

**City of Rainier
Regular City Council Meeting
December 6, 2021
6 p.m.
Rainier City Hall**

Mayor Jerry Cole called the Regular Council Meeting to order at 6:04 p.m.

Council Present: Connie Budge, Scott Cooper, Robert duPlessis, and Mike Kreger

Council Absent: Jeremy Howell, Levi Richardson and Jenna Weaver

City Attorney Present: No

City Staff Present: Sarah Blodgett, City Recorder; Gregg Griffith, Police Chief; W. Scott Jorgensen, City Administrator; Sue Lawrence, Public Works Director

Flag Salute

Additions/Deletions from the Agenda: Public Works Director Sue Lawrence said she wanted to add the payment for paving project at city hall and the new C Street speed humps to the agenda as one item and a bid for improvements to the public works shop as another. Council President Mike Kreger moved to add those items to the agenda. That motion was seconded by Councilor Scott Cooper and adopted unanimously. Lawrence said she had a bid for work to address the First Street land slippage. Kreger moved to add that item to the agenda. That motion was seconded by Cooper and adopted unanimously.

Mayor's Address: Cole said the Christmas tree lighting event went well and the turnout was good. He thanked the event's sponsors, including the Masonic Lodge, and praised the Kregers for their efforts in putting it together.

Visitor Comments: Shawn Clark introduced himself in his new role as executive director for the Port of Columbia County and new staff member Amy Bynum. Clark said the port would eventually like to have a presence in Rainier.

Consider Approval of the Consent Agenda:

Consider Approval of the November 1, 2021 Regular Council Meeting Minutes-Kreger moved to approve the consent agenda. That motion was seconded by Councilor Connie Budge and adopted unanimously.

New Business

- a. Col-Pac Presentation—Ayreann Colombo described the organization as a federal economic development district that covers Clatsop, Columbia, Tillamook and western Washington counties. It was established in 1994 and works with federal agencies to bring funds to the region for infrastructure. Col-Pac facilitates collaboration and its board has representatives from counties and cities, including Rainier City Administrator W. Scott Jorgensen. Current efforts include establishing regional broadband services, a business startup loan program and a housing study. Jorgensen said the city may be working with the Department of Land Conservation and Development (DLCD) to adjust its Urban Growth Boundary (UGB) and that the housing study would help. He asked what the timeline was for its completion. Colombo said she expected it to be done by the middle of 2022.
- b. Timber Sale Update—City Forester Patrick McCoy said the sale is almost completed, with cleanup taking place this week. Rain caused challenges and the city may want to do its logging in the summer next time. The timber was sold to Interfor in Molalla. He can have more information for council at its next meeting about the amount of revenue generated by the sale.
- c. RFP for Certified Public Accountant Professional Services—Jorgensen said he put the RFP together and ran it by Office Manager Sarah Blodgett, Finance Clerk Elisha Shulda and a CPA firm in Longview that used to do work for the city. Budget moved to approve the RFP. That motion was seconded by Councilor Scott Cooper and adopted unanimously.
- d. Update on 313 W 7th Street—Jorgensen referred the council to the correspondence he had with City Attorney Steve Petersen that was included in the meeting packet. The mortgage company received a General Judgement of Foreclosure on the property in September. They filed a Writ of Execution on the Foreclosure that was signed October 22. The property is in the hands of the Columbia County Sheriff's Office to hold a sale. Petersen had corresponded with the attorney representing the mortgage company and gave them until November 29 to abate the nuisance. No action was taken. Petersen subsequently advised Jorgensen that the city can move forward with the process of declaring the property a nuisance. Public works has indicated that they can do the work in-house instead of contracting it out. The City will incur costs for equipment rental, but those can be recovered by placing a lien on the property. Cooper moved to direct the city administrator to schedule a public hearing to declare the property a nuisance. That motion was seconded by Kreger and adopted unanimously.
- e. Process for Vacating City Rights-of-Way—Jorgensen said he spoke with Petersen about the process and obtained the memo that was included in the council packet. This issue has come up a few times and he would like to clean it up early next year. Council had gone through this same process a few years back. There were some streets it decided not to

vacate that may be worth taking another look at. Blodgett said she had that information. Staff can come up with a preliminary list of rights-of-way to vacate and bring that back to council at the next meeting. Council agreed by consensus.

- f. Paving Projects—Lawrence requested council approval to pay for the recent paving projects at city hall, the D Street Loop and the speed humps on C Street. Kreger moved to approve the request. That motion was seconded by Councilor Robert duPlessis. Cole said he wants to monitor the feedback the city receives on the speed bumps to see if they need to be adjusted. He feels they may be too steep. Lawrence said she could look into widening them and putting up signage. The motion was adopted unanimously.
- g. Public Works Shop—Cole said the council has been talking about this issue for a long time. The proposed improvements would help the City secure its assets. Lawrence said the bid she received would include enclosing the structure and adding a concrete floor for half of it. The current shop is in poor condition. She wants to move assets out of the old shop and secure them. The bid is for around \$40,000. Those costs could be covered between the water, sewer and street funds. Budge moved to approve the funding request. That motion was seconded by Kreger and adopted unanimously.
- h. First Street Land Slippage Repairs—Lawrence said the area where the old culvert was located has been excavated. She spoke with the city engineer about how to deal with the erosion and prevent future slippage and a plan was put together. It will cost \$241,000 but will take care of the issue. Around \$81,000 of the cost can be covered through the sewer fund and the rest could come from the street fund. The original bid was for \$123,000 for a temporary fix. Cole asked about the street fund. Lawrence said there were resources available in that fund. Cooper moved to table the matter to the next meeting. That motion was seconded by Kreger. Cole said the bid is only good for 30 days and may go up after then. Lawrence said the area is a big, open ditch right now. Cooper withdrew his motion. Cole said he was fine with using street funds to cover a portion of the cost. The area will have to be stabilized before it's ever used as a street again. It can be restored as a street in the future once the City has the money to do so. Budge moved to approve the expenditure, with \$81,000 coming out of the sewer fund and the remainder from the street fund. That motion was seconded by Kreger and adopted unanimously.

Unfinished Business

- a. D Street Loop Update—Lawrence said the project has been completed and came in at \$22,000 under bid.
- b. Riverfront Trail Update
- c. Fox Creek Update—Jorgensen said he signed the grant agreement with the Department of Administrative Services (DAS) for the feasibility study. DAS has also signed it and the City should be receiving those funds soon.

- d. Senior and Multigenerational Housing
- e. Moorage Agreement Update—Jorgensen said he made the changes that were suggested at the last meeting and added stronger language prohibiting camping on boats. Cooper moved to approve the agreement. That motion was seconded by Kreger and adopted unanimously.

Staff Report—Police Chief Gregg Griffith said his department will be selling donuts as a fundraiser for HOPE December 18. Lawrence said she received information from the insurance company about the water plant fire. The total repairs should come to around \$358,000. Around six totes of the records that were stored at the plant were recovered. The water meter replacement is complete and should pay for itself in two years. It also takes much less staff time to read the meters now. Jorgensen said he and Blodgett attended a Columbia County Board of Commissioners meeting to update that body about planning issues and to discuss having an IGA in place for building and planning code enforcement. The city's planning commission is going to be working on some issues that could affect the county, including annexation policies and a possible adjustment to the UGB. He met with the union representative about upcoming negotiations, McCoy about the timber sale and Petersen about the right-of-way issue. Along with Cooper, he met with a representative of the Department of State Lands about an IGA that would allow the city to enforce code on land owned by that agency along the riverfront trail. He met with Cooper to develop the code enforcement survey that went out in the utility bills and plans to present the results at the January council meeting. Jorgensen worked with the county assessor's office to create a map of the city's UGB with a topographical overlay and presented it to an official with the DLCD. He and Lawrence met with representatives of the Rainier Drainage Improvement Company on an agreement they're working on with the city. Jorgensen put together the RFP for the CPA services and submitted the grant agreement to DAS for the Fox Creek feasibility study.

Council Reports—duPlessis said the local scout troop raised 1200 pounds of food for HOPE in city limits during a recent canned food drive.

City Calendar/Announcements—Cole said the next council meeting will be January 10.

Cole adjourned the regular council meeting at 7:39 p.m.

Executive Session—*The Rainier City Council will hold an executive session under ORS 192.660 (2)(i) to review and evaluate the employment-related performance of the chief executive officer of any public body, a public officer, employee or staff member who does not request an open hearing.*

Mayor Jerry Cole

W. Scott Jorgensen, City Administrator

DRAFT

Columbia County

Multi Jurisdiction

Natural Hazard Mitigation Plan

2019



Columbia County
Department of
Emergency Management

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Introduction

This Multi-Jurisdiction Hazard Mitigation Plan has been prepared for Columbia County Oregon, its incorporated jurisdictions, districts and special districts. The plan assesses the probability of hazard occurrence and local vulnerabilities then establishes goals, objectives, and strategies for natural hazard mitigation. It identifies resources for implementing the mitigation strategies and establishes processes, procedures, and responsibilities for periodically reviewing the plan, evaluating its effectiveness, and making adjustments throughout its five-year life.

Hazard mitigation is defined by 44 CFR 201.2 as any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards. Hazard mitigation is the responsibility of individuals, private businesses and industries, state and local governments, and the federal government. Engaging in mitigation actions provides the state, counties, cities, businesses, and citizens with several benefits: fewer injuries and deaths; less damage to buildings, critical facilities, and infrastructure; diminished interruption in essential services; reduced economic hardship; minimized environmental harm; and quicker, lower-cost recovery

Structure

This Multi-Jurisdiction Hazard Mitigation Plan consists of three components:

The Basic plan

This section defines the planning area and identifies the plan participants, describes the plan contents, federal regulations, grant programs that require an HMP and a review of the County's mitigation planning history. In addition, the Basic Plan offers a community description and documents the County wide Hazard profile that is used by each Jurisdiction Annex to inform their vulnerability analyses and mitigation strategies.

The Jurisdiction Annexes

The County and each of the cities and districts participating in this plan has its own annex. Each annex is essentially a standalone Hazard Mitigation Plan with a methodology and a detailed county Hazard Profile acting as shared elements from the basic plan. Each Annex will utilize the following layout:

Prerequisites - This section addresses the prerequisites of plan adoption, which include adoption by the governing body of each participating jurisdiction. Adoption resolutions for each jurisdiction are included in the Appendices.

Community Description - This section provides more detailed history and background of the communities and unincorporated areas of Columbia County,

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including historical trends for population and the demographic and economic conditions that have shaped the area.

Planning Process - This section describes the planning process and identifies the Steering Committee members, the meetings held as part of the planning process, and the key stakeholders within the county and surrounding region. In addition, this section documents public outreach activities, public meetings and the review and incorporation of relevant plans, reports, and other appropriate information.

Hazard Analysis - This section provides an opportunity for each jurisdiction to expand on the shared Hazard Profile documented in the Basic Plan, by providing specific recognition of certain hazards and historical events.

Vulnerability Analysis - This section identifies potentially vulnerable assets—people, residential and nonresidential buildings dwelling units, RL properties, critical facilities, and critical infrastructure—in the incorporated cities and unincorporated areas of the county. These data were compiled by assessing the potential impacts from each hazard using Geographic Information System (GIS) and community provided information. The resulting information identifies the full range of hazards that the incorporated cities and unincorporated areas of the county could face and potential impacts, damages, and (where data was available) economic losses.

Mitigation Strategy - The mitigation strategy provides a plan for reducing the potential losses identified in the vulnerability analysis. Each jurisdictions Steering Committee developed a list of mitigation goals and potential actions to address the risks facing Columbia County and the seven incorporated communities. All hazard mitigation actions and strategies include NFIP compliance, preventive actions, property protection techniques, natural resource protection strategies, structural projects, emergency services, and public information and awareness activities. The Steering Committees selected relevant mitigation actions and strategies to implement countywide.

Each section of the Jurisdiction Annexes is prefaced with the federal Planning Requirements and Planning Elements as documented in the FEMA Local Mitigation Plan Review Guide.

Appendices

This section is reserved for the addition of reference documentation, provision of annual review worksheets and a section aggregating the local resolutions adopting the plan.

Hazard Mitigation Assistance

Hazard Mitigation Planning

Hazard mitigation, as defined in Title 44 of the Code of Federal Regulations (CFR), Part 201.2, is “any action taken to reduce or eliminate the long-term risk to human life and property from natural hazards.” Many areas have expanded this definition to include human-caused hazards.

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As such, hazard mitigation is any work done to minimize the impacts of any type of hazard event before it occurs. It aims to reduce losses from future disasters. Hazard mitigation is a process in which hazards are identified and profiled, people and facilities at risk are analyzed, and mitigation actions are developed. The implementation of the mitigation actions, which include long-term strategies that may include planning, policy changes, programs, projects, and other activities, is the result of this process.

Local Mitigation Planning Requirements

Local hazard mitigation planning is driven by Federal law. On October 30, 2000, Congress passed the Disaster Mitigation Act of 2000 (DMA 2000) (P.L. 106-390) which amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) (Title 42 of the United States Code [USC] 5121 et seq.) by repealing the act's previous mitigation planning section (409) and replacing it with a new mitigation planning section (322). This new section emphasized the need for State, Tribal, and local entities to closely coordinate mitigation planning and implementation efforts. In addition, it provided the legal basis for the Federal Emergency Management Agency's (FEMA) mitigation plan requirements for mitigation grant assistance.

To implement these planning requirements, FEMA published an Interim Final Rule in the *Federal Register* on February 26, 2002 (FEMA 2002a), 44 CFR Part 201 with subsequent updates. The planning requirements for local entities are described in detail in Section 2 and are identified in their appropriate sections throughout this MHMP.

FEMA's October 31, 2007 changes to 44 CFR Part 201 combined and expanded flood mitigation planning requirements with local mitigation plans (44 CFR §201.6). All hazard mitigation assistance program planning requirements for HMGP, PDM, FMA, SRL and potentially RFC programs were combined eliminating duplicated mitigation plan requirements. It also required participating NFIP communities' risk assessments and mitigation strategies to identify and address repetitively flood-damaged properties. Under 44 CFR §201.6. Local mitigation plans now qualified communities for federal Hazard Mitigation Assistance.

44 CFR §201.6 offers additional requirements for participation in the process: The risk assessment must assess each jurisdiction's risk where they may vary from the risks facing the entire planning area, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan, and each jurisdiction requesting approval of the plan must document that it has been formally adopted.

Grant Programs Requiring Hazard Mitigation Plans

All FEMA grant programs provide funding to States, Tribes, and local entities that have a FEMA-approved State or Local Mitigation Plan.

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Hazard Mitigation Grant Program

This program is authorized by Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended (the Stafford Act), Title 42, United States Code (U.S.C.) 5170c. The purpose of HMGP is to help communities implement hazard mitigation measures following a Presidential Major Disaster Declaration in the areas of the state, tribe, or territory requested by the Governor or Tribal Executive. The key purpose of this grant program is to enact mitigation measures that reduce the risk of loss of life and property from future disasters. FEMA offers a variety of disaster assistance programs with different eligibility requirements. HMGP provides funds to states, tribes, and local communities after a disaster declaration to protect public or private property through various mitigation measures. Hazard mitigation includes long-term efforts to reduce the impact of future events. HMGP recipients (states, Federally-recognized tribes, or territories) have the primary responsibility for prioritizing, selecting, and administering state and local hazard mitigation projects.

Pre-Disaster Mitigation Program

This program is authorized by Section 203 of the Stafford Act, 42 U.S.C. 5133. The PDM program is designed to assist States, Territories, Indian Tribal governments, and local communities to implement a sustained pre-disaster natural hazard mitigation program to reduce overall risk to the population and structures from future hazard events, while also reducing reliance on Federal funding from future disasters. The program awards planning and project grants and provides opportunities for raising public awareness about reducing future losses before disaster strikes. Mitigation planning is a key process used to break the cycle of disaster damage, reconstruction, and repeated damage. PDM grants are funded annually by Congressional appropriations and are awarded on a nationally competitive basis.

Flood Mitigation Assistance Grant Program

The FMA program is authorized by Section 1366 of the National Flood Insurance Act of 1968, as amended with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP). FMA provides funding to States, Territories, federally-recognized tribes and local communities for projects and planning that reduces or eliminates long-term risk of flood damage to structures insured under the NFIP. FMA funding is also available for management costs. Funding is appropriated by Congress annually. FEMA requires state, tribal, and local governments to develop and adopt hazard mitigation plans as a condition for receiving certain types of non-emergency disaster assistance, including funding for HMA mitigation projects.

Planning Area Definition and Participating Jurisdictions

This plan has been prepared by Columbia County, Oregon and covers the jurisdictions, governments, and districts located within its boundaries. The Columbia County MJHMP assesses risk in unincorporated Columbia County, the Cities of Scappoose, St. Helens, Columbia City, Rainier, Prescott, Clatskanie, and Vernonia.

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For the first time, several special purpose districts are also participating in this Hazard Mitigation Plan update. These districts have substantial administrative and fiscal independence, and their considerable risk to natural hazards allow a valid assessment relative to the other jurisdictions. The districts participating in this update are St. Helens School District, Mist Birkenfeld Rural Fire Protection District, and Scappoose Drainage Improvement District

Columbia County Mitigation Planning Overview

Initial Planning Processes, 1998-2005

In 1997 Columbia County was the first county in Oregon to begin the development of a complete (in 1998) a Hazard Mitigation plan – anticipating the requirement of the Disaster Mitigation Act of 2000 by two years.

In 2005, the Columbia County Director of Emergency Management, under direction from the County Commissioners, expanded the original Steering Committee to include, not only County agencies, but also city agencies, public safety agencies, private organizations, and businesses broadening countywide citizen involvement. The newly expanded Steering Committee collaboratively worked to evaluate and update the 1998 Natural Hazards Mitigation Plan to fulfill newly developed DMA 2000 requirements ultimately adopting it as the 2005 Natural Hazards Mitigation Plan (2005 HMP).

The 2005 HMP Steering Committee consisted of a county level commissioner, emergency management, road department, land development staff, city public works, police, fire and rescue, 911 communications staff, State forestry, fire district personnel and a consultant.

The 2005 HMP formed the basis for the County's All Hazard Mitigation Planning focus -- identifying five far-reaching planning goals with supporting objectives, and corresponding action items. This process refined goal achievement with a matrix to delineate coordinating and partner organizations, timelines, and lists the specific planning goals addressed by each action item.

The plan listed several mitigation actions to reduce or prevent damage and losses from natural hazards. However, limited resources prevented developing specific actions or assigning responsible entities to undertake project development and completion.

2009 Plan Update

The 2009 Columbia County Multi-Jurisdictional Hazard Mitigation Plan update was intended to: include newly identified hazards affecting individual jurisdictions; provide a comprehensive risk assessment and vulnerability analysis; provide community-based mitigation actions; identify funding sources; and include all incorporated jurisdictions within the county as part of the update.

FEMA provided technical assistance to facilitate developing this MHMP. This includes updating the portions of the existing plan for the unincorporated areas within the County as well as

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including the incorporated cities (the Cities of Clatskanie, Columbia City, Prescott, Rainier, Scappoose, and Vernonia). The City of Vernonia's portion of this plan also addresses update requirements as part of bringing all of the cities under one Multi-Jurisdictional plan.

The 2009 planning effort was a comprehensive and technical substitution of the county's previous HMP. The plan has served successfully to guide previous and ongoing mitigation efforts in the county and provided the basis for the subsequent hazard mitigation planning effort.

2014 Hazard Mitigation Plan Update

Unlike the 2009 effort this update did not rely on the services of an outside contractor – the entire effort was conducted 'in house'. This decision was made based on the quality of the product that the county adopted in 2009. Resultantly, while that plan forms the template for the 2014 effort, significant changes were made throughout the basic plan and the county and jurisdictional appendices.

2019 Hazard Mitigation Plan Update

The 2019 planning effort demonstrated another evolution of the County's Hazard Mitigation Plan as the former plan has been thoroughly reformatted in the interest of making the process as clear and as simple to attract as many cities and districts to the process as possible. The process that produced this plan was conducted with broad public input for each annex that makes up the plan. Again, this plan update process was conducted "in-house" and did not utilize consultation services to provide technical or staff support for the process.

Community Description

History and geography

Columbia County, named for the Columbia River, was created in 1854 from the northern half of Washington County. It encompasses 687 square miles and is bounded on the north and east by 62 miles of the Columbia River. It is bordered on the west by Clatsop County and on the south by Washington and Multnomah Counties. Columbia County is Oregon's third smallest county and the sixteenth county to be formed.

Columbia County lies within the marine west coast climate zone. Summers are warm and dry with clear skies, with July averaging 68.4° Fahrenheit (F). Winters can be mild to chilly with January averaging 39°F, and very wet; the rainfall averages 44.6 inches per year. Columbia County averages 155 days of measurable precipitation a year. Snow occurs frequently in the coastal range and the County can experience major snow and ice storms as cold air patterns flow from the Columbia River Gorge. The county's winter snowfall totals range from negligible to a high of 60.9 inches. The County's lowest temperature was -3°F on February 2, 1950; the highest temperature reached 107°F on July 29, 1965, August 8, 1981, and August 10, 1981.

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The Lewis and Clark expedition traveled through Columbia County on its way to the Pacific Ocean. Early fur traders settled the County in 1810 and many settlers came to the heavily forested region as immigrants seeking adventure and lush farmland. Other inhabitants left Washington State because of ongoing Indian wars. These emigrants sought safer locations on the other side of the Columbia River arriving in what is now St. Helens and Columbia City.

The primary industries of private sector employment within Columbia County are manufacturing, retail trade, energy and health services. The county was once covered by old growth timber, which was completely logged over by the 1950s. Now second growth timber provides the raw material for regional lumber and paper mills.

Development

Since the 2008 nationwide financial crisis, development of residential areas of Columbia County and its incorporated cities has been slowly recovering. However, construction levels have not yet returned to their former pace. The result is that relatively little residential development has occurred in the county since the 2009 plan. In this regard, this updated plan has only made minor changes in its hazard and vulnerability assessments regarding new residential development.

The same is not true for industrial developments in the County. While new physical infrastructure construction (factories, refineries, etc.) has been flat, the commodity flow into these areas has increased. In addition, in March of 2014 the Columbia County Board of County Commissioners approved the rezoning of 737 acres adjacent to the Port Westward industrial park. This ordinance re-zoned the area as Rural Industrial Planned Development, though no new construction has been carried out on the area. Despite this the area remains a focus of mitigation planning for the county and the adjacent local jurisdiction.

Demographics

Understanding the population and certain of its characteristics help identify actions that can be taken to reduce the impacts of a disaster before it occurs. The population of Columbia County is located largely in low-lying areas along the Columbia River. The County's population is growing slowly except in the Southeastern corner, closest to the Portland Metropolitan area where significantly increased housing prices are driving working commuters to seek bargains in a rural setting.

Jurisdiction	2010 Census population*	2018 Estimate**	Percent Change
Columbia County	49,351	51,900	+5.1%
Clatskanie	1,737	1765	+1.6%
Columbia City	1,946	1,985	+2.0%
Rainier	1,895	1,925	+1.5%
St Helens	12,883	13,240	+2.8%

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Jurisdiction	2010 Census population*	2018 Estimate**	Percent Change
Scappoose	6,592	7,200	+9.2%
Vernonia	2,151	2,065	-4.0%

*US Census Bureau, 2011–2015 American Community Survey (<https://factfinder.census.gov/>)

**Portland State University, Population Research Center (<https://www.pdx.edu/prc/population-reports-estimates>)

Hazard Profile

Introduction

A description of Columbia County's Hazard profile has been accomplished by describing hazards in terms of their nature, history, magnitude, frequency, location, and probability. Hazards are identified through the collection of historical and anecdotal information, review of existing plans and studies, and preparation of hazard maps of the study area.

The Homeland Security and Emergency Management Commission (HSEMC), which acts as the steering committee for the County Hazard Mitigation Plan Annex (See Columbia County Annex), identified 16 hazards that could affect Columbia County and the participating jurisdictions. They evaluated and screened the comprehensive list of potential hazards based on a range of factors, including prior knowledge or perception of the relative risk presented by each hazard, the ability to mitigate the hazard, and the known or expected availability of information on the hazard. The table below indicates the HSEMC members determined that 2 hazards pose no risk as they have no historical precedent are unlikely to occur in the future.

Natural Hazards		
Hazard Type	Included	Explanation
Erosion (Riverine & Tributary)	Yes	Columbia County is located inland and is not subject to coastal erosion. Riverine and tributary erosion occurs throughout the county in localized areas.
Drought	Yes	Along with the entire State of Oregon, Columbia County is subject to impacts associated with drought.
Earthquake	Yes	Columbia County is located within the geographical area bordering the Cascadia Subduction Zone, and its geography contains crustal faults. The county is subject to impacts associated with earthquakes.
El Niño / La Niña	Yes	Historic El Niño / La Niña patterns have been observed affecting weather patterns throughout the state.
Expansive Soils	Yes	Expansive soils occur in Columbia County.
Tornado	Yes	Though there have only been a few incidents of unverified tornadic activity, tornadoes have been known to occur in neighboring jurisdictions.
Flood	Yes	Historic flooding has been identified as occurring throughout Columbia County.

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Natural Hazards		
Hazard Type	Included	Explanation
Landslide/Debris Flow	Yes	Columbia County is vulnerable to slope instability, especially after prolonged rainfalls.
Volcano	Yes	Columbia County is located in the vicinity of active volcanoes.
Wind	Yes	Columbia County's geography and vegetation, makes it vulnerable to high winds.
Winter Storm	Yes	Winter storms in Columbia County result in several natural hazards – including floods, ice formations, snow, and wind. This hazard is the most frequent cause of large disasters in the county.
Wildland/Urban Fire	Yes	The terrain, vegetation, and weather conditions in the region are favorable for the ignition and rapid spread of wildland fires in Columbia County. Historic downtowns, and dense development in many towns, along with dense forest growth right up to city boundaries, make many cities in the county vulnerable to Wildland/Urban Interface fires.
Dust Storm	No	There are no historical records of dust-storms in the county; there is little risk from this hazard to any portion of the jurisdiction.
Tsunami	No	Columbia county lies inland from the pacific coast of Oregon and thus is not vulnerable to Tsunami risk. It is possible that some localized flooding could occur as a result of seismic energy producing seiche in the Columbia River and Multnomah Channel, but the risk is considered too low or uncertain for mitigation planning.

In addition, the Columbia County Department of Emergency Management produced the following Hazard Analysis Matrix to inform its emergency operations plan.

Columbia County Hazard Analysis Matrix					
Hazard	Rating Criteria with Weight Factors				Total Score
	History ¹ (WF=2)	Vulnerability ² (WF=5)	Max Threat ³ (WF=10)	Probability ⁴ (WF=7)	
Rating Factor (High = 10 points; Moderate = 5 points; Low = 1 point) X Weight Factor (WF)					
Earthquake	10	100	100	7	217
Wildland/Urban Fire	10	50	10	35	105
Flood	20	100	100	70	290
Hazardous Materials	10	50	50	70	180
Transportation Accident	20	50	50	70	190
Severe Weather	20	100	100	35	255
Multiple Casualty Incident	20	10	10	70	110
Public	10	50	100	70	240

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Columbia County Hazard Analysis Matrix					
Hazard	Rating Criteria with Weight Factors				Total Score
	History ¹ (WF=2)	Vulnerability ² (WF=5)	Max Threat ³ (WF=10)	Probability ⁴ (WF=7)	
Rating Factor (High = 10 points; Moderate = 5 points; Low = 1 point) X Weight Factor (WF)					
Violence/Terrorism					
Volcanic Eruption	2	50	50	7	109
Drought	10	10	50	35	105
Notes:					
1. History addresses the record of previous major emergencies or disasters. Weight Factor is 2. Rating factors: high = 4 or more events in last 100 years; moderate = 3 events in last 100 years; low = 1 or 0 events in last 100 years.					
2. Vulnerability addresses the percentage of population or property likely to be affected by a major emergency or disaster. Weight Factor is 5. Rating factors: high = more than 10% affected; moderate = 1%-10% affected; low = less than 1% affected.					
3. Maximum Threat addresses the percentage of population or property that could be affected in a worst-case incident. Weight Factor is 10. Rating factors: high = more than 25% could be affected; moderate = 5%-25% could be affected; low = less than 5% could be affected.					
4. Probability addresses the likelihood of a future major emergency or disaster within a specified period of time. Weight Factor is 7. Rating factors: high = one incident within a 10-year period; moderate = one incident within a 50-year period; low = one incident within a 100-year period.					
Source: Columbia County Emergency Operations Plan 2018					

Narrative Hazard Profiles

The narrative hazard profiles are intended to provide a comprehensive assessment on the hazards that can impact Columbia County. They include definitions of the hazards, their history extent and locations within the county, and the probability of future events. This section is meant to support each of the annexes that comprise the jurisdictional nature of this plan. However, additional information is provided in each annex to provide jurisdiction specific examples of the nature and local impact of these hazards.

