

COUNCIL RESOLUTION No. 8-2020**A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF MILWAUKIE, OREGON, ADOPTING UPDATES TO THE CITY'S ADDENDUM TO THE CLACKAMAS COUNTY MULTI-JURISDICTIONAL NATURAL HAZARDS MITIGATION PLAN.**

WHEREAS, the 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 (NHMP) is required as a condition of future funding for mitigation projects under multiple Federal Emergency Management Administration (FEMA) disaster mitigation grant programs; and

WHEREAS, the city has participated in the FEMA prescribed mitigation planning process to prepare the Clackamas County Multi-Jurisdictional NHMP, which has established a comprehensive, coordinated planning process to eliminate or minimize these vulnerabilities; and

WHEREAS, the city has identified natural hazard risks and prioritized several proposed actions and programs needed to mitigate the impacts of future disasters within the Clackamas County Multi-Jurisdictional NHMP; and

WHEREAS, these proposed projects and programs have been incorporated into the Clackamas County Multi-Jurisdictional NHMP that has been prepared for consideration and implementation by the cities of Clackamas County; and

WHEREAS, the Oregon Office of Emergency Management and FEMA Region X officials have reviewed the city's addendum to the Clackamas County Multi-Jurisdictional NHMP and have pre-approved it 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: Jurisdictional 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.

Now, therefore, be it resolved, by the City Council of the City of Milwaukie, Oregon, that the city's updated addendum to the Clackamas County Multi-Jurisdictional NHMP is adopted as an official plan; and the city manager is directed to develop and implement the mitigation strategies and administrative changes related to the NHMP.

Be it further resolved, that the city will submit this adoption resolution to the Oregon Office of Emergency Management and FEMA Region X officials to enable final approval of the Clackamas County Multi-Jurisdictional NHMP.

Introduced and adopted by the City Council on **January 21, 2020.**

This resolution is effective immediately.



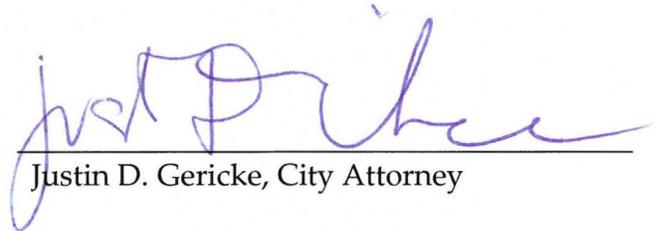
Mark F. Gamba, Mayor

ATTEST:

APPROVED AS TO FORM:



Scott S. Stauffer, City Recorder



Justin D. Gericke, City Attorney

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



March 2019

Volume II: Milwaukie Addendum



Prepared for:

City of Milwaukie

Prepared by:

**University of Oregon
Institute for Policy Research and Engagement
Oregon Partnership for Disaster Resilience**

Planning grant funding provided by:



FEMA

Federal Emergency Management Agency (FEMA)
Pre-Disaster Mitigation Program
Grant: EMS-2017-PC-0005
Sub-grant Application Reference: PDMC-PL-10-OR-2016-001, and

Additional Support Provided by:



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FEMA

January 27, 2020

The Honorable Jim Bernard
Chair, Clackamas County Commissioners
2020 Kaen Road Suite A
Oregon City, Oregon 97045

Dear Chairman Bernard:

On April 12, 2019, the United States Department of Homeland Security's Federal Emergency Management Agency (FEMA) Region 10, approved the Clackamas County Multi-Jurisdictional Hazard Mitigation Plan as a multi-jurisdictional local plan as outlined in Code of Federal Regulations Title 44 Part 201. This approval provides the below jurisdictions eligibility to apply for the Robert T. Stafford Disaster Relief and Emergency Assistance Act's, Hazard Mitigation Assistance grants through April 11, 2024, through your state.

Clackamas County	City of Estacada	City of Lake Oswego
City of West Linn	City of Wilsonville	City of Johnson City
City of Oregon City	City of Happy Valley	City of Canby
Clackamas Fire District	City of Gladstone	City of Sandy
City of Milwaukie	City of Molalla	

The updated list of approved jurisdictions includes the cities of Milwaukie and Molalla which recently adopted the Clackamas County Multi-Jurisdictional Hazard Mitigation Plan. To continue eligibility, jurisdictions must review, revise as appropriate, and resubmit the plan within five years of the original approval date.

If you have questions regarding your plan's approval, please contact Joseph Murray, State Hazard Mitigation Planner with the Oregon Military Department, Office of Emergency Management, at 503-378-3929, who coordinates and administers these efforts for local entities. If you have questions regarding FEMA's mitigation grant programs, please contact Amie Bashant, State Hazard Mitigation Officer with the Oregon Military Department, Office of Emergency Management, at 503-378-4660.

Sincerely,

Mark Carey, Director
Mitigation Division

Enclosure

JG

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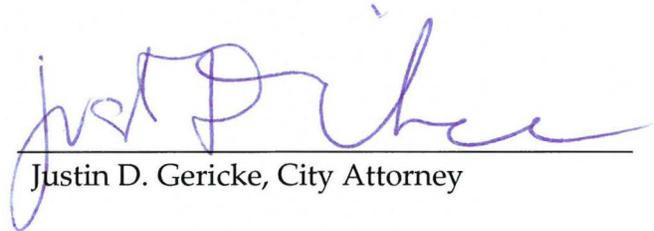
Mark F. Gamba, Mayor

ATTEST:

APPROVED AS TO FORM:



Scott S. Stauffer, City Recorder



Justin D. Gericke, City Attorney

Purpose

This is an update of the Milwaukie 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 Milwaukie'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.

Milwaukie adopted their addendum to the Clackamas County Multi-jurisdictional NHMP on **January 21, 2020**. FEMA Region X approved the Clackamas County NHMP on April 12, 2019 and the City's addendum on **January 27, 2020**. 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 **April 11, 2024**.

Mitigation Plan Mission

The NHMP mission states the purpose and defines the primary functions of the 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 city concurs with the mission statement developed during the Clackamas County planning process (Volume I, Section 3):

Promote sound public policy designed to protect citizens, critical facilities, infrastructure, private property, and the environment from natural hazards.

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 Clackamas County residents, as well as public and private partners, can take while working to reduce the city's 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.

The city concurs with the goals developed during the Clackamas County planning process (Volume I, Section 3). All 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.

Below is a list of the NHMP goals:

GOAL #1: PROTECT LIFE AND PROPERTY

- Implement activities that assist in protecting lives by making homes, businesses, infrastructure, critical facilities, and other property more resistant to natural hazards.
- Reduce losses and repetitive damages for chronic hazard events while promoting insurance coverage for catastrophic hazards.
- Improve hazard assessment information to make recommendations for discouraging new development and encouraging preventative measures for existing development in areas vulnerable to natural hazards.

GOAL #2: ENHANCE NATURAL SYSTEMS

- Balance watershed planning, natural resource management, and land use planning with natural hazards mitigation to protect life, property, and the environment.
- Preserve, rehabilitate, and enhance natural systems to serve natural hazard mitigation functions.

GOAL #3: AUGMENT EMERGENCY SERVICES

- Establish policy to ensure mitigation projects for critical facilities, services, and infrastructure.
- Strengthen emergency operations by increasing collaboration and coordination among public agencies, non-profit organizations, and business, and industry.
- Coordinate and integrate natural hazards mitigation activities, where appropriate, with emergency operations plans and procedures.

GOAL #4: ENCOURAGE PARTNERSHIPS FOR IMPLEMENTATION

- Strengthen communication and coordinate participation among and within public agencies, citizens, non-profit organizations, business, and industry to gain a vested interest in implementation.
- Encourage leadership within public and private sector organizations to prioritize and implement local, county, and regional hazard mitigation activities.

GOAL #5: PROMOTE PUBLIC AWARENESS

- Develop and implement education and outreach programs to increase public awareness of the risks associated with natural hazards.
- Provide information on tools, partnership opportunities, and funding resources to assist in implementing mitigation activities.

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*.

Milwaukie first developed an addendum to Clackamas County's Natural Hazards Mitigation Plan in 2003. This plan was updated in 2009, 2012/2013, and 2018/2019. The most recent update of the Milwaukie addendum to the Clackamas County NHMP was approved by FEMA on April 8, 2013.

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 Milwaukie to update their NHMP. This project is funded through the Federal Emergency Management Agency's (FEMA) Fiscal-Year 2016 (FY16) Pre-Disaster Mitigation (PDM) Competitive Grant Program EMS-2017-PC-0005 (PDMC-PL-10-OR-2016-001). Members of the Milwaukie NHMP Hazard Mitigation Advisory Committee (HMAC) also participated in the County NHMP update process (Volume III, Appendix B).

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

Convener

The Milwaukie police chief served as as the NHMP addendum convener during the 2018/2019 update process; the city's emergency manager will serve as the convener during the implementation and maintenance phase, as well as the next plan update. 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 Milwaukie 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 Milwaukie HMAC was comprised of the following representatives:

- Convener, Steve Bartol, police chief (*retired*)
- Luke Strait, police chief
- Mark Dye, police captain
- Damien Farwell, fleet and facilities supervisor
- Steve Hoffeditz, emergency manager
- Nick Lindekugel, GIS coordinator
- Peter Passarelli, public works director
- Samantha Vandagriff, building official

Public participation was achieved by posting the NHMP publicly and providing community members the opportunity to make comments and suggestions during the review process. Community members were also provided an opportunity for comment through a survey administered by Clackamas County (Volume III, Appendix G). The HMAC served as the local review body for the NHMP's development and was comprised of city officials representing different departments and sectors.

NHMP Implementation and Maintenance

City Council will be responsible for adopting the Milwaukie addendum to the Clackamas County NHMP. This addendum designates an 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 Milwaukie 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 city's emergency manager will serve as the convener 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; and
- Documenting successes and lessons learned during the year.

The convener will also remain active in the county's implementation and maintenance process (Volume I, Section 4).

The city will use the same action item prioritization process as the county (Volume I, Section 4).

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 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, Milwaukie 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.

Future development without proper planning may result in worsening problems associated with natural hazards. Metro, the regional government for Clackamas, Multnomah and Washington counties, determines many land use laws for the tri-county region and sets the urban growth boundary. The entire Portland Metro area is subject to tremendous growth pressures due to its desirable location and the restrictions on urban sprawl placed by urban growth boundary requirements.

Milwaukie's acknowledged comprehensive plan is the City of Milwaukie Comprehensive Plan (1989, *update expected in December 2019*). The city implements the plan through its development code.

Milwaukie currently has the following plans, regulations and projects that relate to natural hazard mitigation. For a complete list, visit the city's [website](#) and [General City Maps page](#):

- [Comprehensive Plan](#) (1989, [2019 Update](#))
 - [Land Use Map \(Additional Planning Documents\)](#)
- [Municipal Code](#) (Ord. 1686, July 9, 2018)
 - Title 13: Public Services
 - Title 15: Buildings and Construction
 - Title 16: Environment
 - Title 17: Land Division
 - Title 18: Flood Hazard Areas (SFHA and 1996 flood inundation area)
 - Title 19: Zoning
 - Title 21: Utility Service
- [Capital Improvement Plan](#) (2017-2022; 2019-2024)
- [Disaster Debris Management Plan](#) (Metro)
- [Milwaukie Community Climate Action Plan](#)
- Emergency Operations Plan
- [Transportation Systems Plan](#)
 - [Portland Metro 2014 Regional Transportation Plan](#)
- [Stormwater Master Plan](#)
- [Urban Forest Plan](#)
- [Wastewater Master Plan](#)
- [Water System Master Plan](#)

Other plans:

- [Clackamas County Community Wildfire Protection Plan](#)
 - [Clackamas Fire District #1](#)

Government Structure

The City of Milwaukie has a council-manager form of government. City Council consists of five members—a mayor and four councilors. The mayor presides over City Council meetings. The mayor and City Council members are elected to four-year terms of office through a general election. City Council is responsible for identifying problems and needs within the community, then addressing those problems through community goals and objectives.

The City of Milwaukie currently has the following departments that have a role in natural hazard mitigation:

City Manager's Office is responsible for taking charge of the daily supervision of city affairs.

Community Development oversees the planning and building departments.

The **planning department** regulates growth and development in Milwaukie by administering the city's Comprehensive Plan and Municipal Code related to zoning and land division. Tasks range from implementing existing zoning regulations to assisting City Council with land use and growth planning policy development. Planning is also responsible for regulating development impacts in natural resource areas.

The **building division** is responsible for plan review and inspections on commercial, industrial and residential developments, as well as fire life and safety plan review.

The **Public Works Department** provides many of the essential urban services to the community members of Milwaukie, including:

The **stormwater division** continues regular sewer line cleaning and inspection. The stormwater division maintains the components comprising the Milwaukie's stormwater infrastructure, valued at more than \$6 million. These components include 1,190 catch basins, 548 manholes, 62 sedimentation-manholes, 197 drywells, 37 miles of pipe and open ditches, and five detention ponds. The division uses information from inspections for ongoing analysis of the sewer system components and capital needs assessment, and on-the-spot pipe rehabilitation to minimize sewer back-ups. It also ensures that the city complies with the National Discharge Elimination System (NPDES) permit. The division also monitors pollutants in surface water.

The wastewater division maintains the components that comprise the city's wastewater infrastructure, valued at more than \$7 million. This includes 75 miles of sanitary sewer, five lift stations, and 1,607 manholes.

The **water division** is responsible for the supply and distribution of drinking water, maintaining all the components comprising the city's infrastructure, valued at more than \$16.5 million. The various components include 100 miles of water main, 964 fire hydrants, 6,911 water services, seven well houses, three storage reservoirs and four pump stations. The division ensures that the city's water storage and distribution systems comply with all state and federal regulations.

The **streets division** maintains the components that comprise the city's infrastructure, valued at more than \$38.7 million. These include 75 miles of road surface as well as signage and street pavement markings.

The **fleet division** maintains the city's vehicles and equipment, including police cars, sweepers, excavators, dump trucks and 150 pieces of small equipment and generators. And, the **Facilities Division** is responsible for maintaining all city facilities.

The **Engineering Department** provides quality engineering services to ensure that all city utilities, including wastewater collection, water, streets and storm water infrastructure, meet all municipal code requirements, are efficiently managed at the lowest cost to ratepayers, and serve the long-term needs of the community. In addition, the Engineering Department provides floodplain management and regulation for the city.

Public safety is committed to providing quality services to the Milwaukie community. Police services are provided by the Milwaukie **Police Department**, and fire services are provided by **Clackamas Fire District #1**. **Code enforcement** is responsible for neighborhood preservation, code compliance and nuisance abatement.

Continued Public Participation

An open public involvement process is essential to the development of an effective NHMP. To develop a comprehensive approach to reducing the effects of natural disasters, the planning process shall include opportunity for the public, neighboring communities, local and regional agencies, as well as, private and non-profit entities to comment on the NHMP during review.¹ Keeping the public informed of the city's efforts to reduce its risk to future natural hazard events is important for successful NHMP implementation and maintenance. The city is committed to involving the public in the NHMP review and update process (Volume I, Section 4). The city posted the plan update for public comment before FEMA approval, and after approval will maintain the plan on the City's website: hwww.milwaukieoregon.gov.

NHMP Maintenance

The Clackamas County NHMP and City of Milwaukie addendum will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. During the county NHMP update process, the city will also review and update its addendum (Volume I, Section 4). The convener will be responsible for convening the HMAC to address the questions outlined below.

- Are there new partners that should be brought to the table?
- Are there new local, regional, state or federal policies influencing natural hazards that should be addressed?
- Has the community successfully implemented any mitigation activities since the NHMP was last updated?
- Have new issues or problems related to hazards been identified in the community?
- Are the actions still appropriate given current resources?
- Have there been any changes in development patterns that could influence the effects of hazards?
- Have there been any significant changes in the community's demographics that could influence the effects of hazards?

¹ Code of Federal Regulations, Chapter 44. Section 201.6, subsection (b). 2015

- Are there new studies or data available that would enhance the risk assessment?
- Has the community been affected by any disasters? Did the NHMP accurately address the impacts of this event?

These questions will help the HMAC determine what components of the mitigation plan need updating. The HMAC will be responsible for updating any deficiencies found in the NHMP.

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) were first developed during the 2003 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 2018 update process the city reevaluated their mitigation strategy (action items). During this process action items were updated, noting what accomplishments had been made and whether the actions were still relevant; any new action items were identified at this time (see Attachment A for more information on changes to action items).

Priority Action Items

Table MA-1 presents a list of mitigation actions. The HMAC decided to modify the prioritization of action items in this update to reflect current conditions (risk assessment), needs, and capacity. High priority actions are shown in **bold** text with grey highlight. The City of Milwaukie 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 detailed information for each action. Full text of the plan goals referenced in Table MA-1 is located on page MA-2.

