Annex D: City of Hillsboro

1. Introduction

1.1. Planning Process Contact

The point of contact during the Washington County Natural Hazard Mitigation Plan (NHMP) planning process for the City of Hillsboro was the Emergency Program Manager.

1.2. Annex Organization

This annex has six sections that satisfy mitigation requirements 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

The information provided in this annex is for the City of Hillsboro alone. All pertinent information that is not identified in this annex is identified in other sections of this NHMP or within the respective appendices.

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 City will take the plan to City Council for final public comment and local adoption. A copy of the resolution was inserted into the NHMP and is held on file in the City of Hillsboro and 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.

City officials recognize the benefits of having a long-term, all-hazards approach to mitigating natural hazards. The passage of the Disaster Mitigation Act of 2000 (DMA 2000) enabled City officials to recognize the benefits of having a long-term, all-hazards approach to hazard mitigation and mitigating natural hazards. The City's involvement in the Washington County NHMP represents the collective efforts of the NHMP Steering Committee members, all participating local Technical Committee members, the public, and stakeholders

The City developed this annex in accordance with guidance outlined in 44 CFR §201.6(c)(5) of DMA 2000. The complete NHMP and this annex identify hazards and mechanisms to minimize damages associated with these hazards as they occur in the geographical area of the City.

2.2. Organizing the Planning Effort

A comprehensive approach was taken in developing this NHMP. An open involvement process was established for the public and all stakeholders, which provided an opportunity for everyone to be involved in the planning process and make their views known.

Two teams worked simultaneously on this mitigation plan:

1. **Hazard Mitigation Steering Committee:** This committee consisted of points of contact from each plan 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 that consisted 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. City of Hillsboro's Technical Committee

This annex within the NHMP was developed by the City of Hillsboro's local Technical Committee with support from IEM, a consulting firm hired to assist with the planning process. The efforts of the committee were led by the City's Emergency Program Manager throughout 2022.

Table 133: City of Hillsboro Technical Committee Members for the 2023 NHMP

Job Title and Department	Role in Committee and Planning Process
Emergency Program Manager, Fire and Rescue	General oversight, hazard identification, and plan development
Emergency Management Officer, Fire and Rescue	Hazard identification and plan development
Management Analyst, Human Resources/Risk	Hazard identification and plan development
Senior Project Manager, City Manager's Office	Hazard identification and plan development
Senior Program Manager, Water	Hazard identification and plan development
Management Analyst, Water	Hazard identification and plan development
Fire Chief, Fire and Rescue	Hazard identification and plan development
Development Services Manager, Planning/Community Development	Hazard identification and plan development
Building Division Director, Building Division	Hazard identification and plan development
Public Works Director, Public Works	Hazard identification and plan 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 City, 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 City 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 City of Hillsboro in determining and prioritizing appropriate mitigation action items to reduce losses from identified hazards.

3.1. Changes in Development Since Adoption of the 2017 NHMP

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

Since the 2017 Washington County NHMP was adopted, the City's population has increased approximately 9%. This has led to an increase in single-family residential development to meet the demand of population growth and the expansion of the City's Urban Growth Boundary (UGB) as needed to accommodate forecasted residential or employment growth needs. While expansion of the UGB can increase vulnerability to natural hazards, the City has focused on minimizing or eliminating vulnerability in the UGB and throughout the City by creating and enforcing policies focused on minimizing impacts of natural hazards on people and property, providing information and services to support disaster preparedness and recovery for people of all ages, abilities, cultures, and incomes; improving coordination

with public and private partners; building capacity for greater urban resilience; and managing and maintaining spatial, demographic, and economic data to support hazard mitigation planning.[382]

The Hillsboro 2035 Community Plan includes the vision statement of "In 2035, Hillsboro is an inclusive, welcoming multicultural community that supports a resilient, world-class economy and dynamic urban tapestry while continuing to honor the City's agricultural heritage and commitment to environmental stewardship."[383] The work and initiatives the City has undertaken since the 2017 NHMP have focused on fulfilling this vision statement.

3.2. Community Profile

This section provides information on City-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 City-specific assets during the planning process may assist in identifying appropriate measures for natural hazard mitigation.

The following table reflects the community demographics and vulnerable populations in the City. This information was gathered from the U.S. Census, Portland State University, and the City of Hillsboro.

Table 134: Community Demographics*

Population	Total	Percent Change
2010 population[384]	91,611	
2021 population[385]	108,154	+18.1%
2035 forecasted population	114,323	+5.7%
Race and Ethnicity[386]	**Total**	**Percent of Population**
White alone	61,512	57%
Black or African American alone	3,122	3%
American Indian and Alaska Native alone	1,428	1%
Asian alone	13,411	18%
Native Hawaiian and Other Pacific Islander alone	568	0.5%
Two or more races	12,033	18%
Hispanic/Latino/a/x	26,339	24%

[382] City of Hillsboro. (2017, November 21). Hillsboro Comprehensive Plan. https://www.hillsboro-oregon.gov/home/showpublisheddocument/16832/637995422246570000
[383] City of Hillsboro. (2020, August). Hillsboro 2035 Community Plan. https://www.hillsboro2035.org/wp-content/uploads/2021/07/Plan-Update-2020_English_VER23_web.pdf
[384] United States Census Bureau. (2010, April 1). QuickFacts Hillsboro City, Oregon. Accessed August 15, 2022, from https://www.census.gov/quickfacts/hillsborocityoregon
[385] Portland State University Population Research Center. (2022). Population Estimate Reports. https://www.pdx.edu/population-research/population-estimate-reports
[386] United States Census Bureau. (2021, July 1). 2016–2020 American Community Survey 5-Year Estimates Demographic and Housing Estimates, Table DP05. Accessed November 30, 2022, from https://data.census.gov/cedsci/table?q=hillsboro%20oregon&tid=ACSDP5Y2020.DP05

Language Spoken at Home[387]	Percent of Population
English only	69.2%
Spanish	17.8%
Indo-European languages	4.5%
Asian and Pacific Island languages	7.4%
Other languages	1.1%
Vulnerable Age Groups[388]	**Percent of Population**
Less than 15 years of age	13%
65 years and older	11%
Disability Status[389]	**Percent of Population**
Total	10%
Less than 17 years of age	7%
65 years and older	25%

*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

The City of Hillsboro is in central Washington County, about 10 miles west of Portland. It is the largest city in Washington County and serves as the county seat.

All of Hillsboro is located within the watershed of the Tualatin River. Hillsboro's dominant natural landscape features are the Tualatin River and its tributaries, including Dairy, McKay, Dawson, and Rock Creeks, as well as the Jackson Bottom Wetlands Area along the Tualatin River. Hillsboro is relatively flat, but the Coastal Range is to the west, Tualatin Hills is to the north, Portland's West Hills and Mount Hood are to the east, and Chehalem Mountain is to the south.

The climate for Hillsboro is moderate. Mean daily temperatures range from highs of about 81 °F and lows of about 52 °F in July and August, to highs of about 45 °F and lows of about 33 °F in December and January. The average annual rainfall is about 38 inches. Average monthly precipitation varies from 6 to 7 inches in November through January to about 0.5 inches in July. Average annual snowfall is about 5 inches, although many years have no measurable snow.

The following tables reflect the community demographics, vulnerable facilities in the jurisdiction, and the critical facilities and infrastructure that are exposed to the identified hazards and could be impacted. This information was gathered from the U.S. Census, Portland State University, and from the City of Hillsboro.

[387] United States Census Bureau. (2021, July 1). 2016–2020 American Community Survey 5-Year Estimates, Language Spoken at Home, Table S1601. Accessed November 30, 2022, from https://data.census.gov/cedsci/table?q=hillsboro%20oregon%20language&tid=ACSST5Y2020.S1601
[388] United States Census Bureau. (2021, July 1). 2016–2020 American Community Survey 5-Year Estimates, Age and Sex, Table S0101. Accessed November 30, 2022, from https://data.census.gov/cedsci/table?q=hillsboro%20oregon%20age
[389] United States Census Bureau. (2021, July 1). 2016–2020 American Community Survey 5-Year Estimates, Disability Characteristics, Table S1810. Accessed November 30, 2022, from https://data.census.gov/cedsci/table?q=hillsboro%20oregon%20disability

3.2.2. Transportation, Infrastructure, and Housing

3.2.2.1. Transportation

Critical transportation routes in Hillsboro include Oregon Route 8, known locally as the Tualatin Valley Highway (TV Highway), the primary east–west highway. US Highway 26, also known as the Sunset Highway, bisects the northeast corner of the City. Other major east–west roads are Cornell Road and Main Street (also known as Baseline Road). Major north–south routes are Oregon Route 219/1st Avenue, 10th Avenue, Cornelius Pass Road, and Brookwood Parkway. The easternmost north–south route, 185th Avenue, borders the City of Beaverton and runs between the Tanasbourne Town Center and the rest of Hillsboro. TV Highway connects to the cities of Cornelius and Forest Grove to the west and Beaverton to the east.

The Hillsboro Airport, which is owned, operated, and maintained by the Port of Portland, is located on the north side of the City. With over 200,000 operations annually, it is the second busiest airport in the state (second only to Portland International Airport) and the busiest “general aviation” airport in Oregon. It is a 900-acre executive airport with three runways (6,600 feet, 3,821 feet, and 3,600 feet) and four full-service fixed-base operators, and it provides all the facilities necessary to support jet and propeller-driven aircraft and helicopters. Hillsboro Airport is one of the sites of the Oregon International Airshow.

The Tri-County Metropolitan Transit District (TriMet) provides light rail commuter service from Hillsboro to Beaverton, Portland, and east Multnomah County and bus service throughout the tri-county region. The Southern Pacific Railroad provides limited freight service through Hillsboro.

During the workday, more than 50,000 employees commute to the City by car, bicycle, bus, or light rail train to work.

3.2.2.2. Infrastructure

The City of Hillsboro critical and vulnerable facilities listed below in Table 135 may be vulnerable to one or more natural hazards.

Table 135: Critical Facility and Asset Inventory

Name of Infrastructure, Facility, or Resource	Type of Asset	Address	Comments
Hillsboro Garbage Disposal Waste Re-Load Facility	Infrastructure or Facility	4945 SW Minter Bridge Road	Owned by Hillsboro Garbage, Hillsboro solid waste franchisee
Hillsboro Landfill	Infrastructure or Facility	3205 SE Minter Bridge Road	Owned by Waste Management, Inc., Hillsboro solid waste franchisee
Hidden Creek Community Center	Infrastructure or Facility	5100 NE Hidden Creek Drive	
Fiber Hut	Infrastructure or Facility	Redacted	
Civic Center	Infrastructure or Facility	150 E. Main Street	
Facilities - Maintenance Shop	Infrastructure or Facility	1890 NE Griffin Oaks Street	
Fire - Parkwood Logistics	Infrastructure or Facility	275 NE 25th Avenue	
Fire - Station 1 Main	Infrastructure or Facility	240 S 1st Avenue	
Fire - Station 2 Brookwood	Infrastructure or Facility	5045 SE Drake Road	
Fire - Station 3 Ronler	Infrastructure or Facility	4455 NE Century Blvd	
Fire - Station 5 Jones	Infrastructure or Facility	2850 NE 25th Avenue	Contains Fire and Police Department Operations Center
Fire - Station 6 Cherry	Infrastructure or Facility	1225 NE Cherry Lane	Contains City Emergency Operations Center
Fire - Wood St. Training Center	Infrastructure or Facility	620 SW Wood Street	
Fleet - Evergreen	Infrastructure or Facility	4437 NE 30th Avenue	

Name of Infrastructure, Facility, or Resource	Type of Asset	Address	Comments
Intermodal Transit Facility - Bike	Infrastructure or Facility	775 SE Baseline Street	
Intermodal Transit Facility - East Side	Infrastructure or Facility	285 SE 8th Avenue	
Intermodal Transit Facility - Pacific University	Infrastructure or Facility	775 SE Baseline Street	
Intermodal Transit Facility - Parking Structure	Infrastructure or Facility	253 SE 8th Avenue	
Intermodal Transit Facility - Portland Community College	Infrastructure or Facility	775 SE Baseline Street	
Library - Brookwood	Infrastructure or Facility	2850 NE Brookwood Pkwy	
Library - Shute	Infrastructure or Facility	775 SE 10th Avenue	
Parking Lot - 2nd & Lincoln	Infrastructure or Facility	257 NE 2nd Avenue	
Parking Lot - 2nd & Washington	Infrastructure or Facility	202 SE 2nd Avenue	
Parking Lot - 300 West Main	Infrastructure or Facility	300 W. Main Street	
Parks - 53rd Ave Concession	Infrastructure or Facility	250 NE 53rd Avenue	
Parks - Administration	Infrastructure or Facility	4400 NE Century Boulevard	
Parks - Ballpark/Hops/Ron Tonkin	Infrastructure or Facility	4460 NE Century Boulevard	
Parks - Cultural Arts Center	Infrastructure or Facility	527 E. Main Street	
Parks - Hidden Creek Community Center	Infrastructure or Facility	5100 NE Hidden Creek Drive	

Name of Infrastructure, Facility, or Resource	Type of Asset	Address	Comments
Parks - Jackson Bottom Wetland	Infrastructure or Facility	2600 SW Hillsboro Highway	
Parks - Maintenance	Infrastructure or Facility	450 NE 53rd Avenue	
Parks - Masters House	Infrastructure or Facility	20650 SW Kinnaman Road	
Parks - McDonald House	Infrastructure or Facility	22180 NW Birch Street	
Parks - Patterson House	Infrastructure or Facility	5207 SE Patterson Street	
Parks - River House	Infrastructure or Facility	4000 SE Rood Bridge Road	
Parks - Senior Center	Infrastructure or Facility	750 SE 8th Avenue	
Parks - Shute Aquatic and Recreation Center	Infrastructure or Facility	953 SE Maple Street	
Parks - Shute Aquatic and Recreation Center Annex	Infrastructure or Facility	626 SE 9th Avenue	
Parks - Stadium/Gordon Faber Recreation Complex/Canadians	Infrastructure or Facility	4450 NE Century Boulevard	
Parks - Tyson Rec	Infrastructure or Facility	1880 NE Griffin Oaks Street	
Police - East Precinct	Infrastructure or Facility	8695 NE Cornell Road	
Police - Maple Street Training	Infrastructure or Facility	142 SE Maple Street	
Police - West Precinct	Infrastructure or Facility	250 SE 10th Avenue	
Public Works - Evergreen	Infrastructure or Facility	4415 NE 30th Avenue	Contains Public Works Department Operations Center

Name of Infrastructure, Facility, or Resource	Type of Asset	Address	Comments
Water - Operations	Infrastructure or Facility	390 W. Main Street	Contains Water Department Operations Center
Crandall Reservoir	Infrastructure or Facility	30575 NW Evergreen Road	
Evergreen Reservoir	Infrastructure or Facility	5540 NW Evergreen Parkway	
24th Ave Reservoir	Infrastructure or Facility	250 NE 24th Avenue	
Clean Water Services Rock Creek Wastewater Treatment Plant	Infrastructure or Facility	3125 SE River Road	
Clean Water Services Quality Lab	Infrastructure or Facility	2550 SW Hillsboro Highway	
Clean Water Services Wastewater Treatment Plant	Infrastructure or Facility	770 S. First Avenue	
Metro West Ambulance	Infrastructure or Facility	5475 NE Dawson Creek Road	
Oregon Health and Science University (OHSU) Hillsboro Medical Center	Infrastructure or Facility	335 SE 8th Avenue	
Kaiser Westside Medical Center	Infrastructure or Facility	19301 NW Venetian Drive	
OHSU West Campus	Infrastructure or Facility	505 NW 185th Avenue	
Orenco Elementary School	Infrastructure or Facility	22550 NW Birch Street	
Quatama Elementary School	Infrastructure or Facility	6905 NE Campus Way	
Tualatin Valley Junior Academy	Infrastructure or Facility	21975 SW Baseline Road	
West Union Elementary School	Infrastructure or Facility	2387 NW West Union Road	

Name of Infrastructure, Facility, or Resource	Type of Asset	Address	Comments
Farmington View Elementary	Infrastructure or Facility	8300 SW Hillsboro Highway	
Groner Elementary School	Infrastructure or Facility	23405 SW Scholls Ferry Road	
Eastwood Elementary School	Infrastructure or Facility	2100 NE Lincoln Street	
J.W. Poynter Middle School	Infrastructure or Facility	1535 NE Grant Street	
Mooberry Elementary School	Infrastructure or Facility	1230 NE 10th Avenue	
Carden Cascade Academy	Infrastructure or Facility	770 NE Rogahn Street	
Brookwood Elementary School	Infrastructure or Facility	3960 SE Cedar Street	
Century High School	Infrastructure or Facility	2000 SW Century Blvd.	
City View Charter School	Infrastructure or Facility	1771 SE Minter Bridge Road	
Hillsboro High School	Infrastructure or Facility	3285 SE Rood Bridge Road	
Imlay Elementary School	Infrastructure or Facility	5900 SE Lois Street	
Ladd Acres Elementary	Infrastructure or Facility	2425 SW Cornelius Road	
Minter Bridge Elementary School	Infrastructure or Facility	1750 SE Jacquelin Drive	
R.A. Brown Middle School	Infrastructure or Facility	1505 SW Cornelius Pass Road	
Rosedale Elementary School	Infrastructure or Facility	3901 SW 229th Avenue	

Name of Infrastructure, Facility, or Resource	Type of Asset	Address	Comments
South Meadows Middle School	Infrastructure or Facility	4690 SE Davis Road	
W. L. Henry Elementary School	Infrastructure or Facility	1060 SE 24th Avenue	
Witch Hazel Elementary School	Infrastructure or Facility	4950 SW Davis Road	
Faith Bible Christian High School	Infrastructure or Facility	2299 SE 45th Avenue	
Evergreen Middle School	Infrastructure or Facility	29850 NW Evergreen Road	
Glencoe High School	Infrastructure or Facility	2700 NW Glencoe Road	
Hillsboro Online Academy	Infrastructure or Facility	452 NE 3rd Avenue	
Jackson Elementary School	Infrastructure or Facility	675 NE Estate Drive	
Lincoln St. Elementary School	Infrastructure or Facility	801 NE Lincoln Street	
Miller Education Center - Options Program	Infrastructure or Facility	215 SE 6th Avenue	
Miller Education Center 6–12 grades	Infrastructure or Facility	440 SE Oak Street	
Liberty High School	Infrastructure or Facility	21945 NW Wagon Way	
Paul L. Patterson Elementary School	Infrastructure or Facility	261 NE Lenox Street	
W. Verne McKinney Elementary School	Infrastructure or Facility	535 NW Darnielle Street	
St. Matthew Elementary School	Infrastructure or Facility	221 SE Walnut Street	
Johnson House	Historical Property	771 NE Third Avenue	

Name of Infrastructure, Facility, or Resource	Type of Asset	Address	Comments
Faull House	Historical Property	123 NW Garibaldi Street	
Wilfert House	Historical Property	868 SE Washington Street	
Warren Oak Trees	Historical Property	1023–1093 E. Main Street	
Shorey House	Historical Property	905 E Main Street	National Registry Site
Williams Developmental Learning Center Oak Tree	Historical Property	2170 NE Cornell Road	
Shute Estate	Historical Property	210 SE Twelfth Avenue	
Bergen House	Historical Property	2009 E. Main Street	
Shute House I	Historical Property	2140 E. Main Street	
Brogden House	Historical Property	2846 NE Brogden Street	
Tongue Estate	Historical Property	328 W Main Street	
Emmott House	Historical Property	425 SE 26th Avenue	
Douglas Fir Tree	Historical Property	356 SE Sixth Avenue	Tree only
Walker House	Historical Property	711 SE Maple Street	
Hoag House	Historical Property	308 SE Maple Street	
Master House	Historical Property	565 SE Heathcliff Lane	
Freudenthal House	Historical Property	2025 SE Jean Court	
The Manor (Wells House)	Historical Property	725 SE Seventh Avenue	
Burger People	Historical Property	626 SE 9th Avenue; relocated from original site	
Pioneer Cemetery	Historical Property	1601 SE Baseline Street	
Richard D. Malone House	Historical Property	258 NE 2nd Avenue	
Robert Busch House	Historical Property	261 NE 3rd Avenue	
Five Oaks	Cultural Resource	NE Casper Court, South of NE Jacobsen Street and Helvetia Road	
Hillsboro Artists' Regional Theatre (HART)	Cultural Resource	185 SE Washington Street	National Registry Site

Name of Infrastructure, Facility, or Resource	Type of Asset	Address	Comments
Sewell Clay Works site	Cultural Resource	Southeast corner of Evergreen & Sewell Roads	
McGill/Pitman House	Cultural Resource	6810 NE Cherry Drive	
Orenco Presbyterian Church	Cultural Resource	6815 NE Birch Street	
Orenco Presbyterian Church Manse	Cultural Resource	6851 NE Birch Street	
Methodist Meeting House Site	Cultural Resource	East of NE Starr Boulevard, North of NE Evergreen Road	
McDonald House	Cultural Resource	7248 NE Birch Street	National Registry Site
Mincemoyer House	Cultural Resource	102 NE Century Boulevard	
Orenco Grocery	Cultural Resource	6698 NE Alder Street	
Berry House	Cultural Resource	1255 NE 68th Avenue	
Oelrich House	Cultural Resource	1135 NE 68th Avenue	
Wilson House	Cultural Resource	6694 NE Chestnut Street	
Holmasen House	Cultural Resource	6917 NE Quatama Street	
McFadden House	Cultural Resource	6724 NE Birch Street	
Orenco Drug	Cultural Resource	6750 NE Alder Street	
McGee House	Cultural Resource	6796 NE Birch Street	
Johnson–Belluschi House	Cultural Resource	1513 NE Stile Drive	
Jackson Bottom Wetlands Preserve	Natural Resource	2600 SE Hillsboro Highway	Major wetland area and home to several native sensitive species

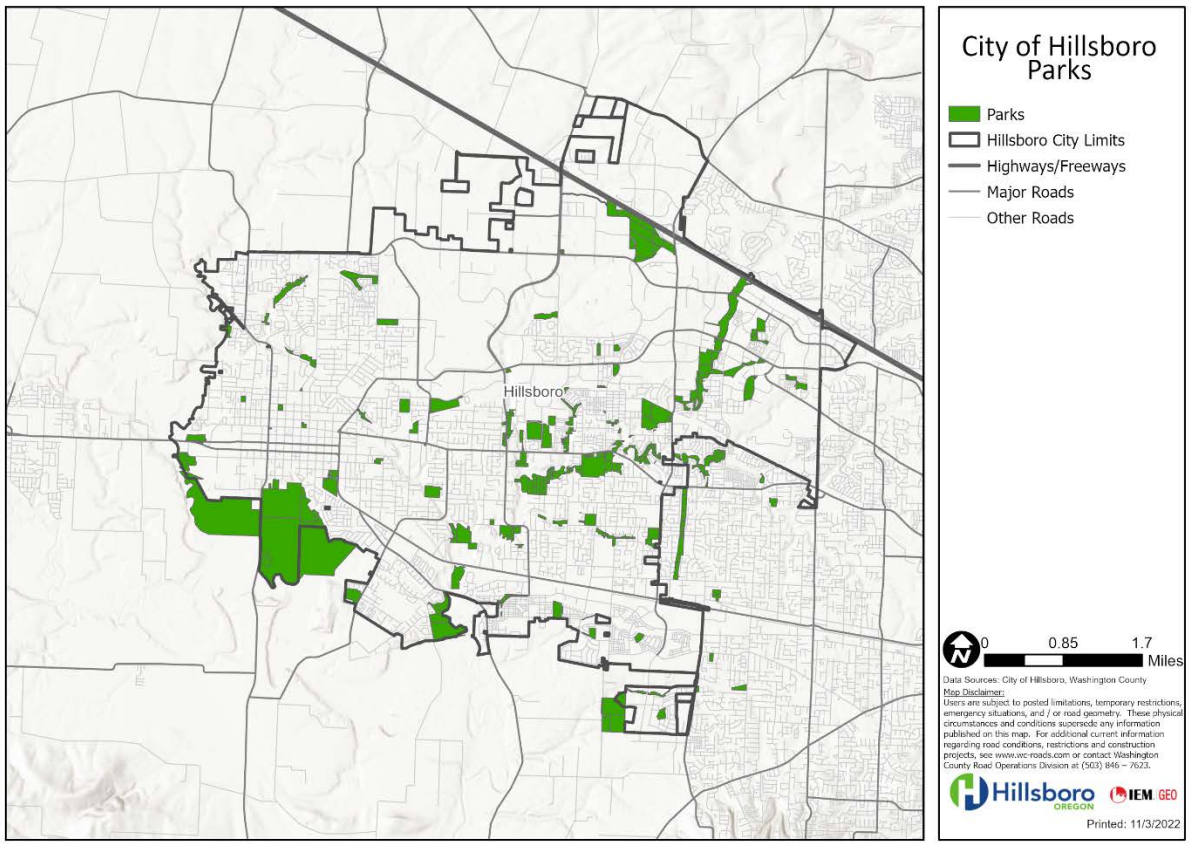

Figure 32: City of Hillsboro Parks and Greenspaces

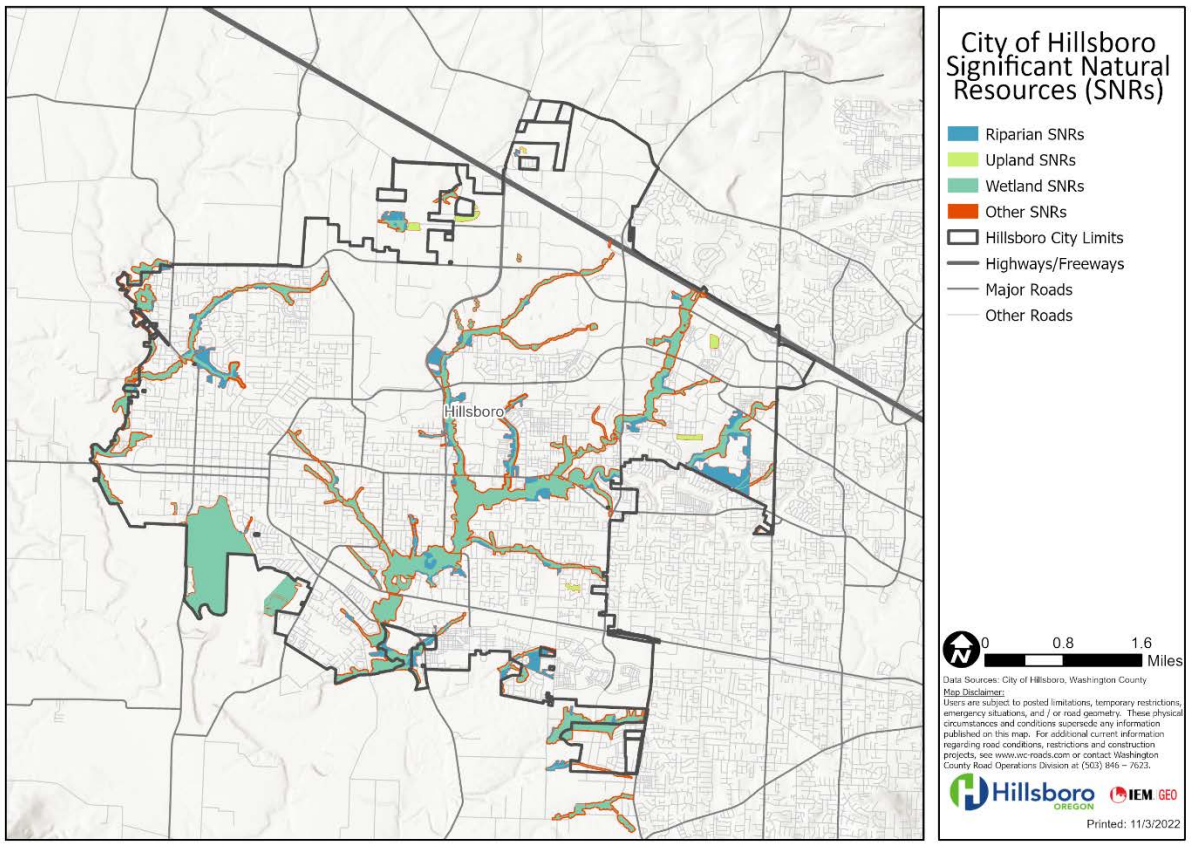

Figure 33: City of Hillsboro Significant Natural Resources

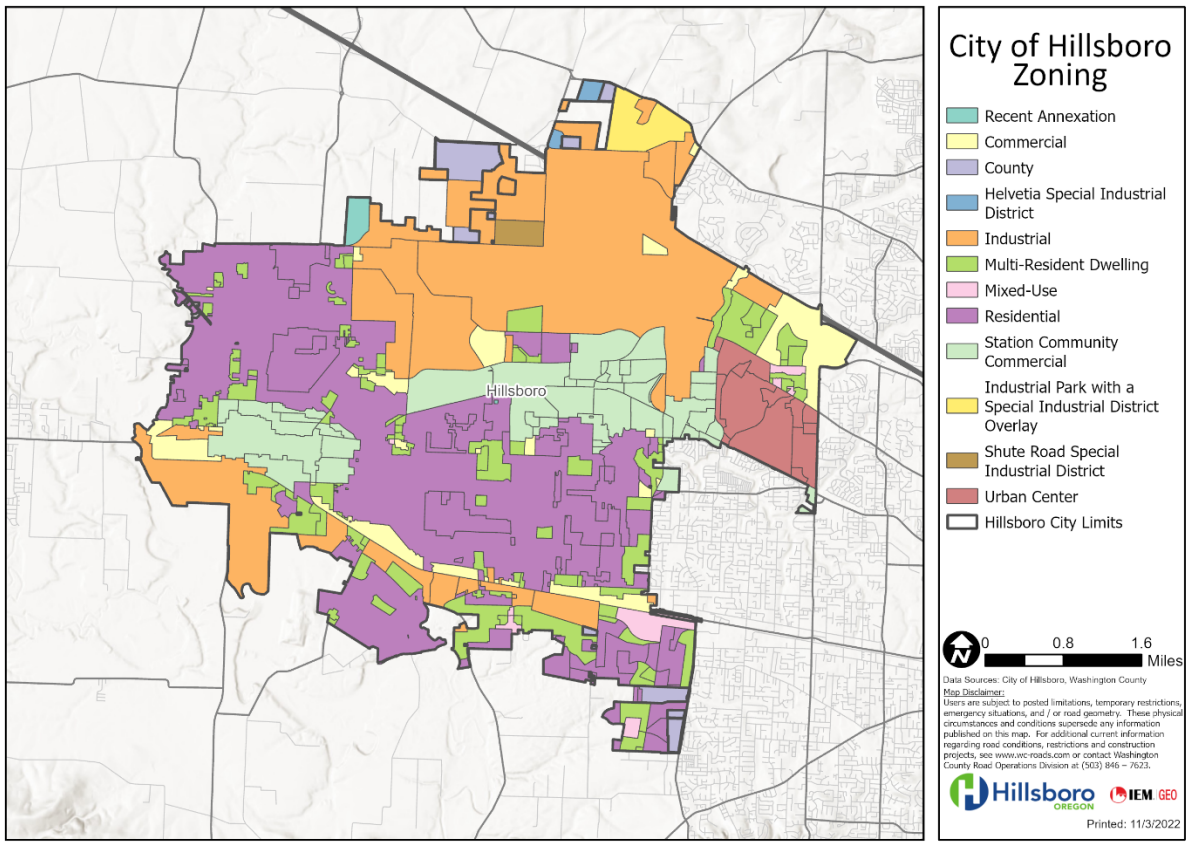

Figure 34: City of Hillsboro Zoning

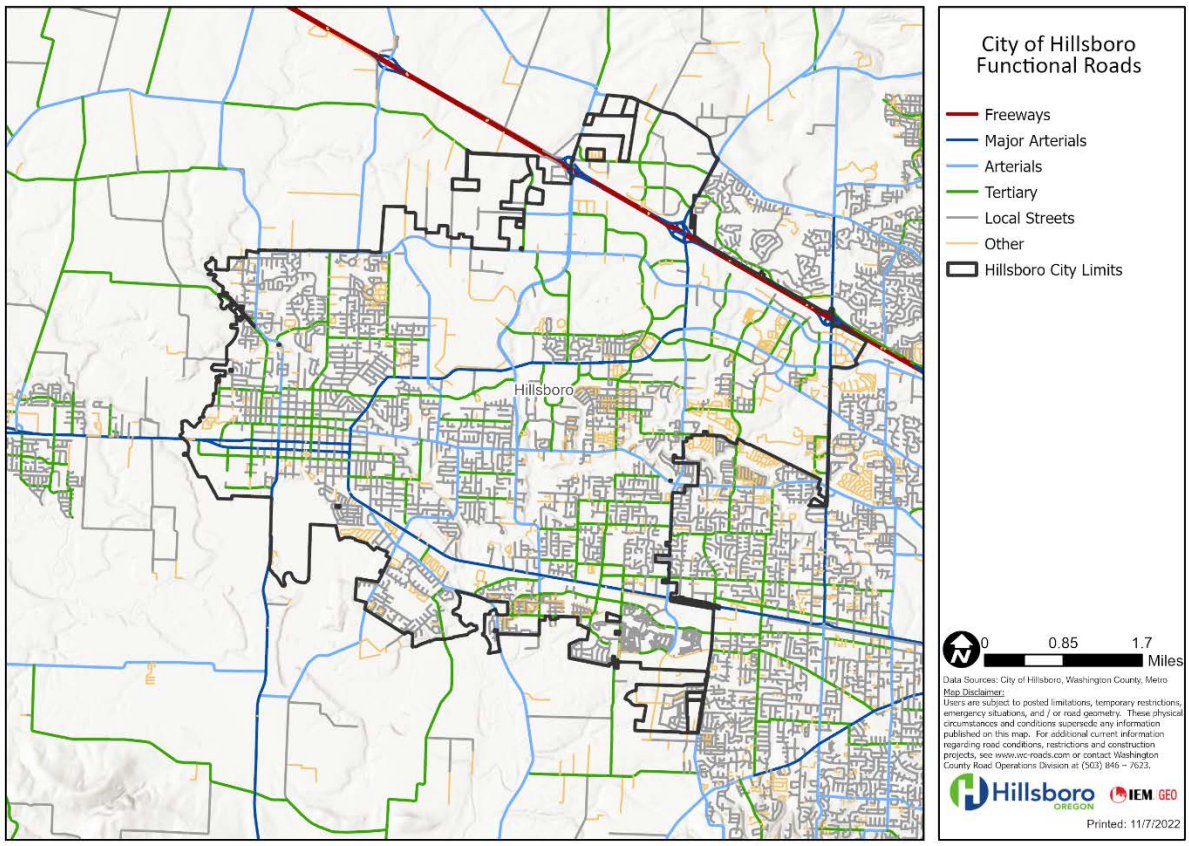

Figure 35: City of Hillsboro Functional Road Classifications

3.2.2.3. Housing

Housing characteristics are an important factor in mitigation planning. The information below 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 136: Housing Characteristics*

Households	Total
Total households[390]	38,903
Units in Housing Structure[391]	**Percent of Housing**
One-unit structures	63%
Structures with two or more units	36%
Manufactured homes and all other types	1%
Year Housing Structure Built[392]	**Percent of Housing**
Pre-1979	26%
1980–1999	37%
2000 to present	37%
Housing Tenure and Vacancy	**Percent of Housing**
Owner-occupied[393]	53%
Renter-occupied[394]	47%
Vacant[395]	5%

* 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

Hillsboro is in the “silicon forest” and is known as the “high-tech hub of Oregon” or the “tallest tree in the silicon forest.” Companies such as Intel and Genentech are large employers in the City, in addition to

[390] United States Census Bureau. (2021, July 1). 2016–2020 American Community Survey 5-Year Estimates, Households and Families, Table S1101. Accessed November 30, 2022, from https://data.census.gov/cedsci/table?q=hillsboro%20oregon%20housing&tid=ACSST5Y2020.S1101
[391] United States Census Bureau. (2021, July 1). 2016–2020 American Community Survey 5-Year Estimates, Households and Families, Table S1101. Accessed November 30, 2022, from https://data.census.gov/cedsci/table?q=hillsboro%20oregon%20housing&tid=ACSST5Y2020.S1101
[392] 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 November 30, 2022, from https://data.census.gov/cedsci/table?q=hillsboro%20oregon%20housing&tid=ACSST5Y2020.S2504
[393] United States Census Bureau. (2021, July 1). 2016–2020 American Community Survey 5-Year Estimates, Households and Families, Table S1101. Accessed November 30, 2022, from https://data.census.gov/cedsci/table?q=hillsboro%20oregon%20housing&tid=ACSST5Y2020.S1101
[394] United States Census Bureau. (2021, July 1). 2016–2020 American Community Survey 5-Year Estimates, Households and Families, Table S1101. Accessed November 30, 2022, from https://data.census.gov/cedsci/table?q=hillsboro%20oregon%20housing&tid=ACSST5Y2020.S1101
[395] United States Census Bureau. (2021, July 1). 2020 Decennial Census, Occupancy Status, Table H1. Accessed November 30, 2022, from https://data.census.gov/cedsci/table?q=hillsboro%20oregon%20housing&tid=DECENNIALPL2020.H1

government agencies and healthcare and education systems. Hillsboro is home to a research facility associated with Oregon Health and Sciences University, which includes the Regional Primate Center and Pacific University's College of Health Professions Campus.

