

CITY OF LYONS ADDENDUM

Purpose

This addendum serves as the City of Lyon's Addendum to the Linn County Multi-Jurisdictional Natural Hazards Mitigation Plan (MNHMP, NHMP). This addendum supplements information contained in Volume I (Basic Plan) of this NHMP which serves as the plan foundation and Volume III (Appendices) which provide additional information (particularly regarding public participation, the community profile, and the mitigation strategy). 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).

Plan 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*. Prior to this update, Lyons has participated in a natural hazard mitigation planning process and has a pre-existing addendum to the Linn County NHMP.

In the summer of 2016, the City of Lyons expressed interest in updating its addendum to the Linn County NHMP. The City then worked with the Oregon Partnership for Disaster Resilience (OPDR) at the University of Oregon's Community Service Center to update the addendum. To maintain compliance with the Disaster Mitigation Act of 2000 (DMA2K), the plan requires an update every five years, with the next scheduled update slated for 2022. This project is funded through the Federal Emergency Management Agency's (FEMA) FY14 Pre-Disaster Mitigation Competitive Grant Program (PDMC-PL-10-OR-2014-002).

By updating this addendum to the Linn County NHMP, locally adopting it, and having it approved by FEMA, the City of Lyons will gain eligibility for FEMA Hazard Mitigation, Pre-Disaster Mitigation, and Flood Mitigation Assistance grant program funds.

The Linn County NHMP, and Lyons addendum, are the result of a collaborative effort between citizens, public agencies, non-profit organizations, the private sector, and regional organizations. Public officials, including Lyon's City Recorder, guided the process of developing the plan. For more information on all parties involved in the planning process, see the *Acknowledgements*, *Plan Summary*, and *Planning and Public Process* (Appendix A).

The Lyons City Recorder is the designated convener of this addendum. The Convener will take the lead in implementing, maintaining, and updating the addendum to the Linn County NHMP in collaboration with Linn County.

The City Recorder and staff from the Oregon Partnership for Disaster Resilience (OPDR) met via phone conference one occasion to discuss creating the Lyons addendum (see Appendix A for more information). During this meeting OPDR staff briefed the Lyons steering committee on the County's planning process. Prior to the meeting, the City Recorder reviewed and revised the draft addendum provided by OPDR, with particular focus on the plan's hazard history, risk assessment, and mitigation strategy (action items). During the meeting, the steering committee provided additional information on action item prioritization, reflecting local resource and capacity restraints. The addendum reflects decisions from this steering committee meeting and subsequent work between the steering committee and other city staff that was then communicated to OPDR.

The City of Lyons Steering Committee is comprised of the following individuals:

- Micki Mitchell, City Recorder
- Richard Berkey, Public Works
- Darrell Ritchie, Public Works

Lyons used multiple approaches to engage the public. First, the City established a steering committee comprised of representatives from the City. Next, the City participated in countywide community engagement activities described in Volume I, Section 4 and in Appendix A. City staff also presented the draft plan to the City Council during an open public council session. The steering committee was closely involved throughout the development of the plan and served as the local oversight body for the plan's development. In addition, community members outside of the steering committee were provided an opportunity for comment via the plan review process (see Appendix A for more information).

The Linn County NHMP was approved by FEMA on [Month] [Day], 2017 and the Lyons addendum was adopted via resolution on [Month] [Day], 2017. This NHMP is effective through [Month] [Day], 2022.

The Convener will also remain active in the county's implementation and maintenance process (see Volume I, Section 4 for more information).

Mitigation Strategy

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

During the 2016-17 Linn County and Lyons update process, OPDR assisted the steering committee with developing mitigation actions that will meet Lyon's unique situation. The initial set of action items were based on those developed by the Lyons steering committee in 2011. These actions were reviewed by the steering committee to create a status update and propose modifications. The steering committee then developed a list of priority actions. Any actions that were not prioritized were placed in the Action Item Pool and will be considered during the semi-annual meetings.

Priority Actions

The City is listing a set of high priority actions to focus attention on an achievable set of high leverage activities over the next five-years (see Table LY-1).

Table LY-1. Lyons Priority Action Items

Action Item	Hazard	Action Title	Coordinating Agencies	Timeline
Priority #1	Multi-Hazard	Update emergency operations plan.	Planning, Administration	Ongoing
Priority #2	Multi-Hazard	Create or update a Continuity of Operations Plan (COOP).	Planning, Emergency Mangement, Fire, Police	Short-Term
Priority #3	Multi-Hazard	Continue public education efforts aimed at informing citizens of the natural hazards Lyons is vulnerable to and mitigation measures residents can take independently to protect new and existing property.	Planning, Fire, Police	Ongoing
Priority #4	Multi-Hazard	Provide NHMP awareness training to City staff to incorporate Natural Hazard Mitigation.	Planning, Administration	Ongoing
Priority #5	Drought	Provide information regarding droughts and other natural hazards on the City's website. Provide hard copies at Lyons City Hall.	Public Works, Administration, Planning	Ongoing
Priority #6	Earthquake	Request that ODOT assess the seismic stability of the 5th Street Bridge and seek funding for seismic retrofitting/reinforcement of vulnerable buildings as needed.	Fire, Police, Emergency Management, Planning, ODOT	Ongoing
Priority #7	Earthquake	Complete inventory of public and commercial buildings and prioritize structures that are vulnerable to earthquake damage.	Planning, Public Works, Emergency Management	Short-Term
Priority #8	Flood	Complete an inventory of locations in city of Lyons subject to frequent storm water flooding outside of designated floodplains.	Public Works, Planning	Short-Term
Priority #9	Flood	For locations with repetitive flooding and significant damages or road closures, determine and implement mitigation measures such as upsizing culverts or storm water drainage ditches.	Public Works, Planning	Long-Term
Priority #10	Flood	Ensure continued compliance in the National Flood Insurance Program (NFIP) through enforcement of the provisions of flood damage prevention in the Lyons Municipal Code.	Planning, Public Works, Administration	Ongoing
Priority #11	Wildfire	Implement wildfire actions in the Linn County Community Wildfire Protection Plan as they relate to Lyons.	Fire, Police, Emergency Management	Ongoing

Source: City of Lyons NHMP Steering Committee, 2016.

