

City of Oregon City Addendum to the Clackamas County Multi-Jurisdictional Natural Hazard Mitigation Plan



Photo Credit: City of Oregon City

Effective:

September 12, 2024 – September 11, 2029

Prepared for
The City of Oregon City

Updated:
July 17, 2024, (Resolution # 24-22)
September 4, 2019, (Resolution # 19-30)
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September 2, 2009



This Natural Hazard Mitigation Plan was prepared by:



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Table of Content

PURPOSE	1
NHMP PROCESS, PARTICIPATION AND ADOPTION	1
<i>Convener</i>	1
NHMP IMPLEMENTATION AND MAINTENANCE	2
<i>Implementation through Existing Programs</i>	2
CAPABILITY ASSESSMENT	3
<i>Existing Authorities</i>	3
<i>Land Use Regulations</i>	4
<i>Policies and Programs</i>	5
<i>Personnel</i>	7
<i>Capital Projects</i>	7
<i>Capital Resources</i>	8
<i>Findings</i>	9
MITIGATION PLAN MISSION	9
MITIGATION PLAN GOALS	10
MITIGATION STRATEGY	11
<i>Mitigation Successes</i>	8
RISK ASSESSMENT	15
<i>Hazard Analysis</i>	15
<i>Community Characteristics</i>	16
<i>Community Lifelines</i>	20
<i>Hazard Characteristics</i>	24
ATTACHMENT A: ACTION ITEM CHANGES	43
ATTACHMENT B: PUBLIC INVOLVEMENT SUMMARY	44

List of Tables

TABLE OC-1 ACTION ITEMS.....	12
TABLE OC-2 HAZARD ANALYSIS MATRIX.....	16
TABLE OC-3 COMMUNITY CHARACTERISTICS	19
TABLE OC-4 CRITICAL FACILITIES IN OREGON CITY	20
TABLE OC-5 RAPID VISUAL SURVEY SCORES	28
TABLE OC-6 EXPECTED DAMAGES AND CASUALTIES FOR THE CSZ FAULT AND PORTLAND HILLS FAULT: EARTHQUAKE, SOIL MOISTURE, AND EVENT TIME SCENARIOS.....	30
TABLE OC-7: COMMUNITY REPETITIVE LOSS PROPERTIES.....	33
TABLE OC-8 STATUS OF ALL HAZARD MITIGATION ACTIONS IN THE PREVIOUS PLAN	43

List of Figures

FIGURE OC-1: UNDERSTANDING RISK	15
FIGURE OC-2 CASCADIA SUBDUCTION ZONE EXPECTED SHAKING	25
FIGURE OC-3 ACTIVE CRUSTAL FAULTS, EPICENTERS (1971-2008), AND SOFT SOILS.....	27
FIGURE OC-4 FEMA FLOOD ZONES	32
FIGURE OC-5 LANDSLIDE SUSCEPTIBILITY EXPOSURE	35
FIGURE OC-6 WILDFIRE RISK.....	41



FEMA

September 12, 2024

Tootie Smith, Chair
Clackamas County
2051 Kaen Road
Oregon City, Oregon, 97045

Reference: Approval of the Clackamas County Multi-jurisdictional Hazard Mitigation Plan

Dear Chair Smith:

In accordance with applicable¹ laws, regulations, and policy, the United States Department of Homeland Security's Federal Emergency Management Agency (FEMA) Region 10 has approved the Clackamas County multi-jurisdictional hazard mitigation plan for the following jurisdictions:

Clackamas County	City of Canby	City of Estacada
City of Gladstone	City of Happy Valley	City of Lake Oswego
City of Milwaukie	City of Molalla	City of Oregon City
City of Sandy	City of West Linn	City of Wilsonville
Clackamas Fire District #1	Clackamas River Water	Colton Water District
Oak Lodge Water Services		

The approval period for this plan is from September 12, 2024 through September 11, 2029.

An approved hazard mitigation plan is one of the conditions for applying for and receiving FEMA mitigation grants from the following programs:

- Hazard Mitigation Grant Program (HMGP)
- Hazard Mitigation Grant Program Post-Fire (HMGP-PF)
- Building Resilient Infrastructure and Communities (BRIC)
- Flood Mitigation Assistance (FMA)
- High Hazard Potential Dams Grants Program (HHPD)

Based on FEMA's review, the plan did not include all dam risk. Thus, the participating jurisdictions are not eligible for assistance from the HHPD Grant Program. If any participating jurisdictions with HHPDs are interested in this assistance, they should contact the FEMA Region 10 Hazard Mitigation Planning Team at FEMA-R10-MT_Planning@fema.dhs.gov, to learn more about how to include all dam risks in the plan.

¹ Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended; the National Flood Insurance Act of 1968, as amended; and National Dam Safety Program Act, as amended; Title 44 Code of Federal Regulations (CFR) Part 201, Mitigation Planning; and Local Mitigation Planning Policy Guide (FP-206-21-0002).

Chair Smith
September 12, 2024
Page 2

Having an approved hazard mitigation plan does not mean that mitigation grant funding will be awarded. Specific application and eligibility requirements for the programs listed above can be found in each FEMA grant program's respective policies and annual Notice of Funding Opportunities, as applicable.

To avoid a lapsed plan, the next plan update must be approved before the end of the approval period, including adoption by the participating jurisdiction(s). Before the end of the approval period, please allow sufficient time to secure funding for the update, including the review and approval process. Please include time for any revisions, if needed, and for participating jurisdictions to formally adopt the plan after the review, if not adopted prior to submission. This will enable each jurisdiction to remain eligible to apply for and receive funding from FEMA's mitigation grant programs with a hazard mitigation plan requirement. Local governments, including special districts, with a plan status of "Approvable Pending Adoption" are not eligible for FEMA's mitigation grant programs with a hazard mitigation plan requirement.

If you have questions regarding your plan's approval or FEMA's mitigation program, please contact Joseph Murray, Mitigation Planner at (503) 378-2911 or joseph.murray@oem.oregon.gov, who coordinates these efforts for local entities.

Sincerely,

Wendy Shaw, P.E.
Risk Analysis Branch Chief

Enclosures

cc: Stephen Richardson, Oregon Department of Emergency Management
Joseph Murray, Oregon Department of Emergency Management

JF:JG:WS

RESOLUTION NO. 24-22

A RESOLUTION adopting the City of Oregon City Representation in the Updates to the Clackamas County Multi-Jurisdictional Natural Hazards Mitigation Plan

WHEREAS, the City of Oregon City recognizes the threat that natural hazards pose to people, property and Infrastructure within our community; and

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

WHEREAS, an adopted Natural Hazards Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

WHEREAS, the City of Oregon City has fully participated in the FEMA prescribed mitigation planning process to prepare the Clackamas County, Multi-Jurisdictional Natural Hazards Mitigation Plan, which has established a comprehensive, coordinated planning process to eliminate or minimize these vulnerabilities; and

WHEREAS, the City of Oregon City has identified natural hazard risks and prioritized a number of proposed actions and programs needed to mitigate the vulnerabilities of the City of Oregon City to the impacts of future disasters within the Clackamas County, Multi-Jurisdictional Natural Hazards Mitigation Plan; and

WHEREAS, these proposed projects and programs have been incorporated into the Clackamas County, Multi-Jurisdictional Natural Hazards Mitigation Plan that has been prepared and promulgated for consideration and implementation by the participating cities and special districts of Clackamas County; and

WHEREAS, the Oregon Department of Emergency Management and Federal Emergency Management Agency, Region X officials have reviewed the Clackamas County, Multi-Jurisdictional Natural Hazards Mitigation Plan and pre-approved it (dated, May 29, 2024) contingent upon this official adoption of the participating governments and entities; and

WHEREAS, the NHMP is comprised of three volumes: Volume I -Basic Plan, Volume II – Jurisdiction Addenda, and Volume III – Appendices, collectively referred to herein as the NHMP; and

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


NOW, THEREFORE, OREGON CITY RESOLVES AS FOLLOWS:

1. The City of Oregon City adopts the *Clackamas County Multi-Jurisdictional Natural Hazards Mitigation Plan* (NHMP) as its official plan along with the *Oregon City Addendum to the NHMP* and directs the City Manager to develop, approve, and implement the mitigation strategies and any administrative changes to the NHMP.
2. The City of Oregon City will submit this Adoption Resolution to the Oregon Department of Emergency Management and Federal Emergency Management Agency, Region X officials to enable final approval of the Clackamas County Multi-Jurisdictional Natural Hazards Mitigation Plan.
3. This resolution shall take effect immediately upon its adoption by the City Commission.

Approved and adopted at a regular meeting of the City Commission held on the 17th day of July 2024.


DENYSE C. MCGRIFF
Mayor

Attested to this 17th day of July 2024:


Jakob Wiley, City Recorder

Approved as to legal sufficiency:


City Attorney

Purpose

This is an update of the Oregon City addendum to the Clackamas County Multi-Jurisdictional Natural Hazard Mitigation Plan (NHMP). This addendum supplements information contained in Volume I (Basic Plan) which serves as the NHMP foundation and Volume III (Appendices) which provide additional information. This addendum meets the following requirements:

- Multi-Jurisdictional **Plan Adoption** §201.6(c)(5),
- Multi-Jurisdictional **Participation** §201.6(a)(3),
- Multi-Jurisdictional **Mitigation Strategy** §201.6(c)(3)(iv) and
- Multi-Jurisdictional **Risk Assessment** §201.6(c)(2)(iii).

Updates to Oregon City’s addendum are further discussed throughout the NHMP and within Volume III, Appendix B, which provides an overview of alterations to the document that took place during the update process.

Oregon City adopted their addendum to the Clackamas County Multi-jurisdictional NHMP on July 17, 2024. FEMA Region X approved the Clackamas County NHMP and the City’s addendum on September 12, 2024. With approval of this NHMP the City is now eligible to apply for the Robert T. Stafford Disaster Relief and Emergency Assistance Act’s hazard mitigation project grants through September 11, 2029.

NHMP Process, Participation and Adoption

This section of the NHMP addendum addresses 44 CFR 201.6(c)(5), *Plan Adoption*, and 44 CFR 201.6(a)(3), *Participation*.

In addition to establishing a comprehensive community-level mitigation strategy, the Disaster Mitigation Act of 2000 (DMA2K), and the regulations contained in 44 CFR 201, require that jurisdictions maintain an approved NHMP to receive federal funds for mitigation projects. Local adoption, and federal approval of this NHMP ensures that the city will remain eligible for pre- and post-disaster mitigation project grants.

The Oregon Partnership for Disaster Resilience (OPDR) at the University of Oregon’s Institute for Policy Research, and Engagement (IPRE) collaborated with the Oregon Office of Emergency Management (OEM), Clackamas County, and Oregon City to update their NHMP.

The Clackamas County NHMP, and Oregon City addendum, are the result of a collaborative effort between citizens, public agencies, non-profit organizations, the private sector, and regional organizations. The Oregon City HMAC guided the process of developing the NHMP.

Convener

The Oregon City’s Public Works Director serves as the NHMP addendum convener. The convener of the NHMP will take the lead in implementing, maintaining, and updating the addendum to the Clackamas County NHMP in collaboration with the designated convener of the Clackamas County NHMP (Clackamas County Resilience Coordinator).

Representatives from the City of Oregon City HMAC met formally and informally, to discuss updates to their addendum (Volume III, Appendix B). The HMAC reviewed and revised the City’s addendum, with focus on the NHMP’s risk assessment and mitigation strategy (action items).

This addendum reflects decisions made at the designated meetings and during subsequent work and communication with the Clackamas County Resilience Coordinator, and the OPDR. The changes are highlighted with more detail throughout this document and within Volume III, Appendix B. Other documented changes include a revision of the City’s risk assessment and hazard identification sections, NHMP mission and goals, action items, and community profile.

The Oregon City HMAC was comprised of the following representatives:

- Convener, John Lewis, Public Works Director
- Vance Walker, Assistant Public Works Director
- Audrey Meeker, Senior Administrative Assistant

The HMAC served as the local review body for the NHMP update.

NHMP Implementation and Maintenance

The City Commission will be responsible for adopting the Oregon City addendum to the Clackamas County NHMP. This addendum designates a HMAC and a convener to oversee the development and implementation of action items. Because the City addendum is part of the County’s multi-jurisdictional NHMP, the City will look for opportunities to partner with the County. The City’s HMAC will convene after re-adoption of the Oregon City NHMP addendum on an annual schedule. The County is meeting on a semi-annual basis and will provide opportunities for the cities to report on NHMP implementation and maintenance during their meetings. The convener will serve as the conveners and will be responsible for assembling the HMAC. The HMAC will be responsible for:

- Reviewing existing action items to determine suitability of funding;
- Reviewing existing and new risk assessment data to identify issues that may not have been identified at NHMP creation;
- Educating and training new HMAC members on the NHMP and mitigation actions in general;
- Assisting in the development of funding proposals for priority action items;
- Discussing methods for continued public involvement;
- Evaluating effectiveness of the NHMP at achieving its purpose and goals (use Table 26, Volume I, Section 4, as one tool to help measure effectiveness); and
- Documenting successes and lessons learned during the year.

The HMAC will be responsible for the following activities described in detail in Volume I, Section 4:

The jurisdiction will utilize the same implementation and maintenance process identified in Volume I, Section 4.

The jurisdiction will provide continued public participation during the plan maintenance process through periodic presentations to elected officials, public meetings, postings on social media, and/or through interactive content on the jurisdiction’s website (for more information see Volume I, Section 4).

The jurisdiction will utilize the same action item prioritization process as the County (for more information see Volume I, Section 4 and Volume III, Appendix E).

Implementation through Existing Programs

This NHMP is strategic and non-regulatory in nature, meaning that it does not necessarily set forth any new policy. It does, however, provide: (1) a foundation for coordination and collaboration among

agencies and the public in the city; (2) identification and prioritization of future mitigation activities; and (3) aid in meeting federal planning requirements and qualifying for assistance programs. The mitigation plan works in conjunction with other city plans and programs including the Comprehensive Land Use Plan, Capital Improvements Plan, and Building Codes, as well as the Clackamas County NHMP, and the State of Oregon NHMP.

The mitigation actions described herein (and in Attachment A) are intended to be implemented through existing plans and programs within the city. Plans and policies already in existence have support from residents, businesses, and policy makers. Where possible, Oregon City will implement the NHMP's recommended actions through existing plans and policies. Many land-use, comprehensive and strategic plans get updated regularly, allowing them to adapt to changing conditions and needs. Implementing the NHMP's action items through such plans and policies increases their likelihood of being supported and implemented. Implementation opportunities are further defined in action items when applicable.

Capability Assessment

The Capability Assessment identifies and describes the ability of the City of Oregon City to implement the mitigation strategy and associated action items. Capabilities can be evaluated through an examination of broad categories, including: existing authorities, policies, programs, funding, and resources. As applicable the 2019 NHMP was integrated into these authorities/documents over the last five years (e.g., land use regulations, water system master plan, capital improvement plan, etc.).

Existing Authorities

Hazard mitigation can be executed at a local scale through three (3) methods: integrating hazard mitigation actions into other local planning documents (i.e., plan integration), adopting building codes that account for best practices in structural hardening, and codifying land use regulations and zoning designations that prescribe mitigation into development requirements. The extent to which a municipality or multi-jurisdictional effort leverages these approaches is an indicator of that community's capabilities.

Comprehensive Plan

Oregon's Statewide Planning Goal 7 requires comprehensive planning within every jurisdiction that is designed to reduce risks to people and property from natural hazards.

Oregon City addresses Statewide Planning Goal 7 Natural Hazards as part of their Comprehensive Plan. Adoption of the revised Oregon City 2040 (OC2040) Comprehensive Plan is underway. Goal 4, Protected Environment, covers Statewide Planning Goal 7, Natural Hazards. It integrates the hazard analysis and findings of the 2019 Natural Hazards Mitigation Plan. Goal 3 for Protected Environments states that the City will "ensure the safety of residents and property by supporting plans, programs, and investments that minimize the impacts of future natural hazard events and aid in rapid response and recovery." Strategy 2A further states that the City will "protect existing development from natural hazards through mitigation measures identified in the Clackamas County Hazard Mitigation Plan."

Planned updates to the jurisdiction's Goal 7 element or its broader comprehensive plan will reflect the data and findings within this NHMP and integrate analyses of future climate and natural hazard impacts into the community's long-range plans.