Table 137: Income Characteristics[396]*

Households by Income Category	Percent of Households
Less than $5,000	2%
$5,000 to $9,999	2%
$10,000 to $14,999	2%
$15,000 to $19,999	2%
$20,000 to $24,999	2%
$25,000 to $34,999	6%
$35,000 to $49,999	9%
$50,000 to $74,999	19%
$75,000 to $99,999	14%
$100,000 to $149,999	22%
$150,000 or more	21%
Median Household Income	
$85,586	

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

[396] United States Census Bureau. (2021, July 1). 2016–2020 American Community Survey 5-Year Estimates, Financial Characteristics, Table S2503. Accessed November 30, 2022, from https://data.census.gov/cedsci/table?q=hillsboro%20oregon%20income&tid=ACSST5Y2020.S2503

3.3. Natural Hazard Profiles

The City of Hillsboro's Technical Committee utilized the OEM's hazard analysis methodology to examine hazard vulnerability and probability by collecting information about history, probability, vulnerability, and maximum threat for each hazard that impacts the City. 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.

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.

All natural hazards included in the NHMP have the potential to impact the City; however, due to geographic location and topography, the City cannot be directly impacted by dam failure and landslide. The City assigned relatively low scores to these hazards and identifies their potential impacts as secondary and not direct.

Table 138: Natural Hazard Risk Scores

Natural Hazard	History	Vulnerability	Maximum Threat	Probability	Score
Dam failure	Low	Medium	Medium	Low	81
Drought	High	High	Medium	High	184
Earthquake	Low	High	High	Medium	201
Extreme heat	High	Medium	High	High	179
Flooding, including channel migration and streambed erosion	High	Medium	Medium	High	159
Landslide	Low	Low	Low	Low	34
Volcanic ash	Low	Medium	High	Low	126
Wildland fire	High	Medium	High	High	177
Windstorm, including tornado	High	Medium	High	High	205
Winter storm	High	Medium	High	High	205

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 the City of Hillsboro was November 1, 2016, to February 22, 2022. Hazard events that occurred during this period and were deemed significant by the City'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 the 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

Due to geographic location and topography, the City cannot be directly impacted by dam failure. Any impacts in the City due to dam failure are identified as secondary and minimal. Potential impacts of and vulnerabilities to dam failure are identified below.

3.3.1.1. Potential Impacts

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

- If Scoggins Dam were to fail, areas in the south and southwest portions of the City within the established 100-year flood risk area of the Tualatin River could be impacted by flooding. There is not a significant amount of built development and population in the 100-year flood risk area that could be affected by a failure event.

3.3.1.2. Vulnerabilities

The built environment, critical facilities, infrastructure, and natural environment vulnerabilities to a dam failure event are identified below.

- The Jackson Bottom Wetlands Preserve may be vulnerable to dam failure. The preserve is owned and managed by the City; however, the area is not located within City limits. Despite not being located within the City, if the area were to be impacted, the City would be in charge of response and recovery actions.
- The Clean Water Services Hillsboro Treatment Facility is in the potential dam failure impact area. This facility provides wastewater treatment for the cities of North Plains and Banks, the western region of Hillsboro, the southeastern portion of Cornelius, and the northwestern portion of Forest Grove. The facility cleans approximately 4 million gallons of wastewater on an average day.[397]
- The Joint Water Commission (JWC) Water Treatment Plant could be vulnerable to flooding created by a Scoggins Dam failure event. The plant could be vulnerable to higher-than-normal water levels and damage to infrastructure due to debris flows, which could lead to changes in the amount of water available for use.

[397] Clean Water Services. (2022). Locations. https://cleanwaterservices.org/about/locations/

3.3.2. Drought

Drought typically occurs as a regional event and often affects more than one city and county simultaneously. The City is a member of the JWC and has water storage reservoirs. It therefore may be impacted by drought differently than other NHMP participants. Potential impacts of and vulnerabilities to drought are identified below.

3.3.2.1. Potential Impacts

The potential impacts of a drought event are identified below. The type, magnitude, and extent of impacts can vary based on the scale of the event. 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 in such industries as 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.

3.3.2.2. Vulnerabilities

All populations, economies, structures, improved property, critical facilities and infrastructure, historical properties and cultural resources, and natural environments in the City are vulnerable to drought. These include:

- People in the City with preexisting health conditions, those without access to clean water, children, pregnant women, and older adults. This may include those living in or spending time in the City's schools and medical care facilities.
- Those who are employed in water-dependent sectors, such as agriculture and recreation, may experience a reduction in income.
- Water supply sources of the upper Tualatin River and its tributaries.
- Critical infrastructure and facilities, including solid waste disposal facilities, city buildings and facilities, fiber huts, fire stations and facilities, intermodal transit facilities, parking lots, parks, a water operations center, wastewater treatment plants, a Clean Water Services Quality Lab, police stations, historical properties, including historical trees and landscaping, cultural resources, Jackson Bottom Wetlands Preserve, Oregon Health and Science University West Campus, schools and administrative facilities, ambulance service, and hospitals.
    - The City has three in-town storage reservoirs totaling 31 million gallons of treated water storage capacity. The City also owns Dilley Reservoir, located in Dilley, which provides an additional 650,000 gallons of storage.

- Other critical infrastructure, including arterial roads, TriMet light rail, communication structures, and emergency generators.

3.3.3. Earthquake

The City 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 impacts of and vulnerabilities to earthquake 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, historical properties and cultural resources, and natural environments in the City are vulnerable to earthquakes. These include:

- Critical infrastructure and facilities, including solid waste disposal facilities, city buildings and facilities, fiber huts, fire stations and facilities, intermodal transit facilities, parking lots, parks, a water operations center, wastewater treatment plants, a Clean Water Services Quality Lab, police stations, historical properties, including historical trees and landscaping, cultural resources, Jackson Bottom Wetlands Preserve, Oregon Health and Science University West Campus, schools and administrative facilities, ambulance service, and hospitals.
- Other critical infrastructure, such as pipelines and utility lines, arterial roads, TriMet light rail, communication structures, and emergency generators can be vulnerable to damage from liquefaction due to the type of soil in the City.
- Buildings in relatively high liquefaction-susceptible areas along Dairy Creek, Gales Creek, and the Tualatin River are at higher risk to damage from coseismic liquefaction-induced ground deformation.
- Unreinforced masonry buildings in the older central business district of the City are more vulnerable to potentially substantial damage during an earthquake compared to other nearby structures built to modern standards.[398]
- 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 vulnerable to major seismic damage.
- Buildings with very high or high collapse potential include residential and commercial buildings constructed prior to 1990. Nearly half of all structures in the City were built in or before 1980, with most of these structures being residential buildings.[399]
- Areas near the epicenter of an earthquake event are likely to incur a significant amount of damage to all buildings, infrastructure, facilities, and property.
    - Using 2022 Hazus®-MH information, it is estimated a 6.7 magnitude Gales Creek Fault earthquake event would result in 888 yellow-tagged buildings, 148 red-tagged buildings, and $426,257,000 in total economic losses.[400]
    - A 2018 Oregon Department of Geology and Mineral Industries (DOGAMI) report described the following earthquake scenarios and their potential impacts on Hillsboro[401]:
        - A Cascadia Subduction Zone magnitude 9.0 earthquake in “dry” soil conditions could result in $1,810,000,000 in building repair costs, 946,000 tons of debris, 938 long-term displaced residents, and up to 1,601 deaths.
        - A Cascadia Subduction Zone magnitude 9.0 earthquake in “wet” soil conditions could result in $2,884,000,000 in building repair costs, 1,280,000 tons of debris, 7,124 long-term displaced residents, and up to 2,986 deaths.

[398] 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
[399] City of Hillsboro. (2017, November 21). Hillsboro Comprehensive Plan. https://www.hillsboro-oregon.gov/home/showpublisheddocument/16832/637995422246570000
[400] 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
[401] Oregon Department of Geology and Mineral Industries. (2018). Earthquake Regional Impact Analysis for Clackamas, Multnomah, and Washington Counties, Oregon. https://www.oregongeology.org/pubs/ofr/O-18-02/O-18-02_report.pdf

- A Portland Hills Fault magnitude 6.8 earthquake in “dry” soil conditions could results in $3,320,000,000 in building repair costs, 1,476 thousand tons of debris, 2,116 long-term displaced residents, and up to 2,788 deaths.
- A Portland Hills Fault magnitude 6.8 earthquake in “wet” soil conditions could result in $5,269,000,000 in building repair costs, 2,063,000 tons of debris, 12,836 long-term displaced residents, and up to 5,247 deaths.

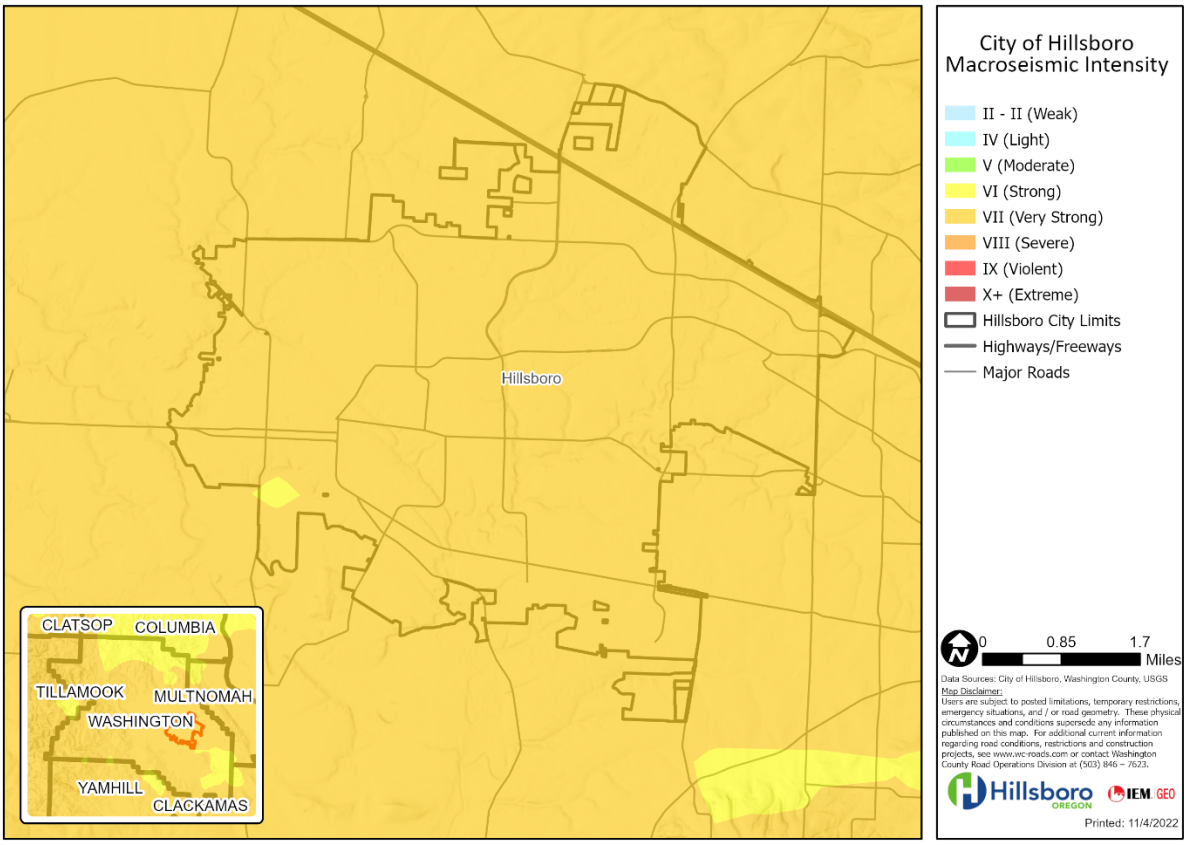

Figure 36: City of Hillsboro Perceived Shaking and Damage Potential of a Magnitude 9.0 Earthquake

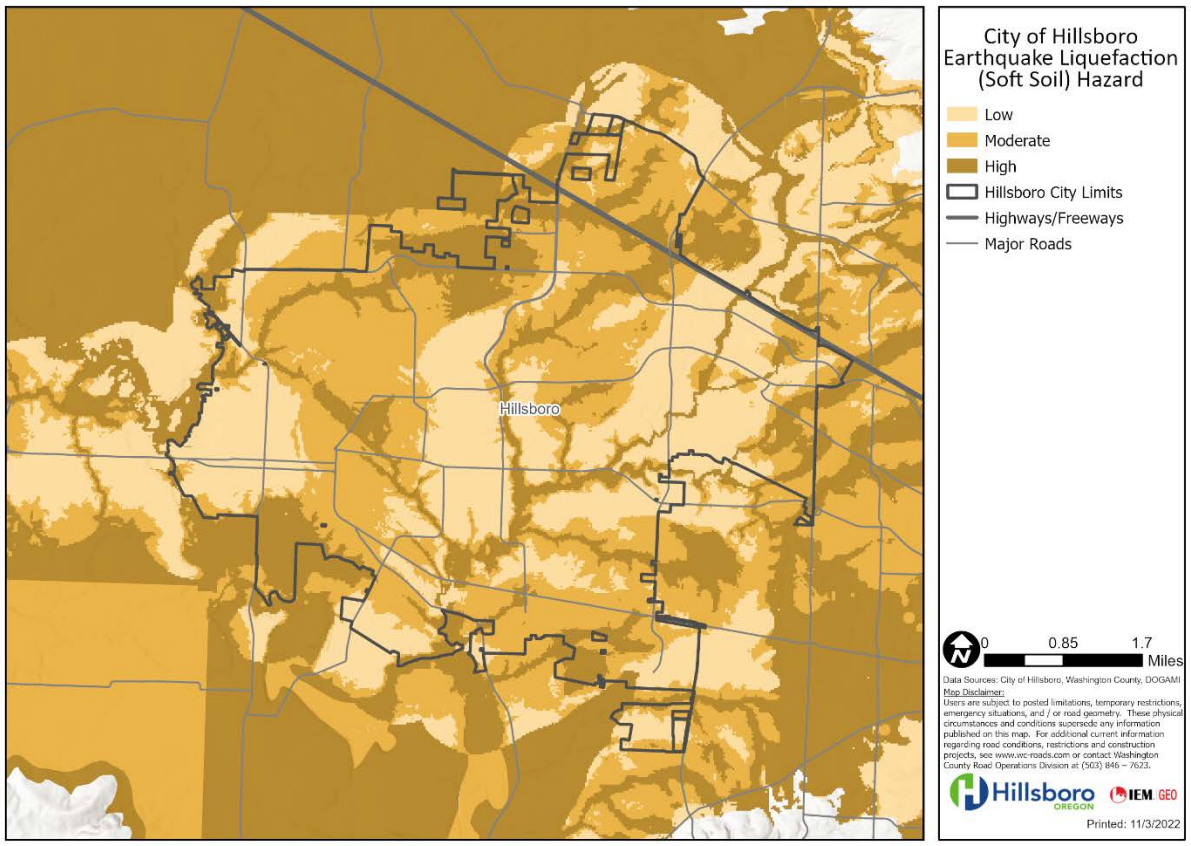

Figure 37: City of Hillsboro Liquefaction

3.3.4. Extreme Heat

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

3.3.4.1. Significant Events

Extreme heat was not included in previous NHMPs. The City identified two significant extreme heat events it has experienced.

- **June 26–29, 2021:** The maximum temperature reached 108 °F, with a heat index of 115 °F. Throughout Washington County there were numerous fatalities, closures and postponements of businesses and events, and buckled roads, and cooling shelters were opened.
- **August 11–24, 2021:** The high temperature at Hillsboro Airport was 103 °F, with a heat index of 109 °F on August 11 and 12. Peak afternoon temperatures ranged from 100 °F to 105 °F. Throughout the County there were fatalities, closures and postponements of businesses and events, and cooling shelters were opened.

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, historical properties and cultural resources, and natural environments in the City are vulnerable to extreme heat.

Populations substantially vulnerable to extreme heat include:

- People who work or spend a significant amount of time outdoors, including those in construction, landscaping, maintenance and repair, roofing, and solid waste collection.[402]
- People who live and/or work in buildings without air conditioning or cooling equipment. A City resident without a cooling source in his home died in June of 2021.[403]
- People living, working, or spending time in heat islands within the City.
- People living outdoors or in the upper floors of multi-family housing units.
- Populations with higher heat sensitivity, including older adults, infants and children, pregnant women, people with preexisting or chronic diseases, and those who take certain medications that affect thermoregulation or block nerve impulses. This may include those living in or spending time in the City's schools and medical care facilities.
- 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:

- A limited number of cooling centers and shelters are available for the public.
- Critical infrastructure and facilities, including solid waste disposal facilities, city buildings and facilities, fiber huts, fire stations and facilities, intermodal transit facilities, parking lots, parks, a water operations center, wastewater treatment plants, a Clean Water Services Quality Lab, police stations, historical properties, including historical trees and landscaping, cultural resources, Jackson Bottom Wetlands Preserve, Oregon Health and Science University West Campus, schools and administrative facilities, ambulance service, and hospitals.
- Other critical infrastructure, such as pipelines and utility lines, arterial roads, TriMet light rail, 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.

[402] Samayoa, Monica. (2021, July 21). *Hillsboro construction worker latest workplace heat death.* OPB. https://www.opb.org/article/2021/07/21/hillsboro-construction-worker-latest-workplace-heat-death/
[403] Forrest, Jack. (2021, July 8). *Daughter, longtime neighbor remember Washington County man who died in heat wave.* Oregon Live. https://www.oregonlive.com/news/2021/07/daughter-longtime-neighbor-remember-washington-county-man-who-died-in-heatwave.html

- 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 fire risk.
- Natural environments located throughout the City.
- Plants, animals, ecosystems, and natural environments are vulnerable to high rates of mortality due to excessive heat.

3.3.5. Flooding, Including Channel Migration and Streambed Erosion

Some degree of flooding is not uncommon in the County, and events typically occur from October through April. The City experiences localized flooding, but historically it has not been significant or severe. Potential impacts of and vulnerabilities to flooding are identified below. It is anticipated that flooding caused by a dam failure event would have similar impacts and create similar vulnerabilities as flood caused by other events.

3.3.5.1. 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 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.
- 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.

3.3.5.2. Vulnerabilities

Populations, economies, structures, improved property, critical facilities and infrastructure, historical properties and cultural resources, and natural environments vulnerable to a flooding event include:

- Populations without access to private transportation.
- Critical infrastructure and facilities, including solid waste disposal facilities, city buildings and facilities, fiber huts, fire stations and facilities, intermodal transit facilities, parking lots, parks, a water operations center, wastewater treatment plants, a Clean Water Services Quality Lab, police stations, historical properties, including historical trees and landscaping, cultural resources, Jackson Bottom Wetlands Preserve, Oregon Health and Science University West Campus, schools and administrative facilities, ambulance service, and hospitals.

- Other critical infrastructure, such as pipelines and utility lines, arterial roads, TriMet light rail, communication structures, and emergency generators.
- Natural environments such as Jackson Bottom Wetlands Preserve and historical landscaping and trees.
- Repetitive loss property within the City.
- Properties without flood insurance.
- Special flood hazard areas within the City.
- Portions of the City 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 identified drainage hazard areas include about two dozen areas within the City.
- The following street intersections in the City have been identified as prone to flooding:
  - Highway 219 at Wood Street
  - Glencoe Road at Harewood Street
  - Brookwood Avenue at curve north of SW Golden Road
  - NW 317th Avenue at Jackson Street
  - Bridge at River Road at Rood Bridge Road
  - NW Paget Road at NW 10th Avenue
  - NW 9th Avenue at Hertie Road
- Flood loss estimates determined by Hazus-MH include[404]:
  - 10-year flood scenario
    - Number of buildings lost: 39
    - Loss estimate: $922,000
  - 50-year flood scenario
    - Number of buildings lost: 66
    - Loss estimate: $1,995,000
  - 100-year flood scenario
    - Number of buildings lost: 74
    - Loss estimate: $2,547,000
  - 500-year flood scenario
    - Number of buildings lost: 141
    - Loss estimate: $6,173,000

[404] 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

Table 139: Land Use Type in the 100-Year Floodplain

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
Agriculture	14	$63,516,600	609.14	284.53	46.7%
Commercial	59	$326,050,420	3,234.64	322.98	9.99%
Forest	4	$5,355,460	25.92	23.2	89.5%
Industrial	4	$80,858,220	676.17	166.87	24.68%
Multi-Family Residential	15	$562,701,460	539.94	134.23	24.86%
Public	153	$133,689,890	2,105.88	916.34	43.5%
Rural	1	$415,660	1.24	0.92	74.2%
Single Family Residential	611	$340,338,860	4,213.51	442.96	10.5%
Vacant	67	$9,033,530	293.89	100.79	34.3%
Other	98	$379,228,190	2,276.6	962.16	42.3%
Total	**1,026**	**$1,901,188,290**	**13,976.93**	**3,354.98**	**24%**

Table 140: Buildings in Hillsboro within FEMA-Mapped Floodplains

Buildings	Buildings Within Hillsboro	Buildings Within 100-Year Floodplain
Total Buildings	43,004	228
Percentage of Buildings within Hillsboro	100%	0.53%

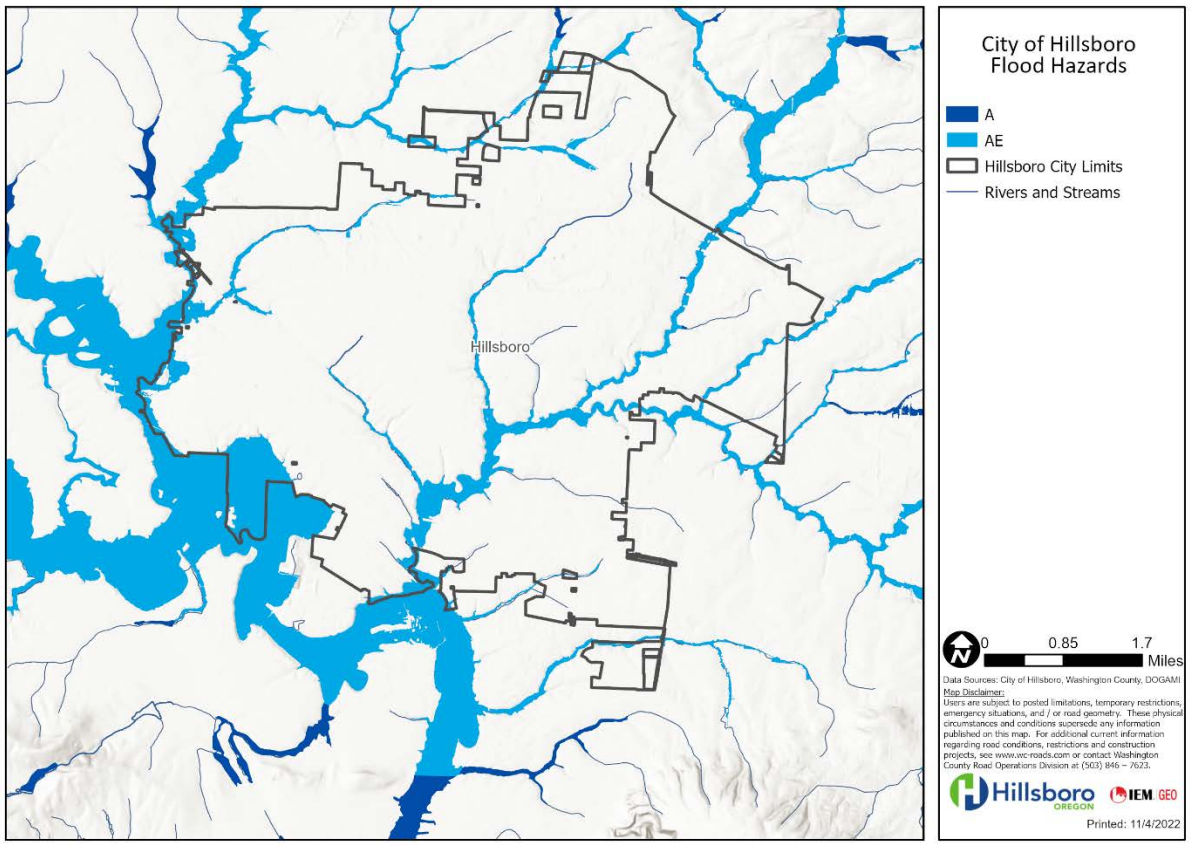

Figure 38: City of Hillsboro Flood Hazards

3.3.6. Landslide

Due to geographic location and topography, the City cannot be directly impacted by landslides. Any impacts in the City due to landslides are identified as secondary. Potential impacts of and vulnerabilities to landslides are identified below.

3.3.6.1. Potential Impacts and Vulnerabilities

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

- The potential for landslide impacts in the City is minimal with the possible exception of very small areas immediately adjacent to stream channels. Buildings built along Rock Creek in Hillsboro are at higher risk of damage from landslides than other adjacent areas[405]; however, the potential impact is minimal.
- 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.

[405] 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 from the Cascade Volcanoes. It is anticipated that ashfall from a volcanic eruption has the potential to impact the City, 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 impacts of 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, and may include:

- 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, historical properties and cultural resources, and natural environments in the City are vulnerable to volcanic ash. These include:

- People in the City with chronic lung problems and other preexisting health conditions, children, pregnant women, and older adults. This may include those living in or spending time in the City's schools and medical care facilities.
- People without access to effective dust masks, eye protection, and drinking water and food uncontaminated by volcanic ash.

- Critical infrastructure and facilities, including solid waste disposal facilities, city buildings and facilities, fiber huts, fire stations and facilities, intermodal transit facilities, parking lots, parks, a water operations center, wastewater treatment plants, a Clean Water Services Quality Lab, police stations, historical properties, including historical trees and landscaping, cultural resources, Jackson Bottom Wetlands Preserve, Oregon Health and Science University West Campus, schools and administrative facilities, ambulance service, and hospitals.
- Other critical infrastructure, including arterial roads, TriMet light rail, communication structures, and emergency generators.
- Older buildings and infrastructure not built to withstand the weight and impacts of large amounts of volcanic ash, including manufactured homes and buildings, and the people who live or work in them.

3.3.8. Wildland Fire

Although the City could experience a wildland–urban interface event, historically the City is more likely to be affected by smoke and poor air quality due to wildland fires outside its boundaries. Previous events and potential impacts of and vulnerabilities to wildland fire are identified below.

3.3.8.1. Significant Events

The City has not been directly impacted by a wildland fire event since adoption of the 2017 NHMP. However, in September 2020, multiple wildland fires occurred concurrently in the County, outside the County, and outside the state, and the City experienced significant smoke from the fires. The Air Quality Index in the City was between 199 and 317 with particulate matter 2.5 micrometers or smaller ($PM_{2.5}$).

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. 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 roads 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

Given the dynamic nature of wildland fires, all populations, economies, structures, improved property, critical facilities and infrastructure, historical properties and cultural resources, and natural environments in the City are vulnerable to this hazard. These include:

- People in the City with chronic lung problems and other preexisting health conditions, children, pregnant women, and older adults. This may include those living in or spending time in the City's schools and medical care facilities.
- Populations without access to private transportation.
- First responders and other personnel working directly on fire protection, suppression, and patrols or near a wildland fire can experience burns, smoke exposure, heat-related impacts such as heat stroke, heat exhaustion, dehydration, physical fatigue, mental health challenges, injuries, and death.
- Critical infrastructure and facilities, including solid waste disposal facilities, city buildings and facilities, fiber huts, fire stations and facilities, intermodal transit facilities, parking lots, parks, a water operations center, wastewater treatment plants, a Clean Water Services Quality Lab, police stations, historical properties, including historical trees and landscaping, cultural resources, Jackson Bottom Wetlands Preserve, Oregon Health and Science University West Campus, schools and administrative facilities, ambulance service, and hospitals.
- Other critical infrastructure, including arterial roads, TriMet light rail, 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 wildland fire and can cause health impacts on a large scale.
- Homes, businesses, and infrastructure adjacent to the wooded areas near the outskirts of the City.
- Per analysis of the Oregon State University–Extension Service Fire Program and Wildland Fire Associates dataset, there are 32 buildings with a total value of $6,772,000 at high risk of wildland fire, 25 buildings with a total value of $6,932,000 at moderate wildland fire risk, and 2,431 buildings with a total value of $733,690,000 at low wildland fire risk.[406] Additionally, a community

[406] 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

risk profile completed by DOGAMI shows 166 residents may be potentially displaced due to a wildland fire event.[407]

[407] 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

3.3.9. Windstorm, Including Tornado

The City has an elevation of 194 feet and historically has not experienced the same frequency of windstorms as those parts of the County at higher elevations. Potential impacts of and vulnerabilities to windstorm, including tornado and previous significant events are identified below.

3.3.9.1. Significant Events

The City identified one significant windstorm event since the 2017 NHMP. On September 7, 2020, strong winds caused widespread damage to trees and downed power lines in the City, leading to power outages and road closures.

3.3.9.2. 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. Impacts may include:

- 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 roads 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.

3.3.9.3. Vulnerabilities

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

- Critical infrastructure and facilities, including solid waste disposal facilities, city buildings and facilities, fiber huts, fire stations and facilities, intermodal transit facilities, parking lots, parks, a water operations center, wastewater treatment plants, a Clean Water Services Quality Lab, police stations, historical properties, including historical trees and landscaping, cultural resources, Jackson Bottom Wetlands Preserve, Oregon Health and Science University West Campus, schools and administrative facilities, ambulance service, and hospitals.
- Older buildings and infrastructure not built to withstand high winds, including manufactured homes and buildings.
- Other critical infrastructure, including arterial roads, TriMet light rail, communication structures, and emergency generators.
- Aboveground utility and power lines.

3.3.10. Winter Storm

The City has an elevation of 194 feet and historically has not experienced the same frequency and intensity of winter storms as those parts of the County at higher elevations. Potential impacts of and vulnerabilities to winter storm and previous significant events are identified below.

3.3.10.1. Significant Events

The City identified one significant winter storm event since the 2017 NHMP. Between February 11 to February 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 City experienced snowy and icy roads, downed tree limbs, localized power outages, and travel impacts.

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. 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 roads 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, historical properties and cultural resources, and natural environments in the City 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, or people who have been drinking alcohol are at increased risk for hypothermia. This may include those living in or spending time in the City's schools and medical care facilities.
- People improperly using generators and heating devices.
- Populations with disabilities may be more affected due to mobility issues.
- Critical infrastructure and facilities, including solid waste disposal facilities, city buildings and facilities, fiber huts, fire stations and facilities, intermodal transit facilities, parking lots, parks, a water operations center, wastewater treatment plants, a Clean Water Services Quality Lab, police stations, historical properties, including historical trees and landscaping, cultural resources, Jackson Bottom Wetlands Preserve, Oregon Health and Science University West Campus, schools and administrative facilities, ambulance service, and hospitals.
- Older buildings and infrastructure not built to withstand the weight and impacts of large amounts of snow and ice.
- Other critical infrastructure, including arterial roads, TriMet light rail, communication structures, and emergency generators.
- Numerous roads, bridges, and overpasses identified within the City's Inclement Weather Response Plan are vulnerable to winter storms and are included in snowplow and anti-icing priority routes.

3.4. Historical Events

The timeframe of data collected during the planning process for the City of Hillsboro was November 1, 2016, to February 22, 2022. Hazard events that impacted the entire planning area during that timeframe are detailed in Volume I, Section 2. Since the adoption of the 2017 NHMP, the City has experienced impacts of widespread extreme heat, windstorm, winter storm, and wildland fire smoke events.

One disaster declaration was issued by the City since the adoption of the 2017 NHMP. A disaster declaration for the COVID-19 pandemic was in effect from March 12, 2020, to April 7, 2021. 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, windstorm, including tornado, winter storm, earthquake, drought, and extreme heat present the highest relative risk to the City of Hillsboro. These hazards can create widespread events and all populations, economies, structures, improved property, critical facilities and infrastructure, and natural environments in the City can be vulnerable to these hazards.

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

- Populations with higher vulnerability, such as those with preexisting health conditions, older adults, children, and pregnant women.
- Populations that are unhoused, do not have access to private transportation, and/or are without access to air conditioning, cooling equipment, sufficient heating, and clean water.
- People living, working, or spending time in heat islands within the City.
- Populations with limited income and financial resources.
- Populations whose primary language is not English.
- Industries that 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 impacts to the City, 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.
- Critical infrastructure and facilities, including solid waste disposal facilities, city buildings and facilities, fiber huts, fire stations and facilities, intermodal transit facilities, parking lots, parks, a water operations center, wastewater treatment plants, a Clean Water Services Quality Lab, police stations, historical properties, including historical trees and landscaping, cultural resources, Jackson Bottom Wetlands Preserve, Oregon Health and Science University West Campus, schools and administrative facilities, ambulance service, and hospitals.
- Other critical infrastructure, including arterial roads, TriMet light rail, communication structures, and electric generating systems.
- Older buildings and infrastructure not built to current building codes or seismic standards may be more vulnerable. This includes historical structures and properties, unreinforced masonry buildings, and buildings in relatively high liquefaction-susceptible areas.
- Areas near the epicenter of an earthquake event are likely to incur a significant amount of damage to all buildings, infrastructure, facilities, and property.

4. Capability Assessment

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

The following capability assessment and safe growth analysis examine the ability of the City to implement and manage a comprehensive mitigation strategy. Strengths, opportunities, and resources of the jurisdiction are identified to develop an effective hazard mitigation action plan. The capabilities identified in this assessment were evaluated collectively to develop feasible recommendations, which support the implementation of effective mitigation activities.

A capability questionnaire was distributed to the City of Hillsboro Technical Committee to initiate 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 analysis 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 City that can prevent and reduce the impacts of hazards.

The City's Comprehensive Plan addresses natural hazards, identifies projects that can be included in the mitigation strategy, and can be used to implement mitigation actions. This plan provides adequate space for expected future growth in areas located outside natural hazard areas. Many of the goals and policies in the City's Comprehensive Plan are related to those in this NHMP and safe growth objectives. The monitoring and implementation section of the NHMP covers these and all other hazard mitigation strategies discussed in the plan. Safety is explicitly included in the City's Comprehensive Plan's growth and development policies.

Hillsboro's Capital Improvement Plan addresses natural hazards, identifies projects that can be included in the mitigation strategy, and can be used to implement mitigation actions. Additionally, this plan's corresponding capital improvement program provides funding for hazard mitigation projects identified in this NHMP; however, the program does not limit expenditures on projects that would encourage development in areas vulnerable to natural hazards. The City's infrastructure policies do not limit extension of existing facilities and services that would encourage development in areas vulnerable to natural hazards.

The City's Local Emergency Operations Plan, Stormwater Management Plan, and Community Wildfire Protection Plan (CWPP) also address natural hazards, identify projects that can be included in the mitigation strategy, and can be used to implement mitigation actions.

The continuity of operations plans for some City departments are complete, and the planning effort for the remaining departments is underway and is an action included in Section 6 of this annex. The Hillsboro Transportation System Plan does not specifically address natural hazards or identify projects that can be included in the mitigation strategy and cannot be used to implement mitigation actions. However, the Hillsboro Transportation System Plan limits access to identified hazard areas and is used to guide growth into safe locations and the City's corridor plans recognize the need to avoid or mitigate natural hazards. The City and the plan do not identify movement systems designed to function under disaster conditions, such as during an evacuation. The Regional Disaster Preparedness Organization and Metro are working to create Emergency Transportation Route maps, and the City is a part of this effort.

Land use planning and ordinances are adequately administered and enforced and are an effective measure for reducing hazard impacts through the City's Community Development Code. These include zoning, subdivision, floodplain, and natural hazard-specific ordinances and the utilization of flood insurance rate maps (FIRM)s. The City has a future land use map that clearly identifies natural hazard areas. Additionally, land use policies discourage development or redevelopment within natural hazard areas. Depending on the development activity, the Community Development Code dictates what level the permit is reviewed at, either a Type II staff-level review or a Type III hearing body review. After receiving land use approval, developers can submit required engineering or building permitting. The City's building code also contains provisions to strengthen or elevate construction to withstand hazard forces.