Action Item Pool

Table LY-2 presents a pool of mitigation actions. This expanded list of actions is available for local consideration as resources, capacity, technical expertise and/or political will become available.

Table LY-2. Lyons Action Item Pool

Action Item	Hazard	Action Title	Coordinating Agencies	Timeline
#1	Multi-Hazard	Assist K-12 schools, childcare facilities and schools to develop vulnerability assessments and mitigation projects to improve safety.	Planning, Fire, Police, School District	Ongoing
#2	Multi-Hazard	Prepare residents to manage without power, utilities, or transportation during disaster event; communicate and promote readiness; build cooperative relationships with private businesses for assistance during disaster.	Emergency Management, Fire, Police, Planning	Ongoing
#3	Multi-Hazard	Provide NHMP awareness training to City staff to incorporate Natural Hazard Mitigation Planning aspects into their daily work.	Administration, Emergency Management, Fire, Police	Ongoing
#4	Drought	Identify incentive programs to install water efficient devices in existing and new city owned facilities.	Planning, Administration	Short-Term
#5	Earthquake	Evaluate Lyons' water distribution system, and seek funding alternatives to seismically retrofit where appropriate.	Planning, Public Works	Long-Term
#6	Flood	Encourage development of acquisition and management strategies to preserve open space for flood mitigation, fish habitat, and water quality in the floodplain and reduce risk to flood prone properties as well as preserve space for open space property.	Planning, Parks and Recreation	Ongoing
#7	Severe Weather (Winter Storm/Windstorm)	Develop and implement landscaping and tree standards to keep trees from threatening lives, property, and public infrastructure.	Planning, Public Works	Short-Term

Source: City of Lyons NHMP Steering Committee, 2016.

Plan Implementation and Maintenance

The City Council will be responsible for adopting the City of Lyons addendum to the Linn County NHMP. This addendum designates a convener and a coordinating body 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 steering committee will convene after adoption of the City of Lyons addendum on an annual schedule; the county meets semi-annually. The City of Lyons convener will participate in the Linn County NHMP meetings and will report on city specific activities as appropriate. The steering committee will be responsible for identifying new risk assessment data, reviewing status of mitigation actions, identifying new actions, and seeking funding to implement the City's mitigation strategy (actions). The convener will also remain active in the County's implementation and maintenance process (see Volume I, Section 4 for more information).

The City will utilize the same prioritization process as the county (See Volume I, Section 4: Plan Implementation and Maintenance and Volume IV, Appendix C: Economic Analysis of Hazard Mitigation Projects for more information).

Implementation through Existing Programs

Many of the Natural Hazards Mitigation Plan's recommendations are consistent with the goals and objectives of the City's existing plans and policies. Where possible, the City of Lyons will implement the NHMP's recommended actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses, and policy makers. 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.

The Lyons Comprehensive Plan was first acknowledged by the Oregon Land Conservation and Development Commission first in 1980. The City last amended the plan in 2011. Lyons last updated Chapter 903, which includes information pertaining to Statewide Planning Goal 7, *Natural Hazards*, in 2011. The City implements the plan through the City of Lyons Municipal Code, which was last revised in 2015.

Lyons currently has the following plans that relate to natural hazard mitigation. These documents can currently be viewed through the city's [website](#):

- [Comprehensive Plan](#) (1980, last amended in 2011)
- [Municipal Development Code](#) (April, 2015)
 - [Flood Damage Prevention](#)
- [City Storm Drainage Plan](#) (May, 2011)

Continued Public Participation

Keeping the public informed of the City's efforts to reduce the City's risk to future natural hazards events is important for successful plan implementation and maintenance. The City is committed to involving the public in the plan review and updated process. See Volume I, Section 4 for more information.

Plan Maintenance

The Linn County Multi-Jurisdictional Natural Hazards Mitigation Plan and city addendum will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. During the county plan update process, the City will also review and update its addendum. The convener will be responsible for convening the steering committee 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 plan 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?
- Are there new studies or data available that would enhance the risk assessment?
- Has the community been affected by any disasters? Did the plan accurately address the impacts of this event?

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

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 Section 2, *Risk Assessment*, and Appendix B, *Community Profile*. The risk assessment process is graphically depicted in Figure LY-1 below. Ultimately, the goal of hazard mitigation is to reduce the area of risk, where hazards overlap vulnerable systems.

Figure LY-1. Understanding Risk



Hazard Analysis Methodology

This NHMP utilizes a hazard analysis methodology that was first developed by FEMA circa 1983, and gradually refined by the Oregon Military Department's Office of Emergency Management (OEM) over the years.

The methodology produces scores ranging from 24 (lowest possible) to 240 (highest possible). Vulnerability and probability are the two key components of the methodology. Vulnerability examines both typical and maximum credible events, and probability endeavors to reflect how physical changes in the jurisdiction and scientific research modify the historical record for each hazard. Vulnerability accounts for approximately 60% of the total score, and probability approximately 40%.

This method provides the jurisdiction with a sense of hazard priorities, or relative risk. It does not predict the occurrence of a particular hazard, but it does "quantify" the risk of one hazard compared with another. By doing this analysis, planning can first be focused where the risk is greatest.