Table MA-I Milwaukie Action Items

Natural Hazard Action ID	Action Item	Coordinating Organization (Lead)	Internal Partners	Timing	Plan Goals Addressed				
					Goal 1	Goal 2	Goal 3	Goal 4	Goal 5
MH #1	Ensure that there are adequate shelter facilities in hazard-free zones to serve Milwaukie residents.	Emergency Management	CERT Volunteer, CFD#1	Ongoing	✓		✓	✓	✓
MH #2	Improve network of communications during a disaster.	Information Systems Technology	Public Works, CERT	Short Term	✓		✓	✓	✓
MH #3	Increase outreach and education for hazard awareness and natural disaster preparedness, especially for low-income, elderly, non-English speaking, and other vulnerable populations.	Emergency Management	Public Works, Community Services, CFD#1, CERT	Ongoing	✓		✓	✓	✓
MH #4	Maintain and promote CERT program activity in the area and recruit new members for training.	CFD#1	Emergency Management (EM), CERT	Ongoing	✓		✓	✓	✓
MH #5	Maintain and enhance strategies for debris management for all hazards.	Public Works	Metro	Ongoing	✓	✓	✓	✓	
MH #6	Improve and obtain resources and equipment essential for responding to and recovering from disasters.	Public Works	Emergency Management	Long Term	✓		✓	✓	
MH #7	Integrate the goals and mitigation actions from the Milwaukie Natural Hazards Mitigation Plan into existing regulatory documents and programs, where appropriate.	Planning	Engineering	Ongoing	✓	✓	✓	✓	✓
MH #8	Coordinate natural hazard related climate change action items through the Milwaukie Community Climate Action Plan.	Public Works	Planning, CFD#1, EM, Community Services	Ongoing	✓	✓	✓	✓	✓

Natural Hazard Action ID	Action Item	Coordinating Organization (Lead)	Internal Partners	Timing	Plan Goals Addressed				
					Goal 1	Goal 2	Goal 3	Goal 4	Goal 5
DR #1	Develop public brochures to raise awareness about drought hazards and mitigation actions residents can take to reduce the impact of drought.	Neighborhood Services	Emergency Management	Ongoing	✓			✓	✓
EQ #1	Conduct seismic evaluations on identified critical and essential facilities and infrastructure and implement appropriate structural and non-structural mitigation strategies.	Facilities	Building	Ongoing	✓		✓	✓	
FL #1	Evaluate alternatives for reducing the flooding hazard for properties along Kellogg Creek, Johnson Creek, Mount Scott Creek area, and the Willamette River.	Engineering	Planning, Public Works	Long Term	✓	✓	✓	✓	✓
FL #2	Ensure continued compliance with the National Flood Insurance Program through enforcement of local floodplain management ordinances.	Engineering	Planning, Building	Ongoing	✓	✓		✓	✓
SW #1	Bury vulnerable critical infrastructure, such as power lines, to lessen potential failures during severe weather.	Public Works	Engineering	Ongoing	✓	✓	✓	✓	
WF #1	Coordinate wildfire mitigation action items through the Clackamas County Community Wildfire Protection Plan.	CFD#1	Public Works, Building, Planning	Ongoing	✓	✓	✓	✓	✓

Source: City of Milwaukie HMAAC, 2018.

Note: Full text of the plan goals referenced in this table is located on page MA-2.

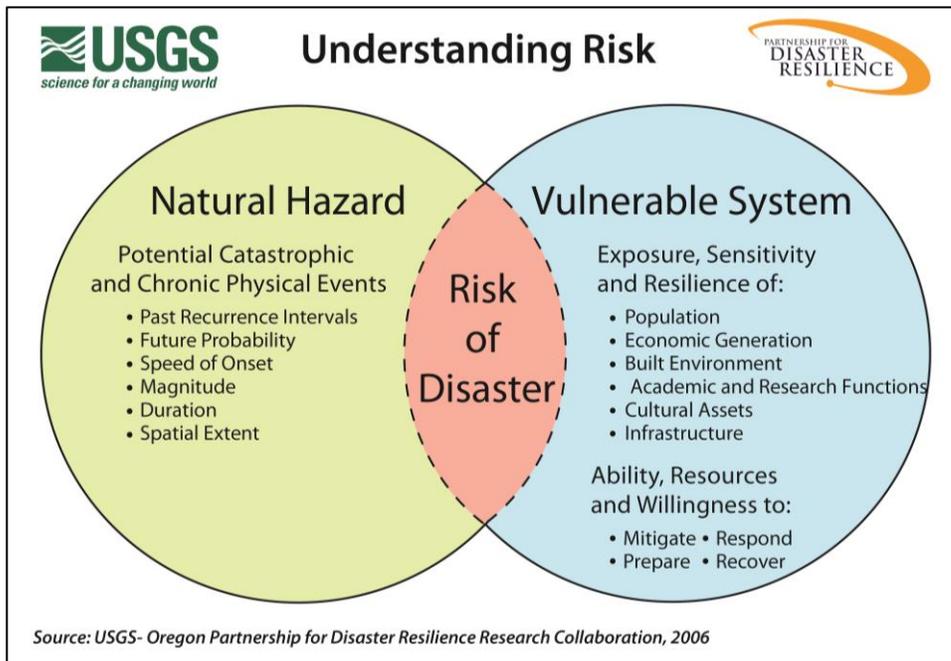
Risk Assessment

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 MA-1. Ultimately, the goal of hazard mitigation is to reduce the area of risk, where hazards overlap vulnerable systems.

Figure MA-1 Understanding Risk



Hazard Analysis

The Milwaukie HMA developed the city’s hazard vulnerability assessment (HVA), using the city’s 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 Milwaukie, which are discussed throughout this addendum. For detailed information on the methodology see Volume I, Section 2.

Table MA-2 shows the HVA matrix for Milwaukie 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 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 (flood, winter storm) rank as the top hazard threats to the city (Top Tier). Extreme heat and windstorm comprise the next highest ranked hazards (Middle Tier), while the drought, wildfire, volcanic event and landslide hazards comprise the lowest ranked hazards (Bottom Tier).

Table MA-2 Hazard Analysis Matrix – Milwaukie

Hazard	Maximum				Total Threat Score	Hazard Rank	Hazard Tiers
	History	Vulnerability	Threat	Probability			
Earthquake - Cascadia	4	45	100	49	198	#1	Top Tier
Earthquake - Crustal	6	50	100	21	177	#2	
Flood	16	20	40	56	132	#3	
Winter Storm	14	30	70	56	170	#4	
Extreme Heat	16	40	60	42	158	#5	Middle Tier
Windstorm	14	15	50	42	121	#6	
Drought	10	10	50	28	98	#7	Bottom Tier
Wildfire	6	15	50	21	92	#8	
Volcanic Event	2	10	40	14	66	#9	
Landslide	6	15	20	21	62	#10	

Source: Milwaukie HMAc, 2018.

Table MA-3 categorizes the probability and vulnerability scores from the hazard analysis for the city and compares the results to the assessment completed by the Clackamas County HMAc. Variations between the city and county are noted in **bold** text within the city ratings.

Table MA-3 Probability and Vulnerability Comparison

Hazard	Milwaukie		Clackamas County	
	Probability	Vulnerability	Probability	Vulnerability
Drought	Moderate	Low	High	Low
Earthquake - Cascadia	Moderate	High	Moderate	High
Earthquake - Crustal	Low	High	Low	High
Extreme Heat	Moderate	High	Low	High
Flood	High	High	High	Moderate
Landslide	Low	Low	High	Low
Volcanic Event	Low	Low	Low	Moderate
Wildfire	Low	Low	High	Moderate
Windstorm	Moderate	Low	Moderate	Low
Winter Storm	High	Moderate	Moderate	Moderate

Source: Milwaukie and Clackamas County HMAc, 2018.

Future Climate Variability

Human-caused climate change is impacting the natural systems and environmental health of regional and local communities. The City of Milwaukie recognizes the effects that climate change will have on the city and its residents, including changes to the frequency, severity, and impacts of natural hazards from historical norms. According to the [Intergovernmental Panel on Climate Change Fourth National Climate Assessment](#), the Pacific Northwest region will see impacts to drought risk, water quality, wildfires and air quality, human health and more due to climate change. Even with these challenges, the Pacific Northwest and Milwaukie will shelter a growing population seeking livability and refuge from more extreme climates in the nation.

Climate models for Oregon suggest future regional climate changes include increases in temperature around 0.2-1°F per decade in the 21st century, along with warmer and drier summers, and some evidence that extreme precipitation will increase in the future.² Increased droughts may occur in the Willamette Valley under various climate change scenarios because of various factors, including reduced snowpack, rising temperatures and likely reductions in summer precipitation. Climate models suggest that as the region warms, winter snow precipitation will likely shift to higher elevations and snowpack will diminish as more precipitation falls as rain altering surface flows.

Acknowledging the city's responsibility to be a leader in the climate crisis, Milwaukie adopted a [Climate Action Plan](#) detailing 53 city-led actions to mitigate and adapt to climate change. Along with reducing the city's greenhouse gas emissions and contribution to climate change, the Climate Action Plan calls for increasing the community's resiliency and preparedness for natural hazards through policy, advocacy, outreach and education.

Milwaukie is committed to planning and preparing for the immediate and future threats that climate change will have on the community. By addressing the climate crisis through the actionable goals of the Climate Action Plan, Milwaukie hopes to reduce the risk and impact of climate change related natural hazards on residents of Milwaukie and the region while encouraging others to take climate action.

² Oregon Climate Change Research Institute (OCCRI), [Fourth Oregon Climate Assessment Report](#) (2019) and [Fourth National Climate Assessment, Chapter 23: Northwest](#) (2019). <http://www.occri.net/publications-and-reports/publications/>

Community Characteristics

Table MA-4 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. Between 2010 and 2016, the Milwaukie grew by 220 people (1%; as of 2019 the population was 20,535) and median household income increased by about 8%.³ Between 2019 and 2040, the population is forecast to grow by 13% to 23,149.⁴ New development has complied with the standards of the [Oregon Building Code](#) and the city's development code.

Transportation/Infrastructure

Milwaukie is accessible by two state highways, OR-99E (or SE McLoughlin Boulevard), running north to south in the western part of the city, and Highway 224, running west to east through the central part of the city. Milwaukie is also bisected by the Union Pacific Railroad main line, which travels northwest to southeast carrying both passengers and freight.

The responsibility and authority, as well as the financial capability, to maintain an adequate level of service for the highways rests with Metro and Oregon Department of Transportation (ODOT) authorities. Congestion can result in the diversion of traffic onto Milwaukie streets.

The city's public transit is provided by Portland's TriMet transit system. Eleven bus routes go through the downtown Milwaukie transit center daily. The [MAX Orange Line](#) provides service to Milwaukie. The availability and quality of pedestrian and bicycling facilities (sidewalks, bike lanes, and pathways) is inconsistent, generally newer neighborhoods have facilities. [Base Maps](#) are found on the city's website.

Economy

Milwaukie is a major industrial center in the Portland metropolitan area, containing one of the largest concentrations of warehousing and distribution industries in the region. The North Milwaukie Industrial/Innovation Area, Omark Industrial Park and Johnson Creek industrial area comprise more than 300 acres of industrial land within the city. These areas are nearing capacity and very little land within the city is currently available for new industrial development.

Milwaukie's commercial lands are largely built up. New commercial development along Highway 224, McLoughlin Boulevard, and 82nd Avenue has lured many people away from downtown Milwaukie for purchasing comparison goods, such as clothes, furniture and appliances. Downtown Milwaukie, however, has continued to attract commercial investment in the form of commercial service uses including banks, insurance, professional offices, and a residential mixed-use development. The city has identified areas for commercial, office, or mixed use development: [map](#).

The city, school district and smaller employers (retail, offices and other professional services) provide for most of Milwaukie's employment.

³ Portland State University, Population Research Center, "Annual Population Estimates", 2016 & 2018 and Social Explorer, Table T57, U.S. Census Bureau, 2012-2016 and 2006-2010 American Community Survey Estimates.

⁴. Metro, 2040 Distributed Forecast (2016).

Table MA-4 Community Characteristics

Population Characteristics		
2010 Population	20,290	
2016 Population [2019 Population]	20,510 [20,535]	
2040 Forecasted Population*	23,149	
Race (non-Hispanic) and Ethnicity (Hispanic)		
White	84%	
Black/ African American	1%	
American Indian and Alaska Native	1%	
Asian	3%	
Native Hawaiian and Other Pacific Islander	< 1%	
Some Other Race	< 1%	
Two or More Races	2%	
Hispanic or Latino	9%	
Limited or No English Spoken	2%	
Vulnerable Age Groups		
Less than 15 Years	3,088	15%
65 Years and Over	3,388	16%
Disability Status		
Total Population	2,741	13%
Children (under 18)	134	4%
Seniors (65 and older)	1,100	33%
Income Characteristics		
Households by Income Category		
Less than \$15,000	777	9%
\$15,000-\$29,999	1,275	14%
\$30,000-\$44,999	1,113	12%
\$45,000-\$59,999	1,112	12%
\$60,000-\$74,999	1,126	12%
\$75,000-\$99,999	1,338	15%
\$100,000-\$199,999	2,035	22%
\$200,000 or more	325	4%
Median Household Income	\$63,421	
Poverty Rates		
Total Population	2,236	11%
Children	411	11%
Seniors	250	8%
Housing Cost Burden		
Owners with Mortgage	1,295	24%
Renters	1,562	43%

Source: U.S. Census Bureau, 2014-2018 American Community Survey; Portland State University, Population Research Center, "Annual Population Estimates", 2016 & 2019. [Metro, 2040 Distributed Forecast](#). Note: * = Population forecast within Metro UGB

Housing Characteristics		
Housing Units		
Single-Family	6,476	67%
Multi-Family	3,061	32%
Mobile Homes	82	1%
Year Structure Built		
Pre-1970	5,375	56%
1970-1989	2,795	29%
1990 or later	1,449	15%
Housing Tenure and Vacancy		
Owner-occupied	5,466	57%
Renter-occupied	3,635	38%
Seasonal	48	< 1%
Vacant	470	5%

Milwaukie has grown substantially since its incorporation in 1903 and has an area today of about 5 square miles. Between 1940 and 1980, the population grew from about 2,000 to just under 18,000 residents. Since then the growth in population has slowed.

The city is located within the southern bounds of the Portland metropolitan area (about six miles from downtown Portland). The city is within the Willamette River basin and has two major creeks flowing through it, Johnson Creek in the northern part of the city and Kellogg Creek in the southern part.

Milwaukie's climate is consistent with the Marine west coast climate zone, with warm summers and cool, wet winters. Milwaukie receives most of its rainfall between October and May, and averages 43 inches of rain, and less than one (1) inch of snow, per year.⁵

Elevations in the city range from 205 feet near 59th Avenue and Monroe Street to a low of 43 feet on the shores of the Willamette River. Milwaukie is characterized by flat or gently hilly topography.

⁵ ["Monthly Average for Milwaukie, OR"](#) The Weather Channel Interactive, Inc. Retrieved March 22, 2019.

Community Assets -

This section outlines the resources, facilities and infrastructure that, if damaged, could significantly impact the public safety, economic conditions and environmental integrity of Milwaukie. The community assets below were identified by the City of Milwaukie. The tables identify which hazards each asset may be exposed to based upon both a GIS analysis as well as HMAC member knowledge. Additional information is needed to fully understand the extent of risk to each asset. It is important to note that the facilities identified as “critical” and “essential” are characterized differently than the structural code that identifies buildings as “essential” and “non-essential.” The structural code uses different language and criteria and therefore have completely different meanings than the buildings identified in this addendum.

Critical Facilities

These facilities are critical 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.

Law Enforcement/Fire Stations:

City Facilities:

- Public Safety Building: Milwaukie Police Department/[CFD #2](#) (3200 SE Harrison St.)

Facilities Not in Milwaukie:

- [Town Center Station](#) (CFD #1, not in city)
- [Oak Grove Station](#) (CFD #3, not in city)
- [Lake Road Station](#) (CFD #4, not in city)
- Clackamas County Sheriff (not in city)
- Oregon State Police (not in city)

Hospitals:

- Providence Milwaukie Hospital (10150 SE 32nd Ave)
- Kaiser Permanente Hospital (not in city)
- Willamette Falls Hospital (not in city)

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 city buildings, such as the public safety building and City Hall, as well as other public facilities, such as schools.

City Buildings:

- Ledding Library
- Milwaukie Center
- Milwaukie City Hall
- 40th & Harvey
- Johnson Creek Building

- Public Safety Building

County Buildings:

- Kellogg Treatment Plant

Schools:

- Ardenwald Elementary (new)
- Clackamas Community College (Milwaukie Campus)
- Hector Campbell Elementary (closed)
- Linwood Elementary
- Milwaukie Elementary
- Milwaukie High School (new)
- Portland Waldorf School (private)
- Rowe Middle School
- Seth Lewelling Elementary
- St. John's School (private)
- School Transportation Center
- Wichita Center for Family and Community (not in city)

Potential Red Cross Shelter Sites:

- Milwaukie Center (5440 SE Kellogg Creek Dr)
- Eagles Wings Ministries (10902 SE Garrett Dr)
- Milwaukie Presbyterian Church (2416 SE Lake Rd)
- Clackamas Park Friends Church (8120 SE Thiessen Rd, Oak Grove)
- King of Kings Lutheran Church (5501 SE Thiessen Rd, Oak Grove)

Essential Infrastructure

Infrastructure that provide necessary services that supplement response efforts:

Bridges:

City

- 17th Avenue across Johnson Creek
- Milport Road across Johnson Creek
- Do you need to note Milwaukie Bay Bridge for WES?

County

- 55th Avenue across Johnson Creek
- 60th Avenue across Johnson Creek
- Linwood Avenue across Johnson Creek
- Stanley Avenue across Johnson Creek
- Oatfield Road across Kellogg Creek
- Rusk Road across Mount Scott Creek

Portland

- Johnson Creek Boulevard across Johnson Creek
- Ochoco Street across Johnson Creek

TriMet

- OR-99E (McLoughlin Boulevard)
- Kellogg Creek
- Ochoco (elevated portion)

State of Oregon

- McLoughlin Boulevard across Johnson Creek, north of the city
- McLoughlin Boulevard across Kellogg Creek
- McLoughlin off-ramp to Hwy. 224 across Johnson Creek
- Hwy. 224 across Johnson Creek, McLoughlin Boulevard and Main Street
- Hwy. 224 across railroad tracks and 26th Avenue
- Hwy. 224 across Mount Scott Creek
- Hwy. 224 across MAX Light Rail Orange Line tracks

Transportation Corridors:

- 17th Ave
- 32nd Ave
- 55th Ave
- Harrison St/42nd Ave/King Rd.
- Highway 224
- Johnson Creek Blvd
- King Rd
- Lake Rd
- Linwood Ave
- Max Orange Line
- McLoughlin Blvd/Highway 99E
- Oatfield Rd
- River Rd
- MAX Orange Line and Bus Lines

Water Treatment Facilities

- Eight City Wells
- Aeration Packed Towers – 5 @ two locations
- Concrete Storage Tank – 40th & Harvey
- Elevated Water Storage Tank – 40th & Harvey
- Ground Level Metal Tank – Stanley & Harlow
- Sewerage Pump Stations – 5

Other Utilities

- NW Natural pipelines
- PGE Substations (One is at edge of Lake / Harmony; a second is on the East end of Johnson Creek; a third is on the border between Milwaukie and Oak Grove)

Vulnerable Populations:

Vulnerable populations, including seniors, disabled citizens, women, and children, as well as 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:

- Lockdown Facility (9200 SE McBrod Ave.)
- Hillside Manor
- Johnson Creek Treatment Facility
- Prestige Post-Acute and Rehab Center
- Royal Marc Retirement Residence
- Annie Ross House (transitional family housing)
- Milwaukie Center (daytime programs)
- ElderPlace Providence (daytime programs, Providence Milwaukie)
- Senior Center on Rusk Road near North Clackamas Park (in development)

Hazardous Materials:

Facilities that, if damaged, could cause serious secondary impacts may also be considered “critical.” A hazardous material facility is one example of this type of critical facility. Those sites that store, manufacture, or use potentially hazardous materials include: International Way, North Milwaukie Innovative Area, and Precision Cast Parks.