The City has zoning ordinances that conform to the comprehensive plan in terms of discouraging development or redevelopment within natural hazard areas, including prohibiting development within, or filling of, wetlands, floodways, and floodplains. The ordinance also contains natural hazard overlay zones that set conditions for land use within such hazard zones. Rezoning procedures recognize natural hazard areas as off limits to any zoning changes that would allow for increased activity or development in the area. The City does not have subdivision regulations that restrict the division of land within or adjacent to natural hazard areas, provide for conservation subdivisions or cluster subdivisions in order to conserve environmental resources, or allow density transfer where hazard areas exist.

The City's Planning Division leads and facilitates review of land use applications and enforces site plan review requirements. The City of Hillsboro utilizes the most current building codes as they are adopted by the State of Oregon.[408] The Hillsboro Fire and Rescue Department has an Insurance Services Office (ISO) rating of 2, and the last Public Protection Classification survey was completed in January 2003.

The City has environmental systems that protect development from hazards identified and mapped and policies that maintain and restore protective ecosystems, including land use policies and an Environmental Sustainability Plan. The City does not have policies that provide incentives to development that is located outside protective ecosystems.

Hillsboro has an adopted shelter plan to deal with emergencies from natural hazards. The economic development or redevelopment strategies in the City do not include provisions for mitigating natural hazards.

4.1.1. 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.

A repetitive loss (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 is one FEMA-identified RL property in the City.

[408] City of Hillsboro. (2022). Codes & Standards. https://www.hillsboro-oregon.gov/our-city/departments/community-development/codes-standards

4.1.1.1. National Flood Insurance Program Details

Insurance Summary

There are currently 105 NFIP policies in the City and $33,537,900 coverage in force. There are $79,683 in premiums paid annually.

There have been 15 claims paid for a total amount of $178,860 paid. Two substantial damage claims have been paid.

There are approximately 226 structures exposed to flood risk within the community.

Staff Resources

There are no barriers to running an effective NFIP program in the City. The City's NFIP Coordinator is currently undergoing the certification process, including completing the *FEMA E0273: Managing Floodplain Development through the National Flood Insurance Program* course and exam. The Planner who executes floodplain management functions also handles development applications outside the floodplain. NFIP administration services in the City include permit review for new development in the floodplain and alterations, geographic information system (GIS) management of floodplain data and determining the base flood elevation, education with homeowners and property owners, coordination with the Building Department on structural reviews, and review of capital projects affecting the floodplain.

Compliance History

The City is in good standing with the NFIP and there are no outstanding compliance issues. The most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC) was on September 4, 2003, and a CAC is scheduled with FEMA for summer 2023.

The City will continue NFIP compliance during the next five years of NHMP implementation by enforcing floodplain management requirements, including new construction and substantial improvements within the Special Flood Hazard Area (SFHA), maintaining and using floodplain mapping, and undertaking any code amendments needed to maintain compliance.

Regulation

The City entered into the NFIP on April 12, 1974, and has both digital and paper flood insurance rate maps (FIRMs). Floodplain development regulations meet the minimum FEMA and state requirements. Development within the floodplain requires a Floodplain Activity permit, which is a Land Use Application.

Community Rating System

The City does not participate in the Community Rating System.

4.2. Administrative and Technical Assessment

This portion of the assessment includes staff and their skills and tools that can be used for mitigation planning and to implement specific mitigation actions.

The City's Planning Commission is responsible for reviewing, recommending, and approving Type II and III land use case files as well as making recommendations to the City Council on policy and code amendments. The Mitigation Technical Committee works together effectively to update and maintain the NHMP.

The City administers maintenance programs to reduce risk, including tree trimming, clearing drainage systems, and landscape maintenance of open spaces and rights of way. The City also has multiple effective mutual aid agreements and planning partnerships, including intergovernmental agreements,

Oregon Water/Wastewater Agency Response Network, Washington County Emergency Management Cooperative, the Regional Disaster Preparedness Organization, and the Cooperative Public Agencies of Washington County.
The City of Hillsboro has adequate staffing levels to enforce regulations, staff are trained on hazards and mitigation efforts, and coordination on mitigation initiatives with staff is effective. The Chief Building Official is part of the Community Development Department and is a full-time position. The Development Services Section is within the Planning Division of the Community Development Department and has several full-time positions, including Planning Technicians, Planners, Senior Planners, an Urban Design Planner, and a Manager. This department houses the subject matter expert on the floodplain and natural resources. The Emergency Management Office is located within Hillsboro Fire and Rescue.

Multiple City departments have staff who can support the mitigation strategy, including planners and engineers with an understanding of natural hazards, engineers and professionals trained in construction practices related to buildings and infrastructure, staff with education or expertise to assess vulnerability to hazards, and GIS staff and coordinators.

Additionally, the City has many technical capabilities that have been used to assess or mitigate risk and could be used in future efforts. Warning systems include Everbridge and OR-Alert in partnership with Washington County and the Barney Reservoir earthquake monitoring system. Grant writing is completed by individual departments as needed. The City has a robust GIS program and has created mapping products specific to each department, and hazard data and information can be pulled from a variety of sources, including historical records and DOGAMI.

4.3. Education and Outreach Assessment

Education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information were assessed to determine the City's capabilities.

Hillsboro's Community Emergency Response Team (CERT) Program promotes disaster preparedness for hazards and trains members in basic disaster response skills, such as fire safety, light search and rescue, and disaster medical operations. Safety Town is hosted by the Hillsboro Police Department each year and educates the public on the effects of various emergencies and disasters as well as steps families can take to lessen the affects. The City's Public Works Department trains residents on proper tree trimming and vegetation waste disposal. Additionally, Hillsboro is a Tree City USA and works with contractors to maintain landscaping and properties to reduce natural hazards vulnerabilities and impacts. General preparedness and natural hazard mitigation education is also provided to homeowner's associations and community groups as requested. The Hillsboro Building Department's website includes videos on home preparation and retrofitting. The Hillsboro Water Department provides preparedness and emergency information to residents at public events about being prepared with an action plan, building up a water supply at home, accessing additional water from your water heater, winterization, and shutting off your home's water supply during an emergency.

There are many nonprofit organizations and community groups that can assist with implementing future mitigation actions, including those that provide food security resources and healthcare, sheltering and emergency assistance, extreme heat sheltering, and emergency management-specific groups. These partners include Centro, Adelante Mujeres, Salvation Army, local churches, the Regional Disaster Preparedness Organization, Washington County Emergency Management Cooperative, Local Emergency Managers group, Regional Water Providers Consortium, and the Local Emergency Planning Committee.

4.4. Financial Assessment

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

- Capital improvements project funding
- Fees for water, sewer, gas, and/or electric services
- Impact fees for new development
- Stormwater utility fees
- Incurrence of debt through general obligation bonds and/or special tax bonds
- Incurrence of debt through private activities
- Federal funding sources, including the Community Development Block Grant, Urban Areas Security Initiative, Building Resilient Infrastructure and Communities, and Hazard Mitigation Assistance Grants
- State funding programs, including the State Homeland Security Program

4.5. Capability Expansion and Improvement

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

- Continuing to update City plans as necessary to ensure they are current and reflect the needs of the community;
- Further developing 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; and
- 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. Mitigation Successes

Joint Water Commission Wildfire Protection Plan

The JWC, in partnership with Clean Water Services, hired Geosyntec Consultants Inc. to complete a CWPP. The plan includes a pre-fire prevention and mitigation plan and post-fire response and mitigation plan for the Tualatin Basin and the JWC's Drinking Water Source Area. The plan identifies important resources and assets vulnerable to wildland fire and recognizes actions that can be taken before, during, and after a wildland fire event to mitigate the impacts. Based on plan recommendations, JWC will work to implement the short-term prevention and mitigation measures immediately and plan for some of the longer-term mitigation projects.

City of Hillsboro Water Department Seismic Pipeline Design Standards

The intent of the design standards is to mitigate the impact of a seismic event and resulting seismic hazards for critical pipelines, transmission lines, and those serving critical facilities within the City, thereby increasing the resilience of the water transmission and distribution system. The standards were developed primarily for ductile iron pipelines, ranging in size from 8 to 24 inches in diameter, which represent over 55% of the City's water system. These standards are intended to guide engineers in the application of seismic design requirements for the design of pipeline systems.

Heat-Reduction Initiatives

The Hillsboro Comprehensive Plan, effective January 2, 2018, contains heat-reduction initiatives such as using shade vegetation and paving materials with a high Solar Reflectance Index.

5.3. 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 City were carefully reviewed and considered when developing the mitigation actions for this plan. The City's Technical Committee will establish a process in which the mitigation strategy, goals, objectives, and actions outlined in this plan will be incorporated into the existing local planning strategies.

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

The members of the City's Technical Committee will remain 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.

5.3.1. Comprehensive Plan

The City of Hillsboro's Comprehensive Plan has goals and policies related to hazard mitigation. Through a coordinated resiliency strategy, the City will focus on five goals related to natural hazards: minimizing risk, increasing preparedness, improving coordination, building resilience, and mitigating hazards. The City will enhance ordinances and standards as part of this effort—especially those relating to the siting of essential facilities and other development—minimizing the potential risk of natural hazards to people and property. Hillsboro will also coordinate emergency preparedness, resilience building, and hazard mitigation efforts with local and regional partners in both the public and private sectors.[409]

When the plan goes through a regular update, additional details about hazard mitigation will be added, as applicable.

5.3.2. Building and Zoning Codes

The City's zoning code, known as the Community Development Code (CDC), addresses the mitigation of flooding hazards through the City's Regulatory Floodplain Overlay (RFO) in CDC Section 12.27.100. Updates to this section and additions for other areas of hazard mitigation strategies can be integrated into future CDC amendment efforts.

5.3.3. Public Engagement, Education, and Outreach

The City of Hillsboro Emergency Management Office will continue public engagement campaigns during National Preparedness Month, expanding translation of the information into multiple languages. The City's Public Works Department will continue to distribute information about leaf pickup and proper tree trimming to reduce potential wildland fire fuel load and debris that could clog the stormwater system.

The Hillsboro Water Department will continue to use social media to share public messaging about mitigation actions for hazards, including drought prevention and extreme heat.

5.3.4. Land Development Regulations

The City's land development regulations, known as the CDC, address the mitigation of flooding hazards through the City's RFO in CDC Section 12.27.100. Updates to this section and additions for other areas of hazard mitigation strategies can be integrated into future CDC amendment efforts.

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

The City of Hillsboro Community Development Department and Emergency Management Office will continue to review any RL properties and incorporate any new findings into the City's mitigation strategy, as appropriate.

The City's Floodplain Management Program is implemented through the City's RFO in CDC Section 12.27.100. Updates to this section and additions for other areas of hazard mitigation can be integrated into future CDC amendment efforts.

[409] City of Hillsboro. (2017, November 21). Hillsboro Comprehensive Plan. https://www.hillsboro-oregon.gov/home/showpublisheddocument/16832/636869398552970000

5.3.6. Stormwater Management Plans and Procedures

Findings of the 2021 City of Hillsboro Stormwater Master Plan will be incorporated into the 2023 NHMP and plan action items.

5.3.7. Water Master Plan

Findings of the 2019 Water Master Plan will be incorporated into the 2023 NHMP and plan action items.

5.3.8. Emergency Plans That Address Evacuation and Sheltering

Evacuation and sheltering are addressed in the City's Emergency Operations Plan, and the City works with Washington County on sheltering efforts as needed. The City of Hillsboro's Emergency Management Office will ensure sheltering and evacuation sites are planned with consideration of flooding potential.

5.3.9. Funding Opportunities

The City of Hillsboro's Emergency Management Office will continue to review annual, post-disaster, and stand-alone grant opportunities for potential mitigation project funding opportunities.

6. Action Items

The City of Hillsboro'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 below in Section 6.1.

Action items for the 2023 NHMP were determined by the City'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 City of Hillsboro Action Items from the 2017 Washington County NHMP

Table 141: Status of Action Items from 2017 NHMP

Action Item Number*	Action Item Description	Hazard(s) Addressed	Implementation Update	Current Status
Short-Term 1	Prepare and pre-script public messages about water conservation.	Drought	2018–2019: The Water Department had a Curtailment Plan addressing water shortage. Also, active messaging on social media and various publications.	Complete.
Long-Term 1	Evaluate current systems and equipment and explore options for backup systems and supplies.	Drought	2018–2019: The Willamette Water Supply System (WWSS) offers redundancy and resilience. 2021: Continued work on WWSS.	Redesigned for 2023 plan.

Action Item Number*	Action Item Description	Hazard(s) Addressed	Implementation Update	Current Status
Short-Term 1	Complete seismic vulnerability analyses for lifeline utility and transportation systems, including water, wastewater, natural gas, electric power, telecommunications, and bridges. Explore options to enhance these systems.	Earthquake	2018–2019: The Water Master Plan update has a seismic resiliency component. The Hillsboro Public Works Department has a catalog of all sanitary and storm lines, which are rated every eight years. They have also conducted a risk analysis of different locations in the system. The Oregon Department of Transportation inspects the City's bridges and is undertaking a review of priority transportation routes, which the City has been heavily involved in. Once those are established, the City will work with the County to develop plans to make priority roadways more resilient. 2020: The Joint Water Commission (JWC) and Hillsboro Water Department have completed their risk and resilience assessments that heavily focus on earthquakes as the primary natural hazard. 2021: Developed seismic design standards for water mains and will include in the design standards at the next update. Planning to implement ShakeAlert at the Pumps Stations and in-town reservoirs and upgrades to the Supervisory Control and Data Acquisition (SCADA) system.	Redesigned for 2023 plan.
Short-Term 2	Analyze fuel storage capabilities and explore locations for emergency fuel storage.	Earthquake	Office of Innovation completed a preliminary scoping project and presented findings to City Council. Numerous locations in the City have been explored as potential fuel storage sites although none have been found suitable/possible at this time.	Phase 1 completed. Redesigned for 2023 plan.

Action Item Number*	Action Item Description	Hazard(s) Addressed	Implementation Update	Current Status
Long-Term 1	Expand and complete a seismic safety inventory of public, commercial, and residential buildings (particularly critical and essential facilities) that may be vulnerable to natural hazards (particularly earthquake).	Earthquake	Inventory of facilities exists as created by Washington County Emergency Management.	Completed. Efforts will continue in the future.
Long-Term 2	Educate homeowners about structural and non-structural retrofitting of vulnerable homes.	Earthquake	Information about preparing homes has been uploaded to the Building Department's webpage.	Complete and expanded for 2023.
Short-Term 1	Identify and inventory critical facilities and buildings in floodplains or other high-risk flood areas and identify mitigation options if such facilities are identified.	Flooding	2018–2019: Hillsboro Public Works Department has identified flood prone areas with historical data.	Completed.
Short-Term 2	Survey elevation data for buildings within mapped floodplains, evaluate flood risk quantitatively, and educate homeowners on mitigation options.	Flooding		Redesigned for 2023 plan.
Long-Term 1	Conduct public awareness campaign each fall to remind residents of ways they can be involved in the prevention of street flooding.	Flooding	2018–2019: Hillsboro Public Works Department conducts outreach each fall to educate the public on street flooding prevention due to leaves or other issues.	Complete. Established efforts will continue in the future.

Action Item Number*	Action Item Description	Hazard(s) Addressed	Implementation Update	Current Status
Long-Term 2	For locations with repetitive flooding and significant damages or road closures, determine and implement mitigation measures such as upsizing culverts or storm water drainage ditches.	Flooding	2018–2019: Culverts: - NE Lori Street/NE Lennox Drive - Secondary route for 49th to increase egress. Worked with business at Cronie to move the pond from private to public ownership. Completed a repair on Evergreen and Rock Creek storm pipe and reviewed recent flood incidents to determine projects for the future. 2021: The 49th Street alternative access was completed. Hidden Creek Drive access was built. The pavement was raised approximately 4 inches at the 47th culvert to help provide a flooding buffer.	Redesigned for 2023 plan.
Long-Term 1	Encourage removal of non-native or invasive plant species.	Wildland Fire	2021: The removal of non-native or invasive plant species is required as part of any permitting associated with the City's Significant Natural Resources Overlay. Working on a wildland fire mitigation plan for critical assets.	Completed and expanded for 2023 plan.
Long-Term 2	Promote tree preservation with consideration of hazard impacts.	Wildland Fire	2021: The City has tree preservation standards in Community Development Code (CDC) Section 12.50.230.	Complete.

Action Item Number*	Action Item Description	Hazard(s) Addressed	Implementation Update	Current Status
Short-Term 1	Ensure that all new and existing critical facilities in the City of Hillsboro have backup power and plans to deal with power outages.	Winter Storm	2018–2019: All critical facilities have backup power, including the newest Public Works Department facility. 2021: The Fire and Rescue Department has a facility request in the fiscal year 2022–2023 budget process to replace the three oldest backup power generators at fire stations 1, 2, and 3. The generators still have useful life, so two of the three being replaced will be repurposed to Wood Street warehouse buildings.	Completed and expanded for 2023 plan.
Long-Term 1	Conduct public awareness campaign to encourage property owners to trim trees near service drops to individual customers.	Winter Storm	2018–2019: The Public Works Department conducted public outreach on tree health and trimming.	Complete. Established efforts will continue in the future.
Long-Term 2	Evaluate current equipment and explore options to increase response capabilities.	Winter Storm	2018–2019: The Public Works Department developed an inclement weather plan for staffing and equipment preparations. Emergency contracts include both equipment and operators. 2020: The Water Department had an inventory of spare parts for repairs and emergency response plans in the case of 24-hour operations.	Redesigned for 2023 plan.

Action Item Number*	Action Item Description	Hazard(s) Addressed	Implementation Update	Current Status
Short-Term 1	Evaluate capability of water treatment plants to deal with high turbidity from ashfalls, and review and update emergency response plans (ERPs) as needed.	Volcanic Ash	2018–2019: Completed. The ERP will be updated in 2020, after the All-Hazards Risk Assessment - Risk and Resilience Assessment of the America's Water Infrastructure Act of 2018 (AWIA) will be completed. 2021: ERP addresses contamination threats and identified contamination of finished water.	Complete.
Short-Term 2	Prepare and pre-script public messages about protecting from and disposing of volcanic ash.	Volcanic Ash	2020: The Fire and Rescue Department worked with the Water Department to prepare/pre-script public messages about the health risks and safety measures related to volcanic ash.	Expanded for 2023 plan.
Long-Term 1	Develop strategy and obtain resources needed to reduce the impact of ashfall to stormwater drainage systems.	Volcanic Ash	2018–2019: On-call contracts include both storm pipe flushing and cleaning and storm water maintenance.	Complete.
Short-Term 1	Develop public and private sector partnerships to foster hazard mitigation.	Multi-Hazard	2018–2019: Training and exercises included the private sector, such as hospitals, assisted living facilities, and local businesses. Newly implemented on-call Public Works contracts with private partners for spills, hazardous materials, tree removal, traffic control, snow removal, etc. Also have on-call contracts for pipeline inspection and cleaning and restoration of traffic signals. 2021: The Water Department completed meetings and made connections with local Oregon Department of Forestry offices and the City of Forest Grove Fire Department to discuss mitigation efforts and fostered relationships.	Complete. Efforts will continue in the future.

Action Item Number*	Action Item Description	Hazard(s) Addressed	Implementation Update	Current Status
Short-Term 2	Establish a liaison with the City of Hillsboro 2035 Vision Implementation Committee to where there might be common interests and activities.	Multi-Hazard	2018–2019: The City's Emergency Program Manager made contact with the committee and will participate where appropriate.	Complete.
Short-Term 3	Identify and pursue funding opportunities to implement mitigation actions.	Multi-Hazard	2018–2019: City of Hillsboro participated in the State Homeland Security Grant Program, State Preparedness and Incident Response Equipment grant program, and Urban Areas Security Initiative Program grant cycles and planning. 2021: Through the 2021 Hazard Mitigation Grant Program–Post Fire notice of funding opportunities, the Fire and Rescue Department submitted a grant application for a Community Wildfire Protection Plan (CWPP) that would guide future mitigation efforts. The Water Department submitted an application for the Building Resilient Infrastructure and Communities Grant Program (BRIC) grant process for a chlorine generation retrofit.	This action item has been implemented and is ongoing. It will be reshaped for the next update to include additional details for the 2023 NHMP cycle.

Action Item Number*	Action Item Description	Hazard(s) Addressed	Implementation Update	Current Status
Short-Term 4	Develop inventory of at-risk buildings and infrastructure and prioritize mitigation items.	Multi-Hazard	2018–2019: An inventory of facilities was created by Washington County Emergency Management. The City's Water Department created a critical facility map and related infrastructure in the Water Master Plan update. The Public Works Department has a catalog of all sanitary and storm pipes, which are rated every eight years. They also conducted a risk analysis of different locations in the system. 2020: The Water Department completed a Risk and Resiliency Assessment and consequent Vulnerability Assessment under the AWIA requirements. The Water Department updated the critical facility map in fall 2020.	Complete. Efforts will continue in the future.

Action Item Number*	Action Item Description	Hazard(s) Addressed	Implementation Update	Current Status
Short-Term 5	Review and update public notification and alert/warning procedures.	Multi-Hazard	2018–2019: The Water Department developed notification and communications plans for algal contamination events. The Communications Department has developed alert and warning procedures for various topics. 2020: The Fire and Rescue Department developed notification, communications, and messaging coordination plans with other City departments on common fire and rescue incidents. Primary notification tools include department Twitter, PublicAlerts, and press release news wire. 2021: The switch from the County's CodeRED emergency notification system to a statewide system (Everbridge) was completed at the county level and is in process to be implemented for internal emergency notifications.	Completed and expanded for 2023 plan.

Action Item Number*	Action Item Description	Hazard(s) Addressed	Implementation Update	Current Status
Long-Term 1	Develop and/or enhance and implement education programs aimed at mitigating natural hazards and reducing the risk to citizens, private property owners, public agencies, businesses, and schools. Programs will focus on actionable items, such as creation of an emergency supply kit or home retrofitting.	Multi-Hazard	2018–2019: CERT classes were hosted each spring and fall. Emergency Management presented at Head Start parent meetings once each year, and revision of Take 5 flyers with Washington County was ongoing. Multiple City departments participated in Celebrate Hillsboro and the library's earthquake preparedness fair. The Public Works Department hosted a Public Works Day at the Saturday Market in May. 2020: The Water Department worked with the Regional Disaster Preparedness Organization (RDPO) and the Regional Water Providers Consortium (RWPC) to address water emergency planning. The Fire and Rescue Department adapted public education and community risk reduction programs such as Hands Only CPR and home fire safety into virtual offerings. Short engaging videos were planned to educate community members with actionable steps to prepare themselves for emergencies. 2021: The Water Department continued to work with the RDPO and RWPC on the Emergency Drinking Water Framework Project.	Complete. Established efforts will continue in the future. Additional public education topics will be added to the 2023 plan.
Long-Term 2	Integrate mitigation plan findings into planning and regulatory documents and programs, including the City of Hillsboro Comprehensive Plan (HCP).	Multi-Hazard	2021: The Planning Division proposed amendments to the municipal code subchapter 11.12 to refine regulations associated with temporary uses from lessons learned through the COVID-19 pandemic.	Complete. Efforts will continue in the future.

Action Item Number*	Action Item Description	Hazard(s) Addressed	Implementation Update	Current Status
Long-Term 3	Update website and social media to include mitigation activities, opportunities, and success stories.	Multi-Hazard	2018–2019: Developed an emergency side to the City's website that can be turned on in the event of an emergency. Social media posts for fire prevention and emergency preparedness months were posted. 2020: The Fire and Rescue Department developed an editorial calendar to consistently create and share useful emergency preparedness and mitigation tips and activities using social media, with call-to-action links to the relevant topics on their website or other timely, relevant sources. 2021: The Fire and Rescue Department webpage content was updated concurrently with City webpage revisions. The Water Department put emergency response information specific to water customers on the updated website.	Complete. Established efforts will continue in the future.

*Number given to action item in 2017 Washington County NHMP.

6.2. City of Hillsboro Action Items: 2023 Washington County NHMP

Table 142: City of Hillsboro Action Items

Action Item Number	Action Item Description	Hazard(s) Addressed	Priority
1	Publish informational materials on City website to provide information on Scoggins Dam and any potential downstream effects that would occur as a result of dam failure. Analyze current preparedness materials and presentations and update as needed.	Dam Failure	Low
2	This project would ensure that all essential buildings in the City would remain safe from potential gas leaks in the event of seismic activity. The City has identified roughly 25 buildings it considers essential in the event of an emergency. Adding seismic gas shutoff valves to these sites would allow the City to use these areas for planning, mobilizing, and implementing its response to whatever is encountered. Adding seismic gas shutoff valves to these sites would also ensure that any staff or public patrons in areas of these buildings would remain safe from potential gas explosions caused by a gas leak.	Earthquake	Low
3	This project includes completing an engineering feasibility planning study and then a Phase 1 Design and Phase 2 Construction project to mitigate risk of insufficient water storage for industrial microchip manufacturing cluster after a seismic event. These assets are at risk of catastrophic failure during a major seismic event. These assets are located in Hillsboro, Oregon, a western suburb of Portland, which is within the Cascadia Subduction Zone (CSZ).	Earthquake	Low
4	This mitigation action proposes a seismic engineering analysis that will assist the City in prioritizing capital projects to upgrade the sanitary sewer system. Planned retrofits will create a sanitary sewer system that is more resilient to earthquakes.	Earthquake	Medium
5	This project includes completing an engineering feasibility planning study and then a Phase 1 Design and Phase 2 Construction project to mitigate and seismically retrofit pipelines and related infrastructure in Hillsboro's Water distribution system. These assets are at risk of catastrophic failure during a major seismic event. These assets are located in Hillsboro, Oregon, a western suburb of Portland, which is within the CSZ.	Earthquake	Medium
6	This project includes completing an engineering feasibility planning study and then a Phase 1 Design and Phase 2 Construction project to mitigate risk of power loss to Water critical lifeline assets after seismic event. These assets are at risk of being unusable after a major seismic event until power can be restored. These assets are located in Hillsboro, Oregon, a western suburb of Portland, which is within the CSZ.	Earthquake	High

Action Item Number	Action Item Description	Hazard(s) Addressed	Priority
7	Seismic retrofit mitigation of the JWC's primary water transmission pipelines, the North Transmission Line (NTL), and the South Transmission Line (STL). The City of Hillsboro, Oregon, is the managing agency for the JWC. These assets are located in/near Hillsboro, Oregon, a western suburb of Portland, which is within the CSZ. Project includes completing an engineering feasibility planning study and then a Phase 1 Design and Phase 2 Construction projects to mitigate risk of catastrophic failure of these assets. These assets are at risk of catastrophic failure during a major seismic event. A preliminary assessment for insurance purposes identified the older STL as at highest risk of catastrophic failure after an earthquake, while the NTL would sustain major damage but might be viable at reduced pressure in an emergency.	Earthquake	High
8	After a recent staff transition in which a new City staff member attended the FEMA E0273 NFIP Floodplain Development course, staff have identified a need to have a more robust response plan in place when overland flooding has impacted structure(s) within the City. Furthermore, City staff expect to need to refine the Regulatory Floodplain Overlay (RFO) regulations to implement the recommendations/requirements from the BiOp effort and provide any additional needed clarity on FEMA regulations.	Flood	Medium
9	This mitigation action proposes a program to analyze and repair stormwater outfalls to natural waterways to prevent flooding conditions. Stormwater outfalls to natural waterways to prevent flooding conditions in several scenarios. Outfalls that are constructed under the 100-year flow elevation can cause backwatering into the storm system causing flooding. Additionally, stormwater outfalls that are inadequately sized for large storm events or are buried/submerged can cause flooding conditions. This action will include a comprehensive plan for determining which outfalls need attention and prioritize repair order based on the flood risk associated with outfall.	Flood	Medium
10	This mitigation action is to replace and upgrade culverts throughout the City but includes two projects within the City of Hillsboro that propose to upgrade and enlarge existing culverts with known flooding issues. The project sites are at the Glencoe Swale crossing at NW Connell Avenue and the Dawson Creek crossing on NE 47th Avenue. At both sites, the roadways become inundated during large storm events, which causes dangerous conditions for residents and infrastructure.	Flood	High
11	Research and purchase equipment needed for volcanic ash cleanup of roadways and pedestrian facilities.	Volcanic Ash	Low
12	This project would upgrade all of the City's existing heating, ventilation, and air-conditioning (HVAC) systems to better deal with downfall of volcanic ash. Physically installing hoods over air intake would reduce direct ash ingestion into HVAC systems.	Volcanic Ash	Low

Action Item Number	Action Item Description	Hazard(s) Addressed	Priority
13	The fuels reduction goals include having nothing burnable within 5 feet of priority buildings and communication sites, maintaining vegetation to heights less than 6" within 30 feet, spacing plants widely (every 100 feet) around buildings, making burn lines, and pruning trees to 8 to 10 feet above ground. This would be accomplished by mowing, thinning, piling, and pile burning as needed. The JWC, BRJOC, and COH plan to create and maintain defensible space and reduce fuel loadings around the following facilities and assets: Cherry Grove Slow Sand Filter Plant (SSFP), Soda Ash Facility, Tualatin Flume, Patton Valley Control Valve, JWC Water Treatment Plant (WTP), and JWC Fernhill Reservoirs.	Wildland Fire	High
14	This project would ensure all of the City's HVAC systems are equipped with means to provide MERV 13 filtration for all the City's HVAC systems. While most of the City's sites do have the ability to use MERV 13 filters, not every system is capable of this. This would give the City the funds to upgrade existing infrastructure to provide MERV 13 filtration for these systems.	Wildland Fire	High
15	Develop a CWPP for the City of Hillsboro. The CWPP will also include actionable tasks that can be taken to prevent or reduce the impact of wildland fires within the City and address the following: determining fuel hazards, assess risk of wildland fire occurrence, identify homes, businesses, and essential infrastructure at risk, and fuel treatment prioritization. The planning project includes a Story Map that will create a highly functional, easy-to-use interface to tell the story of place and people's values in a way that illustrates data-rich science-based information. The Story Map will incorporate important baseline information and will be a place where residents can assess project recommendations, interact with baseline mapping and risk assessment information, and seek real mitigation measures they can take in and around their properties. The Story Map will be designed to be accessible and easily navigable by the public and be available in English and Spanish.	Wildland Fire	High
16	Hillsboro's CWPP will include actionable tasks that can be taken to prevent or reduce the impact of wildland fires within the City and address the following: determining fuel hazards, assess risk of wildland fire occurrence, identify homes, businesses, and essential infrastructure at risk, and fuel treatment prioritization. Using the CWPP as a guide, the City will analyze and implement fuel reduction strategies to reduce the risk and/or spread of wildland fires within the City of Hillsboro.	Wildland Fire	High
17	Evaluate needs for snow/ice response to clear cycle tracks and to purchase equipment if needed.	Winter Storm	Low
18	Install Econolite ZincBlue2 battery backup systems to 11 City of Hillsboro signalized intersections.	Multi-Hazard	Low
19	Construct a new Public Works shop/carport to shelter Public Works equipment and supplies to protect from extreme heat, volcanic ash, inclement weather, and other natural hazards.	Multi-Hazard	Low

Action Item Number	Action Item Description	Hazard(s) Addressed	Priority
20	This mitigation action proposes the installation of weather stations at strategic traffic intersections and other areas throughout the City of Hillsboro. Weather stations will collect and transmit live data to Public Works operation and maintenance staff. Data transmitted will include pavement temperatures as well as rainfall data related to microburst storms. By collecting this data, operation and maintenance staff will be able to prioritize their response to specific weather events. Hazards mitigated by the implementation and management of these weather stations involve slippery road conditions due to severe winter weather and potential flooding due to microburst storms. Live data will allow Public Works staff to prioritize response to the most impacted intersections, therefore minimizing harm to City of Hillsboro residents and infrastructure.	Multi-Hazard	Low
21	The City/Clean Water Services Design and Construction Standards need to be revised to expand plant options when new vegetative stormwater management facilities (SMF) are initially constructed or repaired. More heat- and drought-tolerant plants need to be added, such as native succulents or kinnikinnick, for ground cover that require little amounts of maintenance or water to survive, cover soils to better retain soil moisture, and flower during the year to provide pollinator friendly plants throughout the City. Water quality will still be accomplished using plugs and other deep-rooted and drought-tolerant plants. Surrounding heat- and drought-tolerant native vegetation types, such as madrone, western juniper, crape myrtle, western redbud, yarrow, sage, thyme, and yucca variations, should be added to the approved plant list. 50% of all plants selected to be installed in new SMFs should be required to be heat- and drought-tolerant plants. All existing SMFs within the City will eventually need to have the existing vegetation augmented with more drought-tolerant plant types.	Multi-Hazard	Low
22	Research and analyze alternate energy sources and alternate fuel sources to provide backup power in addition to current diesel generators at City-owned facilities. Develop a plan for implementation based on findings and feasibility. Implement plan based on funding availability.	Multi-Hazard	Low
23	This project includes completing an engineering feasibility planning study and then a Phase 1 Design and Phase 2 Construction project to mitigate risk of catastrophic failure of the Operations Building and rapid mix system. These assets have not been seismically retrofitted to current standards. Therefore, the facilities are at risk of collapse during a major seismic event. These assets are located in unincorporated Washington County near the City of Forest Grove, Oregon, a western suburb of Portland, which is within the CSZ.	Multi-Hazard	Low

Action Item Number	Action Item Description	Hazard(s) Addressed	Priority
24	Seismic retrofit mitigation of the JWC's 2.5-million-gallon Clearwell, including foundation stabilizations, at the WTP. The City of Hillsboro, Oregon, is the managing agency for the JWC. Additional work completed might include seismically resilient finished water pumps and backwash pumps. Project includes completing an engineering feasibility planning study and then a Phase 1 Design and Phase 2 Construction project to mitigate risk of catastrophic failure of the assets and related infrastructure. These assets have not been seismically retrofitted to current standards. Therefore, the facilities are at risk of collapse during a major seismic event. These assets are located in unincorporated Washington County near the City of Forest Grove, Oregon, a western suburb of Portland, which is within the CSZ.	Multi-Hazard	Low
25	Seismic retrofit mitigation of the JWC's finished water pumps at the water treatment plan. The City of Hillsboro, Oregon, is the managing agency for the JWC. Additional work completed might include seismically resilient finished water pumps and backwash pumps. Project includes completing an engineering feasibility planning study and then a Phase 1 Design and Phase 2 Construction project to mitigate risk of catastrophic failure of the assets and related infrastructure. These assets have not been seismically retrofitted to current standards. Therefore, the facilities are at risk of collapse during a major seismic event. These assets are located in unincorporated Washington County near the City of Forest Grove, Oregon, a western suburb of Portland, which is within the CSZ.	Multi-Hazard	Medium
26	Create plan to expedite translation of emergency messaging and emergency public information for languages spoken by approximately 1,000 or more limited English proficiency (LEP) individuals in the City of Hillsboro, based on the current census. This plan may include but is not limited to the following: evaluation of current capabilities, identification of in-house resources, pre-scripting of messages, template creation, analysis of processes, and creation of a streamlined process for translation with checklists and/or flowcharts.	Multi-Hazard	Medium
27	Evaluate existing state of fueling capacity for the City (reference Emergency Fuel Reserves, Analyze and Business Case 2/7/2019) and identify gaps and potential solutions. Create a plan to identify a funding and development strategy. Implement plan based on need and funding availability.	Multi-Hazard	Medium
28	Project includes completing an engineering feasibility planning study to evaluate options for small water systems to interconnect to Hillsboro's upper system pipeline or other more reliable water service options. This will improve the resilience of these water systems to drought natural hazards. This area of Oregon has experienced recent drought and wildland fire disaster declarations. These assets are located in/near Hillsboro, Oregon, a western suburb of Portland, which is within the CSZ.	Multi-Hazard	Medium