In this analysis, severity ratings, and weight factors, are applied to the four categories of history, vulnerability, maximum threat (worst-case scenario), and probability as shown in the table below. See Volume I, Section 2 (*Risk Assessment*) for more information.

Hazard Analysis

The Lyons steering committee developed their hazard vulnerability assessment (HVA), with guidance provided by OPDR, using the County's HVA as a reference. Changes from the County's HVA were made where appropriate to reflect distinctions in vulnerability and risk from natural hazards unique to Lyons, which are discussed throughout this addendum. The approximate level of relative risk posed to Lyons by each of the hazards covered in this NHMP is summarized in Table LY-3. The ranking is based on quantitative and qualitative judgement about the likely long-term average annual damages and losses in Lyons from each hazard, taking into account the probability of major hazard events and the severity of damages and losses if/when such events occur.

This method provides the jurisdiction with a sense of hazard priorities, or relative risk. It doesn't predict the occurrence of a particular hazard, but it does "quantify" the risk of one hazard compared with another. By doing this analysis, planning can first be focused where the risk is greatest.

Two chronic hazards (winter storm and windstorm) and one catastrophic hazard (Cascadia Subduction Zone earthquake) rank as the top three hazard threats to the city. Then flood, crustal earthquakes, wildfires, and drought hazards comprise the next four highest ranked hazards, while landslide and volcano hazards comprise the lowest ranked hazards.

Table LY-3. Hazard Analysis Matrix

Hazard	History	Vulnerability	Maximum Threat	Probability	Total Threat Score	Hazard Rank	Hazard Tiers
Winter Storm	20	50	90	70	230	# 1	Top Tier
Earthquake - Cascadia	2	50	100	56	208	# 2	
Windstorm	16	40	80	70	206	# 3	
Flood - Riverine	12	45	90	28	175	# 4	Middle Tier
Earthquake - Crustal	4	25	70	35	134	# 5	
Wildfire (WUI)	4	25	50	28	107	# 6	
Drought	16	5	50	35	106	# 7	
Landslide	6	10	30	21	67	# 8	Bottom Tier
Volcano	2	20	10	21	53	# 9	

Source: Lyons NHMP Steering Committee, 2016.

Table LY-4 categorizes the probability and vulnerability scores from the hazard analysis for the City and compares the results to the assessment completed by the Linn County NHMP Steering Committee (areas of differences are noted with **bold** text within the city ratings). The City ranked vulnerability to windstorm higher than the County. The City ranked vulnerability to windstorm higher than the County. The City ranked the probability of flood lower than the County and the vulnerability higher than the County. The City rated the probability of wildfire lower than the County. Finally, the City rated both the probability and vulnerability to landslides lower than the County.

Table LY-4. Probability and Vulnerability Comparison

Hazard	Lyons		Linn County	
	Probability	Vulnerability	Probability	Vulnerability
Drought	Moderate	Low	Moderate	Low
Earthquake - Cascadia	High	High	High	High
Earthquake - Crustal	Moderate	Moderate	Moderate	Moderate
Flood - Riverine	Moderate	High	High	Moderate
Landslide	Low	Low	High	Moderate
Volcano	Low	Moderate	Low	Moderate
Wildfire (WUI)	Moderate	Moderate	High	Moderate
Windstorm	High	High	High	Moderate
Winter Storm	High	High	High	High

Source: Lyons NHMP Steering Committee and Linn County NHMP Steering Committee, 2016.

Community Asset Identification

The following section provides information on city specific assets. For additional information on the characteristics of Lyons, in terms of geography, environment, population, demographics, employment and economics, as well as housing and transportation see Volume III, Appendix B, *Community Profile*. 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.

Community Characteristics

The City of Lyons is located in Linn County, approximately 26 miles southeast of Salem, OR and 32 miles northeast of Albany, OR. Lyons was founded in 1880 and legally incorporated in 1958. It occupies an area of 0.88 square miles (563.2 acres). Lyons experiences a moderate climate. In August, the average high temperature is 74 degrees and the average low temperature is 49 degrees. Wintertime temperatures in January range from an average high of 42 degrees, and an average low of 33 degrees. Lyons receives an average annual precipitation of 56.25 inches.¹

The North Santiam River runs along the northern boundary of Lyons. Several small ponds are surrounded by county and municipal parkland near the eastern edge of town. Trask Creek collects drainage from the southern hills along the south edge of the City. Lyons is located on mostly flat land, with elevations increasing slightly on the south side of town, with ridges surrounding Lyons to the south, and northeast. Across the river to the north is the unincorporated community of Mehama, located on the north bank of the North Santiam River. The landscape surrounding the city consists of farmland in level areas, and forestland on surrounding slopes.

¹ Weather.com. Temperature and Precipitation Averages.
<https://weather.com/weather/monthly/l/USOR0203:1:US>

The Population Research Center at Portland State University lists Lyon's 2016 population at 1,160. This represents a negligible increase from 2010. For more demographic information, refer to Appendix B.

Economy

Historically, Lyons was a timber community. Now, about 85% of the labor force in Lyons are now employed in manufacturing and services.² Lyons also serves as a bedroom community for major employers in the surrounding area. These employers include Linn Benton Community College, Lebanon Community Hospital, Georgia Pacific Corps, Samaritan Albany General Hospital, Wah Chang, Santiam Towing and Recovery, and the Target Distribution Center of Albany. Median household income in Lyons in 2015 was \$60,417. For more economic information, refer to Appendix B.

