CITY OF FALLS CITY ADDENDUM

Purpose

This document serves as the City of Falls City's Addendum to the Polk County Multi-Jurisdictional Natural Hazards Mitigation Plan (MNHMP, NHMP). This addendum supplements information contained in Volume I (Basic Plan) of this NHMP, which serves as the foundation for this jurisdiction's addendum, and Volume III (Appendices), which provides additional information (particularly regarding participation and mitigation strategy). This addendum meets the following requirements:

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

Plan Process, Participation, and Adoption

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

In the Fall of 2016, the Oregon Partnership for Disaster Resilience (OPDR) at the University of Oregon's Community Service Center (CSC) partnered with the Oregon Military Department's Office of Emergency Management (OEM), and Polk County and cities, including Falls City, to update their NHMP, which expired October 14, 2014. This project is funded through the Federal Emergency Management Agency's (FEMA) FY14 Pre-Disaster Mitigation Competitive Grant Program (PDMC-PL-10-OR-2014-002).

By developing this addendum to the Polk County NHMP, locally adopting it, and having it approved by FEMA, Falls City will regain eligibility for FEMA Hazard Mitigation, Pre-Disaster Mitigation, and Flood Mitigation Assistance grant program funds.

The Polk County NHMP, and Falls City addendum, are the result of a collaborative effort between citizens, public agencies, non-profit organizations, the private sector, and regional organizations. A project steering committee guided the process of developing the plan. For more information on the composition of the steering committee see the *Acknowledgements*, *Plan Summary*, and *Plan Process* (Volume III, Appendix A).

The City Manager of Falls City is the designated local convener and will take the lead in implementing, maintaining, and updating the addendum to the NHMP in collaboration with the designated convener of the Polk County NHMP (County Planning Department).

Representatives from the City of Falls City steering committee convened on the following occasions (see Appendix A for more information):

- July 27, 2016 - Polk County NHMP Kick-Off Meeting

- August 2016 – NHMP Project Agenda Report to City Council. Added an NHMP update project tab to City website and encouraged public participation.
- October 18, 2016 – Polk County NHMP Second Meeting

The city's addendum reflects decisions decided upon at the plan update meeting and during subsequent work and communication with OPDR.

The Falls City Steering Committee was comprised of the following representatives:

- Convener, City Manager
- Domenica Protheroe , City Clerk
- Terry Ungricht. Mayor and City Manager
- Don Poe, Lead Public Works Worker
- Members of the City Council

Public participation was achieved with the establishment of the steering committee, which was comprised of city officials and special districts representing different organizations and sectors. In addition, public comments were solicited via the City Website (beginning in August 2016). The Steering Committee was closely involved throughout the development of the plan and served as the local oversight body for the plan's development. In addition, community members outside of the steering committee were provided an opportunity for comment via the plan review process (see Appendix A for more information).

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

Mitigation Strategy

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

During the 2016/2017 Polk County update process OPDR re-evaluated the Action Items with the county and local steering committees. Following the review actions were updated, noting what accomplishments had been made, and whether the actions were still relevant; any new action items were identified at this time (see Appendix A for more information). Each jurisdiction developed a list of priority actions any actions that were not prioritized were placed in an Action Item Pool and will be considered during the annual Implementation and Maintenance meetings.

Priority Actions

The city is listing a set of high priority actions in an effort to focus attention on an achievable set of high leverage activities over the next five-years. The city's priority actions are listed below in Table FCA-1.

Action Item Pool

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

The majority of these actions carry forward from prior versions of this plan.

Table FCA-1 Falls City Priority Action Items

Action Item #	Description	Managing Department / Agency	Timeline	Potential Funding Source(s)	Benefit- Costs / Technical Feasibility
Priority Actions					
Multi-Hazard Action (MH)					
MH #1	Purchase and install generators with main power distribution disconnect switches for identified and prioritized critical facilities (particularly schools) susceptible to short term power disruption.	Falls City School District	Mid-Term (2-5 Years)	HMGP, School District Bond	BC: TBD TF: Yes
Earthquake Actions (EQ)					
EQ #1	Disseminate FEMA pamphlets to educate and encourage homeowners concerning seismic structural and non-structural retrofit benefits.	City Manager	Ongoing	General Fund, NEHRP, HMGP	BC: TBD TF: Yes
EQ #2	Repair Dayton Street Bridge	City Manager, Public Works	Mid-TermT (2-5 Years)	OR-IFA, USDA, OPRD	BC: $116,000 TF: Yes
Flood Action (FL) - *including erosion*					
FL #1	Develop an outreach program to educate public concerning NFIP participation benefits, floodplain development, land use regulation, and NFIP flood insurance availability to facilitate continued compliance with the NFIP.	MWVCOG Planning, City Manager, & Public Works	Short Term (0-2 Years)	General Fund	BC: TBD TF: Yes

Source: City of Falls City NHMP Steering Committee, 2016.
MH=Multi-Hazard, EQ=Earthquake, FL=Flood

