Hazard Mitigation

Mitigation Action Information			
Title of action	Public Education of Natural Hazard Mitigation (2017 Pool 2)		
Type of action	Plans/regulations ☐	Natural systems protection ☐	
	Structure and infrastructure project ☐	Public education/awareness ☒	
Action description	Develop, enhance, and implement equitable programs aimed at educating the public about mitigation of natural hazard impacts and reducing the risk to community members, private property owners, public agencies, businesses, and schools.		
Hazard(s) addressed	Dam failure ☒	Flood ☒	Windstorm, incl. tornado ☒
	Drought ☒	Landslide ☒	Winter storm ☒
	Earthquake ☒	Volcanic ash ☒	
	Extreme heat ☒	Wildland fire ☒	
How does the action address identified current or future risks and vulnerabilities?	This action addresses action addresses components of accessibility to education programs that have historically been barriers such as languages other than English, formats that are available in electronic/digital and hard copy, information that is shared through trusted community partners, cultural considerations, etc.		
Area of action impact	All persons in Washington County. Efforts will be made to develop information into safe-harbor languages for community inclusion goals.		
Is the action related to a critical facility or facilities?	Yes ☐ No ☒ If yes, what facility(ies)?		
Mitigation Action Integration			
Alignment with NHMP goals	Goal 1 ☐	Goal 4 ☐	Goal 7 ☐
	Goal 2 ☐	Goal 5 ☒	
	Goal 3 ☒	Goal 6 ☐	
Integration into other initiatives			
Alignment with existing plans and policies			
Mitigation Action Implementation Plan			
Priority	Low ☐	Medium ☐	High ☒
Lead position, office, department, or division responsible for implementation	Emergency Management		

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
WC Emergency Management, WC Public Affairs	WC Emergency Management Cooperative
Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
General fund	
Estimated Cost	$10,000–$50,000

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s) (Est. Cost x 6)**
Making hazards, mitigation efforts and resources known to all persons in Washington County	Greatly expands the messaging to languages other than English and Spanish to foster greater community awareness.	$60,000–$300,000

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term ☐ Mid-term ☐ Long-term ☒ Ongoing ☐	January 2023	December 2027

Implementation Benchmarks: How Will Success Be Measured?

- Final NHMP developed into understandable sections
- NHM information is published on interactive website
- Essential information is offered in safe-harbor languages

Potential Challenges to Implementation

- Translation services and costs of translations

Resources and References, if Applicable

- FEMA Mitigation Ideas Publication, multiple areas.
- Drought: D-9 Educate Residents on Water Saving Techniques, D-10 Educate Farmers on Soil and Water Conservation Practices
- Earthquake: EQ-7 Increase Earthquake Risk Awareness, EQ-9 Provide Information on Structural and Non-Structural Retrofitting
- Extreme Temperatures: ET-2 Increase Awareness of Extreme Temperature Risk and Safety, ET-4 Educate Property Owners About Freezing Pipes
- Flood: F-23 Educate Property Owners about Flood Mitigation Techniques
- Severe Wind: SW-7 Increase Severe Wind Risk Awareness
- Winter Weather: WW-5 Conduct Winter Weather Risk Awareness Activities
- Wildfire: WF-11 Increase Wildfire Risk Awareness, WF-12 Educate Property Owners about Wildfire Mitigation Techniques
- Multiple Hazards: MU-14 Increase Hazard Education and Risk Awareness, MU-15 Improve Household Disaster Preparedness, MU-16 Promote Private Mitigation Efforts

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Develop and publish web resource for information and surveys for most impactive hazards in multiple languages	$50,000	Completed all aspects of #1
Alternative #2	Develop and publish web resource for general hazards in to 50% of safe harbor languages	$25,000	Completed all aspects of #2
Alternative #3	Develop framework for MAI, publish web resources in English and Spanish	$10,000	Complete all aspects of #3

Implementation Progress Report for Plan Maintenance	
Date	
What progress in implementation has been made to date?	
What challenges in implementation have been experienced?	
What are the next steps in implementation?	

Table 342: Map Community Risk

Mitigation Action Information			
Title of action	Map Community Risk		
Type of action	Plans/regulations ☒	Natural systems protection ☐	
	Structure and infrastructure project ☐	Public education/awareness ☐	
Action description	Provide support to develop a countywide project to coordinate GIS resources, giving the ability to all local participants to upload current and changing information regarding structures, critical facilities, water sites for fire use, vulnerable populations exposed to the elements, and support future reviews of this plan and mitigation actions.		
Hazard(s) addressed	Dam failure ☒	Flood ☒	Windstorm, incl. tornado ☒
	Drought ☒	Landslide ☒	Winter storm ☒
	Earthquake ☒	Volcanic ash ☒	
	Extreme heat ☒	Wildland fire ☒	
How does the action address identified current or future risks and vulnerabilities?	This MAI is to find financial resources to hire or contract someone to develop the countywide WC Broadband User Group's "Support of Emergency Planning, Response and Recovery (SEPRR) Project" to develop a centralized GIS place to update hazard, structure, and other GIS data.		
Area of action impact	All of Washington County		
Is the action related to a critical facility or facilities?	Yes ☐ No ☒ If yes, what facility(ies)?		
Mitigation Action Integration			
Alignment with NHMP goals	Goal 1 ☐	Goal 4 ☐	Goal 7 ☒
	Goal 2 ☒	Goal 5 ☒	
	Goal 3 ☐	Goal 6 ☐	
Integration into other initiatives	Washington County Broadband User Group's Support of Emergency Planning, Response and Recovery Project.		
Alignment with existing plans and policies	WC Multi-jurisdictional NHMP		
Mitigation Action Implementation Plan			
Priority	Low ☐	Medium ☒	High ☐
Lead position, office, department, or division responsible for implementation	Emergency Management		

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
WC Emergency Management, WC Information Technical Services	Washington County, all WC cities, NHMP partners
Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
Local government contributions	BRIC, SHSP
Estimated Cost	$600,000

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s) (Est. Cost x 6)**
Provides a central location for all participants to update GIS data for mitigation, response and recovery planning projects.	Establishes common terminology, symbology, definitions and other GIS inconsistencies.	$3,600,000

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term ☐ Mid-term ☐ Long-term ☒ Ongoing ☐	January 2024	December 2027

Implementation Benchmarks: How Will Success Be Measured?

- Successfully find financial sources to fund the project for four years to develop the GIS system, initially populate it, provide products identified in other 2022 Mitigation Action Items, and have it read to allow participating agencies to maintain it forward.

Potential Challenges to Implementation

- Finding non-local financial resources to fund
- Having locals dedicate funds to complete the project
- Managing obtaining agreement on technical aspects of GIS (terminology, symbology, etc.)
- Hiring person(s) to complete the project

Resources and References, if Applicable

- FEMA Mitigation Ideas Publication: MU-1 Assess Community Risk, MU-2 Map Community Risk

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Fund one ½-time person to work on the project	$300,000	Project is fully developed and handed off to agencies, training is prepared and presented
Alternative #2	Fund a contractor to work on the project	$600,000	Project is fully developed and handed off to agencies, training is prepared and presented
Alternative #3	BUG agencies continue to work on project as staff is available	$300,000	Incremental progress is made over five years to coordinate and develop GIS products

Implementation Progress Report for Plan Maintenance	
Date	
What progress in implementation has been made to date?	
What challenges in implementation have been experienced?	
What are the next steps in implementation?	