Action Item Number	Action Item Description	Hazard(s) Addressed	Priority
29	Hometown Taps (HTTs) provide easy access to safe, cool water in public locations. Misting tents are used to provide community members a place to cool down during high temperatures. Both are popular and used at organized events, but additional units are needed due to the increased frequency of extreme heat events. The City has an imperative to respond with access to water and cooling for the public in neighborhoods and near community gathering locations, particularly in low-income areas or areas of the City with limited means of transportation. These HTTs can also be deployed and used during other events where there is a water distribution need.	Multi-Hazard	Medium
30	Purchase and deploy software that allows customers to view their water usage and can be used to deliver targeted and systemwide messages to the public, such as boil water notices, curtailment and water supply advisories, locations for emergency water, etc.	Multi-Hazard	Medium
31	This project will mitigate the risk of the JWC having insufficient aluminum sulfate (alum) on-site for the WTP to operate after a major seismic event. After an engineering feasibility planning study, it was determined the amount of alum supply that will be needed on-site to allow continuous WTP operation until the alum delivery service would resume. All alum tanks would be seismically reinforced as part of this project.	Multi-Hazard	Medium
32	This project would add high wind door stop systems to entrances at high-risk locations in the City. These systems would prevent catastrophic damage to entryways and emergency exits. The project would also help determine design language for future city buildings.	Multi-Hazard	Medium
33	Update Department Continuity of Operations Plans.	Multi-Hazard	Medium
34	Update current Human Resources policies that relate to natural hazards. Analyze policies for any gaps in coverage or type, and create policies as needed based on that analysis. Conduct training on updated and new policies.	Multi-Hazard	Medium
35	The City Council adopted a major update to the HCP that took effect in January 2018. Since then, Planning Division staff have been working through the implementation measures of this major update through amendments to the City's CDC. One section within the HCP that still needs to be implemented is Section 9, Natural Hazards. This section addresses policies and goals related to (1) minimizing the impacts of natural hazards on people and property, (2) providing information and services to support hazard preparation and recovery for people of all ages, abilities, cultures, and incomes, (3) improving coordination with public and private partners, (4) building capacity for greater urban resilience, and (5) managing and maintaining spatial, demographic, and economic data to support hazard mitigation planning.	Multi-Hazard	Medium

Action Item Number	Action Item Description	Hazard(s) Addressed	Priority
36	The CDC that was adopted by the City Council and took effect in September 2014 included the City's Significant Natural Resource Overlay (SNRO) as well as tree preservation standards. Since that adoption, only minor amendments have been made to the SNRO regulations for consistency with Section 12 of the HCP, for ease of implementation and understanding, and to codify off-site mitigation opportunities. In addition, staff have identified a need to analyze current landscaping recommendations to ensure that species susceptible to drought, pests, and wildland fires are possibly removed from the recommendations.	Multi-Hazard	Medium
37	The CWPP recommends that the City set up the JWC WTP for remote operation in the event of an evacuation. In addition to evacuations, monitoring and operating the treatment plant remotely would ensure worker safety and reliable service in the event of other natural disasters, in addition to wildland fire, that could limit operator accessibility to the WTP (i.e., winter storms, flooding, earthquakes, volcanic ash, etc.). The actions needed to set up the WTP for remote operations would entail upgrading cyber security and training operators on new protocols to access the SCADA system.	Multi-Hazard	Medium
38	This project includes completing an engineering feasibility planning study and then a Phase 1 Design and Phase 2 Construction project to mitigate the risk of catastrophic failure of the assets and related infrastructure. These assets have not been seismically retrofitted to current standards. Therefore, the facilities are at risk of collapse during a major seismic event. These assets are located in unincorporated Washington County near the City of Forest Grove, Oregon, a western suburb of Portland, which is within the CSZ.	Multi-Hazard	High
39	Small customers along the pipeline alignment are experiencing unreliable water availability due to drought-induced dry wells. This leads to hardship requests for water service from this pipeline. Two wholesale customers rely on this pipeline for water service: City of Gaston and LA Water Co-Op. This area of Oregon has experienced recent drought and wildland fire disaster declarations. Seismic retrofit of the pipeline will improve the resilience of these water systems and retail customers to earthquake and drought natural hazards.	Multi-Hazard	High
40	This project includes completing an engineering feasibility planning study and then Phase 1 Design and Phase 2 Construction to complete seismic retrofitting to mitigate risk of WTP catastrophic failure after a seismic event. This project would also include additional resilient backup power such as generators or solar panels and power storage. WTP has some power, so need would be assessed during the engineering feasibility study. These assets are at risk of being unusable after a major seismic event. These assets are located in/near Hillsboro, Oregon, a western suburb of Portland, which is within the CSZ.	Multi-Hazard	High

Action Item Number	Action Item Description	Hazard(s) Addressed	Priority
41	Develop and have ready to deploy community engagement regarding preparation for and actions during an emergency that has caused a disruption in water service to Hillsboro Water customers. This will also involve outreach to key community groups (i.e., schools, childcare facilities, elder care facilities, medical facilities, etc.) to educate about emergency water supplies and preparation as well as coordinating with community groups to be partners in emergency water supply delivery and information centers.	Multi-Hazard	High
42	One of the pre-fire prevention and mitigation strategies recommended from the CWPP is creating a preventative maintenance and fuels reduction plan with an accompanying facility inventory database. The preventative maintenance and fuels reduction plan will be developed and reevaluated annually and include location-specific maintenance, completion dates, and a fuels treatment plan for assets and resources outlined in the accompanying facility inventory database. This facility inventory database will focus on key assets, vulnerabilities, preventative maintenance schedule, tracking log, and actions that should be taken immediately if a wildland fire or other natural disaster occurs.	Multi-Hazard	High
43	This project will mitigate the risk of the JWC having insufficient fuel for emergency backup generators on-site to operate the WTP after a major seismic event. An engineering feasibility planning study will determine the amount of fuel supply that will be needed on-site to allow continuous WTP operation until it is estimated that fuel delivery service would resume. All fuel tanks would be seismically reinforced as part of this project. Phase 1 Design and Phase 2 Construction project would implement the solution selected from the planning study.	Multi-Hazard	High
44	Analyze current disaster preparedness videos for gaps in content and cultural appropriateness for the City. Expand the video library for specific seismic, wind, snow, and/or flood safety tips and seismic retrofitting for single-family homes. Make all videos in English as well as in at least one other language.	Multi-Hazard	High
45	Purchase revised code books and associated standards. Analyze Oregon residential code revisions based on current model International Residential Code. Analyze outward customer handouts, forms, and web information accordingly. Revise permit system software as needed. Provide appropriate training for all plan review and inspection staff for implementation of these revisions. Implement revised code review and inspection accordingly on all new projects.	Multi-Hazard	High

Action Item Number	Action Item Description	Hazard(s) Addressed	Priority
46	The City of Hillsboro serves water to 91,000 customers in Washington County, and in the event of an emergency there is no Emergency Drinking Water Plan that specifies water sources, treatment options, drinking water distribution plans, etc. The intent of this plan would be to determine gaps and enhance the City's recovery plan to provide clean, safe drinking water to the public, including identifying underserved communities. The Water Department would use a consultant to identify where water would be delivered, planning for the recovery of existing sources, conveyance, and methods for setting up emergency treatments and distribution centers for City of Hillsboro customers. The plan would include assessment of groundwater sources that could be used as emergency water supplies. The Water Department has a lot of this information or has had these discussions as the City has worked through its Emergency Response Plans; however, the City does not have all of this information in one location/plan to use more effectively to serve the public following a disaster.	Multi-Hazard	High
47	Seismic retrofit mitigation of the JWC Chemical Building for alum, polymer, and power-activated carbon chemical tanks at the WTP. The City of Hillsboro, Oregon, is the managing agency for the JWC. The project includes completing an engineering feasibility planning study and then a Phase 1 Design and Phase 2 Construction project to mitigate risk of catastrophic failure of the building and related infrastructure. These assets have not been seismically retrofitted to current standards. Therefore, the facilities are at risk of collapse during a major seismic event. These assets are located in unincorporated Washington County near the City of Forest Grove, Oregon, a western suburb of Portland, which is within the CSZ.	Multi-Hazard	Low

6.3. Mitigation Action Information Worksheets

Table 143: JWC Water Treatment Plant Remote Operations

Mitigation Action Information			
Title of action	JWC Water Treatment Plant Remote Operations		
Type of action	Plans/regulations ☒	Natural systems protection ☐	
	Structure and infrastructure project ☒	Public education/awareness ☐	
Action description	**JWC Water Treatment Plant – Remote Operations** High-value assets owned by the City of Hillsboro, Joint Water Commission, and Barney Reservoir Joint Ownership Commission at risk of being impacted by wildfire have been identified in two documents – the Tualatin Basin Quantitative Wildfire Risk Assessment and Recommendations (2021) by OSU-Extension Service Fire Program and Wildland Fire Associates, and the Tualatin Wildfire Protection Plan (2022) by JWC and Clean Water Services. The Wildfire Protection Plan recommends that we set up the JWC Water Treatment Plant for remote operation in the event of an evacuation. In addition to evacuations, monitoring and operating the treatment plant remotely would ensure worker safety and reliable service in the event of other natural disasters in addition to wildfire that could limit operator accessibility to the WTP, such as winter storms, flooding, earthquakes, volcanic ash, etc. The actions needed to set up the WTP for remote operations would entail upgrading cyber security and training operators on new protocols to access the SCADA system.		
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?	Remote operation of critical infrastructure like the treatment plant would allow for reliable service during emergency situations when operators could not access the plant.		
Area of action impact			
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? JWC Water Treatment Plant, JWC Fernhill Reservoirs		

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	State of Oregon NHMP		
Alignment with existing plans and policies	Wildfire Protection Plan (2022)		
Mitigation Action Implementation Plan			
Priority	Low ☐	Medium ☒	High ☐
Lead position, office, department, or division responsible for implementation	Information Services & JWC WTP		
Supporting Partners			
Internal Partners		**External Partners, Including Community Partners**	
Information Services, JWC WTP			
Potential Funding Sources			
Non-Federal Funding Sources		**Federal Funding Sources**	
JWC funds, City budget		HMGP	
Estimated Cost	$100,000		
Estimated Benefit			
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**	
Uninterrupted water service during emergencies	Employee safety, public health	$600,000	
Project Timeline			
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**	
Short-term ☐ Mid-term ☒ Long-term ☐ Ongoing ☐	1/1/2023	12/31/2026	
Implementation Benchmarks: How Will Success Be Measured?			
Potential Challenges to Implementation			
• Acquiring adequate cybersecurity to allow for remote operations is a challenge			
Resources and References, if Applicable			

Three Alternatives Considered, Including No Action			
Alternative #1	**Action description**	**Estimated Cost**	**Evaluation**
Alternative #2			
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 144: JWC Alum Storage Mitigation Project

Mitigation Action Information	
Title of action	JWC Alum Storage Mitigation Project
Type of action	Plans/regulations ☐ Natural systems protection ☐ Structure and infrastructure project ☒ Public education/awareness ☐
Action description	Project will mitigate the risk of the JWC having insufficient alum on-site for the water treatment plant (WTP) to operate after a major seismic event. After an engineering feasibility planning study, it was determined the amount of alum supply that will be needed on-site to allow continuous WTP operation until the alum delivery service would resume. All alum tanks would be seismically reinforced as part of this project. Phase 1 Design and Phase 2 Construction project would implement the solution selected from the planning study.
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 JWC WTP currently has 3 alum storage tanks and requires approximately 2 large deliveries per week to maintain adequate supplies. These assets are located in the Cascadia Subduction Zone (CSZ), which is at high risk for a major earthquake. After a major earthquake, heavy truck delivery service will be interrupted. Since alum is a critical chemical necessary to treat the raw water entering the WTP, the WTP would need to stop producing drinking water within a few days after a seismic event due to insufficient on-site inventory of alum. It appears that securing additional on-site alum storage may be the least costly mitigation strategy. Also, all alum tanks would be evaluated for needed seismic retrofits. The Phase 1 Design and Phase 2 Construction project would implement the selected solution from the planning study. The secondary natural hazards arise because roads could be damaged or unpassable from various natural hazard events, which could also disrupt drinking water production if on-site alum supplies were depleted. In 2020 a wildland fire extended to across the street from the WTP, which interrupted deliveries for several days. Wildland Fire and Drought natural disaster emergencies have been declared in Oregon in recent years. Without mitigation, the WTP could be crippled within a few days of a major earthquake. It will take at least several days for crews to clear critical transportation routes so that alum deliveries could be restored which would leave the JWC partners without their primary source for drinking water. With pre-disaster mitigation, the assets will stand up more quickly after a major seismic event.
Area of action impact	Over 400,000 customers located within Washington County receive their drinking water from the JWC WTP, including some large industrial users. JWC partners include the City of Beaverton, City of Forest Grove, City of Hillsboro, Tualatin Valley Water District, and a wholesale customer, City of North Plains.

Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? These assets provide water service, which is a *Food, Water, Shelter Critical Lifeline*.
Mitigation Action Integration	
Alignment with NHMP goals	Final Mitigation Mission Statement: Promote a disaster-resilient Washington County by taking actions to reduce risk, minimize loss, and protect life, property, and the environment from natural hazard events. Goal 1 ☒ Minimize loss of life, disruption of essential infrastructure Goal 2 ☒ Effective mitigation strategies and funding Goal 3 ☐ Natural hazard education and outreach programs Goal 4 ☐ Adopt policies and standards Goal 5 ☐ Enhance communication, collaboration Goal 6 ☒ Align mitigation strategies with local comprehensive plans Goal 7 ☒ Enhance economies to rebound quickly
Integration into other initiatives	Aligns with Hillsboro Water's Strategic Plan Goal 2: *Hillsboro Water continues to plan for the future, moving forward long-term investments while maintaining affordability.* A Hillsboro Water Guiding Principle is: *Protection of public health is the Hillsboro Water Department's number one priority.* Aligns with City Council Guiding Principles: • *We are prepared and resilient.* • *We are exceptional public stewards.* • *We are a safe community.* • *We exemplify diversity, equity, and inclusion.*
Alignment with existing plans and policies	This capital project will be included in the Hillsboro Water Capital Improvement Program (CIP) budget, which is published and reviewed at budget-related public meetings.
Mitigation Action Implementation Plan	
Priority	Low ☐ Medium ☒ High ☐
Lead position, office, department, or division responsible for implementation	Senior Program Manager, WTP City of Hillsboro Water Department
Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
Finance Department Grant Administration	JWC Partners, including City of Hillsboro, City of Beaverton, City of Forest Grove, and the Tualatin Valley Water District.

Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
Joint Water Commission	FEMA BRIC, HMGP USDA Rural Development Congressionally directed grant
Estimated Cost	Preliminary planning cost estimate: • $100,000 Engineering feasibility planning study • $500,000 Phase 1 Design and Phase 2 Construction

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**
Additional alum storage will prolong water production and allow additional time for alum deliveries to be arranged. This could keep water at the tap of 400,000 customers within Washington County.	• Will reduce business interruption and allow businesses to stand back up quicker. • Will allow residences to remain in the area or return more quickly – equity issue because vulnerable residents have less ability to relocate. • Will maintain fire protection services.	Study: $600,000 Phases 1 and 2: $3,000,000

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term (1–2 yrs.) ☐ Mid-term (3–5 yrs.) ☐ Long-term (6+ yrs.) ☒ Ongoing ☐	Start date depends greatly on Hillsboro's ability to secure federal grant funds. Without grant funding, project will need to proceed slowly to meet cash flow constraints.	Project could be completed within 1 to 2 years of securing 75% or greater grant funding. Without grant funding, project would be delayed for approximately 6 to 10 years.

Implementation Benchmarks: How Will Success Be Measured?

- Success will be measured by the substantial completion date JWC Alum Storage Mitigation Project.

Potential Challenges to Implementation

- The greatest obstacle or challenge will be securing federal grant funds to complete the project as quickly as possible. Ordering and delivery time of such a tank could be delayed due to the national goods and services pipeline issues.

Resources and References, if Applicable

- JWC/Hillsboro Water has prepared a preliminary draft cost estimate for this project. The next step would be to publish an RFP for an engineering consultant to prepare a preliminary engineering feasibility report. This report would include an evaluation of at least three alternative remediation solutions, including a No Action option as alternative #3. The engineering report would provide high-level preliminary cost estimates to facilitate determining the best value alternative. The engineer would also be tasked with preparing a preliminary Benefit-Cost Analysis (BCA) using FEMA's BCA spreadsheet with details for an earthquake natural hazard event.
- If preliminary engineering feasibility is approved, Phase 1 Design and Phase 2 Construction could move forward subject to securing funding.

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Add 12,000-gallon alum storage tank	$277,000	JWC Master Plan, JWC Strategic Plan
Alternative #2	Add 20,000-gallon alum storage tank	$350,000	Would allow for 3 truck load deliveries to fill. Oversized at this time and complicates delivery timing.
Alternative #3	No action – not yet available	$0	Status quo.

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 145: Hillsboro Crandall Reservoir to High Pressure Zone Pipeline Mitigation Project

Mitigation Action Information			
Title of action	Hillsboro Crandall Reservoir to High Pressure Zone Pipeline Mitigation Project		
Type of action	Plans/regulations ☒ Structure and infrastructure project ☒	Natural systems protection ☐ Public education/awareness ☐	
Action description	Project includes completing an engineering feasibility planning study and then a Phase 1 Design and Phase 2 Construction project to mitigate risk of insufficient water storage for industrial microchip manufacturing cluster after a seismic event. These assets are at risk of catastrophic failure during a major seismic event. These assets are located in Hillsboro, Oregon, a western suburb of Portland, which is within the Cascadia Subduction Zone (CSZ).		
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?	Earthquake is the primary natural hazard. A planning study will identify alternatives to mitigate the risk that existing water reservoir capacity may be insufficient. Industrial microchip manufacturing requires uninterrupted water service. After a seismic event, Hillsboro Water must provide emergency water service to industrial microchip manufacturers for a period of time to allow these firms to gracefully shut down their operations. A follow-up construction project would implement the best value solution to increase reservoir capacity and install isolation valves, pumps, backup power systems, and necessary telemetry and control systems, and to complete seismic retrofit mitigation on any identified at-risk assets. Early indications are that a lower cost solution might be to provide access to additional existing reservoir capacity. Implementing the selected stored water capacity solution and seismic retrofits will allow emergency water service to continue uninterrupted for a limited period after a major seismic event. These assets are located in the Cascadia Subduction Zone (CSZ), which is at high risk for a major earthquake. Without mitigation, industrial microchip manufacturing identified as in the U.S. national interest would experience very costly forced shutdowns. It could take chip plants months to recover from a forced shutdown due to abrupt loss of water service. With pre-disaster mitigation, chip plants will be able to recover more quickly after a major seismic event.		
Area of action impact	The project will benefit Hillsboro Water's High Pressure Zone (HPZ), which is where several industrial microchip manufacturing plants are located.		
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? This infrastructure provides water service to industrial microchip manufacturing plants (fabs, chip plants) identified as in the U.S. national interest.		

Mitigation Action Integration	
Alignment with NHMP goals	Final Mitigation Mission Statement: Promote a disaster-resilient Washington County by taking actions to reduce risk, minimize loss, and protect life, property, and the environment from natural hazard events. Goal 1 ☒ Minimize loss of life, disruption of essential infrastructure Goal 2 ☒ Effective mitigation strategies and funding Goal 3 ☐ Natural hazard education and outreach programs Goal 4 ☐ Adopt policies and standards Goal 5 ☐ Enhance communication, collaboration Goal 6 ☒ Align mitigation strategies with local comprehensive plans Goal 7 ☒ Enhance economies to rebound quickly
Integration into other initiatives	Aligns with Hillsboro Water's Strategic Plan Goal 2: *Hillsboro Water continues to plan for the future, moving forward long-term investments while maintaining affordability.* A Hillsboro Water Guiding Principle is: *Protection of public health is the Hillsboro Water Department's number one priority.* Aligns with City Council Guiding Principles: • *We are prepared and resilient.* • *We are exceptional public stewards.* • *We are a safe community.* • *We exemplify diversity, equity, and inclusion.*
Alignment with existing plans and policies	This capital project will be included in the Hillsboro Water Capital Improvement Program (CIP) budget, which is published and reviewed at budget-related public meetings.
Mitigation Action Implementation Plan	
Priority	Low ☒ Medium ☐ High ☐
Lead position, office, department, or division responsible for implementation	Senior Program Manager City of Hillsboro Water Department

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
Finance Department Grant Administration	Key industrial microchip manufacturing customers of the Hillsboro Water

Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
City of Hillsboro, PGE Renewable Development Fund, Energy trust of Oregon, Oregon Department of Energy	FEMA BRIC, HMGP USDA Rural Development Congressionally directed grant

Estimated Cost	Preliminary planning cost estimate: • $500,000 Engineering feasibility study • $20,000,000 Phase 1 Design and Phase 2 Construction

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**
Emergency water service can continue nonstop after a major seismic event. Assets located in Cascadia Subduction Zone (CSZ) are at high risk for a major earthquake.	After a major earthquake: • Will reduce business interruption and allow businesses to stand back up quicker. • Access to adequate levels of stored water and seismically retrofitted infrastructure will allow industrial microchip manufacturing firms to gracefully shutdown after an earthquake.	Study: $3,000,000 Phases 1 and 2: $120,000,000
Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term (1–2 yrs.) ☐ Mid-term (3–5 yrs.) ☐ Long-term (6+ yrs.) ☒ Ongoing ☐	Start date depends greatly on Hillsboro's ability to secure federal grant funds. Without grant funding, project will need to proceed slowly to meet cash flow constraints.	Project could be completed within 3 to 5 years of securing 75% or greater grant funding. Without grant funding, project would be delayed for approximately 6 to 10 years.
Implementation Benchmarks: How Will Success Be Measured?		
• Success will be measured by the substantial completion date for the Pipeline Retrofit Mitigation Project.		
Potential Challenges to Implementation		
• The greatest obstacle or challenge will be securing federal grant funds to complete the project as quickly as possible. Otherwise, insufficient emergency stored water will be available to industrial microchip manufacturing plants after a major seismic event. This will lead to unexpected fab plant shutdown, and fab plants could take months to recover.		
Resources and References, if Applicable		
• Hillsboro Water has prepared a preliminary draft cost estimate for this project. The next step would be to publish an RFP for an engineering consultant to prepare a preliminary engineering feasibility report. This report would include an evaluation of at least three alternative remediation solutions, including a No Action option as alternative #3. The engineering report would provide high-level preliminary cost estimates to facilitate determining the best value alternative. The engineer would also be tasked with preparing a preliminary Benefit-Cost Analysis (BCA) using FEMA's BCA spreadsheet with details for an earthquake natural hazard event. • If preliminary engineering feasibility is approved, Phase 1 Design and Phase 2 Construction could move forward subject to securing funding.		

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Not yet available		Preliminary engineering feasibility report to be prepared.
Alternative #2	Not yet available		Preliminary engineering feasibility report to be prepared.
Alternative #3	No action – not yet available		Preliminary engineering feasibility report to be prepared.

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 146: Joint Water Commission (JWC) Diesel Fuel Storage Mitigation Project

Mitigation Action Information			
Title of action	Joint Water Commission (JWC) Diesel Fuel Storage Mitigation Project		
Type of action	Plans/regulations ☐		Natural systems protection ☐
	Structure and infrastructure project ☒		Public education/awareness ☐
Action description	Project will mitigate the risk of the Joint Water Commission (JWC) having insufficient fuel for emergency backup generators on-site to operate the water treatment plant (WTP) after a major seismic event. An engineering feasibility planning study will determine the amount of fuel supply that will be needed on-site to allow continuous WTP operation until it is estimated that fuel delivery service would resume. All fuel tanks would be seismically reinforced as part of this project. Phase 1 Design and Phase 2 Construction project would implement the solution selected from the planning study.		
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 JWC WTP currently has standby power generators that can provide power to both the water treatment plant and back into the PGE power grid if needed. The generators have been utilized in several emergencies already. The generators have been used in both extreme hot and cold weather, in a local wildland fire, and during regular power outages. These assets are located in the Cascadia Subduction Zone (CSZ), which is at high risk for a major earthquake. After a major earthquake, heavy truck delivery service will be interrupted. Since power is necessary for pumps and infrastructure to operate and treat the raw water entering the WTP, the WTP would need to stop producing drinking water within a few days after a seismic event due to a power outage. The current 15,000 gallon fuel tank provides enough fuel for about 48 hours of operation. The engineering planning study will evaluate options to mitigate this natural hazard risk. It appears that securing additional on-site fuel storage may be the least costly mitigation strategy. Also, all fuel tanks would be evaluated for needed seismic retrofits. The Phase 1 Design and Phase 2 Construction project would implement the selected solution from the planning study. The secondary natural hazards arise because roads could be damaged or unpassable from various natural hazard events, which could also disrupt drinking water production if backup power is lost. In 2020 a wildland fire extended to across the street from the WTP, which interrupted deliveries for several days. Wildland fire and drought natural disaster emergencies have been declared in Oregon in recent years. Without mitigation, the WTP could be crippled within a few days of a major earthquake. It will take at least several days for crews to clear critical transportation routes so that fuel deliveries could be restored, which would leave the JWC partners without their primary source for drinking water. With pre-disaster mitigation, the assets will stand up more quickly after a major seismic event.		

Area of action impact	Over 400,000 customers located within Washington County receive their drinking water from the JWC WTP, including some large industrial microchip manufacturing users.
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? These assets provide water service, which is a *Food, Water, Shelter Critical Lifeline*.
Mitigation Action Integration	
Alignment with NHMP goals	Final Mitigation Mission Statement: Promote a disaster-resilient Washington County by taking actions to reduce risk, minimize loss, and protect life, property, and the environment from natural hazard events. Goal 1 ☒ Minimize loss of life, disruption of essential infrastructure Goal 2 ☒ Effective mitigation strategies and funding Goal 3 ☐ Natural hazard education and outreach programs Goal 4 ☐ Adopt policies and standards Goal 5 ☐ Enhance communication, collaboration Goal 6 ☒ Align mitigation strategies with local comprehensive plans Goal 7 ☒ Enhance economies to rebound quickly
Integration into other initiatives	Aligns with Hillsboro Water's Strategic Plan Goal 2: *Hillsboro Water continues to plan for the future, moving forward long-term investments while maintaining affordability.* A Hillsboro Water Guiding Principle is: *Protection of public health is the Hillsboro Water Department's number one priority.* Aligns with City Council Guiding Principles: • *We are prepared and resilient.* • *We are exceptional public stewards.* • *We are a safe community.* • *We exemplify diversity, equity, and inclusion.*
Alignment with existing plans and policies	This capital project will be included in the Hillsboro Water Capital Improvement Program (CIP) budget, which is published and reviewed at budget-related public meetings.
Mitigation Action Implementation Plan	
Priority	Low ☐ Medium ☐ High ☒
Lead position, office, department, or division responsible for implementation	Senior Program Manager, WTP City of Hillsboro Water Department
Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
Finance Department Grant Administration	JWC Partners, including City of Hillsboro, City of Beaverton, City of Forest Grove and the Tualatin Valley Water District.

Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
Joint Water Commission	FEMA BRIC, HMGP USDA Rural Development Congressionally directed grant
Estimated Cost	Preliminary planning cost estimate: • $100,000 Engineering feasibility planning study • $500,000 Phase 1 Design and Phase 2 Construction

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**
Additional fuel storage will prolong water production and allow additional time for fuel deliveries to be arranged. This could keep water at the tap of 400,000 customers within Washington County.	• Will reduce business interruption and allow businesses to stand back up quicker. • Will allow residences to remain in the area or return more quickly – equity issue because vulnerable residents have less ability to relocate. • Will maintain fire protection services. • Will reduce power demands on the PGE system during an emergency.	Study: $600,000 Phases 1 and 2: $3,000,000

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term (1–2 yrs.) ☐ Mid-term (3–5 yrs.) ☐ Long-term (6+ yrs.) ☒ Ongoing ☐	Start date depends greatly on Hillsboro's ability to secure federal grant funds. Without grant funding, project will need to proceed slowly to meet cash flow constraints.	Project could be completed within 1 to 2 years of securing 75% or greater grant funding. Without grant funding, project would be delayed for approximately 6 to 10 years.

Implementation Benchmarks: How Will Success Be Measured?
• Success will be measured by the substantial completion date for the JWC Diesel Fuel Storage Mitigation Project.

Potential Challenges to Implementation
• The greatest obstacle or challenge will be securing federal grant funds to complete the project as quickly as possible. Ordering and delivery time of such a tank could be delayed due to the national goods and services pipeline issues.

Resources and References, if Applicable
• JWC/Hillsboro Water has prepared a preliminary draft cost estimate for this project. The next step would be to publish an RFP for an engineering consultant to prepare a preliminary engineering feasibility report. This report would include an evaluation of at least three alternative remediation solutions, including a No Action option as alternative #3. The engineering report would provide high-level preliminary cost estimates to facilitate determining the best value alternative. The engineer would also be tasked with preparing a preliminary Benefit-Cost Analysis (BCA) using FEMA's BCA spreadsheet with details for an earthquake natural hazard event. • If preliminary engineering feasibility is approved, Phase 1 Design and Phase 2 Construction could move forward subject to securing funding.

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Add 15,000-gallon diesel fuel tank	$174,000	This is preferred option so that both tanks are the same size.
Alternative #2	Add 20,000-gallon diesel fuel tank	$225,000	Larger tank would create hydraulic differences between the two tanks resulting in poor fuel turnover.
Alternative #3	No action – not yet available	$0	Status quo.

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 147: City of Hillsboro Emergency Drinking Water Plan

Mitigation Action Information			
Title of action	City of Hillsboro Emergency Drinking Water Plan		
Type of action	Plans/regulations ☒	Natural systems protection ☐	
	Structure and infrastructure project ☐	Public education/awareness ☐	
Action description	The City of Hillsboro serves water to 91,000 customers in Washington County, and in the event of an emergency, there is no Emergency Drinking Water Plan that specifies water sources, treatment options, drinking water distribution plans, etc. The intent of this plan would be to determine gaps and enhance our recovery plan to provide clean, safe drinking water to the public, including identifying underserved communities. The Water Department would use a consultant to identify where water sources could be accessible post-event, determine how and where that water would be delivered, plan for the recovery of existing sources, conveyance, and devise methods for setting up emergency treatment and distribution centers for COH customers. The Plan would include assessment of groundwater sources that could be used as emergency water supplies. The Water Department has a lot of this information or has had these discussions as we've worked through our Emergency Response Plans; however, we do not have all of this information in one location/plan to use to more effectively to serve the public following a disaster.		
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 vulnerability addressed is minimizing the loss of life and minimizing additional public health issues by being able to deliver clean, high-quality water to the public following an emergency event. Post-hazard we need to identify how we can serve our population, including some of our underserved communities.		
Area of action impact	Citywide		
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	Regional Water Providers Drinking Water Framework Plan		
Alignment with existing plans and policies	Regional Water Providers Drinking Water Framework Plan, City of Hillsboro Water Department Emergency Response Plan, State NHMP		

Mitigation Action Implementation Plan			
Priority	Low ☐ Medium ☐ High ☒		
Lead position, office, department, or division responsible for implementation	City of Hillsboro Water Operations		
Supporting Partners			
Internal Partners		**External Partners, Including Community Partners**	
Emergency Management, Police, Fire and Planning			
Potential Funding Sources			
Non-Federal Funding Sources		**Federal Funding Sources**	
City Budget, RDPO UASI Grant		EPA – WIIN Act Grant, HMGP	
Estimated Cost	$300,000		
Estimated Benefit			
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**	
Efficiently providing safe drinking water to the public	Identifying new and additional drinking water sources	$1,800,000	
Project Timeline			
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**	
Short-term ☒ Mid-term ☐ Long-term ☐ Ongoing ☐	July 2023	June 2024	
Implementation Benchmarks: How Will Success Be Measured?			
• The completion of the plan			
Potential Challenges to Implementation			
• Coordination with other departments and compiling internal documents			
Resources and References, if Applicable			
• Emergency Response Plan			

Three Alternatives Considered, Including No Action			
Alternative #1	**Action Description**	**Estimated Cost**	**Evaluation**
	Do nothing	$0	
Alternative #2			
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 148: JWC Chemical Building Seismic Retrofit Mitigation Project

Mitigation Action Information			
Title of action	JWC Chemical Building Seismic Retrofit Mitigation Project		
Type of action	Plans/regulations ☐	Natural systems protection ☐	
	Structure and infrastructure project ☒	Public education/awareness ☐	
Action description	Seismic retrofit mitigation of the Joint Water Commission (JWC) Chemical Building for alum, polymer, and power-activated carbon chemical tanks at the water treatment plant. The City of Hillsboro, Oregon, is the managing agency for the JWC. Project includes completing an engineering feasibility planning study and then a Phase 1 Design and Phase 2 Construction project to mitigate risk of catastrophic failure of the building and related infrastructure. These assets have not been seismically retrofitted to current standards. Therefore, the facilities are at risk of collapse during a major seismic event. These assets are located in unincorporated Washington County near the City of Forest Grove, Oregon, a western suburb of Portland, which is within the Cascadia Subduction Zone (CSZ).		
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?	Earthquake is the primary natural hazard. An engineering feasibility planning study will identify alternatives to mitigate the earthquake natural hazard risk. Then, a follow-up Phase 1 Design and Phase 2 Construction project to implement seismic retrofit of the building and related infrastructure will allow water service to resume shortly after a major seismic event. These assets are located in the Cascadia Subduction Zone (CSZ), which is at high risk for a major earthquake. Secondary risk is drought. Climate change–induced drought is leading to private wells drying up, which leads to hardship requests for water service. The Chemical Building is occupied by JWC staff and is an integral component for operating the water treatment plant. Without a seismic retrofit, life safety risk of casualties is increased and time to stand back up the water treatment plant will be greatly increased. With pre-disaster mitigation, the assets will stand up more quickly after a major seismic event.		
Area of action impact	The JWC water treatment plant is a regional service provider for customers in the Oregon cities of Beaverton, Hillsboro, and Forest Grove and the Tualatin Valley Water District. The city of North Plains is a JWC wholesale customer.		
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? JWC assets provide water service, which is a *Food, Water, Shelter Critical Lifeline*.		

<table>
<tr><th colspan="3">Mitigation Action Integration</th></tr>
<tr><td>Alignment with NHMP goals</td><td colspan="2">Final Mitigation Mission Statement: Promote a disaster-resilient Washington County by taking actions to reduce risk, minimize loss, and protect life, property, and the environment from natural hazard events.
Goal 1 ☒ Minimize loss of life, disruption of essential infrastructure
Goal 2 ☒ Effective mitigation strategies and funding
Goal 3 ☐ Natural hazard education and outreach programs
Goal 4 ☐ Adopt policies and standards
Goal 5 ☐ Enhance communication, collaboration
Goal 6 ☒ Align mitigation strategies with local comprehensive plans
Goal 7 ☒ Enhance economies to rebound quickly</td></tr>
<tr><td>Integration into other initiatives</td><td colspan="2">Aligns with Hillsboro Water's Strategic Plan Goal 2: Hillsboro Water continues to plan for the future, moving forward long-term investments while maintaining affordability.
A Hillsboro Water Guiding Principle is: Protection of public health is the Hillsboro Water Department's number one priority.
Aligns with City Council Guiding Principles:
• We are prepared and resilient.
• We are exceptional public stewards.
• We are a safe community.
• We exemplify diversity, equity, and inclusion.</td></tr>
<tr><td>Alignment with existing plans and policies</td><td colspan="2">This capital project will be included in the Hillsboro and JWC Water Capital Improvement Program (CIP) budget, which is published and reviewed at budget-related public meetings.</td></tr>
<tr><th colspan="3">Mitigation Action Implementation Plan</th></tr>
<tr><td>Priority</td><td colspan="2">Low ☒ Medium ☐ High ☐</td></tr>
<tr><td>Lead position, office, department, or division responsible for implementation</td><td colspan="2">Senior Program Manager
City of Hillsboro Water Department</td></tr>
<tr><th colspan="3">Supporting Partners</th></tr>
<tr><th colspan="2">Internal Partners</th><th>External Partners, Including Community Partners</th></tr>
<tr><td colspan="2">Finance Department Grant Administration</td><td>City of Beaverton, City of Forest Grove, Tualatin Valley Water District, City of North Plains</td></tr>
<tr><th colspan="3">Potential Funding Sources</th></tr>
<tr><th colspan="2">Non-Federal Funding Sources</th><th>Federal Funding Sources</th></tr>
<tr><td colspan="2">JWC partners, including City of Beaverton, City of Forest Grove, City of Hillsboro, and Tualatin Valley Water District</td><td>FEMA BRIC, HMGP
USDA Rural Development
Congressionally directed grant</td></tr>
<tr><td>Estimated Cost</td><td colspan="2">Preliminary planning cost estimate:
• $150,000 Engineering feasibility study
• $12,100,000 Phase 1 Design and Phase 2 Construction</td></tr>
</table>

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**
Seismic retrofit will allow water service to resume shortly after a major seismic event. Assets located in Cascadia Subduction Zone (CSZ) are at high risk for a major earthquake.	After a major earthquake: • Will reduce business interruption and allow businesses to stand back up quicker. • Will allow residences to remain in the area or return more quickly – equity issue because vulnerable residents have less ability to relocate. • Will maintain fire protection services.	Study: $900,000 Construction: $72,600,000
Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term (1–2 yrs.) ☐ Mid-term (3–5 yrs.) ☐ Long-term (6+ yrs.) ☒ Ongoing ☐	Start date depends greatly on Hillsboro/JWC's ability to secure federal grant funds. Without grant funding, project will need to proceed slowly to meet partner cash flow constraints.	Project could be completed within 6 years of securing 75% or greater grant funding. Without grant funding, project would be delayed for approximately 10 years.
Implementation Benchmarks: How Will Success Be Measured?		
• Success will be measured by the substantial completion date for the JWC Chemical Building Seismic Retrofit Mitigation Project.		
Potential Challenges to Implementation		
• The greatest obstacle or challenge will be securing federal grant funds to complete the project as quickly as possible. Otherwise, assets will remain seismically deficient and at greater risk of catastrophic failure for many months after a major seismic event.		
Resources and References, if Applicable		
• JWC/Hillsboro Water has prepared a preliminary draft cost estimate for this project. The next step would be to publish an RFP for an engineering consultant to prepare a preliminary engineering feasibility report. This report would include an evaluation of at least three alternative remediation solutions, including a No Action option as alternative #3. The engineering report would provide high-level preliminary cost estimates to facilitate determining the best value alternative. The engineer would also be tasked with preparing a preliminary Benefit-Cost Analysis (BCA) using FEMA's BCA spreadsheet with details for an earthquake natural hazard event. • If preliminary engineering feasibility is approved, Phase 1 Design and Phase 2 Construction could move forward subject to securing funding.		