Economic Assets/Population Centers:

Economic assets include businesses that employ large numbers of people and provide an economic resource to the City. 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. These assets include: Downtown, McLoughlin Commercial Areas, and North Milwaukie Innovative Area .

Environmental Assets:

Environmental assets are those parks, green spaces, wetlands, and rivers that provide an aesthetic, and functional ecosystem services for the community. These environmental assets include: Ball-Michel Park, Dogwood Park, Elk Rock Island, Homewood Park, North Clackamas Park, Milwaukie Bay Park, Stanley Park, Water Tower Park, and Wichita Park.

Cultural or Historical Assets:

These assets include those facilities that augment or help define community character, and if lost, would represent a significant loss for the community.

Historic Inventory: see State Historic Preservation Office for more information: [Link](#)

- More than 500 houses
- Five commercial buildings
- Three schools
- One cemetery
- One church
- One city hall
- One water works

Community Attractions:

- 17th Avenue Bike/Pedestrian Path
- Bob’s Red Mill
- Carefree Sundays
- Dark Horse Comics Corporate Headquarters
- First Friday (May-October)
- Milwaukie Bay Park
- Milwaukie Farmers Market
- Milwaukie Museum
- Sara Hite Memorial Rose Garden
- Spring Park and Elk Rock Island
- Springwater Trail
- Trolley Trail
- Winter Solstice Event
- Umbrella Parade and Tree Lighting
- Carefree Sunday

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 addendum.*

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.

Milwaukie currently obtains its potable water from the Troutdale Aquifer through eight operating wells located throughout the city. Interties to the City of Portland and Clackamas River Water systems are maintained for emergency water supplies. The network of three water reservoirs provide a storage volume of six million gallons.⁶ The [Water System Master Plan](#) was last updated in 2010 to provide long-term guidance for the development of the city's water system, which is a supporting document for the Comprehensive Plan. The document also includes recommended capital improvement projects and a map documenting the water infrastructure placement within the city.

Vulnerability Assessment

Due to insufficient data and resources, Milwaukie is currently unable to perform a quantitative risk assessment, or exposure analysis, for this hazard.

Mitigation Activities

Milwaukie has a drought action item that addresses public awareness. The existing drought hazard mitigation activities are conducted at the county, regional, state, and federal levels and are described in the Clackamas County NHMP.

Please review Volume I, Section 2 for additional information on this hazard.

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**. *The probability and vulnerability ratings did not change since the previous version of this NHMP addendum. Note: Previously, the earthquake hazard profile was a single risk assessment, which is now divided into two separate earthquake hazards: Cascadia Subduction Zone (CSZ) earthquake and Crustal earthquake.*

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 Milwaukie as well. The causes and characteristics of an earthquake event are appropriately described within the Volume I, Section 2 as well as the location and extent of potential hazards. Previous occurrences are well documented within Volume I,

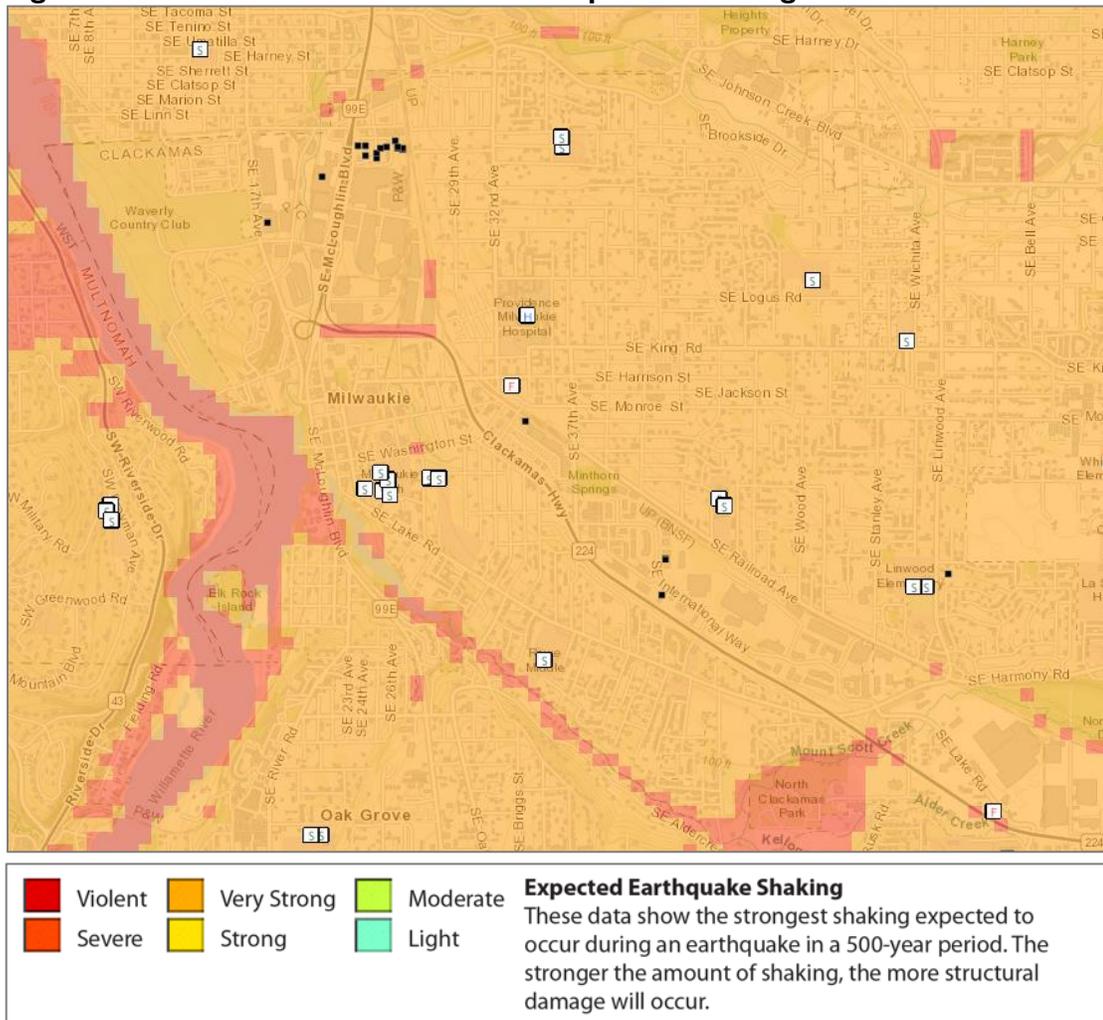
⁶ [Milwaukie Municipal Code Chapter 5](#). Comprehensive Plan, City of Milwaukie. Last Viewed March 27, 2019.

Section 2 and the community impacts described by the county would generally be the same for Milwaukie 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, Portland Hills Fault Zone, Gales Creek-Newberg-Mt. Angel Structural Zone (discussed in the crustal earthquake section).

Figure MA-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 near rivers and streams will experience severe (light red) to violent (dark red) shaking in a CSZ event.

Figure MA-2 Cascadia Subduction Zone Expected Shaking



Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](#)

Note: To view detail click the link above 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.

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**. *The probability rating decreased while the vulnerability rating did not change since the previous version of this NHMP addendum. Note: Previously, the earthquake hazard profile was a single risk assessment, which is now divided into two separate earthquake hazards: Crustal earthquake, and Cascadia Subduction Zone (CSZ) earthquake.*

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 Milwaukie as well. Figure MA-3 shows a generalized geologic map of the Milwaukie 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 Milwaukie 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 faults include the Oatfield fault (just to the east of the city on the eastern side of the Willamette River) and the Damascus-Tickle Creek fault to the east 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.

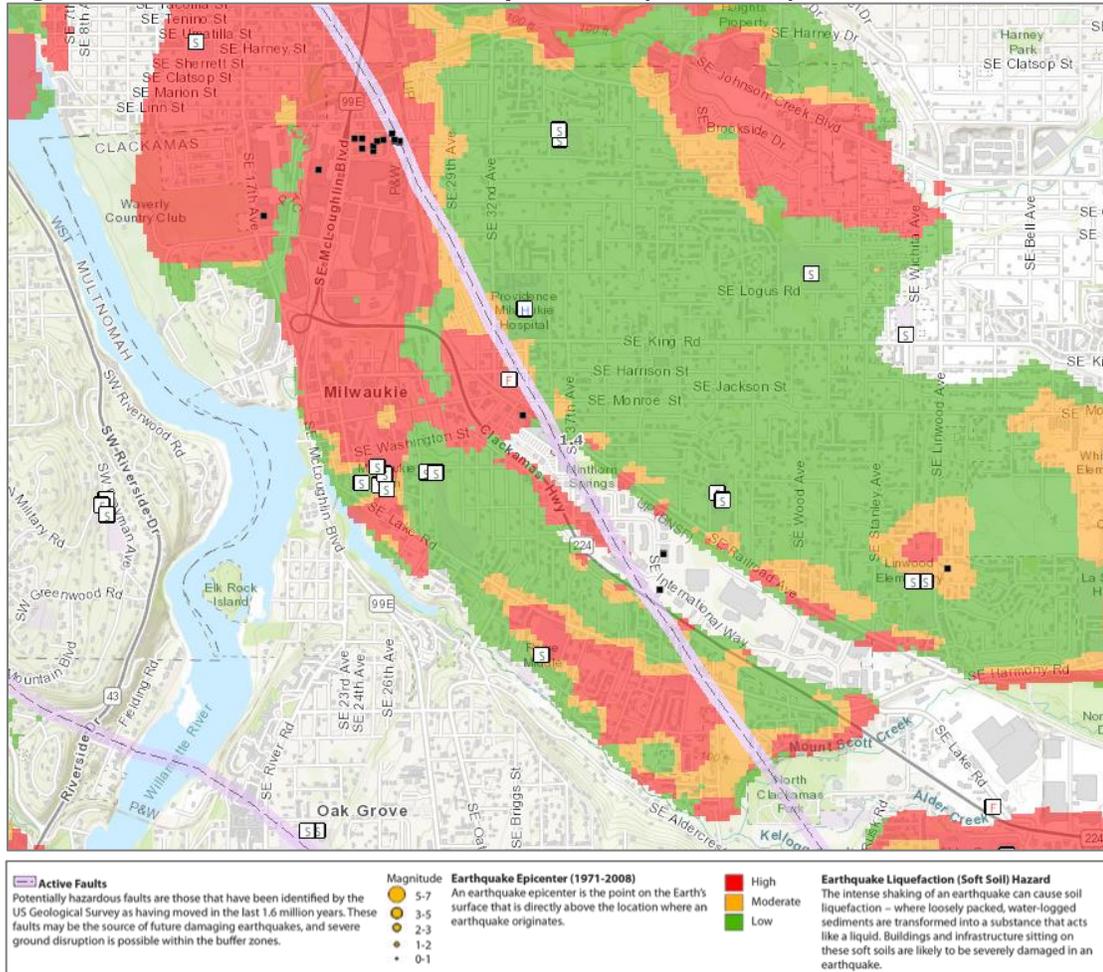
Portland Hills Fault Zone

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 runs through the western side of Milwaukie.

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

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.

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



Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](#)

Note: To view detail click the link above to access Oregon HazVu

Vulnerability Assessment

Due to insufficient data and resources, Milwaukie is currently unable to perform a quantitative risk assessment for this hazard. However, the city completed an analysis, using the best available data, as a component of the vulnerability assessment in 2009, updated in 2012, and reviewed and updated, as appropriate, in 2018. This analysis looked at identified hazard areas in conjunction with available data on property exposed to the hazard. Exposure of community assets to natural hazards was determined by manually comparing community assets with each hazard and identifying where assets and hazards intersected. Additionally, 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.

Community assets located in the highest hazard zone for earthquakes include the Public Safety Building (Milwaukie Police Department and Clackamas Fire District Station 2), Providence Milwaukie Hospital, and the North Milwaukie Innovative Area. Milwaukie's infrastructure is particularly vulnerable to earthquake damage, especially Highway 224 and OR-99E. Of the city's eight wells, two of them are along the fault line, with others in the moderate to high hazard zones for earthquakes. During a major earthquake, emergency responders may have difficulty performing their duties because their buildings could be impacted by the event. The Public Safety Building is in the moderate to high hazard zones. Areas near the Willamette River and various creeks around Milwaukie are likely comprised of softer soils prone to liquefaction. This can be very destructive to underground utilities such as water and sewer lines. Buildings and water lines can sink into the liquefied ground while sewer pipes, manholes and pump stations (assets partially filled with air) may float to the surface. After the earthquake, the liquefied soil will re-solidify, locking tilted buildings and broken pipe connections into place.

Vulnerable populations such as children could be significantly impacted, as many schools lie in the highest two hazard zones. The data gathered from the statewide DOGAMI inventory should be used to prioritize school buildings in Milwaukie for seismic hazard retrofitting.

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 86% 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 MA-5; each "X" represents one building within that ranking category. Of the facilities evaluated by DOGAMI using their Rapid Visual Survey (RVS), three (3) have very high (100% chance) collapse potential, while two (2) have a high (greater than 10% chance) collapse potential. *Note: one school has been retrofitted and one is scheduled to be retrofitted.*

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.

Table MA-5 Rapid Visual Survey Scores

Facility	Site ID*	Level of Collapse Potential			
		Low (<1%)	Moderate (>1%)	High (>10%)	Very High (100%)
Schools					
Alder Creek Middle (13801 SE Webster Rd)	Clac_sch83	X			
Ardenwald Elementary (8950 SE 36th Ave)	Clac_sch14	Retrofitted per a 2008 bond.			
<i>Hector Campbell Elementary (11326 SE 47th Ave) - CLOSED</i>	<i>Clac_sch87</i>		X	X	
Linwood Elementary (11909 SE Linwood Ave)	Clac_sch19	X			X
Milwaukie Elementary School (11250 SE 27 th Ave)	Clac_sch20			X	X
Milwaukie High School (2301 SE Willard St)	Clac_sch28	Rebuild in progress per a 2016 bond.			
Portland Waldorf School (2300 SE Harrison St)	-	2007 RVS report did not include structural appendix for this facility.			
Seth Lewelling Elementary (5325 SE Logus Rd)	Clac_sch88	X			
St. John Catholic School (10956 SE 25th Ave)	-	2007 RVS report did not include structural appendix for this facility.			
Public Safety					
CFD Fire Station 1 (ca. 1983) (11300 SE Fuller Rd)	Clac_fir09	X			
CFD Fire Station 2 (ca. 1993) (Public Safety Building) (3200 SE Harrison)	Clac_fir26	X			
CFD Fire Station 3 (ca. 1997) (2930 SE Oak Grove Blvd)	Clac_fir27	X			
CFD Fire Station 4 (ca. 1999) (6600 SE Lake Rd)	Clac_fir08	X			
Hospital					
Providence Milwaukie (10150 SE 32 nd Ave)	Clac_hos02	X			

Source: [DOGAMI 2007. Open File Report O-07-02. Statewide Seismic Needs Assessment Using Rapid Visual Assessment.](#) "*" – Site ID is referenced on the [RVS Clackamas County Map](#)

Note 1: Bold indicates facilities that have been seismically retrofitted or rebuilt.

Note 2: Private schools were not assessed by DOGAMI as part of O-07-02.

Mitigation Activities

Milwaukie has taken mitigation steps to reduce the city's vulnerability in earthquake events. Additional mitigation activities completed by the City of Milwaukie include:

- Compliance with SB 13, enacted in 2001, requiring local governments to develop seismic preparation procedures, inform their employees about the procedures, and conduct earthquake drills.

- Conformance with seismic-related construction requirements in the Oregon Structural Specialty Code and Oregon One- and Two-Family Dwelling Specialty Code.
- Adoption of a policy to require undergrounding of power lines in new subdivisions.
- Development Code restrictions regarding construction on steep slopes.
- The following buildings have been constructed to be earthquake safe: Water tower at 40th Avenue and Harvey Street, Milwaukie High School Fine Arts Center, Linwood Elementary Main Office and Gym, and the Milwaukie Library.
- Ardenwald Elementary retrofitted per 2008 bond passed by voters (former building demolished in 2009).
- Milwaukie High School scheduled for reconstruction/rebuild of main building by August 2021 through a 2016 bond passed by voters.⁸

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 to 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 night time (2 AM). Impacts to buildings and people were tabulated at the county, jurisdictional (city), and neighborhood unit level. Estimated damaged 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 MA-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.

⁸ [Milwaukie High School Bond Project](#). Capital Construction Bond, North Clackamas Schools. Last visited March 28, 2019.