Land Use Regulations

Existing land use policies that define zoning and address hazardous conditions provide another source of mitigation capability.

Oregon City has undertaken the updating of a number of sections of their Municipal Code to directly address recommendations found within the 2019 Natural Hazards Mitigation Plan, including:

- Oregon City Municipal Code Section 17.42 – Floodplain was amended August 17, 2022.
- Oregon City Municipal Code Section 17.44 – Geologic Hazards was amended July 21, 2021.
- Oregon City Municipal Code Section 17.44 – Natural Resource Overlay District was amended July 3, 2019.
- https://library.municode.com/or/oregon_city/codes/municipal_code
- Stormwater and Grading Design Standards were amended March 2020.
- <https://www.orcity.org/DocumentCenter/View/3530/Stormwater-and-Grading-Design-Standards-PDF>

The Oregon City Community Development Department is the oversight entity for all matters related to long range planning, development review, and code enforcement.

The Planning Department, which is part of Community Development, is responsible for the administration of state, county, and local land use policies and regulations as they relate to the preservation and quality development of property lying within the city limits and urban growth boundary (UGB). The Planning Department assists the City Commission and community by developing the policies and regulations that guide development and ensures that developments are planned according to zoning codes and statewide land use laws. The Planning Department is responsible for comprehensive and neighborhood planning, environmental planning (including geologic hazard review, floodplain review, and natural resources overlay verification and reviews), and growth and development analysis and procedures. Planning works closely with Building, Engineering, and Fire in the review of development applications and building permits. They work closely with the County and neighboring jurisdictions to ensure plans are aligned.

Structural Building Codes

The Oregon Legislature recently adopted updated building codes for both residential (2023 adoption) and commercial structures (2022) since the last update of this Plan. These building codes are based on the 2021 version of the International Building Code, International Fire Code, and International Existing Building Code.

The Oregon City Building Department, which is part of the Community Development Department, administers and enforces the following codes:

- Oregon Structural Specialty Code – October 1, 2022
- Oregon Residential Specialty Code – October 1, 2023
- Oregon Mechanical Specialty Code – October 1, 2022
- Oregon Electrical Specialty Code – October 1, 2023
- Oregon Plumbing Specialty Code – October 1, 2023
- Oregon Energy Efficiency Specialty Code – April 1, 2021
- Oregon Manufactured Dwelling Installation Specialty Code – April 1, 2010
- Oregon Manufactured Dwelling and Parks Specialty Code – April 1, 2005

The Oregon Fire Code is not adopted through the Building Codes Division; it is adopted through the Oregon State Fire Marshal and was adopted October 1, 2022.

Through the continued updating and administration of these codes, new residential and commercial structures and repaired or new infrastructure will be required to build according to the latest seismic and wind hardening standards in addition to using fire resistant building materials for those structures constructed in proximity or within the WUI.

Public Works

The City of Oregon City Public Works Department is responsible for the delivery of safe and reliable sewer, storm water, transportation (streets), and potable water systems to city residents. They are also responsible for maintaining sustainable public infrastructure and protecting public health and safety, water quality, and natural resources within the jurisdiction. Much of their work is associated with the reduction of hazards to the community and the implementation of resilience measures.

City Administration

The City Commission of Oregon City has the responsibility of developing and adopting the annual city budget. Integrating hazard mitigation goals and projects into the annual budget is key to implementing the plan. The City Commission tries to broadly address resilience planning needs while it determines city and departmental priorities and looks for multiple-impact projects wherever possible. They also work with staff to apply for federal and state grant funding to pursue larger projects that are outside of general fund capacity.

Policies and Programs

This Plan directs Oregon City and Clackamas County to explore integration into other planning documents and processes. Oregon City has made significant progress in integrating the NHMP into its portfolio of planning processes and programs over the last five years.

Emergency Operations Plan

The City's Emergency Operations Plan was updated within the last five years. It leans upon the hazard assessment found in the 2019 NHMP for identification of likely areas of concern and for the development of evacuation planning scenarios.

Water Master Plan 2021

This plan establishes the capital improvement plan for the city's water system through 2040, including many projects that will enhance the community's resilience to drought, extreme heat, earthquakes, flooding, etc.

Stormwater Master Plan 2020

The City adopted a new Stormwater Master Plan, with new Stormwater and Grading Design Standards, in 2020. This plan provides the background for capital improvement planning for the next five years, and implements the requirements of the City's Municipal Separate Storm Sewer System (MS4) permit (reissued in 2021). The permit program has six areas of focus that are consistent with EPA's Federal Clean Water Act: public education, public involvement, illicit discharge detection and elimination, construction, post-construction and municipal operations.

TMDL Plan

The City also maintains a Total Maximum Daily Load (TMDL) Plan (updated in December 2023). The Total Maximum Daily Load (TMDL) program includes many of the same requirements as the MS4 program, but also incorporates measures that stabilize stream temperatures. The affected watersheds within the City's

jurisdiction include the Clackamas River and Middle Willamette subbasins of the Willamette River Basin. The NHMP actions are incorporated into this document as appropriate. Example projects include implementation of illicit discharge elimination programs, implementation of erosion control ordinance, review and updating of stormwater standards, public outreach and master planning and implementation of capital projects for stormwater quality enhancement.

Community Wildfire Protection Plan

The Clackamas County Community Wildfire Protection Plan (CWPP) will be incorporated into this Plan as a functioning annex. The NHMP will also be integrated into the City's Capital Improvement Plan, to be adopted by early 2024.

National Flood Insurance Program & Community Rating System

The City of Oregon City participates in the National Flood Insurance Program (NFIP), which makes flood insurance available to everyone. The community information is as follows:

- Name of Community: City of Oregon City
- Community ID No: 410021
- Current Flood Insurance Rate Map (FIRM) Date: June 17, 2008
- FIRM Effective Date: February 15, 1980

Oregon City has floodplain regulations that apply to development within the Flood Management Overlay District (Chapter 17.42 of the [Oregon City Municipal Code](#)). Their flood prevention code section is based on the Oregon Model Flood Hazard Prevention code, which includes provisions addressing substantial improvement/substantial damage.

Compliance with floodplain development regulations is reviewed through the land use review and building permitting process, with review responsibility by the Planning, Public Works Engineering and Building Divisions. The city's Floodplain Administrator is the [City Building Official](#).

Specifically, the Building Official:

- maintains and administers Oregon City's floodplain regulations;
- reviews and issues floodplain development permits;
- maintains elevation certificates for all new and substantially improved structures (and maintains an extensive database of historic elevation certificates);
- ensures that encroachments do not occur within the regulated floodway;
- implements measures to ensure that new and substantially improved structures are protected from flood losses;
- maintains floodplain studies and maps and makes this information available to the public;
- maintains a flood information website with digital flood insurance rate map (DFIRM) data;
- conducts site visits to assess conditions and provide technical assistance to the public;
- maintains a library of historical flood related information;
- informs the public of flood insurance requirements; and
- conducts outreach and training about flood hazards and development within the floodplain.

In 2023, Oregon City had 24 active flood insurance policies in place in Oregon City. Of those policies, 14 were in the 100 year floodplain, and 10 were not in other zones. There are 117 buildings which exist within the floodplain. The Special Flood Hazard Area contains 530.88 acres.

The City has adopted [FEMA and 100-year floodplain maps](#). Property owners can view the floodplain layers on [OCWebMap](#). OCWebMap shows the extent of the 1996 flood inundation, the FEMA 2008 100-Year floodplain, the FEMA 2008 500-year floodplain, the FEMA 2008 floodway, and the FEMA 2008 Base Flood Elevation.

The City makes continual efforts to reduce flood damage potential, which reduces insurance rates through participation in the Community Rating System (CRS). The CRS program was created by the [Federal Emergency Management Agency \(FEMA\)](#) in an effort to improve public safety, prevent property damage, and protect the natural floodplain environment. Communities that participate in this program agree to manage flood hazard areas by adopting minimum regulatory standards. The City's ability to maintain a Class 6 CRS certification saves policy holders in the 100-year floodplain an average of \$745 per year.

Personnel

The following Oregon City personnel have assignments related to natural hazard mitigation planning and implementation:

Emergency Management: Police Chief, Shaun Davis

Public Information Officer: Community Communications Manager, Jarrod Lyman

Floodplain Manager: Jim Sayers, Building Official

Grant writing (for Public Works or emergency management): Public Works, Dayna Webb, City Engineer.

Capital improvement planning: Public Works Director, John Lewis.

Capital improvement execution: Public Works Director, John Lewis

Oregon City does not have any employees solely designated to Emergency Management or Mitigation. These personnel integrate hazards and resilience planning into their greater work programs to the best of their abilities. However, there is limited capacity to expand upon their capabilities or workloads.

Capital Projects

Oregon City has implemented recommendations from the last NHMP into its capital improvement projects over the last 5 years, including:

The following mitigation-related or resilience projects have been completed since 2018:

- Newell Canyon Stormwater Outfall Assessment – Determining conditions of existing outfalls
- Beemer Way Outfall – Rehabilitation of a stormwater outfall (2023)
- Permitting of Private Development – Forest Edge Apartments – Implemented monitoring well and water reduction system
- Inflow/Infiltration Program (several projects) – These prevent stormwater from getting into sanitary system overwhelming the sewage treatment plant. Some included storm disconnections.
- Trillium Drive Restoration – Removed failing road and house from landslide area and restabilized ground to prevent future failure. Now pedestrian path connects ends of Trillium Park Drive
- Henrici Reservoir Rehabilitation Project (2023) -- structural improvements to withstand earthquakes
- I-205 Abernethy Bridge seismic upgrades and widening (2022-2026) (ODOT)

- Clackamette Park Master Plan (2023) including relocating RV park out of the floodplain
- 10.5 million-gallon Mountainview drinking water reservoir (seismic upgrades)
- Numerous buildings at Clackamas Community College
- New building - Oregon City High School
- New water lines with flexible couplings at the joints were installed near the Newell Creek Apartments
- New fire station: Clackamas Fire Station 16, Category 4 seismic
- New Public Works Building, Category 4 seismic, 13895 Fir St
- New Police Facility, Category 4 seismic, 1234 Linn Ave

In addition, a \$158 million bond was passed in 2018 to improve security, address overcrowding, and finance and construction including the replacement of Gardiner Middle School and renovation of Tumwata Middle School. The school district also received a \$25,000 Seismic Assessment Grant from the Oregon Department of Education’s Office of School Facilities Technical Assistance Program for seismic assessments at Barclay School, Eastham Community Center, and Park Place School.¹

Ongoing projects that enhance the City’s resilience include:

- Wastewater Treatment Plant Upgrade
- Undergrounding of all new utilities

Mitigation Successes

The community has several examples of mitigation success including the following projects funded through FEMA [Hazard Mitigation Assistance](#) and the Oregon Infrastructure Finance Authority’s [Seismic Rehabilitation Grant Program](#)².

- 2004: PDMC-PJ-10-OR-2003-002 - Mountainview Reservoir Seismic Retrofit
- 2001: HMGP-DR-1099-033 – Acquisition of Structures (\$) – 5 structures near Abernathy and Washington

Seismic Rehabilitation Grant Program Mitigation Successes

- 2021: Clackamas Community College’s Jackson Prep Building B (\$2,457,412)
- 2017: Clackamas Community College’s Randall Hall (\$1,500,000).
- 2013-2014: Clackamas Fire District’s Hilltop Fire Station #16 (\$483,062)

Other Mitigation Successes (projects listed identified in previous plan)

- Carnegie Center, Clackamas Fire Station #15 (John Adams, ca. 1998),
- 10.5 million-gallon Mountainview drinking water reservoir,
- numerous buildings at Clackamas Community College
- New building - Oregon City High School
- new water lines with flexible couplings at the joints were installed near the Newell Creek Apartments.

² The Seismic Rehabilitation Grant Program (SRGP) is a state of Oregon competitive grant program that provides funding for the seismic rehabilitation of critical public buildings, particularly public schools, and emergency services facilities.

- A \$158 million bond was passed in 2018 to improve security, address overcrowding, and finance and construction including the replacement of Gardiner Middle School and renovation of Ogden Middle School.
- The school district received a \$25,000 Seismic Assessment Grant from the Oregon Department of Education’s Office of School Facilities Technical Assistance Program for seismic assessments at Barclay School, Eastham Community Center and Park Place School.
- New fire station, Clackamas Fire District #1, Station 16 (Hilltop)
- Seismic upgrades to Henrici Reservoir
- Police Station, 1234 Linn Ave – new building
- New Public Works Building, 13895 Fir St

Capital Resources

Oregon City maintains several capital resources that have important roles to play in the implementation of the natural hazard mitigation plan.

Communication Towers:

- 415 Mt. View Ln.

Critical facilities with power generators for use during emergency blackouts include:

- OC Engineering and Operations Center, 13895 Fir St.
- OC Police Dept. 1234 Linn Av.
- City Hall, 625 Center St.
- “Old” Public Works, 122 S. Center St.

Wastewater Sites:

- | | |
|---------------------------------|--|
| • Amanda, 275 Amanda Ct. | • Nobel Ridge, 13181 Gaffney Ln. |
| • Cook, 18763 Cook St. | • Hidden Ck., 19833 Hwy. 213 |
| • Parrish, 11520 Parrish Rd. | • Barclay Hills, 17881 Peter Skene Way |
| • Pease, 19638 Pease Rd. | • Newell Crest, 18161 Newell Crest Dr. |
| • Settlers, 19468 Wild bill Ct. | |

Water Sites

- Fairway downs pump station, Beaver creek Rd.
- Hunter pump station, Hunter Dr.
- Mt. View Reservoir

Warming or cooling shelters include:

- Father’s Heart, 603 12th St.
- OC Library, 606 John Adams St.

Facilities listed in the American Red Cross National Shelter System include:

- Father’s Heart, 606 12th St.

Food pantries include:

- Oregon City View Manor Free Food Market. Every 2nd Wed morning of every month. 200 Longview Way
- Oregon City DHS Free Food Market. 1st Tues morning of every month. 315 Beaver creek Rd
- Father’s Heart, 606 12th St.

- Clackamas County Gleaners, 13833 Fir St.

Fueling storage:

- Oregon City Engineering and Operations Center, 13895 Fir St.

Findings

Several important findings from this capability assessment informed the design of the Plan’s mitigation strategy and aided in prioritizing action items.

Staffing Limitations and Capacity

Oregon City staff are assigned hazard mitigation responsibilities as a (small) part of their larger job responsibilities. Restricted capacity reduces the breadth of the programming the community can undertake in any year. The city relies upon its relationships with the County and other cities within its region to expand its operations.

Reliance upon outside funding streams and local match requirements

Oregon City operates on a limited budget with many conflicting priorities. This leaves few opportunities for using local financial resources to implement hazard mitigation work. They lean heavily upon state and federal grant funds as the primary means for securing mitigation funding. Hazard mitigation grants such as HMGP and BRIC require 10-25% local funding match, as well as extra staff capacity and expertise to navigate the application process and manage the funding.

Leveraging Partnerships with Public and Nonprofit Entities

Regional planning displayed in Community Wildfire Protection Planning process demonstrates the City’s ability to effectively share information and identify priority needs.

Mitigation Plan Mission

The 2024 HMAC reviewed the previous NHMP Mission and Goals in comparison to the State NHMP Goals and determined that they would make necessary updates to include references to community lifelines and to advance equity and inclusion in hazard mitigation.

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

The mission of the NHMP is to:

Enhance county resiliency and capacity to address natural hazards by promoting sound public policy and effective mitigation strategies designed to equitably reduce risk and impacts on community members, community lifelines, historic and cultural resources property, and ecological systems.

This can be achieved by increasing public awareness, documenting the resources for risk reduction and loss-prevention, and identifying activities to guide the county towards building a safer, more sustainable community.

Mitigation Plan Goals

Mitigation plan goals are more specific statements of direction that residents and public and private partners can take while working to reduce the risk from natural hazards. These statements of direction form a bridge between the broad mission statement and action items. The goals listed here serve as checkpoints as agencies and organizations begin implementing mitigation action items.

Meetings with the HMAC, previous hazard event reports, and the previous NHMPs served as methods to obtain input and identify priorities in developing goals for reducing risk and preventing loss from natural hazards.