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Not yet available		Preliminary engineering feasibility report to be prepared.
Alternative #2	Not yet available		Preliminary engineering feasibility report to be prepared.
Alternative #3	No action – not yet available		Preliminary engineering feasibility report to be prepared.

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 149: JWC Clearwell Seismic Retrofit Mitigation Project

Mitigation Action Information			
Title of action	JWC Clearwell Seismic Retrofit Mitigation Project		
Type of action	Plans/regulations ☐		Natural systems protection ☐
	Structure and infrastructure project ☒		Public education/awareness ☐
Action description	Seismic retrofit mitigation of the Joint Water Commission's (JWC) 2.5 million gallon Clearwell, including foundation stabilization, at the water treatment plant. The City of Hillsboro, Oregon, is the managing agency for the JWC. Additional work completed might include seismically resilient finished water pumps and backwash pumps. Project includes completing an engineering feasibility planning study and then a Phase 1 Design and Phase 2 Construction project to mitigate risk of catastrophic failure of the assets and related infrastructure. These assets have not been seismically retrofitted to current standards. Therefore, the facilities are at risk of collapse during a major seismic event. These assets are located in unincorporated Washington County near the City of Forest Grove, Oregon, a western suburb of Portland, which is within the Cascadia Subduction Zone (CSZ).		
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?	Earthquake is the primary natural hazard. An engineering feasibility planning study will identify alternatives to mitigate the earthquake natural hazard risk. Then, a follow-up Phase 1 Design and Phase 2 Construction project to implement seismic retrofit of the Clearwell and related infrastructure will allow water service to resume shortly after a major seismic event. These assets are located in the Cascadia Subduction Zone (CSZ), which is at high risk for a major earthquake. Secondary risk is drought. Climate change–induced drought is leading to private wells drying up, which leads to hardship requests for water service. Without a seismic retrofit, life safety risk of casualties is increased and time to stand back up the water treatment plant will be greatly increased. With pre-disaster mitigation, the assets will stand up more quickly after a major seismic event.		
Area of action impact	The JWC water treatment plant is a regional service provider for customers in the Oregon cities of Beaverton, Hillsboro, and Forest Grove and the Tualatin Valley Water District. The city of North Plains is a JWC wholesale customer.		
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? JWC assets provide water service, which is a *Food, Water, Shelter Critical Lifeline*.		

Mitigation Action Integration	
Alignment with NHMP goals	Final Mitigation Mission Statement: Promote a disaster-resilient Washington County by taking actions to reduce risk, minimize loss, and protect life, property, and the environment from natural hazard events. Goal 1 ☒ Minimize loss of life, disruption of essential infrastructure Goal 2 ☒ Effective mitigation strategies and funding Goal 3 ☐ Natural hazard education and outreach programs Goal 4 ☐ Adopt policies and standards Goal 5 ☐ Enhance communication, collaboration Goal 6 ☒ Align mitigation strategies with local comprehensive plans Goal 7 ☒ Enhance economies to rebound quickly
Integration into other initiatives	Aligns with Hillsboro Water's Strategic Plan Goal 2: *Hillsboro Water continues to plan for the future, moving forward long-term investments while maintaining affordability.* A Hillsboro Water Guiding Principle is: *Protection of public health is the Hillsboro Water Department's number one priority.* Aligns with City Council Guiding Principles: • *We are prepared and resilient.* • *We are exceptional public stewards.* • *We are a safe community.* • *We exemplify diversity, equity, and inclusion.*
Alignment with existing plans and policies	This capital project will be included in the Hillsboro and JWC Water Capital Improvement Program (CIP) budget, which is published and reviewed at budget-related public meetings.
Mitigation Action Implementation Plan	
Priority	Low ☒ Medium ☐ High ☐
Lead position, office, department, or division responsible for implementation	Senior Program Manager City of Hillsboro Water Department
Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
Finance Department Grant Administration	City of Beaverton, City of Forest Grove, Tualatin Valley Water District, City of North Plains.

Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
JWC partners, including City of Beaverton, City of Forest Grove, City of Hillsboro, and Tualatin Valley Water District	FEMA BRIC, HMGP USDA Rural Development Congressionally directed grant
Estimated Cost	Preliminary planning cost estimate: • $500,000 Engineering feasibility study • $52,700,000 Phase 1 Design and Phase 2 Construction

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**
Seismic retrofit will allow water service to resume shortly after a major seismic event. Assets located in Cascadia Subduction Zone (CSZ) are at high risk for a major earthquake.	After a major earthquake: • Will reduce business interruption and allow businesses to stand back up quicker. • Will allow residences to remain in the area or return more quickly – equity issue because vulnerable residents have less ability to relocate. • Will maintain fire protection services.	Study: $3,000,000 Phases 1 and 2: $316,200,000

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term (1–2 yrs.) ☐ Mid-term (3–5 yrs.) ☐ Long-term (6+ yrs.) ☒ Ongoing ☐	Start date depends greatly on Hillsboro/JWC's ability to secure federal grant funds. Without grant funding, project will need to proceed slowly to meet partner cash flow constraints.	Project could be completed within 6 years of securing 75% or greater grant funding. Without grant funding, project would be delayed for over 10 years.

Implementation Benchmarks: How Will Success Be Measured?
• Success will be measured by the substantial completion date for the JWC Chemical Building Seismic Retrofit Mitigation Project.

Potential Challenges to Implementation
• The greatest obstacle or challenge will be securing federal grant funds to complete the project as quickly as possible. Otherwise, assets will remain seismically deficient and at greater risk of catastrophic failure for many months after a major seismic event.

Resources and References, if Applicable
• JWC/Hillsboro Water has prepared a preliminary draft cost estimate for this project. The next step would be to publish an RFP for an engineering consultant to prepare a preliminary engineering feasibility report. This report would include an evaluation of at least three alternative remediation solutions, including a No Action option as alternative #3. The engineering report would provide high-level preliminary cost estimates to facilitate determining the best value alternative. The engineer would also be tasked with preparing a preliminary Benefit-Cost Analysis (BCA) using FEMA's BCA spreadsheet with details for an earthquake natural hazard event. • If preliminary engineering feasibility is approved, Phase 1 Design and Phase 2 Construction could move forward subject to securing funding.

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Not yet available		Preliminary engineering feasibility report to be prepared.
Alternative #2	Not yet available		Preliminary engineering feasibility report to be prepared.
Alternative #3	No action – not yet available		Preliminary engineering feasibility report to be prepared.

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 150: JWC Finished Water Pumps Seismic Retrofit Mitigation Project

Mitigation Action Information			
Title of action	JWC Finished Water Pumps Seismic Retrofit Mitigation Project		
Type of action	Plans/regulations ☐	Natural systems protection ☐	
	Structure and infrastructure project ☒	Public education/awareness ☐	
Action description	Seismic retrofit mitigation of the Joint Water Commission's (JWC) Finished Water Pumps at the water treatment plant. The City of Hillsboro, Oregon, is the managing agency for the JWC. Additional work completed might include seismically resilient finished water pumps and backwash pumps. Project includes completing an engineering feasibility planning study and then a Phase 1 Design and Phase 2 Construction project to mitigate risk of catastrophic failure of the assets and related infrastructure. These assets have not been seismically retrofitted to current standards. Therefore, the facilities are at risk of collapse during a major seismic event. These assets are located in unincorporated Washington County near the City of Forest Grove, Oregon, a western suburb of Portland, which is within the Cascadia Subduction Zone (CSZ).		
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?	Earthquake is the primary natural hazard. An engineering feasibility planning study will identify alternatives to mitigate the earthquake natural hazard risk. Then, a follow-up Phase 1 Design and Phase 2 Construction project to implement seismic retrofit of the Finished Water Pumps and related infrastructure will allow water service to resume shortly after a major seismic event. These assets are located in the Cascadia Subduction Zone (CSZ), which is at high risk for a major earthquake. Secondary risk is drought. Climate change–induced drought is leading to private wells drying up, which leads to hardship requests for water service. Without a seismic retrofit, life safety risk of casualties is increased and time to stand back up the water treatment plant will be greatly increased. With pre-disaster mitigation, the assets will stand up more quickly after a major seismic event.		
Area of action impact	The JWC water treatment plant is a regional service provider for customers in the Oregon cities of Beaverton, Hillsboro, and Forest Grove and the Tualatin Valley Water District. The city of North Plains is a JWC wholesale customer.		
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? JWC assets provide water service, which is a *Food, Water, Shelter Critical Lifeline*.		

Mitigation Action Integration	
Alignment with NHMP goals	Final Mitigation Mission Statement: Promote a disaster-resilient Washington County by taking actions to reduce risk, minimize loss, and protect life, property, and the environment from natural hazard events. Goal 1 ☒ Minimize loss of life, disruption of essential infrastructure Goal 2 ☒ Effective mitigation strategies and funding Goal 3 ☐ Natural hazard education and outreach programs Goal 4 ☐ Adopt policies and standards Goal 5 ☐ Enhance communication, collaboration Goal 6 ☒ Align mitigation strategies with local comprehensive plans Goal 7 ☒ Enhance economies to rebound quickly
Integration into other initiatives	Aligns with Hillsboro Water's Strategic Plan Goal 2: *Hillsboro Water continues to plan for the future, moving forward long-term investments while maintaining affordability.* A Hillsboro Water Guiding Principle is: *Protection of public health is the Hillsboro Water Department's number one priority.* Aligns with City Council Guiding Principles: • *We are prepared and resilient.* • *We are exceptional public stewards.* • *We are a safe community.* • *We exemplify diversity, equity, and inclusion.*
Alignment with existing plans and policies	This capital project will be included in the Hillsboro and JWC Water Capital Improvement Program (CIP) budget, which is published and reviewed at budget-related public meetings.
Mitigation Action Implementation Plan	
Priority	Low ☐ Medium ☒ High ☐
Lead position, office, department, or division responsible for implementation	Senior Program Manager City of Hillsboro Water Department

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
Finance Department Grant Administration	City of Beaverton, City of Forest Grove, Tualatin Valley Water District, City of North Plains.

Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
JWC partners, including City of Beaverton, City of Forest Grove, City of Hillsboro, and Tualatin Valley Water District	FEMA BRIC, HMGP USDA Rural Development Congressionally directed grant

Estimated Cost	Preliminary planning cost estimate: • $200,000 Engineering feasibility study • $11,100,000 Phase 1 Design and Phase 2 Construction

<table>
<tr><th colspan="3">Estimated Benefit</th></tr>
<tr><th>Primary Benefit(s)</th><th>Secondary Benefit(s)</th><th>Financial Benefit(s)</th></tr>
<tr><td>Seismic retrofit will allow water service to resume shortly after a major seismic event. Assets located in Cascadia Subduction Zone (CSZ) are at high risk for a major earthquake.</td><td>After a major earthquake:
Will reduce business interruption and allow businesses to stand back up quicker.
Will allow residences to remain in the area or return more quickly – equity issue because vulnerable residents have less ability to relocate.
Will maintain fire protection services.</td><td>Study: $1,200,000
Phases 1 and 2: $66,600,000</td></tr>
<tr><th colspan="3">Project Timeline</th></tr>
<tr><th>Expected Timeline for Completion</th><th>Potential Start Date</th><th>Potential Completion Date</th></tr>
<tr><td>Short-term (1–2 yrs.) ☐
Mid-term (3–5 yrs.) ☐
Long-term (6+ yrs.) ☒
Ongoing ☐</td><td>Start date depends greatly on Hillsboro/JWC’s ability to secure federal grant funds. Without grant funding, project will need to proceed slowly to meet partner cash flow constraints.</td><td>Project could be completed within 8 years of securing 75% or greater grant funding. Without grant funding, project would be delayed for over 10 years.</td></tr>
<tr><th colspan="3">Implementation Benchmarks: How Will Success Be Measured?</th></tr>
<tr><td colspan="3">Success will be measured by the substantial completion date for the JWC Finished Water Pumps Seismic Retrofit Mitigation Project.</td></tr>
<tr><th colspan="3">Potential Challenges to Implementation</th></tr>
<tr><td colspan="3">The greatest obstacle or challenge will be securing federal grant funds to complete the project as quickly as possible. Otherwise, assets will remain seismically deficient and at greater risk of catastrophic failure for many months after a major seismic event.</td></tr>
<tr><th colspan="3">Resources and References, if Applicable</th></tr>
<tr><td colspan="3">JWC/Hillsboro Water has prepared a preliminary draft cost estimate for this project. The next step would be to publish an RFP for an engineering consultant to prepare a preliminary engineering feasibility report. This report would include an evaluation of at least three alternative remediation solutions, including a No Action option as alternative #3. The engineering report would provide high-level preliminary cost estimates to facilitate determining the best value alternative. The engineer would also be tasked with preparing a preliminary Benefit-Cost Analysis (BCA) using FEMA’s BCA spreadsheet with details for an earthquake natural hazard event.
If preliminary engineering feasibility is approved, Phase 1 Design and Phase 2 Construction could move forward subject to securing funding.</td></tr>
</table>

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Not yet available		Preliminary engineering feasibility report to be prepared.
Alternative #2	Not yet available		Preliminary engineering feasibility report to be prepared.
Alternative #3	No action – not yet available		Preliminary engineering feasibility report to be prepared.

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 151: JWC North and South Transmission Pipelines Seismic Retrofit Mitigation Project

Mitigation Action Information	
Title of action	JWC North and South Transmission Pipelines Seismic Retrofit Mitigation Project
Type of action	Plans/regulations ☒ Natural systems protection ☐ Structure and infrastructure project ☒ Public education/awareness ☐
Action description	Seismic retrofit mitigation of the Joint Water Commission's (JWC) primary water transmission pipelines, the North Transmission Line (NTL) and the South Transmission Line (STL). The City of Hillsboro, Oregon, is the managing agency for the JWC. These assets are located in/near Hillsboro, Oregon, a western suburb of Portland, which is within the Cascadia Subduction Zone (CSZ). Project includes completing an engineering feasibility planning study and then a Phase 1 Design and Phase 2 Construction project to mitigate risk of catastrophic failure of these assets. These assets are at risk of catastrophic failure during a major seismic event. A preliminary assessment for insurance purposes identified the older STL as at highest risk of catastrophic failure after an earthquake, while the NTL would sustain major damage but might be viable at reduced pressure in an emergency.
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?	Earthquake is the primary natural hazard. An engineering feasibility planning study will identify alternatives to mitigate the seismic natural hazard risk for the NTL and STL. Then, a follow-up Phase 1 Design and Phase 2 Construction project would implement the best value solution to seismically strengthen these large diameter water transmission pipelines. Implementing the seismic retrofits will allow emergency water service to be delivered sooner after a major seismic event. These assets are located in the Cascadia Subduction Zone (CSZ), which is at high risk for a major earthquake. Without mitigation, the NTL and STL could experience catastrophic failure, which would cripple the JWC's ability to deliver water to partners even if the water treatment plant can be returned to service quickly after a seismic event. It could take several months to search for damage as the pipelines are located underground and under roads, etc., and then to effect emergency repairs. With pre-disaster mitigation, the assets will stand up more quickly after a major seismic event.
Area of action impact	The JWC is a regional service provider for customers in the Oregon cities of Beaverton, Hillsboro, and Forest Grove and the Tualatin Valley Water District. The city of North Plains is a JWC wholesale customer.
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? JWC assets provide water service, which is a *Food, Water, Shelter Critical Lifeline*.

Mitigation Action Integration	
Alignment with NHMP goals	Final Mitigation Mission Statement: Promote a disaster-resilient Washington County by taking actions to reduce risk, minimize loss, and protect life, property, and the environment from natural hazard events. Goal 1 ☒ Minimize loss of life, disruption of essential infrastructure Goal 2 ☒ Effective mitigation strategies and funding Goal 3 ☐ Natural hazard education and outreach programs Goal 4 ☐ Adopt policies and standards Goal 5 ☐ Enhance communication, collaboration Goal 6 ☒ Align mitigation strategies with local comprehensive plans Goal 7 ☒ Enhance economies to rebound quickly
Integration into other initiatives	Aligns with Hillsboro Water's Strategic Plan Goal 2: *Hillsboro Water continues to plan for the future, moving forward long-term investments while maintaining affordability.* A Hillsboro Water Guiding Principle is: *Protection of public health is the Hillsboro Water Department's number one priority.* Aligns with City Council Guiding Principles: • *We are prepared and resilient.* • *We are exceptional public stewards.* • *We are a safe community.* • *We exemplify diversity, equity, and inclusion.*
Alignment with existing plans and policies	This capital project will be included in the Hillsboro and JWC Water Capital Improvement Program (CIP) budget, which is published and reviewed at budget-related public meetings.
Mitigation Action Implementation Plan	
Priority	Low ☐ Medium ☐ High ☒
Lead position, office, department, or division responsible for implementation	Senior Program Manager City of Hillsboro Water Department

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
Finance Department Grant Administration	City of Beaverton, City of Forest Grove, Tualatin Valley Water District, City of North Plains.

Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
City of Hillsboro	FEMA BRIC, HMGP USDA Rural Development Congressionally directed grant

Estimated Cost	Preliminary planning cost estimate: • $3,578,000 Transmission line condition engineering assessment • $32,000,000 Phase 1 Design and Phase 2 Construction

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**
Seismic retrofit will allow water service to resume shortly after a major seismic event. Assets located in Cascadia Subduction Zone (CSZ) are at high risk for a major earthquake.	After a major earthquake: • Will reduce business interruption and allow businesses to stand back up quicker. • Will allow residences to remain in the area or return more quickly – equity issue because vulnerable residents have less ability to relocate. • Will maintain fire protection services.	Study: $21,468,000 Phases 1 and 2: $192,000,000
Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term (1–2 yrs.) ☐ Mid-term (3–5 yrs.) ☐ Long-term (6+ yrs.) ☒ Ongoing ☐	Start date depends greatly on Hillsboro's ability to secure federal grant funds. Without grant funding, project will need to proceed slowly to meet cash flow constraints.	Project could be completed within 3 to 5 years of securing 75% or greater grant funding. Without grant funding, project would be delayed for approximately 6 to 10 years.
Implementation Benchmarks: How Will Success Be Measured?		
• Success will be measured by the substantial completion date for the JWC North and South Transmission Pipelines Seismic Retrofit Mitigation Project.		
Potential Challenges to Implementation		
• The greatest obstacle or challenge will be securing federal grant funds to complete the project as quickly as possible. Otherwise, assets will remain seismically deficient and at greater risk of catastrophic failure for many months after a major seismic event. • Other challenges will include permitting and scheduling of work as pipeline work will impact roads, businesses, residences, etc.		
Resources and References, if Applicable		
• JWC/Hillsboro Water has prepared a preliminary draft cost estimate for this project. The next step would be to publish an RFP for an engineering consultant to prepare a preliminary engineering feasibility report. This report would include an evaluation of at least three alternative remediation solutions, including a No Action option as alternative #3. The engineering report would provide high-level preliminary cost estimates to facilitate determining the best value alternative. The engineer would also be tasked with preparing a preliminary Benefit-Cost Analysis (BCA) using FEMA's BCA spreadsheet with details for an earthquake natural hazard event. • If preliminary engineering feasibility is approved, Phase 1 Design and Phase 2 Construction could move forward subject to securing funding.		

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Not yet available		Preliminary engineering feasibility report to be prepared.
Alternative #2	Not yet available		Preliminary engineering feasibility report to be prepared.
Alternative #3	No action – not yet available		Preliminary engineering feasibility report to be prepared.

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 152: JWC Operations Building and Rapid Mix Retrofit Mitigation Project

Mitigation Action Information			
Title of action	JWC Operations Building and Rapid Mix Retrofit Mitigation Project		
Type of action	Plans/regulations ☐		Natural systems protection ☐
	Structure and infrastructure project ☒		Public education/awareness ☐
Action description	Seismic retrofit mitigation of the Joint Water Commission (JWC) Operations Building and rapid mix system at the water treatment plant. The City of Hillsboro, Oregon is the managing agency for the JWC. Project includes completing an engineering feasibility planning study and then a Phase 1 Design and Phase 2 Construction project to mitigate risk of catastrophic failure of the Operations Building and rapid mix system. These assets have not been seismically retrofitted to current standards. Therefore, the facilities are at risk of collapse during a major seismic event. These assets are located in unincorporated Washington County near the City of Forest Grove, Oregon, a western suburb of Portland, which is within the Cascadia Subduction Zone (CSZ).		
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?	Earthquake is the primary natural hazard. An engineering feasibility planning study will identify alternatives to mitigate the earthquake natural hazard risk. Then, a follow-up Phase 1 Design and Phase 2 Construction project to implement seismic retrofit of the building and rapid mix asset will allow water service to resume shortly after a major seismic event. These assets are located in the Cascadia Subduction Zone (CSZ), which is at high risk for a major earthquake. Secondary risk is drought. Climate change–induced drought is leading to private wells drying up, which leads to hardship requests for water service. The Operations Building is occupied by JWC staff and is an integral component for operating the water treatment plant. Without a seismic retrofit, life safety risk of casualties is increased and time to stand back up the water treatment plant will be greatly increased. With pre-disaster mitigation, the assets will stand up more quickly after a major seismic event.		
Area of action impact	The JWC water treatment plant is a regional service provider for customers in the Oregon cities of Beaverton, Hillsboro, and Forest Grove and the Tualatin Valley Water District. The city of North Plains is a JWC wholesale customer.		
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? JWC assets provide water service, which is a *Food, Water, Shelter Critical Lifeline*.		

<table>
<tr><th colspan="3">Mitigation Action Integration</th></tr>
<tr><td>Alignment with NHMP goals</td><td colspan="2">Final Mitigation Mission Statement: Promote a disaster-resilient Washington County by taking actions to reduce risk, minimize loss, and protect life, property, and the environment from natural hazard events.
Goal 1 ☒ Minimize loss of life, disruption of essential infrastructure
Goal 2 ☒ Effective mitigation strategies and funding
Goal 3 ☐ Natural hazard education and outreach programs
Goal 4 ☐ Adopt policies and standards
Goal 5 ☐ Enhance communication, collaboration
Goal 6 ☒ Align mitigation strategies with local comprehensive plans
Goal 7 ☒ Enhance economies to rebound quickly</td></tr>
<tr><td>Integration into other initiatives</td><td colspan="2">Aligns with Hillsboro Water's Strategic Plan Goal 2: Hillsboro Water continues to plan for the future, moving forward long-term investments while maintaining affordability.
A Hillsboro Water Guiding Principle is: Protection of public health is the Hillsboro Water Department's number one priority.
Aligns with City Council Guiding Principles:
• We are prepared and resilient.
• We are exceptional public stewards.
• We are a safe community.
• We exemplify diversity, equity, and inclusion.</td></tr>
<tr><td>Alignment with existing plans and policies</td><td colspan="2">This capital project will be included in the Hillsboro and JWC Water Capital Improvement Program (CIP) budget, which is published and reviewed at budget-related public meetings.</td></tr>
<tr><th colspan="3">Mitigation Action Implementation Plan</th></tr>
<tr><td>Priority</td><td colspan="2">Low ☒ Medium ☐ High ☐</td></tr>
<tr><td>Lead position, office, department, or division responsible for implementation</td><td colspan="2">Senior Program Manager
City of Hillsboro Water Department</td></tr>
<tr><th colspan="3">Supporting Partners</th></tr>
<tr><th colspan="2">Internal Partners</th><th>External Partners, Including Community Partners</th></tr>
<tr><td colspan="2">Finance Department Grant Administration</td><td>City of Beaverton, City of Forest Grove, Tualatin Valley Water District, City of North Plains</td></tr>
<tr><th colspan="3">Potential Funding Sources</th></tr>
<tr><th colspan="2">Non-Federal Funding Sources</th><th>Federal Funding Sources</th></tr>
<tr><td colspan="2">JWC partners, including City of Beaverton, City of Forest Grove, City of Hillsboro, and Tualatin Valley Water District</td><td>FEMA BRIC, HMGP
USDA Rural Development
Congressionally directed grant</td></tr>
<tr><td>Estimated Cost</td><td colspan="2">Preliminary planning cost estimate.
• $250,000 Engineering feasibility study
• $14,500,000 Phase 1 Design and Phase 2 Construction</td></tr>
</table>

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**
Seismic retrofit will allow water service to resume shortly after a major seismic event. Assets located in Cascadia Subduction Zone (CSZ) are at high risk for a major earthquake.	After a major earthquake: • Will reduce business interruption and allow businesses to stand back up quicker. • Will allow residences to remain in the area or return more quickly – equity issue because vulnerable residents have less ability to relocate. • Will maintain fire protection services.	Study: $1,500,000 Phases 1 and 2: $87,000,000
Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term (1–2 yrs.) ☐ Mid-term (3–5 yrs.) ☐ Long-term (6+ yrs.) ☒ Ongoing ☐	Start date depends greatly on Hillsboro/JWC's ability to secure federal grant funds. Without grant funding, project will need to proceed slowly to meet partner cash flow constraints.	Project could be completed within 3 to 5 years of securing 75% or greater grant funding. Without grant funding, project would be delayed for approximately 6 to 10 years.
Implementation Benchmarks: How Will Success Be Measured?		
• Success will be measured by the substantial completion date for the JWC Operations Building and Rapid Mix Retrofit Mitigation Project.		
Potential Challenges to Implementation		
• The greatest obstacle or challenge will be securing federal grant funds to complete the project as quickly as possible. Otherwise, assets will remain seismically deficient and at greater risk of catastrophic failure for many months after a major seismic event.		
Resources and References, if Applicable		
• JWC/Hillsboro Water has prepared a preliminary draft cost estimate for this project. The next step would be to publish an RFP for an engineering consultant to prepare a preliminary engineering feasibility report. This report would include an evaluation of at least three alternative remediation solutions, including a No Action option as alternative #3. The engineering report would provide high-level preliminary cost estimates to facilitate determining the best value alternative. The engineer would also be tasked with preparing a preliminary Benefit-Cost Analysis (BCA) using FEMA's BCA spreadsheet with details for an earthquake natural hazard event. • If preliminary engineering feasibility is approved, Phase 1 Design and Phase 2 Construction could move forward subject to securing funding.		

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Not yet available		Preliminary engineering feasibility report to be prepared.
Alternative #2	Not yet available		Preliminary engineering feasibility report to be prepared.
Alternative #3	No action — not yet available		Preliminary engineering feasibility report to be prepared.

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 153: JWC Raw Water Intake Facility Seismic Retrofit Mitigation Project

Mitigation Action Information			
Title of action	JWC Raw Water Intake Facility Seismic Retrofit Mitigation Project		
Type of action	Plans/regulations ☐		Natural systems protection ☐
	Structure and infrastructure project ☒		Public education/awareness ☐
Action description	Seismic retrofit mitigation of the Joint Water Commission's (JWC) Raw Water Intake Facility. The City of Hillsboro, Oregon, is the managing agency for the JWC. Project includes completing an engineering feasibility planning study and then a Phase 1 Design and Phase 2 Construction project to mitigate risk of catastrophic failure of the assets and related infrastructure. These assets have not been seismically retrofitted to current standards. Therefore, the facilities are at risk of collapse during a major seismic event. These assets are located in unincorporated Washington County near the City of Forest Grove, Oregon, a western suburb of Portland, which is within the Cascadia Subduction Zone (CSZ).		
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?	Earthquake is the primary natural hazard. An engineering feasibility planning study will identify alternatives to mitigate the earthquake natural hazard risk. Then, a follow-up Phase 1 Design and Phase 2 Construction project to implement seismic retrofit of the Raw Water Intake Facility and related infrastructure will allow water service to resume shortly after a major seismic event. Land purchase may be required for siting Raw Water Intake Facility if engineering feasibility determines that it would be more costly to retrofit the existing facility. These assets are located in the Cascadia Subduction Zone (CSZ), which is at high risk for a major earthquake. Secondary risk is drought. Climate change–induced drought is leading to private wells drying up, which leads to hardship requests for water service. Without a seismic retrofit, life safety risk of casualties is increased and time to stand back up the water treatment plant will be greatly increased. With pre-disaster mitigation, the assets will stand up more quickly after a major seismic event.		
Area of action impact	The JWC water treatment plant is a regional service provider for customers in the Oregon cities of Beaverton, Hillsboro, and Forest Grove and the Tualatin Valley Water District. The city of North Plains is a JWC wholesale customer.		
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? JWC assets provide water service, which is a *Food, Water, Shelter Critical Lifeline*.		

Mitigation Action Integration	
Alignment with NHMP goals	Final Mitigation Mission Statement: Promote a disaster-resilient Washington County by taking actions to reduce risk, minimize loss, and protect life, property, and the environment from natural hazard events. Goal 1 ☒ Minimize loss of life, disruption of essential infrastructure Goal 2 ☒ Effective mitigation strategies and funding Goal 3 ☐ Natural hazard education and outreach programs Goal 4 ☐ Adopt policies and standards Goal 5 ☐ Enhance communication, collaboration Goal 6 ☒ Align mitigation strategies with local comprehensive plans Goal 7 ☒ Enhance economies to rebound quickly
Integration into other initiatives	Aligns with Hillsboro Water's Strategic Plan Goal 2: *Hillsboro Water continues to plan for the future, moving forward long-term investments while maintaining affordability.* A Hillsboro Water Guiding Principle is: *Protection of public health is the Hillsboro Water Department's number one priority.* Aligns with City Council Guiding Principles: • *We are prepared and resilient.* • *We are exceptional public stewards.* • *We are a safe community.* • *We exemplify diversity, equity, and* inclusion.
Alignment with existing plans and policies	This capital project will be included in the Hillsboro and JWC Water Capital Improvement Program (CIP) budget, which is published and reviewed at budget-related public meetings.
Mitigation Action Implementation Plan	
Priority	Low ☐ Medium ☐ High ☒
Lead position, office, department, or division responsible for implementation	Senior Program Manager City of Hillsboro Water Department
Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
Finance Department Grant Administration	City of Beaverton, City of Forest Grove, Tualatin Valley Water District, City of North Plains.

Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
JWC partners, including City of Beaverton, City of Forest Grove, City of Hillsboro, and Tualatin Valley Water District	FEMA BRIC, HMGP USDA Rural Development Congressionally directed grant
Estimated Cost	Preliminary planning cost estimate: • $500,000 Engineering feasibility study • $50,000,000 Phase 1 Design and Phase 2 Construction

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**
Seismic retrofit will allow water service to resume shortly after a major seismic event. Assets located in Cascadia Subduction Zone (CSZ) are at high risk for a major earthquake.	After a major earthquake: • Will reduce business interruption and allow businesses to stand back up quicker. • Will allow residences to remain in the area or return more quickly – equity issue because vulnerable residents have less ability to relocate. • Will maintain fire protection services.	Study: $3,000,000 Phases 1 and 2: $300,000,000

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term (1–2 yrs.) ☐ Mid-term (3–5 yrs.) ☐ Long-term (6+ yrs.) ☒ Ongoing ☐	Start date depends greatly on Hillsboro/JWC's ability to secure federal grant funds. Without grant funding, project will need to proceed slowly to meet partner cash flow constraints.	Project could be completed within 8 years of securing 75% or greater grant funding. Without grant funding, project would be delayed for over 10 years.

Implementation Benchmarks: How Will Success Be Measured?

- Success will be measured by the substantial completion date for the JWC Raw Water Intake Facility Seismic Retrofit Mitigation Project.

Potential Challenges to Implementation

- The greatest obstacle or challenge will be securing federal grant funds to complete the project as quickly as possible. Otherwise, assets will remain seismically deficient and at greater risk of catastrophic failure for many months after a major seismic event.
- A unique obstacle is that the federal government owns the Raw Water Intake Facility which has not been seismically retrofitted. Therefore, obtaining permits, approvals, rights of way, etc., will be more complicated.

Resources and References, if Applicable
• JWC/Hillsboro Water has prepared a preliminary draft cost estimate for this project. The next step would be to publish an RFP for an engineering consultant to prepare a preliminary engineering feasibility report. This report would include an evaluation of at least three alternative remediation solutions, including a No Action option as alternative #3. The engineering report would provide high-level preliminary cost estimates to facilitate determining the best value alternative. The engineer would also be tasked with preparing a preliminary Benefit-Cost Analysis (BCA) using FEMA's BCA spreadsheet with details for an earthquake natural hazard event. • If preliminary engineering feasibility is approved, Phase 1 Design and Phase 2 Construction could move forward subject to securing funding.

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Not yet available		Preliminary engineering feasibility report to be prepared.
Alternative #2	Not yet available		Preliminary engineering feasibility report to be prepared.
Alternative #3	No action – not yet available		Preliminary engineering feasibility report to be prepared.

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 154: Hillsboro Pipeline Retrofit Mitigation Project

Mitigation Action Information	
Title of action	Hillsboro Pipeline Retrofit Mitigation Project
Type of action	Plans/regulations ☒ Natural systems protection ☐ Structure and infrastructure project ☒ Public education/awareness ☐
Action description	Project includes completing an engineering feasibility planning study and then a Phase 1 Design and Phase 2 Construction project to mitigate and seismically retrofit pipelines and related infrastructure in Hillsboro's Water distribution system. These assets are at risk of catastrophic failure during a major seismic event. These assets are located in Hillsboro, Oregon, a western suburb of Portland, which is within the Cascadia Subduction Zone (CSZ).
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?	Earthquake is the primary natural hazard. Planning study will identify at-risk pipelines and related infrastructure. Follow-up construction project will seismically retrofit and mitigate identified natural hazard risks. Seismic retrofit of these assets will allow water service to resume shortly after a major seismic event. These assets are located in the Cascadia Subduction Zone (CSZ), which is at high risk for a major earthquake. Without mitigation, life safety risk of interrupted water service could impact critical services such as hydrants, lifeline facilities, and industrial microchip manufacturing identified as in the U.S. national interest. With pre-disaster mitigation, the assets will stand up more quickly after a major seismic event.
Area of action impact	The project will impact the Hillsboro Water service area, which includes census tracts identified as medium to high vulnerability on the CDC's Social Vulnerability index scale.
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? This infrastructure provides water service, which is a *Food, Water, Shelter Critical Lifeline*.