Critical and Important Facilities

Lyons contains critical facilities that provide important services to city residents. These include the following:

- City Hall, 449 5th St, Lyons, OR 97358
- Lyons Post Office, 402 Ironwood St, Lyons, OR 97358
- Lyons Rural Fire District Station 550, 1114 Main St, Lyons, OR 97358
- Lyons-Mehama Water District Shop, 442 Locust St, Lyons, OR 97358
- The former St. Patrick's Catholic Church located on 7th Street, (listed on the National Register of Historic Places)
- The Corvallis and Eastern Railroad Depot, 60 Front Street, (listed on the National Register of Historic Places)
- The Lyons School on Birch Street, (listed on the National Register of Historic Places)
- Lyons Public Library, 279 8th St, Lyons, OR 97358
- Santiam Chapel Assembly of God, 440 5th St, Lyons, OR 97358
- Canyon Baptist Church, 446 Cedar St, Lyons, OR 97358

The nearest hospital is the Santiam Memorial Hospital in Stayton at 1401 N 10th Ave, Stayton, OR 97383.

Main transportation corridors to and from Lyons include Highway 226, which connects with Highway 20 to provide the main access to and from Albany, located to the southwest. Highway 22 to the north provides east/west access to and from Stayton to the west, and Salem to the northwest. Highways 22 and 226 provide connectivity to I-5. Highway 226 intersects with Highway 22 just north of Lyons, in Mehama, located on the north bank of the North Santiam River. East Lyons Mill City Drive diverges from Highway 226 in downtown Lyons, and provides an additional east/west connection to Mill City, located 8 miles to the east. The North Santiam River Bridge between Lyons and Mehama forms the only connection between the two communities. Without an operational bridge, Lyons would have no access to Mehama, or Highway 22.

² Business Oregon – Oregon Prospector. Total Employees by Major SIC (2017) for Lyons, OR. <http://oregon.zoomprospector.com/>

Albany and Eastern Railroad Company (AERC) owns and operates the Mill City District railroad line, a railway that runs from Mill City to Lebanon and which forms the southern boundary of Lyons. This railroad provides railroad transport to industrial sites in Lebanon and Albany, OR.

The Chemeketa Area Regional Transportation System (CARTS) is the public transit provider for Marion and Polk Counties, and specified communities of Linn County. The CART Canyon Connector Route has stops at both the Lyons Fire Station and City Hall, and provides transportation to and from Salem, Stayton, Mill City, and Gates.

Lyons has the following schools which serve the community from within the city limits:

- Mari-Linn Elementary School, 741 5th St, Lyons, OR 97358

For middle and high school, residents of Lyons attend schools in Stayton.

Hazard Characteristics

Drought

The characteristics of drought in Lyons are the same for the county as a whole.

Table LY-5. Drought Summary

Hazard	Drought
Type	Climatic
Speed of Onset	Slow
Location	Varies, County Wide
Extent	Moderate to Severe Drought*
Prior Occurance	Three > 6 months duration since 1982
Probability	~9%

*Defined as between -2 and -4 on the National Resource Conservation Service (NRCS) Surface Water Supply Index (SWSI)

Sources: Oregon NHMP; NRCS; analysis by OPDR

The probability of drought in Lyons is **moderate**, the same as for the county as a whole. The City's vulnerability to drought is **low** (the same as the County's rating).

Volume I, Section 2, *Risk Assessment*, adequately describes the characteristics of drought hazards, as well as the location and extent of a potential event. Due to a cool, wet climate, past and present weather conditions have generally spared Linn County communities from the effects of drought. However, Governor Kate Brown declared a drought emergency for all of Linn County in September 2015.

The Lyons/Mehama Water District has a water storage capacity of approximately 800,000 gallons supplied by three storage reservoirs, and additional water capacity available as needed, provided from the Big Cliff Reservoir, which is located approximately 3 miles downstream from Detroit Lake. Because the City has adequate existing capacities, and a close proximity to the North Santiam River, the Lyons steering committee estimates a low vulnerability to drought events. Due to expected changes and unpredictability in climate patterns, the City acknowledges uncertainty in this estimate, and will re-evaluate conditions when this plan is updated.

Portions of a community that are typically affected by droughts include those that depend on agriculturally-based operations, water-dependent recreational activities, and water-borne transportation systems. Domestic water-users may also be subject to conservation measures and/or could be faced with significant increases in electricity or water rates. Additionally, droughts can have severe environmental consequences. A prolonged drought in forests promotes an increase of insect pests, which in turn damages trees that are already weakened by a lack of water. Likewise, a moisture-deficient forest constitutes a significant fire hazard.

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Earthquake

The characteristics of both a crustal earthquake and a Cascadia Subduction Zone (CSZ) earthquake are similar to the county as a whole.

Table LY-6. Earthquake Summary Crustal

Hazard	Earthquake - Crustal
Type	Geologic
Location	Multiple active faults; Willamette Valley
Speed of Onset	Rapid
Extent	Very Strong to Severe shaking ~ 500 yrs*
Prior Occurance	One over Magnitude 5 last 100 yrs**
Probability	Approximately 1% annual

*DOGAMI HazVu; ** PNSN - 1993 Scotts Mills just north of Marion County

Sources: DOGAMI - Oregon HazVu; Oregon NHMP; Pacific Northwest Seismic Network

Table LY-7. Earthquake Summary Subduction

Hazard	Earthquake - Subduction
Type	Geologic
Location	Primarily west of the Cascades; CA - BC
Speed of Onset	Rapid
Extent	Catastrophic
Prior Occurance	One over Magnitude 9 last 500 yrs
Probability	Magnitude 9+ is 7% - 12% over 50 yrs**

*DOGAMI HazVu; **Oregon Natural Hazard Mitigation Plan, analysis by Oregon Department of Geology and Mineral Industries.

