

Chapter 3: Natural Hazards

Overview of Local Hazard Mitigation Mission and Goals

Short and long-term action items identified through the planning process are an important part of the mitigation plan. Action items are more detailed recommendations for activities that local government, developers, citizens and others could engage in to reduce risk. They address both All-Hazard and hazard-specific issues.

The sector summaries describe sensitivities to Flood, Landslide, Wildfire, Winter and Severe Storms, Earthquake, Drought, and an All-Hazards section to address actions which may encompass several different hazard threat sources. Because of limited meeting time with system experts, the assessment does *not* reflect all hazards for all sectors. The flood scenario used does *not* include dam failure and associated inundation. It reflects riverine flooding due to precipitation and snow melt as well as some impacts of urban street flooding.

The Cottage Grove Natural Hazards Mitigation Steering Committee developed the action items presented in this plan. The action items can be found within each individual Hazard Section, in chapter 3. These can also be found in Appendix D are a combination of revised action items from the 2005, 2010 and 2015 updates. Mitigation plans and new action items that address hazards and opportunities are identified during the update process. During the update process, the steering committee has identified which actions from previous plans have been completed or not completed, and whether or not these actions would be completed.

2016 action items are detailed in an action item worksheet detailing the activity, identifying the rationale for the project, identifying potential ideas for implementation, and assigning coordinating and partner organizations. The action items located in Appendix ___ can assist the community in pre-packaging potential projects for grant funding.

Action items include short and long-term activities, and include an estimate on time for implementation. Short-term action items are activities that may be implementing with existing resources and authorities within one to five years. On-going action items may require new or additional resources or authorities, may be part of the annual work program, and/or may take over five years to implement.

In a continuing effort to coordinate plan contents and planning activities, the City of Cottage Grove has taken into account efforts being made at the County level in

order to seamlessly integrate with Lane County’s Natural Hazards Mitigation Plan Goals. This ensures alignment with Lane County goals, and those for the State of Oregon. In furtherance of this effort, the Goals in the City of Cottage Grove NHMP match those of Lane County and can be seen in Table 6 “Goals of the Cottage Grove Natural Hazard Mitigation Plan”; and “Goals from the State of Oregon Natural Hazard Mitigation Plan (2012)”, which follow in Table 7.

Table 6: Goals of the Cottage Grove Natural Hazard Mitigation Plan

<p>Goal 1: Prevent loss of life and reduce injuries and illness.</p> <p>Goal 2: Minimize and prevent damage to buildings and infrastructure.</p> <p>Goal 3: Reduce recovery period and minimize economic losses for the community.</p> <p>Goal 4: Maintain and improve ability of Lane County, municipal governments, and critical service providers to quickly resume operations.</p> <p>Goal 5: Protect natural, historic, and cultural resources.</p> <p>Goal 6: Increase awareness of hazards and understanding of mitigation methods.</p> <p>Goal 7: Improve attractiveness to individuals and businesses by demonstrating effectiveness in dealing with a disaster.</p>

Table 7: Goals from the State of Oregon Natural Hazard Mitigation Plan (2012)

<p>Goal 1: Protect life and reduce injuries resulting from natural hazards.</p> <p>Goal 2: Minimize public and private property damages and the disruption of essential infrastructure and services from natural hazards.</p> <p>Goal 3: Increase the resilience of local, regional, and statewide economies.</p> <p>Goal 4: Minimize the impact of natural hazards while protecting and restoring the environment.</p> <p>Goal 5: Enhance and maintain state capability to implement a comprehensive statewide hazard loss reduction strategy.</p> <p>Goal 6: Document and evaluate Oregon’s progress in achieving hazard mitigation.</p> <p>Goal 7: Motivate the public, private sector, and government agencies to mitigate against the effects of natural hazards through information and education.</p> <p>Goal 8: Eliminate development within mapped hazardous areas where the risks to people and property cannot be mitigated.</p>

Action Item Identification and Prioritization

There were several factors considered in determining the action items for the next five years. This Plan update is being written during a time that the United States and Oregon are experiencing economic hardship. Consequently, what cannot be ignored is the ubiquitous problem of shrinking budgets and thinning resources. Therefore, to keep this plan meaningful, potential action items are prioritized and only those meeting the following criteria were included in the Plan:

- Does the purpose of the Action Item (AI) align with the core mission of Cottage Grove City government?
- Is there motivation to carry out the AI?
- Do we know what to do to carry out the AI?
- Does the AI address some of our most pressing challenges?
- Is implementing the AI feasible in terms of cost and resources?
- Are there tangible benefits?

These criteria are evaluated on a continuing basis, with the intent of accomplishing as many of the listed action items as are feasible given limited budget and limited availability of staff time and resources. Project prioritization may change over the next five years as availability of funding opportunities become available.

Action Items are located at the end of each Hazard Section.

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Section 1: Flooding

The City of Cottage Grove does not currently provide access to online mapping tools. However, the State Department of Geology and Mineral Industries (DOGAMI) provides the online tool HAZVU, which is available to the general public: <http://www.oregongeology.org/hazvu/>.

Detailed mapping resources can be found at Lane County GIS, located at: <http://www.lanecounty.org/Departments/IS/GIS/Pages/default.aspx>.

Flooding Profile

The City of Cottage Grove is located south of the confluence of the Row River and the Coast Fork of the Willamette River. These two rivers as well as Silk, Mosby, and Bennett Creeks contribute to the flooding hazard in Cottage Grove. The city itself is located wholly within the Coast Fork Willamette Watershed Basin.

The Coast Fork of the Willamette River runs north then northeast through the center of the city along a fairly narrow, channelized corridor that has seen development since the founding of the community in the 1860's. The original channel has been heavily modified. Some slight movement of the Coast Fork Willamette channel has been seen in its more northern reaches within City limits.

The Row River forms the City's eastern boundary. Its channel remains fairly natural, with multiple meanders and a wide, vegetated flood plain. Much of the Row River floodplain in the City is under City of Cottage Grove ownership as a measure of floodwater control. The Row River joins the Coast Fork of the Willamette River immediately to the north of the city's urban growth boundary. Silk Creek enters the city from the west from the foothills of the Coast Range. This creek flows through the back yards of several residential neighborhoods before crossing under River Road via a culvert to join the Coast Fork. Mosby Creek joins the Row River east of the City, west of Dorena Lake.

The U.S. Army Corps of Engineers operates 13 multi-purpose flood control projects (dams) in the Willamette Valley Project, nine of which are located in Lane County, and were constructed between 1941 and 1968.

The Dorena Dam was built on the Row River upstream of Cottage Grove in 1942. This federally owned dam is operated and maintained by the U.S. Army Corps of Engineers, as a part of the Willamette Valley Project. The structure is 154 high, and has 131,000 acre feet of storage in this earthen type dam.

The Cottage Grove Dam was built on the Coast Fork Willamette River upstream of Cottage Grove in 1943. Like Dorena, the dam is owned federally, operated and maintained by the U.S. Army Corps of Engineers as a part of the Willamette Valley Project. The structure is 103 feet high, and has 50,000 acre feet of storage in an earthen type dam.

A primary purpose of the Willamette Valley Project is flood control, although the reservoirs only control flooding on 50% of the tributaries in the Willamette Basin. Reservoirs are maintained at full pool from May to September for recreation, and drained in the fall for the wet season to provide storage capacity for winter storms. Most riverine flooding in Cottage Grove occurs along tributaries and rivers with no flood control devices, such as Silk Creek and Mosby Creek.

Flooding occurs when climate, geology, and hydrology combine to create conditions where river and stream waters flow outside of their usual course and “overspill” beyond their banks. In Lane County, the combination of these factors, augmented by ongoing development, create chronic seasonal flooding conditions. Lane County spans a wide range of climatic and geologic regions from the Pacific coast to the high Cascades. This diversity results in considerable variation in precipitation. The average annual precipitation ranges from less than 40 inches in the Willamette Valley to over 100 inches in the Coast Range and along the west slope of the Cascades. Snowmelt from the Central Cascades provides a continuous water source throughout the year, and can contribute significantly to flooding.

Flooding is most common from October through April, when storms from the Pacific Ocean bring intense rainfall to the area. Larger floods result from heavy rains that continue over the course of several days, augmented by snowmelt at time when the soil is near saturation from previous rains.

Previous Occurrences

Cottage Grove has a long history of flood events. The most heavily flooded areas are the low lands along the Row and Willamette Rivers, and the properties adjacent to Silk Creek. The following historical recount of flooding was developed from the Cottage Grove Development Timeline created by community members using data from local historical resources, such as the Cottage Grove Museum. The complete timeline is attached as Appendix H.

- 1861 Floods hit the area
- 1881 Floods in the town
- 1926 People rode rowboats into the Bartell Hotel
- 1933 Flood in the town
- 1946 January heavy rains... 4.32 inches-Floods
- 1961 February Floods-4.74 inches in 24 hours
- 1963 High water at Christmas
- 1964 High water again
- 1985 Flooding in the area with heavy rains
- 1996 100 inches of rain, flooding along Silk Creek, Mosby Creek

Since the construction of Cottage Grove and Dorena Dams in the 1940s, flooding has been less severe along the Row River and Coast Fork of the Willamette. These dams have reduced the expected 100-year stream discharges (volume of water

flowing in the rivers). Hence expected flood elevations and overall flood potential for major flood events along these rivers have been substantially reduced. The flood hazard areas shown on the current Flood Insurance Rate Maps (FIRM) for Cottage Grove assume that the dams are operating properly. Dam failure hazards are not addressed by the FIRM.

Despite the reduction in flood potential from construction of the dams, the Cottage Grove area continues to face flood risks from the Coast Fork Willamette and Row Rivers as well as smaller creeks like Silk Creek and Bennett Creek. Flood risk on these smaller streams has not been reduced by the dams.