Mitigation Action Integration	
Alignment with NHMP goals	Final Mitigation Mission Statement: Promote a disaster-resilient Washington County by taking actions to reduce risk, minimize loss, and protect life, property, and the environment from natural hazard events. Goal 1 ☒ Minimize loss of life, disruption of essential infrastructure Goal 2 ☒ Effective mitigation strategies and funding Goal 3 ☐ Natural hazard education and outreach programs Goal 4 ☐ Adopt policies and standards Goal 5 ☐ Enhance communication, collaboration Goal 6 ☒ Align mitigation strategies with local comprehensive plans Goal 7 ☒ Enhance economies to rebound quickly
Integration into other initiatives	Aligns with Hillsboro Water's Strategic Plan Goal 2: *Hillsboro Water continues to plan for the future, moving forward long-term investments while maintaining affordability.* A Hillsboro Water Guiding Principle is: *Protection of public health is the Hillsboro Water Department's number one priority.* Aligns with City Council Guiding Principles: • *We are prepared and resilient.* • *We are exceptional public stewards.* • *We are a safe community.* • *We exemplify diversity, equity, and inclusion.*
Alignment with existing plans and policies	This capital project will be included in the Hillsboro Water Capital Improvement Program (CIP) budget, which is published and reviewed at budget-related public meetings.
Mitigation Action Implementation Plan	
Priority	Low ☐ Medium ☒ High ☐
Lead position, office, department, or division responsible for implementation	Senior Program Manager City of Hillsboro Water Department
Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
Finance Department Grant Administration	Businesses, residences, and industrial microchip manufacturing customers of Hillsboro Water
Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
City of Hillsboro	FEMA BRIC, HMGP USDA Rural Development Congressionally directed grant
Estimated Cost	Preliminary planning cost estimate: • $300,000 Engineering feasibility study • $3,500,000 Phase 1 Design and Phase 2 Construction

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**
Seismic retrofit will allow water service to resume shortly after a major seismic event. Assets located in Cascadia Subduction Zone (CSZ) are at high risk for a major earthquake.	After a major earthquake: • Will reduce business interruption and allow businesses to stand back up quicker. • Will allow residences to remain in the area or return more quickly – equity issue because vulnerable residents have less ability to relocate. • Will maintain fire protection services.	Study: $1,800,000 Phases 1 and 2: $21,000,000
Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term (1–2 yrs.) ☐ Mid-term (3–5 yrs.) ☐ Long-term (6+ yrs.) ☒ Ongoing ☐	Start date depends greatly on Hillsboro's ability to secure federal grant funds. Without grant funding, project will need to proceed slowly to meet cash flow constraints.	Project could be completed within 3 to 5 years of securing 75% or greater grant funding. Without grant funding, project would be delayed for approximately 6 to 10 years.
Implementation Benchmarks: How Will Success Be Measured?		
• Success will be measured by the substantial completion date for the Pipeline Retrofit Mitigation Project.		
Potential Challenges to Implementation		
• The greatest obstacle or challenge will be securing federal grant funds to complete the project as quickly as possible. Otherwise, assets will remain seismically deficient and at greater risk of catastrophic failure for many months after a major seismic event.		
Resources and References, if Applicable		
• Hillsboro Water has prepared a preliminary draft cost estimate for this project. The next step would be to publish an RFP for an engineering consultant to prepare a preliminary engineering feasibility report. This report would include an evaluation of at least three alternative remediation solutions, including a No Action option as alternative #3. The engineering report would provide high-level preliminary cost estimates to facilitate determining the best value alternative. The engineer would also be tasked with preparing a preliminary Benefit-Cost Analysis (BCA) using FEMA's BCA spreadsheet with details for an earthquake natural hazard event. • If preliminary engineering feasibility is approved, Phase 1 Design and Phase 2 Construction could move forward subject to securing funding.		

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Not yet available		Preliminary engineering feasibility report to be prepared.
Alternative #2	Not yet available		Preliminary engineering feasibility report to be prepared.
Alternative #3	No action – not yet available		Preliminary engineering feasibility report to be prepared.

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 155: Hillsboro Water System Power Resilience Mitigation Project

Mitigation Action Information			
Title of action	Hillsboro Water System Power Resilience Mitigation Project		
Type of action	Plans/regulations ☒	Natural systems protection ☐	
	Structure and infrastructure project ☒	Public education/awareness ☐	
Action description	Project includes completing an engineering feasibility planning study and then a Phase 1 Design and Phase 2 Construction project to mitigate risk of power loss to Water critical lifeline assets after a seismic event. These assets are at risk of being unusable after a major seismic event until power can be restored. These assets are located in Hillsboro, Oregon, a western suburb of Portland, which is within the Cascadia Subduction Zone (CSZ).		
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?	Earthquake is the primary natural hazard. A planning study will identify alternatives to mitigate the risk that power could be lost for critical water system assets. This would render these assets unusable until power could be restored. Implementing the selected power resilience solution and seismic retrofits will allow emergency water service to continue or to be restarted more quickly after a major seismic event. These assets are located in the Cascadia Subduction Zone (CSZ), which is at high risk for a major earthquake. Resilience solutions might include alternative power generation systems, such as generators, solar, and hydroelectric generators, located at reservoir, pump, and pressure-reducing valve sites with backup storage systems. Microsystems with backup storage might be used to provide resilient power for SCADA and other telemetry systems located across the water distribution system. Without mitigation, certain water assets would be unusable until power could be restored. These assets include certain pumps, pressure reducing valves, and SCADA telemetry systems. With pre-disaster mitigation, the assets will stand up more quickly after a major seismic event.		
Area of action impact	The project will benefit Hillsboro Water's business and residential customers and the City of Cornelius, City of Gaston, and LA Water Co-Op, which are wholesale partners.		
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? These assets provide water service, which is a *Food, Water, Shelter Critical Lifeline*.		

Mitigation Action Integration	
Alignment with NHMP goals	Final Mitigation Mission Statement: Promote a disaster-resilient Washington County by taking actions to reduce risk, minimize loss, and protect life, property, and the environment from natural hazard events. Goal 1 ☒ Minimize loss of life, disruption of essential infrastructure Goal 2 ☒ Effective mitigation strategies and funding Goal 3 ☐ Natural hazard education and outreach programs Goal 4 ☐ Adopt policies and standards Goal 5 ☐ Enhance communication, collaboration Goal 6 ☒ Align mitigation strategies with local comprehensive plans Goal 7 ☒ Enhance economies to rebound quickly
Integration into other initiatives	Aligns with Hillsboro Water's Strategic Plan Goal 2: *Hillsboro Water continues to plan for the future, moving forward long-term investments while maintaining affordability.* A Hillsboro Water Guiding Principle is: *Protection of public health is the Hillsboro Water Department's number one priority.* Aligns with City Council Guiding Principles: • *We are prepared and resilient.* • *We are exceptional public stewards.* • *We are a safe community.* • *We exemplify diversity, equity, and inclusion.*
Alignment with existing plans and policies	This capital project will be included in the Hillsboro Water Capital Improvement Program (CIP) budget, which is published and reviewed at budget-related public meetings.
Mitigation Action Implementation Plan	
Priority	Low ☐ Medium ☐ High ☒
Lead position, office, department, or division responsible for implementation	Senior Program Manager City of Hillsboro Water Department

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
Finance Department Grant Administration	Business and residential customers. City of Cornelius, City of Gaston, LA Water Co-Op

Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
City of Hillsboro Potential grants: PGE Renewable Development Fund, Energy Trust of Oregon, Oregon Department of Energy	FEMA BRIC, HMGP USDA Rural Development Congressionally directed grant
Estimated Cost	Preliminary planning cost estimate: • $150,000 Engineering feasibility study of Hillsboro's water system • $15,000,000 Phase 1 Design and Phase 2 Construction of alternative power generation with on-site power storage systems at major water infrastructure sites and microgeneration systems with local power storage for identified SCADA and other water infrastructure locations needing resilient power

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**
Resilient power will allow water service to resume shortly after a major seismic event. Assets located in Cascadia Subduction Zone (CSZ) are at high risk for a major earthquake.	After a major earthquake: • Will reduce business interruption and allow businesses to stand back up quicker. • Will allow residences to remain in the area or return more quickly – equity issue because vulnerable residents have less ability to relocate. • Will maintain fire protection service.	Study: $900,000 Phases 1 and 2: $90,000,000

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term (1–2 yrs.) ☐ Mid-term (3–5 yrs.) ☐ Long-term (6+ yrs.) ☒ Ongoing ☐	Start date depends greatly on Hillsboro's ability to secure federal grant funds. Without grant funding, project will need to proceed slowly to meet cash flow constraints.	Project could be completed within 3 to 5 years of securing 75% or greater grant funding. Without grant funding, project would be delayed for approximately 6 to 10 years.

Implementation Benchmarks: How Will Success Be Measured?
• Success will be measured by the substantial completion date for the Water System Power Resilience Mitigation Project.

Potential Challenges to Implementation
• The greatest obstacle or challenge will be securing federal grant funds to complete the project as quickly as possible. Other challenges might include securing permits and right of ways.

Resources and References, if Applicable
• Hillsboro Water has prepared a preliminary draft cost estimate for this project. The next step would be to publish an RFP for an engineering consultant to prepare a preliminary engineering feasibility report. This report would include an evaluation of at least three alternative remediation solutions, including a No Action option as alternative #3. The engineering report would provide high-level preliminary cost estimates to facilitate determining the best value alternative. The engineer would also be tasked with preparing a preliminary Benefit-Cost Analysis (BCA) using FEMA's BCA spreadsheet with details for an earthquake natural hazard event. • If preliminary engineering feasibility is approved, Phase 1 Design and Phase 2 Construction could move forward subject to securing funding.

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Not yet available		Preliminary engineering feasibility report to be prepared.
Alternative #2	Not yet available		Preliminary engineering feasibility report to be prepared.
Alternative #3	No action – not yet available		Preliminary engineering feasibility report to be prepared.

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 156: Hillsboro Small Water Provider Resilience Planning Project

Mitigation Action Information	
Title of action	Hillsboro Small Water Provider Resilience Planning Project
Type of action	Plans/regulations ☒ Natural systems protection ☐ Structure and infrastructure project ☐ Public education/awareness ☐
Action description	Project includes completing an engineering feasibility planning study to evaluate options for small water systems to interconnect to Hillsboro's upper system pipeline or other more reliable water service options. This will improve the resilience of these water systems to drought natural hazards. This area of Oregon has experienced recent drought and wildfire disaster declarations. These assets are located in/near Hillsboro, Oregon, a western suburb of Portland, which is within the Cascadia Subduction Zone (CSZ).
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?	Drought is the primary natural hazard. A planning study will identify alternatives to mitigate the risk of small water systems with unreliable water sources from being without water. Certain small water providers in the region have identified that their water sources are becoming unreliable due to more severe drought natural hazard impacts. The engineering feasibility study would evaluate options for more reliable water supply, including potentially installing pipelines and interconnection infrastructure for emergency water service or wholesale water service from the upper system pipeline. Secondary risk is earthquake. Engineering study would also recommend seismic retrofits to critical pipelines and related assets to reduce the time needed to restore water service after a major seismic event. Seismic retrofit of these assets will allow water service to resume shortly after a major seismic event. These assets are located in the Cascadia Subduction Zone (CSZ), which is at high risk for a major earthquake. Without mitigation, life safety risk of interrupted water service could impact critical services such as hydrants, lifeline facilities, and business and residential customers for these small water systems. With pre-disaster mitigation, the assets will stand up more quickly after a major seismic event. These small water systems serve rural census tracts, some with high CDC social vulnerability index scores. These populations have already endured distress from COVID pandemic impacts. Water service failure would leave vulnerable residents for an extended period, possibly months, without water service. Temporary relocation could have disparate impacts on vulnerable populations. As has been evidenced with hurricanes in the New Orleans area, distressed communities are often more place-bound due to lack of personal transportation, insufficient ready cash, and other limitations. These populations are more often left behind. ABC News reported, "That was one of the real failings with Katrina. People who don't have money to pay for a hotel room or don't have a car of their own stayed behind." Therefore, this mitigation project will greatly benefit distressed communities. Washington County is identified with about 32% of population as medium-to-high social vulnerability.
Area of action impact	Water customers located in rural Washington County served by these small water providers.

Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? These assets provide water service, which is a *Food, Water, Shelter Critical Lifeline*.
Mitigation Action Integration	
Alignment with NHMP goals	Final Mitigation Mission Statement: Promote a disaster-resilient Washington County by taking actions to reduce risk, minimize loss, and protect life, property, and the environment from natural hazard events. Goal 1 ☒ Minimize loss of life, disruption of essential infrastructure Goal 2 ☒ Effective mitigation strategies and funding Goal 3 ☐ Natural hazard education and outreach programs Goal 4 ☐ Adopt policies and standards Goal 5 ☒ Enhance communication, collaboration Goal 6 ☒ Align mitigation strategies with local comprehensive plans Goal 7 ☒ Enhance economies to rebound quickly
Integration into other initiatives	Aligns with Hillsboro Water's Strategic Plan Goal 2: *Hillsboro Water continues to plan for the future, moving forward long-term investments while maintaining affordability.* A Hillsboro Water Guiding Principle is: *Protection of public health is the Hillsboro Water Department's number one priority.* Aligns with City Council Guiding Principles: • *We are prepared and resilient.* • *We are exceptional public stewards.* • *We are a safe community.* • *We exemplify diversity, equity, and inclusion.*
Alignment with existing plans and policies	This capital project will be included in the Hillsboro Water Capital Improvement Program (CIP) budget, which is published and reviewed at budget-related public meetings.
Mitigation Action Implementation Plan	
Priority	Low ☐ Medium ☒ High ☐
Lead position, office, department, or division responsible for implementation	Senior Program Manager City of Hillsboro Water Department
Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
Finance Department Grant Administration	Small, at-risk water systems in Washington County

Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
City of Hillsboro and small water systems	FEMA BRIC, HMGP USDA Rural Development Congressionally directed grant
Estimated Cost	Preliminary planning cost estimate: • $500,000 Engineering feasibility study • Phase 1 Design and Phase 2 Construction would be based on which small providers elect to move forward.

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**
Small water systems at risk due to unreliable water sources would be able to explore emergency backup water service options.	Drought and earthquake risks would be mitigated: • Will reduce business interruption and allow businesses to stand back up quicker. • Will allow residences to remain in the area or return more quickly – equity issue because vulnerable residents have less ability to relocate. • Will maintain fire protection services.	$3,000,000 for study. Phase 1 and 2 benefit is dependent on direction.

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term (1–2 yrs.) ☐ Mid-term (3–5 yrs.) ☐ Long-term (6+ yrs.) ☒ Ongoing ☐	Start date depends greatly on Hillsboro's and small partners' ability to secure federal grant funds. Without grant funding, project will need to proceed slowly to meet cash flow constraints.	Project could be completed within 3 to 5 years of securing 75% or greater grant funding. Without grant funding, project would be delayed for approximately 6 to 10 years.

Implementation Benchmarks: How Will Success Be Measured?
• Success will be measured by the substantial completion date for the Small Water Provider Resilience Planning Project.

Potential Challenges to Implementation
• The greatest obstacle or challenge will be securing federal grant funds to complete the project as quickly as possible. Other obstacles could include permitting, right of ways, etc.

Resources and References, if Applicable
• Hillsboro Water has prepared a preliminary draft cost estimate for this project. The next step would be to publish an RFP for an engineering consultant to prepare a preliminary engineering feasibility report. This report would include an evaluation of at least three alternative remediation solutions, including a No Action option as alternative #3. The engineering report would provide high-level preliminary cost estimates to facilitate determining the best value alternative. The engineer would also be tasked with preparing a preliminary Benefit-Cost Analysis (BCA) using FEMA's BCA spreadsheet with details for an earthquake natural hazard event. • If preliminary engineering feasibility is approved, Phase 1 Design and Phase 2 Construction could move forward subject to small system approval and securing funding.

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Not yet available		Preliminary engineering feasibility report to be prepared.
Alternative #2	Not yet available		Preliminary engineering feasibility report to be prepared.
Alternative #3	No action – Not yet available		Preliminary engineering feasibility report to be prepared.

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 157: Hillsboro Upper System Pipeline Retrofit Mitigation Project

Mitigation Action Information			
Title of action	Hillsboro Upper System Pipeline Retrofit Mitigation Project		
Type of action	Plans/regulations ☐		Natural systems protection ☐
	Structure and infrastructure project ☒		Public education/awareness ☐
Action description	Phase 1 Design and Phase 2 Construction project to complete seismic retrofit mitigation of water pipeline serving rural Washington County, Oregon. An engineering feasibility study has been completed. These assets are located in/near Hillsboro, Oregon, a western suburb of Portland, which is within the Cascadia Subduction Zone (CSZ). The pipeline serves customers in rural Washington county. Small well customers along the pipeline alignment are experiencing unreliable water availability due to drought climate induced dry wells. This leads to hardship requests for water service from this pipeline. Two wholesale customers rely on this pipeline for water service: City of Gaston and LA Water Co-Op. This area of Oregon has experienced recent drought and wildfire disaster declarations. Seismic retrofit of the pipeline will improve the resilience of these water systems and retail customers to earthquake and drought 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?	Earthquake is the primary natural hazard. Seismic retrofit of the water pipeline and related infrastructure will allow water service to resume shortly after a major seismic event. These assets are located in the Cascadia Subduction Zone (CSZ), which is at high risk for a major earthquake. Secondary risks are drought and wildland fires. Climate change–induced drought is leading to private wells drying up, which leads to hardship requests for water service. Also, this water system will provide bulk water to crews fighting wildland fires in the area. These assets have not been seismically retrofitted to current seismic standards. Seismic retrofit of these assets will allow water service to resume shortly after a major seismic event. These assets are located in the Cascadia Subduction Zone (CSZ), which is at high risk for a major earthquake. Mitigation would comprise seismic retrofitting of assets and additional resilient backup power system, such as generators or solar panels with power storage, to ensure backup power will be available if primary power is unavailable after an earthquake. Without mitigation, life safety risk of interrupted water service could impact critical services such as hydrants, lifeline facilities, and business and residential customers. With pre-disaster mitigation, the assets will stand up more quickly after a major seismic event. This WTP serves rural census tracts with high CDC social vulnerability index scores. These populations have already endured distress from COVID pandemic impacts. Therefore, WTP could experience catastrophic failure due to climate change and natural hazards. WTP failure would leave vulnerable		

	residents for an extended period, possibly months, without water service. Temporary relocation could have disparate impact on vulnerable populations. As has been evidenced with hurricanes in the New Orleans area, distressed communities are often more place-bound due to lack of personal transportation, insufficient ready cash, and other limitations. These populations are more often left behind. ABC News reported, "That was one of the real failings with Katrina. People who don't have money to pay for a hotel room or don't have a car of their own stayed behind." Therefore, this mitigation project will greatly benefit distressed communities. Washington County is identified with about 32% of population as medium-to-high social vulnerability.
Area of action impact	Water customers located in rural Washington County are served by this water pipeline. This includes residential and commercial customers and the City of Gaston and the LA Water Co-Op.
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? The upper system pipeline and related infrastructure provides water service, which is a *Food, Water, Shelter Critical Lifeline*.
Mitigation Action Integration	
Alignment with NHMP goals	Final Mitigation Mission Statement: Promote a disaster-resilient Washington County by taking actions to reduce risk, minimize loss, and protect life, property, and the environment from natural hazard events. Goal 1 ☒ Minimize loss of life, disruption of essential infrastructure Goal 2 ☒ Effective mitigation strategies and funding Goal 3 ☐ Natural hazard education and outreach programs Goal 4 ☐ Adopt policies and standards Goal 5 ☐ Enhance communication, collaboration Goal 6 ☒ Align mitigation strategies with local comprehensive plans Goal 7 ☒ Enhance economies to rebound quickly
Integration into other initiatives	Aligns with Hillsboro Water's Strategic Plan Goal 2: *Hillsboro Water continues to plan for the future, moving forward long-term investments while maintaining affordability.* A Hillsboro Water Guiding Principle is: *Protection of public health is the Hillsboro Water Department's number one priority.* Aligns with City Council Guiding Principles: • *We are prepared and resilient.* • *We are exceptional public stewards.* • *We are a safe community.* • *We exemplify* diversity, equity, and inclusion.
Alignment with existing plans and policies	This capital project is included in the Hillsboro Water Capital Improvement Program (CIP) budget which has been published and reviewed at budget-related public meetings.

Mitigation Action Implementation Plan			
Priority	Low ☐ Medium ☐ High ☒		
Lead position, office, department, or division responsible for implementation	Senior Program Manager City of Hillsboro Water Department		
Supporting Partners			
Internal Partners		**External Partners, Including Community Partners**	
Finance Department Grant Administration		City of Gaston, LA Water Co-Op, Commercial and residential customers served by upper system pipeline, Washington County	
Potential Funding Sources			
Non-Federal Funding Sources		**Federal Funding Sources**	
Hillsboro Water		FEMA BRIC, HMGP USDA Rural Development Congressionally directed grant	
Estimated Cost	Phase 1 Design and Phase 2 Construction preliminary estimates: • AACE class 5 estimates totaling $77.4M: o Segment 1: $6.5M o Segment 2: $6.5M o Segment 3: $4.3M o Segment 4: $7.0M o Segment 5: $8.5M o Segment 6: $7.5M o Segment 7: $8.0M o Segment 8 – High SVI: $11.6M o Segment 9 – High SVI: $10.0M o Segment 10: $7.5M • Staff costs, soft costs, escalation: $5,500,000 Total Cost: $83,000,000		
Estimated Benefit			
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**	
Seismic retrofit will allow water service to resume shortly after a major seismic event. Assets located in Cascadia Subduction Zone (CSZ) are at high risk for a major earthquake.	After a major earthquake: • Will reduce business interruption and allow businesses to stand back up quicker. • Will allow residences to remain in the area or return more quickly – equity issue because vulnerable residents have less ability to relocate. • Will maintain fire protection services.	Total benefit: $498,000,000	

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term (1–2 yrs.) ☐ Mid-term (3–5 yrs.) ☐ Long-term (6+ yrs.) ☒ Ongoing ☐	Start date depends greatly on Hillsboro's ability to secure federal grant funds. Without grant funding, project will need to proceed slowly to avoid an unsustainable rate increase shock.	Each project segment could be completed within 3 to 5 years of securing 75% or greater grant funding. Without grant funding, perhaps one segment every 3 to 5 years would proceed.

Implementation Benchmarks: How Will Success Be Measured?
• Success will be measured by the substantial completion date for each pipeline segment.

Potential Challenges to Implementation
• The greatest obstacle or challenge will be securing about $60 million in federal grant funds to complete all pipeline segment projects as quickly as possible. Otherwise, pipeline segments will remain seismically deficient and at greater risk of catastrophic failure for many months after a major seismic event.

Resources and References, if Applicable
• Hillsboro Water has completed a preliminary engineering feasibility study that identified pipeline segments, evaluated alternatives for remediation, and provided cost estimates. The engineering report also provided alternative costs to complete work in a manner that reduces disruptive impacts on vulnerable populations during construction—for example, trenchless work at critical transportation arteries. • For this project, Phase 1 Design and Phase 2 Construction can move forward as soon as funding is secured.

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	No action, keep existing pipe	N/A	Because this alternative would result in a major service disruption, a cost estimate was not calculated at the preliminary design stage. When Hillsboro prepares a FEMA grant application, a detailed analysis of cost impacts will be prepared using FEMA's BCA spreadsheet.

Alternative #2	Segment 1: Sliplining/CIPP Segment 2: Sliplining/CIPP Segment 3: Cut and Cover, Reroute ROW Segment 4: Cut and Cover, Reroute ROW Segment 5: CIPP Segment 6: CIPP Segment 7: Cut and Cover w/ HDPE, Parallel Installation (opposite side of road) Segment 8: High SVI – Cut and Cover, Parallel Installation, Reroute Segment 9: High SVI – CIPP Segment 10: Cut and Cover w/ HDPE, Parallel Installation	Segment 1: $6.5M Segment 2: $6.5M Segment 3: $4.3M Segment 4: $6.7M Segment 5: $7.4M Segment 6: $6.6M Segment 7: $5.4M Segment 8: High SVI – $10.2M Segment 9: High SVI – $8.7M Segment 10: $4.7M	Preliminary cost estimates from preliminary engineering feasibility study.
Alternative #3	Segment 1: Cut and Cover with RJ DIP, Parallel Installation Segment 2: Cut and Cover, Parallel Installation Segment 3: Cut and Cover, Parallel Installation Segment 4: Cut and Cover, Parallel Installation Segment 5: Cut and Cover, Parallel Installation Segment 6: Cut and Cover, Parallel Installation Segment 7: Cut and Cover, Parallel Installation Segment 8: High SVI – Cut and Cover, Parallel Installation Segment 9: High SVI – Cut and Cover, Parallel Installation Segment 10: Cut and Cover, Parallel Installation, Reroute	Segment 1: $5.5M Segment 2: $5.5M Segment 3: $3.5M Segment 4: $6.2M Segment 5: $6.2M Segment 6: $5.5M Segment 7: $7.5M Segment 8: High SVI – $9.8M Segment 9: High SVI – $7.3M Segment 10: $7.5M	Preliminary cost estimates from preliminary engineering feasibility study.

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 158: Hillsboro Upper System Water Treatment Plant Seismic Retrofit Mitigation Project

Mitigation Action Information			
Title of action	Hillsboro Upper System Water Treatment Plant Seismic Retrofit Mitigation Project		
Type of action	Plans/regulations ☒	Natural systems protection ☐	
	Structure and infrastructure project ☒	Public education/awareness ☐	
Action description	Project includes completing an engineering feasibility planning study and then Phase 1 Design and Phase 2 Construction to complete seismic retrofitting to mitigate risk of water treatment plant (WTP) catastrophic failure after a seismic event. Project would also include additional resilient backup power such as generators or solar panels and power storage. WTP has some power, so need would be assessed during engineering feasibility. These assets are at risk of being unusable after a major seismic event. These assets are located in/near Hillsboro, Oregon, a western suburb of Portland, which is within the Cascadia Subduction Zone (CSZ).		
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?	Earthquake is the primary natural hazard. A planning study will identify alternatives to mitigate the risk of catastrophic failure of the upper system WTP. Secondary risks are drought and wildland fires. Climate change induced drought is leading to private wells drying up, which leads to hardship requests for water service. Also, this water system is providing bulk water to crews fighting wildland fires in the area. These assets have not been seismically retrofitted to current seismic standards. Seismic retrofit of these assets will allow water service to resume shortly after a major seismic event. These assets are located in the Cascadia Subduction Zone (CSZ), which is at high risk for a major earthquake. Mitigation would comprise seismic retrofitting of assets and additional resilient backup power system, such as generators or solar panels with power storage, to ensure backup power will be available if primary power is unavailable after an earthquake. Without mitigation, life safety risk of interrupted water service could impact critical services such as hydrants, lifeline facilities, and business and residential customers. With pre-disaster mitigation, the assets will stand up more quickly after a major seismic event. This WTP serves rural census tracts with high CDC social vulnerability index scores. These populations have already endured distress from COVID pandemic impacts. Therefore, WTP could experience catastrophic failure due to climate change and natural hazards. WTP failure would leave vulnerable residents for an extended period, possibly months, without water service. Temporary relocation could have disparate impact on vulnerable populations. As has been evidenced with hurricanes in the New Orleans area, distressed communities are often more place-bound due to lack of personal transportation, insufficient ready cash, and other limitations. These populations are more often left behind. ABC News reported, “That was one of the real failings with Katrina. People who don’t have money to pay for a hotel room or don’t have a car of		

	their own stayed behind." Therefore, this mitigation project will greatly benefit distressed communities. Washington County is identified with about 32% of population as medium-to-high social vulnerability.
Area of action impact	Water customers located in rural Washington County are served by this water facility and pipeline. This includes residential, commercial, and wholesale customers, as well as the City of Gaston and the LA Water Co-Op.
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? These assets provide water service, which is a *Food, Water, Shelter Critical Lifeline*.
Mitigation Action Integration	
Alignment with NHMP goals	Final Mitigation Mission Statement: Promote a disaster-resilient Washington County by taking actions to reduce risk, minimize loss, and protect life, property, and the environment from natural hazard events. Goal 1 ☒ Minimize loss of life, disruption of essential infrastructure Goal 2 ☒ Effective mitigation strategies and funding Goal 3 ☐ Natural hazard education and outreach programs Goal 4 ☐ Adopt policies and standards Goal 5 ☐ Enhance communication, collaboration Goal 6 ☒ Align mitigation strategies with local comprehensive plans Goal 7 ☒ Enhance economies to rebound quickly
Integration into other initiatives	Aligns with Hillsboro Water's Strategic Plan Goal 2: *Hillsboro Water continues to plan for the future, moving forward long-term investments while maintaining affordability.* A Hillsboro Water Guiding Principle is: *Protection of public health is the Hillsboro Water Department's number one priority.* Aligns with the Hillsboro's Water Master Plan. Aligns with City Council Guiding Principles: • *We are prepared and resilient.* • *We are exceptional public stewards.* • *We are a safe community.* • *We exemplify diversity, equity, and inclusion.*
Alignment with existing plans and policies	This capital project will be included in the Hillsboro Water Capital Improvement Program (CIP) budget, which is published and reviewed at budget-related public meetings.
Mitigation Action Implementation Plan	
Priority	Low ☐ Medium ☐ High ☒
Lead position, office, department, or division responsible for implementation	Senior Program Manager City of Hillsboro Water Department

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
Finance Department Grant Administration	City of Gaston, LA Water Co-Op, commercial and residential customers served by upper system pipeline, Washington County
Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
City of Hillsboro	FEMA BRIC, HMGP USDA Rural Development Congressionally directed grant
Estimated Cost	Preliminary planning cost estimate: • $500,000 Engineering Feasibility Study • $35,000,000 Phase 1 Design and Phase 2 Construction costs to retrofit and remediate seismic deficiencies identified in the engineering study

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**
Seismic retrofit will allow water service to resume shortly after a major seismic event. Assets located in Cascadia Subduction Zone (CSZ) are at high risk for a major earthquake.	After a major earthquake or wildland fire: • Will reduce business interruption and allow businesses to stand back up quicker. • Will allow residences to remain in the area or return more quickly – equity issue because vulnerable residents have less ability to relocate. • Will maintain fire protection services.	Study: $3,000,000 Phases 1 and 2: $210,000,000

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term (1–2 yrs.) ☐ Mid-term (3–5 yrs.) ☐ Long-term (6+ yrs.) ☒ Ongoing ☐	Start date depends greatly on Hillsboro's ability to secure federal grant funds. Without grant funding, project will need to proceed slowly to meet cash flow constraints.	Project could be completed within 3 to 5 years of securing 75% or greater grant funding. Without grant funding, project would be delayed for approximately 6 to 10 years.

Implementation Benchmarks: How Will Success Be Measured?
• Success will be measured by the substantial completion date for the Upper System Water Treatment Plant Seismic Retrofit Mitigation Project.
Potential Challenges to Implementation
• The greatest obstacle or challenge will be securing federal grant funds to complete the project as quickly as possible.

Resources and References, if Applicable
• Hillsboro Water has prepared a preliminary draft cost estimate for this project. The next step would be to publish an RFP for an engineering consultant to prepare a preliminary engineering feasibility report. This report would include an evaluation of at least three alternative remediation solutions, including a No Action option as alternative #3. The engineering report would provide high-level preliminary cost estimates to facilitate determining the best value alternative. The engineer would also be tasked with preparing a preliminary Benefit-Cost Analysis (BCA) using FEMA's BCA spreadsheet with details for an earthquake natural hazard event. • If preliminary engineering feasibility is approved, Phase 1 Design and Phase 2 Construction could move forward subject to securing funding.

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Not yet available		Preliminary engineering feasibility report to be prepared.
Alternative #2	Not yet available		Preliminary engineering feasibility report to be prepared.
Alternative #3	No action – not yet available		Preliminary engineering feasibility report to be prepared.

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 159: Emergency Water Supply Community Engagement and Response Plan

Mitigation Action Information	
Title of action	Emergency Water Supply Community Engagement and Response Plan
Type of action	Plans/regulations ☐ Natural systems protection ☐ Structure and infrastructure project ☐ Public education/awareness ☒
Action description	Develop and have ready to deploy community engagement regarding preparation for and actions during an emergency that has caused a disruption in water service to Hillsboro Water customers. This will also involve outreach to key community groups (schools, childcare facilities, elder care facilities, medical facilities, etc.) to educate about emergency water supplies and preparation, as well as coordinating with community groups to be partners in emergency water supply delivery and information centers.
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 City will have worked with the public to encourage homeowners to do some emergency preparations at home so they are not as reliant on the City to deliver drinking water and have some of their own source of water saved in case of an emergency. The City will also have an established network of partners to ensure that vulnerable communities are prioritized when there is a water emergency due to wildfire, algal blooms, storms, extreme heat, or infrastructure failure.
Area of action impact	Water service area (in-town and upper system)
Is the action related to a critical facility or facilities?	Yes ☐ No ☒ If yes, what facility(ies)? JWC WTP, SSFP WTP, JWC Transmission System, COH Distribution System, Emergency Water Distribution Facility (TBD?)
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	City of Hillsboro Emergency Drinking Water Plan
Alignment with existing plans and policies	Water Management and Curtailment Plan, Algal Response Communications Plan, Wildfire Protection Plan, etc.

Mitigation Action Implementation Plan			
Priority	Low ☐ Medium ☐ High ☒		
Lead position, office, department, or division responsible for implementation	Water – Business Admin (Communications), Resources, Operations (Emergency Management)		
Supporting Partners			
Internal Partners		**External Partners, Including Community Partners**	
City Communications/Public Information, City Emergency Planning		County Emergency Planning, Schools, Childcare Facilities, Elder Care Facilities, Community Centers, Medical Centers, etc., communities with limited English proficiency	
Potential Funding Sources			
Non-Federal Funding Sources		**Federal Funding Sources**	
City Budget, RDPO Grants			
Estimated Cost	$30,000		
Estimated Benefit			
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**	
Community is prepared for an interruption in water service during an emergency. Less loss of life and/or sickness.	Building relationships and partnerships with community partners.	$180,000	
Project Timeline			
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**	
Short-term ☐ Mid-term ☒ Long-term ☐ Ongoing ☐	July 1, 2023	Unknown, TBD	
Implementation Benchmarks: How Will Success Be Measured?			
• Outreach to community at large about emergency water preparation, establishment of community partners, and specific outreach to vulnerable communities			
Potential Challenges to Implementation			
• Unwilling community partners, unreceptive public engagement, staff time, funding			
Resources and References, if Applicable			

Three Alternatives Considered, Including No Action			
Alternative #1	**Action Description**	**Estimated Cost**	**Evaluation**
	No Action	$0	
Alternative #2			
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 160: Increase Number of Home Town Tap Water Boards and Misting Tents

Mitigation Action Information			
Title of action	Increase Number of Home Town Tap Water Boards and Misting Tents		
Type of action	Plans/regulations ☐		Natural systems protection ☐
	Structure and infrastructure project ☐		Public education/awareness ☒
Action description	Home Town Taps (HTTs) provide easy access to safe, cool water in public locations. Misting tents are used to provide community members a place to cool down during high temperatures. Both are popular and used at organized events, but additional units are needed due the increased frequency of extreme heat events. The City has an imperative to respond with access to water and cooling for the public in neighborhoods and near community gathering locations, particularly in low-income areas or areas of the City with limited means of transportation. These HTTs can also be deployed and used during other events where there is a water distribution need.		
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?	Extreme heat events are increasing in frequency and are a greater risk to public health and safety.		
Area of action impact	Locations throughout City will be identified based on community access and need with a focus on low-income areas or limited mobility.		
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	State of Oregon NHMP		
Alignment with existing plans and policies	City of Hillsboro – EOP – Extreme Temperatures Annex (Heat)		
Mitigation Action Implementation Plan			
Priority	Low ☐	Medium ☒	High ☐
Lead position, office, department, or division responsible for implementation	Water – Resources, Operations, Communications		

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
Parks and Recreation Department, Fire Dept.	Houseless services organizations
Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
City Budget	
Estimated Cost	$25,000

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**
Providing drinking water to underserved populations during extreme heat events.	Additional HHTs at stationary locations, would reduce staffing to setup and tear down of temporary HHT locations.	$150,000

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

Implementation Benchmarks: How Will Success Be Measured?
• The City has sufficient units to support planned events and quickly deploy to areas of the community in extreme heat events.

Potential Challenges to Implementation

Resources and References, if Applicable

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	No action	$0	
Alternative #2	Two HHTs rather than four	$10,000	
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 161: Deploy Customer Water Usage and Messaging Software Program

Mitigation Action Information	
Title of action	Deploy Customer Water Usage and Messaging Software Program
Type of action	Plans/regulations ☐ Natural systems protection ☐ Structure and infrastructure project ☐ Public education/awareness ☒
Action description	Purchase and deploy software that allows customers to view their water usage and can be used to deliver targeted and system-wide messages to the public such as boil water notices, curtailment and water supply advisories, locations for emergency water, etc.
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?	Allows customers to monitor their water usage to be more water efficient during times of drought and to better comply with curtailment orders, if issued during a supply emergency or drought. The software also allows the City to communicate vital information to customers quickly when there is a water quality emergency due to wildfire, algal blooms, storms, extreme heat, and infrastructure failure.
Area of action impact	Water service area (in-town and upper system)
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? WTPs, water distribution system
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	State of Oregon NHMP
Alignment with existing plans and policies	WMCP – Water Curtailment Plan and COH Water Emergency Response Plan, City of Hillsboro Emergency Operations Plan
Mitigation Action Implementation Plan	
Priority	Low ☐ Medium ☒ High ☐
Lead position, office, department, or division responsible for implementation	Water – Resources, Communications

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
Information Services, Finance	
Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
City Budget	HMGP
Estimated Cost	$100,000

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**
Customer will be educated on water usage and receive emergency notices.	Customers can easily see their usage and adjust to meet curtailment goals in a drought or service limitation event.	$600,000

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term ☐ Mid-term ☒ Long-term ☐ Ongoing ☐	July 2023	June 2024

Implementation Benchmarks: How Will Success Be Measured?
• Software is deployed, integrated with City's billing and meter data, and customers are enrolled.