Table FCA-2 Falls City Action Item Pool

Action Item #	Description	Managing Department / Agency	Timeline	Potential Funding Source(s)	Benefit- Costs / Technical Feasibility
Action Item Pool					
Multi-Hazard Actions (MH)					
MH #2	Update Bulding Limitations Map and update Zoning and Development Code if required.	MWVCOG	Short Term (0-2 Years)	General Fund	BC: TBD TF: Yes
MH #3	Complete critical facility data collection to allow a more thorough vulnerability analysis for the City's infrastructure.	City Manager	Mid-Term (2-5 Years)	General Fund	BC: TBD TF: Yes
Drought Actions (DR) - *including expansive soils*					
No specific actions identified; see multi-hazard actions.					
Earthquake Actions (EQ)					
EQ #3	Identify high seismic hazard areas; develop a wood- frame residential building inventory and an outreach program to educate population concerning facilities particularly vulnerable to earthquake damage, such as pre-1940s homes and homes with cripple wall foundations.	MWVCOG	Mid-Term (2-5 Years)	General Fund	BC: TBD TF: Yes
EQ #4	Retrofit Bridge Street Vehilcular Bridge	City Manager, Public Works	Long Term (5+ Years)	OR-IFA, USDA, OPRD	BC: TBD TF: Yes
EQ #5	Retrofit important public facilities with significant seismic vulnerabilities (City Hall, etc.), such as unreinforced masonry construction. Consider structural and non-structural options.	City Manager Falls City School District	Long Term (5+ Years)	General Fund, NEHRP, HMGP, SRGP	BC: TBD TF: Yes
Flood Actions (FL) - *including erosion*					
FL #2	Southside drainage improvements.	City Manager, Polk County, Public Works	Ongoing	Street Fund, HMGP, HMA	BC: TBD TF: Yes
FL #3	Develop outreach program to educate residents concerning flood proofed well and sewer/septic installation.	Sewer: MWVCOG and City Manager Septic: Polk County	Ongoing	General Fund	BC: TBD TF: Yes
FL #4	Evaluate and implement preferred erosion protection initiatives to prevent or reduce riverine erosion damages to residential structures and road drainage systems.	MWVCOG Planning, City Manager, & Public Works	Ongoing	General Fund, NRCS, HMGP, HMA	BC: TBD TF: Yes

Source: City of Falls City NHMP Steering Committee, 2016
MH=Multi-Hazard, EQ=Earthquake, FL=Flood

Table FCA-2 Falls City Action Item Pool (continued)

2016 Action Item #	Description	Managing Department / Agency	OPDR Timeline	Potential Funding Source(s)	Benefit- Costs / Technical Feasibility
FL #5	Identify buildings that are at risk of being affected by erosion.	MWVCOG Planning, City Manager, & Public Works	Long Term (5+ Years)	General Fund, NRCS, HMPG, HMA	BC: TBD TF: Yes
FL #6	Conduct a water intake siting study and environmental impact study.	City Manager, Public Works	Long Term (5+ Years)	CDBG, USDA, OR-IFA	BC: $25,000 TF: Yes
Landslide Actions (LS)					
LS #1	Develop, implement, and enforce property development landslide risk assessment procedures to identify potential facility vulnerability.	MWVCOG Planning & City Manager	Ongoing	General Fund	BC: TBD TF: Yes
LS #2	Create 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.	MWVCOG Planning & City Manager	Long Term (5+ Years)	General Fund	BC: TBD TF: Yes
Volcano Actions (VE)					
VE #1	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.	MWVCOG, City Manager	Long Term (5+ Years)	General Fund, NOAA/ NWS	BC: TBD TF: Yes
VE #2	Evaluate capability of water treatment plant to deal with high turbidity from ash falls, update emergency response plans, and upgrade treatment facilities' physical plant to deal with ash falls.	City Engineer, City Manager & Public Works	Long Term (5+ Years)	General Fund, NOAA/ NWS	BC: TBD TF: Yes
Wildfire Actions (WF)					
WF #1	Develop outreach program to educate and encourage home landscape cleanup (defensible space) and define debris disposal programs.	DEQ, City Manager	Ongoing	General Fund, ODF, FMAP, HMGP	BC: TBD TF: Yes
WF #2	Participate in the maintenance, implementation, and update of the Polk County Community Wildfire Protection Plan (2009).	PC SW Rural Fire District Polk County & City Manager	Ongoing	General Fund	BC: TBD TF: Yes
WF #3	Identify, develop, implement, and enforce mitigation actions such as fuel breaks and reduction zones for potential wildland fire hazard areas.	Polk County, Oregon Department of Forestry, City Manager	Ongoing	General Fund	BC: TBD TF: Yes
WF #4	Identify critical facilities and vulnerable populations based on mapped high hazard areas.	City Manager	Mid-Term (2-5 Years)	General Fund, HMA	BC: TBD TF: Yes

Source: City of Falls City NHMP Steering Committee, 2016
FL=Flood, LS=Landslide, VE=Volcano, WF=Wildfire

Table FCA-2 Falls City Action Item Pool (continued)