Flood

A flood is the temporary inundation of water or mud on normally dry land. Heavy or prolonged rain, snowmelt, or dam collapse can cause inundation. In Columbia County floods usually are the result of major weather systems that cause flooding of smaller streams that flow into major rivers. This type of flood and inundation of the natural floodplains of the river system is a part of the natural process. Development in or near the floodplain puts lives and property at risk.

Areal, Urban, and Riverine flooding primarily affect Columbia County.

Areal Flooding - The National Weather Service defines an Areal Flood Warning as; flooding that develops more gradually, usually from prolonged and persistent moderate to heavy rainfall. This results in a gradual ponding or buildup of water in low-lying, flood prone areas, as well as small creeks and streams. The flooding normally occurs more than six hours after the rainfall begins and may cover a large area. However, even though this type of flooding develops more slowly than flash flooding, it can still be a threat to life and property. This type of flooding is very common in Columbia County.

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Urban Flooding - Urban flooding occurs in developed areas where the amount of water generated from rainfall and runoff exceeds the storm water systems' capacity. As land is converted from agricultural and forest to urban uses, it often loses its ability to adsorb rainfall. Rain flows over impervious surfaces such as concrete and asphalt and into nearby storm sewers and streams. This runoff can result in the rapid rise of floodwaters. During urban floods, streets can become inundated, and basements can fill with water. Storm drains often back up because of the volume of water and become blocked by vegetative debris like yard waste, which can cause additional flooding. Development in the floodplain can raise the base flood elevation and cause floodwaters to expand past their historic floodplains.

Riverine Flooding - Riverine or overbank flooding of rivers and streams is the most common type of flood hazard. Riverine flooding most frequently occurs in winter and late spring. Air rises and cools over the Coast Range and its foothills and heavy rainfall develops over high-elevation streams, as storms move from the Pacific across the Oregon Coast. In this region, as much as four to six inches of rain can fall over a 24-hour period. Severe and prolonged storms can raise rivers and streams to their flood stages for three to four days or longer. (State of Oregon 2015)

Flash Flooding - Flash floods were not identified as occurring in Columbia County as part of this planning process as typical incident events do not fulfill scientifically defined flashflood parameters.

These types of flood damage can include:

- Structure inundation
- Erosion of stream banks, road embankments, foundations, footings for bridge piers and other features
- Impact damage from high-velocity flow and from debris
- Additional debris damage from accumulation on or blockage of infrastructure
- Cropland destruction
- Sewage and hazardous or toxic materials releases from damaged pipelines, tanks, and facilities
- Economic loss (local facilities, utilities, communications, agriculture)

History

Several very destructive floods have been recorded in Columbia County, as well as much of western Oregon, throughout the years. Between 1955 and 1999, Oregon ranked eleventh nationally for flood losses, with more than \$197 million in annual damages. The county lies between the Coastal Range and the Cascade Range, in topography rich with rivers and tributaries. Because of this topography, melting snow and heavy winter rains can combine to produce devastating flood events. Floods along the Columbia River itself are in many places limited by the high, steep banks of the river, which contain most floodwaters to a narrow band. However, other waterways exceed their banks more easily. (Columbia County Department of Emergency Management, 2014)

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1948 A flood covered eight drainage districts, inundated the industrial port of St. Helens, and much of Clatskanie's central business district.

1964 Nearly every river in the state of Oregon exceeded its flood stages as weather stations set new records for precipitation. Known as the Christmas Flood, the event triggered debris flows, bridge failures and flooding that caused thousands to evacuate and closed airports, railways and hundreds of miles of roads across the state. Ultimately, the event caused more than \$157 million in damages and 20 people were killed.

1972, and 1974 the Nehalem River, Scappoose Creek, North Scappoose Creek, Clatskanie River, Conyers Creek, and McNulty Creek were all subject to winter flooding. (Columbia County Department of Emergency Management, 2014)

1987 a major flood of Scappoose Creek inundated many homes in Scappoose. (Columbia County Department of Emergency Management, 2014)

1996 Virtually every county in the state received a disaster declaration due to a combination of warm temperatures, heavy snow pack and four days of record-breaking rain. Many areas had already received above-average rainfall, meaning rivers were at or reaching their capacities and flood stages. Recent logging activities contributed to increased runoff, resulting in atypical sediment and debris, which made conditions ripe for flooding and landslides. Hundreds of homes were destroyed, power outages were widespread, thousands were evacuated to public shelters and five people died. Some estimates of flood-related damages exceeded \$1 billion. Later that year, in November, a tropical air mass swept across the state, once again bringing record-breaking precipitation. The stormy weather continued into December and early January as 26 major rivers reached flood stage. Snowmelt and intense rain caused extensive flooding that led to widespread landslides, erosion, power outages, damaged homes and businesses, closed roads and eventually resulted in a Presidential Disaster Declaration. (FEMA 2019a)

In Columbia County, there were widespread road closures due to high water and landslides, including the Scappoose-Vernonia Road and highways 30 and 47 in several places. At the peak of the flood, all major highways were closed and those secondary roads that were open were restricted to emergency vehicles. Road closures isolated Vernonia and Clatskanie. Much of these two communities as well as parts of Scappoose, St. Helens and Rainier had to be evacuated. A boil-water alert was in effect for most of the county, and telecommunications, including some emergency communications, were disrupted. FEMA disbursed repair and response totaling more than \$5,000,000 to public entities, and the Oregon Economic Development Department funded nearly \$1,000,000 in Disaster Recovery Grants. Damages to private property were estimated at more than \$5,000,000. Extensive as the 1996 flood was, much larger floods are possible in Columbia County.

2007 Severe storms, winds, mudslides, landslides, and flooding occurred between December 1 and 17, 2007 shutting down roads and highways including Interstate 5. Public infrastructure, homes, and personal property were damaged. In Oregon, 73,000 residents were without power, and wastewater treatment plants were overwhelmed. A major disaster was declared

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for the State of Oregon on December 8, 2007 with Columbia County included in the declaration. Coastal river flooding was estimated at or above the 25-year stage and compared to that of the 1964 and 1996 flood events.

The December storm flooded over 750 residences with 340 of those located in the City of Vernonia alone. 220 Vernonia homes were more than 50% damaged, and 34 greater than 70% damaged with an estimated \$16.5 million in losses. March 2008 FEMA disaster aid was estimated at approximately \$20 million including:

- \$6,051,729 in individual assistance approved
- \$10,957,500 in low-interest disaster loan assistance approved to homeowners, renters and businesses of all sizes
- \$3,157,918 in public assistance obligated
- 3,569 individuals registered for assistance
- 3,864 individuals visited Disaster Recovery Centers
- 2,014 home inspections completed

2015 In December a series of heavy rainfalls only previously saturated ground created flooding conditions in portions of the county. In Vernonia the Nehalem river crested above 13.5 feet as heavy rains continued to fall in the Nehalem drainage just south of Highway 26. Though a large portion of the city was inundated, and some damage was reported, mitigation efforts conducted after the 2007 flood event proved remarkably successful at minimizing impact. In Clatskanie high tide cycles produced flooding along the Clatskanie river as hydrologic damming forced water out of the banks, several properties and a large mobile home community were severely impacted. (Columbia County Department of Emergency Management, 2015)

Location

Columbia County is subject to flooding from river overflow (the Columbia River, Multnomah Channel, rivers such as the Nehalem and Clatskanie rivers) and lesser waterways (including Conyers, McNulty, Milton, Rock, and Scappoose creeks); as well as flooding from local storm water drainage. Between October and April, the county is susceptible to winter rain flooding, while between May and July, snowmelt and runoff can create floods. Typically, the most severe floods are winter rainfall floods in December, January and February.

Flood control storage reservoirs have substantially reduced flood potential along the Columbia River and other major waterways. Upstream of Columbia County, the Columbia River has 22 major reservoirs (representing 40 million acre-feet of flood storage), the Willamette River has 11 major reservoirs (1.7 million acre-feet), and the Cowlitz River, one (360,000 acre-feet). The Lewis River has three reservoirs (12,420 acre-feet). These reservoirs have reduced, but not eliminated flood potential. (American Rivers, 2017)

Extent

Floods are described in terms of their extent (including the horizontal area affected and the vertical depth of floodwaters) and the related probability of occurrence. Flood studies often use historical records, such as stream flow gauges, to determine the probability of occurrence for floods of different magnitudes.

FEMA has mapped most of the flood-prone streams in Oregon for 100- and 500-year flood events. A 100-year flood (one percent probability of occurring within any given year) is used as the standard for floodplain management in the United States and is referred to as a base flood. Flood Insurance Rate Maps (FIRMs) prepared by FEMA provide the most readily available source of information for 100-year floods. These maps are used to support the NFIP. FIRMs delineate 100- and 500-year (two percent probability of occurring in a given year) floodplain boundaries for identified flood hazards; these areas are Special Flood Hazard Areas (SFHAs) and provide the basis for flood insurance and floodplain management requirements.

Columbia County contains a total of 82.2 square miles within the 100-year floodplain, and 103.8 square miles within the 500-year floodplain. The 500-year event floodplain generally encompasses slightly more area than a 100-year event. Each watershed has its own water absorption characteristics. Buildings, roads, and parks replace grass and soil with asphalt or other non-absorbing materials, which limit or prevent water absorption. Therefore, 500-year events contain more water, which spreads further throughout the floodplain until the water can be managed by manmade and natural drainage systems. (Columbia County Department of Emergency Management, 2014)

The FEMA-mapped floodplains in Columbia County include, for the most part, only areas along the larger rivers and streams, which also have significant population and/or development. Other areas in the county have flood risk but are not included in the FIRM because of small stream size or low population. Flood hazard evaluation for Columbia County must also consider these localized areas of high flood risk or repetitive flooding which lie outside mapped floodplains.

For Columbia County, there are several dozen FIRMs for cities as well as for communities in the unincorporated portions of the county. These maps are available at the County Courthouse or online at: <https://msc.fema.gov/portal/home>

Probability of Future Events

Columbia County and the incorporated Cities of St. Helens, Columbia City, Scappoose, Clatskanie, Rainier, Prescott, and Vernonia, participate in the NFIP and are required to regulate floodplain development. Any structure built in the floodplain after 1974 must meet NFIP requirements for elevation and flood proofing. Columbia County and the incorporated jurisdictions use FEMA developed floodplain maps as the basis for implementing floodplain regulations. FIRMs delineate flood hazard areas where NFIP regulations apply. FIRMs and flood insurance studies assess the probability of flooding at given locations. These maps represent a snapshot in time, and do not account for changes in the floodplains. Development and other

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natural and artificial changes in floodplains have caused changes to the rivers and streams in Columbia County. For areas not mapped by FIRMS, flood-susceptible areas can be delineated, and flood levels estimated by using historic stream flow records to determine flood frequency and recurrence.

Flood studies use this information to determine the probability of occurrence for floods of different magnitudes. The probability of occurrence is expressed as a percentage indicating the probability of a specific flood event occurring in any given year.

Factors contributing to the frequency and severity of riverine flooding include:

- Rainfall intensity and duration
- Soil saturation
- Watershed conditions, including steepness of terrain, soil types, amount and type of vegetation, and density of development
- The existence of attenuating features in the watershed, including natural features such as swamps and lakes, and human-built features such as dams
- The existence of flood control features, such as levees and flood control channels
- Velocity of flow
- Tide heights
- Availability of sediment for transport, and the likelihood of erosion of the bed and banks of the watercourse

These factors are evaluated using a hydrologic analysis to determine the probability that discharge of a certain size will occur, and to determine the characteristics and depth of the flood resulting from that discharge.

Flooding in western Oregon generally occurs when storms from the Pacific Ocean bring intense or prolonged rainfall to the west coast. Columbia County typically experiences the most severe floods from winter rainfall in December, January, and February. These floods are occasionally exacerbated by frozen snow packs where rain and snow melt combine while the ground is frozen, preventing ground seepage capability. The County is subject to flooding from river overflows; as well as flooding from local storm water drainage. The county is susceptible to winter rain flooding from October through April; while the months between May and July bring snowmelt and runoff floods. Based on previous occurrences, the county is not susceptible to flash floods. However, the county is likely to experience major flood events occurring in and around the county every 2 to 6 years based on recent historic occurrences.

Winter Storm

Winter storms occurring in Columbia County result in several natural hazards – including floods, landslides/debris flows, and wind. Each on its own, or in combination, can completely immobilize emergency response activities, close transportation corridors, and disrupt

transportation and utilities. Each of these natural hazards is individually discussed in detail in their respective sections.

Winter storms in Columbia County can bring snow as well as rain or can be followed by rising temperatures that melt newly fallen snow in higher elevations. Either scenario often causes flooding; most floods in western Oregon occur as a result of winter storms. The flood hazard is described in detail in the flood section of this document.

As is the case with flood, wind as a hazard in Columbia County most frequently occurs as part of a winter storm. The nature, history, location, extent, and probability of future events for wind, including winter storm wind, are explored in detail in the wind section of this document.

Nature

Ice and snowstorms, which include freezing rain, sleet, and hail, can be the most devastating of winter weather phenomena and are often the cause of automobile accidents, power outages and personal injury. Ice storms result in the accumulation of ice from freezing rain, which coats every surface it falls on with a glaze of ice. Freezing rain is most commonly found in a narrow band on the cold side of a warm front, where surface temperatures are at or just below freezing. Typically, ice crystals high in the atmosphere grow by collecting water vapor molecules, which are sometimes supplied by evaporating cloud droplets. As the ice crystals fall, the air warms and the particles melt and collapse into raindrops. As the raindrops approach the ground, they encounter a layer of cold air and cool to temperatures below freezing. However, since the cold layer is shallow, the drops themselves do not freeze, but rather are supercooled, that is cooled in a liquid state to below-freezing temperatures. These supercooled raindrops freeze on contact when they strike the ground or other cold surfaces.

Snowstorms happen when a mass of very cold air collides with a mass of warm air. The warm air rises quickly and the cold air cuts underneath it, cooling and condensing as it rises, forming a cloud bank in the process. As the moisture droplets in the cloud cool to a point below freezing, they become ice crystals, which then collide within the cloud and snow is formed. The resulting precipitation falls as snow only when the temperature of the air between the bottom of the cloud and the ground is below 40 degrees Fahrenheit. A higher temperature will cause the snowflakes to melt as they fall through the air, turning them into rain or sleet. Like those of ice storms, the effects of a snowstorm can disturb a community for weeks or even months. The combination of heavy snowfall, high winds and cold temperatures poses danger from prolonged power outages, automobile accidents and transportation delays, dangerous walkways, and through direct damage to buildings, pipes, crops, other vegetation, and livestock. Buildings and trees can also collapse under the weight of heavy snow.

History

The following table summarizes significant ice and snowstorms having occurred in Columbia County since 2000.

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Winter Storms Events, 2000 – 2019

Date	Snow Type (Ice, Snow, Sleet)	Details
12/3/2001	Heavy Snow	A powerful Pacific storm dumped very heavy snow in the Cascades again. In the Columbia River Gorge 3 to 4 inches of new snow was reported at Hood River, and both Bonneville Dam and Cascade.
12/17/2001	Heavy Snow	In the Columbia River Gorge, Hood River had 4 inches of snow.
12/27/2001	Winter Storm	In the Columbia River Gorge, Hood River reported 2 inches of snow.
12/30/2001	Winter Storm	In the Columbia River Gorge, Hood River reportedly received sleet, freezing rain, and one inch of snow.
11/17/2003	Winter Storm	Over a three-day period of strong Pacific storms, high winds were brought to the North and Central Oregon coast along with heavy rain and/or snow to the area. Locations in the Central and Southern Willamette Valley reported up to an inch.
1/7/2005	Heavy Snow	Snow fell in the NW Oregon Coast Range, with 8 inches in Buxton, 5 inches west of McMinnville, and 4 inches at Sunset Summit and Wilson River Summit. A cold Pacific storm brought heavy snow to the NW Oregon Coast Range, Northern Oregon Cascades, and Columbia River Gorge.
12/3/2005	Winter Storm	A strong moisture-laden Pacific system brought winter conditions to various regions of northwest Oregon.
3/8/2006	Winter Storm	A strong Pacific storm and associated cold front brought relatively late winter conditions to northwest Oregon. This snow event was one of the latest of the year seen in the Portland area, and forced many school closures around the area.
12/14/2006	Winter Storm and Flooding	A strong low-pressure system combined with existing very cold, shallow air over portions of northwest Oregon brought a wintry mix of precipitation resulting in flooding in eight counties including Columbia County.
12/08/07	Winter Storm	Severe storms resulted in flooding, landslides, and mudslides beginning on December 1, 2007 resulted in a major disaster declaration requiring over 20 million in aid. Five counties in Oregon were included in this disaster. Columbia county and participating jurisdictions were severely impacted by this storm.

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Winter Storms Events, 2000 – 2019

Date	Snow Type (Ice, Snow, Sleet)	Details
12/20-26/2008	Snow, Mudslide, Landslide	A severe storm, record and near-record snow, mudslides, and landslides occurred between December 20 and 26, 2008. Said to be the worst snow and ice event to occur in the Willamette Valley in 40 years -- significantly damaged agricultural buildings and equipment. Heavy snow and freezing rain caused ice buildup that resulted in downed trees, limbs and broken branches throughout northwestern Oregon. Roads, infrastructure, and private property were damaged as a result of the storm.
03/01/2012	Winter Storm	An unstable air mass following a Pacific cold front brought widespread snow showers to the North Oregon Cascades and foothills, and the North Oregon Coastal Range. Portions of Columbia County measured 20 inches of new snow.
2/6-10/2014	Snow, ice	Columbia County saw 8 inches to 12 inches of snow, followed by about 0.5 inches to 0.75 inches of ice. This storm resulted in considerable disruption of traffic in many portions of Columbia County.
1/3-23/2017	Snow, ice and freeze	Heavy snow accompanied by a deep freeze produced conditions that allowed following rain and warmer weather to produce flooding conditions as the soil could not absorb the melt and rainfall.

Data from NOAA, 2019 and Columbia County Department of Emergency Management, 2017

Location

All areas of Columbia County and the participating jurisdictions are susceptible to winter storms as cold arctic air breaches the Cascade Range and moves westward. Cold air rarely travels west of the Cascade Range, as the mountains provide a natural barrier separating the Willamette Valley from the cold air to the east. However, the Columbia River Gorge can provide a low-level passage funneling cold air westward. Rain, sleet, and/or snow will fall if moisture-saturated warm air from the Pacific moves into the area colliding with the colder air mass.

Extent

Columbia County is in Climate Zone 2, generally consisting of wet winters and dry summers. Winter storm characteristics are determined by the amount and extent of ice and snow, air temperature, wind speed and wind direction. Winter storms can cause power outages, transportation and economic disruptions, injuries and loss of life. Winter storms can also cause traffic-related accidents and death, hypothermia, and heart attacks from snow shoveling. Emergency response times can be slowed because of icy road conditions. The weight of the snow or ice can cause utility disruption and falling trees and limbs. Snowmelt can cause flooding and landslides.

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Probability of Future Events

Historical data shows that the probability for annual winter storm recurrence is high with a one-year recurrence interval. Winter storms combined with other weather events, like El Niño and La Niña cycle; often result in compounded hazards countywide. Winter storms have caused flooding, landslides, debris flows, utility and transportation systems disruptions.

Landslide

Nature

Landslide is a general term for the dislodgment and fall of a mass of soil or rocks along a sloped surface, or for the dislodged mass itself. The term is used for varying phenomena, including mudflows, mudslides, debris flows, rock falls, rockslides, debris avalanches, debris slides and slump-earth flows. The susceptibility of hillside and mountainous areas to landslides depends on variations in geology, topography, vegetation and weather.

Landslides can be triggered by natural events such as seismic tremors and earthquakes, volcanic eruptions, stream erosion, snowmelt, and prolonged or heavy rainfall. Development and other human activities can also provoke landslides. Increased runoff, excavation in hillsides, shocks and vibrations from construction, placement of non-engineered fill, and changes in vegetation from fire, timber harvesting, and land clearing have all led to landslide events. Weathering and decomposition of geologic material, and alterations in flow of surface or ground water can further increase the potential for landslides.

The United States Geological Survey (USGS) identifies six types of landslides, distinguished by the type of material and movement mechanism involved (USGS 2008a):

Slides - The more accurate and restrictive use of the term landslide refers to a mass movement of material, originating from a discrete area of weakness that slides from stable underlying material. A rotational slide occurs when there is movement along a concave surface; and a translational slide originates from movement along a flat surface.

Debris flows - Flows arise from saturated material that generally moves rapidly down a slope. A debris flow usually mobilizes from other types of landslides on steep slopes, then flows through confined channels, liquefying and gaining speed. Debris flows can travel at speeds of more than 35 miles per hour for several miles. Other types of flows include debris avalanches, mudflows, creeps, earthflows, debris flows, and lahars.

Lateral Spreads This type of landslide generally occurs on gentle slopes or flat terrain. Lateral spreads are characterized by liquefaction of fine-grained soils. The event is typically triggered by an earthquake or human-caused rapid ground motion.

Falls - Falls are the free-fall movement of rocks and boulders detached from steep slopes or cliffs.

Topples - Topples are rocks and boulders that rotate forward and may become falls.

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Complex - Any combination of landslide types.

The likelihood of a landslide in any given slide-prone location is largely dependent on the water content of the soil or rock fill. Landslides may happen at any time of the year, especially during rainy months when soils become saturated with water. Earthquakes can add to slope stress and disrupt ground stability, thereby triggering landslides, usually in already slide-prone locations. In addition, unconsolidated deposits of alluvial and glacial outwash materials are subject to accelerated stream bank erosion and landslides.

Landslides often occur in conjunction with other natural hazards, thereby exacerbating conditions, as described below:

- Shaking due to earthquakes can trigger events ranging from rock falls and topples to massive slides.
- Intense or prolonged precipitation that causes flooding can also saturate slopes and cause failures leading to landslides.
- Landslides into a reservoir can indirectly compromise dam safety, and a landslide can even affect the dam itself.
- Wildfires can remove vegetation from hillsides, significantly increasing runoff and landslide potential.

History

Landslides and debris flows are common in Columbia County. Much of the terrain is hilly and susceptible to slides; however, many slides take place in undeveloped areas and are unreported or even unnoticed. A statewide survey of winter storm landslides during 1996 and 1997, conducted by the Oregon Department of Geology and Mineral Industries (DOGAMI), reported 9,582 documented slides. The actual number was estimated to be many times the documented number. (Columbia County Department of Emergency Management, 2014)

Historically, long periods of winter rain and heavy snowfall in the mountains trigger landslides. These landslides affect county roads, Electric distribution and transmission and key emergency transportation routes.

A February 1996 winter storm triggered numerous slides in Columbia County. Slides interrupted transportation routes in dozens of locations, including two emergency transportation routes, the Scappoose-Vernonia Road (19 locations) and Apiary Road (four locations).

The December 2007 winter storm caused 77 landslides and 41 debris flows in Columbia, Clatsop, and Tillamook counties. In northwestern Columbia County, one or more small landslides occurred triggering a debris flow that traveled approximately 1 mile and blocked a drainage near Woodson on Highway 30. This blockage combined with additional rainfall resulted in a temporary lake (30-40 feet deep and 200 feet long). Woodson residents were evacuated, and Highway 30 was closed on December 11th, 2007. A catastrophic debris flow

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occurred when the embankment failed and engulfed Highway 30 and Woodson. No fatalities occurred.

During the 2015 flood event numerous landslides effected the county. A major slide near milepost 4 of the Scappoose Vernonia highway cut that road and did extensive damage to the electric distribution grid in that area. In fact, most major feeder roads in the County road system were blocked and badly damaged, in some cases multiple times, isolating the entire western portion of the county. State highway 47, 202 and the critical highway 30 were all closed multiple times at multiple locations for days after the worst of the rains had ended.

Since this latest event small incidents continue to require occasional clean up and indicate that landslides remain a constant hazard for county residents in the future.

Location

In general, the probability of slope failure increases with an increase in slope inclination. However, this is not always the case. Depending on various factors such as soil type and water content, a slope having a relatively low inclination could be at greater risk of failure than another slope having a relatively high inclination. Other factors that influence susceptibility include rock type; vegetative cover and type; slope aspect; permeability and rate of infiltration; proximity to seismic sources; and magnitude of seismic events. In addition, unconsolidated deposits of alluvial and glacial outwash materials are subject to accelerated stream bank erosion and landslides. The possibility of failure also increases in sloped areas in which human influences, such as cutbacks, have occurred.

Extent

The Oregon Department of Forestry (ODF) conducted a 3-year study of the impacts of landslides in Oregon. The ODF study included eight study areas, one of which was in Columbia County, but did not provide a detailed inventory of landslide prone areas in Columbia County, outside of the very small study area. This study concluded that the highest hazard for shallow rapid landslides in western Oregon occurs on slopes of over 70% to 80% steepness (depending on landform and geology). (ODF 2001)

The geographic extent of landslide events is essentially the same as slide location, while the effects depend on what infrastructure is in the way of a slide, as well as the magnitude and force of the slide itself. The extent of effects could be as limited as one building or property, to region-wide effects, as in the case of a major transportation disruption, slide-induced dam failure, or utility outage.

Rapidly moving landslides have the greatest potential to endanger human life or inflict serious injury, especially to those living in or traveling through rapidly moving slide prone areas. Slow moving slides are less likely to inflict serious human injuries but can cause property damage.

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Probability of Future Events

Landslides are an annual occurrence in Oregon during the rainy months, October through April. They generally result from intense or prolonged rainfall, particularly during a rain on snow event. Slope alteration and shape can also be a recurrence interval factor. Oregon's Enhanced Natural Hazard Mitigation Plan states that, "Landslide recurrence interval is highly variable" and is terrain dependent. (Oregon, 2015) Recurrence intervals for steep terrain can range from 50-5,000 years, with some debris flow recurrence intervals of less than 10 years.

Wildfires

Columbia County contains vast areas of second and third growth timber reproduction, and wildlands that take advantage of the temperate conditions and significant annual rainfall to produce considerable vegetation among multiple fuel types and sizes. Under certain conditions these areas are vulnerable to the ignition and rapid spread of large and damaging fires.

Nature

Wildfires can be classified as wildland fires, wildland/urban interface fires, urban fires, and prescribed fires. Due to the large amount of forested land in Columbia County, both wildland fires and wildland/urban interface fires are significant hazards.

Wildland fires spread through the consumption of vegetation. They often begin unnoticed, spread quickly, and are usually signaled by dense smoke that may be visible for miles around. Wildland fires can be caused by human activities such as arson or campfires, or by natural events like lightning. Wildland fires often occur in forests or other areas with ample vegetation. When a wildland fire spreads to developed areas such as suburbs, small communities, or isolated homes, it becomes a wildland/urban interface fire.

The following three factors contribute appreciably to wildland fire behavior and can be used to identify hazards.

Topography - As slope increases, the rate of wildfire spread increases. South-facing slopes are also subject to more solar radiation, making them drier and thereby intensifying wildfire behavior. However, ridge tops can mark the end of a wildfire's spread, since fire spreads more slowly or may even be unable to spread downhill.

Fuel - The type and condition of vegetation plays a significant role in the occurrence and spread of wildfires. Certain types of plants are more susceptible to burning or will burn with greater intensity. Dense or overgrown vegetation increases the amount of combustible material available to fuel the fire (referred to as the "fuel load"). The ratio of living to dead plant matter is also important. The moisture content of both living and dead plant matter decreases during periods of prolonged drought and greatly increases the risk of fire. The fuel's continuity, both horizontally and vertically, is also an important factor. Forests with strong ladder fuels (understory growth between ground fuels and tree crowns) are more likely to have major fires involving tree crowns. Forests with limited ground fuels and little or no ladder fuels are much more likely to experience minor ground fires than a fire involving tree crowns.