All the NHMP goals are important and are listed below in no order of priority. Establishing community priorities within action items neither negates nor eliminates any goals, but it establishes which action items to consider implementing first, should funding become available.

Goal 1: Protect Life and Property

- Develop and implement mitigation and climate adaptation projects and policies that aid in protecting lives by making homes, businesses, community lifelines, and other property more resilient to natural hazards and impacts from climate change.
- Establish mitigation projects and policies that minimize losses and repetitive damages from recurring disasters while promoting insurance coverage for severe hazards.
- Improve hazard identification and risk assessment information to inform and provide recommendations for enhanced resilience in new development decisions and promote preventative measures for existing development in areas vulnerable to natural hazards.

Goal 2: Enhance Natural Systems

- Incorporate natural hazard mitigation planning and activities into watershed planning, natural resource management, natural systems enhancement, and land use planning to protect life, property, and ecological system.

Goal 3: Augment Emergency Services

- Strengthen emergency operations by enhancing communication, collaboration, and coordination of natural hazard mitigation activities and policies across agencies at all levels and regions of government, sovereign tribal nations, and the private sector.

Goal 4: Encourage Partnerships for Implementation

- Improve communication, coordination, and participation among and with public agencies, community members, community lifelines, and private sector organizations to prioritize and implement hazard mitigation activities and policies.
- Enhance efforts toward identifying and optimizing opportunities across state agencies, surrounding communities, and private entities for resource sharing, mutual aid, and funding sources/support.

Goal 5: Promote Public Awareness

- Build community resilience and awareness and reduce the effects of natural hazards and climate change through community-wide engagement, collaboration, resource-sharing, learning, leadership-building, and identifying mitigation project-related funding opportunities.

Goal 6: Advance Equity and Inclusion

- Mitigate the inequitable impacts of natural hazards by prioritizing the directing of resources and efforts to build resilience and engagement in the most vulnerable communities least able to prepare, respond, and recover.
- Strengthen efforts aimed at increasing engagement, outreach, and collaboration with community and cultural organizations and agencies that are dedicated to providing services and support to vulnerable and underserved communities.

Mitigation Strategy

This section of the NHMP addendum addresses 44 CFR 201.6(c)(3)(iv), *Mitigation Strategy*.

The City's mitigation strategy (action items) was first developed during the 2009 NHMP planning process and revised during subsequent NHMP updates. During these processes, the HMAc assessed the City's risk, identified potential issues, and developed a mitigation strategy (action items).

During the 2023 update process, the City re-evaluated their mitigation strategy (action items). During this process action items were updated, noting if the action is complete, not complete and whether the actions were still relevant; any new action items were identified at this time (see Attachment B for more information on changes to action items).

Action Items

Table OC-1 documents the title of each action along with, the lead organization, partners, timeline, cost, and potential funding resources. Current conditions (risk assessment), needs, and capacity have not altered community priorities as such the HMAc decided not to modify the prioritization of action items in this update (see Attachment A for more information). High priority actions are shown with orange highlight. The City will focus their attention, and resource availability, upon these achievable, high leverage, activities over the next five-years. Although this methodology provides a guide for the HMAc in terms of implementation, the HMAc has the option to implement any of the action items at any time. This option to consider all action items for implementation allows the committee to consider mitigation strategies as new opportunities arise, such as capitalizing on funding sources that could pertain to an action item that is not currently listed as the highest priority. Refer to Attachment A for changes to actions since the previous NHMP.

Table OC-1 Action Items

Action Item #	Statement	Impacted Hazard									Implementation and Maintenance			
		Drought	Earthquake	Extreme Heat	Flood	Landslide	Volcanic Event	Wildfire	Windstorm	Winter Storm	Lead/ Partners	Timeline	Potential Funding Source	Estimated Cost
MH#1	Maintain Certification and coordinate with Clackamas County and regional partners to identify and coordinate building officials that are qualified to conduct damage assessments.		X		X	X		X	X	X	Emergency Management/ Building	Ongoing	Local Resources	Low
MH#2	Integrate the goals and action items from the Oregon City Natural Hazards Mitigation Plan into existing regulatory documents and programs, where appropriate.	X	X	X	X	X	X	X	X	X	Community Development/ Public Works, City Commission	Ongoing	Local Resources, DLCD-TA, FEMA HMA-C&CB	Low
MH#3	Develop, enhance, and implement education programs aimed at mitigating natural hazards, and reducing risk.	X	X	X	X	X	X	X	X	X	Community Development/ Public Works, CFD #1	Ongoing	Local Resources, DLCD-TA, FEMA, OEM	Low
MH#4	Improve vegetation management throughout Oregon City.							X	X	X	Community Services/ Community Development, Code Enforcement, Parks and Recreation, Public Works	Ongoing	Local Resources	Low to Moderate
EQ#1	Conduct seismic evaluations on identified community assets and 'high risk' school and emergency service buildings and implement appropriate structural and non-structural mitigation strategies.		X								Emergency Management/ Community Development, Public Works	Long Term	Local Resources, DLCD-TA, FEMA HMA-C&CB	Low to High

Table OC-1 Action Items

		Impacted Hazard									Implementation and Maintenance			
Action Item #	Statement	Drought	Earthquake	Extreme Heat	Flood	Landslide	Volcanic Event	Wildfire	Windstorm	Winter Storm	Lead/ Partners	Timeline	Potential Funding Source	Estimated Cost
FL#1	Promote and protect the use of naturally flood prone open space or wetlands as flood storage areas.				X						Community Development/ Public Works	Ongoing	Local Resources	Low
FL#2	Continue participating in the National Flood Insurance Program and develop strategies to reduce property damage and related financial impacts due to flooding.				X						Community Development/ Public Works	Ongoing	Local Resources	Low
FL#3	Complete periodic updates of the Surface Water Management Master Plan.				X						Public Works / Community Development	Ongoing	Local Resources	Low
LS#1	Continue to implement municipal codes and policies mitigating future landslide damage.					X					Public Works / Community Development	Ongoing	Local Resources	Low
LS#2	Maintain an inventory of streets and properties threatened by landslides.					X					Mapping, GIS / Community Development, Public Works	Ongoing	Local Resources	Low

Table OC-1 Action Items

Action Item #	Statement	Impacted Hazard									Implementation and Maintenance			
		Drought	Earthquake	Extreme Heat	Flood	Landslide	Volcanic Event	Wildfire	Windstorm	Winter Storm	Lead/ Partners	Timeline	Potential Funding Source	Estimated Cost
SW#1	Reduce frequency and duration of power outages from the severe wind and winter storm hazards where possible.								X	X	Public Works/ Community Development	Ongoing	Local Resources, DLCD-TA, FEMA HMA-C&CB	Low to High
WF#1	Coordinate wildfire mitigation action items through the Clackamas County Community Wildfire Protection Plan							X			Clackamas Fire District #1 / Community Development, Public Works	Ongoing	Local Resources, FEMA HMA, CWDG, ODF, OSFM	Low to High
WF#2	Complete periodic updates of the Water Master Plan.	X			X			X			Public Works/ Community Development	Ongoing	Local Resources	Low
WF#3	Promote fire-resistant strategies and the use of non-combustible roofing materials by evaluating and making recommendations to current code to encourage noncombustible roofing standards in high fire-hazard areas.							X			Community Development / Public Works; Clackamas Fire District #1	Ongoing	Local Resources	Low

Source: Oregon City NHMP HMA, updated 2023

Cost: Low (less than \$50,000), Medium (\$50,000-\$100,000), High (more than \$100,000)

Timing: Ongoing (continuous), Short (1-2 years), Medium (3-5 years), Long (5 or more years)

Priority Actions: Identified with orange highlight

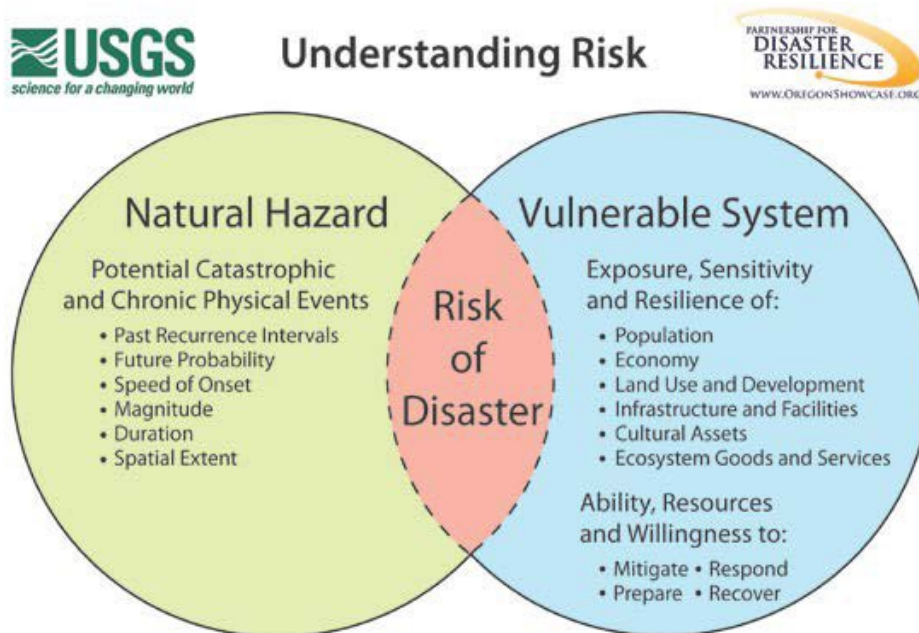
Risk Assessment

This section of the NHMP addendum addresses 44 CFR 201.6(b)(2) - Risk Assessment. In addition, this chapter can serve as the factual basis for addressing Oregon Statewide Planning Goal 7 – Areas Subject to Natural Hazards. Assessing natural hazard risk has three phases:

- **Phase 1:** Identify hazards that can impact the jurisdiction. This includes an evaluation of potential hazard impacts – type, location, extent, etc.
- **Phase 2:** Identify important community assets and system vulnerabilities. Example vulnerabilities include people, businesses, homes, roads, historic places and drinking water sources.
- **Phase 3:** Evaluate the extent to which the identified hazards overlap with or have an impact on, the important assets identified by the community.

The local level rationale for the identified mitigation strategies (action items) is presented herein and within Volume I, Section 3 and Volume III, Appendix C. The risk assessment process is graphically depicted in Figure OC-1. Ultimately, the goal of hazard mitigation is to reduce the area of risk, where hazards overlap vulnerable systems.

Figure OC-1: Understanding Risk



Source: USGS- Oregon Partnership for Disaster Resilience Research Collaboration, 2006

Hazard Analysis

The Oregon City HMAC developed their hazard vulnerability assessment (HVA), using their previous HVA and the County’s HVA as a reference. Changes from their previous HVA and the County’s HVA were made where appropriate to reflect distinctions in vulnerability and risk from natural hazards unique to Oregon City, which are discussed throughout this addendum. Table OC-2 shows the HVA matrix for Oregon City

listing each hazard in order of rank from high to low. For local governments, conducting the hazard analysis is a useful step in planning for hazard mitigation, response, and recovery. The method provides the jurisdiction with a sense of hazard priorities but does not predict the occurrence of a hazard. Two catastrophic hazards (Cascadia Subduction Zone earthquake and Crustal earthquake) and two chronic hazards (extreme heat and winter storm) rank as the top hazard threats to the City (Top Tier). Flood, landslide, and wildfire comprise the next highest ranked hazards (Middle Tier), while drought, windstorm, and volcanic event comprise the lowest ranked hazards (Bottom Tier).

Table OC-2 Hazard Analysis Matrix

Hazard	History	Vulnerability	Maximum Threat	Probability	Total Threat Score	Hazard Rank	Hazard Tiers
Earthquake - Cascadia	2	45	100	49	196	1	Top Tier
Extreme Heat Event	18	35	70	56	179	2	
Earthquake - Crustal	6	50	100	21	177	3	
Winter Storm	20	30	70	49	169	4	
Flood	16	20	70	56	162	5	Middle Tier
Landslide	14	35	30	63	142	6	
Wildfire	12	25	70	21	128	7	
Drought	10	15	50	42	117	8	Bottom Tier
Windstorm	14	15	30	42	101	9	
Volcanic Event	2	15	50	7	74	10	

Source: Oregon City HMAC, 2023.

Community Characteristics

Table OC-3 and the following section provides information on City specific demographics and assets. Many of these community characteristics can affect how natural hazards impact communities and how communities choose to plan for natural hazard mitigation. Considering the City specific assets during the planning process can assist in identifying appropriate measures for natural hazard mitigation.

Oregon City is near the southern limits of the Portland metro-area and is the County Seat of Clackamas County. The City has benefited from its natural setting. Its location on the Willamette and Clackamas Rivers supplied an abundant power source and bolstered an economy based on manufacturing, timber, and commerce. This prime location drew settlers from around the nation and helped Oregon City become the first incorporated city in Oregon. In the shadow of Mount Hood and surrounded by forests, Oregon City is a scenic settlement built on the “solid ground” of the valleys and hillsides.

The City has grown in land area over the years. As of 2023, Oregon City occupies 6,576 acres. Urbanization at the edge of Oregon City is constrained by the Willamette River and the City of West Linn to the west, the Clackamas River and the City of Gladstone to the north, and steep topography to the south and east.

Oregon City’s temperatures range from monthly average lows of 36°F in the winter months (December/January coldest) to average highs of 82°F in the summer months (July/August hottest). The average annual precipitation is 46 inches.³

³ [Western Regional Climate Center, Oregon City, Oregon](#). Retrieved November 16, 2018

Population, Housing, and Income

Oregon City has grown substantially since its incorporation in 1913 and has an area today of 2.26 square miles. It is in the south-central region of Clackamas County, located approximately 29 miles southeast of the City of Portland. The City is within the Oregon City River watershed, with the Oregon City River about a mile east of the UGB.

Between 2016 and 2021 the City grew by 3,546 people (10%; as of 2022 the population is 37,786). Between 2022 and 2045 the population is forecast to grow by 30% to 49,009.

Most of the population is White/Caucasian (88%) and about 18% of the population is Hispanic or Latino. The poverty rate is 6% (6% of children under 18, 7% for people 65 and older), 7% do not have health insurance, and 49% of renters pay more than 30% of their household income on rent (37% for owners). About 30% of the population has a bachelor's degree or higher (5% do not have a high school degree). Approximately 12% of the population lives with a disability (37% of population 65 and older), and 41% are either below 15 (25%) or over 65 (16%) years of age. About 9% of the population are 65 or older and living alone and 5% are single parents.

The City includes a diversity of land uses but is zoned primarily residential. About 80% of housing units are single-family, 17% are multifamily, and 2% are mobile homes. One quarter of homes (25%) were built before 1970; almost half (49%) were built after 1990. Newer homes are more likely to be built to current seismic, flood, wildfire, and other hazard standards. Almost two-thirds (64%) of housing units are owner occupied, 33% are renter occupied, less than 1% are seasonal homes, and 4% are vacant.

Transportation and Infrastructure

In Oregon City, transportation has played a major role in shaping the community. Oregon City has three state highways and one interstate. State Highway 99E (or McLoughlin Blvd.), runs along the western border of the city; Highway 213 runs north to south through the eastern part of the city; Highway 43 enters at the northwest border of the city, and Interstate 205 runs along the northern border.

Motor vehicles represent the dominant mode of travel through and within Oregon City. Thirteen percent (13%) of renters and 1% of owners do not have a vehicle. Most workers drive alone to work (77%); 9% carpool, 1% use public transit, 3% either walk or use a bicycle, and 9% work at home. Oregon City public transportation is serviced by Tri-Met which provides daily local bus services to numerous community transit centers, including downtown Oregon City and the Clackamas County College Campus. The Canby Area Transit (CAT) additionally serves Oregon City with service to Canby, Aurora, Hubbard, and Woodburn, while the South Clackamas Transportation District (SCTD) provides transportation between Clackamas Community College south to Molalla. Oregon City is also accessed by the Union Pacific Railroad main line and Amtrak, which travels northeast to southwest carrying both passengers and freight. In 2021 Clackamas County started the ClackCo connects shuttle. The shuttle service fills gaps from TriMet stops to underserved portions of Oregon City and the Clackamas Industrial Area.