The most recent major flood event occurred in February 1997. Unusually heavy rains over the four-day period from February 5th to February 8th resulted in significant flooding on numerous rivers and streams throughout western Oregon. The 1997 flood may have been about a 250-year event. During this flood event, Silk Creek flooded adjacent properties, and the Row River raised high enough to damage the city's current water treatment intake facility. Damage to Lane County businesses, residences and infrastructure was estimated to be roughly \$19 million dollars for this February 1997 storm.

In January 2011, several days of heavy rain caused isolated flooding throughout the County, although little or no flooding occurred within Cottage Grove. Saturated soils caused the loss of the Coast Fork Willamette River bank in a few locations, and overloaded storm drains caused isolated street flooding in the community. These locations were documented by city maintenance staff for future maintenance. At the end of the event, the U.S. Army Corps of Engineers opened the floodgates on the Cottage Grove and Dorena Dams, rapidly raising the levels of the Coast Fork and Row Rivers. The prolonged high waters weakened many riparian trees along the Coast Fork. Although Lane County activated its EOC during this event, Cottage Grove had no need to do so.

It should be noted that storm water is not treated in the City wastewater system. There exist remnants within the city of older piping that combines storm water into the sewer system, increasing unnecessary costs in waste water treatment. These remnants are addressed and removed on a case by case basis when found and as funding is available.

The City of Cottage Grove takes a three pronged approach to addressing flood hazards in the city:

- Administration of regulations applying to private property.
- Maintenance / enhancement of City-owned facilities and utilities.
- Education and awareness of flood risks.

In addition to this three pronged approach, the city is mindful of meeting all minimum federal requirements with regard to federal flood legislation, laws, regulations, and local code. These include compliance with Presidential Executive Order 11988 (1977) "Floodplain Management" as amended in 2015, and incorporation of changes

into current city code. The City also prepares needed documentation for the National Flood Insurance Program (NIFP).

The City has established a Floodplain Manager in the person of the Community Development Director. The City is actively participating in the Community Assistance Visit (CAV) program, which is a major component of the NFIP's Community Assistance Program (CAP). The most recent CAV occurred on February 11th, 2016 with positive reviews, and no administrative or potential violations identified. The City intends to proactively continue its efforts to reduce flood risk.

Flooding Hazard Assessment

Hazard Identification

FEMA last produced Flood Insurance Rate Maps (FIRM) for Cottage Grove that detail the flood hazard areas in 1999. These 100-year flood-plain and floodway maps have been digitized and reproduced for the City of Cottage Grove by Lane County, and can be seen in Figure 5: "Flood Zones City of Cottage Grove", below.

As of March, 2016, 206 parcels have been identified as either being wholly or partially within the Special Flood Hazard Area. 150 properties have natural or artificial wetlands on part or all of the property.

Based on historical occurrence Lane County and by extension, Cottage Grove, can expect a significant flood event every 15 – 20 years; however, much of this risk is mitigated through dams and efforts undertaken by the Corps of Engineers. A failure of either the Cottage Grove Dam or Dorena Dam would cause significant flooding in the area, far beyond the scale of a naturally occurring flood event.

This is considered to be an unlikely possibility, requiring a "perfect storm" of factors such as the reservoirs being at full pool (normally occurring only during the summer recreation season), combined with saturated soils (a winter wet season phenomenon). These conditions rarely occur at the same time.

Flooding potential is most common from October through April when storms from the Pacific Ocean bring steady and occasionally intense rainfall, and soil saturation remains high. Flooding can be aggravated when streams are altered by human activity, such as through channelization of streams or loss of wetlands. Many types of flood hazards exist in Oregon, including riverine floods, flash floods (resulting from locally intense thunderstorms, ice jams, and dam failures), coastal floods, shallow area and urban flooding, and playa flooding.

Riverine flooding is affected by the intensity and distribution of rainfall, soil moisture, seasonal variation in vegetation, and water-resistance of the surface areas caused by urbanization. Flash flooding is a localized flood that results from a short duration of intense rainfall across a limited geographic area. During extended periods of intense rainfall, storm water conveyance systems can be overwhelmed and flooding of surrounding neighborhoods can result.

Table 8: Flood Warning Types

Riverine Flooding
Flood Potential Outlook (FPO): Announcement to alert the public of potentially heavy rainfall that could send rivers and streams into flood or aggravate an existing flood.
Flood Watch: Announcement to inform the public that current or developing conditions indicate a threat of flooding, but occurrence is neither certain nor imminent.
Flood Warning: An announcement by the NWS to inform the public of flooding along larger streams in which there is a serious threat to life or property. A flood warning will usually contain river stage forecasts.
Flood Statement: A statement issued by the NWS to inform the public of flooding along major streams in which there is not a serious threat to life or property. It may also follow a flood warning to give later information.

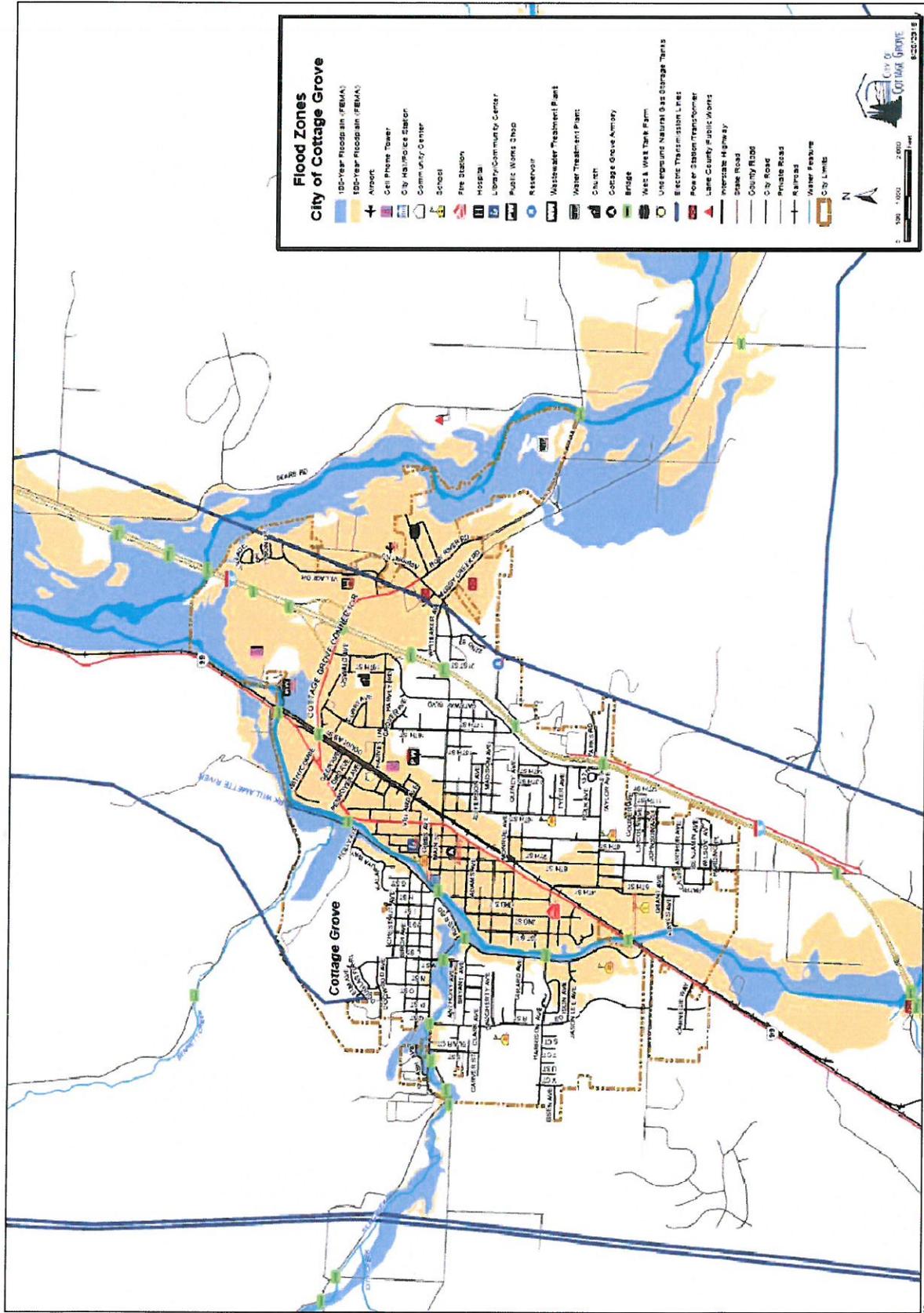
Flash Floods
Flash Flood Watch: Announcement that current or developing conditions indicate potential flash flooding in the watch area
Flash Flood Warning: Issued to inform the public that flash flooding is in progress, imminent, or highly likely.
Flash Flood Statement: A statement by the NWS which provides follow-up information on flash flood watches



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Figure 5: Flood Zones City of Cottage Grove





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Vulnerability Assessment

Community assets located in the 100-year flood plain include the Row River Water Treatment Facility, the Wastewater Treatment Facility, the Middlefield Golf Course, North Regional Park, Row River Nature Park, Willamette River Greenway Trail, and the Row River Trail. Bridges may also be impacted, and can be found in Figure 5: "Flood Zones City of Cottage Grove".

The critical facilities that face flood hazards in the 100-year flood plain are major facilities that if incapacitated would cause tremendous problems for the City as well as citizens. Bridges are vulnerable to flooding because debris can choke bridges and cause them to collapse under the increased pressure. The City of Cottage Grove relies on bridges for transportation, as the Coast Fork of the Willamette River divides the city with all critical facilities located on the east portion of the city. A collapse of all bridges would leave the west portion of the city isolated from emergency services.

Potential 100-year flood events affect less than 5 percent of the property within the City of Cottage Grove. A 500-year flood event would impact approximately one third of the land located within city limits. Dorena Dam failure could impact the eastern third of the city, particularly the Cottage Grove Airport, the Cottage Grove Community Hospital, Welt & Welt, and Wal-Mart. Failure of the Cottage Grove dam would inundate over one half of the city, including all of the historic core and Hwy 99.