Table MA-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	7,891	7,891	7,891	7,891
Building Value (\$ Million)	2,890	2,890	2,890	2,890
Building Repair Cost (\$ Million)	295	394	1,341	1,598
Building Loss Ratio	10%	14%	46%	55%
Debris (Thousands of Tons)	162	193	542	615
Long-Term Displaced Population	93	83	2,459	5,456
Total Casualties (Daytime)	294	380	1,427	1,595
Level 4 (Killed)	14	19	82	89
Total Casualties (Nighttime)	34	92	326	546
Level 4 (Killed)	1	3	10	16

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

The City of Milwaukie is expected to have a 10% building loss ratio with a repair cost of \$295 million under the CSZ “dry” scenario, and a 14% building loss ratio with a repair cost of \$394 million under the CSZ “wet” scenario.⁹ The city is expected to have around 294 daytime or 34 nighttime casualties during the CSZ “dry” scenario and 380 daytime or 92 nighttime casualties during the CSZ “wet” scenario. It is expected that there will be a long-term displaced population of around 93 for the CSZ “dry” scenario and 83 for the CSZ “wet” scenario.¹⁰

Portland Hills Fault Scenario

The City of Milwaukie is expected to have a 46% building loss ratio with a repair cost of \$1.341 billion under the CSZ “dry” scenario, and a 55% building loss ratio with a repair cost of \$1.598 billion under the CSZ “wet” scenario.¹¹ The long-term displaced population and casualties are greatly increased for all the Portland Hills Fault scenarios. The city is expected to have around 1,427 daytime or 326 nighttime casualties during the Portland Hills Fault “dry” scenario and 1,595 daytime or 546 nighttime casualties during the Portland Hills Fault “wet” scenario. It is expected that there will be a long-term displaced population of around 2,459 for the Portland Hills Fault “dry” scenario and 5,456 for the Portland Hills Fault “wet” scenario.¹²

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 MA-1 and Volume I, Section 3). For more detailed information on the report, the damage estimates, and the recommendations see:

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

¹⁰ Ibid, Tables 12-8 and 12-9.

¹¹ Ibid, Tables 12-10 and 12-11

¹² Ibid, Tables 12-10 and 12-11.

Earthquake regional impact analysis for Clackamas, Multnomah, and Washington Counties, Oregon (2018, [O-18-02](#)).

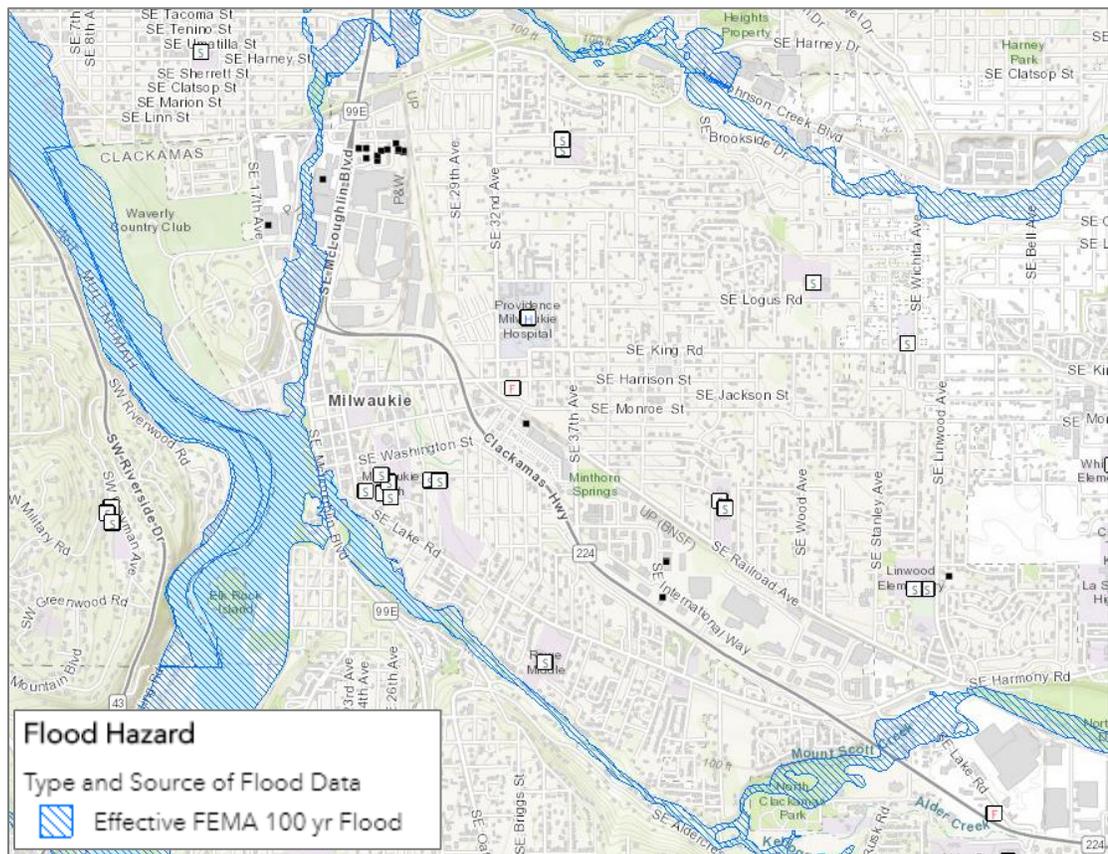
Please review Volume I, Section 2 for additional information on this hazard.

Flood

The HMAC determined that the city's probability for flood is **high** and that their vulnerability to flood is **high**. *The probability rating did not change, while the vulnerability rating increased since the previous version of this NHMP addendum.*

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

Figure MA-4 Special Flood Hazard Area



Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](#)

Note: To view detail click the link above to access Oregon HazVu

For additional maps including the 1996 flood inundation area see the City's [Flood Hazard Map Viewer](#)

Portions of Milwaukie have areas of floodplain (special flood hazard areas, SFHA). These include Johnson Creek, Kellogg Creek, Mount Scott Creek, Minthorn Creek, Spring Creek, and Willamette River. The Federal Emergency Management Agency (FEMA) regulatory floodplains for each of these rivers are depicted as relatively narrow areas on each side of the channels. On the Willamette River, the floodway is generally confined within high

stream banks. The FEMA 100-year map shows that 1.3 miles of the transportation network could be affected in a flood.

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 Milwaukie 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. City staff has identified sites where local drainage facilities are taxed during high flows, especially where open ditches enter culverts or go underground into storm sewers and works to mitigate the stormwater flood risks in these areas (see the Milwaukie's [Stormwater Master Plan](#) for more information).

The speed of onset, lack of warning and depth of flooding make dam failures a potentially deadly, albeit unlikely, occurrence. There are four major dams upstream of Milwaukie on the Clackamas River: North Fork, Faraday, River Mill and Timothy. These are operated by Portland General Electric and subject to the dam safety and warning requirements of the Federal Energy Regulatory Commission. According to the Clackamas County Emergency Operations Plan, areas of Milwaukie bordering on the Willamette River in the vicinity of its confluence with the Clackamas River would be inundated by a wall of water 60-80 feet high in approximately an hour and a half should the North Fork dam fail under a "probable maximum flood" (a worst-case scenario where all four dams fail). In December 2015, Milwaukie had to evacuate approximately 50 people from their homes as Mount Scott and Johnson Creek overflowed.

The largest flooding event to affect Milwaukie was the February 1996 flood. The high-water level meant tributaries could not drain into the Tualatin and Willamette rivers, which led to localized flooding on several backed-up creeks.

The extent of flooding hazards in Milwaukie primarily depends on climate and precipitation levels. Additionally, withdrawals for irrigation and drinking water, as well as stream and wetland modifications or vegetation removal can influence water flow.

Vulnerability Assessment

Due to insufficient data and resources, Milwaukie is currently unable to perform a quantitative risk assessment for this hazard. However, the city completed an analysis, using the best available data, as a component of the vulnerability assessment in 2009, updated in 2012, and reviewed and updated, as appropriate, in 2018. This analysis looked at identified hazard areas in conjunction with available data on property exposed to the hazard. Exposure of community assets to natural hazards was determined by manually comparing community assets with each hazard and identifying where assets and hazards intersected.

The areas around Johnson Creek (impacts industrial area), Kellogg Creek, Mount Scott Creek (impact North Clackamas Park, senior center and multiple residences north of Highway 224 and south of Lake Road), and Willamette River are particularly vulnerable to flooding. Additionally, proposed lots on 19th Avenue may be vulnerable to Willamette River flooding. Johnson Creek runs through the downtown mixed-use and North Milwaukie Industrial/Innovation Area. Kellogg Creek mostly affects residential areas in the chance of flooding. The downtown area is located near the Willamette River due to the historic use of the river for economic reasons.

Additionally, a great deal of infrastructure (bridges, water lines, sewage pump stations, etc.) is in the floodplain. Infrastructure exposed to flooding includes, but is not limited to, Highway 224, Lake Road, McLoughlin Boulevard, and the North Milwaukie Innovative Area. Disruption to this infrastructure could result in transportation issues, power outages, sewage back-up, and affect overall community and environmental health.

National Flood Insurance Program (NFIP)

FEMA’s Flood Insurance Study (FIS), and Flood Insurance Rate Maps (FIRMs) are effective as of January 18, 2019 and June 17, 2008. Table MA-7 shows that as of July 2018, Milwaukie has 60 National Flood Insurance Program (NFIP) policies in force. Of those, 50 are for properties that were constructed before the initial FIRMs. The last Community Assistance Visit (CAV) for Milwaukie was on June 26, 2019 (including an audit of Title 18: Flood Hazard Areas). Milwaukie does not participate in the Community Rating System (CRS).

Table MA-7 Flood Insurance Detail

	Clackamas County	Milwaukie
Effective FIRM and FIS	6/17/2008	1/18/2019
Initial FIRM Date	-	6/18/1980
Total Policies	1,957	60
Pre-FIRM Policies	1,086	50
Policies by Building Type		
Single Family	1,761	31
2 to 4 Family	30	4
Other Residential	58	16
Non-Residential	9	1
Minus Rated A Zone	123	2
Insurance in Force	\$541,833,400	\$18,107,600
Total Paid Claims	590	48
Pre-FIRM Claims Paid	450	41
Substantial Damage Claims	83	5
Total Paid Amount	\$20,830,662	\$2,228,684
Repetitive Loss Structures	51	6
Severe Repetitive Loss Properties	4	0
CRS Class Rating	-	NP
Last Community Assistance Visit	-	6/26/2019

Source: Information compiled by Department of Land Conservation, and Development, July 2018.
 Note: The portion of the cities of Portland and Tualatin that are within Clackamas County are not included in this table. NP = Not Participating

The table shows that most flood insurance policies are for residential structures, primarily single-family homes. There has been a total of 48 paid claims for \$18,107,600. The city complies with the NFIP through enforcement of their flood damage prevention ordinance (Title 18) and their floodplain management program.

Risk Analysis - Repetitive Loss Properties:

Milwaukie works to mitigate problems regarding flood issues as they arise. Some areas in the city are more susceptible to flooding issues and have incurred repetitive losses. The Community Repetitive Loss record for Milwaukie identifies six (6) Repetitive Loss (RL) Properties¹³, none are considered Severe Repetitive Loss (SRL) Properties¹⁴. RL and SRL properties are troublesome because they continue to expose lives and valuable property to the flooding hazard. Local governments as well as federal agencies such as FEMA attempt to address losses through floodplain insurance and attempts to remove the risk from repetitive loss of properties through projects, such as acquiring land and improvements, relocating homes or elevating structures. Continued repetitive loss claims from flood events lead to an increased amount of damage caused by floods, higher insurance rates, and contribute to the rising cost of taxpayer funded disaster relief for flood victims.

Table MA-8 provides information on the identified RL and SRL properties. There have been 17 paid RL claims totaling \$612,550. Of these properties, none (0) are considered SRL. Three (3) of the RL properties are not insured as of July 2018. For additional detail and a map of their general location see Volume I, Section 2 and Figure 2-13.

Table MA-8 Repetitive Loss and Severe Repetitive Loss Properties Detail

RL or SRL Property	Location	Currently Insured?	Flood Zone	Occupancy	Historic Building	Total Paid Claims	Total Paid Amount
RL	Property 1	NO	A19	Non-residential	No	2	\$396,804
RL	Property 3	YES	X	Single Family	No	2	\$65,060
RL	Property 5	NO	X	Single Family	No	2	\$5,058
RL	Property 14	NO	B	Single Family	No	6	\$100,814
RL	Property 15	YES	C	2-4 Family	No	3	\$27,463
RL	Property 16	YES	C	2-4 Family	No	2	\$17,351
Total						17	\$612,550

Source: Department of Land Conservation and Development, July 2018.

Notes: RL – Repetitive Loss Property, SRL – Severe Repetitive Loss Property

For location details see Table 2-15 in the Clackamas NHMP Volume I, Section 2.

Mitigation Activities

Milwaukie employs several mitigation strategies to reduce the city’s risk to flood events, including mapping flood-prone areas by address. The city’s priority is to mitigate residences

¹³ 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.

¹⁴ 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.

located within the floodway (see FL #1). The city development code includes policies and regulations for flood prone areas including, Natural Resources Overlay Zone (Chapter 19.402, [Natural Resources Administrative Map](#)), Flood Hazard Regulations (Title 18 – Flood Hazard Areas (includes the SFHA and the 1996 flood inundation area; [Flood Hazard Map Viewer](#)), and Willamette Greenway Zone (Chapter 19.401). Milwaukie regularly inspects and maintains the stormwater facilities. Catch basins are routinely cleaned and inspected and a regular street sweeping program reduces the amount of debris and contaminants entering the stormwater system. The city maintains a [Stormwater Master Plan](#) and has been planning various projects to restore Kellogg Creek. These projects would include building a bridge over the creek and downtown revitalization.

To improve stormwater management, Milwaukie lined the interiors of all pipes along the 18th Avenue infiltration line. This mitigation project minimizes the amount of groundwater that infiltrates into sewer lines and helps reduce the overall amount of water going into the wastewater treatment plant, thus reducing the chance of overflow of the sewer system. Additionally, a severe repetitive loss property on Rusk Road was purchased and demolished using FEMA Flood Mitigation Assistance funding in 2018 (grant covered approximately \$315,000 for the purchase of the property, additional funds were allocated for staff hours, title report, due diligence reports, and demolition contract).

In 2006 Clackamas County Water Environment Services partnered with eight community groups to restore the Three Creeks area – including Mount Scott, a tributary to Kellogg Creek and the Willamette. The group reshaped the stream channel to make it more natural; removed invasive species; planted thousands of native plants to stabilize; and put in lard wood and boulders to stabilize the channel and provide habitat for fish. The groups also removed trash and transient camps that polluted the streams during floods.

Projects completed by the Johnson Creek Watershed Council:

- Tree Plantings along Johnson Creek.
- Storm water detention near Milport Road.

In 2018, the city completed its [Urban Forest Plan](#) that includes information on tree planting strategies.

Please review Volume I, Section 2 for additional information on this hazard.

Landslide

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

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. Although catastrophic landslides have not occurred in Milwaukie, steep slopes do exist along the banks of the Willamette River and Kellogg Creek.

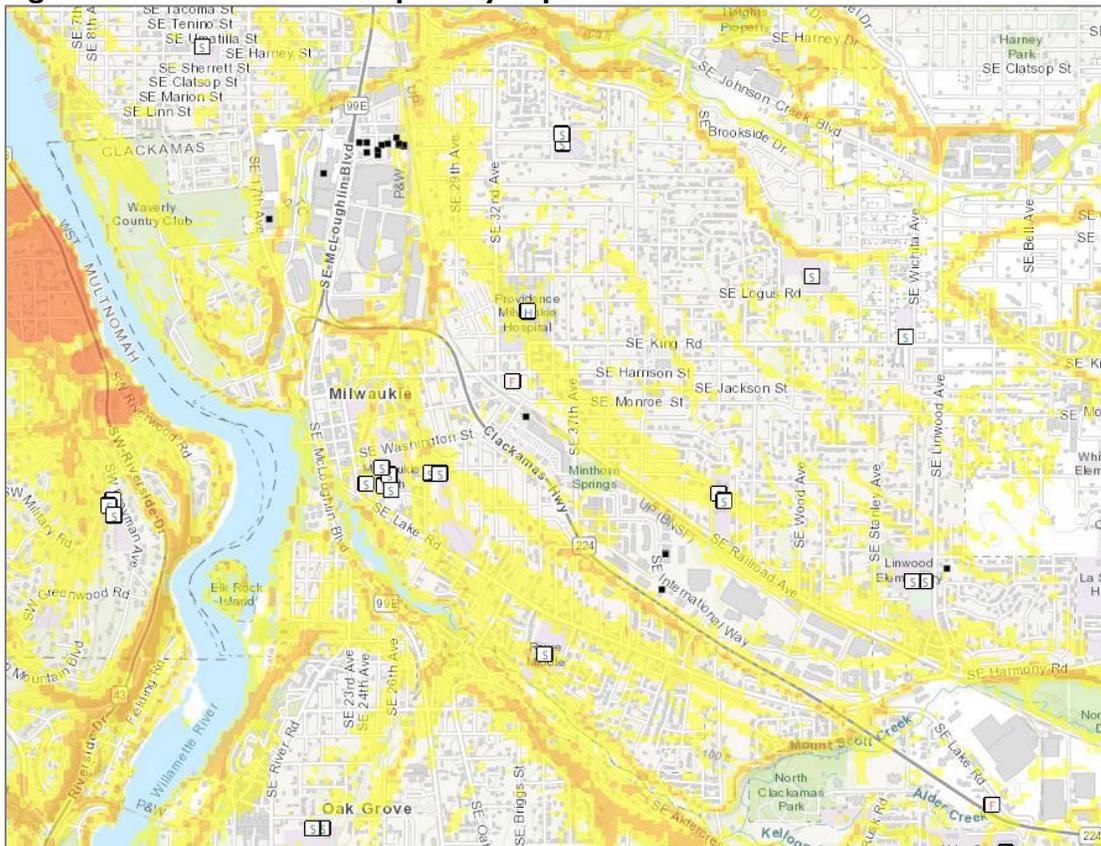
Landslide susceptibility exposure for Milwaukie is shown in Figure MA-5.

Most of Milwaukie demonstrates a low to moderate landslide susceptibility exposure. Approximately 4% of Milwaukie has very high or high, and approximately 31% moderate,

landslide susceptibility exposure.¹⁵ However, most of the areas that are identified to exhibit dangerous potential rapidly moving landslides are vacant and often preserved in wooded and dedicated open space.

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.