Economy

Oregon City is located near the greater Portland region, resulting in easy access to downtown Portland and surrounding communities. Historically, Oregon City had a strong mill and timber economic presence. Now, Oregon City residents are mostly employed in professional and related occupations.⁹ In 2022, the average per capita income for residents was \$37,997. About 51% of the resident population 16 and over is in the labor force (18,960 people) and are employed in a variety of occupations including professional (22%), management, business, and financial (17%), office and administrative (13%), construction, extraction, and maintenance (11%), and sales (10%) occupations.

Most workers residing in the city (87%, 15,440 people) travel outside of the city for work primarily to Portland and surrounding areas.⁴ A significant population of people travel to the city for work, (86% of the workforce, 13,471 people) primarily from Portland and surrounding areas.⁵

⁴ U.S. Census Bureau. LEHD Origin-Destination Employment Statistics (2002-2021). Longitudinal-Employer Household Dynamics Program, accessed on December 18, 2023 at <https://onthemap.ces.census.gov>.

⁵ Ibid.

Table OC-3 Community Characteristics

Population Characteristics		Population	Household Characteristics	
		Growth		
2016 Population Estimate	34,240		Housing Units	
2022 Population Estimate	37,786	10%	Single-Family (includes duplexes)	11,278 80%
2045 Population Forecast*	49,009	30%	Multi-Family	2,427 17%
Race			Mobile Homes (includes RV, Van, etc.)	342 2%
American Indian and Alaska Native		1%	Household Type	
Asian		1%	Family Household	9,150 68%
Black/ African American		< 1%	Married couple (w/ children)	3,323 25%
Native Hawaiian and Other Pacific Islander		0%	Single (w/ children)	738 5%
White		88%	Living Alone 65+	1,216 9%
Some Other Race		1%	Year Structure Built	
Two or More Races		4%	Pre-1970	3,518 25%
Hispanic or Latino/a (of any race)			1970-1989	3,586 26%
Limited or No English Spoken	766	2%	1990-2009	5,479 39%
Vulnerable Age Groups			2010 or later	1,464 10%
Less than 5 Years	2,335	6%	Housing Tenure and Vacancy	
Less than 15 Years	7,204	19%	Owner-occupied	8,924 64%
65 Years and Older	5,294	14%	Renter-occupied	4,585 33%
85 Years and Older	562	2%	Seasonal	13 < 1%
Age Dependency Ratio		0.51	Vacant	525 4%
Disability Status (Percent age cohort)			Vehicles Available (Occupied Units)	
Total Disabled Population	4,551	12%	No Vehicle (owner occupied)	59 1%
Children (Under 18)	275	3%	Two+ vehicles (owner occupied)	7,091 79%
Working Age (18 to 64)	2,375	10%	No Vehicle (renter occupied)	594 13%
Seniors (65 and older)	1,901	37%	Two+ vehicles (renter occupied)	2,254 49%
Income Characteristics			Employment Characteristics	
Households by Income Category			Labor Force (Population 16+)	
Less than \$15,000	590	4%	In labor Force (% Total Population)	18,960 51%
\$15,000-\$29,999	932	7%	Unemployed (% Labor Force)	985 5%
\$30,000-\$44,999	1,276	10%	Occupation (Top 5) (Employed 16+)	
\$45,000-\$59,999	1,550	11%	Professional & Related	4,089 22%
\$60,000-\$74,999	1,398	10%	Management, Business, & Financial	3,257 17%
\$75,000-\$99,999	2,042	15%	Office & Administrative	2,537 13%
\$100,000-\$199,999	4,612	34%	Construction, Extraction, & Maint.	2,014 11%
\$200,000 or more	1,109	8%	Sales & Related	1,906 10%
Median Household Income			Health Insurance	
		\$85,193	No Health Insurance	2,483 7%
Gini Index of Income Inequality			Public Health Insurance	11,599 32%
		0.37	Private Health Insurance	26,921 74%
Poverty Rates (Percent age cohort)			Transportation to Work (Workers 16+)	
Total Population	2,180	6%	Drove Alone	14,439 77%
Children (Under 18)	469	6%	Carpooled	1,618 9%
Working Age (18 to 64)	1,361	6%	Public Transit	233 1%
Seniors (65 and older)	350	7%	Motorcycle	16 < 1%
Housing Cost Burden (Cost > 30% of household income)			Bicycle/Walk	547 3%
Owners with a Mortgage	2,585	37%	Work at Home	1,756 9%
Owners without a Mortgage	203	10%		
Renters	2,235	49%		

Source: U.S. Census Bureau, 2016-2021 American Community Survey; Portland State University, Population Research Center, "Annual Population Estimates", METRO 2040 Population Distributed Forecast (2021, [Exhibit A to Ordinance 21-1457](#)).

Note: ACS 5-year estimates represent average characteristics from 2012-2016 or 2017-2021. Sampling error may result in low reliability of data. This information or data is provided with the understanding that conclusions drawn from such information are the responsibility of the user. Refer to the original source documentation to better understand the data sources, results, methodologies, and limitations of each dataset presented.

Community Lifelines

This section outlines the resources, facilities, and infrastructure that, if damaged, could significantly impact the public safety, economic conditions, and environmental integrity of the city. [Community Lifelines](#) are the most fundamental services in the community that, when stabilized, enable all other aspects of society to function. Mitigating these facilities will increase the community’s resilience.

The community lifelines identified below were identified by the City of Oregon City. This integrated network of assets, services, and capabilities are used day-to-day to support the recurring needs of the community and enable all other aspects of society to function. Decisive intervention (e.g., rapid re-establishment or employment of contingency response solutions) is required to maintain/reestablish these facilities and services following a hazard incident.

Critical Facilities

Facilities that are critical and essential to government response, and recovery activities (i.e. life, safety, property, and environmental protection). These facilities include: 911 Centers, Emergency Operations Centers, Police, and Fire Stations, Public Works facilities, sewer, and water facilities, hospitals, bridges, roads, shelters, and more. Table OC-4 includes critical facilities identified in the DOGAMI Risk Report (2024) and assumed impact from individual hazards.

Table OC-4 Critical Facilities in Oregon City

Critical Facilities by Community	Flood 1% Annual Chance	CSZ 9.0 Earthquake Moderate to Complete Damage	Canby-Molalla Fault Mw-6.8 Moderate to Complete Damage	Landslide High and Very High Susceptibility	Wildfire High or Moderate Risk
	Exposed	>50% Prob.	>50% Prob.	Exposed	Exposed
Alliance Charter Academy	-	X	-	-	-
Clackamas Academy of Industrial Sciences	-	X	X	-	-
Clackamas Community College	-	X	-	-	-
Clackamas Community College - Public Safety	-	-	-	-	-
Clackamas County Jail	-	X	X	-	-
Clackamas County Public Works	X	X	X	-	-
Clackamas County Sheriff's Lot	X	X	X	-	-
Clackamas County Sheriff's Office - South Station	-	-	-	-	-
Clackamas Fire District #1 - Station 9 Holcomb (built 1974)	-	-	-	-	-
Clackamas Fire District #1 - Station 15 John Adams (remodeled 1998)	-	X	X	-	-
Clackamas Fire District #1 - Station 16 Hilltop (rebuilt 2018)	-	X	-	-	-
Clackamas Fire District #1 - Station 17 (built 2004)	-	-	-	-	-
Clackamas Middle School	-	-	-	-	-
Eye Health Northwest	-	X	-	-	-
Gaffney Lane Elementary School	-	X	-	-	-
Gardiner Middle School	-	X	-	-	-
Holcomb Elementary School	-	X	-	-	-

Critical Facilities by Community	Flood 1% Annual Chance	CSZ 9.0 Earthquake Moderate to Complete Damage	Canby-Molalla Fault Mw-6.8 Moderate to Complete Damage	Landslide High and Very High Susceptibility	Wildfire High or Moderate Risk
	Exposed	>50% Prob.	>50% Prob.	Exposed	Exposed
Jackson Building	-	X	X	-	-
John McLoughlin Elementary School	-	X	X	-	-
Kings Academy	-	X	X	-	-
North Clackamas Christian School	-	X	-	-	-
Oregon City Police Department (built 2020)	-	X	-	-	-
Oregon City Senior High School	-	X	-	-	-
Oregon City Service Learning Academy	-	X	X	-	-
Providence Willamette Falls Hospital	-	X	X	-	-
St John the Apostle School	-	-	-	-	-
The Marylhurst School	-	X	-	-	-
Tri-City Service District	-	-	X	-	-
Willamette Falls Hospital	-	X	X	-	-

Source: DOGAMI, Multi-Hazard Risk Report for Clackamas County, Oregon (2024), Table A-31.

Additional Critical Facilities not included in the DOGAMI Risk Report:

- Public Works Operation Center
- Clackamas County EOC
- PGE Substation, Canemah
- PGE Substation, 18th Street

Critical Infrastructure

Infrastructure that provides necessary services for emergency response include:

- Natural Gas System
- Electrical Power System
- Tri-City Wastewater Treatment Plant
- Wastewater Collection System
- Hunter Pump Station
- Mountain View Pump Station
- Barlow Crest Reservoir
- Boynton Standpipe Reservoir and Pump Station
- Henrici Reservoir (seismically upgraded)
- Mountainview Reservoir #1 (2 MG)
- Mountainview Reservoir #2 (10.5 MG)
- North Fork Water Transmission Pipe
- South Fork Water Filter Plant
- South Fork Water Intake
- South Fork/Division Street Pump Station
- Clackamas River Water/South Fork Water Intake
- South Fork Water Transmission Line
- Metro South Transfer Station

- PGE Dam
- Water Distribution System

Additionally, the following transportation infrastructure is considered vulnerable (hazards noted where applicable):

- 5th Street
- 7th Street
- Abernethy Road (flood)
- Abernethy Creek Culvert at McLoughlin Blvd.
- Anchor Way
- Anchor Way Bridge at Abernethy Creek
- Beaver Creek Road (flood)
- Central Point Road
- Division Street
- George Abernethy Bridge (I-205 at Willamette)
- Glen Oak Road
- High Street
- Highway 43 Arch Bridge
- Highway 213 at Holcomb Boulevard
- Redland Road overcrossing on Hwy 213
- I-205 over Clackamas River
- Interstate 205
- Leland Road
- Linn Avenue (flood)
- Main Street (7th to McLoughlin Blvd)
- Main Street overcrossing at I-205
- Maple Lane Road
- McLoughlin Blvd Viaduct
- South End Road
- Warner Milne Road
- Warner Parrott Road
- Washington Street overcrossing on Hwy 213
- Washington Street Bridge (at Abernethy Creek)

Essential Facilities

Facilities that are essential to the continued delivery of key government services, and/or that may significantly impact the public’s ability to recover from the emergency. These facilities may include: community gathering places, commercial centers, and other public facilities such as school fields.

Schools

- Gaffney Lane Elementary School
- Holcomb Elementary School
- John McLoughlin Elementary School
- King Elementary School
- Park Place Elementary School
- Gardiner Middle School
- Tumwata Middle School
- Oregon City High School
- Jackson Campus (CAIS)
- Clackamas Community College

- Eastham Community School

Other Facilities

- City Hall
- Pioneer Community Center
- Community Development Building
- Clackamas County Jail
- Area churches
- Clackamas County Road Services
- Veterans of Foreign Wars Post 1324

Churches include: First Presbyterian, First United Methodist Church, Light on the Hill Fellowship, Logan Community Church, Maranatha Baptist Church, Mountain View Community Church, North Clackamas Christian, Oregon City Christian, Oregon City Church of the Nazarene, Oregon City Evangelical, St. John the Apostle Catholic Church, St. Paul’s Episcopal Church, St. Philip Benizi Church, Trinity Lutheran Church, and Victorious Faith Family Church.

Environmental Facilities

Environmental assets are those parks, green spaces, wetlands, and rivers that provide an aesthetic and functional ecosystem service for the community include Clackamette Park and Mill Creek Canyon.

Vulnerable Populations

Vulnerable populations, including seniors, disabled citizens, women, and children, as well those people living in poverty, often experience the impacts of natural hazards and disasters more acutely. Populations that have special needs or require special consideration include child care facilities and adult care facilities.

Hazardous Materials

Facilities that, if damaged, could cause serious secondary impacts may also be considered “critical.” Hazardous materials sites are particularly vulnerable to earthquake, landslide, volcanic event, wildfire, and winter storm hazards. A hazardous material facility is one example of this type of critical facility. Those sites that store, manufacture, or use potentially hazardous materials include: Clackamas Community College, Benchmade, Metro South Transfer Station, Railroad, Rossman Landfill.

Economic Assets/Population Centers

Economic assets include businesses that employ large numbers of people and provide an economic resource to the city of Happy Valley. If damaged, the loss of these economic assets could significantly affect economic stability, and prosperity. Population Centers usually are aligned with economic centers and are a concern during evacuation/notification during a hazard event.

Cultural and Historic Assets

The cultural and historic heritage of a community is more than just tourist charm. For families that have lived in the city for generations and new resident alike, it is the unique places, stories, and annual events that makes the community an appealing place to live. The cultural and historic assets are both intangible benefits and obvious quality-of-life- enhancing amenities. Because of their role in defining and supporting the community, protecting these resources from the impact of disasters is important.

The following historic resources can be found in Oregon City:

- 7th Street Historic Fire Station
- 90 Historic Homes in Canemah, a National Registered Historic District
- 376 Individually Designated Historic Homes in McLoughlin Historic Conservation District
- 98 Individually Designated Historic Homes Outside of a Historic District
- Barclay House
- Carnegie Center
- Carnegie Library
- Clackamas County Courthouse
- End of the Oregon Trail Interpretive Center
- Ermatinger House
- McLoughlin House
- McLoughlin Promenade
- Museum of the Oregon Territory
- Oregon City Municipal Elevator
- Rose Farm
- Stevens-Crawford House

- Willamette Falls Locks
- Oregon City/West Linn (Hwy. 43) Bridge

The city's Historic Review Board reviews new development in the McLoughlin and Canemah historic districts and the city has adopted a Historic Overlay District to ensure that new development is compatible with existing historically designated structures.

Hazard Characteristics

Drought

The HMAC determined that the City's probability for drought is **moderate** and that their vulnerability to drought is **low**. *These ratings did not change since the previous version of this NHMP.*

Volume I, Section 2 describes the characteristics of drought hazards, history, as well as the location, extent, and probability of a potential event. Due to the climate of Clackamas County, past and present weather conditions have shown an increasing potential for drought.

Oregon City provides [water](#) to most of its residents within a service area of approximately 6,297 (source: OC GIS) acres; residents not within the services area are served by the Clackamas River Water District. Oregon City draws its main water supply comes from the Clackamas River which is supplied by the South Fork Water Board (a wholesale water supplier that is equally owned by Oregon City and West Linn). Water is provided via an intake and pumping station just to the north of the Oregon City boundary limits which is delivered to the SFWB water treatment plant located in the Park Place area. The City has a current surplus of 4.99 million gallons (MG), however, the city's Water Master Plan has identified the need for an additional storage to meet anticipated growth.

To meet these needs the city plans to build two new ground level storage reservoirs (one 2 MG storage reservoir just beyond the Henrici Reservoir, and the other 3 MG storage reservoir near Holly Lane (additional storage will be needed if/when CRW facilities are incorporated into the City). The City has identified areas that will need to replace existing pipelines to meet the demand and flow requirements.

Vulnerability Assessment

Due to insufficient data and resources, Oregon City is currently unable to perform a quantitative risk assessment, or exposure analysis, for this hazard. For a list of facilities and infrastructure vulnerable to this hazard see the Community Assets Section and Table OC-4.

Future Projections

According to the Oregon Climate Change Research Institute "Future Climate Projections, Clackamas County,"⁶ drought, as represented by low summer soil moisture, low spring snowpack, low summer runoff, and low summer precipitation, is projected to become more frequent in Clackamas County by the 2050s.

Increasingly frequent droughts will have economic and social impacts upon those who depend upon predictable growing periods (ranches, farms, vineyards, gardeners) as well as upon the price and availability of fresh vegetables. It may also stress local jurisdiction's ability to provide water for irrigation or commercial and household use.

⁶ Oregon Climate Change Research Institute, *Future Climate Projections, Clackamas County, Oregon*. February 2023.