Sources: DOGAMI - Oregon HazVu; Oregon NHMP; Pacific Northwest Seismic Network

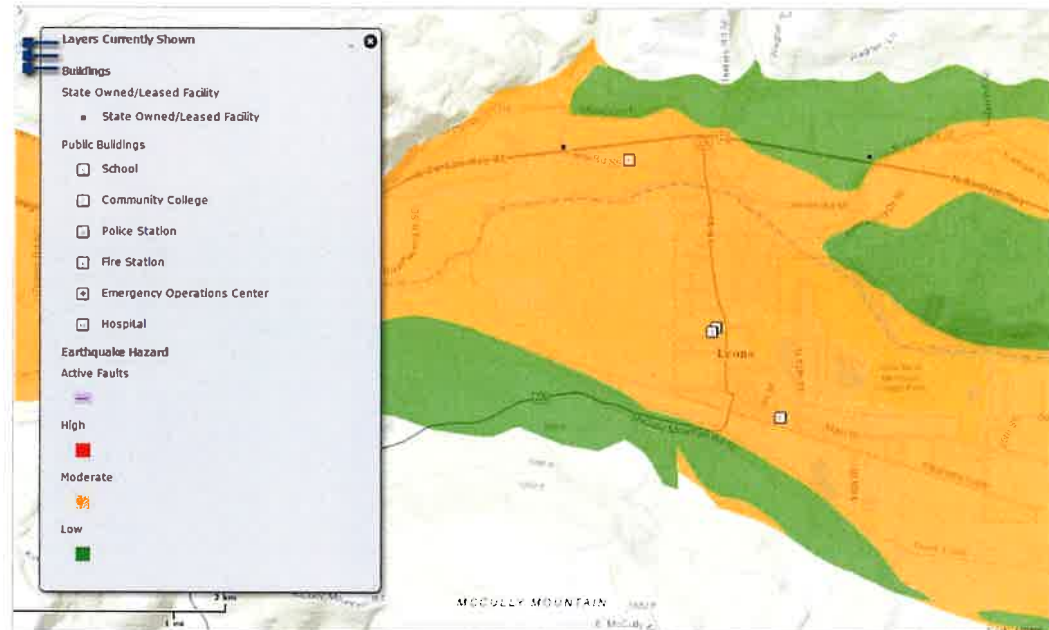
The steering committee determined that the city's probability for a Cascadia Subduction Zone (CSZ) Earthquake event is **high** and that their vulnerability to a Cascadia Earthquake event is **high** (these are the same ratings assigned to the County). The steering committee determined that the city's probability for a Crustal Earthquake event is **moderate** and that their vulnerability to a Crustal Earthquake event is **moderate** (again, the same ratings assigned to the County).

Volume I, Section 2, *Risk Assessment*, adequately 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 Lyons as well. The causes and characteristics of an earthquake event are appropriately described within the county's plan, as well as the location and extent of potential hazards. Previous occurrences are well-documented within the county's plan, and the community impacts described by the county would generally be the same for Lyons as well.

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 particular site. In many major earthquakes, damages have primarily been caused by the behavior of the soil. Figure LY-2 displays relative liquefaction hazards. As shown in Figure LY-2, nearly all of Lyons is in an area with moderate

concern for soil liquefaction. This is due to a combination of soil characteristics and moderate levels of predicted shaking in the area. For more information, see Figure 2-4 in Volume I, Section 2 - *Risk Assessment*.

Figure LY-2. Active Faults and Soft Soils



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

The following is a list of potential infrastructure identified by the steering committee as potentially vulnerable to seismic events:

- Lyons Public Library is located in an older, 2 story unreinforced masonry building. The steering committee believes this building could be damaged in the event of an earthquake.
- As described in Appendix B, *Community Profile*, Figure B-8, over 70% of Lyon’s housing was built before 1990. Older homes are at a greater risk of damage from earthquake events. Structures built after 1994 in the Northwest used earthquake resistant designs and construction techniques.
- Stable transportation networks are necessary for economic continuity and emergency service provisions. The 5th Street Bridge that crosses the North Santiam River could be vulnerable to seismic activity; likewise, damages to Highway 226 on the south side of Lyons would be detrimental to the transportation system.

Information on specific public buildings’ (schools and public safety) estimated seismic resistance was determined via a Rapid Visual Survey (RVS) conducted by the Department of Geology and Mineral Industries (DOGAMI) in 2007. The RVS recommends further study on buildings that were ranked as either ‘high’ or ‘very high’ collapse potential. Facilities with at least one building with a ‘very high’ or ‘high’ potential for collapse that are located within

Lyons are listed below. Additional information can be found within the RVS study on DOGAMI's website (www.oregongeology.org).

'Very High' Collapse Potential

- Mari-Linn Elementary School: (741 5th St, Lyons, OR 97358)

A map of all facilities that were assessed is available on DOGAMI's website.³

Utility systems will be significantly damaged, including damaged buildings and damage to utility infrastructure, including 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 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.⁴

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Flood

Table LY-8. Flood Summary

Hazard	Flood
Type	Climatic
Speed of Onset	Slow to moderate
Location	Mapped flood zones, floodplain
Extent	Moderate to severe
Prior Occurance	Four significant events since 1964
Probability	1% annual within SFHA

Sources: DOGAMI - Oregon HazVu; Oregon NHMP

Lyons's probability for riverine flood is **moderate** (compared to the County's rating of high) and vulnerability to flood is **high** (compared to the County's rating of moderate).

Volume I, Section 2, *Risk Assessment*, adequately describes the characteristics of flood hazards, history, as well as the location, extent, and probability of a potential event. The most recent significant floods in Linn County occurred in 1996, causing widespread damage in both rural and urban areas of the county and throughout the region. The February 1996 flood was caused by prolonged heavy precipitation that contributed to an early snowmelt. Many rivers and creeks throughout the Willamette River watershed rose to the mapped 100-year flood level, inundating surrounding areas, including cities.