Figure MA-5 Landslide Susceptibility Exposure



Low	Landsliding unlikely. Areas classified as Landslide Density = Low (less than 7%) and areas classified as Slopes Prone to Landsliding = Low.
Moderate	Landsliding possible. Areas classified as Landslide Density = Low to Moderate (less than 17%) and areas classified as Slopes Prone to Landsliding = Moderate OR areas classified as Landslide Density = Moderate (7%-17%) and areas classified as Slopes Prone to Landsliding = Low.
High	Landsliding likely. Areas classified as Landslide Density = High (greater than 17%) and areas classified as Slopes Prone to Landsliding = Low and Moderate OR areas classified as Landslide Density = Low and Moderate (less than 17%) and areas classified as Slopes Prone to Landsliding = High.
Very High	Existing landslides Landslide Density and Slopes Prone to Landsliding data were not considered in this category. Note: the quality of landslide inventory (existing landslides) mapping varies across the state.

Source: [Oregon HazVu: Statewide Geohazards Viewer \(DOGAMI\)](#)

Note: To view detail click the link above to access Oregon HazVu

¹⁵ DOGAMI. [Open-File Report, O-16-02](#), *Landslide Susceptibility Overview Map of Oregon* (2016)

Vulnerability Assessment

Due to insufficient data and resources, Milwaukie is currently unable to perform a quantitative risk assessment for this hazard. However, DOGAMI completed a statewide landslide susceptibility assessment in 2016 ([O-16-02](#)), general findings from that report are provided above and within Figure MA-5. Additionally, the city completed an analysis, using the best available data, as a component of the vulnerability assessment in 2009, updated in 2012, and reviewed and updated, as appropriate, in 2018. This analysis looked at identified hazard areas in conjunction with available data on property exposed to the hazard. Exposure of community assets to natural hazards was determined by manually comparing community assets with each hazard and identifying where assets and hazards intersected.

Across the Willamette River, in the Riverdale area, there is a large area of land at a very high risk of landslide. This could result in potential flooding along Milwaukie's banks in the event of a landslide that disrupts the flow of the Willamette River. Within the city, parts of Highway 224, SE Lake Rd and SE Johnson Creek Blvd are located within the areas of high landslide susceptibility. These important arterials that help connect Milwaukie. The Milwaukie Heights area, which includes mostly low density residential and open space areas, is also vulnerable. This exposure means that large scale and simultaneous landslides triggered by an earthquake could substantially disrupt city operations buildings, fire stations and key pieces of infrastructure (bridges, sewage pump stations, water reservoirs) that would hinder the ability of the city to respond to emergency situations created by such an event.

As a result, it will be important for the city to pursue opportunities for retrofitting and mitigating important structures and infrastructure, such that said facilities can withstand and survive landslides, particularly simultaneous landslides generated by an earthquake. Business continuity planning shall also be an important factor, given the number of economic centers and employment facilities that are threatened by the landslide hazard.

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 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.

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.

Mitigation Activities

Milwaukie works to mitigate future landslide hazards. The city development code includes several policies and regulations to protect slopes including Erosion Control (Chapter 16.28), Willamette Greenway Zone Overlay (Chapter 19.401), and limitations of permitted development within slopes greater than 25%.

Please review Volume I, Section 2 for additional information on 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 Milwaukie's probability for extreme heat events is **moderate** and that their vulnerability is **high**. *The probability and vulnerability ratings increased since the previous version of this NHMP addendum.*

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.

Milwaukie 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.

Please review Volume I, Section 2 for additional information on this hazard.

Windstorm

The HMAC determined that Milwaukie'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 addendum.*

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. Because windstorms typically occur during winter months, they are sometimes accompanied by flooding and winter storms (ice, freezing rain, and very rarely, snow). Other severe weather events that may accompany windstorms, including thunderstorms, hail, lightning strikes, and tornadoes are generally negligible for Milwaukie.

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.

Please review Volume I, Section 2 for additional information on this hazard.

Winter Storm (Snow/Ice)

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

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 Milwaukie typically originate in the Gulf of Alaska or in the central Pacific Ocean. These storms are most common from November through March.

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

Vulnerability Assessment

Due to insufficient data and resources, Milwaukie is currently unable to perform a quantitative risk assessment, or exposure analysis, for the extreme heat, windstorm, and winter storm hazards. However, the city completed an analysis, using the best available data, as a component of the vulnerability assessment in 2009, updated in 2012, and reviewed and updated, as appropriate, in 2018. This analysis looked at identified hazard areas in conjunction with available data on property exposed to the hazard. Exposure of community assets to natural hazards was determined by manually comparing community assets with each hazard and identifying where assets and hazards intersected.

The areas of Milwaukie that are often most at risk to severe storms are residential areas on steeper slopes, where roads may be icy and, thus, difficult to climb and descend. Road corridors leading to residential areas with fuller tree canopies are susceptible to downed tree limbs, and those areas that are above 500 feet in elevation are particularly vulnerable. However, some weather systems are characterized by a temperature inversion, where the valley floor is colder than the nearby hills. Consequently, severe storms affect the entire city. In 2016 and 2017 the state of Oregon declared a state of emergency for severe storms. The city's plowing, sanding and de-icing removal plan is maintained by the public works department and includes provisions to place equipment on designated principal routes throughout Milwaukie ([Plowing and Sanding Routes Map](#)). Private property owners are also required to clear the sidewalks abutting their property of snow or ice within 24 hours after the snow has stopped falling. For more information see the city's Winter Weather Response Plan information [webpage](#) and their [Winter Weather Response Plan](#).

The major risk to property results from exposed utilities, especially power lines and water pipes that are damaged by wind, broken tree limbs and cold temperatures. Businesses also suffer economic losses when they must close as the result of the inclement weather and/or the loss of power, which, in turn, disrupts the local supply chain of goods and services.

Periods of extended ice coverage hinder emergency response services and limit the mobility of residents, which could result in serious life safety issues.

Residents and businesses that are in areas that exhibit the severe storm hazard face some risk of damage from severe storms. Severe weather events are expected to impact nearly all Milwaukie residents. In addition, critical infrastructure, economic centers, cultural or historic assets, environmental assets, and hazardous material sites are exposed to the severe weather hazards. For a list of facilities and infrastructure vulnerable to these hazards see the Community Assets section.

The exposure of these facilities and infrastructure means that severe weather events could substantially disrupt the operations of city government buildings and fire stations, impairing key city functions, while hindering the ability of emergency response personnel to respond to emergency situations that are created by a severe storm event.

All these facilities depend upon utility lines, roads and bridges to operate and perform their respective important functions within the city. Exposed utility and power lines are particularly vulnerable to damage from severe winter storms by wind, ice and snow. More hardened infrastructure, like bridges and roads, can sustain a severe winter storm, but during the event, they are often hazardous to traverse because of icy, windy and snowy conditions.

Consequently, severe weather (wind or winter storm) could substantially disrupt numerous key resources and facilities within Milwaukie through impediments to the transportation system and damage to the power grid. Among other things, these transportation problems and power failures disrupt business operations and educational facilities, resulting in economic losses and halting educational opportunities.

Power to hazardous material sites could also be disrupted. The sites themselves could be damaged or rendered inaccessible. In turn, these conditions could pose threats to the natural environment of Milwaukie and the health of its population, while disrupting the availability of gasoline for vehicle transport and furthering economic losses.

As a result, it will be important for the city to pursue opportunities for undergrounding utilities and retrofitting utility lines so that they may withstand cold weather conditions without freezing and bursting. Adhering to current building codes for weatherization of structures, as well as current engineering and fire codes that pertain to the steepness of new roads, are also key factors for the city to consider. Business continuity planning shall also be an important factor, given the number of economic centers and employment facilities that are threatened by the severe storm hazard.

Mitigation Activities

Mitigating severe weather can be difficult because storms affect all areas of the city, but Milwaukie has made progress to reduce the effects of storms. Milwaukie has a tree board to maintain a plan for the care of the trees as well as codes about where trees can be planted (Chapter 16.32). Most utilities are underground, and all new utilities are required to be undergrounded, but, in case of power outages, the city's critical facilities have back up power generation. Milwaukie also has a designated snow plow and sanding routes to help expedite snow removal ([Plowing and Sanding Routes Map](#)).

Please review Volume 1, Section 2 for additional information on this hazard.

Volcanic Event

The HMAC determined that Milwaukie's probability for a volcanic event is **low** and that their vulnerability to a volcanic event is **low**. *The probability did not change and the vulnerability rating decreased since the previous version of this NHMP addendum.*

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 western portion of the County is likely to affect Milwaukie as well. Several volcanoes are located near Milwaukie, the closest of which are Mount Hood, Mount Adams, Mount Saint Helens, Mount Rainier and Three Sisters.

Vulnerability Assessment

Due to insufficient data and resources, Milwaukie is currently unable to perform a quantitative risk assessment, or exposure analysis, for this hazard.

Due to Milwaukie'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.

Mitigation Activities

The existing volcano hazard mitigation activities are conducted at the county, regional, state, and federal levels and are described in the Clackamas County NHMP.

Please review Volume I, Section 2 for additional information on this hazard.

Wildfire

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

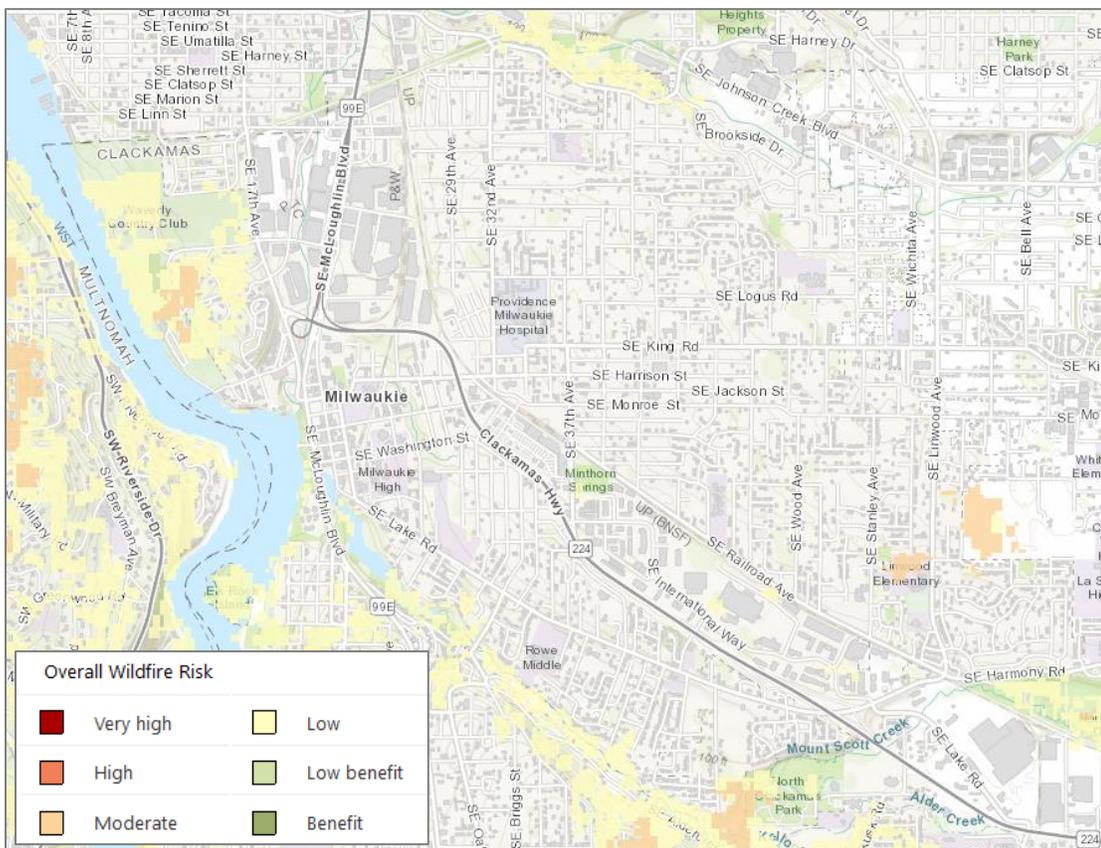
The [2017 Clackamas County Community Wildfire Protection Plan \(CWPP\)](#) was completed in May 2018. The CWPP is hereby incorporated into this NHMP addendum by reference, and it will serve as the wildfire section for this addendum. The following presents a summary of key information; refer to the full CWPP for a complete description, and evaluation of the wildfire hazard: <https://www.clackamas.us/dm/CWPP.html>. Information specific to Milwaukie is found in the following chapter: [Chapter 10.3: 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. Weather and urbanization conditions are primarily at cause for the hazard level. Milwaukie has not experienced a catastrophic wildfire within city limits. Clackamas Fire District #1 also provides services to other cities besides Milwaukie, including Oregon City, Happy Valley, Johnson City and many unincorporated areas within Clackamas County.

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 Milwaukie, 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.

Milwaukie is highly urbanized and as such does not have much danger of wildfire within its boundaries. The city does have parks and neighborhoods surrounded by mature trees. Located on the edge of its southeastern boundary is the Three Creeks Park, which has heavy fuels adjacent to homes and infrastructure. Three Creeks Park is a designated Medium Priority Community at Risk (CARs).¹⁶ Figure MA-6 shows overall wildfire risk in Milwaukie.

Figure MA-6 Overall Wildfire Risk



Source: [Oregon Wildfire Risk Explorer](#), date accessed November 9, 2018.

¹⁶ Clackamas County Community Wildfire Protection Plan, *Clackamas Fire District #1* (2018), Table 10.13-1.

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.¹⁷ 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.

Vulnerability Assessment

Due to insufficient data and resources, Milwaukie is currently unable to perform a quantitative risk assessment, or exposure analysis, for this hazard. However, the city completed an analysis, using the best available data, as a component of the vulnerability assessment in 2009, updated in 2012, and reviewed and updated, as appropriate, in 2018. This analysis looked at identified hazard areas in conjunction with available data on property exposed to the hazard. Exposure of community assets to natural hazards was determined by manually comparing community assets with each hazard and identifying where assets and hazards intersected.

Milwaukie does not have much vulnerability to wildfire, though there is always the risk of fire destroying residential and commercial areas. Vegetation along roadways can be highly dangerous, as negligent motorists provide ignition sources by tossing cigarette butts out car windows. Because schools are generally located near parks and scenic areas, they can be threatened by wildfires.

The potential community impacts, and vulnerabilities described in Volume I, Section 2 are generally accurate for the city as well. Milwaukie'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 will update Milwaukie'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).

Mitigation Activities

Milwaukie and Clackamas Fire District #1 (CFD#1) use several mitigation tools to reduce the city's risk to wildfires. CFD #1 provides emergency fire suppression, medical response and rescue services to the community. Mutual aid agreements with neighboring jurisdictions are also in place. Water supply and storage capacity in Milwaukie conforms with recommended fire flow requirements.

The city does not allow backyard burning due to requirements of DEQ. The CFD #1 provides outreach and education to the community on wildfire mitigation via news releases, posters,

¹⁷ [Oregon Wildfire Risk Explorer](#), date accessed March 29, 2019.

signage, website messages, safety exhibits at community events, and visits to schools, civic organizations and neighborhood associations.

CFD #1 serves the cities of Happy Valley, Johnson City, Milwaukie and Oregon City, as well as the unincorporated areas of Barton, Beaver Creek, Boring, Carus, Carver, Central Point, Clackamas, Clarkes, Damascus, Eagle Creek, Highland, Hillsview, Holcomb, Kelso, Jennings Lodge, Oak Grove, Redland, South End, Sunnyside, and Westwood. For more information on the fire district see their addendum.

Please review the [2017 Clackamas County Community Wildfire Protection Plan \(CWPP\)](#), Volume I, Section 2, and the Clackamas Fire District #1 Addendum in Volume II for additional information on this hazard.

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ATTACHMENT A: ACTION ITEM FORMS

ACTION ITEM FORMS

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* - Priority Action Item

Note: The HMAC decided to modify the prioritization of action items in this update to reflect current conditions (risk assessment), needs, and capacity.

Summary of Action Changes

Below is a list of changes to the action items since the previous plan.

Previous NHMP Actions: Completed

Multi-Hazard Action #1 (2012/13): “Improve vegetation management throughout the city” is considered complete since the city has an established program for vegetation management.

Landslide Action #1 (2012/13): “Reduce the vulnerability of property owners in landslide-prone areas” is considered complete since the city has an established program for steep slope development.

Wildfire Action #1 (2012/13): “Promote fire-resistant strategies for new and existing developments” is considered complete since the city has an established program for promoting fire resistant strategies through the development and building codes.

See 2019 status identified in each action for activities that have been completed since the previous plan.

Previous NHMP Actions: Removed

Multi-Hazard Action #8 (2012/13): “Improve the hazard assessment in the Milwaukie Natural Hazards Mitigation Plan” was removed from the list since it was determined by the steering committee that this is a function of their Implementation and Maintenance Plan and did not need to be included as an action.

Note: 2012/13 Actions MH #2, MH #3, MH#4, MH #5, MH #6, MH #7, and MH #9 were renumbered to 2019 Actions MH #1, MH #2, MH #3, MH #4, MH#5, MH #6, and MH #7 respectively.

New NHMP Actions (2019):

- Multi-Hazard #8
- Wildfire Action #1

See action item forms below for detail.

Action Item Forms

Each action item has a corresponding action item worksheet describing the activity, identifying the rationale for the project, identifying potential ideas for implementation, and assigning coordinating and partner organizations. The action item worksheets can assist the community in pre-packaging potential projects for grant funding. The worksheet components are described below.

ALIGNMENT WITH EXISTING PLANS/POLICIES

The Clackamas County NHMP includes a range of action items that, when implemented, will reduce loss from hazard events in the County, participating cities, and special districts. Within the plan, FEMA requires the identification of existing programs that might be used to implement these action items. The City addresses statewide planning goals and legislative requirements through its comprehensive plan, capital improvements plan, mandated standards and building codes. To the extent possible, the City will work to incorporate the recommended mitigation action items into existing programs and procedures. Each action item identifies related existing plans and policies.

STATUS/RATIONALE FOR PROPOSED ACTION ITEM

Action items should be fact-based and tied directly to issues or needs identified throughout the planning process. Action items can be developed at any time during the planning process and can come from several sources, including participants in the planning process, noted deficiencies in local capability, or issues identified through the risk assessment. The rationale for proposed action items is based on the information documented in Section 2. The worksheet provides information on the activities that have occurred since the previous plan for each action item.