Risk Analysis

Due to insufficient data and funding, the City of Cottage Grove is unable to perform a quantitative risk analysis at this time. The City has addressed this issue in the action items, and will be completing a risk assessment as data and resources become available.

Repetitive Flood Loss

The City of Cottage Grove works to mitigate problems regarding flood issues when they arise. Throughout history, some areas in the city have proven more susceptible to flooding issues and may have incurred repetitive losses, meaning they have more than two National Flood Insurance Program (NFIP) claims in a ten-year period. There have been 10 claims to NFIP in Cottage Grove since its inception in 1978. Of those claims only 3 were closed for a total of \$5,068.63 in payouts. According to the most current data from Oregon Department of Land Conservation and Development (DLCD), there are no properties in Cottage Grove that meet the criteria for repetitive loss at this time.

Existing Flood Mitigation Activities

Flood mitigation activities listed here include current mitigation programs and activities that are being implemented by the City of Cottage Grove or other agencies or organizations.

Flood Mitigation Projects

Cottage Grove has actively pursued several flood hazard mitigation activities in an effort to reduce vulnerability to damage and disruption from flooding events. Efforts include:

- Cottage Grove participates in the National Flood Insurance Program, which enables property and business owners to qualify for federally underwritten flood insurance.
- In 2008, the City replaced the Row River Water Treatment Facility intake structure with a flood-proof intake structure.
- The City has been working with the Coast Fork Willamette Watershed Council to pursue funding to re-connect the Row River Nature Park wetlands to the Row River to encourage riparian meandering and lessen flood hazard.
- The City has begun replacing and hardening stormwater outfalls into the Coast Fork to ensure that flood waters continue to drain into the river during high-water events.
- The City has adopted a Stormwater Management Plan. The goal of this plan is to protect citizens and property from urban flooding through planning for and building adequate green and gray stormwater systems.
- The City has participated in dam failure scenarios with the Lane County Emergency Preparedness Coalition, South Lane County Fire & Rescue, USACE and the Cottage Grove Community Hospital.

Flood Mitigation Objectives and Action Items

The flood mitigation Objectives and their associated Action Items below and in Appendix E provide direction on specific activities that the City of Cottage Grove, organizations, and residents may undertake to reduce risk and prevent loss from flood events. Each Objective is followed by Action Items that are intended to achieve in part or in whole the Objective they are attached to. These Objectives and Actions may be used by local decision makers in pursuing strategies for implementation.

Agency Coordination

1) Seek training and exercise opportunities with other agencies and jurisdictions.

Estimated Cost:	Low
Timeline:	Ongoing
Responsible Agency:	Cottage Grove Community Development Department (CGCDD); Oregon Department of Transportation (ODOT); NW Natural Gas; Pacific Power; Eugene Public Utilities District (EPUD)
Priority:	High

2) Work with United States Corps of Engineers (USACE) and the Federal Emergency Management Agency (FEMA) on Upper Willamette Valley Flood Insurance Map Update project.

Estimated Cost:	None / Staff time
Timeline:	Ongoing
Responsible Agency:	CGCDD; USACE; FEMA
Priority:	Low

3) Coordinate with Coast Fork Willamette Watershed Council, USACE, and Oregon Department of Fish and Wildlife on Row River Nature Park flood storage improvements.

Estimated Cost:	High
Timeline:	3-5 years
Responsible Agency:	Coast Fork Willamette Watershed Council, State and Federal Agencies
Priority:	Medium/High

- 4) **Participate in state-wide water management group led by USACE for flood controlled streams (join conference call held on a weekly, bi-weekly, or as needed basis). Participate in Northwest Regional Floodplain Management Association (NORFMA) and Association of State Floodplain Managers (ASFM).**

Estimated Cost:	Low / Staff time
Timeline:	Ongoing
Responsible Agency:	Public Works; CGCDD; NORFMA
Priority:	High

Critical Facilities Protection

- 1) **Evaluate and flood-proof City-owned Critical Facilities within the 500 year floodplain.**

Estimated Cost:	To be determined
Timeline:	Ongoing
Responsible Agency:	CGCDD
Priority:	Low

Flood Loss Mitigation

- 1) **Increase awareness of localized flood risk and safety: Use outreach programs to advise home and property owners of risks to life, property, health, and safety. Increase outreach to residential and commercial residents of the city on additional measures property owners can take to reduce their risk to flooding, and facilitate funding for mitigation measures.**

Estimated Cost:	Low
Timeline:	Ongoing
Responsible Agency:	CGCDD; Public Works
Priority:	High

2) Extend the freeboard requirement.

Estimated Cost:	Low
Timeline:	1-3 Years
Responsible Agency:	CGCDD
Priority:	High

3) Mitigate flooding by limiting or restricting how development occurs in flood prone areas through actions such as: Prohibit or limit floodway development through regulatory and/or incentive-based measures; Limit the density of developments in the floodplain; Require that floodways be kept as open space; Manage and enforce a riparian buffer ordinance to protect water resources and limit flood impacts; Limit fill in floodplain areas.

Estimated Cost:	Low
Timeline:	1-3 Years
Responsible Agency:	CGCDD
Priority:	High

4) Develop a long term plan for Open Space land acquisitions (purchases by the City) for floodway protection (in 4 specific lots within the Floodplain).

Estimated Cost:	High
Timeline:	3-5 Years
Responsible Agency:	CGCDD
Priority:	Low

Floodplain Management

- 1) **Designate a local floodplain manager and/or CRS coordinator who achieves Certified Floodplain Manager (CFM) certification.**

Estimated Cost:	Low
Timeline:	Completed / Ongoing
Responsible Agency:	CGCDD
Priority:	Medium

- 2) **Conduct NIFP community workshops to provide information and incentives for property owners to acquire flood insurance.**

Estimated Cost:	Low
Timeline:	1-3 Years
Responsible Agency:	CGCDD
Priority:	Low

- 3) **Require and maintain FEMA elevation certificates for all new and improved buildings located in floodplains. (Records are maintained in the Cottage Grove Community Development Office.)**

Estimated Cost:	Low
Timeline:	Ongoing
Responsible Agency:	CGCDD
Priority:	High

- 4) **Include requirements in the local floodplain ordinance for homeowners to sign non-conversion agreements for areas below base flood elevation.**

Estimated Cost:	None / Staff Time
Timeline:	1-3 Years
Responsible Agency:	CGCDD
Priority:	Low

- 5) **Maintain and provide access to Flood Insurance Rate Maps.**

Estimated Cost:	None/staff time
Timeline:	Ongoing
Responsible Agency:	CGCDD
Priority:	High

- 6) **Implement damage reduction measures for existing, publically owned, buildings such as acquisition, relocation, retrofitting, and maintenance of drainage ways and retention basins.**

Estimated Cost:	High
Timeline:	3-5 Years
Responsible Agency:	CGCDD
Priority:	Low

- 7) **Improve flood warning, emergency response, and evacuation planning. (Alert Sense)**

Estimated Cost:	Medium
Timeline:	Ongoing
Responsible Agency:	CGCDD
Priority:	High

Stormwater Management and Improvement

- 1) Integrate Natural Hazard Mitigation plan goals and policies with Total Maximum Daily Loads (TMDL) plan goals and policies.**

Estimated Cost:	Low
Timeline:	Ongoing
Responsible Agency:	Public Works; CGCDD
Priority:	Medium

- 2) Rehabilitate and manage riparian areas under city ownership to improve function; utilize stream restoration to ensure adequate drainage and diversion of storm water; and protect and enhance landforms that serve as natural mitigation features (i.e., riverbanks, wetlands, buffers etc.).**

Estimated Cost:	High TBD
Timeline:	Ongoing → 3-5 Years
Responsible Agency:	Public Works; CGCDD
Priority:	Low

- 3) Obtain and install a River Flow Gauge at the mouth of Mosby Creek at confluence of Row River.**

Estimated Cost:	Medium
Timeline:	3-5 Years
Responsible Agency:	CGCDD
Priority:	High

4) Pursue funding for culvert resizing.

Estimated Cost:	High
Timeline:	2-5 years
Responsible Agency:	Public Works; CGCDD
Priority:	Medium

5) Develop storm water management standards in Development Code.

Estimated Cost:	Medium
Timeline:	1-3 Years
Responsible Agency:	Public Works; CGCDD
Priority:	High

6) Enforce Riparian Development standards.

Estimated Cost:	Low
Timeline:	Ongoing
Responsible Agency:	Public Works; CGCDD, Coast Fork Willamette Watershed Council
Priority:	Medium

7) Coordinate with Coast Fork Watershed Council on riparian area restoration and education programs.

Estimated Cost:	Low
Timeline:	Ongoing
Responsible Agency:	Public Works; CGCDD; Coast Fork Willamette Watershed Council
Priority:	Low

- 8) **Join or schedule yearly (or bi-annual) river/stream cleanup projects with the public at-large, and facilitate debris removal activities with Coast Fork Watershed Council and United States Forest Service (USFS) to use debris removed from the Coast Fork and Row Rivers for wildlife habitat in the Row River Nature Park.**

Estimated Cost:	Low
Timeline:	Annual / Biannual basis
Responsible Agency:	Public Works; CGCDD; Coast Fork Willamette Watershed Council
Priority:	Medium

- 9) **Develop an open space acquisition, reuse, and preservation plan targeting hazard areas.**

Estimated Cost:	Low / Staff Time
Timeline:	3-5 Years
Responsible Agency:	Public Works; CGCDD; Coast Fork Willamette Watershed Council
Priority:	Medium

- 10) **Compensate an owner for partial rights, such as easement or development rights, to prevent a property from being developed.**

Estimated Cost:	High
Timeline:	Long Term
Responsible Agency:	Public Works; CGCDD
Priority:	Low

Section 2: Landslide

Landslide Profile

The probability of landslide events in the City of Cottage Grove was determined using scientific data, historical occurrences, and local knowledge and has been mapped by Lane County for the City of Cottage Grove. Figure 7, “*Landslide Hazard Region City of Cottage Grove*”, illustrates these areas below. The Lane County All-Hazard Mitigation Plan addresses the risk of landslide in Lane County, in section 8, and the same assessment applies to Cottage Grove and will not be repeated here.