Earthquake (Cascadia Subduction Zone)

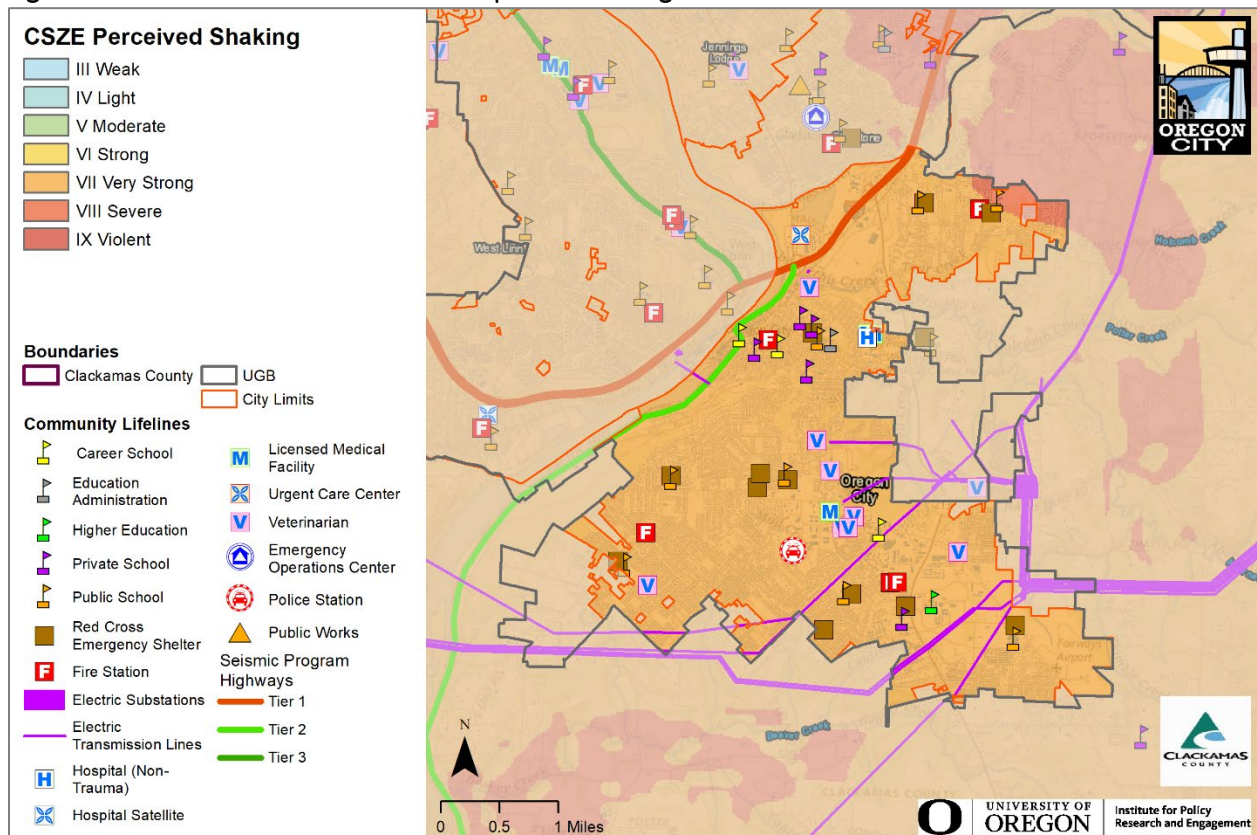
The HMAC determined that the City’s probability for a Cascadia Subduction Zone (CSZ) earthquake is **moderate** and that their vulnerability to a CSZ earthquake is **high**. *These ratings did not change since the previous version of this NHMP.*

Volume I, Section 2 describes the characteristics of earthquake hazards, history, as well as the location, extent, and probability of a potential event. Generally, an event that affects the County is likely to affect Oregon City as well. The causes and characteristics of an earthquake event are appropriately described within Volume I, Section 2 as well as the location and extent of potential hazards. Previous occurrences are well documented within Volume I, Section 2 and the community impacts described by the County would generally be the same for Oregon City as well.

Within the Northern Willamette Valley/Portland Metro Region, three potential faults and/or zones can generate high-magnitude earthquakes. These include the Cascadia Subduction Zone, Gales Creek-Newberg-Mt Angel Structural Zone, Portland Hills Fault Zone, and the Canby-Oregon City Fault Zone (discussed in the crustal earthquake section).

Figure OC-2 displays relative shaking hazards from a Cascadia Subduction Zone earthquake event. As shown in the figure, most of the city is expected to experience very strong shaking (orange), while areas around the city will experience severe shaking (light red) (shown by the red northeast corner) in a CSZ event.

Figure OC-2 Cascadia Subduction Zone Expected Shaking



Source: Map created by Oregon Partnership for Disaster Resilience.

Data: Oregon Department of Geology and Mineral Industries. Preparedness Framework Implementation Team (IRIS v3).

Note: To view hazard detail click this [link](#) to access Oregon HazVu

Cascadia Subduction Zone

The Cascadia Subduction Zone is a 680-mile-long zone of active tectonic convergence where oceanic crust of the Juan de Fuca Plate is subducting beneath the North American continent at a rate of 4 cm per year. Scientists have found evidence that 11 large, tsunami-producing earthquakes have occurred off the Pacific Northwest coast in the past 6,000 years. These earthquakes took place roughly between 300 and 5,400 years ago with an average occurrence interval of about 510 years. The most recent of these large earthquakes took place in approximately 1700 A.D.⁷

The city's proximity to the Cascadia Subduction Zone, potential slope instability and the prevalence of certain soils subject to liquefaction and amplification combine to give the city a high-risk profile. Due to the expected pattern of damage resulting from a CSZ event, the Oregon Resilience Plan divides the State into four distinct zones and places the city predominately within the "Valley Zone" (Valley Zone, from the summit of the Coast Range to the summit of the Cascades). Within the Northwest Oregon region, damage and shaking is expected to be strong and widespread - an event will be disruptive to daily life and commerce and the main priority is expected to be restoring services to business and residents.

Older buildings and the sewer system in the city are most vulnerable to damage. Earthquakes shift soil that could cause landslides. Transportation routes and economic centers within the City can also be affected. Demand for resources such as Police, Fire and Public Works would also increase.

Earthquake (Crustal)

The HMAC determined that the City's probability for a crustal earthquake is **low** and that their vulnerability to crustal earthquake is **high**. *These ratings did not change since the previous version of this NHMP.*

Volume I, Section 2 describes the causes and characteristics of earthquake hazards, history, as well as the location, extent, and probability of a potential event. Generally, an event that affects the County is likely to affect Oregon City as well. Figure OC-3 shows a generalized geologic map of the Oregon City area that includes the areas for potential regional active faults, earthquake history (1971-2008), and soft soils (liquefaction) hazard. The figure shows the areas of greatest concern within the City limits as red and orange.

There are two potential crustal faults and/or zones near the City that can generate high- magnitude earthquakes. These include the Gales Creek-Mt. Angel Structural Zone and Portland Hills Fault Zone (discussed in greater detail below). Other nearby faults include the Bolton fault and Oatfield faults which run through the city west and east side respectively, Canby-Molalla structural zones located west of the city, and the Mt. Hood Fault in eastern Clackamas County. Historical records count over 56 earthquakes in the Portland-metro area. The more severe ones occurred in 1877, 1880, 1953 and 1962. The most recent severe earthquake was the March 25, 1993 Scotts Mills quake. It was a 5.6 magnitude quake with aftershocks continuing at least through April 8.

Earthquake-induced damages are difficult to predict, and depend on the size, type, and location of the earthquake, as well as site-specific building, and soil characteristics. Presently, it is not possible to accurately forecast the location or size of earthquakes, but it is possible to predict the behavior of soil at any site. In many major earthquakes, damages have primarily been caused by the behavior of the soil.

⁷ The Cascadia Region Earthquake Workgroup, 2005. Cascadia Subduction Zone Earthquakes: A magnitude 9.0 earthquake scenario. <http://www.crew.org/PDFs/CREWSubductionZoneSmall.pdf>

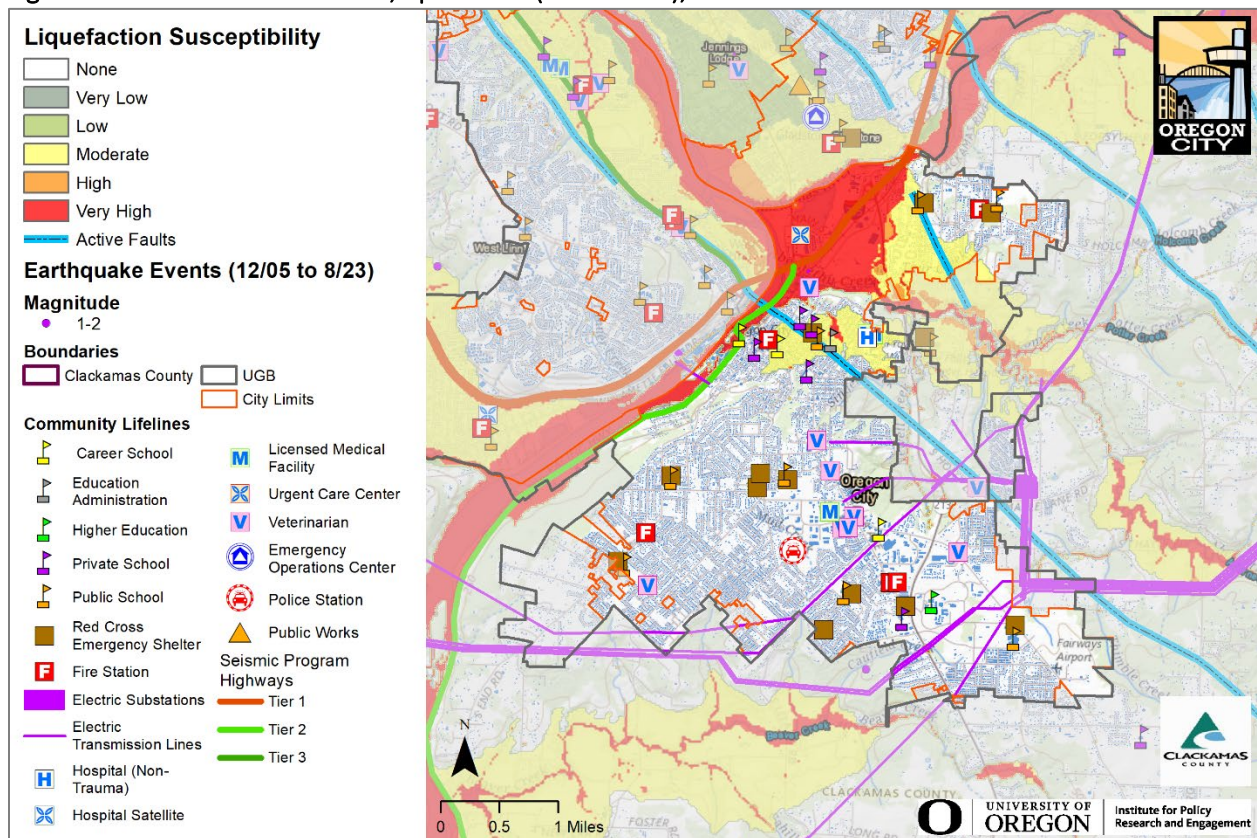
Canby-Molalla Fault Zone

The Canby-Molalla Fault Zone is a series of NE-trending fault that vertically displace the Columbia River Basalt with discontinuous aeromagnetic anomalies that represent significant offset of Eocene basement and volcanic rocks. The fault zone extends for 31 miles from the vicinity of Tigard south through the towns of Canby and Oregon City in northern Oregon.

Portland Hills Fault Zone

The Portland Hills Fault Zone is a series of NW-trending faults that vertically displace the Columbia River Basalt by 1,130 feet and appear to control thickness changes in late Pleistocene (approx. 780,000 years ago) sediment. The fault zone extends along the eastern margin of the Portland Hills for 25 miles and lies about 11 miles northeast of Oregon City.

Figure OC-3 Active Crustal Faults, Epicenters (1971-2008), and Soft Soils



Source: Map created by Oregon Partnership for Disaster Resilience.

Data: Oregon Department of Geology and Mineral Industries. Preparedness Framework Implementation Team (IRIS v3).

Note: To view hazard detail click this [link](#) to access Oregon HazVu

Vulnerability Assessment

In 2018 the Department of Geology and Mineral Industries (DOGAMI) completed a regional impact analysis for earthquakes originating from the Cascadia Subduction Zone and Portland Hills faults (O-18-02). Findings from that report are provided at the end of the crustal earthquakes hazard section.

Seismic building codes were implemented in Oregon in the 1970s; however, stricter standards did not take effect until 1991 and early 2000s. As noted in the community profile, approximately 36% of residential buildings were built prior to 1990, which increases the City’s vulnerability to the earthquake hazard. Information on specific public buildings’ (schools and public safety) estimated seismic resistance, determined by DOGAMI in 2007, is shown in Table OC-5; each “X” represents one building within that

ranking category. Of the facilities evaluated by DOGAMI using their Rapid Visual Survey (RVS), one (1) have a very high (100% chance) collapse potential and eight (8) has a high (greater than 10% chance) collapse potential.

For a list of facilities and infrastructure vulnerable to this hazard, see the Community Assets Section and Table OC-5.

Table OC-5 Rapid Visual Survey Scores

Facility	Site ID*	Level of Collapse Potential			
		Low (<1%)	Moderate (>1%)	High (>10%)	Very High (100%)
Schools					
Jackson Campus: CAIS (ca. 1939) (19761 Beaver Creek Rd)	None	2007 RVS report did not include structural appendix for this facility. Facility built 1939.			
Gaffney Ln Elementary (ca. 1965) (13521 S Gaffney Ln)	Clac_sch44	X		X	
Gardiner Middle (ca. 1954) (180 Ethel St) see Mitigation Successes	-	School rebuilt per 2019 school bond.			
Holcomb Elementary (ca. 1966) (14625 S Holcomb)	Clac_sch43	X	X		
John McLoughlin Elem. (ca. 1975) (19230 S End Rd)	Clac_sch91			X	
King Campus: OCSLA (ca. 1959) (995 S End Rd)	Clac_sch46			X,X	
<i>Mt Pleasant Elementary</i> (1232 Linn Ave) – Building demolished	<i>Clac_sch47</i>	School demolished and replaced with Police Department (2020)			
Tumwata Middle (ca. 1965) (14133 S Donovan Rd) see Mitigation Successes	Clac_sch50				
Oregon City High (ca. 2003) (19761 S Beaver Creek Rd) see Mitigation Successes	Clac_sch51			X,X	
Alliance Charter Academy (16075 S Front Ave)	Clac_sch48				
Clackamas Community College (19600 S Molalla Ave)	Varies	See note below.			
Fire Facilities					
Station 9 – Holcomb (300 Longview Wy)	Clac_fir29	X			
Station 15 – John Adams (624 W 7 th St)	Clac_fir35	X			
Station 16 – Hilltop (19340 S Molalla Ave) see Mitigation Successes	Clac_fir36	Station rebuilt to Category 4 seismic standards (ca. 2018)			
Station 17 – South End (19001 South End)	Clac_fir51	X			

Facility	Site ID*	Level of Collapse Potential			
		Low (<1%)	Moderate (>1%)	High (>10%)	Very High (100%)
Police Facilities					
Police Department (no longer in use) (Building sold to Clackamas County) (320 Warner Milne Rd)	Clac_pol11	X			
Police Department (1234 LinnAve)	None	2007 RVS report did not include structural appendix for this facility. Facility built 2020.			
Hospital					
Providence Milwaukie (10150 SE 32nd Ave)	Clac_hos02	X		X	

Source: [DOGAMI 2007. Open File Report 0-07-02. Statewide Seismic Needs Assessment Using Rapid Visual Assessment.](#)

“*” – Site ID is referenced on the [RVS Clackamas County Map](#)

Note: Clackamas Community College buildings with ‘very high’ collapse potential include: Dye Learning Center, Family Residential Center, Gregory Forum ; and with ‘high’ collapse potential include: McLoughlin Hall, Pauling Center (east and south), Randall Hall (mitigated per 2015-2017 SRGP grant), and Streeter Hall.

In addition to building damages, utility (electric power, water, wastewater, natural gas) and transportation systems (bridges, pipelines) are also likely to experience significant damage. There is a low probability that a major earthquake will result in failure of upstream dams.