2016 Action Item #	Description	Managing Department / Agency	OPDR Timeline	Potential Funding Source(s)	Benefit- Costs / Technical Feasibility
WF #5	Install new fire hydrants in locations where there is insufficient coverage as identified in Master Water Plan.	City Manager & Public Works	Long Term (5+ Years)	Water Fund, HMGP, PDM	BC: $331,000 TF: Yes
Windstorm Action (WS)					
WD #1	Identify and prioritize critical facilities' overhead utilities that could be placed underground to reduce power disruption from windstorm / tree blow down damage.	City Manager & Pacific Power & Light	Mid-Term (2-5 Years)	General Fund, HMGP, HMA, Utility Co.	BC: TBD TF: Yes
Winter Storm Actions (WT)					
WT #1	Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms.	Public Works	Ongoing	General Fund	BC: TBD TF: Yes
WT #2	Develop and implement strategies and educational outreach programs for debris management from severe winter storms.	MWVCOG Planning & City Manager & Public Works	Mid-Term (2-5 Years)	General Fund, PA	BC: TBD TF: Yes

Source: City of Falls City NHMP Steering Committee, 2016
WF=Wildfire, WD=Windstorm, WT=Winter Storm

Plan Implementation and Maintenance

The City Council will be responsible for adopting the City of Falls City addendum to the Polk County NHMP. This addendum designates a coordinating body and a convener to oversee the development and implementation of action items. Because the city addendum is part of the county's multi-jurisdictional NHMP, the city will look for opportunities to partner with the county. The city's steering committee will convene after re-adoption of the City of Falls City addendum on an annual schedule; the county is meeting on a semi-annual basis and will provide opportunities for the cities to report on NHMP implementation and maintenance during their meetings. The City Manager will serve as the convener and will be responsible for assembling the steering committee (coordinating body). The steering committee will be responsible for:

- identifying new risk assessment data,
- reviewing status of mitigation actions,
- identifying new actions, and
- seeking funding to implement the city's mitigation strategy (actions).

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

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

Implementation through Existing Programs

Many of the Natural Hazards Mitigation Plan's recommendations are consistent with the goals and objectives of the city's existing plans and policies. Where possible, the City of Falls City will implement the NHMP's recommended actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, allowing them to adapt to changing conditions and needs. Implementing the NHMP's action items through such plans and policies increases their likelihood of being supported and implemented.

Falls City's acknowledged comprehensive plan is the Falls City Comprehensive Plan. The Oregon Land Conservation and Development Commission first acknowledged the plan in 1979. The City last amended the plan in July 2013. The City implements the plan through the Falls City Zoning and Development Code, which was amended in 2017.

Falls City currently has the following plans, programs, and policies that relate to natural hazard mitigation. For a complete list visit the city website: www.fallscityoregon.gov.

Table FCA-3 Legal and Regulatory Resources Available for Hazard Mitigation

Regulatory Tool	Name	Effects on Hazard Mitigation
Plans	Falls City Emergency Operations Plan (2014)	Identifies emergency planning, policies, procedures, and response to extraordinary emergency situations associated with natural disasters, technological incidents, and national security emergencies.
	Falls City Emergency Preparedness Plan (2015)	Provides resources for residents to be prepared in case of disaster.
	Falls City Comprehensive Plan (1979) Amended 2001, 2003, 2010, 2013	Defines governance, development, infrastructure, and responsibilities.
	Falls City Charter (2014)	Defines governance.
	Falls City Wastewater Facility Plan: Part A, Part B (2014)	Outline wastewater improvements.
	Falls City Water Master Plan (Underway 2017)	Outlines water system improvements.
	Transportation System Plan (2013)	To establish the City's goals, policies, and action strategies for development and improving the transportation system.
	Street Improvement Plan (2010)	Identifies needed street improvements.
	Park Master Plan (Underway 2017)	Outlines improvements and acquisitions for city parks.
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.
	CIS Flood Insurance	Falls City has a $5M flood insurance policy with CIS.
Policies (Municipal Codes)	Falls City Municipal Code Chapter 151 Building Regulations	Adopts and enforces the Oregon Building Code.
	Falls City Municipal Code Chapter 150 Flood Damage Prevention	To minimize public and private losses due to flood conditions.
	Falls City Municipal Code Chapter 154 Zoning and Development Code	Adopts Falls City Zoning and Development Ordinance. Defines building requirements for the city, restricts building in hazard zones.

Table FCA-4 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	City Engineer: Steve Ward, Westech Engineering, LLC City Planner Mid-Willamette Council of Governments (MWV COG)
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	City Engineer: Steve Ward, Westech Engineering, LLC
Planner(s) or engineer(s) with an understanding of manmade or natural hazards	City Engineer: Steve Ward, Westech Engineering, LLC City Planner City Planner Mid-Willamette Council of Governments (MWVCOG)
Floodplain manager	City Planner Mid-Willamette Council of Governments (MWVCOG)
Personnel skilled in GIS and/or HAZUS-MH	No capability in Falls City GIS accomplished by Mid-Willamette Council of Governments (MWVCOG) and Westech Engineering, LLC
Director of Emergency Services	City Manager
Finance (grant writers, purchasing)	City Manager
Public Information Officers	City Manager

Table FCA-5 Financial Resources for Hazard Mitigation

Financial Resources	Effect on Hazard Mitigation
General funds	Available for mitigation projects
Authority to levy taxes for specific purposes	(Measure 5 or Measure 50) w/ a cap w/ voter approval (cannot exceed cap)
Incur debt through general obligation bonds	Yes can increase city funding capability
Incur debt through special tax and revenue bonds	Yes
Incur debt through private activity bonds	No

Note: See Appendix D – Grant Programs for additional financial resources.