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Weather - The most variable factor affecting wildfire behavior is weather. Temperature, humidity, wind and lightning can affect chances for ignition and spread of fire. Extreme weather, such as high temperatures coupled with low humidity, can lead to devastating wildfires. Conversely, cool temperatures and higher humidity often signal reduced wildfire occurrence and easier containment of existing fires.

Columbia County contains the topography fuel and weather patterns necessary for the ignition and rapid spread of wildland fire. Wildland fires can be categorized as occurring in the following locations:

Agricultural - Agricultural fires burn in areas where the primary fuels are flammable cultivated crops, such as wheat. This type of fire tends to spread very rapidly but is relatively easy to suppress if adequate resources are available. Structures threatened, if any, are generally those belonging to ranch and farm owners. There can also be significant losses in agricultural products.

Forest - Forest fires are the classic wildland fire. These fires burn fuels composed primarily of timber and associated fuels, such as brush, grass, logging residue and thick stands of replanted trees. Due to variations in fuel and topography, this type of fire may be extremely difficult and costly to suppress.

Wildland-Urban Interface - Fires involving the wildland-urban interface occur in areas where urbanization and the presence of natural vegetation fuels allow a fire to spread rapidly from natural fuels to structures and vice versa. Especially in the early stage of such fires, structural fire suppression resources can be quickly overwhelmed, increasing the number of structures destroyed. Such fires are known for the large number of structures simultaneously exposed to fire. Nationally, wildland interface fires commonly produce widespread losses.

Although thought of as a summer occurrence, wildland fires can, and do, occur during any month of the year. Most wildland fires occur between July and October. Dry spells during the winter months, especially when combined with the factors of winds or dead fuels, result in fires that burn with alarming intensity and rate of spread. Common causes of wildland fire include lightning; equipment use; railroad activity; debris burning; arson; and improperly extinguished cigarettes and campfires.

Wildland fires are part of the natural ecology and natural life cycles of wildlands. Fires create open spaces with different habitats for both plants and animals than existed previously. Fires also reduce fuel loads in areas, which in turn decreases the potential for large catastrophic fires. However, a wildland fire may grow into an emergency or disaster if not promptly controlled. Even a small fire can threaten lives and resources and destroy property, especially in heavily developed interface areas. Wildland fires may also harm livestock and pets. In addition to threatening humans, animals, and infrastructure, wildfires in forested areas have a severe impact on natural resources. Wildland fires strip the land of vegetation and destroy forest resources. Soil exposed to intense heat may lose its capability to absorb moisture and support life. Exposed soils erode quickly and enhance siltation of rivers and streams, thus increasing

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flood potential, harming aquatic life and degrading water quality. Lands stripped of vegetation are also subject to increased debris flow hazards, as discussed in the landslides hazard profile.

History

ODF provided records for all wildland fires in ODF-responsibility lands in Columbia County for recent years. Since 1987 a total of 689 wildland fires occurred on ODF-responsibility lands in Columbia County, or an average of 20 fires per year. Most of these fires were less than one acre, 134 fires were between 1 and 9 acres, and 15 fires were 10 acres or more. The largest fire reported consumed 93 acres. It is important to keep in mind that these data are for ODF-responsibility areas, along with ODF joint responses to fires in areas where the primary responsibility is provided by local fire agencies. However, because ODF-responsibility lands include nearly 80% of the entire county, these data probably represent most of the wildland fires in Columbia County in the last 31 years. The following table shows recent fires in the vicinity of Columbia County.

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Recent Large Fires in Columbia County and Vicinity

Fire Name	Location	Size (Acres)	Fuel Type	w/i WUI	Year	Cause Category	Vicinity of Homes
Pebble Creek	South of Vernonia	165	Logging Slash/Timber	Yes	1987	Hunter/Smoking	Yes
Keasey Dam	West of Vernonia	117	Logging Slash Reproduction	No	1989	Recreationist/Campfire	No
Emerald Forest		37	Logging Slash	No	1994	Equipment/Logging	Yes
Kerry Road	West of Clatskanie	31	Fell/Buck, Slash, Reproduction			Equipment/Logging	No
Wolden Road		31	Reproduction	Yes	1999	Debris Burning	Yes
Lost Creek Road		20	Reproduction	Yes	1999	Debris Burning	Yes
Lost Creek Road	West of St. Helens	5	Logging Slash	Yes	1999	Burning	Yes
Scappoose Airport	Scappoose Airport	200	Logging Slash/Timber	Yes	2000	Burning	Yes
Pittsburg Road	South of Liberty Hill	5	Scrub Oak/Grass	Yes	2006	Recreationist/unknown	Yes
Hwy 30/Jones Rd	Hwy 30/Jones Rd	12	Grass/Brush	Yes	2008	Burning vehicle	Yes
North Fork Unit	Elk Creek	7	Slash	No	2008	Hold Over	No
Flora Road	Flora Road	23	Reproduction	No	2009	Vehicle Sparks	Yes
Pittsburg Road	Pittsburg Road	5	Grass	Yes	2012	Burning Building	Yes
Sunset Grade	N. Fork Wolf Creek	67	Logging Slash	No	2015	Recreationist/shooting	No
Hwy 47, MP 5	Hwy 47, MP 5	30	Logging Slash	No	2017	Vehicle Sparks	No
Chapman Grange Rd. # 1	Chapman Grange Rd.	42	Logging Slash	No	2018	Recreationist/unknown	No

Location

Columbia County is approximately 90% forested; therefore, there is high risk for wildland fires in the county. (Loy 2001) According to a United States Forest Service report identifying wildland/urban interface communities within the vicinity of Federal lands in Oregon that are at high risk from wildfire, every community in Columbia County is at risk for wildland/urban interface fires. (66 Fed. Reg. 43383-43435)

However, the actual fire hazard in these areas may be lower than expected because a high percentage of forest lands in Columbia County are actively managed for timber. Harvested

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areas typically have lower fire risk because they are relatively free of dead and downed material that would contribute to the fuel load. Lands under active management are typically served by a network of roads which provides access to fire fighting resources should a fire start. In addition, forests within Columbia County are relatively free of major insect and disease problems that often plague other forests in Oregon. Finally, typical rainfall amounts for Columbia County are “moderately high” to “high”, averaging 40 to 60 inches per year.

The fire protection service providers in the county identified areas of special concern for wildland/urban interface fires. These areas are identified in the following table.

Areas of Special Concern for Wildland/Urban Interface Fires

Community	Areas of Special Concern
Clatskanie	Conyers Creek drainage area, area NE of Clatskanie and populated areas in the interface adjoining natural cover and wildland fuels.
Mist-Birkenfeld	Fishhawk Lake area and other rural areas in the interface adjoining natural cover and wildland fuels.
Rainier	Populated areas of the interface adjoining natural cover and wildland areas.
Scappoose	Chapman, Alder Creek, JP West, Mt. View, Callahan, Bonneville, and Wilkinson Roads. Dutch Canyon, Pamarama Terrace and Raymond Creek subdivisions. Populated areas of the interface adjoining natural cover and wildland areas.
St. Helens	Gray Cliffs and surrounding greater St. Helens area. Areas involving oak, brush, and grass fuel types. Populated areas of the interface adjoining natural cover and wildland areas.
Vernonia	Populated areas of the interface adjoining natural cover and wildland areas.

Extent

ODF records of historical fires show that minor wildland fires occur regularly in Columbia County. Fire protection services have generally been able to contain these fires before they exceeded 10 acres. Due to successful fire control, the minor wildland fires that have occurred in Columbia County have damaged relatively few residential areas, scattered buildings, and natural resources in the affected forests. However, if a major wildland fire were to occur, it would have the potential to severely impact residential structures, roads, power lines, and other critical infrastructure in all jurisdictions in the county.

Probability of Future Events

In Oregon, wildland fire season normally begins in late June, peaks in August, and ends in October. However, a combination of above normal-temperatures and drought can increase the length of the traditional fire season. Wildland fire hazards throughout the county would be highest during prolonged periods of drought, especially after periods of below normal rainfall, which would result in a combination of high fuel loads and unusually dry conditions.

Due to historical fire patterns, the probability of a minor wildland fire occurring in any of the jurisdictions is very high. Although Columbia County has never experienced the major fires that

have affected other counties in Oregon, there is a possibility that a major wildland or wildland/urban interface fire could occur in Columbia County in the future.

Earthquake

Nature

An earthquake is a sudden motion or trembling of the earth produced by the rupture of rocks due to stresses beyond the rocks' elastic limits. The point inside the Earth where the rupture takes place is termed the hypocenter. The point on the planet's surface directly above the hypocenter is the epicenter. The effects of an earthquake can be felt far beyond the site of its occurrence. Earthquakes usually occur without warning and, after just a few seconds, can cause massive damage and extensive casualties. The most common effect of earthquakes is ground motion, usually felt as shaking and vibrations.

The severity of ground motion generally increases with the amount of energy released and decreases with distance from the fault or epicenter of the earthquake. Ground motion causes waves in the earth's interior, also known as seismic waves, and along the earth's surface, known as surface waves. There are two kinds of seismic waves. P (primary) waves are longitudinal or compression waves similar in character to sound waves, that cause back-and-forth oscillation along the direction of travel (vertical motion). S (secondary) waves, also known as shear waves, are slower than P waves and cause structures to vibrate from side to side (horizontal motion). When P and S waves hit the surface of the Earth, they generate surface waves, which are further categorized into Raleigh waves and Love waves. Slower than seismic waves, and therefore later to hit, surface waves are responsible for most of the damage during an earthquake.

Earthquakes are usually measured in terms of magnitude and intensity. Magnitude is related to the amount of energy released during an event, while intensity refers to the effects on people and structures at a specific place. Small to moderate earthquake magnitude is usually reported according to the standard Richter scale. Larger earthquakes are reported according to the moment-magnitude scale because the standard Richter scale does not adequately represent the energy released by these large events.

Intensity is usually reported using the Modified Mercalli Intensity Scale. This scale has 12 categories ranging from "not felt" to "total destruction." Different values can be recorded at different locations for the same event depending on local circumstances such as distance from the epicenter or building construction practices. Peak ground acceleration (PGA) is also used to measure earthquake intensity. It measures the earthquake's intensity by quantifying how hard the earth shakes in each location. PGA can be measured in g, which is acceleration due to gravity. The following table identifies corresponding intensity and magnitude ratings as well as effects associated with each rating.

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Effects of Intensity and Magnitude Ratings			
Magnitude	MM Intensity	PGA (% g)	Perceived Shaking
0 – 4.3	I	<0.17	Not Felt
	II-III	0.17 – 1.4	Weak
4.3 – 4.8	IV	1.4 – 3.9	Light
	V	3.9 – 9.2	Moderate
4.8 – 6.2	VI	9.2 – 18	Strong
	VII	18 – 34	Very Strong
6.2 – 7.3	VIII	34 – 65	Severe
	IX	65 – 124	Violent
	X	124 +	Extreme

In addition to ground motion, several secondary hazards can occur from earthquakes, such as surface faulting. Surface faulting is the differential movement of two sides of a fault at the earth's surface. Displacement along faults, both in terms of length and width, varies but can be significant (up to 20 feet), as can the length of the surface rupture (up to 200 miles). Surface faulting can cause severe damage to linear structures, such as railways, highways, pipelines, and tunnels.

Earthquake-related ground failure due to liquefaction is another secondary hazard. Liquefaction occurs when seismic waves pass through saturated granular soil, distorting its structure, and causing some of the empty spaces between granules to collapse. Pore-water pressure may also increase sufficiently to cause the soil to briefly become fluid. Liquefaction causes lateral spreads (horizontal movements commonly of 10 to 15 feet, but up to 100 feet), flow failures (massive flows of soil, typically hundreds of feet, but up to 12 miles) and loss of bearing strength (soil deformations causing structures to settle or tip). Liquefaction can cause severe damage to property.

The most common earthquakes that occur in Oregon are crustal, intraplate or great subduction earthquakes. These are described as follows:

Crustal earthquakes - These generally occur along shallow faults near the earth's surface. Crustal earthquakes make up most earthquakes in the Cascadia area (western Washington, Oregon and northwestern California) and are a result of fault movement in the Earth's surface. These shallow earthquakes are usually less than 7.5 magnitude and strong shaking generally lasts 20 to 60 seconds. Aftershocks, as well as tsunamis and landslides, are anticipated after a crustal event.

Intraplate earthquakes - These occur deeper, at 20 to 40 miles beneath the ground surface. These deep earthquakes are usually less than 7.5 magnitude, and damaging events occur every 10 to 30 years in this region. There are few aftershocks, and tsunamis are generally not anticipated, although landslides can trigger localized tsunamis. Due to the deep earth

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movement, an intraplate earthquake is felt over a larger area with less intensity. Damage from this type of event is generally less than with an equally sized crustal earthquake.

Great subduction earthquakes - occur offshore of the Oregon and Washington Coasts along the Cascadia Subduction Zone. This zone is the result of the Juan de Fuca plate being pushed under the North American plate. Earthquakes centered along this zone can be as great as 9.0 magnitude. Geologic evidence demonstrates approximately 500 years between events with the last significant event on January 26, 1700. Aftershocks up to 7.0 magnitude are anticipated to cause additional damage. Liquefaction, tsunamis and landslides are expected as a result of a great subduction earthquake.

History

Approximately 7,000 earthquakes in the Pacific Northwest have been documented over the past 200 years. This documentation has occurred sporadically, with only the most significant events being recorded until recent history. Currently, the University of Washington seismology laboratory records approximately 1,000 earthquakes of magnitude 1.0 or greater annually in Washington and Oregon. While most of these events are barely felt, anywhere from 12 to 24 earthquakes cause enough ground shaking to be recognized as an actual earthquake by area residents. The following table shows significant earthquakes potentially felt in Columbia County since 1949.

Significant Earthquakes, 1949 - 2006		
Date	Magnitude	Location
April 13, 1949	7.1	Olympia, WA
April 18, 1961	4.5	Albany, OR
November 5, 1962	5.5	Vancouver, WA
March 7, 1963	4.6	Salem, OR
March 25, 1993	5.6	Scotts Mills, OR
February 28, 2001	6.8	Anderson Island, WA
June 29, 2002	4.5	Mt. Hood, OR
June 30, 2004	4.4	Lakeview, OR
July 12, 2004	4.9	Newport, OR
July 22, 2004	4.3	Lakeview, OR
August 18, 2004	4.7	Newport, OR
July 14, 2008	4.2	Maupin, OR

Location

Columbia County is located within the geographical area bordering the Cascadia Subduction Zone. This zone is comprised of an 800-mile sloping fault and several smaller offshore faults located west of the Pacific Coast, from British Columbia to the north and Northern California to the south. The fault system separates the Juan de Fuca and North American plates. Inland,

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there are nine faults located within the USGS Quaternary Fault and Fold Database including the Portland Hills Fault, East Bank Fault, and Mount Angel Fault.

Extent

The extent of earthquake effects depends on the nature, magnitude, and location of the quake. An earthquake can range from a tiny tremor affecting only a small, localized area, to a major shake affecting an entire region. For hazard mitigation purposes, it should be considered that the extent of a major event would be greater than countywide.

While Columbia County contains crustal faults which can produce short high intensity earthquakes at a higher frequency than a Cascadia subduction zone earthquake, for planning purposes, the Department of Emergency Management follows the lead of the State of Oregon as identifying the CSZ event as the primary and most severe risk to the people and built environment of the county. A CSZ event, with a predicted magnitude of 9.0 or greater exceeds the MMI scale. Earthquakes with this energy release have occurred in Oregon and happened last in 1700. Columbia County's proximity to the coast means that such an event is anticipated to be the largest and most widespread natural hazard that the county faces.

Probability of Future Events

The evidence for past earthquakes of magnitude 9.0 suggests that they recur on average every 500 years, but the actual intervals between events are far from predictable—such earthquakes have been separated by as many as 1,000 years and as few as 200. The estimates of the sizes of pre-1700 earthquakes demonstrate that 9.0 magnitude earthquakes are possible but not certain. Cascadia has now been building up strain for over 300 years, so the next great earthquake could happen at any time. Reduced to simple odds, the chances that an earthquake as large as magnitude 9.0 will occur along the zone within the next 50 years are about one in ten, odds for an 8.0 or better rise to 4 in ten. (Cascadia Region Earthquake Workshop. 2013)

Volcano

Nature

A volcano is a vent or opening in the earth's crust from which molten lava (magma), pyroclastic materials, and volcanic gases are expelled onto the surface. Volcanoes and other volcanic phenomena can unleash cataclysmic destructive power and can pose serious hazards if they occur in populated and/or cultivated regions. Ashfall and tephra, an eruptive hazard, are of the greatest concern in Columbia County, though lahars (debris flows) can impact shipping in the navigation channel on the Columbia River.

There are four general types of volcanoes found within a short distance of Columbia County:

Lava domes - are domes that are formed when lava erupts and accumulates near the vent.

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Cinder cones - are cone-shaped and formed by accumulation of cinders, ash, and other fragmented materials originating from an eruption.

Shield volcanoes - are broad, gently sloping volcanic cones of flat domical shape, usually several tens or hundreds of square miles in extent, built chiefly of overlapping and interfingering basaltic lava flows.

Composite or stratovolcanoes - are typically steep-sided, symmetrical cones of large dimensions built of alternating layers of lava flows, volcanic ash, cinders, and blocks. Most composite volcanoes have a crater at the summit containing a central vent or clustered group of vents.

Along with the different kinds of volcanoes there are different types of eruptions. The type of eruption is a major determinant of what physical results an event will create, and what hazards it poses. Six main types of volcano hazards exist:

Volcanic gases - are made up of water vapor (steam), carbon dioxide, ammonia, as well as sulfur, chlorine, fluorine, boron, and several other compounds. Wind is the primary source of dispersion for volcanic gases. Life, health, and property can be endangered from volcanic gases within about six miles of a volcano. Acids, ammonia, and other compounds present in volcanic gases can damage eyes and respiratory systems, and heavier-than-air gases, such as carbon dioxide, can accumulate in closed depressions and suffocate humans or animals.

Lahars - are formed when loose masses of unconsolidated, wet debris become mobilized, and are usually created by shield volcanoes and stratovolcanoes. Eruptions may trigger one or more lahar directly by quickly melting snow and ice on a volcano or ejecting water from a crater lake. More often, lahars are formed by intense rainfall during or after an eruption. Rainwater can easily erode loose volcanic rock and soil on hillsides and in river valleys. As a lahar moves farther away from a volcano, it will eventually begin to lose its heavy load of sediment and decrease in size.

Landslides - are common on stratovolcanoes because their massive cones typically rise thousands of feet above the surrounding terrain and are often weakened by the very process that created the mountain – the rise and eruption of molten rock (magma). If the moving rock debris is large enough and contains a large content of water and soil material, the landslide may transform into a lahar and flow more than 50 miles from the volcano.

Lava flows - are streams of molten rock that erupt from a vent and move down slope. Lava flows destroy everything in their path. However, deaths caused directly by lava flows are uncommon because most move slowly and flows usually do not travel far from the source vent. Lava flows can bury homes and agricultural land under hardened rock, obscuring landmarks and property lines.

Pyroclastic flows - are dense mixtures of hot, dry rock fragments and gases that can reach 50 mph. Most pyroclastic flows include a ground flow composed of coarse fragments and an ash

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cloud that can travel by wind. Escape from a pyroclastic flow is unlikely because of the speed at which they move.

Tephra - is a term describing any size of volcanic rock or lava that is expelled from a volcano during an eruption. Large fragments generally fall back close to the erupting vent, while particles of ash can be carried hundreds to thousands of miles away from the source by wind. Ash clouds are common adaptations of tephra.

History

Mount St. Helens has been the most active volcano in the Cascade Range during the past 10,000 years. In Oregon, awareness of the potential for volcanic eruptions was greatly increased by the May 18, 1980 eruption which killed 57 people. The upper portion of the summit collapsed in a massive landslide triggered by volcanic tremors. That portion of the mountain is now a horseshoe-shaped crater partially filled by a lava dome. Early 19th Century settlers in the region witnessed eruptions occurring along the north flank area of the mountain.

As a result of the 1980 eruption and the far-reaching extent of the lateral blast, damage and reconstruction exceeded \$1 billion. The coverage area was 230 square miles and reached 17 miles northwest of the crater. Impacts from pyroclastic flows covered six square miles and reached 5 miles north of the crater, and landslides covered 23 square miles. Lahars affected the North and South Forks of the Toutle River, the Green River, and ultimately the Columbia River as far as 70 miles from the volcano.

Mount St Helens' most recent eruption began in October of 2004, with initial steam and ash eruptions giving away to slow-moving lava flows which ceased in January of 2008. Several other minor eruption periods occurred during the last 500 years with some lava flow near the summit. The eruptions created pyroclastic flows and lahars with little ash fall. The other volcanoes in the Pacific Northwest have undergone similar formation and eruption cycles.

Location

The extensive north-south oriented chain of volcanoes known as the Cascadia volcanic arc, or Cascade Range were formed by the Cascadia subduction zone. As the seafloor plate sinks beneath the North American Plate, it heats up and begins to melt, providing a vast reservoir of the heat and molten rock that create the magma chambers that become volcanoes.

Volcanoes near Columbia County include Mount St. Helens, Mt. Hood, Mt. Rainier, and Mt. Adams. The first three are active, and Mt. Adams is potentially active. Columbia County is approximately 40 miles from Mount St. Helens, and further away from the other volcanoes.

Extent

The volcanoes nearest to Columbia County are far enough away that none of the more devastating near source hazards are likely to be experienced. Heavier tephra particles will generally not reach Columbia County.

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The major hazard for Columbia County is ashfall – either minor ash falls from an eruption of Mount St. Helens or lesser ash falls from more distant volcanoes. Ashfall deposition is controlled by prevailing wind direction, which in the Cascades is predominately from the west. During previous eruptions, ashfall has drifted to the east of the volcanoes. Volcanic eruptions may impact water bodies, such as the Columbia River at Longview and further downstream. River valleys are susceptible to debris flows, landslides, and lahars; rivers may require dredging to maintain channel depths for navigation.

Mount St. Helens, a stratovolcano, in southwestern Washington is believed to be the volcano with the greatest potential to have a near-term impact on the region because of its activity since the cataclysmic event in 1980. A large eruption of Mount St. Helens is expected to eject tephra to altitudes of 12 to 20 miles, with a deposition area of 40,000 square miles or more. Wind direction and velocity, along with the vigor and duration of the eruption, will control the location, size, and shape of the area affected by tephra fall.

Probability of Future Events

By careful analysis of past activity, geologists can make general forecasts of long-term activity associated with individual volcanoes, but these are on the order of trends and likelihood, rather than specific events or timeline. Short-range forecasts are often possible with greater accuracy. Several signs of increasing activity can indicate that an eruption will follow within weeks or months. Magma moving upward into a volcano often causes a significant increase in small, localized earthquakes, and increased emissions of carbon dioxide and compounds of sulfur and chlorine that can be measured. Shifts in magma depth and location can cause changes in ground level elevation that can be detected through ground instrumentation or remote sensing.

The USGS has identified several other potentially active volcanoes in Washington, Oregon, and California. The effects of volcanic activity from these volcanoes could include landslide avalanches, lahars, tephra, lava, and pyroclastic flows or surges. Activity from one of these volcanoes is highly likely to reoccur.

Wind

Nature

Wind is air flow that travels horizontally with respect to the Earth's surface. High winds are defined as those that last longer than one hour at greater than 39 miles per hour (mph) or for any length of time at greater than 57 mph. Wind speeds vary with individual storms.

In general, the damaging effects of windstorms may extend for distances of 100 to 300 miles from the center of storm activity. Many buildings, utility and transportation systems in open areas, natural grasslands, agricultural, or timberlands are especially vulnerable to wind damage.

Columbia County's most devastating windstorms typically occur from the south.

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History

Columbia County has a two-year recurrence interval of sustained winds speed that ranges from 37 to 43 mph. Winds of this velocity may cause significant damage at sites where local wind speeds are higher than this average. Damage is more prevalent in clear-cut areas. The 50-year recurrence interval winds speed range from 56 to 62 mph, which can cause widespread wind damage.

Numerous damaging windstorms have occurred within Columbia County. The following table includes some of the most noteworthy windstorms that brought extensive damage to the region.

Windstorm Events, 1950 – 2008		
Date	Sustained Wind Speeds	Details
November 10–11, 1951	40 mph	Extensive timber, building, and utility losses and disruption. Damage experienced statewide. Statewide winds 40-80 mph
December 1951	42 mph	Serious damage to buildings and utility system disruption. Statewide winds 40-100 mph
December 21, 1955	60 mph	Extensive damage to buildings, power and telephone lines throughout the state. Statewide winds 55-70 mph
November 1958	51 mph	Extensive timber, building, and utility losses and disruption. At one point, all highways closed at one or more points from fallen trees. Statewide winds 50-75 mph
October 1962	62 mph (90 mph wind gusts)	Downed trees and power lines, utility disruption. The Columbus Day storm was the equivalent of a Category IV hurricane in terms of central pressures and wind speeds. The storm, which started east of the Philippines as Typhoon Freda, measured 1,000 miles long as it hit the West Coast. 38 fatalities, \$200M damages statewide. Statewide winds 29-138 mph. Portland wind-116 mph
March 1963	39-68 mph	Widespread destruction. Statewide wind 39-100 mph
October 1967	70 mph	Extensive agricultural, timber, power and telephone utilities, and home losses Statewide 70 - 115 mph, one fatality and 15 injuries
March 1971	58 mph	Extensive roof damage, trees toppled, power line breakage, extensive utility disruption. Statewide wind 40-71 mph
November 1981	57 mph	Strongest windstorm since the 1962 Columbus Day storm. 57 mph winds. 75-92 mph wind along coast, gusts, 11 fatalities, \$50M damages statewide
November 1997	52 mph	Trees uprooted

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Windstorm Events, 1950 – 2008		
Date	Sustained Wind Speeds	Details
December 2007	52 mph	Heavy snowfall, rains, rapid temperature warming created widespread flooding, tree blockages, landslides, transportation and utility disruptions, and 5 deaths in Oregon. Statewide wind 50-100 mph \$180M damages
November 2009	58 mph	Strong winds were estimated based reports of power outages in communities along the Columbia River in northwest Oregon
November 2011	81 mph	A strong Pacific cold front brought strong southerly winds to the north and central Oregon Coastal range. Strong winds were reported with a gust to 81 mph, and then the sensor stopped reporting.
November 2014	37-42 mph	Strong winds affected the River margin of Columbia County producing power outages and debris blocked roads.

Location

Several Pacific low-pressure centers make landfall on the Northwest each winter. Winds blowing along a north to south axis (parallel to the major mountain ranges) can prove extremely destructive. The windstorm pattern in this area is typically southwesterly, flowing directly into the Pacific Northwest. Severe windstorms have historically impacted all jurisdictions in Columbia County.

The National Weather Service’s extensive ENSO website delineates information explaining these weather patterns as they affect various US locations. They describe the Pacific Northwest’s late fall and early winter El Niño effects as warmer than normal temperatures with decreased precipitation, while La Niña patterns exhibit increased storminess, precipitation, and cold. These patterns and trends appear in Oregon’s historical weather events listing.

Extent

The low-pressure centers bring sustained winds (40-60 mph) strong enough to topple power lines and trees. These prolonged windstorms are likely to last an average of three to six hours before moving on. All areas of Columbia County are subject to strong and damaging wind events.

Probability of Future Events

Windstorms producing winds gusting up to 70 mph or greater occur 1- 2 times every 10 years, with high winds events being relatively common and usually occur during October through April. Destructive windstorms are less frequent. Tornadoes have been documented in Columbia County and nearby counties; two tornadoes have been documented in Columbia County (NOAA 2019); one in August of 1978 near Scappoose, and the other in November of

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1965 at Rainier. The nearby counties of Clatsop, Cowlitz, and Multnomah have experienced several tornado events. (Columbia County Department of Emergency Management, 2014). Despite these examples, climate and weather conditions in Columbia County make the occurrence of major tornadoes unlikely.

Erosion

Nature

Erosion is a process that involves the gradual wearing away, transport, and movement of land. However, not all erosion is gradual. It can occur quite quickly as the result of a flash flood, coastal storm, or other event. Most of the geomorphic change that occurs in a river system is in response to a peak flow event. It is a natural process, but its effects can be exacerbated by human activity.