The historical timeline for the city suggests that no major landslide events have occurred within the City of Cottage Grove in recent history.

Landslide Hazard Assessment

Hazard Identification

Landslide hazards within the City of Cottage Grove are concentrated in the Mt. David area, especially portions of the north, south, and east sides of Mt. David along Holly Avenue and Kalapuya Way. Construction has already occurred on the lower portions of Holly Avenue and portions of Kalapuya Way. Other debris-flow hazards located within the City of Cottage Grove are above and east of the 22nd Street neighborhood.

Vulnerability Assessment

Though less than one percent of the land area is subject to landslide hazards there are some areas in which landslides do pose a hazard to built property. Using analysis of aerial photographs and comparing them with the debris flow hazard maps to identify structures located in debris-flow hazard areas, there were 31 properties identified in the debris-flow hazard areas. These properties do not include any commercial or industrial developments. No critical facilities are located within a landslide hazard area.

Risk Analysis

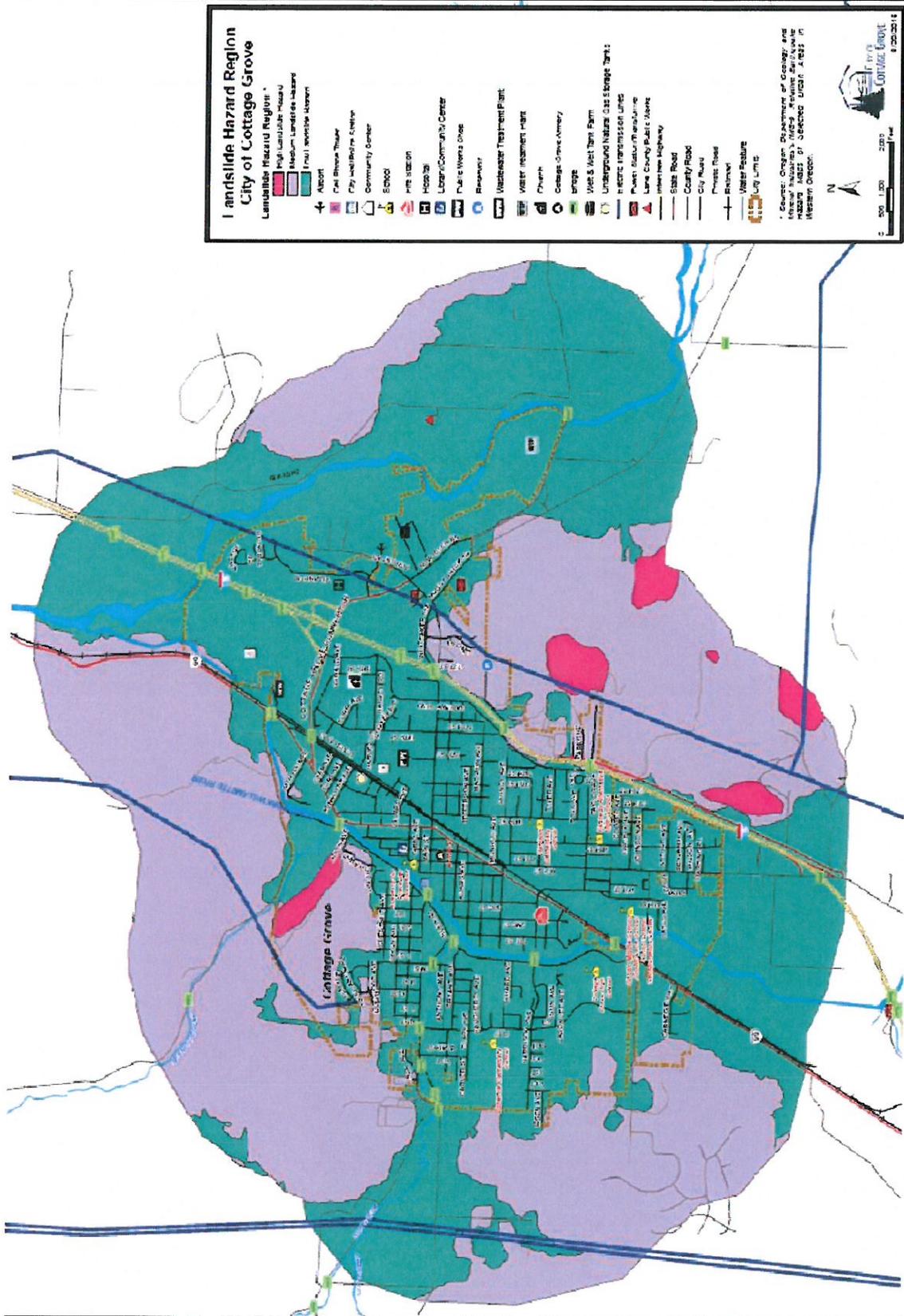
Due to insufficient data, the City of Cottage Grove is unable to perform a quantitative risk assessment at this time. The City has addressed this in the action items, and will be completing a risk assessment as data and resources become available.



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Figure 6: Landslide Hazard Region City of Cottage Grove





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Existing Landslide Mitigation Activities

Landslide mitigation activities listed here include current mitigation programs and activities that are being implemented by the City of Cottage Grove or other agencies or organizations.

Incorporated Municipality Codes Pertaining to Landslides

The City of Cottage Grove Comprehensive Plan addresses hillside development. In 1977 a report was completed entitled, *The City and Its Hillside: A Report Concerning Future Hillside Development*. This report and *The Comprehensive Plan* address the need for a hillside development ordinance. In 2008, Chapter 14.3.7.100 Hillside Development was adopted as part of the Cottage Grove Development Code. The intent and purpose of this code includes:

- 1) To implement the landslide hazard prevention goals in the City of Cottage Grove Natural Hazard Mitigation Plan;
- 2) To implement the “Hillside Development” element of the City of Cottage Grove Comprehensive Plan;
- 3) To provide for the review of hillside development applications and evaluate properties for potential slope related hazards;
- 4) To assess the risk that a proposed use or activity may adversely affect the stability and slide susceptibility of an area; and thus promote the public health, safety, and welfare;
- 5) To establish standards and requirements for the development of lands in a hillside area; and
- 6) To mitigate risk within a hillside area, not to act as a guarantee that the hazard risk will be eliminated, nor as a guarantee that there is a higher risk of hazard at any location.

The standards in 14.3.7.100 are applicable to any development subject to Land Use or Site Design Review on hillsides, in designated floodplains, along river corridors, or within the state-designated Willamette River Greenway. Development is regulated in hillside areas of 15% or greater.

Landslide Mitigation Projects

The City of Cottage Grove has identified steep slopes that may be susceptible to landslide hazards, but no mitigation projects have been completed at this time.

Landslide Mitigation Objectives and Action Items

The landslide mitigation action items below and in Appendix E provide direction on specific activities that organizations and residents in Cottage Grove can undertake to reduce risk and prevent loss from landslide events. Each action item can be used by local decision makers in pursuing strategies for implementation.

Landslide Mitigation

- 1) **Utilize Geospatial Information Systems (GIS) to map, identify, and study landslide hazard areas; develop and maintain a database to track community vulnerability to landslides.**

Estimated Cost:	Low
Timeline:	Ongoing/ 1-3 Years
Responsible Agency:	Public Works; CGCDD
Priority:	Low

- 2) **Develop and maintain a database to track community vulnerability to landslides.**

Estimated Cost:	Low/Staff time
Timeline:	1-3 years
Responsible Agency:	Public Works; CGCDD
Priority:	Medium

- 3) **Locate utilities outside of landslide areas to decrease the risk of service disruption.**

Estimated Cost:	TBD – Project Specific
Timeline:	Ongoing
Responsible Agency:	CGCDD; Public Works; EPUD; Pacific Power, NW Natural gas
Priority:	High

Evaluate Landslide Hazard on Mt. David

- 1) **Begin the mitigation process on north slope of Mt. David through use of Geological Assessment in compliance with Cottage Grove City Development Code 3.7.100 Hillside Development.**

Estimated Cost:	Medium
Timeline:	1-3
Responsible Agency:	CGCDD
Priority:	Medium

- 2) **Engage in long term program to purchase land at high risk of landslide (i.e., Mt. David)**

Estimated Cost:	High
Timeline:	3-5 Years
Responsible Agency:	CGCDD
Priority:	Low

- 3) **Consider Conservation Easements in lieu of land purchase in areas of moderate to high landslide risk.**

Estimated Cost:	Medium
Timeline:	3-5 Years
Responsible Agency:	Public Works; CGCDD
Priority:	Low

Regulatory tools and enforcement

1) Create and adopt regulations regarding erosion control.

Estimated Cost:	Low / Staff time
Timeline:	3 Years
Responsible Agency:	CGCDD
Priority:	Medium

2) Provide education to city staff on erosion control.

Estimated Cost:	Low / Medium
Timeline:	Ongoing
Responsible Agency:	Public Works; CGCDD
Priority:	High

Section 3: Wildfire

Wildfire Profile

The probability of wildfire events in Cottage Grove was determined using scientific data, historical occurrences, and local knowledge has been mapped previously by LCOG. The map, *Wildland-Urban Interface in Cottage Grove*, can be seen below, and is attached to this plan in Appendix A. The Lane County All-Hazard Mitigation Plan addresses the risk of wildfire in Lane County, in section 9, and the same assessment applies to Cottage Grove and will not be repeated here.

This historical account of wildfire was developed from the Cottage Grove Development Timeline created by community members using data from local historical resources, such as the Cottage Grove Museum. The complete timeline is attached as Appendix C to the end of the Plan. The timeline suggests that no major wildfire events have occurred within the City of Cottage Grove in recent history.