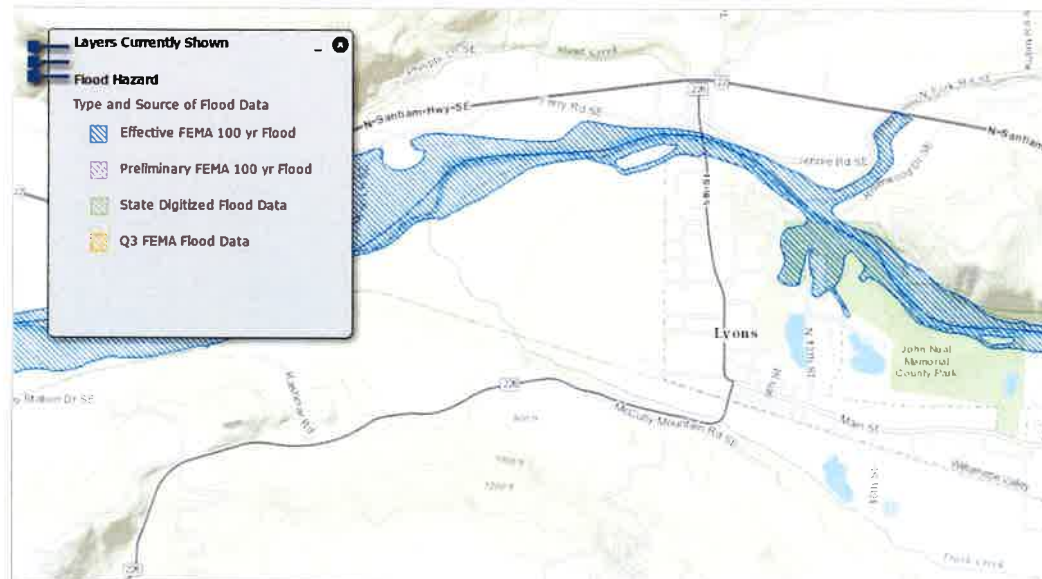
The steering committee indicated that the Detroit Dam sufficiently regulates the flow of the North Santiam River, so that water levels do not exceed bank-full levels. The steering committee did indicate however that Lyons does experience periodic, localized flooding in areas. Inadequate culverts and drainage facilities to the east of 24th Street have caused

³ http://www.oregongeology.org/sub/projects/rvs/maps/Maps_Linn_County.pdf

⁴ Regional All Hazard Mitigation Master Plan for Benton, Lane, and Linn Counties: Phase II (2001)

significant flooding problems in adjacent areas. Trask Creek, flowing along the southern edge of Lyons is also an area of concern according to the Lyons Steering Committee. Trask Creek is a drainage ditch for the hills south of Lyons. Excessive vegetation in and around Trask Creek contributes to flooding in portions of southern Lyons around Trask Creek.

Figure LY-3. Special Flood Hazard Area



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

To mitigate the impacts of future flood events the City of Lyons has adopted Chapter 15.10 of the Lyons Municipal Code: Flood Damage Prevention. This chapter was most recently updated June 2014. The purpose of the Lyons Municipal Code Flood Damage Prevention Chapter 15.10 is to minimize public and private losses due to flood conditions. Methods of reducing flood losses described in this chapter include:

- Restricting or prohibiting uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or in flood heights or velocities.
- Requiring that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction.
- Controlling the alteration of natural flood plains, stream channels, and natural protective barriers, which help accommodate or channel flood waters.
- Controlling filling, grading, dredging, and other development which may increase flood damage.
- Preventing or regulating the construction of flood barriers which will unnaturally divert flood waters or may increase flood hazards in other areas.

For more information on the Lyons Municipal Code flood damage prevention methods, please refer to City of Lyons Municipal Code, Chapter 15.10 – Flood Damage Prevention. Available on the City of Lyons Website: <http://www.cityoflyons.org/city-codes>

A comprehensive description of all areas of special flood hazards for Lyons are contained in a report entitled “The Flood Insurance Study for the City of Lyons”, and contains accompanying flood insurance maps. This report is on file at City Hall in Lyons.

National Flood Insurance Program (NFIP)

FEMA modernized the Lyons Flood Insurance Rate Maps (FIRMs) in September of 2010 and revised them in December 2016. The table below shows that as of October 2016, Lyons has 7 National Flood Insurance Program (NFIP) policies in force. Of those, 3 are for properties that were developed before development of the initial FIRM. Lyon’s last Community Assistance Visit (CAV) occurred in March 1995. Lyons is not a member of the Community Rating System (CRS). Table LY-9 shows that all of the flood insurance policies are for single-family residential structures. There have been no paid flood claims in Lyons. The City complies with the NFIP through enforcement of their flood damage prevention ordinance and their floodplain management program.

The Community Repetitive Loss record for Lyons identifies no Repetitive Loss Properties⁵ and no Severe Repetitive Loss Properties⁶.

Table LY-9. Flood Insurance Detail

Jurisdiction	Effective FIRM and FIS	Initial FIRM Date	Total Policies	Pre-FIRM Policies	Policies by Building Type				Minus Rated A Zone
					Single Family	2 to 4 Family	Other Residential	Residential I	
Linn County	-	-	1,054	684	895	18	6	135	72
Lyons	12/8/2016	12/15/1981	7	3	7	0	0	0	0

Jurisdiction	Insurance In Force	Total Paid Claims	Pre-FIRM Claims Paid	Substantial Damage Claims	Total Paid Amount	Repetitive Loss Properties	Severe Repetitive Loss Properties	CRS Class Rating	Last Community Assistance Visit
Linn County	\$ 230,901,600	97	82	3	\$ 1,526,254	9	1	-	-
Lyons	\$ 1,832,000	0	0	0	\$ -	0	0	NP	3/31/1995

Source: Information compiled by Department of Land Conservation and Development, October, 2016.