Utility systems will be significantly damaged, including damaged buildings and damage to utility infrastructure, including water treatment plants and equipment at high voltage substations (especially 230 kV or higher which are more vulnerable than lower voltage substations). Buried pipe systems will suffer extensive damage with approximately one break per mile in soft soil areas. There would be a much lower rate of pipe breaks in other areas. Restoration of utility services will require substantial mutual aid from utilities outside of the affected area.

Earthquake Regional Impact Analysis

In 2018 DOGAMI completed a regional impact analysis for earthquakes originating from the Cascadia Subduction Zone and Portland Hills faults (O-18-02). Their study focused on damage to buildings, and the people that occupy them, and on two key infrastructure sectors: electric power transmission and emergency transportation routes. Each earthquake was studied with wet and dry soil conditions and for events that occur during the daytime (2 PM) and nighttime (2 AM). Impacts to buildings and people were tabulated at the county, jurisdictional (city), and neighborhood unit level. Estimated damage varied widely across the study area depending on local geology, soil moisture conditions, type of building, and distance from the studied faults. In general, damage from the Cascadia Subduction Zone scenario was greater in the western portion of the study area, however, damage could still be significant in some areas east of the Willamette River. The report found that damage to high-value commercial and industrial buildings was high since many of these facilities are in areas of high to very high liquefaction hazard. Casualties were higher during the daytime scenario (generally double) since more people would be at work and occupying non-wood structures that fare worse in an earthquake.

The Portland Hills fault scenario created greater damages than the Cascade Subduction Zone scenario due primarily to its placement relative to population centers and regional assets; however, at distances 15 or more miles from the Portland Hills fault the damages from the Cascadia Subduction Zone scenario

generally were higher. In both the Cascadia Subduction Zone and Portland Hills Fault scenarios it is forecasted that emergency transportation routes will be fragmented, affecting the distribution of goods and services, conditions are worse under the Portland Hills Fault scenario. Portions of the electric distribution system are also expected to be impacted under both scenarios; however, the impact is considerably less than it is to the transportation routes. Additional capacity or redundancy within the electric distribution network may be beneficial in select areas that are likely to have greater impacts.

Table OC-6 shows the permanent resident population that are vulnerable to injury or death (casualty) and the buildings in the City that are susceptible to liquefaction and landslides, it does not predict that damage will occur in specific areas due to either liquefaction or landslide. More population and property are exposed to higher degrees of expected damage or casualty under the Portland Hills Fault “wet” scenario than in any other scenario.

Table OC-6 Expected damages and casualties for the CSZ fault and Portland Hills fault: earthquake, soil moisture, and event time scenarios

	Cascadia Subduction Zone (M9.0)		Portland Hills Fault (M6.8)	
	"Dry" Soil	"Wet" Saturated Soil	"Dry" Soil	"Wet" Saturated Soil
Number of Buildings	12,641	12,641	12,641	12,641
Building Value (\$ Million)	4,190	4,190	4,190	4,190
Building Repair Cost (\$ Million)	277	342	1,319	1,422
Building Loss Ratio	7%	8%	31%	34%
Debris (Thousands of Tons)	148	170	496	525
Long-Term Displaced Population	102	307	2,983	3,827
Total Casualties (Daytime)	258	318	1,286	1,364
Level 4 (Killed)	14	18	80	85
Total Casualties (Nighttime)	38	57	383	448
Level 4 (Killed)	1	2	11	13

Source: DOGAMI, Earthquake regional impact analysis for Clackamas, Multnomah, and Washington Counties, Oregon (2018, O-18-02), Tables 12-8, 12-9, 12-10, and 12-11.

Cascadia Subduction Zone Scenario

Oregon City is expected to have a 7% building loss ratio with a repair cost of \$277 million under the CSZ “dry” scenario, and an 8% building loss ratio with a repair cost of \$170 million under the CSZ “wet” scenario.⁸ The city is expected to have around 258 daytime or 33 nighttime casualties during the CSZ “dry” scenario and 318 daytime or 57 nighttime casualties during the CSZ “wet” scenario. It is expected that there will be a long-term displaced population of around 102 for the CSZ “dry” scenario and 307 for the CSZ “wet” scenario.⁹

Portland Hills Fault Scenario

Oregon City is expected to have a 31% building loss ratio with a repair cost of \$1.32 billion under the CSZ “dry” scenario, and a 34% building loss ratio with a repair cost of \$1.42 billion under the CSZ “wet” scenario.¹⁰ The long-term displaced population and casualties are greatly increased for all the Portland Hills Fault scenarios. The city is expected to have around 1,286 daytime or 383 nighttime casualties during

⁸ DOGAMI, Earthquake regional impact analysis for Clackamas, Multnomah, and Washington Counties, Oregon (2018, O-18-02), Tables 12-8 and 12-9.

⁹ Ibid, Tables 12-8 and 12-9.

¹⁰ Ibid, Tables 12-10 and 12-11

the Portland Hills Fault “dry” scenario and 1,364 daytime or 448 nighttime casualties during the Portland Hills Fault “wet” scenario. It is expected that there will be a long-term displaced population of around 2,983 for the Portland Hills Fault “dry” scenario and 3,827 for the Portland Hills Fault “wet” scenario.¹¹

Recommendations from the report included topics within Planning, Recovery, Resiliency: Buildings, Resiliency: Infrastructure Improvements, Resiliency: Essential and Critical Facilities, Enhanced Emergency Management Tools, Database Improvements, Public Awareness, and Future Reports. The recommendations of this study are largely incorporated within this NHMPs mitigation strategies (Table OC-1 and Volume I, Section 3). For more detailed information on the report, the damage estimates, and the recommendations see: *Earthquake regional impact analysis for Clackamas, Multnomah, and Washington Counties, Oregon* (2018, [O-18-02](#)).

Natural Hazard Risk Report for Clackamas County

The **Risk Report (DOGAMI, 2024)**¹² provides hazard analysis summary tables that identify populations and property countywide that are vulnerable to the earthquake hazard. According to the Risk Report the following population and property within the study area may be impacted by the profiled events:

Cascadia Subduction Zone event (M9.0 Deterministic): 477 buildings (including 22 critical facilities) are expected to be damaged for a total potential loss of \$340.2 million (a loss ratio of about 6%). About 213 residents may be displaced (less than 1% of the population).

Crustal event (Canby-Molalla fault M6.8 Deterministic): 696 buildings are expected to be damaged, (including 12 critical facilities), for a total potential loss of \$431.9 million (a loss ratio of about 8%). About 415 residents may be displaced (about 1% of the population).

Future Projections

Future development (residential, commercial, or industrial) within Clackamas County will be at risk to earthquake impacts, although this risk can be mitigated by the adoption and enforcement of high development and building standards. Reducing risks to vulnerable populations should be considered during the redevelopment of existing properties.

Flood

The HMAC determined that the City’s probability of flooding is **high** and that their vulnerability to flooding is **moderate**. *These ratings did not change since the previous version of this NHMP.*

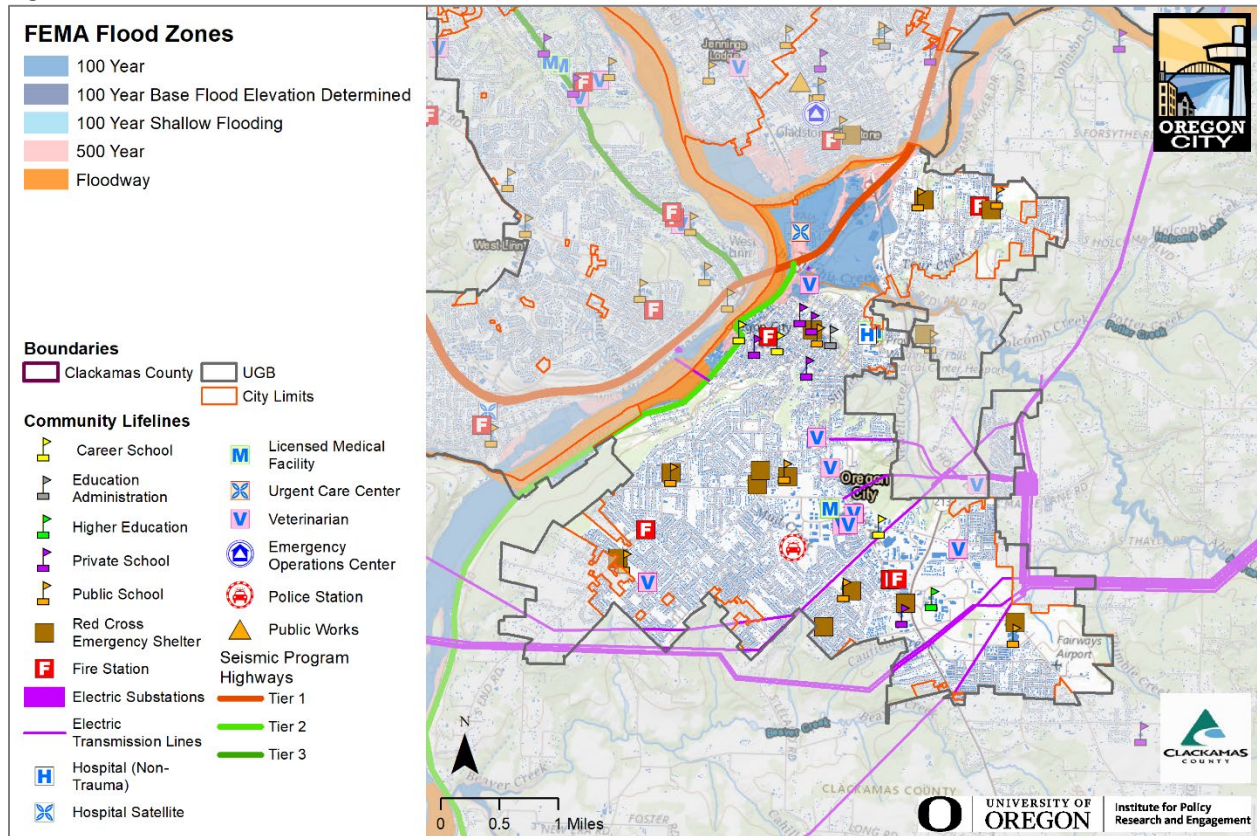
Volume I, Section 2 describes the characteristics of flood hazards, history, as well as the location, extent, and probability of a potential event. Figure OC-4 illustrates the flood hazard area for Oregon City.

Portions of Oregon City have areas of floodplains (special flood hazard areas, SFHA). These include areas along Willamette River, Clackamas River, and Abernethy Creek (Figure OC-4). Other portions of Oregon City, outside of the mapped floodplains, are also subject to flooding from local storm water drainage. Not all flood prone areas are subject to damage. Several valleys, such as the upper reaches of Abernethy Creek, are still in or near their natural state. Flooding of such areas causes no damage to human development and may help the riparian habitat.

¹¹ Ibid, Tables 12-10 and 12-11.

¹² DOGAMI, *Multi-Hazard Risk Report for Clackamas County, Oregon* (2024), Table A-30.

Figure OC-4 FEMA Flood Zones



Vulnerability Assessment

Floods can have a devastating impact on almost every aspect of the community, including private property damage, public infrastructure damage, and economic loss from business interruption. It is important for the City to be aware of flooding impacts and assess its level of risk.

The economic losses due to business closures often total more than the initial property losses that result from flood events. Business owners, and their employees are significantly impacted by flood events. Direct damages from flooding are the most common impacts, but indirect damages, such as diminished clientele, can be just as debilitating to a business.

For mitigation planning purposes, it is important to recognize that flood risk for a community is not limited only to areas of mapped floodplains. Other portions of Oregon City outside of the mapped floodplains may also be at relatively high risk from over bank flooding from streams too small to be mapped by FEMA or from local storm water drainage.

The Willamette and Clackamas Rivers both flooded in January 1997 and from December 28, 2005 to January 1, 2006 following severe winter storms. The high water caused bank erosion and cleanup was required at Clackamette Park, for which FEMA provided some funding.

From January 1 to 2, 2009 a severe winter storm dropped over 3.5 inches of rain over a 24-hour period. The event led to localized flooding, land movement, traffic delays, and sewer line back-ups. Sections of

Meyers Road, Beaver Creek Road, Linn Avenue, Abernethy Road, and Van Buren Street were closed because of the storm. Additional significant floods occurred in December 2015 and March 2017.

Finally, there is a rainfall pattern known as the “Pineapple Express” which brings very heavy and warm rains from the southwest. These warm rains begin their journey from parts of the Pacific near Hawaii, holding their heat and moisture until making landfall along the Oregon coast.

Most of the buildings affected by flooding are in the lowest part of the city, where the three waterways converge. The Floodplain Map shows 12.7 miles of the transportation network could be affected in a flood. For a list of facilities and infrastructure vulnerable to this hazard see the Community Assets section and Table OC-4.

Natural Hazard Risk Report for Clackamas County

The Risk Report (DOGAMI, 2024)¹³ provides hazard analysis summary tables that identify populations and property countywide that are vulnerable to the flood hazard.

According to the Risk Report 103 buildings (2 critical facilities) could be damaged for a total potential loss of \$57.1 million (a building loss ratio of about 1%). About 44 residents may be displaced by flood (about 1% of the population).

National Flood Insurance Program (NFIP)

FEMA’s Flood Insurance Study (FIS), and Flood Insurance Rate Maps (FIRMs) are effective as of January 19, 2018. The City complies with the NFIP through enforcement of their flood damage prevention ordinance and their floodplain management program. The last Community Assistance Visit (CAV) for Oregon City was on March 21st, 2023. Oregon City’s Class Rating within the Community Rating System (CRS) is 6.

The Community Repetitive Loss record for Oregon City identifies two (2) Repetitive Loss Properties (RL)¹⁴ and no Severe Repetitive Loss Properties (SRL)¹⁵. The SRL property is non-residential, located in zone A21, and has had two claims for a total of \$111,661. For additional detail and a map of its general location see Volume I, Section 2 and Figure 2-14.

Table OC-7: Community Repetitive Loss Properties

RL #	RL or SRL Property	Occupancy	Mitigated?	Currently NFIP Insured	Rated Flood Zone	Post FIRM	Paid Claims	Total Paid Amount
38925	RL	Single Family	YES	NO	C	N	3	\$60,499
75554	RL	Non-Residential	NO	NO	A21	N	2	\$51,163
Total							5	\$111,661

Source: FEMA Region X, Regional Flood Insurance Liaison, email February 23, 2023.

¹³ DOGAMI, *Multi-Hazard Risk Report for Clackamas County, Oregon* (2024), Table A-30.

¹⁴ A Repetitive Loss (RL) property is any insurable building for which two or more claims of more than \$1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978. A RL property may or may not be currently insured by the NFIP.

¹⁵ A Severe Repetitive Loss (SRL) property is a single family property (consisting of 1 to 4 residences) that is covered under flood insurance by the NFIP and has incurred flood-related damage for which 4 or more separate claims payments have been paid under flood insurance coverage, with the amount of each claim payment exceeding \$5,000 and with cumulative amount of such claims payments exceeding \$20,000; or for which at least 2 separate claims payments have been made with the cumulative amount of such claims exceeding the reported value of the property.

Future Projections

According to the Oregon Climate Change Research Institute “Future Climate Projections, Clackamas County,”¹⁶ winter flood risk at mid- to low elevations in Clackamas County, where temperatures are near freezing during winter and precipitation is a mix of rain and snow, is projected to increase as winter temperatures increase. The temperature increase will lead to an increase in the percentage of precipitation falling as rain rather than snow. The projected increases in total precipitation, and in rain relative to snow, likely will increase flood magnitudes in the region. Vulnerable populations adjacent to floodways (including the unhoused, manufactured home communities, and campground occupants) will be more at risk as the winter flood risk increases.