Wildfire Hazard Assessment

Hazard Identification

Wildfire hazards within the City of Cottage Grove occur mostly in the outlying areas of the city: in the north section of the city, in North Regional Park and Mt. David; to the west along the UGB edge including the Grove of Pines development as well as areas behind Bohemia Elementary School and Cottage Grove High School; and to the south on properties along the Willamette River Greenway. Fortunately these are sparsely populated areas. To the east along Knox Butte there is also substantial wildland-urban interface potential. Much of this area is comprised of commercial timber lands under Lane County's jurisdiction that are zoned F-1 or F-2.

Vulnerability Assessment

Community assets located in the wildland-urban interface hazard area include the Wastewater Treatment Facility, Bohemia School, Cottage Grove High School, South Lane County Fire & Rescue, and Knox Butte Reservoir.

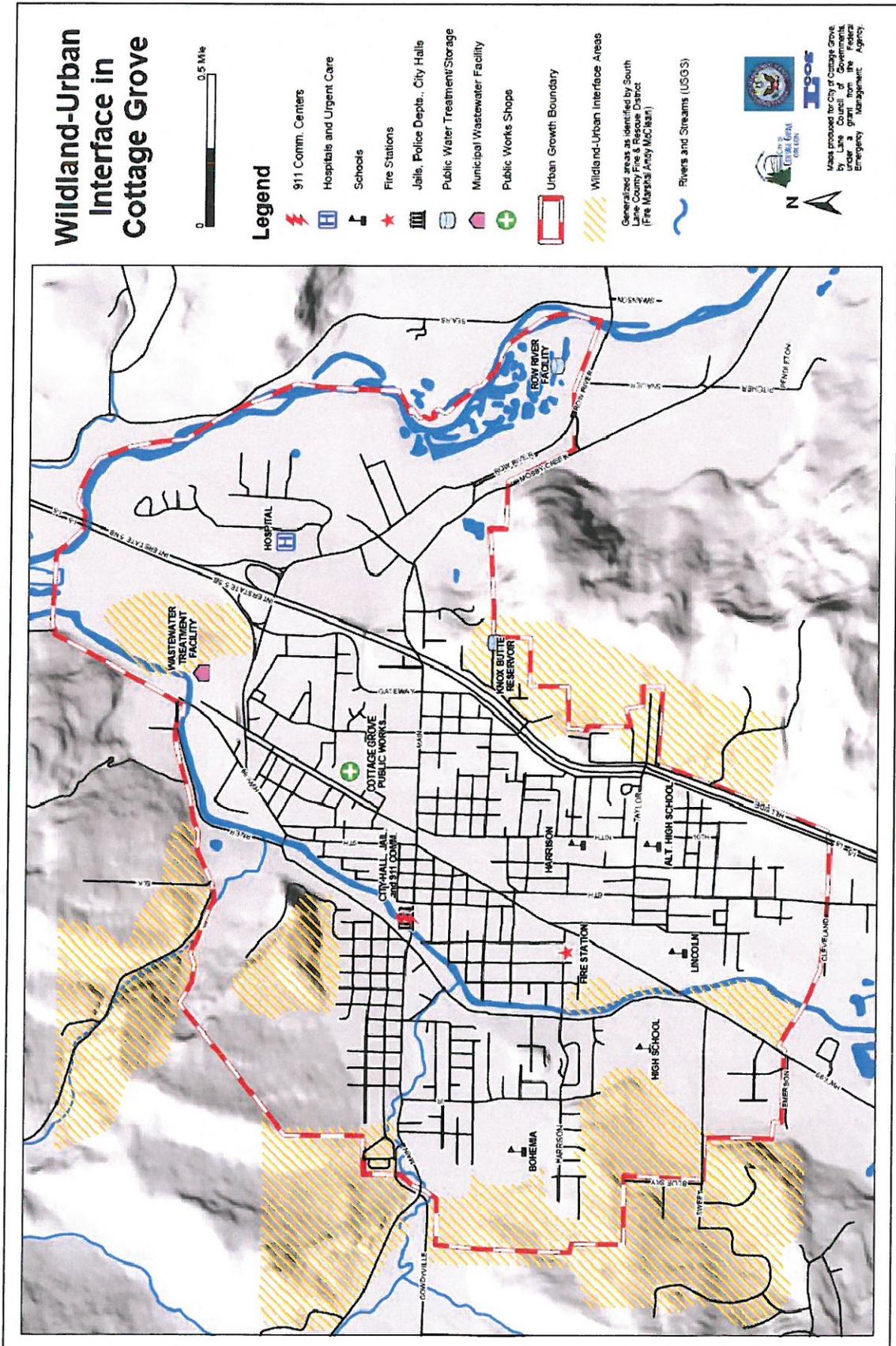
The critical facilities that face wildland-urban interface hazard potential are major facilities that if incapacitated would cause tremendous problems for the City and citizens. Only one densely populated area within the UGB, the Grove of Pines subdivision, is in the wildland-urban interface hazard area.

Although only 10 percent of the land in Cottage Grove is located in the wildland-urban interface and there is no history of large wildland fire in the Cottage Grove area, the potential damage caused by such a fire is great.

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Figure 7: Wildland-Urban Interface





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Risk Analysis

Due to insufficient data, Cottage Grove is unable to perform a quantitative risk assessment at this time. The City has addressed this issue in the action items, and it will be completing a risk assessment as data and resources become available.

Existing Wildfire Mitigation Activities

The South Lane County Fire & Rescue District covers 150 square miles with a population of 25,000. The district is comprised of an urban and rural mix of residential properties, light industry, commercial, and forestland. The fire district provides information and public outreach during the year to promote fire safety awareness.

Incorporated Municipality Codes Pertaining to Wildfires

Grove Municipal Code 8.12.040, Noxious Vegetation, states:

“No person shall allow, cause, permit or suffer noxious vegetation on property or in the right of way of a street, alley or sidewalk abutting the property. Noxious vegetation must be cut down or destroyed as often as needed to prevent the creation of a health, fire or traffic hazard, or in the case of weeds or other noxious vegetation, from maturing or from going to seed. Noxious vegetation includes:

- A. *Vegetation that is or is likely to become:*
 - a. *A health hazard;*
 - b. *A fire hazard;*
 - c. *A traffic hazard, because it impairs the view of a public right of way or otherwise makes the use of the thoroughfare hazardous; or*
 - d. *Grass or weeds exceeding 12 inches. Properties used for crop cultivation and livestock grazing are exempt from the tall grass and weeds provision if a five foot wide cut or cleared fire break surrounds the perimeter of the property.*
- B. *Poison Oak.*
- C. *Poison Ivy.*
- D. *Blackberry bushes that extend into a public way or a pathway frequently by children, or cross a property line.”*

This code is aggressively enforced between June 15 and October 15 of each year by the Community Development Department with the help of the South Lane County Fire & Rescue District. Enforcement ensures that fire hazard within the city limits is low during the dry summer months.

Local Fire Prevention/Education Programs

South Lane County Fire & Rescue Department offers the following fire prevention/education services for its residents.

- Smokey The Bear
- 1st Grade Fire Awareness
- Business Fire Inspections
- Educational Classes upon Request
- Fire Prevention Week
- Community Emergency Response Team (CERT) training

Wildfire Mitigation Objectives and Action Items

The wildfire mitigation action items below and in Appendix D provides direction on specific activities that organizations and residents in Cottage Grove can undertake to reduce risk and prevent loss from wildfire events. The action items may be used by local decision makers in pursuing strategies for implementation.

Incorporate wildfire mitigation in the comprehensive plan.

- 1) Include considerations of wildfire hazards in land use, public safety, and other elements of the comprehensive plan.**

Estimated Cost:	Low/Staff time
Timeline:	Comp. Plan Update Item
Responsible Agency:	CGCDD
Priority:	High

- 2) Recognize the existence of wildfire hazards and identify areas of risk based on a wildfire vulnerability assessment.**

Estimated Cost:	Low/Staff time
Timeline:	1-3 years
Responsible Agency:	South Lane County Fire and Rescue District, CGCDD
Priority:	Medium

3) Describe policies and recommendations for addressing wildfire risk and discouraging expansion in the wildland-urban interface.

Estimated Cost:	Low/Staff Time
Timeline:	Ongoing
Responsible Agency:	CGCDD
Priority:	Low

Reduce risk to wildfire through land use planning

1) Use GIS mapping of wildfire hazard areas to facilitate analysis and planning decisions through comparison with zoning, development, infrastructure, etc.

Estimated Cost:	Low
Timeline:	Land County GIS – LIDAR Mapping Ongoing
Responsible Agency:	South Lane County Fire and Rescue District, CGCDD
Priority:	Medium

- 2) **Promote conservation of open space or wildland-urban boundary zones to separate developed areas from high-hazard areas.**

Estimated Cost:	Low/Staff Time
Timeline:	Ongoing
Responsible Agency:	CGCDD
Priority:	Low

Participate in FireWise system

- 1) **Join the "FireWise Communities/USA" recognition program sponsored by the National Wildlife Coordinating Group (firewise.org).**

Estimated Cost:	Low/Staff Time
Timeline:	Ongoing
Responsible Agency:	CGCDD
Priority:	High

- 2) **Sponsor FireWise workshops for local officials, developers, civic groups, and neighborhood/homeowners' associations.**

Estimated Cost:	Low
Timeline:	Ongoing
Responsible Agency:	CGCDD
Priority:	Low

Decrease vulnerability and risk from wildfire to new and existing construction, and increase public awareness to wildfire risks and mitigations.