Erosion is a problem in developed areas where the disappearing land threatens development and infrastructure. There are three main types of erosion that affect human activity in Oregon.

Coastal erosion is the wearing of land and loss of beach, shoreline, or dune material because of natural activity or man-made influences. It can occur gradually or suddenly. Usually erosion is a long-term process, but it can also happen quickly during storm events.

Wind erosion occurs when wind removes, moves, and redeposits soil. It can cause a loss of topsoil, hindering agricultural production. Blowing dust can also reduce visibility and have a negative effect on air quality.

Riverine erosion results from the force of flowing water in, and adjacent to, river, creek, and tributary channels. This erosion affects the bed and banks of the channel and can alter or preclude any channel navigation or embankment development. In less stable braided channel reaches, erosion and material deposition are a constant issue. In more stable meandering channels, episodes of erosion may only occur occasionally.

Riverine and wind erosion threaten various communities along the rivers, creeks, and tributaries in Columbia County. Erosion of any type rarely causes death or injury. However, erosion can cause significant destruction to property and infrastructure. The Columbia River is subject to tidal influences along the length of the county's coastline. Additionally, a major river reclamation project has taken away part of the natural floodplain north of Clatskanie. This combination of a high tide and reduced floodplain exacerbates flooding damages as these two conditions limit where excess Clatskanie River water can flow during a high-flow flood event. Flooding and erosion scour result from these two conditions.

Generally, erosion within the Columbia River occurs when the flow of the river changes and is directed towards the banks or mid-Channel Islands. These changes can be caused by surface wind stress and gravity waves during storm events (primarily severe winter storms),

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transporting sediment by bottom currents. The reduction in peak river-flows due to the construction of dams and reservoirs have reduced the amount of sand reaching the lower river as well as reducing nearshore sediment movement in many areas of the Columbia River.

Rivers constantly alter their courses, changing shape and depth, trying to find a balance between the sediment transport capacity of the water and the sediment supply. This process is usually seen as the wearing away of the water course's banks and beds over a long time period.

Riverine erosion is often initiated by failure of an embankment causing high sediment loads, or by heavy rainfall. This generates high volume and velocity run-off, which will concentrate in the lower drainages within a river's catchment area. When the stress applied by these flows exceeds the resistance of the embankment material, erosion will occur. As the sediment load increases, fast-flowing waters will erode their banks downstream. Eventually, the river, creek, or tributary becomes overloaded or velocity is reduced, leading to the deposition of sediment further downstream or in dams and reservoirs. The deposition may eventually lead to the watercourse developing a new channel.

While all rivers change in the long-term, short-term rates of change vary significantly. All rivers can be categorized based on their ability to adjust their shape and gradient as either bedrock or alluvial channels. Within Columbia County, the Columbia River is an alluvial channel. (Tetra Tech 1992)

History

Erosion loss has historically occurred in Columbia County from landslides, stream bank failures, and agricultural activities. All rivers and creeks are subject to erosion. Columbia County has over 200 rivers and creeks.

A series of dams were constructed along the Columbia River and its major tributaries from 1912 through the 1970s; the US Army Corps of Engineers dredged the Clatskanie River to accommodate navigational concerns in 1924 and lowered the channel depth to -7.5 feet. Periodic dredging occurred until 1968 to maintain the channel depth, and again in 1998 by the City of Clatskanie. The combination of dam construction, dredging, flow training device construction, and bank stabilization projects has affected river velocities and sediment transport. Only limited major alterations have occurred since 1970 to the lower river system.

The following descriptions provide a brief overview of historic erosion events in Columbia County.

- Sand Island, located east of the City of St. Helens in the Columbia River, has experienced annual erosion loss.
- The shoreline at the Nehalem Street Bridge on the Clatskanie River lost 1.25 feet of depth between 1981 and 1996.
- A small side drainage coming into Conyer's Creek from the west caused road culvert damage.

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- In 2019 a strong winter rain event created high flow conditions on Fox creek in Rainier. This produced the undercutting of a parking lot near the confluence of the creek and the Columbia River.

Location

Columbia County has experienced erosion loss in several localized areas. Rivers, creeks, and tributaries within the county are subject to the effects of erosion include the Columbia, Clatskanie, and Nehalem Rivers, Beaver Creek, Conyer's Creek, Fox Creek, Nice Creek, Owl Creek, Rock Creek, and Bear Creek and several unidentified tributaries. The County experiences annual rain and wind events which assail river shorelines combined with landslides and debris flows within the watersheds, loss of plant cover in riparian areas, and river traffic induced erosion, particularly during severe storm events.

Historic Erosion Hazard Areas within Columbia County	
Community	Description of Location
City of Clatskanie	A number of locations within the Clatskanie River Basin (City of Clatskanie and upstream) occur where portions of the stream bank are unstable <ul style="list-style-type: none">• Nehalem Street Bridge• Dirt road along Conyer's Creek• 25-75% of the Beaver Creek shoreline, which enters northeast of the City is subject to stream bank erosion.
Columbia City	North of Columbia City at McBride Creek and Columbia River.
City of Rainier	Nice Creek and Fox Creek as well as 25-75% of the Beaver Creek shoreline.
City of St. Helens	Sand Island and Columbia River shoreline along city boundary
City of Scappoose	Scappoose Creek (main and North and South areas as well as forks of Alder Creek and Coal Creek)
City of Vernonia	Nehalem River, Rock Creek, Knickerson Creek, Sheely Creek, and Bear Creek

Extent

A variety of natural and human-induced factors influence the erosion process. For example, embankment orientation and exposure to prevailing winds (which can be altered by human development) all influence erosion rates. Other factors that may influence riverine erosion include:

- Geomorphology (composition)
- Structure types along the river embankments

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- Development density
- Amount of encroachment in the high hazard zone
- Proximity of erosion-inducing structures
- Nature of the shoreline topography
- Embankment elevation
- Embankment wind exposure

The erosion rate depends on the sediment supply and amount of run-off reaching the watercourse. These variables are affected by many factors including earthquakes, floods, climatic changes, loss of bank vegetation, urbanization, and the construction of civil works in the waterway.

Erosion along the banks of the rivers and streams in Columbia County is generally caused by a combination of factors:

- The natural process of a watercourse to find the path of least resistance.
- Debris flows within the watershed.
- Loss of plant cover in of riparian areas.
- Logging.
- Increased boat traffic close to river embankments.
- Runoff from rainfall.

While erosion has been identified as occurring within the county, only one event was reported to result in damage (City of Clatskanie culvert at Conyer's Creek). Additionally, the Clatskanie River is reported to have lost 1.25 feet of depth over a 15-year period. Based on past events and the lack of development in proximity to erosion hazard areas, the magnitude and severity of erosion impacts in Columbia County are considered minor, though isolated areas are subject to higher risk.

Probability of Future Events

Based on historic events it is possible that structures located near the shoreline of the Columbia, Clatskanie, and Nehalem Rivers, and numerous creeks and tributaries are vulnerable to erosion. Erosion data is limited to localized geographic areas within the County.

El Niño/Southern Oscillation

ENSO comprise two weather phenomena known as El Niño and La Niña. While ENSO activities are not a hazard itself, it can lead to severe weather events and large-scale damage throughout the jurisdictions in Columbia County. Direct correlations have been found linking ENSO events to severe weather across the Pacific Northwest, particularly drought, flooding, and severe winter storms. (State of Oregon 2015) Therefore, increased awareness and understanding of the impacts of ENSO events on regional weather are important.

For more detailed discussions on drought, flood, and winter storms, please refer to their respective sections in this chapter.

Nature

ENSO weather patterns portray periodic warming and cooling of the central Pacific Ocean. This warming and cooling cycle has global implications as normal weather patterns are altered over vast areas of the world, causing changes in temperature and precipitation from Chile to Indonesia to the Pacific Northwest.

During El Niño periods, alterations in atmospheric pressure in equatorial regions yield an increase in the surface temperature off the west coast of South America. This gradual warming sets off a chain reaction affecting major air and water currents throughout the Pacific Ocean. In the North Pacific, the Jet Stream is pushed north, carrying moisture laden air up and away from its normal landfall along the Pacific Northwest coast. In Oregon, this shift results in reduced precipitation and warmer temperatures, normally experienced several months after the initial onset of the El Niño. These periods tend to last nine to twelve months, after which surface temperatures begin to trend back towards the long-term average.

La Niña periods ensue when surface temperatures increase past the long-term average. Typical weather patterns throughout the Pacific Ocean are strengthened, yielding stormier than normal weather throughout the Pacific Northwest. Above average precipitation and colder temperatures are experienced across Oregon during these periods, with the potential for severe snow storms increasing. These periods generally last longer than El Niño events, taking anywhere from one to three years to dissipate.

Both El Niño and La Niña periods tend to develop between March and June, and peak from December to April.

History

An examination of past ENSO patterns show El Niño and La Niña events are regularly observed in Oregon. Direct correlations have been found linking precipitation, temperature, and snowfall with ENSO across Oregon, including Columbia County (Taylor 2008). In general, El Niño periods result in warmer temperatures and lower precipitation, while La Niña periods are colder and wetter.

Strong El Niños of 1982 and 1997 were observed throughout the state, and the El Niño in 1994 resulted in widespread drought conditions. Alternatively, severe flooding caused by the heavy snow and intense rain in the winters of 1995-1996 and 1998-1999 were due to La Niñas.

Location

ENSO weather pattern effects are experienced on a global scale. Any local climate changes experienced in Columbia County will be reflective of a much broader trend impacting the entire Pacific Northwest. Hazards resulting from one of these periods will most likely be spread across large regions of the state, with adjoining counties experiencing similar conditions.

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Extent

Columbia County has a climate generally consisting of wet winters and dry summers. During El Niño years, decreased precipitation and increased temperatures throughout the winter can lead to drought. Alternatively, increased precipitation and decreased temperatures associated with La Niña periods can result in widespread flooding and severe winter storms.

Probability of Future Events

As climate scientists continue to unravel the oceanic and atmospheric relationships governing ENSO, predictive powers are growing. 1997 marked the first time an El Niño was accurately forecasted, and as more studies detail how ENSO impacts the Pacific Northwest, and Oregon in particular, hazard mitigation agencies will benefit from increased warning time. ENSO generally follows a two to seven-year cycle, with El Niño or La Niña periods occurring every three to five years. However, the cycle is highly irregular, and no set pattern exists. Furthermore, variations are likely to continue, and not all droughts and floods are related to El Niño or La Niña events.

Expansive Soils

Nature

The addition of moisture to any soil will cause a change in volume, which is referred to as a shrink-swell characteristic. Expansive soils are typically comprised of clay minerals that, under some conditions, can increase in volume when moisture is added. Clay soils consist of mineral particles that are less than 0.002 millimeters in diameter.

Linear extensibility is used to determine the shrink-swell potential of soils. Linear extensibility refers to the change in soil volume as the moisture content is decreased from a moist to a dry state. The amount and type of clay minerals in the soil influence volume change. The volume change is described as a percentage value change for the soil being tested. A low shrink-swell potential is considered less than a 3% change in soil volume; whereas a high shrink-swell potential is greater than 6% change in soil volume:

Expansive Soil Criteria Based on Shrink-Swell Potential	
Shrink-Swell Potential	Linear Extensibility (%)
Low	< 3
Moderate	3 - 6
High	6 - 9
Very High	> 9

Source: NRCS National Cooperative Soil Survey

Soil expansion may be caused by changes in soil moisture, variations in thickness and composition of the expansive foundation soil, non-uniform structural loads, and the geometry

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of the structure. Potential sources of moisture changes are variation in precipitation, poor gutter or water drainage, vegetation changes over time (such as root growth of nearby trees), and plumbing leaks. By affecting the relative moisture of soils underlying foundations, uneven movement such as localized heave can occur, causing shifting and non-uniform foundation movements, thus impacting the structures above.

However, many sources of soil moisture change can be avoided, minimized, or mitigated through planning and structure maintenance. Some signs of possible soil expansion include separation of joints and trim; cracks in walls, floors, or concrete; and bowed or non-vertical walls. Some possible mitigation measures are maintaining separation between structures and runoff, using compact fill to shed water, not absorb it, and planting trees a distance equal to their mature height away from buildings to reduce root interference.

Several different types of soil expansion related to structures and infrastructure exist, which can include but are not limited to:

- Doming heave - upward, long-term, dome-shaped foundation movement that develops over many years,
- Cyclic heave - shrink and swell associated with seasonal or water leak events,
- Edge heave - damaging edge or dish-shaped heaving, and
- Lateral movement – lateral thrust of expansive soils.

History

In 1982, expansive soils were documented as the costliest natural hazard in the US, causing more damage than all other natural hazards combined, including earthquakes, floods, tornadoes and hurricanes. Annual losses nationwide have been estimated between \$2 billion and \$9 billion. While expansive soils occur in Columbia County, there have been no historic damages reported.

Location

In Columbia County, approximately 18,925 acres contain soils with “moderate” to “high” rated shrink-swell potential, concentrated mainly in the northern portion of the county and along the Columbia River.

Potential damages to structures from expansive soils in Columbia County include cracks in grade beams, walls, and drilled shafts; distortion and cracking of pavements and on-grade floor slabs; failure of steel or concrete blocks supporting grade beams; jammed or misaligned doors and windows; and buckling of basement and retaining walls due to lateral forces. Extensive damage can potentially result in the condemnation of structures.

Extent

The geographic extent of expansive soil events is directly dependent on the extent of clay-based expansive soil types and the size and type of moisture event that triggers the soil

expansion. Another dependent factor for the extent is the amount and type of infrastructure that exists at the expansive soil location and near proximity, as well as the percentage volume change of the swelling or shrinking soil. The extent of expansive soil effects could be very local and limited to a single structure (i.e. resulting from a plumbing leak), or more landscape in nature due to a large area of soil moisture change (i.e. resulting from a large flood or storm event).

Probability of Future Events

Expansive soil events are difficult to predict because the location and time when water is available to the soil could happen at various periods in the life of a structure. Most soil expansion and associated structural damage has been shown to occur within five to eight years following construction. However, the effects of heave may also not be observed for many years until some change occurs in the foundation conditions to disrupt the moisture regime. The probability of damages increases for structures on expansive soils if the climate, effects of construction, and effects of occupancy promote moisture changes in the soil.

Drought

Nature

Drought is variously defined as a period of abnormally dry weather creating hydrologic imbalance, shortage of precipitation adversely affecting crops, or a period of below-average water in streams and lakes, reservoirs, aquifers, and soils. There is no universal measure of precipitation or dryness that signifies drought. Historically, droughts have been unpredictable and unavoidable events. Climate fluctuations occur everywhere, and periods of low precipitation are a normal, recurrent feature of climate.

Drought is commonly referenced in terms of its effects on agriculture, with crop damage or failure used to measure its effects. Other direct environmental effects of drought include livestock death or decreased production, wildland fire, impaired productivity of forest land, damage to fish habitat, loss of wetlands, and air quality effects. Indirect effects to society are measured by the economic and physical hardships brought on by drought and by the increased stress on residents of a drought-stricken area. The economic impact of drought is estimated between \$6 and \$8 billion annually in the United States. These costs primarily affect agricultural, forestry, fisheries, recreation and tourism, transportation and energy sectors. Drought is also associated with insect infestation, disease, and wind erosion.

Drought is usually thought of as a meteorological phenomenon, resulting from abnormally low precipitation. It can also be an institutional phenomenon, resulting from poor management of water supply and reserves – an imbalance in supply and demand – and is often due to a combination of these factors. Understanding drought as a recurring climate cycle is a first step toward creating management practices that effectively mitigate its effects.

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Drought is difficult to measure, due to its diverse geographical and temporal nature, and its operation on many scales. Despite that difficulty, various indices for measuring and characterizing drought can be useful. The Palmer Drought Indices and the Standardized Precipitation Index are most commonly used. Palmer's indices describe water balance—looking at water supply (precipitation), demand (transpiration), and loss (runoff)—on three scales; weekly during growing season, long-term cumulative measured by month, and another long-term scale that considers hydrological factors such as reservoir and groundwater levels. These are the Crop Moisture Index, the Palmer Drought Severity Index, and the Palmer Hydrological Drought Index, respectively. The Standardized Precipitation Index considers precipitation alone, comparing the probability of a region's receiving a given amount of precipitation (based on historical levels) in a given time period with precipitation recorded. (NOAA 2015)

There are four types of drought: meteorological, agricultural, hydrological and socioeconomic. Meteorological drought is based on the degree of dryness. Agricultural drought focuses the amount of soil moisture versus the needs of the crops. Hydrological drought is associated with shortfalls of surface and subsurface water supply. Socioeconomic drought refers to physical water shortages and its human effect and occurs when the need for water exceeds the supply resulting in a shortfall.

History

Drought occurs in all parts of Oregon and has had profound effects in the past on the state's economy, particularly the agricultural and hydro-power sectors. Environmental consequences have included insect infestations in forests, insufficient stream flows to support endangered fish species, and increased susceptibility to fire.

The following past drought events were recorded for Columbia County:

- 1928-1941 – Statewide prolonged drought caused major agricultural problems
- 1976-1981 – Stream flows were low for western Oregon; 1976 and 1977 were the driest years of the century.
- 1985- 1994 – Ten consecutive years of drought cause problems statewide; fires were common, and insects attacked trees; a drought emergency was declared in 1992.
- 1999 – Drought reduced spring and summer agriculture yields and delayed planting of winter wheat.
- 2000-2001 – Severe drought conditions; October 2000 to February 2001 was the second driest period of record in Washington and Oregon.
- 2005 – February 2005 was the driest since 1977.
- 2015-2016 a severe and widespread drought affected all of Oregon with 1005 of the state experiencing D2 severe drought or higher.

Location

Droughts occur in every climate zone and can vary from region to region. Drought occurs in all parts of Oregon, and has had profound effects on the state's economy, particularly the

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agricultural and hydro-power sectors. All jurisdictions in Columbia County are susceptible to drought.

Extent

Drought is often associated with El Niño events affecting the polar and subtropical jet streams. The polar jet stream dips southward causing the northwest to be drier than average. The severity of drought depends on the degree of moisture deficiency, duration, and size of the affected area. The agricultural sector is usually the first to feel the impacts of drought because of its dependence on soil moisture. Those reliant on surface and groundwater sources are usually the last to feel the effects of drought.

Probability of Future Events

As part of a statewide HMP process, county emergency management program managers conducted risk analyses to determine probability of, and vulnerability to, severe drought occurrence in each county. Oregon’s Partnership for Disaster Resilience assesses Columbia County as having an “average risk” for drought; a future drought affecting the planning area is likely.

Drought appears to be a cyclic part of the climate of Oregon, occurring in both summer and winter, with an average recurrence interval between 8 and 12 years. Short-term, seasonal events are more frequent, while the less frequent, long-term events have ranged from 3 to 12 years in length.

Estimating drought probability and frequency is difficult but understanding cyclic climate variations and other variables that contribute to weather behavior is advancing. Understanding ENSO weather systems are helping scientists to better predict weather changes in the Pacific Northwest.

Participating Jurisdictions

This is a multi-jurisdiction Hazard Mitigation Plan. In this update to the county plan all the incorporated cities participated. In addition, for the first time, several districts participated in the planning process, contributing their own annexes to the plan. The list below includes each of the jurisdictions that contributed annexes to this plan:

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Columbia County

Cities

City of St. Helens

City of Scappoose

City of Columbia City

City of Clatskanie

City of Rainier

City of Vernonia

City of Prescott

Districts

Mist-Birkenfeld Rural Fire Protection District

Greater St. Helens Aquatic District

Scappoose Drainage Improvement District

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City of Rainier
Hazard Mitigation Plan
Annex

2019 Update
Columbia County
Multi-Jurisdiction Hazard Mitigation Plan

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Introduction

This Annex contains specific City of Rainier information to support the Columbia County 2019 Multi-Jurisdictional Hazard Mitigation Plan. This section further supports the County’s planning process by summarizing the review and incorporation of existing plans, studies, and reports used to develop this MHMP. This annex is an addition to Columbia County’s Hazard Mitigation Plan and shares attributes of that plan.

Planning Process and Capability Assessment

The following section includes a detailed capability assessment that describes the resources available to support this plan. The goal of this assessment is not to identify all capabilities the organization may have, but only those that are currently used or could be used to support mitigation efforts. Capabilities are arranged in tables by type and fall under the explicit authority of the jurisdiction/district.

DMA 2000 Requirements: Planning Process	
Planning Requirements	
§201.6(b)	An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:
§201.6(b)(1)	(1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
§201.6(b)(2)	(2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and
§201.6(b)(3)	(3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.
§201.6(c)(1)	[The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.
§201.6(c)(4)(i)	[The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.
§201.6(c)(4)(iii)	[The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.
Planning Elements	
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? 44 CFR 201.6(c)(1)	

A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? 44 CFR 201.6(b)(2)

A3. Does the Plan document how the public was involved in the planning process during the drafting stage? 44 CFR 201.6(b)(1) and 201.6(c)(1)

A4. Does the Plan document the review and incorporation of existing plans, studies, reports, and technical information? 44 CFR 201.6(b)(3)

A5. Is there discussion on how the communities will continue public participation in the plan maintenance process? 44 CFR 201.6(c)(4)(iii)

A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? 44 CFR 201.6(c)(4)(i)

Steering Committee Participants

City of Rainier is dedicated to mitigating potential natural hazards to its population and infrastructure. To fulfill that goal, a Hazard Mitigation Plan Development Steering Committee was seated; dedicated to identifying hazard threats and developing actions to mitigate damage and life losses from those threats.

Table 1 records the Steering Committee's participant list.

Table 1. City of Rainier Steering Committee	
Name	Agency/Department/Affiliation
Greg Griffith	Police Chief
Sue Lawrence	Public Works Director
Shaun Brown	Columbia County Emergency Management

Public Participation

As defined by FEMA, Whole Community Planning is; a means by which residents, emergency management practitioners, organizational and community leaders, and government officials can collectively understand and assess the needs of their respective communities and determine the best ways to organize and strengthen their assets, capacities, and interests. By doing so, a more effective path to societal security and resilience is built.

This Hazard Mitigation Plan was conducted with opportunities for the public to participate to try and meet the goals of whole community planning. Table 2 highlights these efforts.

Table 2. Public Involvement Mechanisms	
Date	Description
2014	
7/19/2014	Columbia Emergency Preparedness Association EXPO – Large emergency management event covering all topics (preparedness, fire, law, mitigation, response).
11/11/2014	HSEMC – Columbia County’s Homeland Security and Emergency Management Commission is recognized by the Board of County Commissioners as the cornerstones of a whole community approach to emergency management planning. All jurisdictions are members of the commission. Semi Annual NHMP meeting, plan review was conducted.
2015	
5/12/2015	HSEMC – Columbia County’s Homeland Security and Emergency Management Commission is recognized by the Board of County Commissioners as the cornerstones of a whole community approach to emergency management planning. All jurisdictions are members of the commission. Semi Annual NHMP meeting, plan review was conducted.
11/10/2015	HSEMC – Columbia County’s Homeland Security and Emergency Management Commission is recognized by the Board of County Commissioners as the cornerstones of a whole community approach to emergency management planning. All jurisdictions are members of the commission. Semi Annual NHMP meeting, plan review was conducted.
2016	
4/2/2016	KOHI Radio Preparedness Talk – Radio talk show for Columbia County, topics “specifically included preparing for the next flood event”.
5/10/2016	HSEMC – Columbia County’s Homeland Security and Emergency Management Commission is recognized by the Board of County Commissioners as the cornerstones of a whole community approach to emergency management planning. All jurisdictions are members of the commission. Semi Annual NHMP meeting, plan review was conducted.
6/4/2016	Ford Family Foundation Preparedness Fair - County wide event to promote preparedness and mitigation in cooperation with the Ford Family Foundation. All cities participated.
7/23/2016	Columbia Emergency Preparedness Association EXPO – Large emergency management event covering all topics (preparedness, fire, law, mitigation, response).
9/22/2016	Columbia County Soil and Water Conservation District – Event hosted by SWCD on preparedness and flood mitigation efforts.
11/15/2016	HSEMC – Columbia County’s Homeland Security and Emergency Management Commission is recognized by the Board of County Commissioners as the cornerstones of a whole community approach to emergency management planning. All jurisdictions are members of the commission. Semi Annual NHMP meeting, plan review was conducted.
2017	
5/9/2017	HSEMC – Columbia County’s Homeland Security and Emergency Management Commission is recognized by the Board of County Commissioners as the cornerstones of a whole community approach to emergency management

Table 2. Public Involvement Mechanisms	
Date	Description
	planning. All jurisdictions are members of the commission. Semi Annual NHMP meeting, plan review was conducted.
11/14/2017	HSEMC – Columbia County’s Homeland Security and Emergency Management Commission is recognized by the Board of County Commissioners as the cornerstones of a whole community approach to emergency management planning. All jurisdictions are members of the commission. Semi Annual NHMP meeting, plan review was conducted.
11/29/2017	Unprepared showing – St. Helens - presentation of OPB documentary regarding CSZ earthquake and tsunami.
2018	
1/19/2018	Preparedness to Vets Group – Presentation to Veterans regarding personal preparedness and flood mitigation.
5/8/2018	HSEMC – Columbia County’s Homeland Security and Emergency Management Commission is recognized by the Board of County Commissioners as the cornerstones of a whole community approach to emergency management planning. All jurisdictions are members of the commission. Semi Annual NHMP meeting, plan review was conducted and plans for plan update discussed.
11/13/2018	HSEMC – Columbia County’s Homeland Security and Emergency Management Commission is recognized by the Board of County Commissioners as the cornerstones of a whole community approach to emergency management planning. All jurisdictions are members of the commission. Semi Annual County-wide Hazard Mitigation meeting. Work Session on Hazard Mitigation Plan update conducted.
11/27/2018	Pints and Preparedness – various topics including Hazard mitigation, and individual preparedness.
2019	
1/22/2019	Pints and Preparedness – various topics including Hazard mitigation, and individual preparedness.
3/26/2019	Pints and Preparedness – various topics including Hazard mitigation, and individual preparedness.
5/7/2019	HSEMC – Columbia County’s Homeland Security and Emergency Management Commission is recognized by the Board of County Commissioners as the cornerstones of a whole community approach to emergency management planning. All jurisdictions are members of the commission. Semi Annual County-wide Hazard Mitigation meeting. Work Session on Hazard Mitigation Plan update conducted.
4/23/2019	Pints and Preparedness – various topics including Hazard mitigation, and individual preparedness.
9/7/2019	Preparedness for Scouts – Presentation on preparedness for all hazards.

Capability Assessment

Table 3, 4, and 5 contain the City of Rainier resources used to support planning activities, including the reports and studies reviewed as part of the update process.

Table 3. City of Rainier Legal and Regulatory Resources Available for Hazard Mitigation		
Regulatory Tool	Name	Effect on Hazard Mitigation
Plans	Comprehensive Plan	Guides the City's governance and development process
	Transportation System Plan	Analyzes the City's Transportation Systems and delineates problems and future initiatives
	Water Quality Report, 2018	This report details where our water comes from, what it contains, and the risks our water testing and treatment are designed to prevent.
	Water System Master Plan	Provides overall guidance for the community's water use and future development requirements. 20-year planning horizon.
	Rainier Emergency Operations Plan	Provides overall guidance for emergency management responsibilities and authority.
Programs	National Flood Insurance Program (NFIP)	Makes affordable flood insurance available to homeowners, business owners, and renters in participating communities. In exchange, those communities must adopt and enforce minimum floodplain management regulations to reduce the risk of damage from future floods.
Policies	Municipal Code	Delineates responsibilities and authorities supporting the Comprehensive Plan and guides development, building, permitting, and siting locations.
	Zoning Ordinance, Title 18	Delineates responsibilities and authorities supporting the Comprehensive Plan
	Building and Construction Ordinance, Title 15	Defines that "building and related activities shall comply with the State Building Code standards, adopted by the Director of the Oregon Department of Commerce, and the Fire and Life Safety Code standards, adopted by the State Fire Marshal, as these codes apply at the time of the building or related activity."