Continued Public Participation

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

Plan Maintenance

The Polk County Multi-Jurisdictional Natural Hazards Mitigation Plan and city addendum will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. During the county plan update process, the city will also review and update its addendum. The convener will be responsible for convening the steering committee to address the questions outlined below.

- Are there new partners that should be brought to the table?
- Are there new local, regional, state, or federal policies influencing natural hazards that should be addressed?
- Has the community successfully implemented any mitigation activities since the plan was last updated?
- Have new issues or problems related to hazards been identified in the community?
- Are the actions still appropriate given current resources?
- Have there been any changes in development patterns that could influence the effects of hazards?
- Have there been any significant changes in the community's demographics that could influence the effects of hazards?
- Are there new studies or data available that would enhance the risk assessment?
- Has the community been affected by any disasters? Did the plan accurately address the impacts of this event?

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

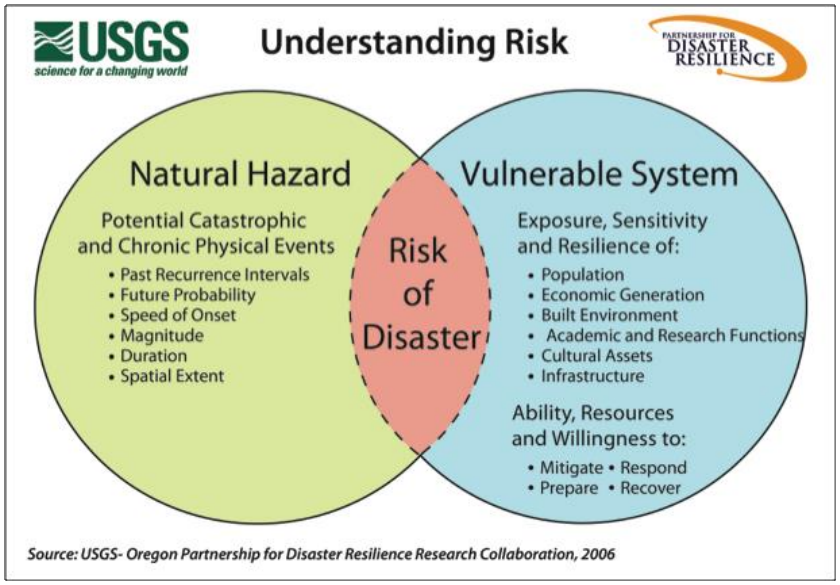
Risk Assessment

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

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

The local level rationale for the identified mitigation strategies (action items) is presented herein, and within Section 2, *Risk Assessment*, and Appendix B, *Community Profile*. The risk assessment process is graphically depicted in Figure FCA-1 below. Ultimately, the goal of hazard mitigation is to reduce the area of risk, where hazards overlap vulnerable systems.

Figure FCA-1 Understanding Risk



Hazard Analysis Methodology

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

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

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

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

Hazard Analysis

The Falls City steering committee developed their hazard vulnerability assessment (HVA), using the county's HVA as a reference. Changes from the county's HVA were made where appropriate to reflect distinctions in vulnerability and risk from natural hazards unique to Falls City, which are discussed throughout this addendum.

Table FCA-6 shows the HVA matrix for Falls City showing each hazard listed in order of rank from high to low. For local governments, conducting the hazard analysis is a useful step in

planning for hazard mitigation, response, and recovery. The method provides the jurisdiction with sense of hazard priorities, but does not predict the occurrence of a particular hazard.

One catastrophic hazards (Cascadia Subduction Zone earthquake) and two chronic hazards (windstorm and landslide) rank as the top hazard threats to the city (Top Tier). The Wildfire, flood, and winter storm hazards comprise the next highest ranked hazards (Middle Tier), while drought, crustal earthquake, and volcano hazards comprise the lowest ranked hazards (Bottom Tier).

Table FCA-6 Hazard Analysis Matrix – Falls City

Hazard	History	Probability	Vulnerability	Maximum Threat	Total Threat Score	Hazard Rank	
Windstorm	16	56	35	100	207	# 1	*Top Tier*
Earthquake (Cascadia)	2	49	50	100	201	# 2	
Landslide	2	56	45	90	193	# 3	
Wildfire	4	56	40	70	170	# 4	*Middle Tier*
Flood	4	56	35	70	165	# 5	
Winter Storm	16	56	15	70	157	# 6	
Drought	6	42	20	80	148	# 7	*Bottom Tier*
Earthquake (Crustal)	2	7	15	30	54	# 8	
Volcano	2	7	25	10	44	# 9	

Source: Falls City NHMP Steering Committee, 2016.

Table FCA-7 categorizes the probability and vulnerability scores from the hazard analysis for the city and compares the results to the assessment completed by the Polk County NHMP Steering Committee (areas of differences are noted with **bold** text within the city ratings). The city ranked probability of landslide higher than the county and their vulnerability to Cascadia Subduction Zone earthquakes, landslide, and wildfire higher than the county.