IDEAS FOR IMPLEMENTATION

The ideas for implementation offer a transition from theory to practice and serve as a starting point for this plan. This component of the action item is dynamic, since some ideas may prove to not be feasible, and new ideas may be added during the plan maintenance process. Ideas for implementation include such things as collaboration with relevant organizations, grant programs, tax incentives, human resources, education and outreach, research, and physical manipulation of buildings and infrastructure.

COORDINATING (LEAD) ORGANIZATION:

The coordinating organization is the public agency with the regulatory responsibility to address natural hazards, or that is willing and able to organize resources, find appropriate funding, or oversee activity implementation, monitoring and evaluation.

INTERNAL AND EXTERNAL PARTNERS:

The internal and external partner organizations listed in the Action Item Worksheets are potential partners recommended by the project HMAP but not necessarily contacted during the development of the plan. The coordinating organization should contact the identified partner organizations to see if they are capable of and interested in participation. This initial contact is also to gain a commitment of time and/or resources toward completion of the action items.

Internal partner organizations are departments within the City or other participating jurisdiction that may be able to assist in the implementation of action items by providing relevant resources to the coordinating organization.

External partner organizations can assist the coordinating organization in implementing the action items in various functions and may include local, regional, state, or federal agencies, as well as local and regional public and private sector organizations.

PLAN GOALS ADDRESSED:

The plan goals addressed by each action item are identified as a means for monitoring and evaluating how well the mitigation plan is achieving its goals, following implementation.

TIMELINE:

All broad scale action items have been determined to be ongoing, as opposed to short-term (0 to 2 years) or long-term (3 or more years). This is because the action items are broad ideas, and although actions may be implemented to address the broad ideas, the efforts should be ongoing.

POTENTIAL FUNDING SOURCE

Where possible potential funding sources have been identified. Example funding sources may include: Federal Hazard Mitigation Assistance programs, state funding sources such as the Oregon Seismic Rehabilitation Grant Program, or local funding sources such as capital improvement or general funds. An action item may include several potential funding sources.

ESTIMATED COST

A rough estimate of the cost for implementing each action item is included. Costs are shown in general categories showing low, medium, or high cost. The estimated cost for each category is outlined below:

- Low - Less than \$50,000
- Medium - \$50,000 – \$100,000
- High - More than \$100,000

Multi-Hazard #1

Proposed Action Item:		Alignment with Plan Goals:	
Ensure that there are adequate shelter facilities in hazard-free zones to serve Milwaukie residents.		Protect Life and Property; Augment Emergency Services; Encourage Partnerships for Implementation; Promote Public Awareness	
Alignment with Existing Plans/Policies:			
2018/19 Status/Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> The Disaster Mitigation Act of 2000 requires that communities create partnerships with emergency response organizations and plan for the shelter and safety of their residents [201.6(c)(4)(ii)]. The city works with the Red Cross to get potential facilities inspected. Since 2009, a CERT Volunteer has worked to identify facilities that are adequate shelter sites for Milwaukie residents. There are currently seven facilities in Milwaukie that are Red Cross certified and trained shelter facilities: The Milwaukie Center (5440 SE Kellogg Creek Dr), Eagles Wings Ministries (10902 SE Garrett Dr), and Milwaukie Presbyterian Church (2416 SE Lake Rd). Outside the city are the Clackamas Park Friends Church (8120 SE Thiessen Rd, Oak Grove) and King of Kings Lutheran Church (5501 SE Thiessen Rd, Oak Grove) 			
Ideas for Implementation:			
<ul style="list-style-type: none"> Identify and contact potential shelter sites to see if there is an interest in becoming a designated Red Cross shelter site; Maintain relationship with Red Cross to renew and maintain shelters in the city and develop sites as needed 			
Coordinating Organization:		Emergency Management	
Internal Partners:		External Partners:	
CFD #1, CERT Volunteer		American Red Cross	
Potential Funding Sources:		Estimated cost:	Timeline:
General Funds		Low	<input type="checkbox"/> Short Term (0-2 years) <input type="checkbox"/> Long Term (2-4+ years) <input checked="" type="checkbox"/> Ongoing
Form Submitted by:	Existing action item		
Priority:	Medium		

Multi-Hazard #2*

Proposed Action Item:		Alignment with Plan Goals:	
Improve network of communications during a disaster.		Protect Life and Property; Augment Emergency Services; Encourage Partnerships for Implementation; Promote Public Awareness	
Alignment with Existing Plans/Policies:			
2018/19 Status/Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> The city successfully recruited and trained Amateur Radio Operators and identified their 800 MHz communication deficiencies, but funding is still needed to fix those deficiencies. The school district now posts emergency notices on their website. The city now has reverse 9-1-1 capabilities and two variable message sign trailers for use communications in a disaster. The Beacon box program provides communication from neighborhoods to the EOC during a disaster. There are 4 boxes throughout the city that have radios that CERT members can communicate with the EOC during an emergency. Milwaukie CERT has 3-4 ham operators that can help if needed. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> Address 800 MHz communication deficiencies, if any arise; Work with the Oregon office of emergency management (OEM) and the Regional Disaster Preparedness Organization (RDPO) to resolve 800 MHz communication inoperability; Improve communication between school officials and parents by updating school emergency contact information for parents/children every 3 months; Supply schools with communication equipment necessary for emergency situations; Post bulletins on the internet for school emergency info, community bulletin board on cable, etc.; Partner with REM tech and REG on the Emergency Alert System (EAS); and Educate citizens and other agencies within the Milwaukie on use of the #ClackCo Public Alerts. Inform residents about the County's Emergency Notification System (CCENS) Work to tie-in or interface with both #ClackCo Public Alerts and CCENS to help with redundancy 			
Coordinating Organization:		Information Systems Technology	
Internal Partners:		External Partners:	
Public Works, CERT		School District, OEM, RDPO	
Potential Funding Sources:		Estimated cost:	Potential Funding Sources:
General Fund		Low to Medium	<input checked="" type="checkbox"/> Short Term (0-2 years) <input type="checkbox"/> Long Term (2-4+ years) <input type="checkbox"/> Ongoing
Form Submitted by:	Existing action item		
Priority:	High		

* - High Priority Action Item

Multi-Hazard #3*

Proposed Action Item:		Alignment with Plan Goals:	
Increase outreach and education for hazard awareness and natural disaster preparedness, especially for low-income, elderly, non-English speaking, and other vulnerable populations.		Protect Life and Property; Enhance Natural Systems; Augment Emergency Services; Encourage Partnerships for Implementation; Promote Public Awareness	
Alignment with Existing Plans/Policies:			
Comprehensive Plan; Policy 7.2.5			
2018/19 Status/Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> The Disaster Mitigation Act of 2000 requires that communities communicate with the public after the hazard plan is updated. [201.6(c)(4)(ii)]. Hazard maps were made available to the public via the city's website. Clackamas Fire District #1 held disaster preparedness training in schools, senior centers and to city employees. The city has engaged in a broad effort to educate the public about Emergency Preparedness. A city webpage was dedicated to the topic, as well as efforts to coordinate a monthly speaker's series on emergency preparation with topics ranging from preparing for earthquakes to community resiliency. Citizens and neighborhood association members are encouraged to become trained through CERT. Two shelters have become Red Cross certified, The American Legion and Eagles Wings Ministries. Emergency Preparedness tips are sent through the city's newsletter, The Pilot, which goes to every address in the city of Milwaukie. Emergency Preparedness tips are provided at each of the seven neighborhood associate meetings. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> Disseminate hazard related information to the public; Translate outreach materials into Spanish and provide translation services at public meetings. Identify property owners in the hazard zones, and conduct a target mailing to disseminate hazard information; Conduct public education as hazard seasons approach; Target neighborhood associations for public education and outreach; Add emergency preparedness and response curriculum to school programs; and Develop public education flyers as billing inserts. 			
Coordinating Organization:		Emergency Management	
Internal Partners:		External Partners:	
Public Works, Community Services, CFD#1, CERT		OEM, FEMA	
Potential Funding Sources:		Estimated cost:	Timeline:
General Fund		Low	<input type="checkbox"/> Short Term (0-2 years) <input type="checkbox"/> Long Term (2-4+ years) <input checked="" type="checkbox"/> Ongoing
Form Submitted by:	Existing action item		
Priority:	High		

* - High Priority Action Item

Multi-Hazard #4

Proposed Action Item:		Alignment with Plan Goals:	
Maintain and promote CERT program activity in the area and recruit new members for training.		Protect Life and Property; Augment Emergency Services; Encourage Partnerships for Implementation; Promote Public Awareness	
Alignment with Existing Plans/Policies:			
2018/19 Status/Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> The City maintains regular CERT trainings for residents and city employees. As of 2019, there are currently 34 residents who are trained as CERT responders. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> Provide information about the CERT program to Milwaukie residents through local publications, neighborhood organizations, churches, etc.; Identify needs of local CERT programs and obtain funding to purchase CERT supplies; Encourage neighborhood associations to sponsor CERT teams; Create CERT teams of city employees. 			
Coordinating Organization:		CFD#1	
Internal Partners:		External Partners:	
Emergency Management, CERT		County EOC	
Potential Funding Sources:		Estimated cost:	Timeline:
General Fund		Low	<input type="checkbox"/> Short Term (0-2 years) <input type="checkbox"/> Long Term (2-4+ years) <input checked="" type="checkbox"/> Ongoing
Form Submitted by:	Existing action item		
Priority:	Medium		

Multi-Hazard #5

Proposed Action Item:		Alignment with Plan Goals:	
Maintain and enhance strategies for debris management for all hazards.		Protect Life and Property; Enhance Natural Systems; Augment Emergency Services; Encourage Partnerships for Implementation	
Alignment with Existing Plans/Policies:			
Comprehensive Plan, Development Code, Zoning Ordinance, Stormwater Master Plan, Disaster Debris Management Plan			
2018/19 Status/Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community [201.6(c)(3)(ii)] • A partnership for a debris removal plan was developed with Metro. • Disaster Debris Management Plan last updated in August 2018/19. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Create an inventory of equipment needed for each hazard; • Develop agreements with other jurisdictions, businesses, and tree service outfits to share equipment and manage debris during disasters. 			
Coordinating Organization:		Public Works	
Internal Partners:		External Partners:	
Emergency Management		Metro, Oregon Department of Transportation, Department of Environmental Quality, USACE, Clackamas County Disaster Management	
Potential Funding Sources:		Estimated cost:	Timeline:
General Fund		Low to Moderate	<input type="checkbox"/> Short Term (0-2 years) <input type="checkbox"/> Long Term (2-4+ years) <input checked="" type="checkbox"/> Ongoing
Form Submitted by:	Existing action item		
Priority:	Medium		

Multi-Hazard #6

Proposed Action Item:		Alignment with Plan Goals:	
Improve and obtain resources and equipment essential for responding to and recovering from disasters.		Protect Life and Property; Augment Emergency Services; Encourage Partnerships for Implementation	
Alignment with Existing Plans/Policies:			
Comprehensive Plan, Stormwater Mater Plan			
2018/19 Status/Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community [201.6(c)(3)(ii)] • Three drinking water bladders were obtained from UASI for the Metro area to use. Boring Water District obtained a generator which Milwaukie can request to use through mutual aid agreements. The city now owns a portable 250kw generator for the Lava Drive pump station. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Harden infrastructure • Contact local facilities that have large trucks that could serve as water tenders in emergency situations, or purchase water tenders for the city; • Partner with national guard, local businesses, contractors and developers; • Obtain funding to purchase one fixed generator for the Lava Drive pump station; and • Obtain funding to purchase one storage trailer for emergency supplies. 			
Coordinating Organization:		Public Works	
Internal Partners:		External Partners:	
Emergency Management			
Potential Funding Sources:		Estimated cost:	Timeline:
General Fund		Low to Moderate	<input type="checkbox"/> Short Term (0-2 years) <input checked="" type="checkbox"/> Long Term (2-4+ years) <input type="checkbox"/> Ongoing
Form Submitted by:	Existing action item		
Priority:	Medium		

Multi-Hazard #7*

Proposed Action Item:		Alignment with Plan Goals:	
Integrate the goals and action items from the Milwaukie Natural Hazards Mitigation Plan into existing regulatory documents and programs, where appropriate.		Protect Life and Property; Enhance Natural Systems; Augment Emergency Services; Encourage Partnerships for Implementation; Promote Public Awareness	
Alignment with Existing Plans/Policies:			
Comprehensive Plan, Development Code, Zoning Ordinance			
2018/19 Status/Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community [201.6(c)(3)(ii)]. Incorporating natural hazards plans into comprehensive plans, local ordinances, and land-use regulations will ensure that communities implement the proper mitigation measures for their community. A Spring Park Master Plan was adopted which called for better vegetation management in the park. New codes were adopted to reflect EOC changes and improvements. City is in the process of updating their Goal 7: Natural Hazards element of their comprehensive plan (<i>expected December 2019</i>), which proposes stronger floodplain protections. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> Use the mitigation plan to help the City's Comprehensive Land Use Plan meet State Land Use Planning Goal 7, designed to protect life and property from natural disasters and hazards through planning strategies that restrict development in areas of known hazards; Use zoning codes to regulate development in hazard-prone areas; Integrate the city's mitigation actions into the current emergency operations plan and capital improvement plans (where appropriate); Partner with other organizations and agencies with similar goals to promote building codes that are more disaster resistant at the state level; Use citizen input for the creation of appropriate ordinances; and Use the natural hazard mitigation planning to learn how to better integrate the NHMP into existing documents and programs. 			
Coordinating Organization:		Planning	
Internal Partners:		External Partners:	
Engineering		Department of Land Conservation and Development, Department of Geology and Mineral Industries, Oregon Department of Transportation, Department of Environmental Quality	
Potential Funding Sources:		Estimated cost:	Timeline:
General Fund, DLCDC Technical Assistance Grant		Low to Moderate	<input type="checkbox"/> Short Term (0-2 years) <input type="checkbox"/> Long Term (2-4+ years) <input checked="" type="checkbox"/> Ongoing
Form Submitted by:	Existing action item		
Priority:	High		

* - High Priority Action Item

Multi-Hazard #8*

Proposed Action Item:		Alignment with Plan Goals:	
Coordinate natural hazard related climate change action items through the Milwaukie Community Climate Action Plan .		Protect Life and Property; Enhance Natural Systems; Augment Emergency Services; Encourage Partnerships for Implementation; Promote Public Awareness	
Alignment with Existing Plans/Policies:			
Milwaukie Community Climate Change Action Plan			
2018/19 Status/Rationale for Proposed Action Item:			
The Climate Change action items provide direction on specific activities that the City and residents in Milwaukie can take to reduce the impacts of climate change.			
Ideas for Implementation:			
Implement relevant mitigation strategies identified in the Climate Action Plan related to the following topic areas: <ul style="list-style-type: none"> • Building Energy and Efficiency • Vehicles and Fuels • Land Use and Transportation Planning • Materials use, purchasing, and recovery • Natural resources • Public health and emergency preparedness 			
Coordinating Organization:		Public Works	
Internal Partners:		External Partners:	
Emergency Management, Planning, Community Services, CFD#1		Portland General Electric, NW Natural, Energy Trust of Oregon, Clackamas Water Environment Services	
Potential Funding Sources:		Estimated cost:	Timeline:
General Fund		Low to High	<input type="checkbox"/> Short Term (0-2 years) <input type="checkbox"/> Long Term (2-4+ years) <input checked="" type="checkbox"/> Ongoing
Form Submitted by:	New action item		
Priority:	High		

* - High Priority Action Item

Drought #1

Proposed Action Item:		Alignment with Plan Goals:	
Develop public brochures to raise awareness about drought hazards and mitigation actions residents can take to reduce the impact of drought.		Protect Life and Property; Encourage Partnerships and Implementation; Promote Public Awareness	
Alignment with Existing Plans/Policies:			
Comprehensive Plan			
2018/19 Status/Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community [201.6(c)(3)(ii)]. The continued education of the public to different hazards is important for communities to do and helps create more resilient communities. Pre-disaster mitigation strategies will reduce post-disaster response needs by lessening life loss, injury, damage, and disruption. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> Meet monthly with neighborhood associations to raise awareness and explain the threat of drought; Write articles in the city newsletter, The Pilot, explaining drought hazards and mitigation activities; Utilize the website to post information regarding drought; and Have a booth at the Farmer's Market from May-November, providing information to the public about the dangers of drought and mitigation activities that residents can take. 			
Coordinating Organization:		Neighborhood Services	
Internal Partners:		External Partners:	
Emergency Management			
Potential Funding Sources:		Estimated cost:	Potential Funding Sources:
		Low to High	<input type="checkbox"/> Short Term (0-2 years) <input type="checkbox"/> Long Term (2-4+ years) <input checked="" type="checkbox"/> Ongoing
Form Submitted by:	Existing action item		
Priority:	Medium		

Earthquake #1*

Proposed Action Item:		Alignment with Plan Goals:	
Conduct seismic evaluations on identified critical and essential facilities and infrastructure and implement appropriate structural and non-structural mitigation strategies.		Protect Life and Property; Augment Emergency Services; Encourage Partnerships for Implementation	
Alignment with Existing Plans/Policies:			
Capital Improvement Project Plan, Stormwater Master Plan, Comprehensive Plan			
2018/19 Status/Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that are being considered by the community to reduce the effect that natural hazards will have on the community [201.6(c)(3)(ii)]. Developing and implementing programs to reduce the potential for earthquakes to cause damage can assist a community in mitigating its overall risk to earthquakes. Pre-disaster mitigation strategies will reduce post-disaster response needs by lessening life loss, injury, damage, and disruption. Refer to risk assessment, and DOGAMI's rapid visual assessment scores Seismic assessment of Public Safety building completed in 2018/19. The Police Department is in the planning stages of retrofitting and is waiting on funding. One school has been retrofitted, with the Milwaukie High School's retrofit expected to be completed in 2021. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> Obtain funding to perform seismic evaluations; Conduct seismic evaluations on identified community assets (including shelters) for implementing appropriate structural and non-structural mitigation strategies; Prioritize seismic upgrades based on criticality of need and population served; Seismically retrofit critical government facilities to guarantee continuous operation during and after a natural disaster; Partner with appropriate organizations to implement seismic upgrades; and Create damage assessment procedures. 			
Coordinating Organization:		Facilities	
Internal Partners:		External Partners:	
Building		DOGAMI, School District, Clackamas Fire District #1	
Potential Funding Sources:		Estimated cost:	Potential Funding Sources:
General Fund, Seismic Rehabilitation Grant Program, Hazard Mitigation Assistance Grants, Utility Funds		Low to High	<input type="checkbox"/> Short Term (0-2 years) <input type="checkbox"/> Long Term (2-4+ years) <input checked="" type="checkbox"/> Ongoing
Form Submitted by:	Existing action item		
Priority:	High		