Landslide

The HMAC determined that the City’s probability for landslide is **high** and that their vulnerability to landslide is **moderate**. *These ratings did not change since the previous version of this NHMP.*

Volume I, Section 2 describes the characteristics of landslide hazards, history, as well as the location, extent, and probability of a potential event within the region. The potential for landslide in Oregon City is high and the City’s wastewater main lines, major water lines and fiber optic lines. The flooding of 1996 caused numerous landslide events in Oregon City. One of these events caused a sanitary sewer pump to begin sliding downhill. A report by Portland State University found that half of the 48 landslides that occurred in the region in 1996 were considered “natural,” while the others were triggered by human activity. Oregon City experienced another series of landslides because of the December 28th, 2005 to January 1st, 2006 storm and flood on Trillium Drive, Morton Road, near the football field at Oregon City High School Jackson Campus, Newell Crest Drive and Newell Creek Village Apartments. In December 2015 landslides impacted the Forest Edge Apartment Complex, forcing the evacuation of all 41 apartments. Landslides in 2017 impacted Trillium Park, South End Road, Center Street, and OR-224.

Landslides destroy or damage anything on the sliding hillside or in the path of the slide. This includes buildings, houses, and streets. Sometimes, a small amount of settlement occurs, giving the owner time to shore up or retrofit the building to prevent further damage. Many property owners in Oregon City have built retaining walls and replaced slide prone soils with rock to help prevent landslides. However, if an entire hillside fails, the buildings may be destroyed and the streets washed out or covered in debris.

Landslide susceptibility exposure for Oregon City is shown in Figure OC-5. Most of Oregon City demonstrates a moderate to high susceptibility to landslide exposure. Approximately 12% of Oregon City has very high or high and approximately 16% moderate, landslide susceptibility exposure.¹⁷

Note that even if a jurisdiction has a high percentage of area in a high or very high landslide exposure susceptibility zone, this does not mean there is a high risk, because risk is the intersection of hazard, and assets.

Vulnerability Assessment

DOGAMI completed a statewide landslide susceptibility assessment in 2016 ([O-16-02](#)), general findings from that report are provided above.

Potential landslide-related impacts are adequately described within Volume I, Section 2, and include infrastructure damages, economic impacts (due to isolation, and/or arterial road closures), property

¹⁶ Oregon Climate Change Research Institute, *Future Climate Projections, Clackamas County, Oregon*. February 2023.

¹⁷ DOGAMI Open-File Report, O-16-02, Landslide Susceptibility Overview Map of Oregon (2016)

damages, and obstruction to evacuation routes. Rain-induced landslides, and debris flows can potentially occur during any winter, and thoroughfares beyond City limits are susceptible to obstruction as well. For a list of facilities and infrastructure vulnerable to this hazard see the Community Assets Section and Table OC-4.

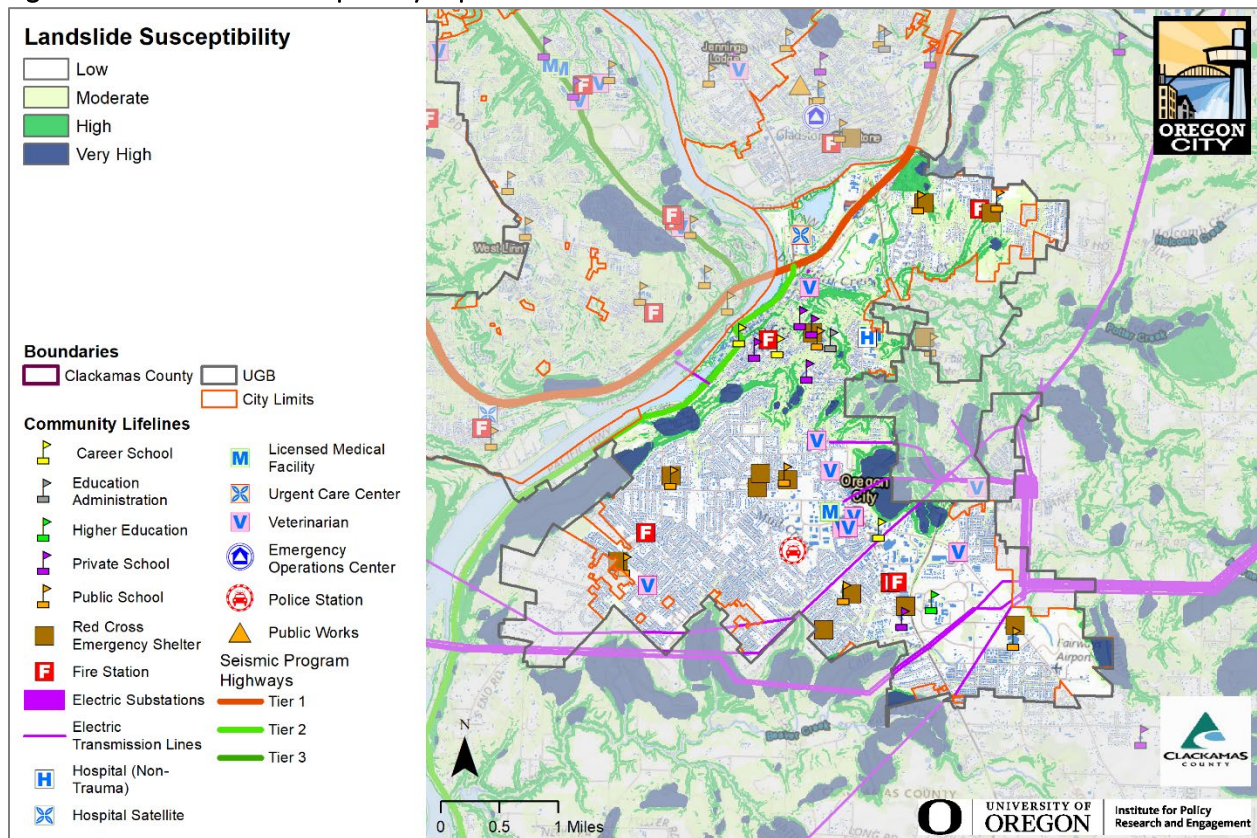
The most common type of landslides are slides caused by erosion. Slides move in contact with the underlying surface, are generally slow moving, and can be deep. Rainfall-initiated landslides tend to be smaller; while earthquake induced landslides may be quite large. All soil types can be affected by natural landslide triggering conditions.

Natural Hazard Risk Report for Clackamas County

The Risk Report (DOGAMI, 2024)¹⁸ provides hazard analysis summary tables that identify populations and property countywide that are vulnerable to the landslide hazard.

According to the Risk Report 533 buildings (no critical facilities) are exposed to the *high and very high landslide susceptibility* hazard for a total exposure of \$205.4 million (a building exposure ratio of about 4%). About 1,778 residents may be displaced by landslides (about 5% of the population).

Figure OC-5 Landslide Susceptibility Exposure



Source: Map created by Oregon Partnership for Disaster Resilience.

Data: Oregon Department of Geology and Mineral Industries. Preparedness Framework Implementation Team (IRIS v3).

Note: To view hazard detail click this [link](#) to access Oregon HazVu

¹⁸ DOGAMI, *Multi-Hazard Risk Report for Clackamas County, Oregon* (2024), Table A-30.

Mitigation Activities

Oregon City works to mitigate future landslide hazards. Oregon City uses percent slope as an indicator of hill slope stability. The city uses a 25% or greater threshold to identify potentially unstable hill slopes. Approximately, 518 acres in the city exceeds this 25% slope threshold (about 8.25% of the land in Oregon City). The city development code includes policies and regulations for landslide prone areas including Chapter 15.48 (Grading, Filling, and Excavating), Chapter 17.44 (US Geologic Hazards), and Chapter 17.47 (Erosion and Sediment Control).

After the 1996 landslide events, 20 of the 48 landslides were repaired by the city, meaning reconstruction or mitigation took place. These fixes varied and included constructing retaining walls, installing rockfill, and moving structures. The sanitary sewer pump station that began sliding downhill had seismic isolation piles installed under the foundation of the building to mitigate future slides.

Repairs and mitigation after the December 28th, 2005 to January 1st, 2006 landslides included:

- The storm sewer manhole that failed on Trillium Drive was repaired. The city installed monitoring wells with inclinometers to allow the city to continue to monitor the slope.
- The owner of the Morton Road apartment building installed a crib wall.
- A homeowner on Newell Crest Drive constructed a retaining wall, costing approximately \$100,000.
- Newell Creek Apartments had the most mitigation work done. The city temporarily repaired one of the water lines and permanently abandoned the waterline on the slope and reconfigured the second water line. The repaired line that remained at risk was later replaced with a new water line with flexible couplings at the joints. The city required relocation and reconstruction of the apartment complex's private sanitary sewer pump station.

The city additionally has many ongoing mitigation actions including a water pipe line leak detection system and annual assessments of slide hazard areas.

Future Projections

Landslides are often triggered by rainfall when the soil becomes saturated. As a surrogate measure of landslide risk, the Oregon Climate Change Research Institute report presents a threshold based on recent precipitation (cumulative precipitation over the previous 3 days) and antecedent precipitation (cumulative precipitation on the 15 days prior to the previous 3 days). By the 2050s under the higher emissions scenario, the average number of days per year in Clackamas County on which the landslide risk threshold is exceeded is not projected to change substantially. However, landslide risk depends on multiple factors, and this metric, which is based on precipitation, does not reflect all aspects of the hazard. Additional triggers, such as earthquakes, wildfires, or development, can increase risks of landslides. Future development along slopes or adjacent to riverbanks will be a greater risk of impact from this hazard.

Severe Weather

Severe weather can account for a variety of intense, and potentially damaging hazard events. These events include extreme heat, windstorms, and winter storms. The following section describes the unique probability, and vulnerability of each identified weather hazard.

Extreme Heat

The HMAC determined that the City's probability for extreme heat events is **high** and that their vulnerability is **moderate**. *The probability rating did not change and the vulnerability rating increased since the previous version of this NHMP.*

Volume I, Section 2 describes the characteristics of extreme heat, history, as well as the location, extent, and probability of a potential event within the region. Generally, an event that affects the County is likely to affect the City as well.

A severe heat episode or "heat wave" occurs about every two to three years, and typically lasting two to three days but can last as many as five days. A severe heat episode can be defined as consecutive days of upper 90s to around 100. Severe heat hazard in the Portland metro region can be described as the average number of days with temperatures greater than or equal to 90-degrees, or 100-degrees, Fahrenheit. On average the region experiences 13.6 days with temperatures above 90-degrees Fahrenheit, and 1.4 days above 100-degrees Fahrenheit, based on new 30-year climate averages (1981-2010) from the National Weather Service – Portland Weather Forecast Office.

The City of Oregon City has not experienced any life-threatening consequences from the few historical extreme heat events, although changes in climate indicate that the area should expect to see more extreme heat events. In June of 2021 there was a "Heat Dome" that produced temperatures of approximately 115* for 3 days. There were 15 deaths attributed to this extreme weather event in Clackamas County.

Future Projections

According to the Oregon Climate Change Research Institute "Future Climate Projections, Clackamas County,"¹⁹ the number, duration, and intensity of extreme heat events will increase as temperatures continue to warm. In Clackamas County, the number of extremely hot days (days on which the temperature is 90°F or higher) and the temperature on the hottest day of the year are projected to increase by the 2020s and 2050s under both the lower (RCP 4.5) and higher (RCP 8.5) emissions scenarios. The number of days per year with temperatures 90°F or higher is projected to increase by an average of 12 (range 3–21) by the 2050s, relative to the 1971–2000 historical baselines, under the higher emissions scenario. The temperature on the hottest day of the year is projected to increase by an average of about 7°F (range 2–11°F) by the 2050s. Higher temperatures and longer/more extreme heat events will have negative impacts upon vulnerable populations such as those over 65+, children, those living in older or temporary housing, and field workers.

Windstorm

The HMAC determined that the City's probability for windstorm is **moderate** and that their vulnerability to windstorm is **low**. *These ratings did not change since the previous version of this NHMP.*

Volume I, Section 2 describes the characteristics of windstorm hazards, history, as well as the location, extent, and probability of a potential event within the region. On December 11th, 1995, a windstorm hit Oregon. Oregon City was one of the most severely damaged cities in Clackamas County. Winds tore off roofs from buildings, uprooted or damaged trees, and knocked out electrical and telephone service. Because windstorms typically occur during winter months, they are sometimes accompanied by ice, freezing rain, flooding and very rarely, snow. Other severe weather events that may accompany windstorms, including thunderstorms, hail, lightning strikes, and tornadoes, are generally negligible for Oregon City. Windstorms also impacted Oregon City in December 2015 and during December 2016 and January 2017 including cold weather and damaging winds.

¹⁹ Oregon Climate Change Research Institute, *Future Climate Projections, Clackamas County, Oregon*. February 2023.

Volume I, Section 2 describes the impacts caused by windstorms, including power outages, downed trees, heavy precipitation, building damages, and storm-related debris. Additionally, transportation and economic disruptions result as well.

Damage from high winds generally has resulted in downed utility lines, and trees usually limited to several localized areas. Electrical power can be out anywhere from a few hours to several days. Outdoor signs have also suffered damage. If the high winds are accompanied by rain (which they often are), blowing leaves, and debris clog drainage-ways, which in turn may cause localized urban flooding.

Future Projections

Limited research suggests little if any change in the frequency and intensity of windstorms in the Northwest as a result of climate change. Those impacted by windstorms at present, including older residential or commercial developments with above-ground utilities, poor insulation or older construction, heavy tree canopies, or poor storm drainage, will continue to be impacted by windstorms in the future.

Winter Storm (Snow/Ice)

The HMAC determined that the City's probability for winter storm is **moderate** and that their vulnerability to winter storm is **moderate**. *These ratings did not change since the previous version of this NHMP.*

Volume I, Section 2 describes the characteristics of winter storm hazards, history, as well as the location, extent, and probability of a potential event within the region. Severe winter storms can consist of rain, freezing rain, ice, snow, cold temperatures, and wind. They originate from troughs of low pressure offshore that ride along the jet stream during fall, winter, and early spring months. Severe winter storms affecting the City typically originate in the Gulf of Alaska or in the central Pacific Ocean. These storms are most common from November through March.

Major winter storms can and have occurred in the Oregon City area. From January 9th to 12th, 1998, a severe winter storm included freezing rain and snow and was accompanied by high winds for two days. Most of the city lost power due to downed electrical lines and malfunctioning transformers. One emergency shelter was opened for those who could not stay in their homes. Off-duty firefighters were called in to help respond to the increased number of calls. Another winter storm happened in January 2009, which resulted in over 3.5 inches of rain in a 24-hour period. The snow and rain led to localized flooding, land movement, traffic delays, and sewer line back-ups. Sections of Meyers Road, Beaver Creek Road, Linn Avenue, Abernethy Road, and Van Buren Street were closed due to the effects of the storm. The storm led to significant power outages, eight water main breaks, and hazardous road conditions. The City contracted forces to assist in snow removal efforts.

Another winter storm impacted the City during December 2016 and January 2017 including cold weather and damaging winds. In February of 2021 a severe ice storm hit Oregon city causing widespread power outages, hundreds of downed trees and branches, road closures, and communication failures. City Public Works staff worked tirelessly for several days clearing streets and ROW areas. The ice event produced hundreds of cubic yards of tree debris which took weeks to clear.

Most winter storms typically do not cause significant damage, they are frequent, and have the potential to impact economic activity. Road and rail closures due to winter weather are an uncommon occurrence but can interrupt commuter, and commercial traffic as noted above.

Future Projections

According to the Oregon Climate Change Research Institute “Future Climate Projections, Clackamas County,”²⁰ cold extremes will become less frequent and intense as the climate warms. In Clackamas County, the number of cold days (maximum temperature 32°F or lower) per year is projected to decrease by an average of 6 (range -3– -8) by the 2050s, relative to the 1971–2000 historical baselines, under the higher emissions scenario. The temperature on the coldest night of the year is projected to increase by an average of 6°F (range 0– 11°F) by the 2050s.

The intensity of extreme precipitation is expected to increase as the atmosphere warms and holds more water vapor. In Clackamas County, the number of days per year with at least 0.75 inches of precipitation is not projected to change substantially. However, by the 2050s, the amount of precipitation on the wettest day and wettest consecutive five days per year is projected to increase by an average of 15% (range 0–31%) and 10% (range -1–26%), respectively, relative to the 1971–2000 historical baselines, under the higher emissions scenario.

Vulnerable populations will be more likely to experience the negative impacts of winter storms in the future, particularly the unhoused and the elderly.

Vulnerability Assessment

Due to insufficient data and resources, Oregon City is currently unable to perform a quantitative risk assessment, or exposure analysis, for the extreme heat, windstorm, and winter storm hazards. For a list of facilities and infrastructure vulnerable to these hazards see the Community Assets Section and Table OC-4.