Table FCA-7 Probability and Vulnerability Comparison

	Falls City		County	
Hazard	Probability	Vulnerability	Probability	Vulnerability
Drought	Moderate	Moderate	Moderate	Moderate
Earthquake (Cascadia)	Moderate	**High**	Moderate	Moderate
Earthquake (Crustal)	**Low**	**Low**	Moderate	Moderate
Flood	High	Moderate	High	Moderate
Landslide	High	**High**	High	Low
Volcano	Low	Moderate	Low	Moderate
Wildfire	**High**	**High**	Moderate	Moderate
Windstorm	High	**Moderate**	High	High
Winter Storm	High	**Low**	High	High

Source: Falls City NHMP Steering Committee and Polk County NHMP Steering Committee, 2016.

Between 2010 and 2015 the City grew by approximately 5 people (<1%) and median household income decreased by 24% (see Appendix B). New development was placed outside of the floodplain per the city's floodplain ordinance (see Table FCA-3) and complied with the seismic safety standards within the Oregon State Building Code. As such changes in population, demographics, and development have had a negligible impact upon

vulnerability. However, decreased household income within the community may be a signal that segments of the community may have a difficult time recovering from a natural hazard. See specific hazard sections below for more information.

Community Asset Identification

This section provides information on city specific assets. For additional information on the characteristics of Falls City, in terms of geography, environment, population, demographics, employment and economics, as well as housing and transportation see Volume III, Appendix B, *Community Profile*. Many of these community characteristics can affect how natural hazards impact communities and how communities choose to plan for natural hazard mitigation. Considering the city specific assets during the planning process can assist in identifying appropriate measures for natural hazard mitigation.

Community Characteristics

Falls City is located in the mid-Willamette Valley nestled in the foothills of the Coast Range and is named for the Little Luckiamute Falls located in the center of town. The city is located on the Little Luckiamute River and covers an area of about 1.2 square miles. The climate of Falls City is moderate; the average monthly temperatures range from 48 – 80 degrees in July and August, and 31-46 degrees in December and January, and the city receives approximately 74 inches of rain each year. Monthly precipitation is about 9-13 inches during the wetter months of November – March, and average about 0.3-1.9 inches during the drier months of June - September. The city's topography is both a mix of relatively flat areas and steeper sloped areas along the western and northern edges of the city.

Economy

Falls City benefits from its location to Salem which is the State Capital and a regional center for industrial technology, engineering, research, commerce, and health care. Top industries for employment include in Falls City include social assistance, educational services, construction, and retail; however, most employment is outside of the city.

Asset Inventory

Asset inventory is the first step of a vulnerability analysis. Assets that may be affected by hazard events include population, residential and nonresidential buildings, critical facilities, and infrastructure.

The asset inventory delineates the City's existing building and infrastructure assets and insured values and are identified in detail in Table FCA-8 and Map FCA-1 (Attachment A).

Table FCA-8 Falls City Critical Facilities and Infrastructure

Facility Type	Name / Number	Address	Value[1]
Government	US Post Office	123 Parry Street	$408,290
	City Hall and Public Works Maintenance Shop	299 Mill Street	$587,500
	City Maintenance Storage Bldg	120 Parry Rd	$161,171
Emergency Response	Fire Station/Community Center	320 N Main Street	$1,150,400
Educational	Falls City Elementary School K-8	177 Prospect Avenue	$3,058,958

Facility Type	Name / Number	Address	Value[1]
	Falls City High School	111 N North Main Street	$3,556,871
	Wagner Library	111 N Main Street	$155,967
Community	George Kitchin Memorial Park	7th Street	$171,133 (restroom only)
	Michael Harding Memorial Park	Parry Road	Unknown
	Fay Wilson Memorial Park	S Main Street	$10,510
	Lower Cemetery		Unknown
	Upper Cemetery		Unknown
	Grace Family Fellowship	401 Lombard Street	$121,090
	United Methodist Church	242 N Main Street	$73,940
	Seventh-Day Adventist Church	205 N Main Street	$432,680
	First Christian Church	233 S Main St	$168,460
	Mountain Gospel Fellowship	257 N Main St	$79,350
State and Federal Highways	Hwy 223 N/S route		Unknown
Bridges	Little Luckiamute River Bridge	500 Main Street	$1,820,000
	Steel Foot Bridge	299 Mill St	$217,271
	Wood Foot Bridge	Dayton St	$113,283
	Dutch Creek Crossing	Mitchell Street	
Utilities	Teal Creek Water Treatment Plant & water storage tank	6666 Teal Creek Rd	$6,170,000
	Wastewater Treatment Plant with sand trap	111 N Main St	$2,198,300
	Fair Oaks Pump Station	Fair Oaks Street	$50,098

Note: [1]Estimated and/or insured structural and/or Polk County Assessed value for critical facilities and estimated values for critical infrastructure

See hazard sections below and Section 2, *Risk Assessment*, for potential hazard vulnerabilities to these facilities.

Hazard Characteristics

Drought

The steering committee determined that the city's probability for drought is **moderate** (which is the same as the county's rating) and that their vulnerability to drought is **moderate** (which is the same as the county's rating).