* - High Priority Action Item

Flood #1*

Proposed Action Item:		Alignment with Plan Goals:	
Evaluate alternatives for reducing the flooding hazard for properties along Kellogg Creek, Johnson Creek, Mount Scott Creek area, and the Willamette River.		Protect Life and Property; Enhance Natural Systems; Augment Emergency Services; Encourage Partnerships for Implementation; Promote Public Awareness	
Alignment with Existing Plans/Policies:			
Flood Ordinance; Stormwater Master Plan; Comprehensive Plan			
2018/19 Status/Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Kellogg Creek is in the planning stage for different restoration projects. A severe repetitive loss property on Rusk Road was purchased and demolished using FEMA Flood Mitigation Assistance funding in 2018/19; (grant covered approximately \$315,000 for the purchase of the property, additional funds were allocated for staff hours, title report, due diligence reports, and demolition contract). 			
Ideas for Implementation:			
<ul style="list-style-type: none"> Prioritize mitigation of residences located within the floodway. Identify repetitive flood loss properties (see NFIP section in this addendum) and discuss mitigation strategies with property owners. Regulate development to a higher standard Limit cut and fill 			
Coordinating Organization:		Engineering	
Internal Partners:		External Partners:	
Planning, Public Works		Department of Land Conservation and Development; Association of State Floodplain Managers	
Potential Funding Sources:		Estimated cost:	Timeline:
General Fund, HMGP, FMA, PDM		Low to High	<input type="checkbox"/> Short Term (0-2 years) <input checked="" type="checkbox"/> Long Term (2-4+ years) <input type="checkbox"/> Ongoing
Form Submitted by:	Existing Action Item		
Priority:	High		

* - High Priority Action Item

Flood #2

Proposed Action Item:		Alignment with Plan Goals:	
Ensure continued compliance with the National Flood Insurance Program (NFIP) through enforcement of local floodplain management ordinances.		Protect Life and Property; Enhance Natural Systems; Encourage Partnerships for Implementation; Promote Public Awareness	
Alignment with Existing Plans/Policies:			
Flood Ordinance; Zoning Code, FEMA FIRMs, Comprehensive Plan			
2018/19 Status/Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> The National Flood Insurance Program provides communities with federally backed flood insurance to homeowners, renters, and business owners, if communities develop and enforce adequate floodplain management ordinances. The benefits of adopting NFIP standards for communities are a reduced level of flood damage in the community and stronger buildings that can withstand floods. The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Continued participation in the NFIP will help reduce the level of flood damage to new and existing buildings in communities while providing homeowners, renters and business owners additional flood insurance protection. All new development must comply with Title 18 of the City's Municipal Code prior issuance of permits. When projects begin prior to obtaining permits, a stop work order is placed on the property and remains until the project can be reviewed for compliance. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> Assess the floodplain ordinances to ensure they reflect current flood hazards and situations and meet or exceed NFIP requirements. Partner with FEMA/DOGAMI to develop and obtain better flood maps. Mitigate areas that are prone to flooding and/or have the potential to flood. Recommend revisions to requirements for development within the floodplain where appropriate. Consider participation in the National Flood Insurance Program's Community Rating System; Community Assistance Visits (CAV) are scheduled visits to communities participating in the NFIP for: 1) conducting a comprehensive assessment of the community's floodplain management program; 2) assisting the community and its staff in understanding the NFIP and its requirements; and 3) assisting the community in implementing effective flood loss reduction measures when program deficiencies or violations are discovered. Actively participate with DLCD and FEMA during Community Assistance Visits. 			
Coordinating Organization:		Engineering	
Internal Partners:		External Partners:	
Planning, Building		Department of Land Conservation and Development; Association of State Floodplain Managers; FEMA	
Potential Funding Sources:		Estimated cost:	Timeline:
General Fund		Low to Medium	<input type="checkbox"/> Short Term (0-2 years) <input type="checkbox"/> Long Term (2-4+ years) <input checked="" type="checkbox"/> Ongoing
Form Submitted by:	Existing Action Item		
Priority:	Medium		

Severe Weather #1

Proposed Action Item:		Alignment with Plan Goals:	
Bury vulnerable critical infrastructure, such as power lines, to lessen potential failures during severe weather.		Protect Life and Property; Enhance Natural Systems; Augment Emergency Services; Encourage Partnerships for Implementation	
Alignment with Existing Plans/Policies:			
Stormwater Master Plan; Development Code			
2018/19 Status/Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> The Disaster Mitigation Act of 2000 requires communities to identify and analyze a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with emphasis on new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Developing and implementing programs to reduce the potential for wind and winter storms to disrupt utility services can assist a community in mitigating its overall risk to wind and winter storms. A FEMA grant was used to evaluate the trees along designated routes. Current development standards for downtown areas and new subdivisions require undergrounding. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> Partner with PGE to obtain funding to bury power lines for critical facilities within the city; Partner with PGE to continue hazardous tree inventory and mitigation programs; and Partner with major businesses and employers to encourage undergrounding of power lines. 			
Coordinating Organization:		Public Works	
Internal Partners:		External Partners:	
Engineering		Clackamas County Water Environment Services, METRO, Department of Environmental Quality, Department of Land Conservation and Development, Department of State Lands	
Potential Funding Sources:		Estimated cost:	Timeline:
Capital Funds		Low to High	<input type="checkbox"/> Short Term (0-2 years) <input type="checkbox"/> Long Term (2-4+ years) <input checked="" type="checkbox"/> Ongoing
Form Submitted by:	Existing Action Item		
Priority:	Medium		

Wildfire #1*

Proposed Action Item:		Alignment with Plan Goals:	
Coordinate wildfire mitigation action items through the Clackamas County Community Wildfire Protection Plan .		Protect Life and Property; Enhance Natural Systems; Augment Emergency Services; Encourage Partnerships and Implementation; Promote Public Awareness	
Alignment with Existing Plans/Policies:			
Clackamas County Community Wildfire Protection Plan (2018/19)			
2018/19 Status/Rationale for Proposed Action Item:			
The wildfire mitigation action items provide direction on specific activities that organizations and residents in Milwaukie can take to reduce wildfire hazards. CCWPP updated in 2018/19.			
Ideas for Implementation: CCWPP Identified Focus Areas and Priority Actions			
<u>Wildfire Risk Assessment (Ch. 4):</u>			
<ol style="list-style-type: none"> Maintain and update the Fuels Reduction (FR) and Communities at Risk (CAR) maps and databases. Continue to track structure vulnerability data throughout the County through structural triage assessments. Update the Overall Wildfire Risk Assessment as new data becomes available. 			
<u>Hazardous Fuels Reduction and Biomass Utilization (Ch. 5):</u>			
<ol style="list-style-type: none"> Develop and maintain an inventory of potential and successful FR projects by meeting with parks and natural lands managers quarterly. Continue securing funding to implement projects/hire seasonal ODF staff. 			
<u>Emergency Operations (Ch. 6):</u>			
<ol style="list-style-type: none"> Develop and FDB Communications Works Group. Conduct a Conflagration Exercise. 			
<u>Education and Community Outreach (Ch. 7):</u>			
<ol style="list-style-type: none"> Develop Firewise toolkit for CAR's. Create incentives for fuels reduction. Update and distribute the Burn Permitting and Fire Restrictions Brochure. Continue to improve address signage throughout the County. 			
<u>Structural Ignitability Policies and Programs (Ch. 8):</u>			
<ul style="list-style-type: none"> Identify a DTD representative for the WFEPCC. Improve coordination with Rural Fire Agencies. Integrate WU into Plan Map and include a public outreach strategy. 			
Coordinating Organization:	Clackamas Fire District #1		
Internal Partners:		External Partners:	
Public Works, Building, Planning		Clackamas Fire Defense Board, ODF, U.S. Forest Service, public land management agencies	
Potential Funding Sources:		Estimated cost:	Timeline:
ODF, operating budgets		Low to High	<input type="checkbox"/> Short Term (0-2 years) <input type="checkbox"/> Long Term (2-4+ years) <input checked="" type="checkbox"/> Ongoing
Form Submitted by:	New Action Item		
Priority:	High		

* - High Priority Action Item

ATTACHMENT B: PUBLIC INVOLVEMENT SUMMARY

Members of the HMAP 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 text below) was announced on the city's website and an email contact was provided for public comment. The opportunity to review the draft plan and to comment was left open from August 5 through September 3, 2019.

During the public review period there were no comments provided by the public.



Press Release

HOME » Feedback Sought For Natural Hazard Mitigation Plan

Feedback Sought for Natural Hazard Mitigation Plan



The city is in the process of updating its Natural Hazard Mitigation Plan and seeking feedback from the community before it is finalized.

This update is being done in cooperation with the Institute for Policy Research and Engagement's Oregon Partnership for Disaster Resilience program at the University of Oregon and the Oregon Military Department's Office of Emergency Management using funds from the Federal Emergency Management Agency's (FEMA) Pre-Disaster Mitigation Grant Program.

By readopting the plan, Milwaukie will maintain its eligibility to apply for federal funding for natural hazard mitigation projects. The local planning process includes a range of representatives from city and county governments and emergency management personnel, along with outreach to the community.

A natural hazard mitigation plan provides communities with a set of goals, action items and resources designed to reduce risk from future natural disaster events. Engaging in mitigation activities provides a number of benefits, including reduced loss of life, property, essential services, critical facilities, and economic hardship; reduced short-term and long-term recovery and reconstruction costs; increased cooperation and communication within the community through the planning process; and increased potential for state and federal funding for recovery and reconstruction projects.

A PDF of the draft Milwaukie Natural Hazard Mitigation Plan is available below. Input will be collected until Tuesday, Aug. 20. To provide feedback and submit comments, email Steve Hoffeditz, emergency operations manager, at hoffeditzs@milwaukieoregon.gov.

A PDF of the draft Milwaukie Natural Hazard Mitigation Plan is available below. Input will be collected until Tuesday, Aug. 20. To provide feedback and submit comments, email Steve Hoffeditz, emergency operations manager, at hoffeditzs@milwaukieoregon.gov.

For questions about the Natural Hazard Mitigation Plan or the update process in general, contact Michael Howard, assistant program director for the Oregon Partnership for Disaster Resilience, at 541.346.8413, mrhoward@uoregon.edu or Steve Hoffeditz at 503.786.7456, hoffeditzs@milwaukieoregon.gov.

SUPPORTING DOCUMENTS

 [Draft Natural Hazard Mitigation Plan](#) (3 MB)

SHARE     

ATTACHMENT C: MAPS

The following pages include City of Milwaukie Critical and Essential Assets and Flood Hazard Maps.

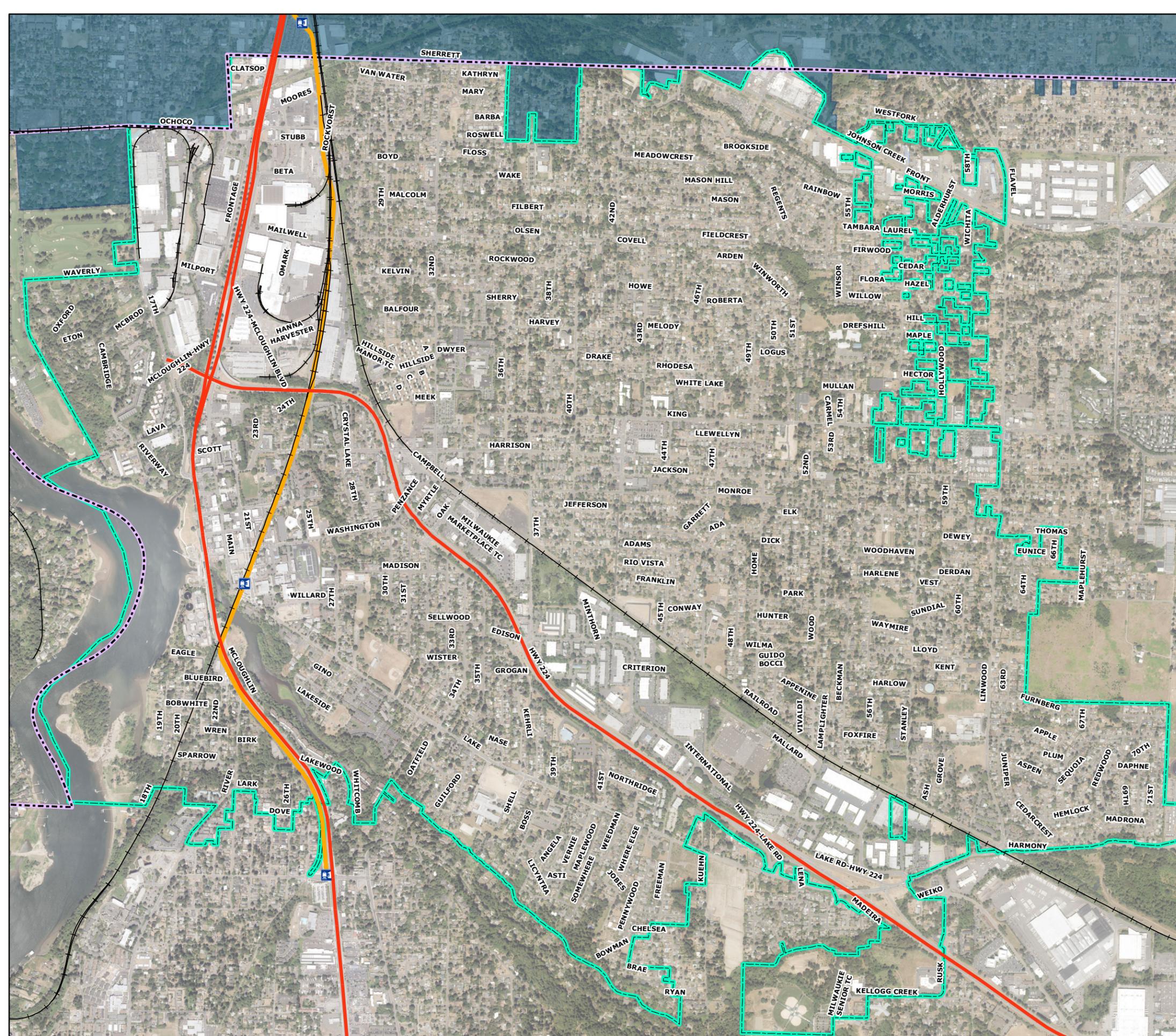
Natural Hazards Mitigation Plan - Assets & FEMA Flood Hazard Zones

Transportation Infrastructure

-  Highway
-  RR Track
-  MAX Light Rail (Orange Line)
-  Light Rail Stop

Jurisdictional Boundaries

-  Clackamas County
-  City of Milwaukie
-  City of Portland

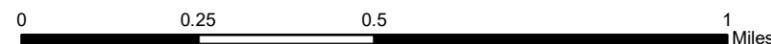


Data Sources: City of Milwaukie GIS, Clackamas County GIS, Metro Data Resource Center

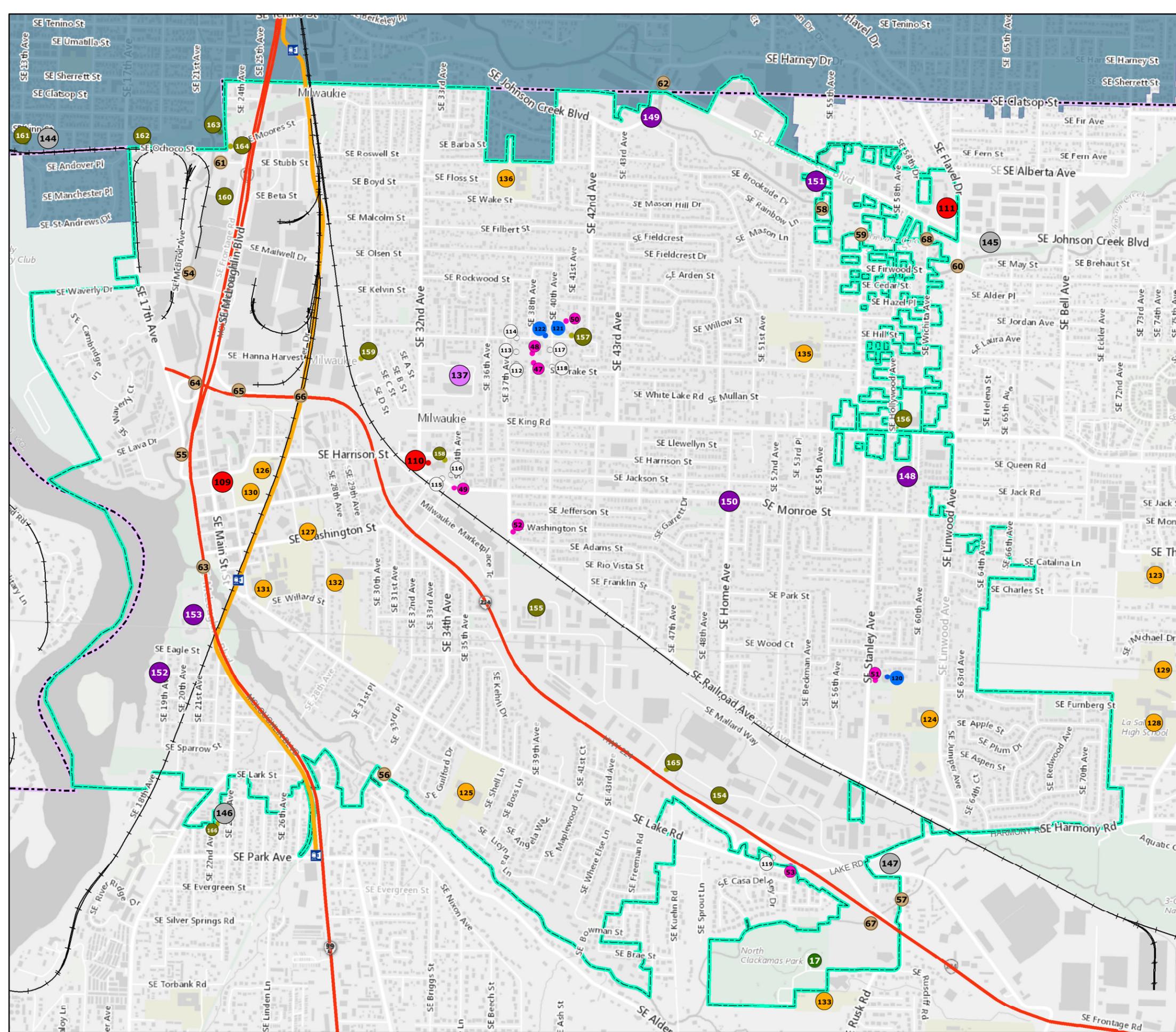
Date: Tuesday, July 23, 2019

The information depicted on this map is for general reference only. The City of Milwaukie cannot accept any responsibility for errors, omissions or positional accuracy. There are no warranties, expressed or implied, including the warranty of merchantability or fitness for a particular purpose, accompanying this product. However, notification of errors would be appreciated.