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

⁵ 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.

⁶ 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.

Landslide

Table LY-10: Landslide Summary

Hazard	Landslide
Type	Climatic/Geologic
Speed of Onset	Slow to rapid
Location	Waterways (banks) and transportation facilities
Extent	Minor
Prior Occurance	No major events
Probability	Low for minor events; less than 5% major events

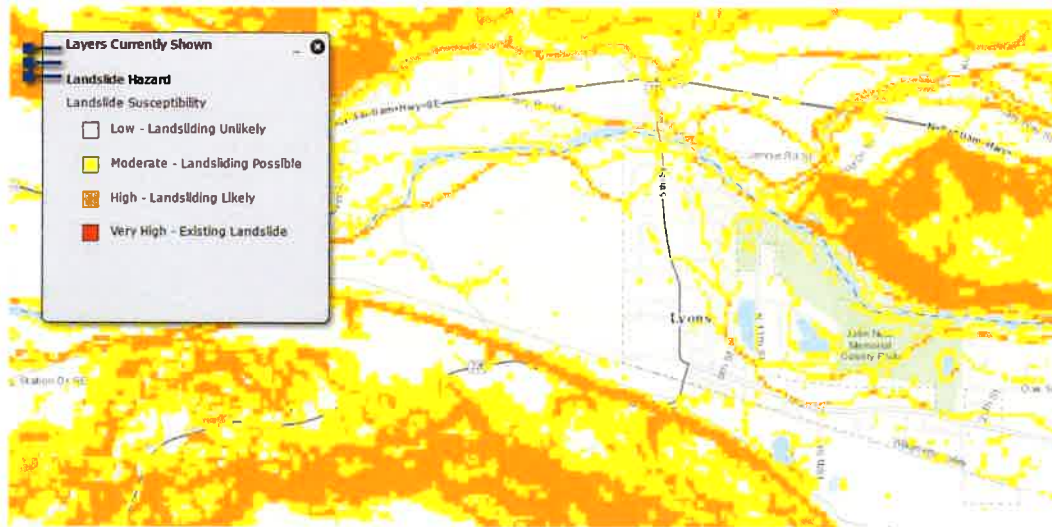
Sources: DOGAMI - Oregon HazVu; Oregon NHMP

Lyons's probability for landslide is **low** (compared with the County's rating of high) and their vulnerability to landslide is also **low** (compared to the County's rating of moderate).

Volume I, Section 2, *Risk Assessment*, adequately describes the characteristics of landslide hazards, history, as well as the location, extent, and probability of a potential event within the region. The Lyons steering committee indicated that no landslides have been experienced within the City limits due to the City's topography. This was the primary reason why Lyons estimates a low probability that landslides will occur within City limits. Additionally, it is unlikely a large portion of Lyons's population or community assets could be affected by a landslide event. Depending upon the type, location, severity, and area affected, property damage, injuries and loss of life could be caused by landslide hazards, but those circumstances are not likely to occur inside Lyons.

Landslides can damage or temporarily disrupt utility services, roads and other transportation systems and critical lifeline services such as police, fire, medical, utility and communication systems, and emergency response. In addition to the immediate damage and loss of services, serious disruption of roads, infrastructure and critical facilities and services may also have longer term impacts on the economy of the community and surrounding area. The Lyons steering committee identified Highway 226 southwest of Lyons as the main landslide concern to due to the steep slopes, minimal shoulder, and it being a primary access road.

Figure LY-4. Landslide Susceptibility Exposure



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

Potential landslide-related impacts are adequately described within the County’s plan, and include infrastructural 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 in Linn County, and thoroughfares beyond city limits are susceptible to obstruction as well.

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Volcano

Table LY-1 I: Volcano Summary

Hazard	Volcano
Type	Geologic
Speed of Onset	Slow to rapid
Location	Cascade Mountains
Extent	Minor
Prior Occurance	One significant event since 1916 (Mount St. Helens)
Probability	<1% annual

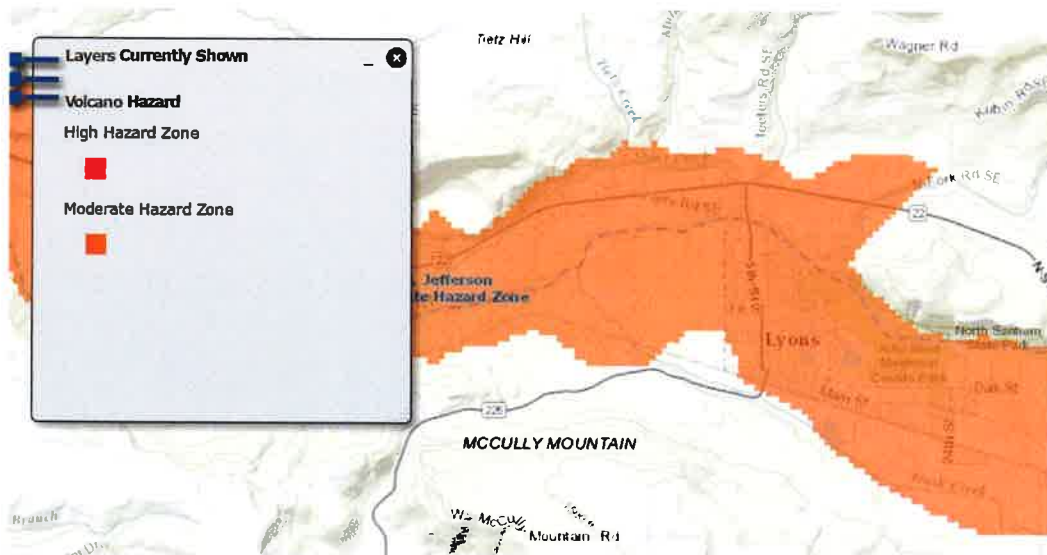
Sources: DOGAMI - Oregon HazVu; Oregon NHMP

The steering committee determined that the city’s probability for volcanic event is **low** (the same as the County’s rating) and their vulnerability to volcano is **moderate** (the same as the County’s rating).