Table 4. City of Rainier Administrative and Technical Resources for Hazard Mitigation	
Staff/Personnel Resources	Department/Division Position
Planner(s) or engineer(s) with knowledge of land development and land management practices	Contract Planner Contract Engineer
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	Public Works Contract Engineer

Table 4. City of Rainier Administrative and Technical Resources for Hazard Mitigation

Staff/Personnel Resources	Department/Division Position
	Contract Building Official
Planner(s) or engineer(s) with an understanding of manmade or natural hazards	Contract Planner Contract Engineer Contract Building Official
Floodplain manager	City Administrator, Building Secretary, Contract Planner and Contract Building Official
Personnel skilled in GIS and/or HAZUS-MH	no
Director of Emergency Services	City Administrator (will defer to Columbia County in the event of major disaster)
Finance (grant writers, purchasing)	City Administrator
Public Information Officers	City Administrator or Mayor

Table 5. City of Rainier Financial Resources for Hazard Mitigation

Financial Resources	Effect on Hazard Mitigation
General funds	yes
Authority to levy taxes for specific purposes	yes, with voter approval
Incur debt through general obligation bonds	yes, with voter approval
Incur debt through special tax and revenue bonds	yes, with voter approval
Incur debt through private activity bonds	no
Hazard Mitigation Grant Program (HMGP)	FEMA funding which is available to local communities after a Presidentially-declared disaster. It can be used to fund both pre- and post-disaster mitigation plans and projects.
Pre-Disaster Mitigation (PDM) grant program	FEMA funding which is available on an annual basis. This grant can only be used to fund pre-disaster mitigation plans and projects only.
Flood Mitigation Assistance (FMA) grant program	FEMA funding which is available on an annual basis. This grant can be used to mitigate repetitively flooded structures and infrastructure to protect repetitive flood structures.
United States Fire Administration (USFA) Grants	The purpose of these grants is to assist state, regional, national or local organizations to address fire prevention and safety. The primary goal is to reach

Table 5. City of Rainier Financial Resources for Hazard Mitigation	
Financial Resources	Effect on Hazard Mitigation
	high-risk target groups including children, seniors and firefighters.
Fire Mitigation Fees	Used to finance future fire protection facilities' construction and other fire capital expenditures to protect new development. The City Council or Fire District may charge fire mitigation fees to ensure new development pays their fair share of constructing these improvements.

Hazard Identification and Vulnerability Assessment

DMA 2000 Requirements: Hazard Identification and Risk Assessment	
Planning Requirements	
§201.6(c)(2)(i)	The risk assessment shall include a] description of the type, location and extent of all-natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.
§201.6(c)(2)(ii)	The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community. All plans approved after October 1, 2008 must also address NFIP insured structures that have been repetitively damaged by floods. The plan should describe vulnerability in terms of:
§201.6(c)(2)(ii)(A)	(A) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas;
§201.6(c)(2)(ii)(B)	(B) An estimate of the potential dollar losses to vulnerable structures identified in ... this section and a description of the methodology used to prepare the estimate.
§201.6(c)(2)(ii)(C)	(C) Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.
§201.6(c)(2)(iii)	For multi-jurisdictional plans, the risk assessment section must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.
Planning Elements	
B1. Does the Plan include a description of the type, location, and extent of all-natural hazards that can affect each jurisdiction? 44 CFR 201.6(c)(2)(i) and 44 CFR 201.6(c)(2)(iii)	
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? 44 CFR 201.6(c)(2)(i)	
B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? 44 CFR 201.6(c)(2)(ii)	
B4. Does the Plan address NFIP insured structures within each jurisdiction that have been repetitively damaged by floods? 44 CFR 201.6(c)(2)(ii)	

Hazard Identification

The Steering Committee determined that the following hazards could potentially threaten the community. Table 6 establishes the hazard profile against which this plan is designed.

Table 6. Hazard Profile	
Natural Hazards	
Flood	X
Winter Storm	X
Landslide	X
Fire (Wildland/Urban)	X
Earthquake	X
Volcano	X
Wind	X
Erosion	X
ENSO (El Niño / La Niña)	
Expansive Soils	
Drought	

Specific Impacts of Identified Hazards

The following section provides specific details of the vulnerabilities and impacts from natural hazards for the City of Rainier.

The Basic Plan of this Multi-Jurisdiction Hazard Mitigation Plan contains the full narrative Hazard Profile for the entire county, including full details for this annex. This section is designed to provide additional notes and concerns regarding hazards that can impact this jurisdiction.

Flood

FEMA FIRMs were used to outline the 100-year and 500-year floodplains for the City of Rainier. The 100-year floodplain delineates an area of high risk, while the 500-year floodplain delineates an area of moderate risk.

There are 34 residential structures (worth \$4.3M), one emergency response facility (worth \$73K), one care facility (worth \$976K), six community facilities (worth \$1.7M), one transportation facility (worth \$355K), and two utilities (worth \$9.1M) within the boundaries of the 100-year floodplain.

There are 111 residential structures (worth \$13.9M), one non-residential structure (value unknown), three community facilities (worth \$1.6M), one bridge (value unknown) and three utilities (worth \$370K) within the 500-year floodplain.

Winter Storm

The natural hazards resulting from winter storms, such as ice, cold, wind and floods, are often widespread. A single event is capable of impacting all people, critical facilities and infrastructure within the City of Rainier.

The entire population (1,755 people), including 870 residential structures (worth \$108.8M), 7 non-residential structures (value unknown), one government facility (worth \$3M), three emergency response facilities (worth \$760K), 11 educational facilities (worth \$25.1M), one care facility (worth \$976K), 17 community facilities (value \$3.7M), one highway (value unknown), one railroad (value unknown), two bridges (worth \$758K), two transportation facilities (worth \$355K), 13 utilities (worth \$17.1M) and two dams (worth \$484K) are at risk.

Landslide

The potential impacts from landslides can be widespread. Potential debris flows and landslides can impact transportation and rail routes, utility systems, and water and waste treatment infrastructure along with public, private, and business structures located adjacent to steep slopes, along riverine embankments, or within alluvial fans or natural drainages. Response and recovery efforts will likely vary from minor cleanup to more extensive utility system rebuilding. Utility disruptions are usually local and terrain dependent. Damages may require reestablishing electrical, communication, and gas pipeline connections occurring from specific breakage points. Initial debris clearing from emergency routes and high traffic areas may be required. Water and waste water utilities may need treatment to quickly improve water quality by reducing excessive water turbidity and reestablishing waste disposal capability.

USGS elevation datasets were used to determine the landslide hazard areas within the City of Rainier. Risk was assigned based on slope angle. A slope angle less than 14 degrees was assigned a low risk, a slope angle between 14 and 32 degrees was assigned a medium risk, and a slope angle greater than 32 degrees was assigned a high risk.

There are 856 residential structures (worth \$107M), seven non-residential structures (value unknown), one government facility (worth \$3M), three emergency response facilities (worth \$760K), 11 educational facilities (worth \$25.1M), 12 community facilities (worth \$1.3M), two bridges (worth \$758K), one transportation facility (worth \$356K), two dams (worth \$484K) and ten utilities (worth \$1.7M) in the moderate landslide risk area.

There are 568 residential structures (worth \$71M), one non-residential structures (value unknown), two bridges (worth \$758K), two dams (worth \$484K), and four utilities (worth \$1.1M) in the high landslide risk area.

Wildland Fires

Wildland fire hazard areas were identified using a model incorporating slope, aspect, and fuel load. South-facing, steep, and heavily vegetated areas were assigned the highest fuel values while areas with little slope and natural vegetation were assigned the lowest fuel values. Risk levels of moderate, high, very high, and extreme were assigned to the entire region based on the results of this modeling.

There are 848 residential structures (worth \$106.1M), seven non-residential structures (value unknown), one government facility (worth \$3M), three emergency response facilities (worth

\$760K), 11 educational facilities (worth \$25.1M), one care facility (worth \$976K), 17 community facilities (value \$3.7M), one highway (value unknown), one railroad (value unknown), two bridges (worth \$758K), two transportation facilities (worth \$355K), 12 utilities (worth \$17M) and one dam (worth \$484K) located in moderate fire risk areas.

There are 763 residential structures (worth \$95.5M), seven non-residential structures (value unknown), one government facility (worth \$3M), three emergency response facilities (worth \$760K), 11 educational facilities (worth \$25.1M), one care facility (worth \$976K), 15 community facilities (value \$3.5M), one highway (value unknown), one railroad (value unknown), two bridges (worth \$758K), two transportation facilities (worth \$355K), 12 utilities (worth \$17M) and two dams (worth \$484K) located in the high fire risk areas.

There are 519 residential structures (worth \$64.9M), two emergency response facilities (worth \$700K), seven educational facilities (worth \$21.7M), three community facilities (worth \$128M), one bridge (worth \$758K), two dams (worth \$484K) and five utilities (worth \$1.7M) located in very high fire risk areas.

There are 236 residential structures (worth \$29.5M) and one bridge (worth \$758K) located in the extreme fire risk area.

Earthquake

Based on PGA shake maps produced by the USGS, the western portion of Columbia County is likely to experience higher levels of shaking than the eastern portion, as a result of its proximity to the Cascadia Subduction Zone. Ground movement in both areas, however, is likely to cause damage to weak, unreinforced masonry buildings, and to induce small landslides along unstable slopes. As well as landslide, earthquakes can trigger other hazards such as dam failure and disruption of transportation and utility systems.

The eastern portion of Columbia County is likely to experience strong shaking should a subduction zone earthquake occur (9-20 percent of the acceleration of gravity). In contrast, the far western portion of the county is likely to experience very strong shaking (20-25 percent). This rating represents the peak acceleration of the ground caused by the earthquake.

Due to the City of Rainier's proximity to the eastern portion of the county, all people, critical facilities and infrastructure within the City of Rainier, and therefore the entire population (1,755 people), including 870 residential structures (worth \$108.8M), 7 non-residential structures (value unknown), one government facility (worth \$3M), three emergency response facilities (worth \$760K), 11 educational facilities (worth \$25.1M), one care facility (worth \$976K), 17 community facilities (value \$3.7M), one highway (value unknown), one railroad (value unknown), two bridges (worth \$758K), two transportation facilities (worth \$355K), 13 utilities (worth \$17.1M) and two dams (worth \$484K) are located in the strong shaking (9-20 percent) area.

Volcano

A volcanic eruption would have a minor impact on the City of Rainier due to the proximity to volcanoes within the Cascade region. The major resources of concern include air quality and waterway sedimentation. During previous eruptions, ashfall has drifted to the east of the volcanoes. (State Interagency Hazard Mitigation Team 2006)

The City of Rainier will likely only experience damage from volcanic eruption columns and clouds which contain volcanic gases, minerals, and rock. The columns and clouds form rapidly and extend several miles above an eruption. Solid particles within the clouds present a serious aviation threat, can distribute acid rain (sulfur dioxide gas and water), can create risk of suffocation (carbon dioxide is heavier than air and collects in valleys and depressions threatening human and animals), and pose a toxic threat from fluorine which clings to ash particles potentially poisoning grazing livestock and contaminating domestic water supplies.

Buildings streets and roads throughout the city may require minor cleanup with negligible impacts. Temporary utility interruptions are likely, and minor cleanup may be required for electrical and other utility services. Water treatment facilities may require additional attention to address high turbidity water. Injuries associated with respiratory problems may result.

Due to the nature of the hazard, it is impossible to predict the location or extent of future events with any probability, although it can be assumed that all critical facilities and infrastructure within the City of Rainier are at risk including the entire population (1,755 people), including 870 residential structures (worth \$108.8M), 7 non-residential structures (value unknown), one government facility (worth \$3M), three emergency response facilities (worth \$760K), 11 educational facilities (worth \$25.1M), one care facility (worth \$976K), 17 community facilities (value \$3.7M), one highway (value unknown), one railroad (value unknown), two bridges (worth \$758K), two transportation facilities (worth \$355K), 13 utilities (worth \$17.1M) and two dams (worth \$484K).

Wind

Many buildings, utilities and transportation systems in open areas, natural grasslands, or agricultural lands are especially vulnerable to wind damage. Impacts associated with wind can include damage to power lines, trees, and structures, and can also cause temporary disruptions of power. Additionally, high winds can cause significant damage to forestlands.

All areas within the City of Rainier are equally at risk of a windstorm event including all people, critical facilities and infrastructure, and therefore the entire population (1,755 people), including 870 residential structures (worth \$108.8M), 7 non-residential structures (value unknown), one government facility (worth \$3M), three emergency response facilities (worth \$760K), 11 educational facilities (worth \$25.1M), one care facility (worth \$976K), 17 community facilities (value \$3.7M), one highway (value unknown), one railroad (value unknown), two bridges (worth \$758K), two transportation facilities (worth \$355K), 13 utilities (worth \$17.1M) and two dams (worth \$484K).

Erosion

Riverine erosion rarely causes death or injury. However, erosion causes significant destruction of property, development, and infrastructure. Erosion hazard data is not readily available, however, descriptions of several localized areas were identified during the development of this document and are identified only by location on a map referencing the river or stream reach described. Critical facilities that may be at risk of erosion were identified using a 300 foot-buffer in the areas identified as having historic erosion impacts to conservatively account for building footprints.

There are 207 residential structures (worth \$25.9M), one non-residential structures (value unknown), one government facility (worth \$3M), one emergency response facility (worth \$73K), two educational facilities (values unknown), five community facilities (worth \$1.3M), one bridge (worth \$760K), one transportation facility (worth \$355K) and one utility (worth \$9M) identified in the City of Rainier to be at risk from erosion impacts.

Values at Risk

Population Analysis

Population data listed in Table 7 were obtained from the 2010 U.S. Census and Portland State University. It comprises census block level data and estimates from university conducted community research.

Table 7. Population			
2000 Census	2010 Census	% Change	PSU Estimate
1,687	1,895	+12.3%	1,925

Asset Inventory

The Asset Inventory describes the physical values; the residential building stock, public facilities, and infrastructure within each community that may be affected by hazard events and includes population, residential and nonresidential buildings, critical facilities, and infrastructure. These values are described in Tables 8 and 9 and portray the City's critical infrastructure numbers and values, and their potential vulnerability by hazard type.

City of Rainier seeks to protect its population by supporting Columbia County and Oregon State initiatives, ordinances, building codes, and development regulations. One of the most important initiatives is to prohibit or not allow future development of buildings, infrastructure and critical facilities in identified high hazard areas. Any essential infrastructure component will undergo stringent review to ensure potential hazard risk will be mitigated.

Table 8. Residential Buildings

Total Building Count	Total Value of Buildings (\$)
870	108,837,000

Table 9. Critical Facilities and Infrastructure

Facility Type	Name / Number	Address	Value ¹
Government	City Hall/Administrative Office/Courthouse/Police Station/Library	106 B Street West Rainier, OR 97048	2,750,100 (building) 280,160 (contents)
Emergency Response	Columbia River Fire and Rescue District - Fernhill Station	73153 Doan Rd	343,200
	Columbia River Fire and Rescue District - Goble Station	69321 Nicolai Rd	343,200
	Columbia River Fire and Rescue District - Rainier Station	211 W 2nd St	73,200
Educational	Hudson Park Elementary	28176 Old Rainier Rd Rainier, OR	3,286,730
	Rainier Junior/Senior High School	28170 Old Rainier Rd Rainier, OR	6,525,050
	Little Rascals Academy (Preschool / Day Care)	308 3rd Street West	
	North Columbia Academy (Charter School)	305 W 3rd St	Value unknown
	Rainier School District Office	28168 Old Rainier Rd Rainier, OR	89,988
	Rainier School Commons	28170 Old Rainier Rd Rainier, OR	11,391,800
	Rainier School Gymnasium	28170 Old Rainier Rd Rainier, OR	1,349,300
	Rainier School Complex Portables	28170 Old Rainier Rd Rainier, OR	420,987
	Rainier School Industrial Tech Shops	28170 Old Rainier Rd Rainier, OR	1,616,070
	Rainier Maintenance Building	28170 Old Rainier Rd Rainier, OR	82,400
	Midco (Bus Garage)	28170 Old Rainier Rd Rainier, OR	355,612
Care Facility	Rainier Senior Center (including Senior Center Restrooms)	48 West 7th St Rainier, OR	859,020 (building) 116,957 (contents)
Community	City of Rainier Riverfront Park	7th St N 46°05.495; W 122°56.465	500,000

Table 9. Critical Facilities and Infrastructure

Facility Type	Name / Number	Address	Value ¹
	Hudson-Parcher Park	75503 Larson Rd Rainier, OR	839,586
	Alston's Corner Assembly of God	25272 Alston Rd	\$109,140
	Calvary Chapel	24056 Beaver Falls Rd	\$128,260
	Rainier Community Church of God	321 W C St	\$672,310
	United Methodist Episcopal Church	1st St & C St	\$133,470
	Rainier Assembly of God Church	75951 Rockcrest Rd	\$946,250
	Rainier Cong of Jehovah's Witnesses	25381 Wonderly Rd	\$183,130
	Nativity of the Blessed Virgin Mary Roman Catholic Church	204 C Street E	
	Shiloh Basin Community Church	67043 Nicolai Rd	
	Columbia Bible Church	407 E 2nd St	
	Riverside Community Church	305 W 3rd St	
	The Church of Jesus Christ of Latter-Day Saints, Rainier Ward,	27410 Parkdale Rd	
	Rainier City Marina (old one) (including rest room)	217 East A Street N 46°05.404; W 122°56.016	217,330 (building) 1,030 (contents)
	Rainier Marina (new one)	E 3rd St N 46°05.544; W 122°56.549	
	Rainier Boat Launch	E 3rd St N 46°05.624; W 122°56.583	
	Rainier Senior Center	27410 Parkdale Rd	
State and Federal Highways	US 30	1.5 miles at 385,000 per mile (est)	\$577,500
	City-Owned		
Railroads	Portland and Western Railroad	1.5 miles	
Bridges	C St Bridge		\$757,714
	Lewis and Clark Bridge		
Transportation Facilities	Department of Public Works Shop		201,880 (building) 153,698 (contents)
	Wastewater Treatment Plant	N 46°05.505; W 122°56.618	9,000,000
	Mill Pumphouse Sewer Pump Stations	Mill Street / Washington Way	36,050
	Rock Crest Sewer Pump Stations	Rock Crest Street / Highway 30	188,490

Table 9. Critical Facilities and Infrastructure

Facility Type	Name / Number	Address	Value ¹
	Water Treatment Plant (new)	750 Rainier Blvd N 46°05.002; W 122°56.081	3,969,620 (building) 69,010 (contents)
	Water Treatment Plant (old)	750 Rainier Blvd N 46°05.043; W 122°56.090	523,300 (building) 42,230 (contents)
	Water Tank (Reservoir)	750 Rainier Blvd N 46°05.025; W 122°56.091	452,170
	Water Tank High Level Reservoir	Neer City Rd N 46°04.661; W 122°55.811	451,140
	Water Tank (Reservoir)	Townsend Rd N 46°05.152; W 122°57.784	52,530
	Water Tank (Reservoir)	Old Highway 30 N 46°05.463; W 122°57.495	575,770
	Reservoir Pump Station	GPS Location:	
	Highway 30 Pump House Pump Station	Old Highway 30	47,380 (building) 6,180 (contents)
	City Marina Pump Station	217 East A Street N 46°05.404; W 122°56.016	139,990 (building) 5,150 (contents)
	Clatskanie PUD, Rainier Substation	830 Rainier Blvd Rainier, OR N 46°05.057; W 122°56.001	\$1,636,440
Dams	Power Substations	Lat 45°49.621; Long - 122°59.003 (Larson Rd)	
	Rainier Watershed Reservoir	Lat 46.0657; Long - 122.9357	
	Fox Creek Timber Dam, gravity feed water system	End of Watershed Street	484,100

National Flood Insurance Policy

National Flood Insurance Program data were obtained from the State Department of Land Conservation and Development. This data is significant for the vulnerability assessment as it identifies the impact of flooding, one of the most often repeated natural hazards for the county. This data is displayed in Table 10.

Table 10. Rainier NFIP Insurance Report										
Jurisdiction	Effective FIRM and FIS	Initial FIRM	Total Policies	Pre FIRM Policies	Policies by Building Type				Minus Rated A Zone	Minus Rated V Zone
					Single Family	2 to 4 Family	Other Residential	Non-Residential		
Rainier	11/26/2010	8/16/1988	2	0	2	0	0	0	0	0

Source: FEMA Community Information System 02/21/2019

Table 10a. Rainier NFIP Insurance Report									
Jurisdiction	Insurance in Force	Total Paid Claims	Pre-Firm Claims Paid	Substantial Damage Claims	Total Paid Amount	Repetitive Loss Structures	Severe Repetitive Loss Structures	CRS Class Rating	Last Community Assistance Visit
Rainier	\$630,000	1	1	0	\$2,129	0	0	10	3/27/1991

Source: FEMA Community Information System 02/21/2019

Vulnerability Analysis

A vulnerability analysis predicts the extent of exposure, and the impacts that may result from a hazard event of a given intensity in each area. The analysis provides quantitative data that may be used to identify and prioritize potential mitigation measures by allowing communities to focus attention on areas with the greatest risk of damage. A vulnerability analysis is divided into five steps including asset inventory, methodology, data limitations, exposure analysis for current assets, and areas of future development.

The following is derived from the best available data for facility locations and values. In many cases, values were unavailable, and therefore the totals listed below should be considered incomplete and likely less than the actual costs associated with the respective hazards

The vulnerability analysis development process is thoroughly discussed in the Columbia County Basic Plan, Section 6, which generated the following Hazard Exposure Analysis Overviews in Tables 11, 12, and 13.

Table 11. City of Rainier Potential Hazard Exposure Analysis Overview
Population and Buildings

			Populat ion	Buildings			
				Residential		Non-Residential	
Hazard Type	Hazard Area	Methodology	Numbe r	Number	Value (\$) ¹	Number	Value (\$)
Flood	Moderate	500-year floodplain	--	111	13,886,100	1	unknown
	High	100-year floodplain	--	34	4,253,400	0	--
Winter Storm		descriptive	1,775	870	108,837,000	7	unknown
Landslide	Moderate	>14-32 degrees	--	856	107,085,600	7	unknown
	High	>32-56 degrees	--	568	71,056,800	1	unknown
Wildland Fire	Moderate	Moderate fuel rank	--	848	106,084,800	7	unknown
	High	High fuel rank	--	763	95,451,300	7	unknown
	Very High	Very high fuel rank	--	519	64,926,900	0	--
	Extreme	Extreme fuel rank	--	236	29,523,600	0	--
Earthquake	Strong	9-20% (g)	--	870	108,837,000	7	unknown
	Very strong	20-40% (g)	--	0	--	0	--
	Severe	>40-60% (g)	--	0	--	0	--
Volcano		descriptive	1,775	870	108,837,000	7	unknown
Wind		descriptive	1,775	870	108,837,000	7	unknown
Erosion		within 300' of potential areas of erosion	--	207	25,895,700	1	unknown
ENSO							
Expansive Soils							
Drought							

¹ Average insured structural value of all residential buildings (including single-family dwellings, mobile homes, etc., is \$172,500 per structure).

Table 12. City of Rainier Potential Hazard Exposure Analysis Overview
Critical Facilities

			Government		Emergency Response		Educational		Care		Community	
Hazard Type	Hazard Area	Methodology	No.	\$	No.	\$	No.	\$	No.	\$	No.	\$
Flood	Moderate	500-year floodplain	--	--	--	--	--	--	--	--	3	1.6M
	High	100-year floodplain	--	--	1	73K	--	--	--	--	6	1.7M
Winter Storm		descriptive	1	3M	3	760K	11	25.1M	1	976K	17	3.7M
Landslide	Moderate	>14-32 degrees	1	3M	3	760K	11	25.1M	--	--	12	1.3M
	High	>32-56 degrees	--	--	--	--	--	--	--	--	--	--
Wildland Fire	Moderate	Moderate fuel rank	1	3M	3	760K	11	25.1M	1	976K	17	3.7M
	High	High fuel rank	1	3M	3	760K	11	25.1M	1	976K	15	3.5M
	Very High	Very high fuel rank	--	--	2	700K	7	21.7M	--	--	3	128M
	Extreme	Extreme fuel rank	--	--	--	--	--	--	--	--	--	--
Earthquake	Strong	9-20% (g)	1	3M	3	760K	11	25.1M	1	976K	17	3.7M
	Very strong	20-40% (g)	--	--	--	--	--	--	--	--	--	--
	Severe	>40-60% (g)	--	--	--	--	--	--	--	--	--	--
Volcano		descriptive	1	3M	3	760K	11	25.1M	1	976K	17	3.7M
Wind		descriptive	1	3M	3	760K	11	25.1M	1	976K	17	3.7M
Erosion		within 300' of potential areas of erosion	1	3M	1	73K	2	unknown	--	--	5	1.3M
El Nino and La Nina												
Expansive Soils												
Drought												

Table 13. City of Rainier Potential Hazard Exposure Analysis Overview
Critical Infrastructure

			Highways		Railroads		Bridges		Transportation Facilities		Utilities		Dams	
Hazard Type	Hazard Area	Methodology	Miles	Value	Miles	Value	No.	Value	No.	Value	No.	Value	No.	Value
Flood	Moderate	500-year floodplain	--	--	--	--	1	unknown	--	--	3	340K	--	--
	High	100-year floodplain	--	--	--	--	--	--	2	355K	2	9.1M	--	--
Winter Storm		descriptive	unknown	unknown	unknown	unknown	2	758K	2	355K	13	17.1M	2	484K
Landslide	Moderate	>14-32 degrees	--	--	--	--	2	758K	1	356K	10	1.7M	2	484K
	High	>32-56 degrees	--	--	--	--	2	758K	--	--	4	1.1M	2	484K
Wildland Fire	Moderate	Moderate fuel rank	unknown	unknown	unknown	unknown	2	758K	2	355K	12	17M	1	484K
	High	High fuel rank	unknown	unknown	unknown	unknown	2	758K	2	355K	12	17M	2	484K
	Very High	Very high fuel rank	--	--	--	--	--	--	--	--	5	1.7M	2	484K
	Extreme	Extreme fuel rank	--	--	--	--	1	758K	--	--	--	--	--	--
Earthquake	Strong	9-20% (g)	unknown	unknown	unknown	unknown	2	758K	2	355K	13	171.M	2	484K
	Very strong	20-40% (g)	--	--	--	--	--	--	--	--	--	--	--	--
	Severe	>40-60% (g)	--	--	--	--	--	--	--	--	--	--	--	--
Volcano		descriptive	unknown	unknown	unknown	unknown	2	758K	2	355K	13	171.M	2	484K
Wind		descriptive	unknown	unknown	unknown	unknown	2	758K	2	355K	13	171.M	2	484K
Erosion		within 300' of potential areas of erosion	--	--	--	--	1	760K	1	355K	1	9M	--	--
El Nino and La Nina														
Expansive Soils														
Drought														

Mitigation Strategy

The following section defines mitigation action identification and analysis as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Mitigation Strategy	
Planning Requirements	
§201.6(c)(3)	The plan shall include the following:] A mitigation strategy that provides the jurisdiction’s blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs, and resources, and its ability to expand on and improve these existing tools.
§201.6(c)(3)(i)	The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.
§201.6(c)(3)(ii)	The hazard mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure. All plans approved by FEMA after October 1, 2008, must also address the jurisdiction’s participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.
§201.6(c)(3)(iii)	The hazard mitigation strategy shall include an] action plan, describing how the action identified in paragraph (c)(3)(ii) of this section will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.
§201.6(c)(3)(iv)	For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.
§201.6(c)(4)(ii)	The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvements, when appropriate.
Planning Elements	
C1. Does the plan document each jurisdiction’s existing authorities, policies, programs and resources, and its ability to expand on and improve these existing policies and programs? 44 CFR 201.6(c)(3)	
C2. Does the Plan address each jurisdiction’s participation in the NFIP and continued compliance with NFIP requirements, as appropriate? 44 CFR 201.6(c)(3)(ii)	
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? 44 CFR 201.6(c)(3)(i)	
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? 44 CFR 201.6(c)(3)(ii) and 44 CFR 201.6(c)(3)(iv)	

C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? 44 CFR 201.6(c)(3)(iii) and 44 CFR (c)(3)(iv)

C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? 44 CFR 201.6(c)(4)(ii)

Identify Mitigation Goals

Columbia City reviewed the Columbia County goals and determined they meet the City's needs and subsequently adopted the Goals in Table 14 for the current planning period.