Volume I, Section 2, *Risk Assessment*, adequately describes the characteristics of drought hazards, as well as the location and extent of a potential event. Due to a cool, wet climate, past and present weather conditions have generally spared Polk County communities from the effects of drought; however, Polk County was included in a Governor declared drought declaration in 1992 and a Presidential drought declaration in 2015.

Falls City's primary water supply comes from the Teal Creek and Glaze Creek drainages. The city has one (1) storage reservoir for a total of 600,000 gallons of treated water storage capacity. The city's water treatment plant has been operating since 1998. Oregon Health Authority (OHA) has approved the 2017 Water Master Plan and the City is awaiting approval from Oregon Water Resources Department (OWRD). In general, water supply is available

and sufficient. Additional, drought-related community impacts are described within the county's Drought Hazard Annex.

A comprehensive risk and vulnerability assessment is not available at this time. As of the publication of this NHMP FEMA is providing an opportunity for the county and city to participate in a Risk Mapping, Assessment, and Planning (Risk MAP) process that would generate additional data on risks and vulnerabilities.

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

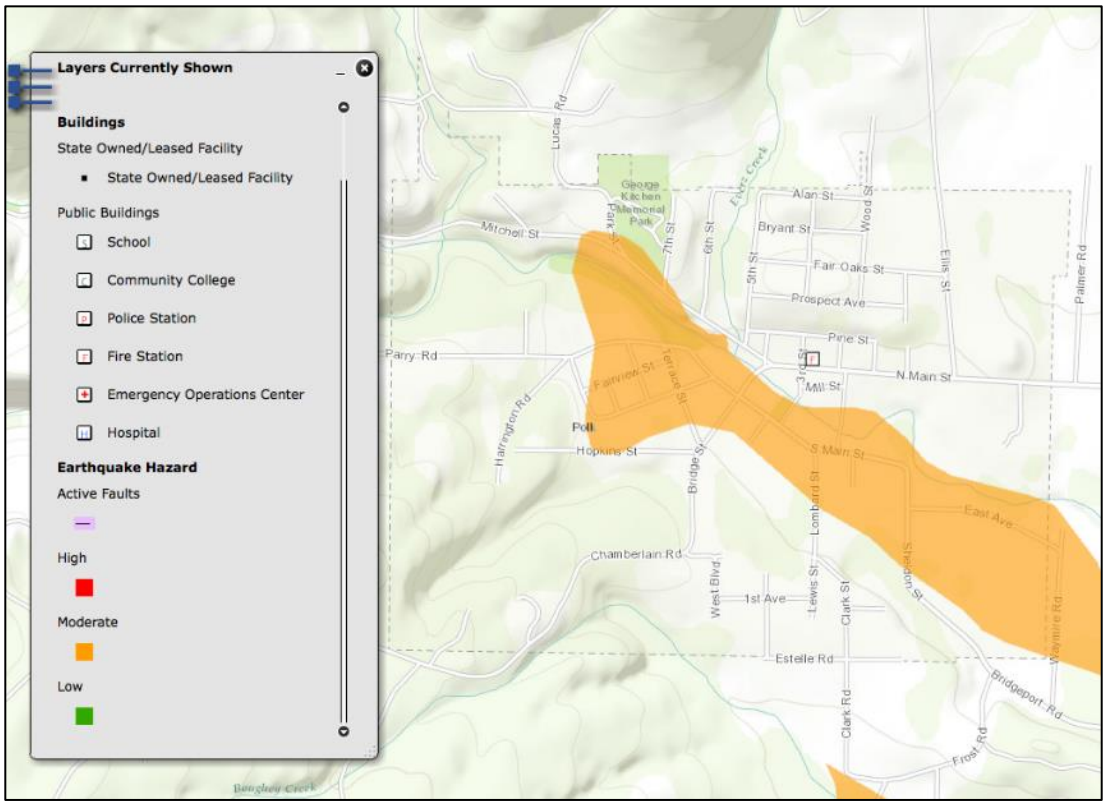
Earthquake

The steering committee determined that the city's probability for a Cascadia Subduction Zone (CSZ) Earthquake event is **moderate** (which is the same as the county's rating) and that their vulnerability to a Cascadia Earthquake event is **high** (which is higher than the county's rating). The steering committee determined that the city's probability for a Crustal Earthquake event is **low** (which is lower than the county's rating) and that their vulnerability to a Crustal Earthquake event is **low** (which is lower than the county's rating).

Volume I, Section 2, *Risk Assessment*, adequately describes the characteristics of earthquake hazards, history, as well as the location and extent of a potential event. Generally, an event that affects the county is likely to affect Falls City as well. The causes and characteristics of an earthquake event are appropriately described within the county's plan, as well as the location and extent of potential hazards. Previous occurrences are well-documented within the county's plan, and the community impacts described by the county would generally be the same for Falls City as well.

Earthquake-induced damages are difficult to predict, and depend on the size, type, and location of the earthquake, as well as site-specific building and soil characteristics. Presently, it is not possible to accurately forecast the location or size of earthquakes, but it is possible to predict the behavior of soil at any particular site. In many major earthquakes, damages have primarily been caused by the behavior of the soil. Figure FCA-2 displays relative liquefaction hazards. As shown, the area of greatest concern within the city of Falls City (darker areas) is along the Little Luckiamute River where the concentration of soft soils is the highest.