GIS Coordinator - City of Milwaukie
6101 SE Johnson Creek Blvd. Milwaukie, OR 97206 (503) 786-7687



Natural Hazards Mitigation Plan - Critical & Essential Assets



Transportation Infrastructure

- Highway
- RR Track
- MAX Light Rail (Orange Line)
- Light Rail Stop

Jurisdictional Boundaries

- Clackamas County
- City of Milwaukie
- City of Portland

Parks

- 17. The Milwaukie Center

Groundwater

- 47. City of Milwaukie Well No. 2
- 48. City of Milwaukie Well No. 3
- 49. City of Milwaukie Well No. 4
- 50. City of Milwaukie Well No. 5
- 51. City of Milwaukie Well No. 6
- 52. City of Milwaukie Well No. 7
- 53. City of Milwaukie Well No. 8

Bridges

- 54. Bridge over Johnson Creek (Milport Rd.)
- 55. Bridge over Johnson Creek (17th Ave.)
- 56. Bridge over Kellogg Creek (Oatfield Rd.)
- 57. Bridge over Mt. Scott Creek (Rusk Rd.)
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- 59. Bridge over Johnson Creek (Stanley Ave.)
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- 61. Bridge over Johnson Creek (Ochoco St.)
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- 65. Bridge over McLoughlin Blvd. (SR 224)
- 66. Bridge over Orange Line & 26th Ave (SR 224)
- 67. Bridge over Mt. Scott Creek (SR 224)
- 68. Bridge over Johnson Creek (Wichita Ave.)

Municipal

- 109. Milwaukie City Hall
- 110. Clackamas Fire District Station #2
- 111. Public Works Campus

Water Treatment

- 112. Water Treatment Tower
- 113. Water Treatment Tower
- 114. Water Treatment Tower
- 115. Water Treatment Tower
- 116. Water Treatment Tower
- 117. Water Treatment Backwash Station

Water Storage

- 118. Water Treatment Clearwell
- 119. City Well No. 8 Containment Chamber
- 120. Stanley Ave. Storage Reservoir
- 121. Water Tower
- 122. City Water Reservoir No. 2

Schools

- 123. Whitcomb Elementary
- 124. Linwood Elementary
- 125. Rowe Middle
- 126. Milwaukie Junior High School
- 127. St. John The Baptist
- 128. La Salle High
- 129. Christ The King
- 130. Portland Waldorf School
- 131. Milwaukie High
- 132. Milwaukie Elementary
- 133. Cascade Heights Public Charter
- 135. Lewelling Elementary
- 136. Ardenwald Elementary

Vulnerable Populations

- 137. Providence Milwaukie Hospital

Electrical

- 144. Sellwood Substation
- 145. Bell Substation
- 146. Island Substation
- 147. Harmony Substation

Wastewater

- 148. Wastewater Pump Station
- 149. Wastewater Pump Station
- 150. Wastewater Pump Station
- 151. Wastewater Pump Station
- 152. Wastewater Pump Station
- 153. Kellogg Creek Treatment Plant

Cellular

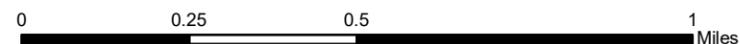
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Data Sources: City of Milwaukie GIS, Clackamas County GIS, Metro Data Resource Center

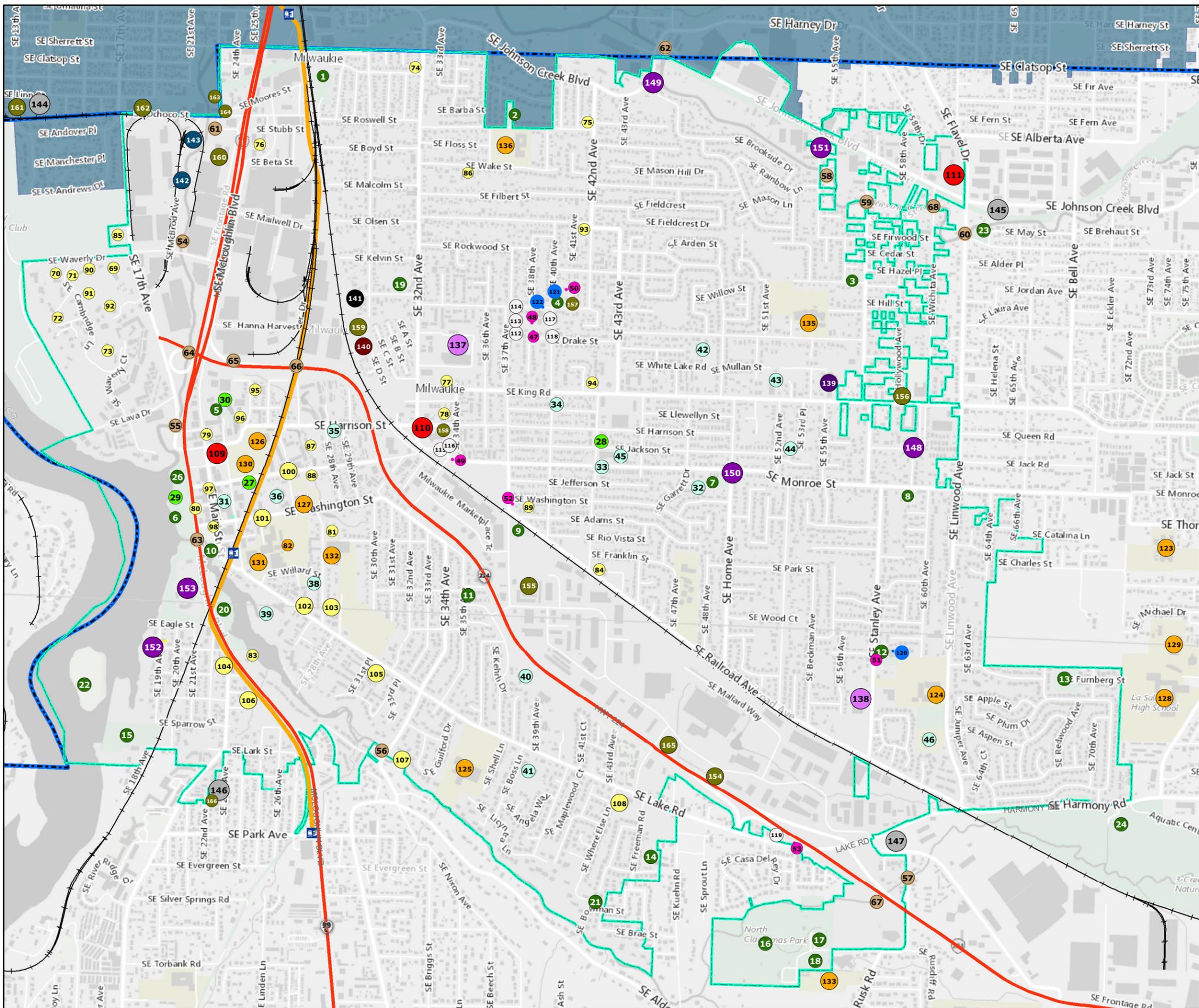
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Milwaukie NHMP - All Asset Locations

-  Highway
-  RR Track
-  MAX Light Rail (Orange Line)
-  Light Rail Stop
-  Clackamas County
-  City of Milwaukie
-  City of Portland
-  Parks
-  Community Centers
-  Places of Worship
-  Groundwater
-  Bridges
-  Historic Structures
-  Municipal
-  Water Treatment
-  Water Storage
-  Schools
-  Correctional
-  Electrical
-  Wastewater
-  Cellular



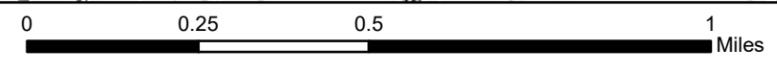
Note: See reverse side for full list of asset locations



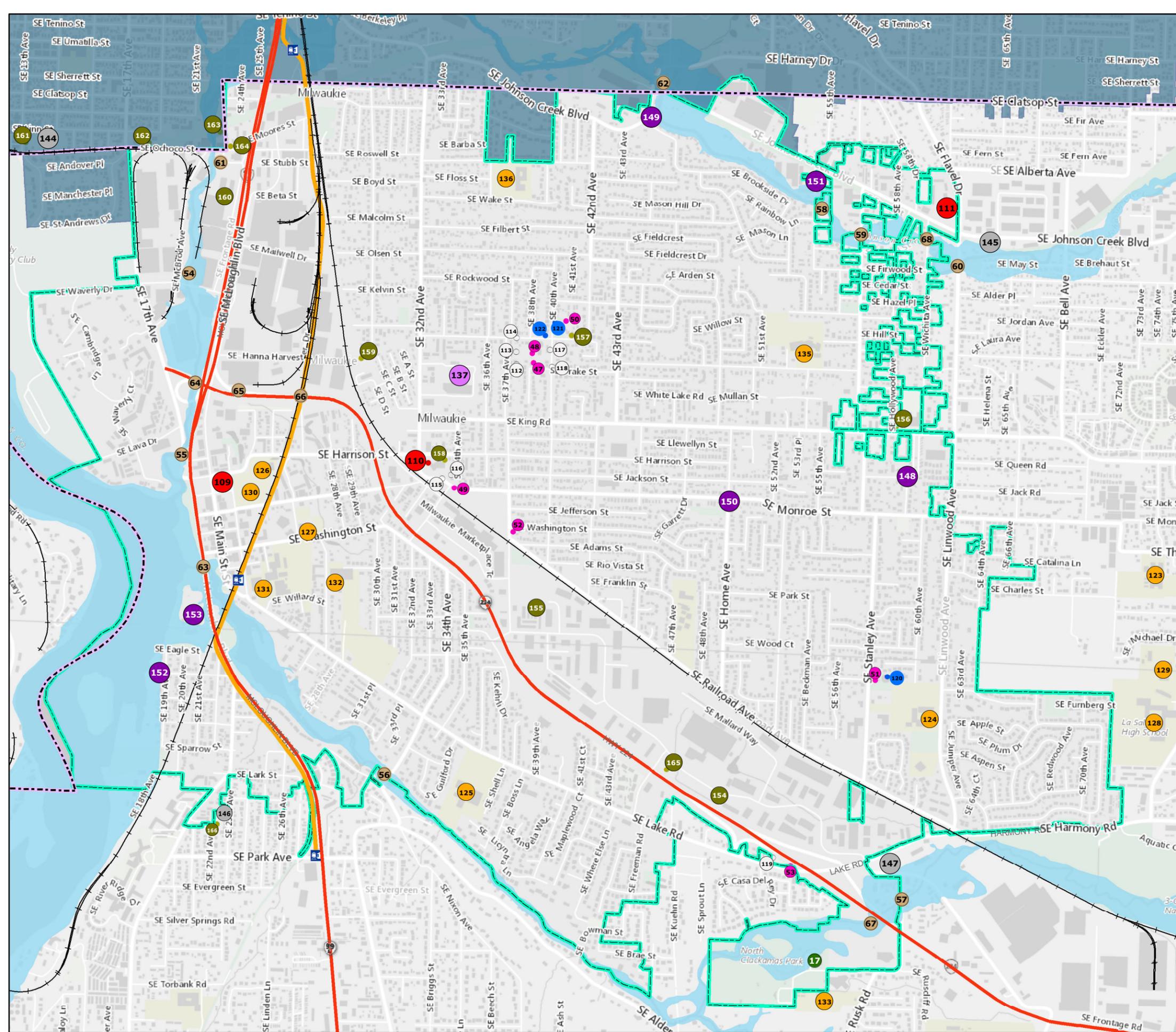
Data Sources: City of Milwaukie GIS, Clackamas County GIS, Metro Data Resource Center

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Natural Hazards Mitigation Plan - Assets & FEMA Flood Hazard Zones

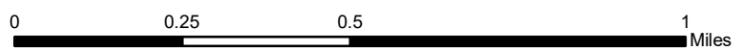


- FEMA Flood Hazard Zone**
 - 1% Annual Chance Flood Hazard ("100-Year Floodplain")
- Transportation Infrastructure**
 - Highway
 - Light Rail Stop
 - RR Track
 - MAX Light Rail (Orange Line)
- Jurisdictional Boundaries**
 - Clackamas County
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 - City of Portland
- Parks**
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- Schools**
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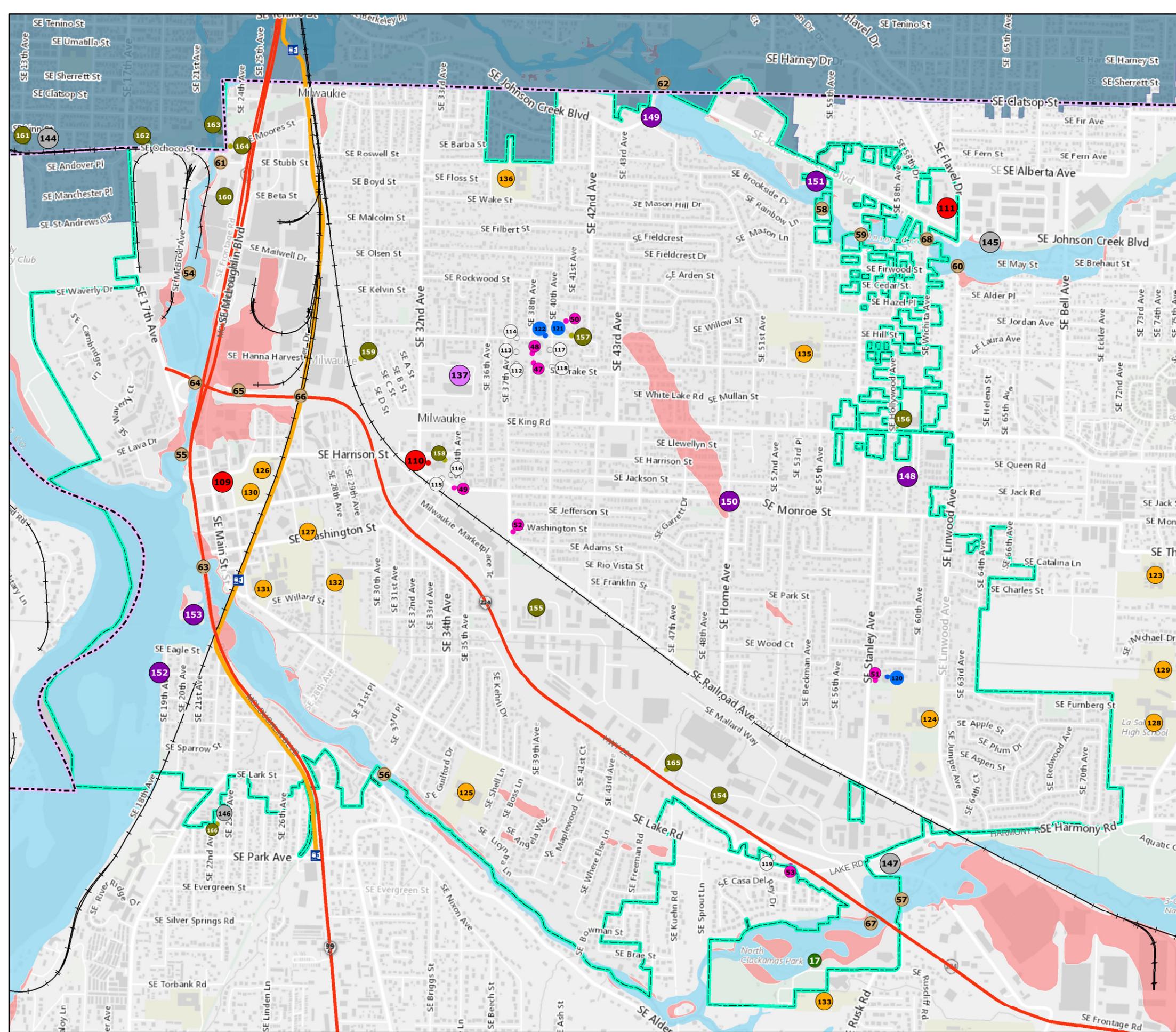


Data Sources: City of Milwaukie GIS, Clackamas County GIS, Metro Data Resource Center
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Natural Hazards Mitigation Plan - Assets & FEMA Flood Hazard Zones



- FEMA Flood Hazard Zone**
- 1% Annual Chance Flood Hazard ("100-Year Floodplain")
 - 0.2% Annual Chance Flood Hazard ("500-Year Floodplain")
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 - Light Rail Stop
 - RR Track
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 - 150. Wastewater Pump Station
 - 151. Wastewater Pump Station
 - 152. Wastewater Pump Station
 - 153. Kellogg Creek Treatment Plant



Data Sources: City of Milwaukie GIS, Clackamas County GIS, Metro Data Resource Center
 Date: Monday, July 22, 2019

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