Potential Challenges to Implementation

Resources and References, if Applicable

Three Alternatives Considered, Including No Action			
Alternative #1	**Action Description**	**Estimated Cost**	**Evaluation**
	No Action	$0	
Alternative #2			
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 162: Initial Wildfire Fuel Reduction and Defensible Space

Mitigation Action Information	
Title of action	Initial Wildfire Fuel Reduction and Defensible Space
Type of action	Plans/regulations ☒ Natural systems protection ☐ Structure and infrastructure project ☒ Public education/awareness ☐
Action description	**Wildfire Protection** **Fuels Reduction and Defensible Space** High-value assets owned by the City of Hillsboro, Joint Water Commission, and Barney Reservoir Joint Ownership Commission at risk of being impacted by wildfire have been identified in two documents – the Tualatin Basin Quantitative Wildfire Risk Assessment and Recommendations (2021) by OSU-Extension Service Fire Program and Wildland Fire Associates, and the Tualatin Wildfire Protection Plan (2022) by JWC and Clean Water Services. Recommendations from these planning documents focused on creating, increasing, and maintaining defensible space and reducing fire fuels near critical assets. The fuels reduction goals include having nothing burnable within 5 feet of priority buildings and communication sites, maintaining vegetation to heights less than 6 inches within 30 feet, spacing plants widely (every 100 feet) around buildings, making burn lines, and pruning trees to 8–10 feet above ground. This would be accomplished by mowing, thinning, piling, and pile burning as needed. The following list includes facilities and assets the JWC, BRJOC, and COH plan to create and maintain defensible space and reduce fuel loadings around: • Cherry Grove Slow Sand Filter Plant (SSFP) • Soda Ash Facility • Tualatin Flume • Patton Valley Control Valve • JWC Water Treatment Plant • JWC Fernhill Reservoirs
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?	Reducing fuels and increasing defensible space protects worker and public safety in the event of a wildfire, minimizes property loss and damages, and provides resiliency to our water distribution infrastructure to ensure public health and safety.
Area of action impact	City of Hillsboro Water Infrastructure and JWC Water Infrastructure

Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? Cherry Grove Slow Sand Filter Plant (SSFP), Soda Ash Facility, Tualatin Flume, Patton Valley Control Valve, JWC Water Treatment Plant, JWC Fernhill Reservoirs
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	State of Oregon NHMP
Alignment with existing plans and policies	Wildfire Protection Plan (2022) Tualatin Basin Quantitative Wildfire Risk Assessment and Recommendations (2021)
Mitigation Action Implementation Plan	
Priority	Low ☐ Medium ☐ High ☒
Lead position, office, department, or division responsible for implementation	Water Department; Resources, Operations, WTP

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
Fire Department	

Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
City of Hillsboro Budget, Office of State Fire Marshal grants (Defensible Space Local Government Grant)	FEMA BRIC Funding, HMGP
Estimated Cost	$200,000

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**
Risk reduction		$1,200,000

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term ☐ Mid-term ☒ Long-term ☐ Ongoing ☐	1/1/2023	12/31/2026

Implementation Benchmarks: How Will Success Be Measured?
• Success will be measured with the accompanying inventory database and dependent on ability to complete action items in the time intervals set.

Potential Challenges to Implementation

Resources and References, if Applicable
• Wildfire Protection Plan

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	No Action	$0	
Alternative #2			
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 163: Water Maintenance and Fuels Reduction Plan with Facility Inventory Database

Mitigation Action Information			
Title of action	Water Maintenance and Fuels Reduction Plan with Facility Inventory Database		
Type of action	Plans/regulations ☒ Structure and infrastructure project ☒		Natural systems protection ☒ Public education/awareness ☐
Action description	**Wildfire Protection** **Maintenance and Fuels Reduction Plan with Facility Inventory Database** High-valued assets owned by the City of Hillsboro, Joint Water Commission, and Barney Reservoir Joint Ownership Commission at risk of being impacted by wildfire have been identified in two documents – the Tualatin Basin Quantitative Wildfire Risk Assessment and Recommendations (2021) by OSU-Extension Service Fire Program and Wildland Fire Associates, and the Tualatin Wildfire Protection Plan (2022) by JWC and Clean Water Services. One of the pre-fire prevention and mitigation strategies recommended from the Wildfire Protection Plan is creating a preventative maintenance and fuels reduction plan with an accompanying facility inventory database. The preventative maintenance and fuels reduction plan will be developed and reevaluated annually and include location specific maintenance activities to be performed, criteria for initiating maintenance, status of maintenance, completion dates, and a fuels treatment plan for assets and resources outlined in the accompanying facility inventory database. This facility inventory database will focus on key assets, vulnerabilities, preventative maintenance schedule, tracking log, and actions that should be taken immediately if a wildfire or other natural disaster occurs.		
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?	The facilities inventory database and maintenance and fuels reduction plan will reduce risk to public safety by making our water distribution infrastructure more resilient to help ensure delivery of drinking water in the event of wildfire or other natural disasters.		
Area of action impact			
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? Cherry Grove Slow Sand Filter Plant (SSFP),Soda Ash Facility, Tualatin Flume, Patton Valley Control Valve, JWC Water Treatment Plant, JWC Fernhill Reservoirs		

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	State of Oregon NHMP		
Alignment with existing plans and policies	Wildfire Protection Plan (2022) Tualatin Basin Quantitative Wildfire Risk Assessment and Recommendations (2021)		
Mitigation Action Implementation Plan			
Priority	Low ☐	Medium ☐	High ☒
Lead position, office, department, or division responsible for implementation	Water Department; Operations, WTP, Resources		
Supporting Partners			
Internal Partners		**External Partners, Including Community Partners**	
Fire Department			
Potential Funding Sources			
Non-Federal Funding Sources		**Federal Funding Sources**	
City Budget, Oregon State Fire Marshal's Office		HMGP	
Estimated Cost	$50,000		
Estimated Benefit			
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**	
Development of an inventory and maintenance plan for mitigation efforts	Supporting long-term fuel reductions plan	$300,000	
Project Timeline			
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**	
Short-term ☐ Mid-term ☒ Long-term ☐ Ongoing ☐	1/1/2023	12/31/2026	
Implementation Benchmarks: How Will Success Be Measured?			
• Developing an inventory and maintenance plan			
Potential Challenges to Implementation			
• Getting agreements in place for properties that involve other landowners.			
Resources and References, if Applicable			
• Oregon State Fire Marshal's Office. OSU Extension Office.			

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Only create a database with no plan	$25,000	
Alternative #2	Only create a plan with no database of properties	$25,000	
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 164: Battery Backup Systems for Traffic Signals

Mitigation Action Information			
Title of action	Battery Backup Systems for Traffic Signals		
Type of action	Plans/regulations ☐	Natural systems protection ☐	
	Structure and infrastructure project ☒	Public education/awareness ☐	
Action description	Install Econolite ZincBlue2 battery backup systems to 11 City of Hillsboro signalized intersections		
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?	In the event of a power outage, battery backup systems will keep the signals running properly until power is restored. This will aid in response time of emergency responders and the safety of commuting public in the event of a power outage.		
Area of action impact	Emergency response services, commuting public, and citizens of Hillsboro		
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	State of Oregon NHMP		
Alignment with existing plans and policies	City of Hillsboro Comprehensive Plan Policy NH 1.9, NH 4.3, NH 4.4		
Mitigation Action Implementation Plan			
Priority	Low ☒	Medium ☐	High ☐
Lead position, office, department, or division responsible for implementation	Public Works		
Supporting Partners			
Internal Partners		**External Partners, Including Community Partners**	
Public Works		PGE, State and County DOTs	

Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
Transportation Budget, State DOT grant programs	Hazard Mitigation Grant program, Building Resilient Infrastructure and Communities
Estimated Cost	$110,000.00

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**
Emergency response services response time and safety	Safety of commuting public and City of Hillsboro citizens	$660,000

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

Implementation Benchmarks: How Will Success Be Measured?
• Acquiring funding for project • Purchasing battery backup systems • Installation of systems

Potential Challenges to Implementation
• Software updates as need, acquiring funding for replacement of batteries at end of life.

Resources and References, if Applicable

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1			
Alternative #2			
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 165: New Shop/Carport for Emergency Response Equipment and Supplies

Mitigation Action Information	
Title of action	New Shop/Carport for Emergency Response Equipment and Supplies
Type of action	Plans/regulations ☐ Natural systems protection ☐ Structure and infrastructure project ☒ Public education/awareness ☐
Action description	Construct a new Public Works shop/carport to shelter public works equipment and supplies to protect from extreme heat, volcanic ash, inclement weather, and other 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?	To ensure safety to the commuting public and citizens of Hillsboro and to maintain proper response to inclement weather and other natural hazards. Maintain emergency vehicle response times.
Area of action impact	Emergency response services, Commuting public, City of Hillsboro residents and City of Hillsboro Public Works
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	State of Oregon NHMP
Alignment with existing plans and policies	Emergency response plan and policy, City of Hillsboro Emergency Operations Plan, City of Hillsboro Comprehensive Plan
Mitigation Action Implementation Plan	
Priority	Low ☒ Medium ☐ High ☐
Lead position, office, department, or division responsible for implementation	City of Hillsboro Facilities and Fleet Division

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
Facilities, water, fleet, IS, planning and building departments	State and County department of transportation
Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
City capital improvement budget and Transportation fund budget	Hazard Mitigation Grant program
Estimated Cost	$4,000,000

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**
Safety of commuting public and residents of the City of Hillsboro		$24,000,000

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

Implementation Benchmarks: How Will Success Be Measured?

- Receiving approval for development and building
- Securing funding and project buy-in
- Permits and building structure
- Relocating equipment and supplies to new building

Potential Challenges to Implementation

Resources and References, if Applicable

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1			
Alternative #2			
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 166: Gas Flow Shutoff Valves

Mitigation Action Information	
Title of action	Gas Flow Shutoff Valves
Type of action	Plans/regulations ☐ Natural systems protection ☐ Structure and infrastructure project ☒ Public education/awareness ☐
Action description	This project would ensure that all our essential buildings would remain safe from potential gas leaks in the event of seismic activity. We have identified roughly 25 buildings we consider essential in the event of an emergency. Adding seismic gas shutoff valves to these sites would allow us to use these areas for planning, mobilizing, and implementing our response to whatever is encountered. Adding seismic gas shutoff valves to these sites would also ensure that any staff or public patrons in areas of these buildings would remain safe from potential gas explosions caused by a gas leak.
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 roughly 25 facilities identified for this program do not have seismic shut-off valve devices. These sites are essential to ensuring the City of Hillsboro can respond to whatever emergency or natural disaster there may be for the citizens of Hillsboro. It's our responsibility to be able to be there for the community.
Area of action impact	Facility Departments: Police, Fire, Public Works, Water, Parks, Civic Center.
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? Civic Center, Facilities, Davis/Shute Fiber Hut, Fire Stations 1, 2, 3, 5, 6, Fire Training, Brookwood Library, Shute Library, Aquatic Center, Hidden Creek, Park Maintenance, Tyson Rec, Police Training, Evidence, Water Operations.
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	Hillsboro Comprehensive Plan Policy NH 2.3 Policy NH 4.2
Alignment with existing plans and policies	City's ability to mobilize and response to emergencies.

Mitigation Action Implementation Plan			
Priority	Low ☒ Medium ☐ High ☐		
Lead position, office, department, or division responsible for implementation	Public Works Director, Superintendent of Operations and Maintenance.		
Supporting Partners			
Internal Partners		**External Partners, Including Community Partners**	
Office of Emergency Management, Office of the City Manager		Washington County	
Potential Funding Sources			
Non-Federal Funding Sources		**Federal Funding Sources**	
City capital improvement budget, general fund		Hazard Mitigation Grant Program, BRIC	
Estimated Cost	Year 1 – $54,000 ($30,000 equip, $24,000 install); no ongoing cost once complete		
Estimated Benefit			
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**	
Protection of life and essential buildings and the ability to utilize these properties during seismic activity.		Year 1 – $324,000	
Project Timeline			
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**	
Short-term ☒ Mid-term ☐ Long-term ☐ Ongoing ☐	July 2023	March 2024	
Implementation Benchmarks: How Will Success Be Measured?			
• Securing funding and project buy-in. • Completing audit of gas meters to determine size of equipment needed. • Purchase equipment/supplies. • Obtain bids from contractors to install equipment. • Install equipment.			
Potential Challenges to Implementation			
• Securing ongoing funding for maintenance to gauges and software updates. Needing to replace flood gases due to damage caused by vehicles.			
Resources and References, if Applicable			
• Potential vendor: https://onerain.com/applications/flood-warning/			

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	No action	$0	Facilities would remain at risk for potential gas leaks during seismic activity.
Alternative #2	Scale project to fire/life/safety facilities only	Year 1 – $27,000	Police/Fire/Communication properties only
Alternative #3	Scale project over multiple years	$10,800 per year	5-Year plan

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 167: Traffic Intersection Weather Station Installation and Monitoring

Mitigation Action Information			
Title of action	Traffic Intersection Weather Station Installation and Monitoring		
Type of action	Plans/regulations ☐	Natural systems protection ☐	
	Structure and infrastructure project ☒	Public education/awareness ☐	
Action description	This mitigation action proposes the installation of weather stations at strategic traffic intersections and other areas throughout the City of Hillsboro. Weather stations will collect and transmit live data to Public Works operation and maintenance staff. Data transmitted will include pavement temperatures as well as rainfall data related to microburst storms. By collecting this data, operation and maintenance staff will be able to prioritize their response to specific weather events. Hazards mitigated by the implementation and management of these weather stations involve slippery road conditions due to severe winter weather and potential flooding due to microburst storms. Live data will allow Public Works staff to prioritize response to the most impacted intersections, therefore minimizing harm to City of Hillsboro residents and infrastructure.		
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?	Intersections can become hazardous in the event of severe winter storms as they are the site of most weather-related automobile accidents. The City of Hillsboro responds to frozen road conditions with the use of deicer to create safer road conditions. This action item allows Public Works operation and maintenance teams to mobilize where they are needed most first. Depending on the cause of flooding, crews can then remove blockages in storm system or block off dangerous flooding roads and intersections from use.		
Area of action impact	Traffic intersections and other areas will be chosen strategically and will be located throughout the City. Parameters for selecting intersections will include average daily traffic data as well as historical data suggesting these weather station locations are prone to weather-related accidents or flooding. Locations that are known to be most at risk will be chosen for this mitigation action.		
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	This action item can be integrated with the City of Hillsboro action item to identify locations with routine significant flooding and install swing gates to block flooded roads. Weather station data can be collected and analyzed to help determine locations for proposed swing gates. Additionally, this action item can be integrated with the mitigation plan related to removing snow and ice from bike lanes within the City of Hillsboro.		

Alignment with existing plans and policies	The City of Hillsboro has an existing response crew that addresses dangerous intersections during severe winter storms and rainstorms. This mitigation plan will assist with the efficiency and cost of responding to such storms. Crews will be able to respond to the highest risk areas first. This mitigation plan will also provide City of Hillsboro Public Works with data that will assist with the local initiative to prioritize and implement capital projects that improve hazardous intersections and insufficient stormwater systems.

Mitigation Action Implementation Plan

Priority	Low ☒ Medium ☐ High ☐
Lead position, office, department, or division responsible for implementation	Maintenance & Operation Superintendent and Public Works Director

Supporting Partners

Internal Partners	External Partners, Including Community Partners
Traffic Planning, Public Works, City of Hillsboro First Responders	N/A

Potential Funding Sources

Non-Federal Funding Sources	Federal Funding Sources
Transportation Fund	FEMA Hazard Mitigation Grant Program FEMA Hazard Mitigation Assistance Grants (BRIC) – Building Resilient Infrastructure and Communities

Estimated Cost	$2,000 to $5,000 per weather station

Estimated Benefit

Primary Benefit(s)	Secondary Benefit(s)	Financial Benefit(s)
Protection of human life and safety	Weather response procedural efficiency	$12,000 to $30,000 per weather station

Project Timeline

Expected Timeline for Completion	Potential Start Date	Potential Completion Date
Short-term ☐ Mid-term ☐ Long-term ☒ Ongoing ☐	Start of Fiscal Year 2024	TBD

Implementation Benchmarks: How Will Success Be Measured?

- Create prioritization matrix for prioritizing intersections/areas where weather stations will be installed
- Select weather station manufacturer and purchase weather stations
- Install weather stations
- Train staff on use of weather station, monitoring software, and data utilization
- Create and implement response protocol

Potential Challenges to Implementation
• Potential challenges to implementation include technological malfunctions, cost of weather stations and associated data tracking software, and tampering and/or safe maintenance access of weather stations depending on installation location.
Resources and References, if Applicable

Three Alternatives Considered, Including No Action			
Alternative #1	**Action Description**	**Estimated Cost**	**Evaluation**
Alternative #2			
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 168: High-Risk Outfall Repair Program

Mitigation Action Information			
Title of action	High-Risk Outfall Repair Program		
Type of action	Plans/regulations ☒	Natural systems protection ☐	
	Structure and infrastructure project ☒	Public education/awareness ☐	
Action description	This mitigation action proposes a program to analyze and repair stormwater outfalls to natural waterways to prevent flooding conditions. Stormwater outfalls that need repair can cause flooding conditions in several scenarios. Outfalls that are constructed under the 100-year flow elevation can cause backwatering into the storm system, causing flooding. Additionally, stormwater outfalls that are inadequately sized for large storm events or are buried/submerged can cause flooding conditions. This action will include a comprehensive plan for determining which outfalls need attention and prioritize repair order based on the flood risk associated with the outfall.		
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 mitigation action plan identifies current and future risks by addressing infrastructure that could affect human safety and damage infrastructure. Outfalls exist throughout the city and high-risk outfalls within low income and vulnerable areas will be prioritized.		
Area of action impact	High-risk outfalls will be chosen strategically and will be located throughout the City. Outfalls that are known to be most at risk, as well as outfalls within low-income and vulnerable areas, will be prioritized for this mitigation action.		
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	Other NHMP mitigation actions within City of Hillsboro related to flooding and other weather events. State of Oregon NHMP.		
Alignment with existing plans and policies	The City of Hillsboro has existing planning efforts to repair outfalls to maintain functionality of the storm system as well as protecting natural waterways and riparian areas from the effects of hydromodification (e.g., erosion).		

Mitigation Action Implementation Plan			
Priority	Low ☐ Medium ☒ High ☐		
Lead position, office, department, or division responsible for implementation	Storm and Sanitary Sewer Division Manager and Public Works Director		
Supporting Partners			
Internal Partners		**External Partners, Including Community Partners**	
Planning Department		Clean Water Services, Washington County	
Potential Funding Sources			
Non-Federal Funding Sources		**Federal Funding Sources**	
Storm system local service fee funds, system development charge funds		FEMA Hazard Mitigation Grant Program FEMA Hazard Mitigation Assistance Grants (BRIC) – Building Resilient Infrastructure and Communities	
Estimated Cost	Between $160k and $500k for approximately 500 outfalls		
Estimated Benefit			
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**	
Protection of human life and safety	Protection of existing infrastructure and private property	$960,000–$3 million	
Project Timeline			
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**	
Short-term ☐ Mid-term ☐ Long-term ☒ Ongoing ☐	Start of Fiscal Year 2024	Unknown	
Implementation Benchmarks: How Will Success Be Measured?			
• Creating a prioritization matrix to identify high-risk outfalls • Creating an implementation plan for repairing identified outfalls • Procuring on-call contractors to implement long-term program • Implementing outfall repair program			
Potential Challenges to Implementation			
• Potential challenges to implementation include access to project sites and environmental permitting due to temporary impacts to riparian areas where outfalls are often located.			
Resources and References, if Applicable			

Three Alternatives Considered, Including No Action			
Alternative #1	**Action Description**	**Estimated Cost**	**Evaluation**
Alternative #2			
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 169: Upsizing Culvert Capacity for Waterways to Reduce Flooding Risks

Mitigation Action Information	
Title of action	Upsizing Culvert Capacity for Waterways to Reduce Flooding Risks
Type of action	Plans/regulations ☐ Natural systems protection ☐ Structure and infrastructure project ☒ Public education/awareness ☐
Action description	This mitigation action is to replace and upgrade culverts throughout the City but includes two projects within the City of Hillsboro that propose to upgrade and enlarge existing culverts with known flooding issues. The project sites are at the Glencoe Swale crossing at NW Connell Avenue and the Dawson Creek crossing on NE 47th Avenue. At both sites, the roadways become inundated during large storm events and cause dangerous conditions for residents and infrastructure.
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?	These two example project sites are known to create dangerous flooded conditions and are identified as high-ranking projects in planning documents. These sites are located within residential areas, and the roads have been blocked off for significant periods of time due to flooding.
Area of action impact	Culverts located throughout the City, including Glencoe Swale Crossing and NW Connell Avenue and the Dawson Creek Crossing on NE 47th Avenue.
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	Other NHMP mitigation actions within City of Hillsboro related to flooding and other weather events. State of Oregon NHMP.
Alignment with existing plans and policies	The City of Hillsboro Stormwater Master Plan adopted in 2021 identified projects that should be addressed in a 10-year stormwater capital improvement program. Both example project sites associated with this mitigation action plan were ranked in the top 10 most important projects in the program.
Mitigation Action Implementation Plan	
Priority	Low ☐ Medium ☐ High ☒
Lead position, office, department, or division responsible for implementation	Storm and Sanitary Sewer Division Manager and Public Works Director

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
Traffic Planning, Transportation, Storm and Sanitary Division, Water Department	Clean Water Services
Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
Storm system local service fee funds, system development charge funds, and transportation fund.	FEMA Hazard Mitigation Grant Program FEMA Hazard Mitigation Assistance Grants (BRIC) – Building Resilient Infrastructure and Communities.
Estimated Cost	Individual culvert replacements between $1 million and $5 million

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**
Protection of human life and safety	Decreased need for emergency response.	Between $6 million and $30 million
Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term ☐ Mid-term ☐ Long-term ☒ Ongoing ☐	Start of Fiscal Year 2024	Unknown

Implementation Benchmarks: How Will Success Be Measured?

- Complete engineering analysis/feasibility study for identified culverts
- Secure engineering contractors to complete design of culvert upgrades
- Secure construction contractors to construct culvert upgrades

Potential Challenges to Implementation

- Potential challenges to implementation include environmental impacts to waterways during construction, working around existing infrastructure (e.g., railroad and water lines), and traffic control (providing residents access during construction).

Resources and References, if Applicable

Three Alternatives Considered, Including No Action

	Action Description	Estimated Cost	Evaluation
Alternative #1			
Alternative #2			
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 170: Vegetative Stormwater Management Facility (SMF) Drought Mitigation Plan

Mitigation Action Information			
Title of action	Vegetative Stormwater Management Facility (SMF) Drought Mitigation Plan		
Type of action	Plans/regulations ☒ Structure and infrastructure project ☐		Natural systems protection ☒ Public education/awareness ☐
Action description	The City/CWS Design and Construction Standards need to be revised to expand plant options when new vegetative stormwater management facilities are initially constructed or repaired. More heat- and drought-tolerant plants need to be added, such as native succulents or kinnikinnick, for ground cover that require little amounts of maintenance or water to survive, cover soils to better retain soil moisture, and flower during the year to provide pollinator-friendly plants throughout the City. Water quality will still be accomplished using plugs and other deep-rooted and drought-tolerant plants. Surrounding heat- and drought-tolerant native vegetation types such as Madrone, Western Juniper, Crape Myrtle, Western Redbud, Yarrow, Sage, Thyme, and Yucca variations should be added to the approved plant list. Fifty percent of all plants selected to be installed in new SMFs should be required to be heat- and drought-tolerant plants. All existing SMFs within the City will eventually need to have their existing vegetation augmented with more drought-tolerant plant types.		
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?	Vegetation survivability within vegetative stormwater management facilities is critical for the pollutant removal function that each facility performs and maintains compliance with local, state, and federal regulations. Cost savings: maintaining existing vegetation prevents invasive plant establishment/removal and extends the life of the facility before more expensive rehabilitation and restoration are necessary to re-establish the facility.		
Area of action impact	Vegetative stormwater management facilities within the City of Hillsboro.		
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 2 ☐ Goal 3 ☒	Goal 4 ☐ Goal 5 ☒ Goal 6 ☒	Goal 7 ☐
Integration into other initiatives	Extreme Heat, Flood (Climate Resiliency). State of Oregon NHMP.		
Alignment with existing plans and policies	City Environmental Stewardship, Pollinator/Bee City, City/CWS Division of Responsibilities IGA, City Storm and Sanitary Performance, and Maintenance Standards.		

Mitigation Action Implementation Plan			
Priority	Low ☒ Medium ☐ High ☒		
Lead position, office, department, or division responsible for implementation	Public Works Department, Storm and Sanitary Division, Environmental Services Section.		
Supporting Partners			
Internal Partners		**External Partners, Including Community Partners**	
PW Storm and Sanitary Division, Parks Department, Sustainability		Clean Water Services, Tualatin Soil Water Conservation District, Washington County, METRO	
Potential Funding Sources			
Non-Federal Funding Sources		**Federal Funding Sources**	
COH SWM LSF, COH General Fund, Oregon Clean Water State Revolving Fund		FEMA Hazard Mitigation Grant Program FEMA Hazard Mitigation Assistance Grants (BRIC) – Building Resilient Infrastructure and Communities	
Estimated Cost	Each phase of this action plan has an estimated cost of $100,000 to $500,000		
Estimated Benefit			
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**	
Resource protection	Maintenance repair costs	$600,000 to $3 million	
Project Timeline			
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**	
Short-term ☐ Mid-term ☐ Long-term ☒ Ongoing ☐	Start of Fiscal Year 2025	End of Fiscal Year 2044	
Implementation Benchmarks: How Will Success Be Measured?			
• When a new SMF drought mitigation policy/procedure is implemented. • Design standards are changed to expand plant selection types. • When implementation of heat- and drought-tolerant/resistant native plants are planted and established within all stormwater management facilities.			
Potential Challenges to Implementation			
• Ability to change design and construction standards, funding availability, available personnel, and the number of facilities to augment with additional plants			
Resources and References, if Applicable			

Three Alternatives Considered, Including No Action			
Alternative #1	**Action Description**	**Estimated Cost**	**Evaluation**
Alternative #2			
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 171: Cycle Track and Bike Lane Snow/Ice Removal

Mitigation Action Information			
Title of action	Cycle Track and Bike Lane Snow/Ice Removal		
Type of action	Plans/regulations ☒	Natural systems protection ☐	
	Structure and infrastructure project ☒	Public education/awareness ☐	
Action description	Evaluate needs for snow/ice response to clear cycle tracks and to purchase equipment if needed.		
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?	Clearing cycle tracks and bike lanes during/after a snow/ice event so bicyclists can safely commute		
Area of action impact	Commuting public		
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	State of Oregon NHMP		
Alignment with existing plans and policies	City of Hillsboro Comprehensive Plan Policy NH 1.9, NH 4.3, NH 4.4		
Mitigation Action Implementation Plan			
Priority	Low ☒ Medium ☐ High ☐		
Lead position, office, department, or division responsible for implementation	Transportation Division		
Supporting Partners			
Internal Partners		**External Partners, Including Community Partners**	
Transportation and Stormwater divisions		State/County DOT	

Potential Funding Sources			
Non-Federal Funding Sources		**Federal Funding Sources**	
Transportation Budget Stormwater Budget		Hazard Mitigation Grant program, Building Resilient Infrastructure and Communities	
Estimated Cost	$500,000		
Estimated Benefit			
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**	
Safety and reliability of commuting public.		$3,000,000	
Project Timeline			
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**	
Short-term ☐ Mid-term ☐ Long-term ☒ Ongoing ☐	July 2026	June 2028	
Implementation Benchmarks: How Will Success Be Measured?			
• Evaluate need. • Determine gaps. • Analyze possible solutions. • Secure funding. • Purchase solutions based on findings.			
Potential Challenges to Implementation			
• Opposing roadway improvements needed to obtain approval of new structure			
Resources and References, if Applicable			
• Potential vendor: https://onerain.com/applications/flood-warning/			
Three Alternatives Considered, Including No Action			
Alternative #1	**Action Description**	**Estimated Cost**	**Evaluation**
Alternative #2			
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 172: Volcanic Ash Equipment

Mitigation Action Information			
Title of action	Volcanic Ash Equipment		
Type of action	Plans/regulations ☒	Natural systems protection ☐	
	Structure and infrastructure project ☐	Public education/awareness ☐	
Action description	Research and purchase equipment needed for volcanic ash cleanup of roadways and pedestrian facilities		
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?	In the event of a volcanic eruption, this research and equipment would be needed to streamline the cleanup of ash on roadways and pedestrian facilities to ensure safety of the commuting public. This will also assist with emergency responders' response times.		
Area of action impact	Commuting public, emergency response, storm and sanitary infrastructure		
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	State of Oregon NHMP		
Alignment with existing plans and policies	City of Hillsboro Comprehensive Plan Policy NH 1.9, NH 4.3, NH 4.4		
Mitigation Action Implementation Plan			
Priority	Low ☒	Medium ☐	High ☐
Lead position, office, department, or division responsible for implementation	Public Works Operations Division		
Supporting Partners			
Internal Partners		**External Partners, Including Community Partners**	
Transportation, Sanitary and Stormwater divisions		County and State DOT	

Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
Transportation budget, Sanitary and Stormwater budget	Hazard Mitigation Grant program, building resilient infrastructure and communities
Estimated Cost	$2,000,000

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**
Clear, safe roadways for emergency responders and commuting public		$12,000,000

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term ☐ Mid-term ☐ Long-term ☒ Ongoing ☐	July 2026	June 2028

Implementation Benchmarks: How Will Success Be Measured?

- Determine types of equipment needed
- Purchase equipment

Potential Challenges to Implementation

- Securing funding and storage for equipment

Resources and References, if Applicable

- Potential vendor: https://onerain.com/applications/flood-warning/

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1			
Alternative #2			
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 173: Volcanic Ash

Mitigation Action Information	
Title of action	Volcanic Ash
Type of action	Plans/regulations ☐ Natural systems protection ☐ Structure and infrastructure project ☒ Public education/awareness ☐
Action description	This project would upgrade all our existing HVAC systems to better deal with downfall of volcanic ash. Physically installing hoods over air intake would reduce direct ash ingestion into HVAC systems.
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 would help reduce the damage caused by volcanic ash downfall.
Area of action impact	City of Hillsboro – Citywide Facilities
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? Police Stations – West/East, Training Centers, Fire Stations 1–3, 5, 6.
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	State of Oregon NHMP
Alignment with existing plans and policies	Hillsboro Comprehensive Plan Policy NH 2.3 Policy NH 4.2 City of Hillsboro Emergency Operations Plan
Mitigation Action Implementation Plan	
Priority	Low ☒ Medium ☐ High ☐
Lead position, office, department, or division responsible for implementation	Public Works Director, Superintendent of Operations and Maintenance.

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
City capital improvement budget, general fund, ODHS grant for clean air spaces	Hazard Mitigation Grant Program
Estimated Cost	Year 1 – $100,000; no ongoing cost once complete

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**
Protection of HVAC systems and infrastructure.		Year 1 – $600,000

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

Implementation Benchmarks: How Will Success Be Measured?

- Securing funding and project buy-in.
- Completing audit of HVAC systems to determine size of equipment needed.
- Purchase equipment/supplies.
- Install equipment.

Potential Challenges to Implementation

- Securing ongoing funding for maintenance to gauges and software updates.
- Needing to replace floodgates due to damage caused by vehicles.

Resources and References, if Applicable

- Potential vendor: https://onerain.com/applications/flood-warning/

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	No action	$0	HVAC systems would remain at risk for volcanic ash inhalation from downfall.
Alternative #2	Scale project to fire/life/safety facilities only	$35,000	Police/Fire/Communication properties only
Alternative #3	Scale project over multiple years	$10,000 per year	5 Year plan

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 174: Wildfire – Upgrade HVAC Air Filtration

Mitigation Action Information	
Title of action	Wildfire – Upgrade HVAC Air Filtration
Type of action	Plans/regulations ☐ Natural systems protection ☐ Structure and infrastructure project ☒ Public education/awareness ☐
Action description	This project would ensure all our HVAC system are equipped with means to provide MERV 13 filtration for all our HVAC Systems. While most of our sites do have the ability to use MERV 13 filters, not every system is capable of this. This would give us the funds to upgrade existing infrastructure to provide MERV 13 Filtration for these systems.
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?	Allowing fresh air into a building is important not only for the health of its inhabitants but also for a buildings ability to function properly. When wildfire smoke is in the air, HVAC systems without MERV 13 filtration systems are forced to close off outside air. Not bringing in outside air can cause people in buildings to get sick and can also cause negative building pressure.
Area of action impact	City of Hillsboro – Citywide facilities
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? All City facilities
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	State of Oregon NHMP
Alignment with existing plans and policies	Hillsboro Comprehensive Plan Policy NH 2.3 Policy NH 2.4 Policy NH 4.2
Mitigation Action Implementation Plan	
Priority	Low ☐ Medium ☐ High ☒
Lead position, office, department, or division responsible for implementation	Public Works Director, Superintendent of Operations and Maintenance.

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
City capital improvement budget, general fund	Hazard Mitigation Grant Program
Estimated Cost	Year 1 – $250,000 (equipment) $250,000 (installation)

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**
Protection of building occupants' heath during wildfire smoke, continue normal function of building operation.	Improved filtration of outside air	Year 1: $3,000,000

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

Implementation Benchmarks: How Will Success Be Measured?

- Securing funding and project buy-in.
- Completing audit of existing HVAC systems and equipment needs.
- Purchase equipment/supplies.
- Obtain bids from contractors to install equipment.
- Install equipment.

Potential Challenges to Implementation

- Securing ongoing funding for maintenance to gauges and software updates.
- Needing to replace floodgates due to damage caused by vehicles.

Resources and References, if Applicable

- Potential vendor: https://onerain.com/applications/flood-warning/

Three Alternatives Considered, Including No Action

	Action Description	Estimated Cost	Evaluation
Alternative #1	No action	$0	Existing systems would remain same
Alternative #2	Scale project to fire/life/safety facilities only	$125,000	Police/Fire properties only
Alternative #3	Scale project over multiple years	$50,000 per year	5-Year plan

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 175: Windstorm Damage Prevention Hardware

Mitigation Action Information	
Title of action	Windstorm Damage Prevention Hardware
Type of action	Plans/regulations ☐ Natural systems protection ☒ Structure and infrastructure project ☒ Public education/awareness ☐
Action description	This project would add high wind door stop systems to entrances at high-risk locations in the city. These systems would prevent catastrophic damage to entryways and emergency exits. The project would also help determine design language for future city buildings.
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?	Engineering windbreak vestibules or adding hurricane-rated doorstop hardware are options that could prevent damage to public and private property and keep locations secure during windstorm events. Resources to temporarily secure locations are in high demand during such events and could leave the city vulnerable to increased damage.
Area of action impact	City of Hillsboro Civic Center, Police Precincts, Fire Department, Public Works, and Water Department could all be impacted.
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? Our Civic Center, two Police Precincts, five Fire Stations, Public Works campus, and Water Department could all be impacted.
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	State of Oregon NHMP
Alignment with existing plans and policies	City's ability to mobilize and respond to emergencies. City of Hillsboro EOP.
Mitigation Action Implementation Plan	
Priority	Low ☐ Medium ☒ High ☐
Lead position, office, department, or division responsible for implementation	Department of Public Works Public Works Director Superintendent of Operations and Maintenance

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**

Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
City capital improvement budget, general fund	Hazard Mitigation Grant Program
Estimated Cost	Year 1 – $15,000–$60,000.

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**
Protection of life safety.	Decreased need for emergency response/securing facilities during windstorm events. Prevent damage to public and private property and infrastructure.	Year 1 – $360,000 Ongoing – $90,000

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term ☒ Mid-term ☐ Long-term ☐ Ongoing ☐	April 2023	May 2024

Implementation Benchmarks: How Will Success Be Measured?