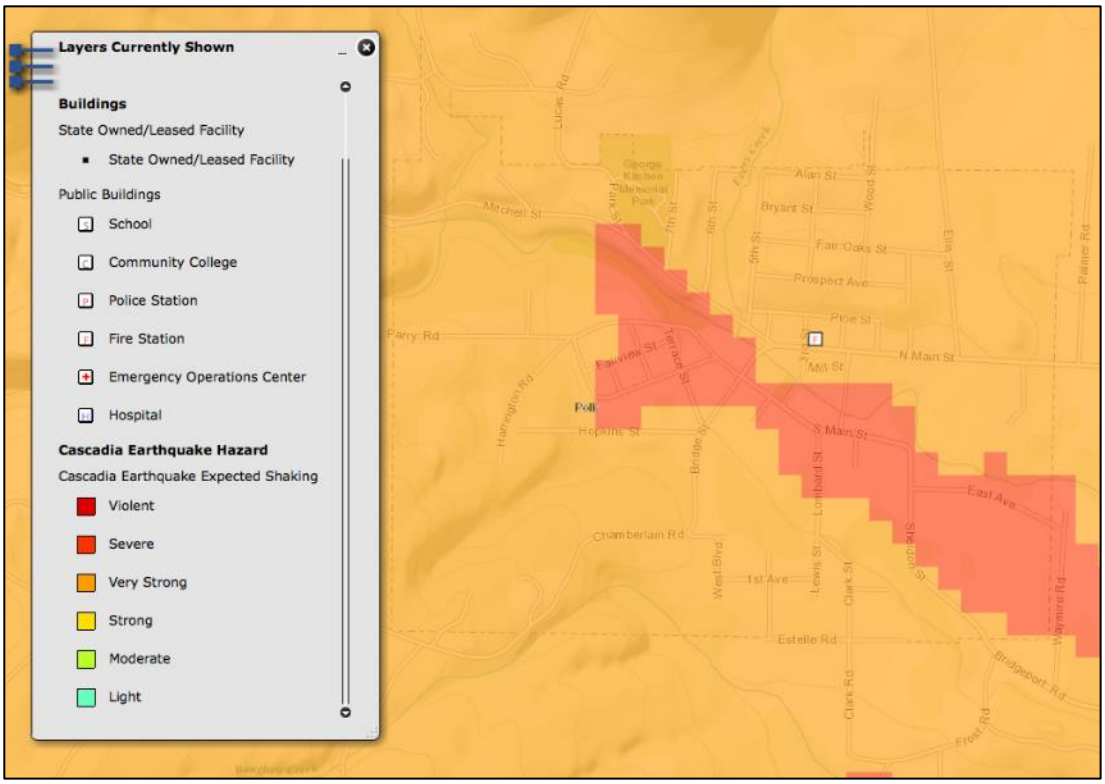
Figure FCA-2 Active Faults and Soft Soils



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

Figure FCA-3 shows the expected shaking/ damage potential for Falls City as a result of a Cascadia Subduction Zone (CSZ) earthquake event. The figure shows that the city will experience "strong" to "very strong" shaking that will last two to four minutes. The strong shaking will be extremely damaging to lifeline transportation routes including Highway 22, 99, and Interstate 5. For more information on expected losses due to a CSZ event see the Oregon Resilience Plan.

Figure FCA-3 Cascadia Subduction Zone Expected Shaking



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

As noted in the community profile approximately 74% of residential buildings were built prior to 1990, which increases the city's vulnerability to the earthquake hazard. Information on specific public buildings' (schools and public safety) estimated seismic resistance, determined by DOGAMI in 2007, is shown in Table FCA-9; each "X" represents one building within that ranking category. The one facility evaluated by DOGAMI using RVS, does not have a high (greater than 10% chance) or very high (100% chance) collapse potential.

Table FCA-9 Rapid Visual Survey Scores

		Level of Collapse Potential			
Facility	**Site ID***	**Low (< 1%)**	**Moderate (>1%)**	**High (>10%)**	**Very High (100%)**
Public Safety					
Falls City Fire Department (320 N Main St)	Polk_fir09	X			

Source: [DOGAMI 2007. Open File Report 0-07-02. Statewide Seismic Needs Assessment Using Rapid Visual Assessment.]
"*" – Site ID is referenced on the [RVS Polk County Map]

In addition to building damages, utility (electric power, water, wastewater, natural gas) and transportation systems (bridges, pipelines) are also likely to experience significant damage.

Utility systems will be significantly damaged, including damaged buildings and damage to utility infrastructure, including water treatment plants and equipment at high voltage substations (especially 230 kV or higher which are more vulnerable than lower voltage

substations). Buried pipe systems will suffer extensive damage with approximately one break per mile in soft soil areas. There would be much lower rate of pipe breaks in other areas. Restoration of utility services will require substantial mutual aid from utilities outside of the affected area.