Table 14. Rainier Mitigation Goals	
Goal Number	Goal Description
1	Reduce the Threat to Life Safety Enhance life safety by minimizing the potential for deaths and injuries in future disaster events.
2	Protect Critical Facilities and Enhance Emergency and Essential Services <ul style="list-style-type: none"> • Implement activities or projects to protect critical facilities and infrastructure. • Seek opportunities to enhance, protect, and integrate emergency and essential services. • Strengthen emergency operations plans and procedures by increasing collaboration and coordination among public agencies, non-profit organizations, businesses, and industry.
3	Reduce the Threat to Property <ul style="list-style-type: none"> • Seek opportunities to protect, enhance and integrate emergency and essential services. • Strengthen emergency operations plans and procedures by increasing collaboration and coordination among public agencies, non-profit organizations, businesses, industries and the citizens of Columbia City.
4	Create a Disaster Resistant and Disaster-Resilient Economy <ul style="list-style-type: none"> • Develop and implement activities to protect economic well-being and vitality while reducing economic hardship in post disaster situations. • Reduce insurance losses and repetitive claims for chronic hazard events. • Work with State and Federal Partners to reduce short-term and long-term recovery and reconstruction costs. • Work with local and County organizations, such as Columbia Emergency Planning Association (CEPA). • Expedite pre-disaster and post-disaster grants and program funding.
5	Increase Public Awareness, Education, Outreach, and Partnerships <ul style="list-style-type: none"> • Coordinate and collaborate, where possible, risk reduction outreach efforts with the Oregon Partners for Disaster Resistance & Resilience and other public and private organizations. • Develop and implement risk reduction education programs to increase awareness among citizens, local, county, and regional agencies, non-profit organizations, businesses, and industry. • Promote insurance coverage for catastrophic hazards • Strengthen communication and coordinate participation in and between public agencies, citizens, nonprofit organizations, businesses, and industry.

Evaluate and Prioritize Mitigation Actions

Mitigation actions are activities, measures, or projects that help achieve the goals of a mitigation plan. Table 15 lists the mitigation actions developed during this mitigation planning process or offered during whole community planning activities. It is not intended that this plan will attempt to act on all of these action items, but the list will be maintained in order to provide documentation for future planning efforts.

Table 15. Rainier Mitigation Actions Considered			
Hazard	Status	Comment	Description
Multi-Hazard (MH)			
MH	Ongoing		Develop and incorporate building ordinances commensurate with building codes to reflect survivability from wind, seismic, fire, and other hazards to ensure occupant safety.
MH	Consider		Cross reference and incorporate mitigation planning provisions into all community planning processes such as comprehensive, capital improvement, land use, transportation plans, etc to demonstrate multi-benefit considerations and facilitate using multiple funding source consideration.
MH	Consider		Develop and incorporate mitigation provisions and recommendations into zoning ordinances and community development processes to maintain the floodway and protect critical infrastructure and private residences from other hazard areas.
MH	Ongoing		Purchase and install generators with main power distribution disconnect switches for identified and prioritized critical facilities susceptible to short term power disruption. (i.e. first responder and medical facilities, schools, correctional facilities, and water and sewage pump stations, etc.)
MH	Consider		Identify and list repetitively flooded structures and infrastructures, analyze the threat to these facilities, and prioritize mitigation actions to acquire, relocate, elevate, and/or flood proof to protect the threatened population.
MH	Ongoing		Perform hydrologic and hydraulic engineering, and drainage studies and analyses. Use information obtained for feasibility determination and project design. This information should be a key component, directly related to a proposed project.
MH	Consider		Acquire, demolish, or relocate structures from hazard prone area. Property deeds shall be restricted for open space uses in perpetuity to keep people from rebuilding in hazard areas.
Flood			
Flood	Consider		Determine and implement most cost beneficial and feasible mitigation actions for locations with

Table 15. Rainier Mitigation Actions Considered			
Hazard	Status	Comment	Description
			repetitive flooding and significant damages or road closures.
Flood	Consider		Establish flood mitigation priorities for critical facilities and residential and commercial buildings located within the 100- year floodplain using survey elevation data.
Flood	Consider		Acquire, relocate, elevate, or otherwise flood-proof critical facilities.
Flood	Consider		Create detention storage basins, ponds, reservoirs etc. to allow water to temporarily accumulate to reduce pressure on culverts and low water crossings. Water ultimately returning to its watercourse at a reduced flow rate.
Winter Storm			
Winter Storms	Consider		Develop and implement severe winter storm debris management plan, strategies, and educational outreach programs.
Winter Storms	Consider		Develop and implement tree clearing mitigation programs to keep trees from threatening lives, property, and public infrastructure from severe weather events.
Winter Storms	Consider		Develop, implement, and maintain partnership program with electrical utilities to use underground utility placement methods where possible to reduce or eliminate power outages from severe winter storms. Consider developing incentive programs.
Landslide			
Landslide	<i>Ongoing</i>		Develop process to limit future development in high landslide potential areas (permitting, geotechnical review, soil stabilization techniques, etc).
Landslide	Consider		Update the storm water management plan to include regulations to control runoff, both for flood reduction and to minimize saturated soils on steep slopes that can cause landslides.
Wildland Fire			
Wildland Fire	<i>Ongoing</i>		Identify critical facilities and vulnerable populations based on mapped high hazard areas.
Wildland Fire	Consider		Identify evacuation routes away from high hazard areas and develop outreach program to educate the public concerning warnings and evacuation procedures.

Table 15. Rainier Mitigation Actions Considered			
Hazard	Status	Comment	Description
Wildland Fire	Consider		Provide wildland fire information in an easily distributed format for all residents.
Wildland Fire	Ongoing		Develop, adopt, and enforce burn ordinances that require burn permits, restricts campfires, and controls outdoor burning.
Wildland Fire	Consider		Develop outreach program to educate and encourage home landscape cleanup (defensible space) and define debris disposal programs.
Wildland Fire	Consider		Identify, develop, and implement, and enforce mitigation actions such as fuel breaks and reduction zones for potential wildland fire hazard areas.
Earthquake			
Earthquake	Consider		Disseminate FEMA pamphlets to educate and encourage homeowners concerning seismic structural and non-structural retrofit benefits.
Earthquake	Consider		Retrofit important public facilities with significant seismic vulnerabilities.
Earthquake	Consider		Develop public outreach program to train earthquake safety; perform drop-cover-hold drills at schools and public facilities.
Earthquake	Consider		Evaluate critical public facility seismic performance i.e. fire stations, public works buildings, potable water systems, wastewater systems, electric power systems, and bridges etc.
Volcano			
Volcano	Consider		Update public emergency notification procedures and develop an outreach program for ash fall events.
Volcano	Consider		Update emergency response planning and develop client focused outreach program for ash fall events affecting river, air, and highway transportation, and industrial facilities and operations.
Volcano	Consider		Evaluate ash impact on storm water drainage system and develop mitigation actions.
Wind			
Wind	Consider		Identify and prioritize critical facilities' overhead utilities that could be placed underground to reduce power disruption from wind storm / tree blow down damage.

Table 15. Rainier Mitigation Actions Considered			
Hazard	Status	Comment	Description
Wind	Consider		Revise requirements to place utilities underground to reduce power disruption from wind storm / tree blow down damage when upgrading or during new development.
<i>Erosion</i>			
Erosion	Consider		Apply for grants/funds to implement riverbank protection methods.
Erosion	Complete		Install embankment protection such as vegetation, riprap, gabion baskets, sheet piling, and walls to reduce or eliminate erosion.

Mitigation Action Plan

The Steering Committee has evaluated and prioritized each of the considered mitigation actions to determine which would be included in the Mitigation Action Plan. The Committee then determined the responsible agency and potential funding sources. The Mitigation Action Plan represents mitigation projects and programs to be implemented through the cooperation of multiple entities.

Upon review, the Steering Committee assigned a high priority ranking to actions that best fulfill the goals of the HMP and are appropriate and feasible for the City and responsible entities to implement during the 5-year lifespan of this version of the HMP. As such, the Steering Committee determined that only the mitigation actions that received a high priority ranking would be included in the City's Mitigation Action Plan. Table 16 depicts the City's mitigation actions grouped by hazard and in descending priority order within each hazard.

Table 16. Columbia City Mitigation Action Plan Matrix

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility
Multi-Hazard (MH)					
MH	Develop and incorporate building ordinances commensurate with building codes to reflect survivability from wind, seismic, fire, and other hazards to ensure occupant safety.	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes
MH	Cross reference and incorporate mitigation planning provisions into all community planning processes such as comprehensive, capital improvement, land use, transportation plans, etc to demonstrate multi-benefit considerations and facilitate using multiple funding source consideration.	City Admin/Planning	Ongoing	General Fund	BC: TBD** TF: Yes
MH	Purchase and install generators with main power distribution disconnect switches for identified and prioritized critical facilities susceptible to short term power disruption. (i.e. water and sewage pump stations, etc.)	City Admin	Ongoing	General Fund	BC: TBD** TF: Yes
MH	Purchase and install generators with main power distribution disconnect switches for identified and prioritized critical facilities susceptible to short term power disruption. (i.e. first responder and medical facilities, schools, correctional facilities, and water and sewage pump stations, etc.)	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes
MH	Identify and list repetitively flooded structures and infrastructures, analyze the threat to these facilities, and prioritize mitigation actions to acquire, relocate, elevate, and/or flood proof to protect the threatened population.	City Admin/Public Works	Ongoing	General Fund, HMA, HMGP	BC: TBD** TF: Yes
MH	Perform hydrologic and hydraulic engineering, and drainage studies and analyses. Use information obtained for	City Admin/Public	Ongoing	General Fund,	BC: TBD** TF: Yes

Table 16. Columbia City Mitigation Action Plan Matrix

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility
	feasibility determination and project design. This information should be a key component, directly related to a proposed project.	Works/Building Dept		HMA, HMGP	
MH	Acquire, demolish, or relocate structures from hazard prone area. Property deeds shall be restricted for open space uses in perpetuity to keep people from rebuilding in hazard areas.	City Admin	Ongoing	General Fund, HMA, HMGP, NRCS	BC: TBD** TF: Yes
Flood					
Flood	Assist local drainage district with implementing flood dike certification.	LDS, Rainier DD, EM	2014	HMPG	BC: Acceptable TF: Yes
Flood	Determine and implement most cost beneficial and feasible mitigation actions for locations with repetitive flooding and significant damages or road closures.	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes
Flood	Establish flood mitigation priorities for critical facilities and residential and commercial buildings located within the 100- year floodplain using survey elevation data.	City Admin/	Ongoing	General Fund	BC: TBD** TF: Yes
Flood	Acquire, relocate, elevate, or otherwise flood-proof critical facilities.	City Admin	Ongoing	General Fund, HMA, HMGP, NRCS	BC: TBD** TF: Yes
Flood	Create detention storage basins, ponds, reservoirs etc. to allow water to temporarily accumulate to reduce pressure on culverts and low water crossings. Water ultimately returning to its watercourse at a reduced flow rate.	City Admin/Public Works	Ongoing	General Fund, HMA, HMGP	BC: TBD** TF: Yes
Winter Storm					
Winter Storm	Develop and implement severe winter storm debris management plan,	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes

Table 16. Columbia City Mitigation Action Plan Matrix

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility
	strategies, and educational outreach programs.				
Winter Storm	Develop and implement tree clearing mitigation programs to keep trees from threatening lives, property, and public infrastructure from severe weather events.	City Admin/Public Works	Ongoing	General Fund, HMA, HMGP	BC: TBD** TF: Yes
Winter Storm	Develop, implement, and maintain partnership program with electrical utilities to use underground utility placement methods where possible to reduce or eliminate power outages from severe winter storms. Consider developing incentive programs.	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes
Landslide					
Landslide	Develop process to limit future development in high landslide potential areas (permitting, geotechnical review, soil stabilization techniques, etc).	City Admin/Planning/ Building Dept	Ongoing	General Fund	BC: TBD** TF: Yes
Landslide	Update the storm water management plan to include regulations to control runoff, both for flood reduction and to minimize saturated soils on steep slopes that can cause landslides.	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes
Landslide	Identify and seasonally restrict recreational and construction activities in high landslide areas.	City Admin/Building Dept	Ongoing	General Fund	BC: TBD** TF: Yes
Wildland Fire					
Wildland Fire	Identify evacuation routes away from high hazard areas and develop outreach program to educate the public concerning warnings and evacuation procedures.	City Admin/Fire Dept	Ongoing	General Fund, FMAP	BC: TBD** TF: Yes

Table 16. Columbia City Mitigation Action Plan Matrix

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility
Wildland Fire	Provide wildland fire information in an easily distributed format for all residents.	City Admin/Fire Dept	Ongoing	General Fund, FMAP	BC: TBD** TF: Yes
Wildland Fire	Develop, adopt, and enforce burn ordinances that require burn permits, restricts campfires, and controls outdoor burning.	City Admin/Fire Dept	Ongoing	General Fund	BC: TBD** TF: Yes
Wildland Fire	Develop outreach program to educate and encourage home landscape cleanup (defensible space) and define debris disposal programs.	City Admin/Fire Dept	Ongoing	General Fund, FMAP	BC: TBD** TF: Yes
Wildland Fire	Identify, develop, and implement, and enforce mitigation actions such as fuel breaks and reduction zones for potential wildland fire hazard areas.	City Admin/Fire Dept	Ongoing	General Fund, FMAP	BC: TBD** TF: Yes
Earthquake					
Earthquake	Disseminate FEMA pamphlets to educate and encourage homeowners concerning seismic structural and non-structural retrofit benefits.	City Admin/Public Works	Ongoing	General Fund, HMGP	BC: TBD** TF: Yes
Earthquake	Retrofit important public facilities with significant seismic vulnerabilities.	City Admin/Public Works	Ongoing	General Fund, HMA, HMGP	BC: TBD** TF: Yes
Earthquake	Develop public outreach program to train earthquake safety; perform drop-cover-hold drills at schools and public facilities.	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes
Earthquake	Evaluate critical public facility seismic performance i.e. fire stations, public works buildings, potable water systems, wastewater systems, electric power systems, and bridges etc.	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes
Earthquake	Disseminate FEMA pamphlets to educate and encourage homeowners concerning seismic structural and non-structural retrofit benefits.	City Admin/Public Works	Ongoing	General Fund, HMGP	BC: TBD** TF: Yes

Table 16. Columbia City Mitigation Action Plan Matrix					
Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility
Volcano					
Volcano	Update public emergency notification procedures and develop an outreach program for ash fall events.	City Admin/Public Works	Ongoing	General Fund, NOAA/NWS	BC: TBD** TF: Yes
Volcano	Update emergency response planning and develop client focused outreach program for ash fall events affecting river, air, and highway transportation, and industrial facilities and operations.	City Admin/Public Works	Ongoing	General Fund, NOAA/NWS	BC: TBD** TF: Yes
Volcano	Evaluate ash impact on storm water drainage, and water treatment systems. Develop mitigation actions.	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes
Wind					
Wind	Identify and prioritize critical facilities' overhead utilities that could be placed underground to reduce power disruption from windstorm / tree blow down damage.	City Admin/Public Works	Ongoing	General Fund, Utility Co., HMGP	BC: TBD** TF: Yes
Wind	Revise requirements to place utilities underground to reduce power disruption from windstorm / tree blow down damage when upgrading or during new development.	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes
Erosion					
Erosion	Apply for grants/funds to implement riverbank protection methods.	City Admin/Public Works	Ongoing	General Fund, USACOE, HMGP	BC: TBD** TF: Yes

Plan Adoption and Maintenance

The following section provides documentation of the formal adoption of this annex by the governing board of the district or the city council/county commission of the jurisdiction. It also identifies the standing committee that will be responsible for future reviews between update periods.

DMA 2000 Requirements: Plan Review, Evaluation, Implementation, and Adoption	
Planning Requirements	
§201.6(d)(3)	A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit if for approval within 5 years in order to continue to be eligible for mitigation project grant funding.
§201.6(c)(5)	The plan shall include...] Documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County commissioner, Tribal Council). For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.
Planning Elements	
D1. Was the plan revised to reflect changes in development? 44 CFR 201.6(d)(3)	
D2. Was the plan revised to reflect progress in local mitigation efforts? 44 CFR 201.6(d)(3)	
D3. Was the plan revised to reflect changes in priorities? 44 CFR 201.6(d)(3)	
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? 44 CFR 201.6(c)(5)	
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? 44 CFR 201.6(c)(5)	

Resolution of Adoption

(Example) BEFORE THE BOARD OF COUNTY COMMISSIONERS FOR COLUMBIA COUNTY, OREGON

In the Matter of Adopting the 2014) Columbia County Multi-Jurisdictional) RESOLUTION NO. 40-2014 Hazard
Mitigation Plan Update)

WHEREAS, Columbia County, Oregon has experienced repetitive disasters that have damaged commercial, residential and public properties, displaced citizens and businesses, and presented general public health and safety concerns; and

WHEREAS, Columbia County has prepared a Multi-Jurisdictional Hazard Mitigation Plan that outlines the options to reduce overall damage and impact from natural hazards; and

WHEREAS, the Multi-Jurisdictional Hazard Mitigation Plan has been reviewed by community residents, business owners, and federal, state and local agencies, and has been revised to reflect their concerns;

NOW, THEREFORE, BE IT RESOLVED that:

1. 1. The Multi-Jurisdictional Hazard Mitigation Plan is hereby adopted as an official plan of Columbia County.
2. 2. A Hazard Mitigation Planning Group is hereby established as a permanent advisory body. The Hazard Mitigation Planning Coordinator shall designate its members, subject to the approval of the County and the participating jurisdictions. They shall serve one-year terms. The group's duties shall be as designated in the Hazard Mitigation Plan.
3. 3. The Hazard Mitigation Planning Coordinator is charged with supervising the implementation of the Plan's recommendations within the funding limitations as provided by Columbia County or other sources.
4. 4. The Hazard Mitigation Planning Coordinator shall give priority attention to the goals identified in Table A-13 of the Columbia County Appendix, and the actions listed in Table A-14 of the Columbia County Appendix to the Hazard Mitigation Plan and;
5. 5. The Hazard Mitigation Planning Coordinator shall convene the hazard mitigation planning group annually. The planning group shall monitor implementation of the plan and shall submit an annual review worksheet to the Board of County Commissioners in accordance with the following format:
 - a. A review of the original plan.
 - b. A review of any disasters or emergencies that occurred during the previous calendar year.
 - c. A review of the actions taken, including what was accomplished during the previous year.
 - d. A discussion of any implementation problems.
 - e. Recommendations for new projects or revised action items. Such recommendations shall be subject to approval by the Columbia County.

Dated this 27th day of August, 2014.

BOARD OF COUNTY COMMISSIONERS FOR COLUMBIA COUNTY, OREGON

By: _____ Anthony Hyde, Chair

By: _____ Henry Heimuller, Commissioner

By: _____ Earl Fisher, Commissioner

Standing Review Committee

The following table identifies the members of the Standing committee that will meet quarterly to review the HMP annex and provide a running update.

Table 17. City of Rainier Standing Hazard Mitigation Committee	
Name	Agency/Department/Affiliation
Name	Agency/Department/Affiliation
Greg Griffith	Police Chief
Sue Lawrence	Public Works Director
Shaun Brown	Columbia County Emergency Management

APPLICATION for position on REDCO BOARD

Please answer the following questions. Please use a separate sheet of paper, if needed.

1. Why are you interested in Rainier's Economic Development?

Civic Duty

2. What would you bring to REDCO that would make you a valuable member of the REDCO board?

I was involved back when REDCO was first. I was a certified internal auditor @ WEYCO

3. Please tell us a little about you and your past and current involvement in your community.

*Came here in the late 80's for an outage @ Trojan & never left.
Garden Club member, Planning Commission, HOPE, Senior Center*

4. Do you have special skills, training, talents or interest in a particular area of community development? Please tell us.

Beautification - Flowers, plants, trees

5. What is your vision for Rainier's future?

To keep our small town charm.

6. What part would you like to play in that vision?

Not quite sure at this time, I'm a
good facilitator.

7. Please share any other information you would like us to know.

Name: Candis Forrest

Mailing Address: Box 1021

Daytime Telephone: 503-396-7009 Fax #: _____

E-Mail Address: candisforrest@gmail.com

Thank you for your time in completing this questionnaire and thank you for being
interested in your community.

**REQUEST FOR PROPOSALS
FOR
CITY OF RAINIER, OREGON**

CERTIFIED PUBLIC ACCOUNTANT PROFESSIONAL SERVICES



DECEMBER 28, 2021

Prepared by



Contact: Robert G. Moody, Jr., Partner
rmoody@merina.com

7624 SW Mohawk Street
Tualatin, OR 97062
(503) 723-0300
www.merina.com

Scott Jorgensen, City Administrator
City of Rainier, Oregon
PO Box 100
106 W B Street
Rainier, OR 97048

December 28, 2021

Dear Mr. Jorgensen,

Merina+Co (MCO) is pleased to provide this proposal for Certified Public Accountant (CPA) Services to the City of Rainier, Oregon. We are confident that our experience, expertise and client-centered approach will allow us to deliver best-in-class expertise and service to the City. Our confidence is a direct result of our experienced and committed team providing the following:

Outstanding reputation in government – MCO has been helping state and local government with comprehensive assurance and advisory services since 1979. We believe in the value that strong governmental entities provide to their communities and have committed ourselves to developing the experience, understanding, and expertise necessary to support governmental operations. That is why MCO works exclusively with governmental entities.

Expertise in government finance and accounting – We are experts in governmental finance and accounting. Collectively, we have assisted state and local governments in Oregon and Washington manage, improve, and audit their financial operations for over 40 years. Our experience in government ranges from small divisional operations to departments with multi-million-dollar budgets. This experience provides us with a deep understanding of the unique pressures, opportunities, and challenges facing local governments which allows our team to help you make informed decisions about your operations.

Client-centered style and approach - Our style and approach are focused on our clients' wants while understanding their needs in the context of the overall engagement. We pride ourselves on our ability to listen and develop a comprehensive understanding of the specific personnel, operating conditions, and environment that makes each organization unique. This approach includes in-person and on-site operations, when possible, as well as leveraging all available virtual collaboration tools to facilitate the same level of interaction with clients when on-site operations are not possible.

We appreciate the opportunity to provide you with a proposal. As a Partner, I am the primary point of contact for this solicitation and can be reached by email at rmoody@merina.com or by phone at 503.730.2243. Please let us know if you need any additional information or have any questions.

Sincerely,



Robert G. Moody, Jr., CPA; Partner | *Focused on Your Wants and Understanding Your Needs*

A. Minimum Qualifications

Merina+Co (MCO) meets all minimum qualifications for providing the required services to the City of Rainier.

Minimum Qualifications	Met?	
<i>Be registered and maintain proper business licenses</i>	Yes	MCO maintains all required registrations and business licenses and, if selected, will obtain and maintain an active business license with the City.
<i>Have sufficient size and depth of management, resources and staff to support the services required</i>	Yes	MCO has provided continuous service to state and local governments throughout Oregon and Washington for over 40 years and has the resources to continue to provide service. We have a team of 16 with the various skills and experience to serve the City.
<i>Have sufficient financial resources to meet payroll, equipment and supplies to meet operational requirements and ensure quality service</i>	Yes	
<i>Have measurable and demonstrated successful experience in providing specified services for like size venue and operations</i>	Yes	MCO currently provides services to several cities comparable to the City of Rainier. Please see references and recommendations provided.
<i>Provide accounting services as the primary function of their business</i>	Yes	MCO is a full-service CPA firm providing assurance and advisory services. Please see specific references provided.
<i>Have been in business for at least five (5) years providing accounting services</i>	Yes	MCO has been in business since 1979.
<i>Have experience with public bodies and knowledge of government accounting practices</i>	Yes	MCO works exclusively with government entities and has a strong knowledge of GAAP and other standards applicable to government accounting and reporting as well as Oregon Local Budget Law.
<i>Have experience with economic development or urban renewal agencies</i>	Yes	MCO has extensive experience with accounting, reporting and auditing of urban renewal agencies.

B. Qualifications of Merina+Co

Merina+Co (MCO) is a State of Oregon certified Women Business Enterprise (Certificate No. 8090) and Limited Liability Partnership (LLP) located in Tualatin, Oregon providing comprehensive advisory services to state and local governments throughout the Pacific Northwest. Since our founding in 1979, our team has had the opportunity to provide a wide variety of services as certified public accountants (CPAs), municipal auditors, internal auditors, trusted advisors and consultants.

We are unique. Our team of 16 combines experts in government finance and accounting with experts in business consulting, organizational development, process improvement, risk management, data analytics, community



Figure 1: MCO Organizational Chart

planning and engineering, and project management. We focus on leveraging our dynamic team and variety of expertise to help local municipalities meet their needs while also focusing on their wants. Our mission is to help leaders in government make a difference in their communities by strengthening the organizations that serve them.

Our Team's Qualifications

- + **Certified Public Accountants (CPAs) – 5**
- + **CPA eligible - 3**
- + **Certified Municipal Auditors – 4**
- + **Certified Fraud Examiners – 2**
- + **AICPA Advanced Single Audit Certificate holder - 1**
- + **Professional Engineer (PE) - 1**
- + **Project Management Professional (PMP) - 1**
- + **Lean Process Improvement Certificate holder - 1**

Key Personnel

The following team members have extensive experience providing financial support and advisory services to local municipalities in Oregon and are available to provide services upon award of a contract for CPA services. Should it become necessary, we can call upon a wealth of additional resources to ensure the City's wants and needs are met throughout the duration of the contract. Full resumes for select key personnel are included in Appendix A.

Rob Moody, CPA | Engagement Partner

Rob is a Partner with MCO, bringing more than 30 years of governmental experience. He has worked with local government for his entire career – first as a government finance officer with the cities of The Dalles, Sherwood, and Wilsonville and then as a Partner leading the governmental audit practice for a large, local CPA firm. For the last several years Rob has provided consulting and advisory services to local governments on topics of financial reporting, accounting, operations, organizational effectiveness, and various financial analyses. He is a graduate of Western Washington University with a degree in Accounting and is a licensed CPA and Municipal Auditor in Oregon. Rob is a speaker nationally, regionally, and locally on topics of governmental accounting and reporting and has extensive skills and background in financial operations, performance management; accountability and internal controls; organizational assessment; budgeting; risk assessment; resource use and allocation; process improvements and system efficiencies; financial performance; training; and reviewing, evaluating, and documenting operations.

Rob will have primary responsibility for our engagement with the City and will coordinate a level of service you can and should expect from our firm. He will direct staff assignments of our team, review completed staff work, and communicate status and progress to the City.

Jordan Henderson, PE, PMP | Partner

Jordan has ten years of experience in consulting, working with a variety of state and local governments to evaluate and improve their operations and programs. He has an Honors Bachelor of Science degree in Civil Engineering from Oregon State University and leverages his background as a licensed Professional Engineer

(PE) and Project Management Professional (PMP) to provide organizations unique perspectives and expertise in collecting, analyzing, and interpreting data to assess performance, plan for the future, and solve problems. He has experience working with local governments in all areas of their operations including finance and accounting; planning and engineering; parks and recreation; law enforcement; fire and emergency services; human resources; procurement; information technology; maintenance and operations; and capital project delivery.

Jordan is available to the City as an expert in organizational efficiency and effectiveness and capital project planning and delivery. His experience includes detailed program evaluations, risk assessments, infrastructure planning, process improvements, and financial analysis/feasibility studies.

Craig Popp, CPA | Manager

Craig is an experienced auditor and consultant with expertise in governmental financial and compliance audits, accounting and reporting, and analysis. He has provided services to a myriad of government clients throughout the northwest, including municipalities and state agencies. Prior to joining our firm, he spent 6 years as a Weather Forecaster in the U.S. Air Force where he learned how to use data to convey relevant and reliable information to pilots and base commanders to inform critical decision-making. Craig brings this skill to each of his engagements, helping his clients to understand and interpret complex information.

Amanda Taylor, CPA, CFE | Manager

Amanda has over 15 years of auditing and accounting experience. She specializes in compliance auditing, preventive internal control methodology and risk assessment. As a graduate of Washington State University Vancouver, Amanda continues to hone her skills in the area of fraud prevention and internal control assessment, maintaining her knowledge with ongoing Yellow Book and fraud prevention and detection courses. Her experience began as an accountant for a local city, so she connects with clients and staff easily, drawing out information and focusing on ways to improve processes, protect staff, and ensure the safeguarding of entity assets to the greatest extent possible.