- 1. Offer GIS hazard mapping Information online (i.e., DOGAMI HAZVU) for residents, developers, and design professionals.**

Estimated Cost:	Low
Timeline:	Paused until LIDAR Data available from Lane County GIS
Responsible Agency:	CGCDD
Priority:	Low

- 2. Organize a local fire department tour to show local elected officials and planners the most vulnerable areas of the city's wildland-urban interface and increase their understanding of risks.**

Estimated Cost:	Low
Timeline:	Ongoing
Responsible Agency:	CGCDD
Priority:	Low

- 3. Partner with local fire departments to conduct education programs in schools.**

Estimated Cost:	Low/Staff time
Timeline:	Ongoing
Responsible Agency:	CGCDD
Priority:	Low

4. Inform the public about proper evacuation procedures (Workshop/Open House).

Estimated Cost:	Low/Staff Time
Timeline:	Ongoing
Responsible Agency:	CGCDD
Priority:	Low

5. Empower and educate property owners about wildfire mitigation techniques which reduce the risk to property and life.

Estimated Cost:	Low
Timeline:	Ongoing
Responsible Agency:	CGCDD
Priority:	Low

Encourage Fire-safe construction practices for existing and new construction in high-risk areas.

1. Provide developers, homeowners, and businesses with fire-safe construction practice information, and other mitigation options to reduce fire risk.

Estimated Cost:	Low
Timeline:	Ongoing
Responsible Agency:	South Lane County Fire and Rescue District, CGCDD
Priority:	Low

2. Explore FireWise construction and development practices for new development.

Estimated Cost:	Low
Timeline:	Ongoing
Responsible Agency:	CGCDD
Priority:	Low

3. Explore mitigation funding for existing houses on perimeter of city at risk to wildfire.

Estimated Cost:	Low
Timeline:	Ongoing
Responsible Agency:	CGCDD
Priority:	Low

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Section 4: Winter Storm

Winter Storm Profile

The probability of winter storm events in Cottage Grove was determined by using scientific data, historical occurrences, and local knowledge. The Lane County All-Hazard Mitigation Plan addresses the risk of winter storms in Lane County, in section 7, and the same assessment applies to Cottage Grove and will not be repeated here.

This historical account of winter storms was developed from the Cottage Grove Development Timeline created by community members using data from local historical resources, such as the Cottage Grove Museum. The complete timeline is attached as Appendix C to the end of the Plan.

- 1884 Year of the BIG snow, three feet in December
- 1887 Cyclone hits Cottage Grove
- 1919 The deep snows
- 1931 Huge windstorm in May-55 trees topple on Brice Creek Road
- 1949 Cottage Grove Lake freezes over
- 1962 Hurricane Frieda (Columbus Day Storm) in October. 100 mph winds.
- 1984 Heavy snows and lots of freezing
- 1988 Snow heavy
- 2002 Wind storm knocks trees down
- 2003/2004 freezing rain, ice, and snow
- 2013 Ice Storm

Winter Storm Hazard Assessment

Hazard Identification

Severe winter storm hazards are located where trees and vegetation align with utility and power lines as well as near roads and houses. Winter storm hazards are located throughout the city. The majority of winter storms result in power outages, blocked streets, and property damage from fallen trees.

Vulnerability Assessment

Severe storms can be life threatening, cause major infrastructure damage, and can be difficult to manage in terms of response and recovery. Winter storms can cover the road networks with snow and ice, impeding transportation to schools and medical facilities. Winter storms and windstorms can topple trees, down power lines, and cause widespread power outages. Local utilities and Public Works could be strained during a severe storm event as they work to clear roads and repair or replace power distribution and/or transmission lines, and maintain telephone lines for

communication. Older residential areas such as the Northwest Neighborhood, 1-3rd Street neighborhood, and N. 10th Street neighborhoods, are more susceptible to winter storm hazards due to overhead power lines and large trees.

Risk Analysis

Due to insufficient data, Cottage Grove is unable to perform a quantitative risk assessment at this time. The City has addressed this issue in the action items, and will be completing a risk assessment as data and resources become available.

Existing Winter Storm Mitigation Activities

Local utilities work to identify areas for tree trimming that can cause power line outages, and put life and property at risk.

Incorporated Municipality Codes Pertaining to Winter Storms

Section 14.3.4.500 Utilities in the Cottage Grove Development Code states that “all new utility lines including, but not limited to, those required for electric, communication, lighting, and cable television services and related facilities shall be placed underground...” Enforcement of this code ensures that new utilities will not be subject to winter storm hazards.

City Maintenance

The City maintains snow removal equipment for use during winter storms. Maintenance staff trim trees on public lands and right-of-ways as necessary. Additionally, the City makes every attempt to underground existing utilities as part of ongoing maintenance projects.

Limb Removal

The City of Cottage Grove performs city-wide limb pick-up at least annually. This service allows homeowners to trim trees without the burden of disposal, encouraging the maintenance of the tree canopy.

Winter and Severe Storm Mitigation Objectives and Action Items

The winter storm or severe storm mitigation action items below and in Appendix D, which provide direction on specific activities that organizations and residents in Cottage Grove may undertake to reduce risk and prevent loss from these severe storm events. The action item is may be used by local decision makers in pursuing strategies for implementation.

Protect power lines from winter and severe storms effects.

- 1. Continue to require all new construction including remodels, to include underground power lines.**

Estimated Cost:	Low
Timeline:	Ongoing
Responsible Agency:	CGCDD
Priority:	High

Create a Debris Management Plan.

- 1. Determine major stakeholders, and begin planning process for a Debris Management Plan.**

Estimated Cost:	Low/Staff Time
Timeline:	3-5 Years
Responsible Agency:	CGCDD; Public Works
Priority:	Low

- 2. Create a formal Memorandum of Understanding (MOU) with property owners for temporary storage of storm debris.**

Estimated Cost:	Low/Staff Time
Timeline:	3-5 years
Responsible Agency:	CGCDD; Public Works
Priority:	Low

Reduce hazards associated with un-trimmed trees on city property.

1. Survey City owned trees on a seasonal (spring and fall) basis.

Estimated Cost:	Staff Time
Timeline:	Ongoing
Responsible Agency:	Public Works; CGCDD
Priority:	Medium

2. Trim trees identified as being in need, and schedule removal of diseased or dead trees.

Estimated Cost:	Staff Time
Timeline:	Ongoing
Responsible Agency:	Public Works; CGCDD
Priority:	Medium

Ensure that critical facilities have backup power and emergency operations plans to deal with power outages.

1. Maintain backup power availability at Critical Facilities including the City EOC, backup EOC.

Estimated Cost:	Low
Timeline:	Ongoing Maintenance
Responsible Agency:	Public Works; CGCDD
Priority:	Low

Section 5: Earthquake

Earthquake Profile

The probability of earthquake events in Cottage Grove was determined using scientific data, historical occurrences, and local knowledge and has been mapped by Lane County. The map, *Relative Earthquake Hazard Zones in Cottage Grove*, is attached to this plan in Appendix A. The Lane County All-Hazard Mitigation Plan addresses the risk of earthquakes in Lane County, in section 10, and the same assessment applies to Cottage Grove and will not be repeated here.

This historical recount of earthquakes was developed from the Cottage Grove Development Timeline created by community members using data from local historical resources, such as the Cottage Grove Museum. The complete timeline is attached as Appendix C to the end of the Plan.

Small earthquakes occur throughout the region on a semi-frequent basis. The latest earthquakes in Oregon over 4.0 in magnitude were in Newport on August 18, 2004, and Waltherville, Oregon on July 4th, 2015 measuring 4.2 in magnitude.

In general the Pacific Northwest and Cottage Grove, is subject to earthquakes of three differing types:

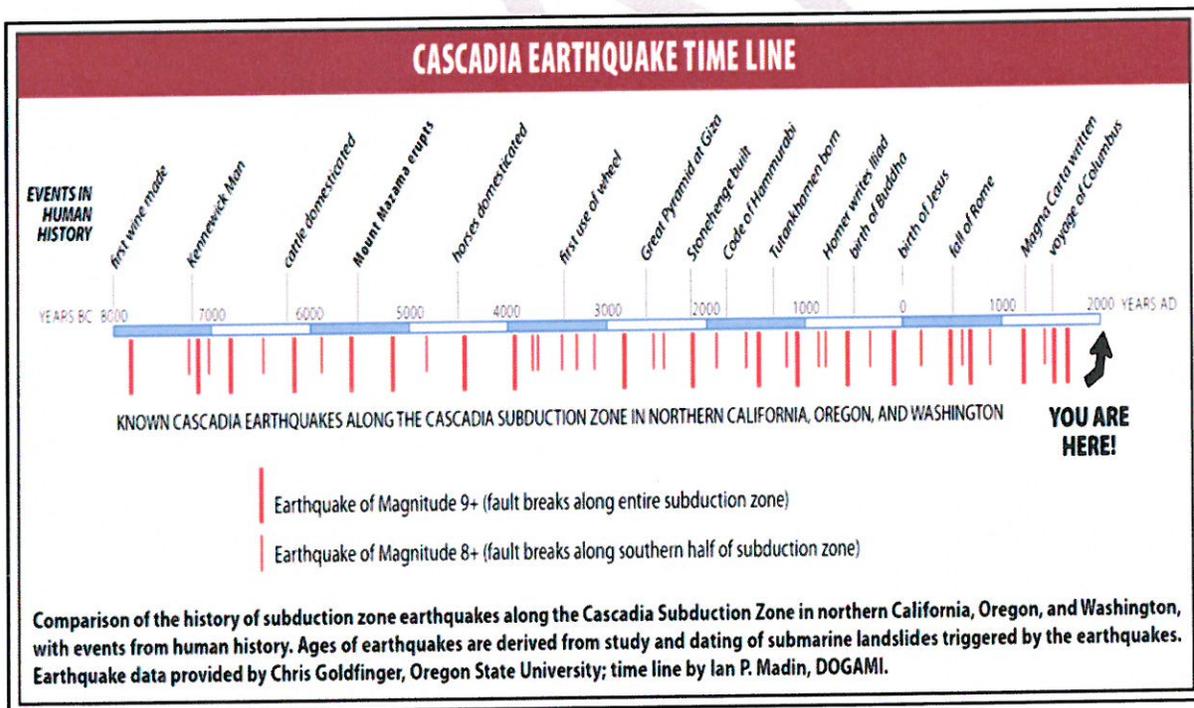
- **Crustal Earthquakes** which tend to be relatively shallow in depth, short in duration, and relatively low on the modified Richter scale - in the range of 1 to 4 in magnitude. These earthquakes represent stresses built up by the presence of the Cascadia Tectonic Subduction Zone, but are not directly linked or connected to it. Shaking tends to be localized, and damages relatively low.
- **Cascadia Deep Subduction Zone** earthquakes are directly caused by Cascadia but occur deep in the earth where the Juan De Fuca plate is sliding into the Earth's mantle. These can cause moderate earthquakes but again tend to cause less damage as they are shorter in duration and lower in magnitude.
- **Cascadia Subduction Zone Shallow** earthquakes are major events capable of temblors in the range of **8.6 to 9.2** on the modified Richter scale. These can occur in three types:
 - Southern Ruptures – the most common form of shallow Cascadia events, and is capable of causing tsunami on the coast. Shaking can last 1 to 3 minutes, but tend to be of lower magnitude and duration than full ruptures of the 600 mile long fault. The City of Cottage Grove may see shaking, liquefaction, and other forms of damage from these events.
 - Southern to Mid-State Ruptures - these are not as common as the exclusively southern ruptures, but occur closer to Cottage Grove presenting a greater risk to the community. While not directly threatened by the tsunami generated by these types of Cascadia