Volcanic Event

The HMAC determined that the City’s probability for a volcanic event is **low** and that their vulnerability to a volcanic event is **low**. *These ratings did not change since the previous version of this NHMP.*

Volume I, Section 2 describes the characteristics of volcanic hazards, history, as well as the location, extent, and probability of a potential event within the region. Generally, an event that affects the County is likely to affect Oregon City as well. Volcanoes are located near Oregon City, the closest of which are Mount Hood, Mount Adams, Mount Saint Helens, Mount Rainier, and the Three Sisters.

Vulnerability Assessment

Due to Oregon City’s relative distance from volcanoes, the city is unlikely to experience the immediate effects that eruptions have on surrounding areas (i.e., mud and debris flows, or lahars). Depending on wind patterns and which volcano erupts, however, the city may experience ashfall. The eruption of Mount St. Helens in 1980, for example, coated the Willamette Valley with a fine layer of ash. If Mount Hood erupts, however, the city could experience a heavier coating of ash.

Natural Hazard Risk Report for Clackamas County

The **Risk Report (DOGAMI, 2024)**²¹ provides hazard analysis summary tables that identify populations and property countywide that are vulnerable to the volcanic event (lahar) hazard.

The Risk Report did not identify population or property within the study area that may be impacted by the profiled volcanic event (lahar) hazard.

²⁰ Oregon Climate Change Research Institute, *Future Climate Projections, Clackamas County, Oregon*. February 2023.

²¹ DOGAMI, *Multi-Hazard Risk Report for Clackamas County, Oregon (2024)*, Table A-30.

Future Projections

Although the science of volcano predictions is improving, it remains challenging to predict a potential volcanic event. Ash fall, which will be the greatest impact, will impact the entire County. Impacts will be felt hardest by property managers (ranches, farmers, etc.) and by those relying upon clean surface water (for drinking water production and irrigation).

Wildfire

The HMAC determined that the City's probability for wildfire is **low**, and that their vulnerability to wildfire is **moderate**. *These ratings did not change since the previous version of this NHMP.*

The [Clackamas County Community Wildfire Protection Plan \(CWPP\)](#) is hereby incorporated into this NHMP addendum by reference, and it will serve as the wildfire section for this addendum. The following presents a summary of key information; refer to the full CWPP for a complete description, and evaluation of the wildfire hazard. Information specific to Oregon City is found in the following chapter: Chapter 9.3: Clackamas Fire District #1.

Volume I, Section 2 describes the characteristics of wildland fire hazards, history, as well as the location, extent, and probability of a potential event within the region. The location and extent of a wildland fire vary depending on fuel, topography, and weather conditions. Figure OC-6 shows wildfire risk in Oregon City.

Weather and urbanization conditions are primarily at cause for the hazard level. Oregon City has not experienced a wildfire within City limits, but the city has abundant wooded areas that are a concern in the case of a wildfire event. However, a major fire broke out near Rosemont Ridge in September 1967. The fire burned 300 acres and cut telephone and electrical service, but fire fighters were able to save all threatened homes. Less than two weeks later another fire destroyed 500 acres. This fire took the efforts of over 150 firefighters to save the homes.

Clackamas County has two major physiographic regions: the Willamette River Valley in western Clackamas County and the Cascade Range Mountains in eastern and southern Clackamas County. The Willamette River Valley, which includes Oregon City, is the most heavily populated portion of the county and is characterized by flat or gently hilly topography. The Cascade Range has a relatively small population and is characterized by heavily forested slopes. Eastern Clackamas County is at higher risk to wildfire than western portions of the county due to its dense forest land. Human caused fires are responsible for most fires in Clackamas County. In Oregon City most instances of fire have been started by the railroads and I-5 but the fires have been small enough to contain quickly and easily.

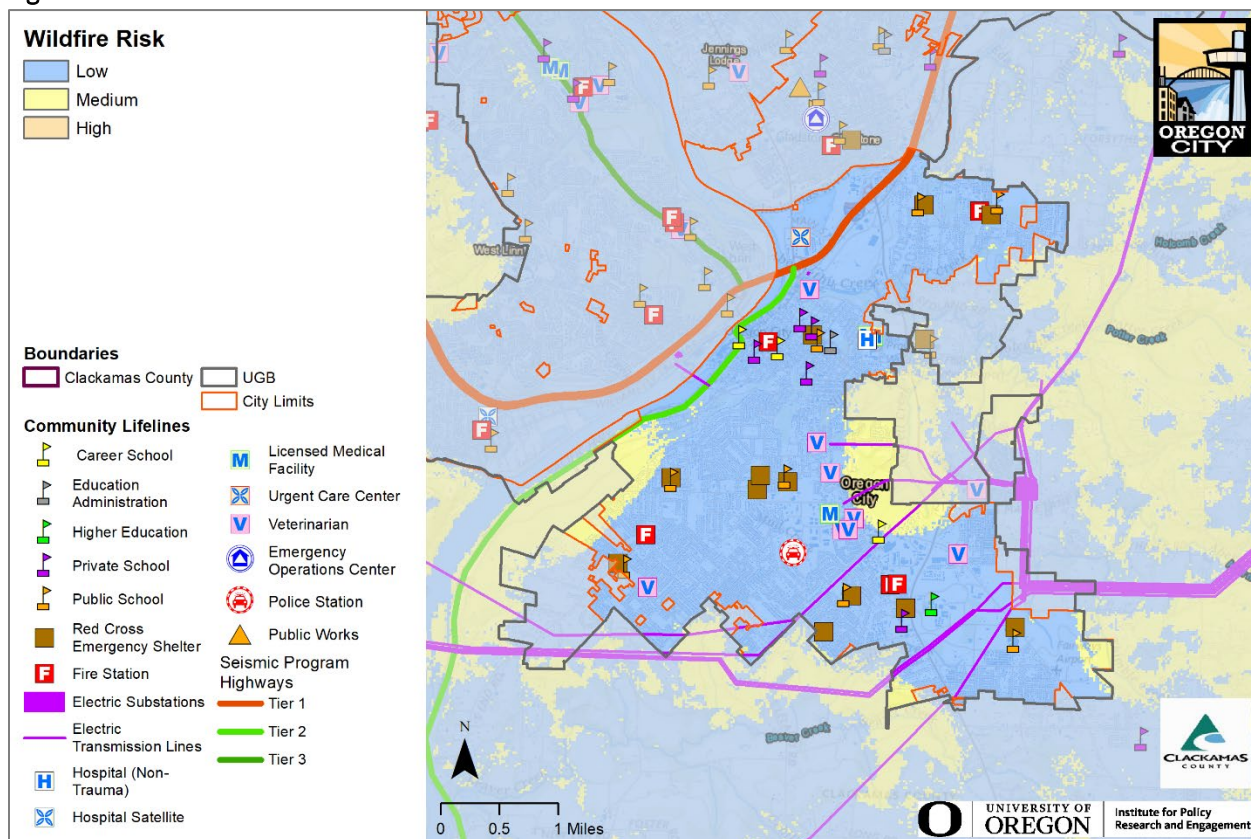
The forested hills within, and surrounding Oregon City are interface areas. One area that's particularly susceptible to fires is the Canemah Bluffs area. This area has heavy tree coverage and a dense neighborhood sits atop a steep wooded area, increasing the threat of wildfire. In August 2005, a wildfire on the Canemah Bluffs burned down a non-occupied historic structure. Another fire began in this same area in 2007. The 2007 fire began at Highway 99E and spread up the rock cliff face. Two additional areas that are particularly susceptible to wildfires: Newell Creek Canyon and the Waterboard Park. Newell Creek Canyon is open space located outside the Metro UGB and is not part of a master plan. This area is a major wildland urban interface and has the potential for a catastrophic fire.

Transients often have campfires in this area, creating a potential for fire to start. Highway 213 runs through this area and a cigarette thrown from a car is another potential source of ignition. If a fire were to break out along the highway, firefighters would have to fight it from the highway as there is limited access to the canyon. The Barclay Hills residential development on the west side of the canyon has very poor access, with only one way in and one way out. Waterboard Park is located along the bluff below

Promontory Avenue. This area is considered a charter park, meaning trees and brush cannot be cut to reduce fuel load. Like Newell Creek Canyon, Waterboard Park is home to many transients and campfires pose a threat to igniting a fire. High and medium Priority Communities at Risk (CARs) within the City include: Canemah Bluffs (high) and Holcomb (medium).²²

Most of the city has less severe (moderate or less) wildfire burn probability that includes expected flame lengths less than four-feet under normal weather conditions.²³ However, conditions vary widely and with local topography, fuels, and local weather (including wind) conditions. Under warm, dry, windy, and drought conditions expect higher likelihood of fire starts, higher intensity, more ember activity, and a more difficult to control wildfire that will include more fire effects and impacts.

Figure OC-6 Wildfire Risk



Source: Map created by Oregon Partnership for Disaster Resilience.

Data: Oregon statewide wildfire risk map created by Oregon State University (unpublished). Preparedness Framework Implementation Team (IRIS v3).

Note: To view additional wildfire risk information click this [link](#) to access Oregon Explorer’s CWPP Planning Tool

Vulnerability Assessment

The potential community impacts and vulnerabilities described in Volume I, Section 2 are generally accurate for the City as well. Oregon City’s fire response is addressed within the CWPP, which assesses wildfire risk, maps wildland urban interface areas, and includes actions to mitigate wildfire risk. The City

²² Clackamas County Community Wildfire Protection Plan, *Clackamas Fire District #1* (2018), Table 10.3-1.

²³ [Oregon Wildfire Risk Explorer](#), date accessed November 19, 2018.

will update the City’s wildfire risk assessment if the fire plan presents better data during future updates (an action item is included to participate in future updates to the CWPP).

Property can be damaged or destroyed with one fire as structures, vegetation, and other flammables easily merge to become unpredictable, and hard to manage. Other factors that affect ability to effectively respond to a wildfire include access to the location, and to water, response time from the fire station, availability of personnel, and equipment, and weather (e.g., heat, low humidity, high winds, and drought).

Natural Hazard Risk Report for Clackamas County

The **Risk Report (DOGAMI, 2024)**²⁴ provides hazard analysis summary tables that identify populations and property countywide that are vulnerable to the wildfire hazard.

According to the Risk Report 173 buildings (no critical facilities) are exposed to the *high and (or) moderate (medium) risk wildfire* hazard for a total exposure of \$60.1 million (a building exposure ratio of about 1%). About 599 residents may be displaced by wildfires (about 2% of the population).

Future Projections

According to the Oregon Climate Change Research Institute “Future Climate Projections, Clackamas County,”²⁵ wildfire frequency, intensity, and area burned are projected to continue increasing in the Northwest. Wildfire risk, expressed as the average number of days per year on which fire danger is very high, is projected to increase in Clackamas County by 14 (range -6– 34) by the 2050s, relative to the historical baseline (1971–2000), under the higher emissions scenario. Similarly, the average number of days per year on which vapor pressure deficit is extreme is projected to increase by 29 (range 10–44) by the 2050s. Communities at risk to wildfire include those within the urban wildfire interface or along river or creek corridors, where fire can travel quickly. Communities will need to address growing wildfire risks if populations are not restricted from expanding further into higher risk areas.

²⁴ DOGAMI, *Multi-Hazard Risk Report for Clackamas County, Oregon* (2024), Table A-30.

²⁵ Oregon Climate Change Research Institute, *Future Climate Projections, Clackamas County, Oregon*. February 2023.

Attachment A: Action Item Changes

Table OC-8 is an accounting of the status (complete or not complete) and major changes to actions since the previous NHMP. All actions were renumbered in this update to be consistent with other jurisdictions that are participating in the multi-jurisdictional NHMP. All actions marked not complete are ongoing, are still relevant, and are included in the updated action plan (Table OC-1).

Previous NHMP Actions that are Complete:

None identified.

Previous NHMP Actions that are Not Complete and No Longer Relevant:

None identified.

Table OC-8 Status of All Hazard Mitigation Actions in the Previous Plan

2018 Action Item	2024 Action Item	Status	Still Relevant? (Yes/No)
Multi-Hazard #1	#1	Not Complete	Yes
Multi-Hazard #2	#2	Not Complete	Yes
Multi-Hazard #3	#3	Not Complete	Yes
Multi-Hazard #4	#4	Not Complete	Yes
Earthquake #1	#5	Not Complete	Yes
Flood #1	#6	Not Complete	Yes
Flood #2	#7	Not Complete	Yes
Flood #3	#8	Not Complete	Yes
Landslide #1	#9	Not Complete	Yes
Landslide #2	#10	Not Complete	Yes
Severe Weather #1	#11	Not Complete	Yes
Wildfire #1	#12	Not Complete	Yes
Wildfire #2	#13	Not Complete	Yes
Wildfire #3	#14	Not Complete	Yes

Attachment B: Public Involvement Summary

Members of the steering committee provided edits and updates to the NHMP prior to the public review period as reflected in the final document.

To provide the public information regarding the draft NHMP addendum, and provide an opportunity for comment, an announcement (see below) was provided from March 6 through March 31 on the City’s website. The plan was also posted and announced on the County’s website. There were no comments provided. Additional opportunities for stakeholders and the public to be involved in the planning process are addressed in Volume III, Appendix B.

A diverse array of agencies and organizations were provided an opportunity to provide input to inform the plan’s content through a variety of mechanisms including the opportunity for comment on the draft plan. The agencies and organizations represent local and regional agencies involved in hazard mitigation activities, those that have the authority to regulate development, neighboring communities, representatives of businesses, academia, and other private organizations, and representatives of nonprofit organizations, including community-based organizations, that work directly with and/or provide support to underserved communities and socially vulnerable populations. For more information on the engagement strategy see Volume III, Appendix B.

Website Posting

The screenshot shows the Oregon City website with a navigation menu at the top: I WANT TO..., YOUR GOVERNMENT, DEPARTMENTS, DOING BUSINESS, OUR COMMUNITY. A sidebar menu on the left lists: Stormwater Plans, Natural Hazards Mitigation Plan, Water Plans, Sanitary Sewer Master Plan, and Transportation Plans. The main content area features a breadcrumb trail: Home | Departments | Public Works | Documents, Drawings, Forms & Permits | Public Works Master Plans | Natural Hazards Mitigation Plan. Below this is the heading "NATURAL HAZARDS MITIGATION PLAN" and a sub-heading "Latest Draft Of Natural Hazard Mitigation Plan released for comment". The text states: "Oregon City is in the process of updating our existing Natural Hazards Mitigation Plan (NHMP). This work is being performed in cooperation with the University of Oregon's Institute for Policy Research and Engagement - Oregon Partnership for Disaster Resilience and the Oregon Department of Emergency Management (OEM) utilizing funds obtained from the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program. The plan is available for public review and comment for two weeks. You can read the plan here. Email comments here." To the right is a thumbnail for the "City of Oregon City Addendum to the Clackamas County Multi-Jurisdictional Natural Hazard Mitigation Plan" with a photo of a building and a date of "April 08, 2024 - April 08, 2024". A "Select Language" dropdown is visible in the bottom left corner.

HMAC

The Hazard Mitigation Advisory Committee (HMAC) members possessed familiarity with the community and how it is affected by natural hazard events. The HMAC guided the update process through several steps including goal confirmation and prioritization, action item review and development, and information sharing, to update the NHMP and to make the NHMP as comprehensive as possible. The steering committee met formally on the following date:

Meeting #1: March 20 and May 24, 2023

During these meetings, the HMAC:

- Reviewed the previous NHMP, and were provided updates on hazard mitigation planning, the NHMP update process, and project timeline.
- Updated recent history of hazard events in the city.
- Reviewed and confirmed the County NHMP's mission and goals.
- Reviewed and provided feedback on the draft risk assessment update including community vulnerabilities and hazard information.
- Reviewed and updated their existing mitigation strategy (actions).
- Reviewed and updated their implementation and maintenance program.
- Discussed the NHMP public outreach strategy.

Meeting #3: November 17, 2023 (via remote conference)

During this meeting, the HMAC:

- Confirmed and provided feedback on the final draft risk assessment update including community vulnerabilities and hazard information provided by DOGAMI (Risk Report).
- Reviewed and confirmed the city's capabilities assessment.
- Reviewed, confirmed, and prioritized the city's mitigation strategies.