Courtney Seto | Consultant

Courtney has over five years of experience in planning and implementing projects to increase operational efficiency and effectiveness across multiple industries including local government, manufacturing, healthcare, and facilities. She has an Honors Bachelor of Science Degree in Industrial & Systems Engineering from the University of Washington and formal training in Lean Six Sigma methodologies which enables her to effectively breakdown complex systems into practical requirements, utilize data to communicate across various audiences, and develop recommendations and solutions with a user focus. Taking a data driven approach, she has a proven record of identifying opportunities to optimize operations and developing plans for solution implementation. Courtney brings an ability to coordinate and communicate across multiple teams with multiple interests and align action towards a common objective. She is skilled at facilitating complex analysis of operational and financial data to help local municipalities make informed decisions.

Shauna Calhoun | Staff Accountant

Shauna is a staff accountant with our team providing assurance services to local governments. She has a Bachelor of Science Degree in Accounting and is experienced in compliance with Oregon Local Budget Law. In addition to general accounting support, Shauna will provide an organized and effective approach to budget preparation to support the City during the annual budget process.


To ensure our team members maintain a current level of knowledge in a variety of topics, MCO invests substantially in continuing professional education (CPE) both as participants in educational courses and in the teaching of technical subjects. Our team members have attended classes throughout the United States and have taught many topics including internal controls, performance auditing, organizational assessment, program assessment, financial reporting and auditing topics, Federal compliance issues, and data analysis.



Team members also maintain affiliations with various organizations to stay current on pertinent topics, network, and receive CPE. Our team is actively involved in various committees and projects associated with professional organizations such as the American Institute of Certified Public Accountants (AICPA), the Oregon Society of CPA's (OSCPA), the Association of Certified Fraud Examiners, Government Finance Officers Association (GFOA), the Oregon Government Finance Officers Association (OGFOA), the Special Districts Association of Oregon (SDAO), and the League of Oregon Cities (LOC).



Related Experience and References

MCO has several long-standing relationships with clients as trusted advisors, consultants and experts in government finance and accounting. We are currently providing services to several organizations similar in scope to your request. The following pages describe our experience as well as provide contact information for project references. Reference letters from select project references are provided in Appendix B. Due to limited availability of select project references, we have provided contact information for some projects in lieu of letters of reference. We encourage you to contact these individuals to better understand our commitment to high levels of service.

Recent Project Examples

 <p><i>City of Siletz, Oregon</i> <i>Finance Support and Advisory Services</i></p> <p><u>Reference:</u> Will Worman, Mayor 541.272.1730 william.worman@gapac.com <i>Letter of reference provided in Appendix B</i></p> <p><u>Period of Performance:</u> May 2021 – Present</p>	<p>MCO has been providing ongoing support and advisory services to the City of Siletz, Oregon focused on supplementing the City's staff with expertise in local government finance, budget and accounting. Specific tasks have included:</p> <ul style="list-style-type: none"> + Establishing a budget preparation project plan and timeline to effectively draft and adopt a budget in line with local budget law, + Drafting public notices as required for Budget Committee meetings and required public hearings, + Drafting a proposed budget for the City's Budget Committee based on prior year budget, anticipating post-adoption adjustment, and + Drafting resolutions required for State Shared Revenues, budget approval, budget adoption, and taxes. + Providing on-site accounting assistance in payroll, accounts payable, cash receipts, and general ledger. + Assisting with policy development and implementation.
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 <p>City of Depoe Bay, Oregon Finance Support and Advisory Services</p> <p>Reference: Barbara Chestler, City Recorder 541.765.2361 recorder@cityofdepoebay.org</p> <p>Period of Performance: March 2021 - Present</p>	<p>MCO provides ongoing finance support and advisory services to the City of Depoe Bay, Oregon. Specific tasks include:</p> <ul style="list-style-type: none"> + Providing a comprehensive needs assessment and recommendation for the selection of a financial information system, and implementation/project management assistance to the City. + On-call support and assistance to the City with respect to financial and organizational questions and needs. + Develop and coordinate a strategy to accomplish the City's completion of financial statement audits. + Development of financial policies and procedures. + Financial analysis, reporting, and advice regarding fuel pricing at the harbor.
 <p>City of Lincoln City, Oregon Finance Support and Advisory Services</p> <p>Reference: Lila Bradley, Interim City Manager 541-996-1235 lbradley@lincolncity.org</p> <p>Period of Performance: August 2021 - Present</p>	<p>MCO provides on-call assistance for the City's finance and accounting personnel. Specific tasks have included:</p> <ul style="list-style-type: none"> + Audit preparation assistance including development of a project plan and coordination with City staff to prepare for the financial statement and compliance audit for the year ended June 30, 2021, and + Prepare draft financial statements from trial balance and other information provided by City. <p>In addition, MCO will be commencing a high-level organizational review and skills assessment of the Finance Department to assist the City in filling open positions within the Finance Department to align with organizational needs and skillsets.</p>

 <p>Confederated Tribes of the Grand Ronde</p> <p><i>Confederated Tribes of the Grand Ronde Community of Oregon Finance Division Assessment and Support</i></p> <p><u>Reference:</u> Christine O'Day, Controller 503-879-1607 Christine.oday@grandronde.org <i>Letter of reference provided in Appendix B</i></p> <p><u>Period of Performance:</u> August 2021 – Present</p>	<p>MCO is working with the Confederated Tribes of the Grand Ronde Community of Oregon to evaluate and improve the Finance Division's ability to deliver services to the rest of the organization efficiently and effectively. This has included:</p> <ul style="list-style-type: none"> + Internal and external evaluation of current service delivery by Finance to identify opportunities for improvement, + Skills assessment of the Finance Division to identify positional needs for the Controller, Assistant Controller, and Treasury Manager positions, + On-call assistance and guidance to the Controller. <p>MCO will be continuing to provide support in the following ways during the next year:</p> <ul style="list-style-type: none"> + Targeted workflow mapping and process improvement within the Finance Division, + Establishing a program for consistent grants management and reporting from grant application through award and ongoing reporting, and + Ongoing coaching and mentoring of Finance staff.
 <p><i>Deschutes County Public Library District Finance Support and Advisory Services</i></p> <p><u>Reference:</u> Robert Guzzo, Business Services Manager 541.312.1036 robertg@dpls.lib.or.us <i>Letter of reference provided in Appendix B</i></p> <p><u>Period of Performance:</u> June 2021 – Present</p>	<p>MCO provides ongoing financial assistance and support to the District. Specific services include:</p> <ul style="list-style-type: none"> + Provide on-call advice as needed or requested. + Provide monthly services including: <ul style="list-style-type: none"> ▪ bank reconciliations, ▪ review of accounts payable, payroll, and interest allocation journal entries, ▪ review of monthly financial reports, and ▪ review capital assets activities. + Provide quarterly review of Board Reports for accuracy. + Provide annual support to the District's audit cycle including: <ul style="list-style-type: none"> ▪ review of all adjusting and closing entries, ▪ review posting of the budget entry for accuracy, ▪ draft the District's financial statements for audit, and ▪ complete a review of payroll and benefits as provided by the District.

 <p>Oak Lodge Water Services District Advisory Services</p> <p><u>Reference:</u> Gail Stevens, Finance Director 971.801.5878 gail@olwsd.org</p> <p><u>Period of Performance:</u> 2018 - Current</p>	<p>MCO provides ongoing financial assistance and support to the District. Specific services include:</p> <ul style="list-style-type: none"> + Provide on-call advice as needed or requested. + Drafting annual financial statements for the District and affiliated organization. + Assist with financial reconciliations and analysis as necessary to support the annual audit and budget cycles. + Develop financial policies and procedures
 <p>City of Scappoose, Oregon Finance Support and Advisory Services</p> <p><u>Reference:</u> Alex Rains, City Manager 503.543.7146 arains@cityofscappoose.org</p> <p><u>Period of Performance:</u> January 2021 – June 2021</p>	<p>MCO worked with the City of Scappoose, Oregon to support the transition of the City to GAAP-basis reporting. Specific support included:</p> <ul style="list-style-type: none"> + Review of the City's fiscal year 2021-22 Proposed Budget for structure and content in support of a planned transition to GAAP-basis reporting. + On-call support and advice regarding the transition.

In addition to our experience supporting local municipalities with financial oversight, support, and advisory services described above, our team has extensive experience providing financial statement audits, performance audits, and program assessments to local governments throughout the state. This gives us an in-depth understanding of the specific needs of municipal operations and departments including economic development and urban renewal agencies. The following is a list of clients within the past three years:

Annual Financial Statement Audits

Cities and Counties

- + City of Adair Village
- + City of Astoria*
- + City of Cascade Locks*
- + City of Dallas*
- + City of Florence*
- + City of Gladstone
- + City of Happy Valley*
- + City of Independence*
- + City of Klamath Falls*
- + City of McMinnville*
- + City of Milwaukie*
- + City of Molalla
- + City of Mt. Angel
- + City of Newport*
- + City of Oregon City*
- + City of Sandy*
- + City of The Dalles*
- + City of Tualatin
- + City of West Linn
- + City of Wilsonville
- + City of Wood Village

Special Districts and State

- + Tillamook Fire District
- + Multnomah Rural Fire Protection District #10
- + Woodburn Rural Fire Protection
- + Port of Tillamook*
- + Columbia Gorge Regional Airport
- + Clackamas Regional Water Supply
- + South Fork Water
- + Sunrise Water Authority
- + QualityLife Intergovernmental Agency
- + Oregon Corrections Enterprises
- + Oregon Department of Veteran Affairs
- + Common School Fund of Oregon Department of State Lands

Performance Audits and Program Assessments

- + City of Grants Pass, Property Management Division
- + City of Wilsonville, Contracts and Procurement
- + Washington Department of Services for the Blind, Fiscal Assessment
- + Camas-Washougal Fire Department Partnership Analysis
- + Bend LaPine Schools Human Resources and Payroll Assessment
- + City of Newberg, Finance Department Assessment
- + Benton County, Oregon Finance Department Assessment
- + Oregon Department of Fish and Wildlife, Pre-paid Licensing Program
- + State of Washington Employee Whistleblower Program
- + State of Hawaii Department of Commerce and Consumer Affairs
- + Oregon Secretary of State
- + Portland Children's Levy

**Single Audit also performed*

Approach

Our approach to providing advisory services begins with our ability to listen. We believe in understanding the context our clients operate within to be able to provide relevant and timely financial information and advice to inform decisions. In all activities, you can expect a high-level of involvement from the engagement partner and senior team members. We also ensure that no "surprises" or conflicts develop during any phase of our engagements. In addition to regularly scheduled status meetings, frequent informal conversations with key personnel and stakeholders will occur to help ensure that the appropriate parties stay informed and have their needs met throughout the terms of our engagement.

We intend to provide a combination of remote and on-site support to the City. To best provide the required services, we intend to work with City staff to request access to your accounting system and financial information on shared drives in order to work directly with you and your team. At the beginning of the engagement, we will meet with you and your team to identify specific tasks, deadlines, expectations, and deliverables to be provided throughout the year. We believe in spending the time to plan our work with you to ensure we can proactively meet your needs and deliver a high level of service. MCO will provide on-call assistance as needed in addition to the following:

- *Financial oversight, including monitoring the City’s financial health and internal control. As appropriate, we will leverage our experience and expertise to provide recommendations for strengthening internal control and process improvement as appropriate.*
- *Monthly review of internal financial statements and bank reconciliations*
- *Assistance in the annual budget process to coordinate an effective approval and adoption within the requirements of Oregon Local Budget Law.*
- *Assistance with preparation for annual audits including review of reconciliations and staff workpapers and drafting financial statements for the City and the Urban Renewal Agency.*
- *Reviewing grant reporting and reimbursement expenditure requests prior to submission*
- *Monthly in person meetings with department heads to review important findings and recommendations in all above areas*
- *Occasional presentations to the Rainier City Council and Rainier Economic Development Council, and*
- *Other technical support as needed.*

C. Proposed Fees

Our estimated fees to accomplish the scope of work total \$57,500 for calendar year 2022 and would be billed as follows:

- + Monthly billings of \$2,625 covering on-going scope activities as identified above.
- + Annual billing of \$11,500 to perform assistance with preparation for annual audits
- + Annual billing of \$14,500 to provide assistance in preparing annual budgets

Our billing rates for any additional work beyond the scope of work described above are as follows:

- + Partner \$275/hour and \$137.50/hour for travel
- + Sr. Consultant/Manager \$225/hour and \$112.50/hour for travel
- + Consultant \$175/hour and \$87.50/hour for travel
- + Senior Accountant \$150/hour and \$75/hour for travel
- + Support Staff \$125/hour and \$62.50/hour for travel

We anticipate an increase of 4% in quoted fees each year for subsequent years.

Value-Added Services

MCO can provide a wide variety of value-added services to the City, should they be desired. In addition to providing ongoing support, our team of experts has helped local governments in the following ways:

Performance Audits and Program Assessments

MCO has extensive experience providing detailed program/organizational assessments and performance audits to governmental entities. We have evaluated numerous operations to help improve efficiency and effectiveness, identify new practices to decrease costs or reduce workloads, establish rates and fees to cover actual costs of services, assist in the identification of new revenue sources, and develop long-term strategies - both financial and

operational - to assist organizations in establishing a foundation for the future. We have assisted organizations to evaluate and improve operations in areas such as:

- + Finance
- + Human Resources
- + Economic Development
- + Housing Authorities
- + Public and Government Affairs
- + Legal/Justice
- + Capital Project Delivery
- + Information Technology
- + Risk Management
- + Law Enforcement and Public Safety
- + Parks and Recreation
- + Facilities Management
- + Public Works and Utilities
- + Procurement, etc.

Risk Assessments

MCO can help you identify, evaluate, prioritize, and mitigate risks in operations, communications, finance, governance, and a variety of other areas. By developing a comprehensive profile of the organization's risk exposure, we can provide meaningful and actionable points on which to focus efforts for improvement and appropriately allocate limited resources.

Process Improvement

Our team has had the opportunity to facilitate workflow mapping and process improvement initiatives in a wide variety of functions within local government. We are adept at developing a complete understanding of the existing operational environment and the specific responsibilities and requirements of those individuals working within it to identify opportunities to make your processes more efficient.

Infrastructure Planning and Projections

With our unique combination of finance and engineering expertise we are well positioned to help your organization plan and deliver key infrastructure improvements. We have worked with local municipalities to develop detailed financial forecasts for projecting infrastructure maintenance and replacement costs over time as well as establish a plan for prioritizing investments to make sure that your critical assets continue to serve your community. Our experience in asset management, civil engineering, owner's representation and project management have helped local cities develop actionable plans for addressing key infrastructure needs.



Appendix A: Resumes



**Rob Moody, CPA
Partner**

**Bachelor of Arts
Western Washington University**

Licensed CPA: Oregon #6161

**Oregon Society of Certified
Public Accountants, Member,
Past Chair**

**Oregon State Board of
Accountancy Peer Review
Oversight Committee, Chair**

Rob Moody, CPA | Partner

Rob is a partner with Merina+Co and leads our Advisory Services Team. Rob has previously been a partner in a public accounting firm where he led the government assurance practice and provided consulting to state and local governments.

Rob brings a strong customer service perspective to clients and a seasoned understanding of government operations and organizational issues. He recognizes challenges early and has a cooperative style that brings people together to solve issues and improve challenging situations.

RELEVANT EXPERIENCE

Finance Oversight and Advisory Services

Rob currently provides ongoing financial oversight and advisory services to several municipal clients including:

- + City of Siletz, Oregon
- + City of Depoe Bay, Oregon
- + Deschutes County Public Library District
- + City of Lincoln City, Oregon

Oak Lodge Water Services District

Rob is the Project Manager overseeing a variety of services to the District addressing several needs and wants resulting from consolidation of two separate entities to form the District. Rob has been directly involved in a structural review of the District's Finance and Accounting Department, development of financial policies and procedures, and an organizational risk assessment.

Benton County, Oregon

Rob is a team member on the centralization of the County's financial operations – from strategically planning and identifying a structure through implementation of the model with County departments. Through interviews and documentation review, Merina+Co has developed specific recommendations regarding organizational structure, reporting relationships, resource usage, procedures, reporting, and communication.

City of Florence, OR

During this engagement Rob addressed the City's objectives for effective, efficient support services and proposed a strategic reorganization that incorporated finance, human resources, and information technology under a Support Services umbrella and worked with the City to implement the structure.

Rob identified gaps in services to operating departments, and worked to eliminate those gaps through improved communications, reporting, and access to real-time financial information.



**Jordan Henderson, PE, PMP
Partner**

Honors Bachelor of Science,
Civil Engineering
Oregon State University

Licensed Professional Engineer
OR 87508PE

Project Management
Professional

Jordan Henderson, PE, PMP | Partner

Jordan is an experienced consultant with a passion for helping clients solve unique and challenging problems. As a business consultant, Professional Engineer and Project Management Professional, Jordan has worked with numerous public agencies to evaluate and improve their programs and operations. He is experienced in the areas of detailed program assessments, operational efficiency reviews, business process improvements, capital project planning and construction, communications and change management. Jordan combines an ability to quickly evaluate and understand large amounts of information and communicate key themes and observations to help drive development of solutions that address deficiencies and align with strategic directions.

RELEVANT EXPERIENCE

Confederated Tribes of the Grand Ronde Community of Oregon

Jordan is working as part of the team providing ongoing advisory services to the Tribe's Finance Department focused on evaluating organizational structure, roles and responsibilities, service levels, and processes to enhance the Department's ability to provide timely services and meaningful financial information to the rest of the organization.

Benton County, Oregon

Jordan has been working with the County on the centralization of the County's financial operations. This process has included a detailed program evaluation and analysis of alternative service delivery models to identify a structure for implementing consolidated financial services within the County. A key component of this project has been defining a sustainable model for merging financial functions in the County's Public Safety, Public Works, and Public Health functions.

City of Grants Pass, Oregon

Jordan served as Senior Consultant for a recent engagement with the City of Grants Pass, Oregon focused on assessing performance of the City's Property Management Division and developing recommendations for a three to five-year operational plan as part of the City's Performance Audit, Visioning, and Enhancement (PAVE) Program. The project included a detailed and thorough review of current practices and performance in the context of established criteria and best practices to develop specific recommendations for the Division moving forward. The recommendations focused on establishing a clear plan for adequately funding infrastructure-related projects to preserve the City's assets.

Washington Department of Services for the Blind (WDSB)

Merina+Co worked with the Department's Executive Team to provide a comprehensive organizational review and evaluation of the Department's Finance function to establish a plan for enhancing internal financial service delivery. As part of the engagement team, Jordan provided recommendations for changes in organizational structure, division of responsibilities, and business practices to help the agency improve operational performance and compliance with fiscal reporting requirements. As part of this, Jordan has continued to assist the agency with implementing new business practices through updated policies and procedures..



Craig Popp, CPA

**Bachelor of Science
University of Evansville**

Licensed CPA in: Oregon #15434

**American Institute of Certified
Public Accountants**

**Oregon Society of Certified
Public Accountants**

Craig Popp, CPA | Manager

Craig is experienced at providing advisory and accounting services for municipal clients. He has provided financial operational assessments, documented business processes, identified and tested internal controls, and identified opportunities for improvement. Additionally, Craig has been extensively involved in financial audits where he determines testing and procedures to be performed and conducts audit work. He also assists in the preparation of financial statements and reports.

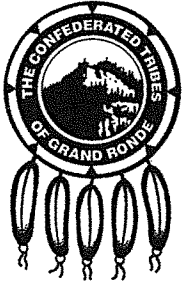
Prior to joining our team, he spent six years in the U.S. Air Force where he learned how to convey relevant and reliable information to pilots and base commanders.

RELEVANT EXPERIENCE

- | | |
|--|-----------------------------------|
| + City of Adair Village | + City of Oregon City |
| + City of Cascade Locks | + City of Tualatin |
| + City of Gladstone
Commission | + Clackamas River Water Supply |
| + City of Happy Valley
District #10 | + Multnomah Rural Fire Protection |
| + City of Independence | + South Fork Water Board |
| + City of Klamath Falls | + Sunrise Water Authority |
| + City of McMinnville | + Woodburn Fire District |
| + City of North Plains | |



Appendix B: Letters of Recommendation



The Confederated Tribes of the Grand Ronde Community of Oregon

Finance Department
Phone (503) 879-5211
1-800 422-0232
Fax (503) 879-2208

9615 Grand Ronde Rd.
Grand Ronde OR 97347

12/17/2021

To: Scott, Jorgensen
City Administrator
City of Rainier
106 West B Street
Rainier, OR 97048

Subject: Letter of Recommendation

Dear Scott,

I have no hesitancy in writing this letter of recommendation for Merina+Co. I have known Rob Moody, Partner, of Merina+Co throughout my 12 years as an auditor and staff accountant. It is during my most recent position as the Financial Controller for the Confederated Tribes of Grand Ronde that I have had the pleasure of working with Rob and his team, Jordan Henderson, Senior Consultant, and Courtney Seto, Consultant.

The Tribe hired Merina+Co for assistance in recruitment of personnel, reorganization, and creating business process improvements for the Finance Department. Throughout the process Rob's team conducted themselves in a professional manner and were easy to work with during a time when our office was going through difficult internal changes. My staff were also impressed telling me that "Jordan was so easy to talk to" and "I feel like they really listened to me." The assistance and information Merina+Co has provided the Tribe will be beneficial for years to come.

I highly recommend Merina+Co for your City's needs, I know you will not be disappointed.

Should you have any additional questions feel free to contact me.

Sincerely,

A handwritten signature in cursive script that reads "Christine O'Day".

Christine O'Day
Financial Controller
Confederated Tribes of Grand Ronde

December 17, 2021

Re: Client Reference for Merina & Co.

To Scott Jorgensen, City of Rainier:

I am writing this letter of reference to recommend Merina & Co. LLP for the performance of accounting services to public entities.

Deschutes Public Library is a special district in the State of Oregon, with financial reporting and accountability requirements as a public institution. We have an annual operating budget which we manage across five separate funds, including a capital fund related to a 2020 bond measure passed by voters to construct a new library and renovate our six existing branches, as well as a fund for servicing of bond repayments.

Merina assisted our District in structuring those two new funds and advised during the bond issuance, in order to maintain our accounts in compliance with standards established by the Governmental Accounting Standards Board (GASB). Merina also provides ongoing accounting services to the District, including: reviewing entries made by our in-house bookkeeping staff; ensuring that quarterly financial statements reported to our governing board are accurate and include any material issues; advising on the applicable GASB standards for grant and bond fund expenditures; assisting in management of fixed assets and depreciation; and preparing materials for the year-end financial statement and annual third party audit.

We have been very pleased with our relationship with Merina. They possess a level of accounting acumen that was far above our previous accounting firm, especially with respect to bond fund accounting for the District's first major capital improvement in two decades. Rob Moody, Merina's accountant for the District, is capable of explaining complex accounting subjects clearly and in a way that effectively assists our in-house bookkeeping team. Rob and his team are responsive to requests and always willing to set up a call or video conference when a question requires a longer explanation than will suffice for email. We considered several different accounting firms when we selected Merina, and we found them to be the best value for the level of service they provide. I highly recommend Merina & Co. LLP to any public entity seeking a similar scope of financial accounting support.

Sincerely,

Robert Guzzo
Business Services Manager
Deschutes Public Library
541-312-1036
robertg@deschuteslibrary.org



Welcome to the

City of Siletz, Oregon

a "Fisherman's Paradise"

Scott Jorgensen, City Manager
City of Rainier

RE: Recommendation of Merina+Co

Dear Mr. Jorgensen,

I understand that Merina+Co is proposing to provide financial support services to the City of Rainier. The City of Siletz has been working with Merina+Co for the past several months in a variety of capacities and have found them to be available and responsive, knowledgeable, communicative, and a valuable part of our overall support team. Rob Moody is the partner on our engagement and provides a high level of expertise in government finance, accounting, and reporting. He brings other members of his team in when appropriate in order to help manage our budget resources and provide the best person for the task.

We are currently working with Merina+Co to improve our practices around payroll, accounts payable, utility billing, cash receipts, and general ledger. They understand operational efficiency and effectiveness as relates to our City, as well as helping us strengthen our internal controls. They have assisted us with our budget process and a supplemental budget and are working with us on preparation for our annual audit cycle.

As we are currently dealing with City crisis due to Covid related issues, Rob has made it his mission to ensure that we do not have failures while we struggle through these times. I feel he has gone above and beyond to prove his and his companies value to the City of Siletz.

I believe that working with Merina+Co has been and continues to be a solid value for the City of Siletz. I would be happy to answer any questions you may have about our relationship with Rob and his team.

Sincerely,

Will Worman, Mayor
City of Siletz
(541)272-1730
William.worman@gapac.com

Servpro of Longview/Kelso

1425 Alabama St

Longview, WA 98632 US

servpro9911@gmail.com

Invoice**BILL TO**City of Rainier
705 Rainier Blvd
Rainier, OR 97048

INVOICE #	DATE	TOTAL DUE	DUE DATE	TERMS	ENCLOSED
5207359	11/30/2021	\$9,956.40	12/30/2021	Net 30	

SALES REP

Internet

MANAGER

Linda Hobson

DATE	ACTIVITY	DESCRIPTION	QTY	RATE	AMOUNT
	General Demolition	Demolition of 516 E E ST Rainier	0.50	17,400.00	8,700.00T
	Permits & Fees	Permit Purchased	0.50	268.80	134.40T
	IH/IAQ	Asbestos Survey	0.50	2,244.00	1,122.00T

SUBTOTAL	9,956.40
TAX (0%)	0.00
TOTAL	9,956.40
BALANCE DUE	\$9,956.40

~~Servpro of Longview/Kelso~~

1425 Alabama St
Longview, WA 98632 US
servpro9911@gmail.com

Statement

~~TO~~

City of Rainier
705 Rainier Blvd
Rainier, OR 97048

~~STATEMENT NO.~~ 1327

~~DATE~~ 12/06/2021

~~TOTAL DUE~~ \$9,956.40

~~ENCLOSED~~

DATE	DESCRIPTION	AMOUNT	BALANCE
10/31/2021	Balance Forward		0.00
11/01/2021	Invoice #5207321	9,956.40	9,956.40
11/30/2021	Invoice #5207359	9,956.40	19,912.80
12/06/2021	Payment #10639	-9,956.40	9,956.40

Current
Due
9,956.40

1-30 Days
Past Due
0.00

31-60 Days
Past Due
0.00

61-90 Days
Past Due
0.00

90+ Days
Past Due
0.00

Amount
Due

~~\$9,956.40~~

106 West "B" Street
P.O. Box 100
Rainier, Oregon 97048



Phone (503) 556-7301
Fax (503) 556-3200
www.cityofrainier.com

Notice of Lien

The City of Rainier, Columbia County, Oregon hereby certifies a lien against the following property for nuisance violation and cost for demolition.

Owner of Record: Steven W. Coy and Nidia G. Coy

Owner's Address of Record: 516 East E. Street, Rainier, OR 97048

City Lien Account No:

Tax Lot Description: Exhibit "A" attached hereto upon this reference incorporated herein.

Current Amount, as of this date: \$19,912.80

Each lien recorded in the lien docket shall be a lien in favor of the City of Rainier against the lot and parcel of land or other property identified and legally described in this lien. The principal balance, which at this time is \$19,912.80 incurs interest at the rate of 9% per month. This amount, plus applicable attorney fees and collection charges, will be added to the balance. This additional amount will be added to the total amount of the lien while it remains unpaid.

The City further certifies that due notice and the opportunity to pay the delinquent account was given the property owner before this lien was recorded. Documents related to this account are located at the City of Rainier City Hall.

When the City remains unpaid for 60 days after it has been recorded in the city's lien docket, the lien may be recorded in the county indices and may be foreclosed in any manner provided by ORS 223.505 to 223.650 or as otherwise provided by law.

Effective Date of Recording: this ____ day of _____, 2022

City Administrator

State of Oregon)
County of Columbia) ss

On this ____ day of _____, 2022, before me appeared Scott Jorgensen, to me personally know, who being first duly sworn, did say the he is the City Administrator of the City of Rainier, that said instrument was executed by the City of Rainier, and he acknowledged said instrument to be the free act and deed of the City of Rainier, Columbia County, Oregon.