events, it will greatly impact the coast, which may impact Cottage Grove in the form of evacuees moving east. The City may also experience shaking, liquefaction, and other related damages from these events.

- Cascadia Full Rupture – These are events referred to as “The Big One”, and are devastating large scale earthquakes. Widespread damage on the Oregon Coast will occur from both the shaking and the tsunami generated. Inland, shaking will last from three to five minutes, with significant damage to state wide infrastructure from the Cascade mountain range west to the Pacific Ocean. Cottage Grove will experience significant direct and indirect effects from a Cascadia Full Rupture event.

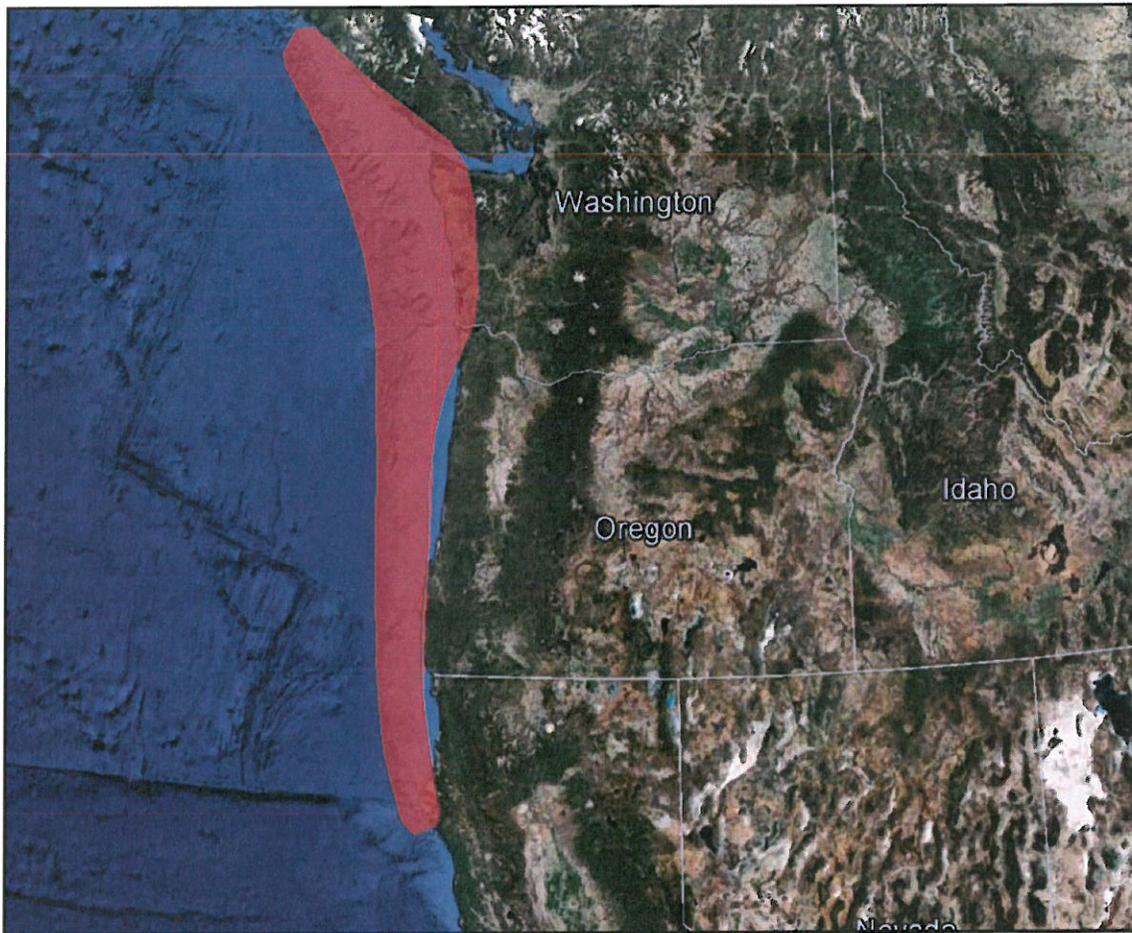
The most recent full rupture occurred on January 26th, 1700 creating an “orphan” tsunami on Japan’s eastern coast. This event is known in significant detail due to records kept in Japan at the time, and when combined with drilling cores done off the coast of Oregon, Washington and California by Oregon State University Geologists, we have a strong timeline of past events occurring on the Cascadia Fault:

Figure 8: Cascadia Subduction Fault Timeline



The Cascadia Tectonic Subduction Zone is one of the largest natural hazards in the United States. Cottage Grove, like the rest of Western Oregon, will suffer from the loss of state infrastructure, and lack of basic services will significantly impact residents for a considerable period of time after the shaking has subsided.

Figure 9: Cascadia Subduction Zone



Earthquake Hazard Assessment

Hazard Identification

Lane County has created relative earthquake hazard maps for Cottage Grove using information from the Department of Geology and Mineral Industries. There are two distinct lines of low to intermediate hazard running through the city. These lines diverge near the I-5 Row River Road intersection. The west branch of the hazard area runs through the North 10th Street area and continues down Highway 99. The east branch follows closely along Row River. The only intermediate to high hazard area is located along Holly Avenue where the Hidden Valley development exists on the border of Hidden Valley Golf Course.

There are several areas within the City that are assessed at a higher risk, largely due to the threat of landslides on steeper slopes. One of these is located in NW Cottage Grove, four more can be found in the SE of the city and are illustrated in Figure 10 "*Relative Earthquake Hazard*".

Vulnerability Assessment

Community assets located in the low to intermediate earthquake hazard area include the Row River Water Treatment Facility, Lincoln Middle School, Fire Station 1, City Hall, and Public Works Shops. Many other buildings due to lack of seismic retrofitting are at risk during an earthquake event. All of downtown is susceptible during an earthquake. Many of the buildings downtown are at specific risk due to the type of construction. Liquefaction in the downtown core is a possibility but the probability is relatively small. There are no critical facilities located in the intermediate to high hazard areas.

An earthquake event could cause substantial damage to area bridges and infrastructure. In the case of bridge failure the west side of the city could potentially be cut off from all emergency services. The water transmission line to the Knox Hill Reservoir is at risk during an earthquake event. This line supplies much of the city's drinking water and a break in the line would cause a significant problem for Public Works to deal with.