Volume I, Section 2, *Risk Assessment*, adequately describes the characteristics of volcanic ash hazards, history, as well as the location, extent, and probability of a potential event within the region. Lyons is very unlikely to experience anything more than volcanic ash during a volcanic event. However, due to its close proximity to the Cascade Range and its position along a riverine corridor, Lyons could potentially experience mudflow effects from

an eruptions event. Oregon’s HAZVU evaluation places the city within a moderate volcano hazard zone.

Figure LY-5. Volcano Hazard



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

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Wildfire

Table LY-12: Wildfire Summary

Hazard	Wildfire
Type	Climatic, Human Caused
Speed of Onset	Moderate to rapid
Location	Outside city limit
Extent	Minor to moderate
Prior Occurance	No history inside city limit
Probability	<1% annual

Sources: Marion County NHMP

The City’s probability for wildfire is **moderate** (compared to the County’s rating of high) and their vulnerability to wildfire is also **moderate** (the same as the County’s rating).

Volume I, Section 2, *Risk Assessment*, adequately describes the characteristics of wildland fire hazards, history, as well as the location, extent, and probability of a potential event within the region. Lyons is surrounded by open farmland and forests to the south, east, and west. The city’s northern border is the Santiam River, and the riparian areas around the river.

The 2007 Linn County Community Wildfire Protection Plan (CWPP), identifies Lyons as a “Community at Risk.” The term “at-risk community” means an area:

- (A) That is comprised of (i) an interface community as defined in the notice entitled “Wildland Urban Interface Communities Within the Vicinity of Federal Lands That Are at High Risk From Wildfire” issued by the Secretary of Agriculture and the Secretary of the Interior in accordance with title IV of the Department of the Interior and Related Agencies Appropriations Act, 2001 (114 Stat. 1009) (66 Fed. Reg. 753, January 4, 2001); or (ii) a group of homes and other structures with basic infrastructure and services within or adjacent to Federal land;
- (B) In which conditions are conducive to a large-scale wildland fire disturbance event;
- (C) For which a significant threat to human life or property exists as a result of a wildland fire disturbance event.⁷

According to Linn County’s CWPP, Lyons’ “fire behavior potential” is influenced by the moderate slopes in the community, broken moderate fuels, and some ladder fuels. The composition of surrounding fuels is conducive to torching and spotting.⁸

The Lyons steering committee identified the following vulnerabilities that Lyons could have to wildfire events:

- Residents who live in the wildland urban interface are a risk to wildfire hazards. These areas include residences on the western border of town, near the wooded areas abutting the northwestern edge of town.
- Children, the elderly, asthma sufferers, and hospital patients may be vulnerable to smoke inhalation or excessive ash fall caused by wildfires.
- Wildfires can have a significant impact on local environmental assets. Wildfires can disrupt the intake of water on the North Santiam River and Trask Creek, either by damaging intake systems or polluting the water source, both of which could disrupt the City’s water supply. Parks located within the City such as John Neal Memorial Park and Freres City Park, could be significantly damaged by wildfires as well.
- The City currently doesn’t have identified emergency shelters and needs to identify options for housing populations post-disaster (for wildfire and all other hazards as well). Potential sites suggested by the steering committee include the Mari-Linn Elementary, Santiam Chapel, Canyon Baptist Church, and the Lyons Public Library.

Lyons does not state land use protection measures for wildfire in the comprehensive plan and has limited infrastructure to fight wildfires. This includes a limited number of access routes and limited water supplies.

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

⁷ Healthy Forests Restoration Act: Title I – Hazardous Fuel Reduction on Federal Land, SEC. 101.
https://www.blm.gov/or/resources/forests/files/HFRA_Law.pdf

⁸ *ibid.*

Severe Weather (Windstorm & Winter Storm)

Table LY-13: Severe Weather Summary

Hazard	Severe Weather/Storm
Type	Climatic
Speed of Onset	Slow to moderate
Location	Countywide
Extent	Minor to severe
Prior Occurance	Minor events occur annually; ~30 moderate to severe events countywide over the past 130 years
Probability	100% for minor events, 23% for moderate to severe events

Sources: Linn County NHMP

Lyon's probability for windstorm is **high** (same as the County's rating) and their vulnerability to windstorm is also **high** (compared to the County's rating of moderate). Lyon's probability for winter storms is **high** (same as the County's rating) and their vulnerability to winter storms is also **high** (same as the County's rating).

Volume I, Section 2, *Risk Assessment*, adequately describes the causes and characteristics of windstorms and severe winter storms, as well as the location and extent of these hazards.

The steering committee indicated that street trees in Lyons are particularly vulnerable to windstorms. The committee stated that power outages were an annual occurrence for residents and businesses. Prolonged outages could potentially cause serious strain on residents in need of provisions and emergency services in the event of a natural disaster.

Severe winter storms can consist of rain, freezing rain, ice, snow, cold temperatures, and wind. They originate from troughs of low pressure offshore that ride along the jet stream during fall, winter, and early spring months. Severe winter storms affecting the city typically originate in the Gulf of Alaska or in the central Pacific Ocean. These storms are most common from November through March.

Major winter storms can and have occurred in the Lyons area, and while they typically do not cause significant damage, they are frequent and have the potential to impact economic activity. For example, in December 2009, Lyons experienced significant tree damage to property and power infrastructure. The most recent winter storms (December 2016 – January 2017) included snow and ice and resulted in transportation and power interruptions combined with government office and school closures.

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.