Notary Public for Oregon
My commission expires: _____

6d

Exhibit A

That portion of the John S. Hawkins Donation Land Claim in Section 16, Township 7 North, Range 2 West of the Willamette Meridian, Columbia County, Oregon, described as follows:

Beginning at a point on the South sideline of E Street (formerly Ash Street) 80 feet Southerly of the Southeast corner of Block 26 of the City of Rainier according to the Blanchard plat thereof in the line of the Easterly side of said Block 26 if extended; thence Westerly along the South sideline of said E Street 50 feet to TRUE POINT OF BEGINNING; thence Westerly along the South sideline of said E Street another fifty (50) feet; thence Southerly on a line parallel with the Easterly side of said Block 26, 100 feet; thence Easterly on a line parallel with the Southerly side of said Block 26, 50 feet; thence Northerly on a line parallel with the Easterly side of said Block 26, 100 feet to the point of beginning.....

**BEFORE THE CITY COUNCIL OF
THE CITY OF RAINIER**

RESOLUTION #22-01-01

**A RESOLUTION TO ASSESS THE COSTS FOR DEMOLITION OF THE NUISANCE
HOUSE AT 516 EAST E STREET**

WHEREAS, the Rainier City Council voted unanimously at its May 3, 2021 meeting to declare a vacant house at 516 East E Street to be a nuisance; and

WHEREAS, the City of Rainier followed all of the processes set forth in Rainier Municipal Code Chapter 15.15 pertaining to Dangerous Buildings; and

WHEREAS, the City incurred a direct cost of \$19,912.80 for the demolition of the nuisance house at 516 East E Street; and

WHEREAS, Rainier Municipal Code Chapter 15.15 enables the City of recover those costs through the placement of a lien on the property;

NOW, THEREFORE, IT IS HEREBY RESOLVED that the Common Council of the City of Rainier, Oregon that:

A lien of approximately \$19,912.80 be placed upon the property of 516 East E Street to recover the costs incurred by the City of Rainier by the demolition of the nuisance home at that location. A legal description of the property is attached as Exhibit A.

PASSED AND ADOPTED by the City Council of the City of Rainier, Oregon this _____ day of _____, 2022.

Attested:

Jerry Cole, Mayor

W. Scott Jorgensen, City Administrator

Exhibit A

That portion of the John S. Hawkins Donation Land Claim in Section 16, Township 7 North Range 2 West of the Willamette Meridian, Columbia County, Oregon, described as follows:

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CITY OF RAINIER
CASH ON HAND/GENERAL LEDGER RECONCILIATION REPORT
CHECKING ACCOUNTS AND LOCAL GOVERNMENT POOL ACCOUNT
11/1/2021-11/30/2021

ACCOUNT REGISTER SUMMARY	CKS/DEBITS	DEP/CREDITS	
Ending Balance	280,294.47		
PERS Deposits -			
New Ending Balance	280,294.47	0.00	0.00
			<u>280,294.47</u>

BANK STATEMENT SUMMARY	CKS/DEBITS	DEP/CREDITS		
Ending Balance SHCU 760072-1	34,330.49			
Ending Balance SHCU 760072-2	358,434.35			
Deposits not Shown on Statement		9,874.87		
Outstanding Cks and Other Debits	101,549.60			
PERS Outstanding	20,795.64			
PERS Adjustment				
Ending Balance	392,764.84	122,345.24	9,874.87	0.00
				<u>280,294.47</u>

LGIP STATEMENT SUMMARY				
Beginning Balance	5,994,494.49			
Deposits		1,004,895.09		
Withdrawals	100,000.00			
Interest		2,342.02		
S/C	0.00			
Ending Balance	5,994,494.49	100,000.00	1,007,237.11	
				<u>6,901,731.60</u>

TOTAL CASH 7,182,026.07

GENERAL LEDGER RECONCILIATION
11/1/2021-11/30/2021

	11/01/21				11/30/21	
Fund	Beginning Balance	Total Revenue	Total Expense	Liabilities	Ending Balance	
10 General	1,898,569.26	1,167,004.21	385,087.28		2,680,486.19	
20 Debt	364,096.00	246,138.92	246,138.92		364,096.00	
30 Sewer	339,352.77	83,965.73	47,520.45		375,798.05	
40 Water	660,495.20	69,452.20	215,826.28		514,121.12	
50 Timber	1,232,989.21	25,259.37	4,337.26		1,253,911.32	
60 Street	252,196.31	111,390.45	10,254.82		353,331.94	
65	0.00				0.00	
70	0.00				0.00	
81 Special Projects	269,282.53	0.00	2,209.63		267,072.90	
83 Sewer Capital	837,705.00	0.00	29,332.36		808,372.64	
84 Water Capital	97,611.82	102,407.33	146,840.52		53,178.63	
85 Transportation Capital	420,865.83	0.00	139.39		420,726.44	
90 Library Trust	89,360.88	2,032.11	462.15		90,930.84	
General Ledger Total	<u>6,462,524.81</u>				<u>7,182,026.07</u>	0.00

Completed by: _____ Date: _____ Approved by: _____ Date: _____

City of Rainier
2020/2021 Budget Year
11/30/2021
Budget Compared to Actual-Major Funds
Budget Variance by Appropriation

	2021/2022	11/30/2021	11/30/2021
General Fund	Budget	YTD Actual	YTD % Variance
*Revenue	1,563,290	1,156,178	73.96%
Expenditures			
10 General Government	388,638	132,837	34.18%
20 City Building Maintenance	13,500	3,806	28.19%
30 Land Use & Development	27,425	8,561	31.22%
50 Library	68,800	3,008	4.37%
60 Attorney	7,500	4,835	64.47%
70 Finance & Administration	56,117	21,610	38.51%
80 Municipal Court	61,084	24,987	40.91%
90 Public Properties	189,483	81,686	43.11%
100 Police Department	965,743	324,332	33.58%
	2021/2022	11/30/2021	11/30/2021
Sewer Fund	Budget	YTD Actual	YTD % Variance
*Revenue	1,468,913	480,740	32.73%
Expenditures			
Personnel Services	454,307	179,043	39.41%
Material & Services	278,000	148,011	53.24%
Capital Outlay	0	0	0.00%
Transfers	956,944	352,073	36.79%
Contingencies	43,310	0	0.00%
	2021/2022	11/30/2021	11/30/2021
Water Fund	Budget	YTD Actual	YTD % Variance
*Revenue	957,000	401,127	41.92%
Expenditures			
Personnel Services	488,346	193,848	39.69%
Material & Services	192,320	88,141	45.83%
Capital Outlay	0	0	0.00%
Transfers	512,382	162,336	31.68%
Contingencies	42,150	0	0.00%
	2021/2022	11/30/2021	11/30/2021
Timber Fund	Budget	YTD Actual	YTD % Variance
*Revenue	180,000	25,259	14.03%
Expenditures			
Material & Services	80,400	28,206	35.08%
Capital Outlay	65,000	0	0.00%
Contingencies	300,000	0	0.00%
Property Purchase Reserve	75,112	0	0.00%
	2021/2022	11/30/2021	11/30/2021
Street Fund	Budget	YTD Actual	YTD % Variance
*Revenue	248,382	166,917	67.20%
Expenditures			
Personnel Services	66,643	30,862	46.31%
Material & Services	118,150	44,228	37.43%
Capital Outlay	0	0	0.00%
Contingencies	2,144	0	0.00%
Transfers	146,128	0	0.00%

*Excludes Beginning Balance

City of Rainier
 2021/2022 Budget Year
 11/30/2021

Budget Compared to Actual-Major Funds

Income/Expense

	2021/2022	11/30/2021	11/30/2021
General Fund	Budget	YTD Actual	YTD % Variance
*Revenue	1,563,290	1,156,178	73.96%
Expenditures	1,778,290	605,662	34.06%

	2021/2022	11/30/2021	11/30/2021
Sewer Fund	Budget	YTD Actual	YTD % Variance
*Revenue	1,468,913	480,740	32.73%
Expenditures	1,732,561	679,127	39.20%

	2021/2022	11/30/2021	11/30/2021
Water Fund	Budget	YTD Actual	YTD % Variance
*Revenue	957,000	401,127	41.92%
Expenditures	1,235,198	444,325	35.97%

	2021/2022	11/30/2021	11/30/2021
Timber Fund		YTD Actual	YTD % Variance
*Revenue	180,000	25,259	14.03%
Expenditures	520,512	28,206	5.42%

	2021/2022	11/30/2021	11/30/2021
Street Fund	Budget	YTD Actual	YTD % Variance
*Revenue	248,382	166,917	67.20%
Expenditures	333,065	75,091	22.55%

*Excludes Beginning Balance

Accounts Payable

Checks by Date - Summary by Check Date

User: elisha
Printed: 12/16/2021 11:45 AM



Check No	Vendor No	Vendor Name	Check Date	Check Amount
10639	3142	Servpro of Longview/Kelso	11/01/2021	9,956.40
Total for 11/1/2021:				9,956.40
10640	066	Airgas USA, LLC	11/11/2021	566.17
10641	2220	Baker & Taylor	11/11/2021	339.99
10642	3782	Ballard Marine Construction LLC	11/11/2021	5,561.00
10643	673	Cintas Corporation	11/11/2021	264.53
10644	3358	Cintas Fire 636525	11/11/2021	788.15
10645	3041	CIS Trust	11/11/2021	2,385.48
10646	097	Columbia County Treasurer	11/11/2021	176.00
10647	044	Columbia River PUD	11/11/2021	292.49
10648	3513	Comcast	11/11/2021	610.01
10649	3669	Comcast Business	11/11/2021	424.13
10650	3514	Core & Main LP	11/11/2021	162.16
10651	3574	Correct Equipment, Inc.	11/11/2021	46,651.43
10652	2167	Country Media Inc.	11/11/2021	328.00
10653	008	Daily News	11/11/2021	244.40
10654	1119	Feltons' Heating & Cooling, Inc.	11/11/2021	272.34
10655	3145	First Data Merchant Services	11/11/2021	17.94
10656	837	Global Security & Comm. Inc.	11/11/2021	3,218.00
10657	581	Home Depot Credit Services	11/11/2021	396.13
10658	3450	Elizabeth Lawrence	11/11/2021	46.63
10659	3644	More Power Computers, Inc.	11/11/2021	2,634.96
10660	182	NW Natural	11/11/2021	114.62
10661	1028	Office Depot	11/11/2021	97.13
10662	3460	Office Express, Inc.	11/11/2021	35.50
10663	060	One Call Concepts Inc	11/11/2021	16.80
10664	996	Oregon Department of Revenue	11/11/2021	715.00
10665	817	Oregon Dept of Forestry	11/11/2021	20.00
10666	027	Platt Electric Supply, Inc	11/11/2021	250.29
10667	382	Postmaster	11/11/2021	511.98
10668	096	Rainier Police Department	11/11/2021	401.00
10669	3080	Ricoh USA, Inc.	11/11/2021	153.12
10670	3368	Ross Recreation Equipment Inc.	11/11/2021	106.50
10671	132	Springbrook SpringbrookHolding Company	11/11/2021	302.00
10672	016	State Forester	11/11/2021	4,160.07
10673	022	Stephen D. Petersen, LLC	11/11/2021	50.00
10674	022	Stephen D. Petersen, LLC	11/11/2021	1,150.00
10675	2299	Susan Sullivan	11/11/2021	121.90
10676	2126	Sunset Auto Parts, Inc.	11/11/2021	165.88
10677	3470	Tribeca Transport LLC	11/11/2021	2,221.44
10678	030	True Value	11/11/2021	412.86
10679	188	United Rentals	11/11/2021	503.02
10680	089	USA Blue Book	11/11/2021	14,120.19
10681	3577	Wasco County Landfill, Inc.	11/11/2021	1,780.84
10682	3653	West Yost & Associates, Inc.	11/11/2021	139.39

Check No	Vendor No	Vendor Name	Check Date	Check Amount
10683	035	Wilcox & Flegel	11/11/2021	168.48
10684	035	Wilcox & Flegel	11/11/2021	709.83
Total for 11/11/2021:				93,807.78
10686	3338	Business Oregon Infrastructure Finance Au	11/15/2021	93,000.00
10687	3338	Business Oregon Infrastructure Finance Au	11/15/2021	69,336.02
10688	3338	Business Oregon Infrastructure Finance Au	11/15/2021	18,320.94
10689	446	Columbia County Clerk	11/15/2021	111.00
10690	446	Columbia County Clerk	11/15/2021	111.00
10691	446	Columbia County Clerk	11/15/2021	111.00
10692	446	Columbia County Clerk	11/15/2021	106.00
10693	3783	Komfort Cruzr LLC	11/15/2021	445.00
10694	3637	Zion Bank Corporate Trust	11/15/2021	65,481.96
Total for 11/15/2021:				247,022.92
10695	3000	ALS Group USA, Corp.	11/23/2021	1,551.00
10696	2128	ASTI PDX LLC (ERS)	11/23/2021	29,987.07
10697	790	Carl's Towing	11/23/2021	477.00
10698	673	Cintas Corporation	11/23/2021	412.24
10699	244	Clatskanie PUD	11/23/2021	8,964.99
10700	3513	Comcast	11/23/2021	392.97
10701	3514	Core & Main LP	11/23/2021	984.11
10702	3574	Correct Equipment, Inc.	11/23/2021	3,441.49
10703	043	Cowlitz Clean Sweep Inc	11/23/2021	787.50
10704	057	Cowlitz River Rigging Inc	11/23/2021	105.73
10705	094	Cowlitz Wahkiakum Government	11/23/2021	1,720.72
10706	3785	Norman J Faris (Valar Cons. Eng)	11/23/2021	1,045.00
10707	3182	Government Ethics Commission	11/23/2021	548.82
10708	222	Hamer Electric	11/23/2021	301.84
10709	020	Lakeside Industries	11/23/2021	101.44
10710	3655	Leeway Engineering Solutions, LLC	11/23/2021	4,146.50
10711	3021	Marlin Business Bank	11/23/2021	178.98
10712	2297	OHA - State of Oregon	11/23/2021	113.00
10713	605	Points S Tire Factory	11/23/2021	1,354.19
10714	089	USA Blue Book	11/23/2021	2,468.00
10715	101	V O Printers, Inc	11/23/2021	324.30
10716	3512	Verizon	11/23/2021	202.47
10717	078	Watkins Tractor & Supply Co	11/23/2021	256.87
10718	3653	West Yost & Associates, Inc.	11/23/2021	2,349.02
10719	035	Wilcox & Flegel	11/23/2021	323.42
10720	035	Wilcox & Flegel	11/23/2021	673.37
10721	3784	Bill Winder	11/23/2021	240.00
Total for 11/23/2021:				63,452.04
ACH	1123	OR DEPT OF JUSTICE	11/30/2021	627.00
ACH	FED TX	EFT Federal tax dep	11/30/2021	9,120.66
ACH	FICA	EFT EE/ER FICA	11/30/2021	11,460.82
ACH	Medicare	EFT EE/ER Medicare	11/30/2021	2,680.32
ACH	OR ST Tx	EFT Employee Oregon St Tx	11/30/2021	6,336.65
ACH	PERSEE	EFT PERS Employee /Employer Pa	11/30/2021	5,551.06
ACH	PERSER	EFT PERS Employer Paid	11/30/2021	15,242.09
ACH	PERU	EFT PERS Units	11/30/2021	2.48
10722	985	AFLAC	11/30/2021	152.59

Check No	Vendor No	Vendor Name	Check Date	Check Amount
10723	077	CIS Trust	11/30/2021	319.23
10724	3618	Office of the Trustee	11/30/2021	950.00
10725	ORSGP	Oregon Savings Growth Plan	11/30/2021	1,900.00
10726	079	Oregon Teamster Employer Trust	11/30/2021	25,467.45
10727	995	Teamsters Local No. 58	11/30/2021	841.00
				<hr/>
Total for 11/30/2021:				80,651.35
				<hr/>
				<hr/>
Report Total (96 checks):				494,890.49
				<hr/>
				<hr/>

City Administrator Report
January 10, 2022 Rainier Council Meeting

Mayor Cole and Members of the Council,

Along with City Planner Keshia Owens, I met with a representative of the state Department of Land Conservation and Development November 30 to discuss a possible adjustment to the city's Urban Growth Boundary.

On December 6, I spoke with Rep. Brad Witt's staff about the city hosting a town hall meeting for him after the February legislative session. I also had a discussion with a representative of the Department of State Lands about an intergovernmental agreement that would allow the city to enforce code on property owned by that agency.

I've continued efforts to work with the Rainier Oregon Historical Museum board of directors to implement the memorandum of understanding that was approved by council and attended that body's December 9 meeting. That same day, I met with the county emergency management director.

City Recorder Sarah Blodgett, Finance Clerk Elisha Shulda and I met December 10 with representatives of the CPA firm that submitted the RFP that is included in the council packet.

I attended the December 15 meeting of the Rainier Chamber of Commerce with Mayor Jerry Cole, and we presented guest speaker Betsy Johnson with a plaque honoring her 20 years of service to Rainier in the Oregon Legislature.

Blodgett, Owens and I coordinated to ensure that the legally required publications of notices were done for items on the council and Planning Commission agendas.

At 9:19 a.m. on Christmas morning, my wife gave birth to our daughter Melody Rosemarie. I took the following two weeks off, and January 10 is my first day back from leave.

Sincerely,

W. Scott Jorgensen, Executive MPA
City Administrator

Code Enforcement Survey Results

At its November 1 meeting, Council directed staff to conduct a citizen survey of code enforcement services. The survey questions were developed by the City Administrator and Councilor Scott Cooper and sent out in the November utility billings.

Citizens were given a deadline of December 17 to return the surveys to city hall. A few comments were not included because they included information about specific properties or were otherwise inappropriate or difficult to decipher.

Approximately **62 responses** were received by the deadline. They are as follows:

1. Are you satisfied with the current level of code enforcement conducted by the City?
Yes—25 votes; 40.3 percent
No—30 votes; 48.4 percent
Don't know/other—7 votes; 11.3 percent
2. What areas do you feel the City should emphasize when doing code enforcement? (mark all that apply)
Abandoned/non-working vehicles—37 votes
Accumulated garbage/debris on properties—34 votes
Prolonged RV occupation—28 votes
Responding to citizen complaints—19 votes
High grass/vegetation—15 votes

Comments:

- *roads, transients
- *Highway homeless/tents on riverfront in city limits
- *Chapters 8.15 and Chapter 8.50 completely and related ORS statutes
- *Dogs barking at all times of the day!
- *Water runoff in the ditches
- *Houses that are abandoned and uninhabitable that indicate no progress in renovating
- *Abandoned boat on beach
- *Unnecessary noise, ie, barking dogs. Loud vehicles. There are dogs in our area that bark at everything and nothing. If it moves or makes a sound they bark at it and the owners don't do anything. The barking I'm speaking of is happening all hours of the day and night. I would be happy to talk with someone about it.
- *Parking in front of occupied homes!
- *Homeless people wandering in day and night
- *RV occupation on the streets
- *Stop excessive noises after 10 p.m. and before 7 a.m.
- *Water front beach-illegal use of boats and prolonged use of car overnight stay

3. Should the City hire additional staff or use existing resources?

Hire additional staff—30 votes; 48 percent

Use existing resources—29 votes; 47 percent

Other—3 votes; 5 percent

Comment:

*Contract it out

4. If the City adds staff to enhance code enforcement, should it be done on a part or full-time basis?

Part-time—39 votes; 63 percent

Full-time—16 votes; 26 percent

Other—7 votes; 11 percent

Comments:

*Part time, if needed six months a year or more, yes

*Part time, or contract with the county

Other Comments:

*We need speed bumps or stop signs on East E Street to slow down speeding traffic!

*The city has more than enough resources to enforce existing ordinances. It just lacks the will to enforce them. There is no need to wait for citizen complaints before enforcement measures begin. By their nature, violations are easily visible during a simple drive by. The entire city could be surveyed in less than four hours. Once a month? Once a week? Quarterly?

*Dead and untrimmed trees on private property with no homes in downtown area.

*Whatever seems feasible and appropriate.

*Never open RV park!

*Dogs running off leash/A Street and neighborhoods

*Transients

*Roads

*We need speed bumps or stop signs on East E Street to slow speeding traffic!

January 5, 2022

SENT VIA: EMAIL

Ms. Sue Lawrence
Public Works Director
City of Rainier
PO Box 100
Rainier, OR 97048

SUBJECT: Proposal for the Fox Creek Culvert Feasibility Study

Dear Ms. Lawrence:

West Yost appreciates the opportunity to provide this letter proposal to the City of Rainier (City) to prepare a Feasibility Study for the Fox Creek Culvert (Project).

BACKGROUND

Fox Creek runs through the City of Rainier, from South to North, going under Highway 30, and then flowing into the Columbia River. From West C Street to the crossing of Highway 30, the creek is contained within a series of culverts, pipe and manhole, crossing public (City of Rainier, and ODOT) and private commercial properties.

During the heavy rain events in December 2015, the culvert was overwhelmed leading to significant flooding on Highway 30, and the development of a sink hole in the middle of the culvert reach threatening the surrounding businesses. Follow up hydraulic analysis demonstrated that the City's culvert and the piped section of Fox Creek are undersized and do not offer good fish passage.

This proposed Feasibility Study will analyze structures and fish passage alternatives. Fish passage options will be considered separately by the three ownership segments: ODOT, Private owners, and City.

SCOPE OF SERVICES

Following is a list of the key tasks necessary to perform this proposed Scope of Services, each further described below:

- Task 1. Project Management
- Task 2. Data Collection
- Task 3. Geotechnical Engineering Evaluation
- Task 4. Alternatives Analysis
- Task 5. Feasibility Report
- Task 6. Public Engagement

Task 1. Project Management

Project management includes coordination with client, sub-consultant and internal team, a Project kick-off meeting, and bi-weekly meetings. This Task also includes the preparation of six (6) monthly progress reports and invoices.

Task 1 Assumptions

- The anticipated project duration is six (6) months.

Task 1 Deliverables

- West Yost will provide one electronic (PDF) copy of monthly progress reports with invoices.
- West Yost will provide meeting minutes for the project kick-off meeting.

Task 2. Data Collection

Collect background and baseline data necessary to evaluate the feasibility of design alternatives along the culverted section of Fox Creek as well as its associated costs.

Subtask 2.1 Desktop Analysis & Baseline Data Review

Review background data including record drawings, previous reports and studies and other information such as recent anadromous fish surveys and data related to fish passage design.

Subtask 2.2 Site Reconnaissance and Stream Survey

Conduct a site reconnaissance of the piped section of Fox Creek to document the existing size and condition of the pipe and culvert(s). GPS survey equipment will be used during the site visit. W2R will also evaluate inlet and outlet conditions and determine bankfill channel width along with other geomorphic parameters necessary to determine elements required for State and federal fish passage requirements.

Task 2 Assumptions

- Utility locates and survey is not included in this scope of work.
- City to provide access through the project reach, including upstream and downstream of the culvert(s).
- Topographic survey, hazardous materials, historical and archaeological, biological, and other environmental resources are not included in this scope of work.

Task 2 Deliverables

- None.

Task 3. Geotechnical Engineering Evaluation

Complete a geotechnical evaluation to identify any potential concerns with the soils underlying the area of the potential upgrades, including:

- Complete a geologic background review and a site reconnaissance
- Conduct one boring/geoprobe at the culvert location to a maximum depth of 30 feet or auger refusal if encountered shallower to assess the subsurface soil conditions and the presence of bedrock and/or boulders
- Provide geotechnical engineering recommendations for the culvert design and construction, such as subsurface soil conditions, foundation bearing, site excavation, subgrade preparation, structural fill compaction criteria, and other earthwork recommendations.

Task 3 Assumptions

- Utility locates and survey is not included in this scope of work.
- City to provide access through the project reach, including upstream and downstream of the culvert(s).

Task 3 Deliverables

- None.

Task 4. Alternatives Analysis

Evaluate up to three crossing alternatives along the three ownership segments (ODOT, Private owners, and City) as shown in Table 4-1 below. A fourth “daylighting” option will be included in the Privately-owned segment. Feasibility will consider Class 4 AACEI cost estimate range, constructability, and environmental compliance for a bridge, open-bottom culvert, and buried culvert.

Table 4-1. Potential Alternatives				
Ownership Segment	Bridge	Open-Bottom Culvert	Buried Culvert	Daylight
ODOT	YES	YES	YES	NO
Private owners	YES	YES	YES	YES
City	YES	YES	YES	NO

Subtask 4.1 Structures Alternatives Evaluation

Evaluate constructability for a bridge, open-bottom culvert, and buried culvert. Bridge foundation options will include shallow (spread footing), and deep (driven pile and drilled shaft) foundations. Similar analysis will be conducted for a daylighted section through the private property.

Subtask 4.2 Regulatory Agency consultation

Coordinate via telephone interviews with ODFW Fish Passage Program and Field Office personnel to verify the target fish species and design requirements (i.e., flow velocities, culvert entrance height, etc.). Coordinate virtual meetings with ODFW, NMFS, USACE, City staff, and other stakeholders requested by the City to (a) verify design parameters, (b) discuss constraints to potential options (e.g., arch culvert height clearance requirements versus available fill cover space), (c) agree on documentation requirements for

different options, and (d) outline needed environmental permits for the selected alternative (e.g., compliance with available programmatic permits for the Oregon Removal-Fill Law, Section 404 of the federal Clean Water Act, Section 7 of the Endangered Species Act, and other applicable laws).

Subtask 4.3 Fish Passage Analysis

Determine feasible fish passage options that comply with applicable state and federal laws. Options will include Stream Simulation Design for a bridge, open-bottom culvert (arch or box), or buried culvert (round, oval, or box), and partial daylighting with stream restoration.

Task 4 Assumptions

- Only single-span crossing options will be considered. No multiple-barrel culvert configurations or bridge piles in the stream will be analyzed.
- Open -bottom culvert options include either an arch culvert or inverted “U”.
- Fish passage options that require special review from ODFW personnel (e.g., detailed hydraulic analysis to meet specific velocities and depths for various fish species requirements) will not be considered.

Task 4 Deliverables

- None.

Task 5. Feasibility Report

Prepare a Fox Creek Culvert Feasibility Study Report summarizing the following for each alternative:

- Concept design sheet in simple planform graphics
- Estimated design and construction cost
- Description of advantages and disadvantages, including constraints such as constructability and safety
- Operations and maintenance considerations
- Environmental compliance strategy, that outlines how the project achieves compliance with applicable state and federal fish passage laws as well as environmental permitting necessary for the selected alternative.

The report will include identification of the recommended and most feasible alternative given cost, agency consultation and other considerations.

Task 5 Assumptions

- City will provide written comments on the Draft Feasibility Report within 2 weeks of submittal.
- One review meeting to review client comments prior to final report preparation.

Task 5 Deliverables

- West Yost will provide one electronic (PDF) copy of the Draft Feasibility Report for City’s review.
- West Yost will provide three hard copies and one electronic (PDF) copy of the Final Feasibility Report.

Task 6. Public Engagement

Subtask 6.1 Presentation and Handouts

Prepare presentation and handouts for a workshop with City Council and other interested stakeholders. The presentation will be developed in PowerPoint format. Handouts will be provided at the presentation for attendees.

Subtask 6.2 City Council/Stakeholder Workshop

West Yost and W2R will present the alternatives during City Council meeting.

Task 6 Assumptions

- None.

Task 6 Deliverables

- Draft presentation materials one week prior to public engagement date.
- Final presentation materials on public engagement date.

PROJECT BUDGET

West Yost's proposed level of effort and budget for each of the tasks described above is summarized in Table 1 below. West Yost will perform the Scope of Services described above on a time-and-expenses basis, at the billing rates set forth in West Yost's current contract for providing City Engineer-of-Record Services, with a not-to-exceed budget of \$99,959.

Any additional services not included in this Scope of Services will be performed only after receiving written authorization and a corresponding budget augmentation.

Table 1. Estimated Project Budget	
Task	Budget, \$
Task 1. Project Management	10,746
Task 2. Data Collection	10,964
Task 3. Geotechnical Engineering Evaluation	11,275
Task 4. Alternatives Analysis	35,724
Task 5. Feasibility Report	23,286
Task 6. Public Engagement	7,964
Total Budget	\$99,959

SCHEDULE

West Yost anticipates the project to be completed within six months after Notice to Proceed. The schedule assumes a Notice of Proceed in January 2022 and will complete the project by September 30, 2022.

Thank you for providing West Yost the opportunity to be of continued service to the City. We look forward to working with you on this important project. Please call, 503.784.9536, if you have any questions or require additional information

Sincerely,
WEST YOST



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