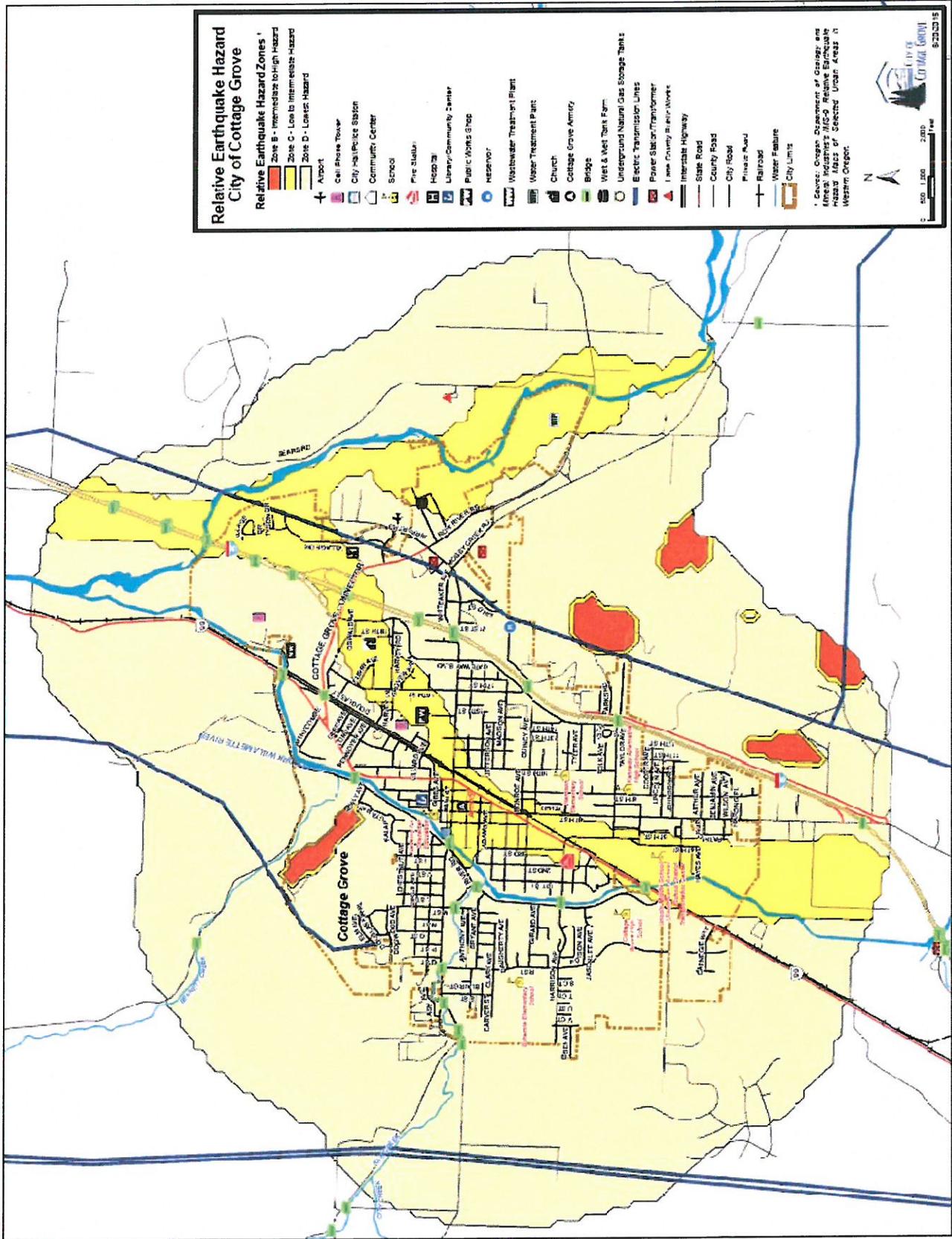
Risk Analysis

Due to insufficient data, Cottage Grove is unable to perform a quantitative risk assessment at this time. The City has addressed this issue in the action items, and will be completing a risk assessment as data and resources become available.

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Figure 10: Cottage Grove Relative Earthquake Hazard



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Existing Earthquake Mitigation Activities

The City of Cottage Grove has adopted the International Building Code, which sets the minimum design and construction standards for new buildings.

The South Lane School District has developed seismic preparation procedures and routinely conducts drills. These drills include familiarization with routes and methods of exiting the building and methods of duck, cover and hold during an earthquake.

Earthquake Mitigation Action Items

The earthquake mitigation action items below and in Appendix D provide direction on specific activities that organizations and residents in Cottage Grove can undertake to reduce risk and prevent loss from earthquake events. The action items are followed by ideas for implementation, which can be used by local decision makers in pursuing strategies for implementation.

Staff

Address Community vulnerability to seismic threats.

1. **Develop an inventory of public, commercial, and historically significant buildings that may be particularly vulnerable to earthquake damage.**

Estimated Cost:	Low/Staff Time
Timeline:	Ongoing
Responsible Agency:	CGCDD
Priority:	High

2. **Inventory of buildings within Downtown Historic District vulnerable to earthquake damage, and investigate potential funding sources for building retrofits.**

Estimated Cost:	Low/Staff Time
Timeline:	Ongoing
Responsible Agency:	CGCDD
Priority:	High

- 3. Develop mitigation strategies for seismic retrofitting of critical city structures and conduct seismic retrofitting for critical public facilities and historic structures within the Downtown Historical District most at risk to earthquakes.**

Estimated Cost:	Medium
Timeline:	1-5 years / Ongoing
Responsible Agency:	GCCDD
Priority:	High

- 4. Create an earthquake scenario to estimate potential loss of life and injuries, the types of potential damage, and existing vulnerabilities within community to develop earthquake mitigation priorities (EOP Exercises).**

Estimated Cost:	Staff Time
Timeline:	1-3 years
Responsible Agency:	CGCDD
Priority:	High

- 5. Establish a school survey procedure and guidance document to inventory structural and non-structural hazards in and around school buildings.**

Estimated Cost:	Staff Time
Timeline:	1-3 years
Responsible Agency:	CGCDD, South Lane County School District
Priority:	High

- 6. Assist with and/or develop program to fund seismic retrofit designs for historic buildings and encourage seismic retrofits as part of any alterations or remodels.**

Estimated Cost:	Staff Time
Timeline:	3-5 years
Responsible Agency:	CGCDD
Priority:	Medium

Evaluate and protect critical facilities and infrastructure.

- 1. Identify and harden critical lifeline systems (i.e., critical public services such as utilities and roads) to meet "Seismic Design Guidelines and Standards for Lifelines" or equivalent standards such as American Lifelines Alliance (ALA) guidance.**

Estimated Cost:	High
Timeline:	ongoing
Responsible Agency:	CGCDD
Priority:	Medium

- 2. Evaluate bridges for resilience to earthquake, and establish priority listing from post event evaluation and repair.**

Estimated Cost:	Staff Time
Timeline:	Ongoing
Responsible Agency:	CGCDD; ODOT Public Works
Priority:	High

3. Develop a process by which critical public buildings are prioritized for retrofitting based upon their role in recovery after an earthquake.

Estimated Cost:	Low / Staff time
Timeline:	1-3 Years
Responsible Agency:	CGCDD
Priority:	Medium

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Section 6: Drought

Drought has long been considered a slow moving type of event, and though it may not lead to visible, rapid changes, or catastrophic destruction in the short term, the long term effects can be significant.

Western Oregon is blessed with a mild climate and generally plentiful rainfall. However, regional droughts do occur, and can affect local water table heights, the recharge rate of aquifers, local stream and tributary flow rates, and water quality, as well as other regional ecological effects on fish and wildlife habitat and riparian areas. Locally, reduced flow rates on the Row River could impact the city water supply both through a reduced volume, and increases in turbidity, which Public Works would need to mitigate.

Drought Action Items

Drought action items found in Appendix D are those activities that pertain to the slow onset hazard of Drought.

Assess vulnerability to drought risk.

- 1. Gather and analyze water and climate data to gain a better understanding of local climate and drought history.**

Estimated Cost:	Low
Timeline:	Ongoing
Responsible Agency:	CGCDD; Public Works
Priority:	Low

- 2. Identify factors that affect the severity of a drought.**

Estimated Cost:	Low
Timeline:	Ongoing
Responsible Agency:	CGCDD
Priority:	Low

3. Identify alternative available water sources.

Estimated Cost:	Low
Timeline:	Very Long Term
Responsible Agency:	CGCDD
Priority:	Low

Monitor drought conditions.

1. Identify local drought indicators, such as precipitation, temperature, surface water levels, soil moisture, etc.

Estimated Cost:	Low
Timeline:	Ongoing
Responsible Agency:	CGCDD; Public Works
Priority:	Low

2. Establish a regular schedule to monitor and record conditions on at least a monthly basis when drought conditions exist.

Estimated Cost:	Low
Timeline:	Ongoing
Responsible Agency:	CGCDD
Priority:	Low

Monitor water supply

1. Regularly check for leaks to minimize water supply losses.

Estimated Cost:	Low
Timeline:	Ongoing
Responsible Agency:	Public Works
Priority:	Medium

2. Improve water supply monitoring through the installation of a USGS Monitoring system on Mosby Creek

Estimated Cost:	High
Timeline:	Future Project - grant funding needed.
Responsible Agency:	Public Works
Priority:	High

3. Develop a long range water conservation plan

Estimated Cost:	Low
Timeline:	Long term
Responsible Agency:	CGCDD; Public Works
Priority:	Medium

Section 7: All-Hazards

This section summarizes actions that increase community resilience and reduce risks associated with all hazards. These actions are largely focused on public outreach and developing means of involving the public in community resilience building efforts.

Develop Community Involvement

- 1. Work with insurance companies, utility providers, and others to include wildfire safety information in materials provided to area residents.**

Estimated Cost:	Low
Timeline:	Long term
Responsible Agency:	CGCDD
Priority:	Low

- 2. Develop partnerships with neighborhood groups, homeowners' associations, and others to conduct outreach activities. (E.g., Community Emergency Response Teams, Map My Neighborhood etc.).**

Estimated Cost:	Low
Timeline:	Long term
Responsible Agency:	CGCDD
Priority:	Medium

- 3. Create a severe weather scenario to estimate potential damage and existing vulnerabilities within community to develop severe wind/weather mitigation priorities.**

Estimated Cost:	Low
Timeline:	1-2 years
Responsible Agency:	CGCDD
Priority:	Low

4. Develop tabletop or other exercises for the purposes of training city employees on how to respond to an emergency.

Estimated Cost:	Medium/Staff Time
Timeline:	1-2 years
Responsible Agency:	CGCDD
Priority:	High

5. Develop exercises or events to strengthen community resilience through public participation and educational events.

Estimated Cost:	Low
Timeline:	1 year
Responsible Agency:	CGCDD
Priority:	High

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Section 8: Volcanic Eruption

Volcano Profile

The probability of volcanic eruptions in Cottage Grove was determined using scientific data, historical occurrences, and local knowledge. The Lane County All-Hazard Mitigation Plan addresses the risk of volcanic eruption in Lane County, in section 11, and the same assessment applies to Cottage Grove and will not be repeated here.

The only volcanic activity of note in the Pacific Northwest in recent times occurred in the spring of 1980, with the violent eruption and landslide at Mt. St. Helens in Southern Washington State. This event caused little in the way of disruption in Cottage Grove.

Volcanic Eruption Hazard Assessment

There is very little risk for the City of Cottage Grove concerning volcanic eruption. The closest active volcanoes, the Three Sisters Range, pose little threat of ash fall to Cottage Grove due to the direction of the prevailing wind moving ash away from Cottage Grove. If ash fall were to become significant in the Cottage Grove area it could pose a risk to all critical facilities as well as transportation routes.

Existing Volcanic Eruption Mitigation Activities

There are currently no existing volcanic eruption mitigation activities occurring within Cottage Grove.

Volcanic Eruption Mitigation Action Items

The City of Cottage Grove will not be undertaking any local volcanic eruption mitigation activities at this time.