- Identify high-risk entry systems
- Research solutions
- Procuring equipment and contractors
- Installing equipment

Potential Challenges to Implementation

- Securing ongoing funding for maintenance to gauges and software updates.
- Needing to replace flood gates due to damage caused by vehicles.

Resources and References, if Applicable

- Potential vendor: https://onerain.com/applications/flood-warning/

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	No action	$0	Continued life safety risk, and risk of damage to city facilities.
Alternative #2	Scale project to Civic Center only	Year 1 – $15,000	Taking on our highest risk site with minimal improvements would help but leave other sites at risk.

Alternative #3	Adjust project dates to multi-year steps.	$15,000 per year for 5 to 7 years.	Take on an additional facility each year until completion.

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 176: Expand and Update Continuity of Operations Plans (COOPs)

Mitigation Action Information	
Title of action	Expand and Update Continuity of Operations Plans (COOPs)
Type of action	Plans/regulations ☒ Natural systems protection ☐ Structure and infrastructure project ☐ Public education/awareness ☐
Action description	Update Department COOP Plans
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?	During and after a natural hazard event, the City relies on its Continuity of Operations Plans (COOPs) to guide each department in their response and recovery. Keeping each department's COOP up-to-date ensures that critical functions and services are maintained as seamlessly as possible. COOPs also provide information on how employees may be deployed into different work areas. COOPs help departments mitigate the length and severity of disruptions that are caused by natural hazards.
Area of action impact	All departments and their staff
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? Multiple facilities all across the City (ones that are deemed "primary" and "alternate" facilities).
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	State of Oregon NHMP
Alignment with existing plans and policies	Updates will be made to existing department COOPs. Updating a COOP provides us with an opportunity to review the existing plan from a wide range of aspects, which may have implications to other existing plans and policies. City of Hillsboro Comprehensive Plan City of Hillsboro Emergency Operations Plan
Mitigation Action Implementation Plan	
Priority	Low ☐ Medium ☒ High ☐
Lead position, office, department, or division responsible for implementation	Management Analyst (HR/Risk), Department COOP Coordinators, department leadership

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
All City Departments (City Manager's Office, Community Development, Economic Development, Finance, Fire & Rescue, Human Resources, Library, Parks & Recreation, Police, Public Works, Water)	N/A

Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
General Fund	HMGP
Estimated Cost	$150,000

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**
Continuity plans for the City's essential functions		$900,000

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term ☐ Mid-term ☐ Long-term ☒ Ongoing ☒	March 2023	December 2025, then updated as needed

Implementation Benchmarks: How Will Success Be Measured?

- Secure funding, project buy-in
- 1/3 of departments have a COOP
- 2/3 of departments have a COOP
- All City departments have a COOP
- COOPs have been tested and evaluated
- Gaps or failures in plans have been identified and addressed
- Plans have been modified accordingly

Potential Challenges to Implementation

- Time, department buy-in

Resources and References, if Applicable

Three Alternatives Considered, Including No Action

	Action Description	Estimated Cost	Evaluation
Alternative #1	Focus on a few departments	$75,000	
Alternative #2	Focus on a few areas of COOP plan	$75,000	

Alternative #3	Create high-level (less detailed), comprehensive COOP plan	$50,000	

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 177: Analyze and Update Human Resources Policies

Mitigation Action Information			
Title of action	Analyze and Update Human Resources Policies		
Type of action	Plans/regulations ☒ Structure and infrastructure project ☐		Natural systems protection ☐ Public education/awareness ☐
Action description	Update current Human Resources policies that relate to natural hazards. Analyze policies for any gaps in coverage or type, and create policies as needed based on that analysis. Conduct training on updated and new policies.		
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?	Human Resources plays a key role in planning for any emergency staffing and workforce planning, training, reorganization, or revising policies to accommodate changing needs and priorities. Performing this function successfully during emergency requires existing HR policies to be up-to-date.		
Area of action impact	City staff		
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 2 ☐ Goal 3 ☐	Goal 4 ☐ Goal 5 ☒ Goal 6 ☐	Goal 7 ☐
Integration into other initiatives	State of Oregon NHMP		
Alignment with existing plans and policies	City of Hillsboro Comprehensive Plan, City of Hillsboro Emergency Operations Plan		
Mitigation Action Implementation Plan			
Priority	Low ☐	Medium ☒	High ☐
Lead position, office, department, or division responsible for implementation	Management Analyst (HR/Risk), policy stakeholder (depends on policy)		
Supporting Partners			
Internal Partners		**External Partners, Including Community Partners**	
All City Departments		N/A	

Potential Funding Sources			
Non-Federal Funding Sources		**Federal Funding Sources**	
General fund		HMGP	
Estimated Cost	$150,000		
Estimated Benefit			
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**	
Enhancement of City policies to serve and protect staffing during critical times	N/A	$900,000	
Project Timeline			
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**	
Short-term ☐ Mid-term ☒ Long-term ☒ Ongoing ☐	Spring 2023	Fall 2024	
Implementation Benchmarks: How Will Success Be Measured?			
• Development of policy and review of policies after they are implemented.			
Potential Challenges to Implementation			
• As the project unfolds, its scope of application may expand.			
Resources and References, if Applicable			
• Varies			
Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	**Review policy and create an inventory (no update)**	**$50,000**	
Alternative #2	**Partial review and update**	**$100,000**	
Alternative #3	**No action**	No cost	
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 178: City of Hillsboro Community Wildfire Protection Plan

Mitigation Action Information	
Title of action	City of Hillsboro Community Wildfire Protection Plan
Type of action	Plans/regulations ☒ Natural systems protection ☐ Structure and infrastructure project ☐ Public education/awareness ☐
Action description	Develop a Community Wildfire Protection Plan for the City of Hillsboro. The CWPP will also include actionable tasks that can be taken to reduce the impact of wildfires within the City and address the following: determining fuel hazards, assess risk of wildfire occurrence, identify homes, businesses, and essential infrastructure at risk, and fuel treatment prioritization. The planning project includes a Story Map that will create a highly functional, easy-to-use interface to tell the story of place and people's values in a way that illustrates data-rich science-based information. The Story Map will incorporate important baseline information and will be a place where residents can access project recommendations, interact with baseline mapping and risk assessment information, and seek real mitigation measures they can take in and around their properties. The Story Map will be designed to be accessible and easily navigable by the public and be available in English and Spanish.
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 plan will identify and quantify current and future risk, and it will provide actionable tasks that will aid in reducing or preventing wildfires or the spread of wildfires within the City's greenspaces and adjacent areas.
Area of action impact	Entire City
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	The CWS (National Cohesive Wildland Fire Management Strategy) aligns well with the goals of Healthy Forest Restoration Act and the origins of community fire planning: collaboration. By aligning the CWPP with the CWS, the city will benefit from seamless integration with fire policy at the state, regional, and federal levels. Also aligns with the following OEM NHMP goals: (1) Protect life and reduce injuries resulting from natural hazards. (2) Minimize property damage from natural hazards. (3) Minimize damage to critical or essential infrastructure and services from natural hazards. (5) Minimize project impacts to the environment

	and utilize natural solutions to protect people and property from natural hazards. (9) Minimize damage to historic and cultural resources from natural hazards. Aligns with Oregon Planning Goal 7.
Alignment with existing plans and policies	OEM NHMP 2020, City of Hillsboro Comprehensive Plan

Mitigation Action Implementation Plan			
Priority	Low ☐ Medium ☐ High ☒		
Lead position, office, department, or division responsible for implementation	Fire Chief		
Supporting Partners			
Internal Partners		**External Partners, Including Community Partners**	
Public Works, Parks, Floodplain Manager		Washington County	
Potential Funding Sources			
Non-Federal Funding Sources		**Federal Funding Sources**	
General fund		HMGP, HMGP-PF-FM, Community Wildfire Defense Grant	
Estimated Cost	$126,000		
Estimated Benefit			
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**	
Life safety and infrastructure and property protection		$756,000	
Project Timeline			
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**	
Short-term ☐ Mid-term ☒ Long-term ☐ Ongoing ☐	Summer 2023	Winter 2024	
Implementation Benchmarks: How Will Success Be Measured?			
Completion of milestones: • RFP and selection of contractor • Kick-off meeting • Workshops • Gathering data • Assess risk of occurrence/identify infrastructure at risk • Establish community base map • Develop risk assessment • Assess firefighting capabilities and wildfire readiness			

• Develop CWPP • Adopt CWPP • Develop Story Map and present to community
Potential Challenges to Implementation
• Funding, availability of qualified contractor
Resources and References, if Applicable
• Washington County CWPP

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	No action	0	
Alternative #2	CWPP with no Story Map	$106,000	Would lessen the benefit to the whole community if the Story Map were excluded.
Alternative #3	Full action	$126,000	

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 179: Public Education for Dam Failure

Mitigation Action Information			
Title of action	Public Education for Dam Failure		
Type of action	Plans/regulations ☐	Natural systems protection ☐	
	Structure and infrastructure project ☐	Public education/awareness ☒	
Action description	Publish informational materials on City website to provide information on Scoggins Dam and any potential downstream effects that would occur as a result of dam failure. Analyze current preparedness materials and presentations and update as needed.		
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 education to the public about Scoggins Dam and downstream effects of dam failure at that location.		
Area of action impact	Provides information to the City 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	State of Oregon NHMP		
Alignment with existing plans and policies	City of Hillsboro Comprehensive Plan		
Mitigation Action Implementation Plan			
Priority	Low ☒	Medium ☐	High ☐
Lead position, office, department, or division responsible for implementation	Fire – Emergency Management		

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
Water, Communications	Bureau of Reclamation, JWC
Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
General fund	HMGP
Estimated Cost	$5,000

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**
Provide information to the public to enhance awareness and preparedness		$30,000

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term ☒ Mid-term ☐ Long-term ☐ Ongoing ☐	Fall 2023	Fall 2024

Implementation Benchmarks: How Will Success Be Measured?

For website:
- Gathering of information
- Layout
- Web design
- Publishing

For other materials:
- Review materials and presentations
- Update as needed

Potential Challenges to Implementation

- Staff time

Resources and References, if Applicable

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1			
Alternative #2			
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 180: Analyze and Implement Fuel Reduction Strategies to Reduce the Risk and/or Spread of Wildfires Within the City of Hillsboro, Using Findings from the CWPP as a Guide

Mitigation Action Information			
Title of action	Analyze and Implement Fuel Reduction Strategies to Reduce the Risk and/or Spread of Wildfires Within the City of Hillsboro, Using Findings from the CWPP as a Guide		
Type of action	Plans/regulations ☐	Natural systems protection ☒	
	Structure and infrastructure project ☐	Public education/awareness ☐	
Action description	Hillsboro's Community Wildfire Protection Plan (CWPP) will include actionable tasks that can be taken to prevent or reduce the impact of wildfires within the City and address the following: determining fuel hazards; assessing risk of wildfire occurrence; identifying homes, businesses, and essential infrastructure at risk; and prioritizing fuel treatment. Using the CWPP as a guide, the City will analyze and implement fuel reduction strategies to reduce the risk and/or spread of wildfires within the City of Hillsboro.		
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 City will analyze and implement fuel reduction strategies to reduce the risk and/or spread of wildfire in greenspace and adjacent properties.		
Area of action impact	Entire City		
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	Aligns with the following OEM NHMP goals: (1) Protect life and reduce injuries resulting from natural hazards. (2) Minimize property damage from natural hazards. (3) Minimize damage to critical or essential infrastructure and services from natural hazards. (5) Minimize project impacts to the environment and utilize natural solutions to protect people and property from natural hazards. (9) Minimize damage to historic and cultural resources from natural hazards.		
Alignment with existing plans and policies	OEM NHMP 2020, City of Hillsboro Comprehensive Plan		
Mitigation Action Implementation Plan			
Priority	Low ☐	Medium ☐	High ☒

Lead position, office, department, or division responsible for implementation	Fire Chief

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
Public Works, Parks, Floodplain Manager	Washington County, ODF, ODFW

Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
General fund, Office of State Fire Marshal grants (Defensible Space Local Government Grant)	HMGP, HMGP-PF-FM, Community Wildfire Defense Grant

Estimated Cost	$10,000,000

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**
Life safety, infrastructure, and property protection		$60,000,000

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

Implementation Benchmarks: How Will Success Be Measured?

Potential Challenges to Implementation
• Funding, availability of staff and/or contractors

Resources and References, if Applicable
• Washington County CWPP

Three Alternatives Considered, Including No Action			
Alternative #1	**Action Description**	**Estimated Cost**	**Evaluation**
Alternative #2			
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 181: Create Plan to Expedite Translation of Emergency Messaging

Mitigation Action Information	
Title of action	Create Plan to Expedite Translation of Emergency Messaging
Type of action	Plans/regulations ☒ Natural systems protection ☐ Structure and infrastructure project ☐ Public education/awareness ☐
Action description	Create plan to expedite translation of emergency messaging and emergency public information for languages spoken by approximately 1,000 or more Limited English Proficiency (LEP) individuals in the City of Hillsboro, based on the current census. This plan may include but is not limited to the following: evaluation of current capabilities, identification of in-house resources, pre-scripting of messages, template creation, analysis of processes, creation of streamlined process for translation with checklists and/or flowcharts.
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?	Ensures timely emergency messaging and emergency public information is accessible to the whole community.
Area of action impact	Total population
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	State of Oregon NHMP
Alignment with existing plans and policies	City of Hillsboro Comprehensive Plan, City of Hillsboro Emergency Operations Plan
Mitigation Action Implementation Plan	
Priority	Low ☐ Medium ☒ High ☐
Lead position, office, department, or division responsible for implementation	Fire – Emergency Management

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
City Manager's Office – Communications, City Manager's Office – Diversity, Equity, and Inclusion Manager	Washington County EM, community partners
Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
General fund	HMGP
Estimated Cost	$20,000

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**
Ensures timely emergency messaging and emergency public information is accessible to the whole community.		$120,000

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

Implementation Benchmarks: How Will Success Be Measured?

- Evaluation of current capabilities
- Identification of in-house resources
- Evaluation of City contracts for translation services
- Analysis of processes
- Pre-scripting of messages and template creation
- Translation of pre-scripted messages and templates
- Creation of process with checklists and/or flowcharts, as needed

Potential Challenges to Implementation

- Staff time, resources

Resources and References, if Applicable

Three Alternatives Considered, Including No Action

	Action Description	Estimated Cost	Evaluation
Alternative #1			
Alternative #2			
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 182: Comprehensive Plan Implementation Measures

Mitigation Action Information			
Title of action	Comprehensive Plan Implementation Measures		
Type of action	Plans/regulations ☒	Natural systems protection ☒	
	Structure and infrastructure project ☐	Public education/awareness ☒	
Action description	The City Council adopted a major update to the Hillsboro Comprehensive Plan (HCP) that took effect in January 2018. Since then, Planning Division staff have been working through the implementation measures of this major update through amendments to the City's Community Development Code (CDC). One section within the HCP that still needs to be implemented is Section 9, Natural Hazards. This section identified policies and goals related to (1) minimizing the impacts of natural hazards on people and property, (2) providing information and services to support hazard preparation and recovery for people of all ages, abilities, cultures, and incomes, (3) improve coordination with public and private partners, (4) building capacity for greater urban resilience, and (5) managing and maintaining spatial, demographic, and economic data to support hazard mitigation planning.		
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?	With the support of a consultant, City staff would update and enhance ordinances and design standards to limit the impact of natural hazards on people and property by limiting/prohibiting future development in hazard areas, enhancing preservation of natural resources, and protecting cultural resources.		
Area of action impact	These amendments would have a City-wide impact with specific focus within the City's Regulatory Floodplain Overlay (RFO) and Significant Natural Resources Overlay (SNRO).		
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? The updated standards would impact the placement and design of critical facility(ies) within hazard areas.		
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	State of Oregon Statewide Land Use Planning Goals 5 and 7		
Alignment with existing plans and policies	This effort would create consistency between the City's long-term goals in policies in the HCP and implementation measures in the CDC.		

Mitigation Action Implementation Plan			
Priority	Low ☐ Medium ☒ High ☐		
Lead position, office, department, or division responsible for implementation	Planning Director, Planning Division, Community Development Department		
Supporting Partners			
Internal Partners		**External Partners, Including Community Partners**	
Staff from the City's Building Division, Emergency Management team, Fire & Rescue Department, Parks & Recreation Department, Public Works Department, Transportation Systems Division, and Water Department		Staff from Clean Water Services and Washington County	
Potential Funding Sources			
Non-Federal Funding Sources		**Federal Funding Sources**	
City general fund		FEMA Building Resilient Infrastructure and Communities Grant	
Estimated Cost	$150,000.00		
Estimated Benefit			
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**	
Carrying the community's vision on hazard preparation and mitigation into the land development code.	Having consistency among regulatory documents.	$900,000.00	
Project Timeline			
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**	
Short-term ☒ Mid-term ☐ Long-term ☐ Ongoing ☐	July 2023	February 2024	
Implementation Benchmarks: How Will Success Be Measured?			
• Stakeholder engagement (July to August 2023), staff report preparation (September to October 2023), Planning Commission initiation and public hearing (November to December 2023), and City Council readings (January to February 2024)			
Potential Challenges to Implementation			
• Staff resources related to other priorities			
Resources and References, if Applicable			

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Pushing start of effort back from July 2023 to January 2024	Same	This may be necessary to account for appropriate staff resources
Alternative #2			
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 183: Natural Resource Regulations Enhancements

Mitigation Action Information			
Title of action	Natural Resource Regulations Enhancements		
Type of action	Plans/regulations ☒	Natural systems protection ☒	
	Structure and infrastructure project ☐	Public education/awareness ☒	
Action description	The Community Development Code (CDC) that was adopted by the City Council and took effect in September 2014 included the City's Significant Natural Resource Overlay (SNRO) as well as tree preservation standards. Since that adoption, only minor amendments have been made to the SNRO and tree preservation standards. While implementing these regulatory provisions, Planning Division staff have identified the need to refine and enhance the SNRO regulations for consistency with Section 12 of the Hillsboro Comprehensive Plan (HCP), for ease of implementation and understanding, and to codify off-site mitigation opportunities. In addition, staff have identified a need to analyze current landscaping recommendations to ensure that species susceptible to drought, pests, and wildland fires are possibly removed from the recommendations.		
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?	With the support of a consultant, City staff would update and enhance the regulations related to the SNRO to ensure consistency with HCP goals and policies, codify current practices, and ensure that staff recommendations on future tree, shrub, and groundcover plantings are cognizant of changing environmental conditions.		
Area of action impact	These amendments would have a City-wide impact with specific focus within the City's SNRO.		
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	State of Oregon Statewide Land Use Planning Goals 5, 6, and 7		
Alignment with existing plans and policies	This effort would create consistency between the City's long-term goals in policies in the Hillsboro Comprehensive Plan (HCP) and implementation measures in the CDC.		

Mitigation Action Implementation Plan			
Priority	Low ☐ Medium ☒ High ☐		
Lead position, office, department, or division responsible for implementation	Senior Planner, Planning Division, Community Development Department		
Supporting Partners			
Internal Partners		**External Partners, Including Community Partners**	
Staff from the City's Emergency Management team, Fire & Rescue Department, and Parks & Recreation Department		Staff from Clean Water Services and Washington County	
Potential Funding Sources			
Non-Federal Funding Sources		**Federal Funding Sources**	
City general fund, State of Oregon Landscape Resiliency Program		Federal Wildland-Urban Interface (WUI) Grants	
Estimated Cost	$75,000.00		
Estimated Benefit			
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**	
Carrying the community's vision on hazard preparation and mitigation into the land development code.	Having consistency among regulatory documents.	$450,000.00	
Project Timeline			
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**	
Short-term ☐ Mid-term ☒ Long-term ☐ Ongoing ☐	January 2024	January 2026	
Implementation Benchmarks: How Will Success Be Measured?			
• Stakeholder engagement (January to December 2024), staff report preparation (January to June 2025), Planning Commission work sessions, initiation, and public hearing (July to November 2025), and City Council readings (December 2025 to January 2026)			
Potential Challenges to Implementation			
• Staff resources related to other priorities			
Resources and References, if Applicable			

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Pushing start of effort back from January 2024 to July 2024	Same	This may be necessary to account for appropriate staff resources
Alternative #2			
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 184: Regulatory Floodplain Overlay Enhancements

Mitigation Action Information			
Title of action	Regulatory Floodplain Overlay Enhancements		
Type of action	Plans/regulations ☒ Structure and infrastructure project ☐	Natural systems protection ☒ Public education/awareness ☒	
Action description	In 2016, the City adopted revised countywide November 4, 2016, FIRMs and Flood Insurance Study, which vastly increased the accuracy of Washington County's effective floodplain mapping and provided detailed hydraulic models for floodway project evaluation on all FEMA floodplains. This adoption process necessitated extensive public outreach and internal GIS data updates. In 2016, the City also began participating in the FEMA Region X/DLCD Endangered Species Act (ESA) Biological Opinion (BiOp) work groups, which provided input to state and federal agencies on how the BiOp could be implemented in Oregon more effectively and efficiently. During this period, the City continued implementing its Flood Damage Protection Ordinance, called the "Regulatory Floodplain Overlay" (RFO) within the City's Community Development Code (CDC). This Overlay resulted in 19 Floodplain Activity land use reviews since 2016, which were implemented through subsequent permits incorporating NFIP requirements for buildings in the flood fringe and floodplain land disturbance. After a recent staff transition in which a new City staff member attended the FEMA E0273 NFIP Floodplain Development Course, staff have identified a need to have a more robust response plan in place when overland flooding has impacted structure(s) within the City. Furthermore, City staff expects to need to refine the RFO regulations to implement the recommendations/requirements from the BiOp effort and provide any additional needed clarity on FEMA regulations.		
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?	With the support of a consultant, City staff would update and enhance the regulations related to the RFO to ensure that best practices on limiting the impact of flooding on people and property are reflected. Additionally, refinements would aim to reduce negative impacts from the NFIP on salmon, steelhead, and other species listed as threatened under the ESA.		
Area of action impact	These amendments would have a City-wide impact with specific focus within the City's Regulatory Floodplain Overlay (RFO).		
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 2 ☐ Goal 3 ☐	Goal 4 ☐ Goal 5 ☒ Goal 6 ☐	Goal 7 ☐
Integration into other initiatives	State of Oregon Statewide Land Use Planning Goals 5, 6, and 7		
Alignment with existing plans and policies	This effort would create consistency between the City's long-term goals in policies in the Hillsboro Comprehensive Plan (HCP) and implementation measures in the CDC.		
Mitigation Action Implementation Plan			
Priority	Low ☐	Medium ☒	High ☐
Lead position, office, department, or division responsible for implementation	Senior Planner, Planning Division, Community Development Department		
Supporting Partners			
Internal Partners		**External Partners, Including Community Partners**	
Staff from the City's Building Division and Emergency Management team		Staff from Clean Water Services and Washington County	
Potential Funding Sources			
Non-Federal Funding Sources		**Federal Funding Sources**	
City general fund		FEMA Flood Mitigation Assistance Grant	
Estimated Cost	$75,000.00		
Estimated Benefit			
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**	
Carrying the community's vision on hazard preparation and mitigation into the land development code.	Having consistency among regulatory documents.	$450,000.00	
Project Timeline			
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**	
Short-term ☐ Mid-term ☒ Long-term ☐ Ongoing ☐	January 2024	January 2026	
Implementation Benchmarks: How Will Success Be Measured?			
• BiOp work groups (TBD), stakeholder engagement (January to December 2024), staff report preparation (January to June 2025), Planning Commission work sessions, initiation, and public hearing (July to November 2025), and City Council readings (December 2025 to January 2026)			

Potential Challenges to Implementation			
• Staff resources related to other priorities			
Resources and References, if Applicable			
Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Pushing start of effort back from January 2024 to July 2024	Same	This may be necessary to account for appropriate staff resources
Alternative #2	Implement BiOp regulations without updating CDC	No cost	This could create confusion for staff and customers
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 185: Public Outreach Media Analysis and Expansion

Mitigation Action Information			
Title of action	Public Outreach Media Analysis and Expansion		
Type of action	Plans/regulations ☐	Natural systems protection ☐	
	Structure and infrastructure project ☐	Public education/awareness ☒	
Action description	Analyze current disaster preparedness videos for gaps in content and cultural appropriateness for our area. Expand video library for specific seismic, wind, snow, and/or flood safety tips and seismic retrofitting for single-family homes. Make all videos in English as well as in at least one other language.		
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?	Public outreach teaches people how to prepare their home for a natural disaster, make an emergency kit before a natural disaster, respond effectively during a natural disaster, and what to do after a natural disaster (i.e., seismic, wind, snow, and flood events). Proper training and understanding in these areas can save lives and reduce damage costs.		
Area of action impact	Citywide		
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	State of Oregon Mitigation Plan		
Alignment with existing plans and policies	City of Hillsboro Comprehensive Plan		
Mitigation Action Implementation Plan			
Priority	Low ☐	Medium ☐	High ☒
Lead position, office, department, or division responsible for implementation	Building Director for the Building Division of the Community Development Department		

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
Chief Plans Examiner, Communications Division, Diversity and Equity Director, and IS.	
Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
Building fund	HMGP and BRIC
Estimated Cost	$100,000

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**
Resiliency of the community		$600,000

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term ☐ Mid-term ☒ Long-term ☐ Ongoing ☐	January 1, 2024	January 1, 2026

Implementation Benchmarks: How Will Success Be Measured?

- Review of current video library. Make new videos. Make matching videos in second language. Make videos available on the city website.

Potential Challenges to Implementation

- Staff time and resources

Resources and References, if Applicable

- FEMA website

Three Alternatives Considered, Including No Action			
Alternative #1	**Action Description**	**Estimated Cost**	**Evaluation**
	Evaluate current gaps	$5,000	5%
Alternative #2	Make current videos in a second language	$50,000	50%
Alternative #3	Complete project as written	$100,000	100%

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 186: Residential Code Revision

Mitigation Action Information			
Title of action	Residential Code Revision		
Type of action	Plans/regulations ☒	Natural systems protection ☐	
	Structure and infrastructure project ☐	Public education/awareness ☐	
Action description	Purchase revised code books and associated standards. Analyze Oregon residential code revisions based on current model International Residential Code. Analyze outward customer handouts, forms, and web information for required revisions based on new code requirements. Analyze gaps in our permit system software. Revise handouts, forms, and web information accordingly. Revise permit system software as needed. Provide appropriate training for all plan review and inspection staff for implementation of these revisions. Implement revised code review and inspection accordingly on all new projects.		
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?	Revising codes to align with the most current International Residential Code makes single family dwellings more resilient to known natural disaster risks for our area (i.e., seismic, wind, snow, and flood events). This saves lives and reduces damage costs.		
Area of action impact	Citywide		
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	State of Oregon Mitigation Plan ORS 455		
Alignment with existing plans and policies	City of Hillsboro Comprehensive Plan		

Mitigation Action Implementation Plan			
Priority	Low ☐ Medium ☐ High ☒		
Lead position, office, department, or division responsible for implementation	Building Director for the Building Division of the Community Development Department		
Supporting Partners			
Internal Partners		**External Partners, Including Community Partners**	
Chief Plans Examiner, Community Development Director and IS		State Building Codes Division	
Potential Funding Sources			
Non-Federal Funding Sources		**Federal Funding Sources**	
Building fund		HMGP and BRIC	
Estimated Cost	$200,000		
Estimated Benefit			
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**	
Resiliency of the community		$1,200,000	
Project Timeline			
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**	
Short-term ☒ Mid-term ☐ Long-term ☐ Ongoing ☐	October 1, 2023	January 1, 2024	
Implementation Benchmarks: How Will Success Be Measured?			
• Review of code revisions to the ORS 455. Revised materials and software. Personnel trained appropriately. Effective implementation of revised codes.			
Potential Challenges to Implementation			
• Staff time and resources			
Resources and References, if Applicable			
• State Building Codes Division			

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Purchase books and implement revised codes	$20,000	10%
Alternative #2	Purchase books, train personnel, and implement revised codes	$150,000	75%

Alternative #3	Complete project as written	$200,000	100%
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 187: Emergency Fuel Reserve Development

Mitigation Action Information	
Title of action	Emergency Fuel Reserve Development
Type of action	Plans/regulations ☒ Natural systems protection ☐ Structure and infrastructure project ☒ Public education/awareness ☐
Action description	Evaluate existing state of fueling capacity for City (reference Emergency Fuel Reserves, Analysis and Business Case 2/7/2019) and identify gaps and potential solutions. Create a plan to identify funding and development strategy. Implement plan based on need and funding availability.
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?	Addresses emergency fueling capacity during events that compromise fuel delivery from established provider (Bretthauer Oil).
Area of action impact	Citywide
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? Supplement fueling necessary in delivery of critical, life safety response by Police, Fire, Public Works, Parks, and Water Departments
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	State of Oregon NHMP
Alignment with existing plans and policies	Emergency Fuel Reserves, Analysis and Business Case 2/7/2019; Hillsboro Comprehensive Plan; Washington County Emergency (Draft) Fuel Plan; City of Hillsboro EOP
Mitigation Action Implementation Plan	
Priority	Low ☐ Medium ☒ High ☐
Lead position, office, department, or division responsible for implementation	Public Works Department, Facilities Division Manager

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
Office of Innovation; Fire, Police, Water & Parks Depts.; Facilities & Fleet Division	DOE, contractors, DEQ, ODOT, Washington County, Bretthauer

Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
General Fund (TBD)	BRIC, HMGP, DOE Grants
Estimated Cost	$22,000,000

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**
Fueling capacity	Decreased response time	$132,000,000

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term ☐ Mid-term ☐ Long-term ☒ Ongoing ☐	Fiscal Year 2025/2026	Fiscal Year 2034/2035

Implementation Benchmarks: How Will Success Be Measured?

- Secure funding for evaluation
- Contractor hired
- Concept development completion 2025/2026
- Approval of concept
- Adoption by leadership and Council 2026/2027
- Funding approved to begin build
- If approved, infrastructure development begins 2027/2028
- Infrastructure development 50% complete
- Infrastructure development complete

Potential Challenges to Implementation

- Finance
- Availability of land

Resources and References, if Applicable

- Emergency Fuel Resources Analysis: Business Case Report 2/7/2019

Three Alternatives Considered, Including No Action			
Alternative #1	**Action Description**	**Estimated Cost**	**Evaluation**
	Analysis and Plan	$2,000,000	
Alternative #2	Analysis, Plan, and one location	$12,000,000	
Alternative #3	Analysis, Plan and two locations	$22,000,000	

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 188: Tertiary Power Solutions at City-Owned Critical Facilities

Mitigation Action Information	
Title of action	Tertiary Power Solutions at City-Owned Critical Facilities
Type of action	Plans/regulations ☒ Natural systems protection ☐ Structure and infrastructure project ☒ Public education/awareness ☐
Action description	Research and analyze alternate energy sources and alternate fuel sources to provide backup power in addition to current diesel generators at City-owned facilities. Develop a plan for implementation based on findings and feasibility. Implement plan based on funding availability.
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?	In the event the primary power source and diesel generator (or components) are compromised by a natural hazard, this would allow functionality at City-owned critical facilities.
Area of action impact	City-owned critical facilities
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? Fire and Police Stations, Water Operations, Public Works facilities, Civic 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	State of Oregon NHMP
Alignment with existing plans and policies	City of Hillsboro Comprehensive Plan, City of Hillsboro Emergency Operations Plan
Mitigation Action Implementation Plan	
Priority	Low ☒ Medium ☐ High ☐
Lead position, office, department, or division responsible for implementation	Public Works – Facilities Division

Supporting Partners	
Internal Partners	**External Partners, Including Community Partners**
Fire, Police, City Manager's Office, Building, Planning, Water	
Potential Funding Sources	
Non-Federal Funding Sources	**Federal Funding Sources**
General fund	HMGP, DOE Grants
Estimated Cost	Analysis and Plan – $250,000 Implementation – $10,000,000

Estimated Benefit		
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**
Ensures timely emergency messaging and emergency public information is accessible to the whole community.		Plan – $1,500,000 Implementation – $60,000,000

Project Timeline		
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**
Short-term ☐ Mid-term ☐ Long-term ☒ Ongoing ☐	2025	2035

Implementation Benchmarks: How Will Success Be Measured?

- Analyze current generator capabilities
- Analyze options for expansion of backup power systems
- Develop implementation plan
- Implement based on funding availability

Potential Challenges to Implementation

- Staff time, resources

Resources and References, if Applicable

Three Alternatives Considered, Including No Action			
	Action Description	**Estimated Cost**	**Evaluation**
Alternative #1	Analysis only	$125,000	
Alternative #2	Analysis and Plan	$125,000	
Alternative #3	Implementation	$10,000,000	

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 189: Seismic Analysis for Sanitary Sewer Conveyance

Mitigation Action Information	
Title of action	Seismic Analysis for Sanitary Sewer Conveyance
Type of action	Plans/regulations ☐ Natural systems protection ☒ Structure and infrastructure project ☒ Public education/awareness ☐
Action description	This mitigation action proposes a seismic engineering analysis that will assist the City in prioritizing capital projects to upgrade the sanitary sewer system. Planned retrofits will create a sanitary sewer system that is more resilient to earthquakes.
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?	Oregon has the potential for a 9.0+ magnitude earthquake caused by the Cascadia Subduction Zone. Currently, scientists are predicting that there is about a 37% chance that a megathrust earthquake of 7.1+ magnitude in this fault zone will occur in the next 50 years. With the current preparedness levels in Oregon, we can anticipate being without services and assistance for at least 2 weeks when the Cascadia Subduction Zone earthquake occurs. Sanitary sewer system components constructed with older, brittle materials like concrete are likely to collapse during an earthquake. By analyzing the current state and planning upgrades to our sanitary sewer system, we can be more prepared and improve emergency response in the event of an earthquake.
Area of action impact	If the City of Hillsboro were affected by an earthquake, the entire sanitary sewer system would be impacted. Older parts of the conveyance system, or sewer infrastructure constructed of brittle materials like concrete, are more likely to be destroyed.
Is the action related to a critical facility or facilities?	Yes ☒ No ☐ If yes, what facility(ies)? Sanitary Sewer Conveyance
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 analysis can be included as a part of a current City of Hillsboro Sanitary Sewer Master Planning effort. State of Oregon NHMP.
Alignment with existing plans and policies	This mitigation action item will provide City of Hillsboro Public Works with data that will assist with the local initiative to prioritize and implement capital projects. Additionally, this analysis can provide insight to help guide future City of Hillsboro design and construction standards. This effort could be aligned with requiring more sustainable materials for use in public infrastructure. By avoiding materials such as concrete, the City of Hillsboro could be built using materials that require less greenhouse gases and other resource-intensive assets. City of Hillsboro Comprehensive Plan.

Mitigation Action Implementation Plan			
Priority	Low ☐ Medium ☒ High ☐		
Lead position, office, department, or division responsible for implementation	Storm and Sanitary Sewer Division Manager Public Works Director		
Supporting Partners			
Internal Partners		**External Partners, Including Community Partners**	
Storm and Sanitary Division, Economic Development Division		Clean Water Services	
Potential Funding Sources			
Non-Federal Funding Sources		**Federal Funding Sources**	
Sanitary Sewer Operating Fund, Sanitary Sewer Local Service Fee		FEMA Hazard Mitigation Grant Program FEMA Hazard Mitigation Assistance Grants (BRIC) – Building Resilient Infrastructure and Communities	
Estimated Cost	$1,000,000		
Estimated Benefit			
Primary Benefit(s)	**Secondary Benefit(s)**	**Financial Benefit(s)**	
Protection of human life and safety, sanitation	Improved earthquake response and return to services	$6,000,000	
Project Timeline			
Expected Timeline for Completion	**Potential Start Date**	**Potential Completion Date**	
Short-term ☐ Mid-term ☐ Long-term ☒ Ongoing ☐	Start of Fiscal Year 2024	Ongoing Program	
Implementation Benchmarks: How Will Success Be Measured?			
• Complete engineering analysis of current state and potential changes to sanitary sewer system design and construction standards. • Create prioritized list of upgrade/retrofit projects to public sanitary sewer system. • Implement prioritized projects list.			
Potential Challenges to Implementation			
• Potential challenges to implementation include upgrades and retrofits to sanitary sewer systems located in sensitive natural areas and traffic control in areas where projects are located in streets.			
Resources and References, if Applicable			

Three Alternatives Considered, Including No Action			
Alternative #1	**Action Description**	**Estimated Cost**	**Evaluation**
Alternative #2			
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?	