A comprehensive risk and vulnerability assessment is not available at this time. As of the publication of this NHMP FEMA is providing an opportunity for the county and city to participate in a Risk Mapping, Assessment, and Planning (Risk MAP) process that would generate additional data on risks and vulnerabilities. According to the previous version of this plan approximately 440 residential structures (value $43M), three government facilities (value $1.2M), one emergency response facility (value $1.2M), two educational facilities (value $1.7M), ten community facilities (value $866K), three bridges (value $2.2M), and two utilities (value $8.4M) which would be impacted by a strong shaking event.[1]

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

Flood

The steering committee determined that the city's probability for riverine flood is **high** (which is the same as the county's rating) and that their vulnerability to flood is **moderate** (which is the same as the county's rating).

Volume I, Section 2, *Risk Assessment*, adequately describes the causes and characteristics of flooding hazards within the region, as well as previous flooding occurrences. General flood-related community impacts are adequately described within the Flood Hazard Annex of Polk County's Natural Hazards Mitigation Plan. Portions of Falls City have areas of flood plains (special flood hazard areas). These include areas along the Little Luckiamute River (see Figure FCA-4 and Attachment A, Map FCA-2). Furthermore, other portions of Falls City, outside of the mapped floodplains, are also subject to significant, repetitive flooding from local storm water drainage.

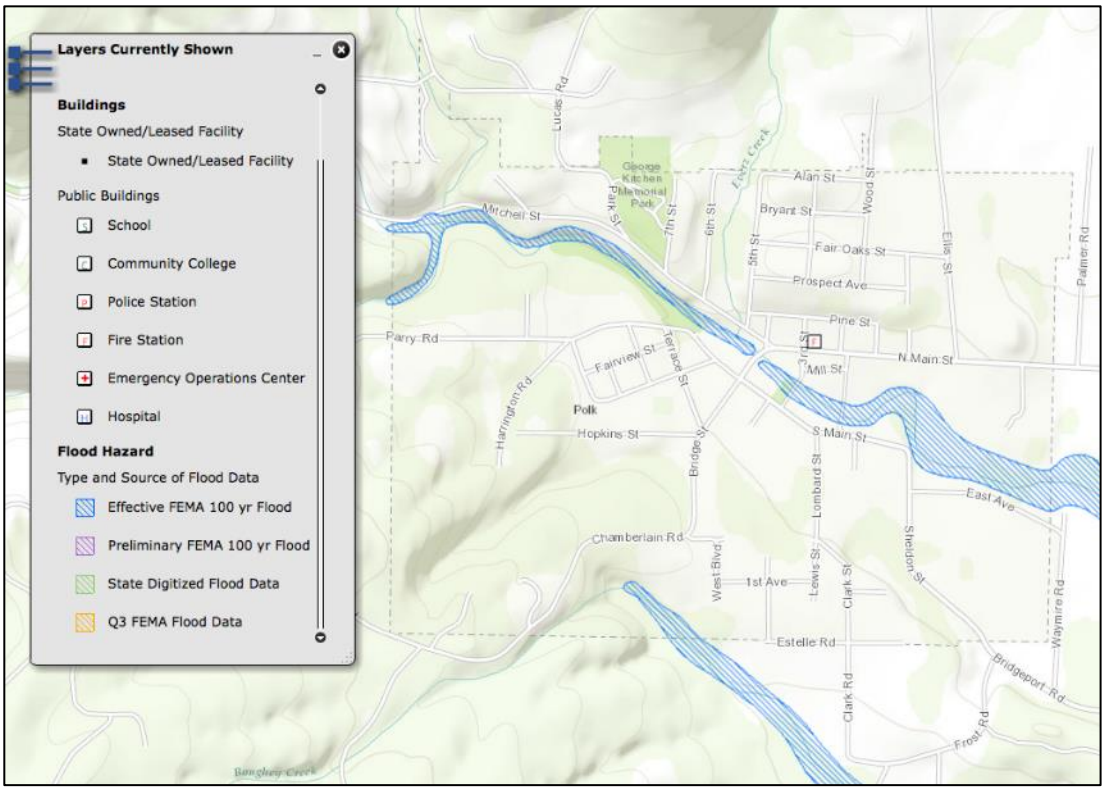
History:

The following incident has occurred since the previous plan:

- 12/07/2016 DR-4258: Flooding – culverts along Mitchell Road at GPS Location 44.869807 - 123.443991 was damaged by fast flowing floodwaters that overwhelmed this facility washing out the culverts and road at this site as a direct result of Sever Winter Storms, Straight-lines Winds, Flooding and Mud Slides.
- 1/17-21/2012: DR-4055: Flooding – severe winter storm and overland flooding inundated Falls City with record amounts of rainfall damaged 10 sites.

[1] URS, 2009 Polk County Natural Hazards Mitigation Plan; values are in 2009 dollars.

Figure FCA-4 Special Flood Hazard Area



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

A comprehensive risk and vulnerability assessment is not available at this time. As of the publication of this NHMP FEMA is providing an opportunity for the county and city to participate in a Risk Mapping, Assessment, and Planning (Risk MAP) process that would generate additional data on risks and vulnerabilities. According to the previous version of this plan approximately 74 residential structures (value $7.2M), two government facilities (value $749K), three community facilities (value $281K), and three bridges (value $2.2M) are located within the 100-year floodplain.[2]

For more information on flood risk see the [Polk County Flood Insurance Study (2006)].

National Flood Insurance Program (NFIP)

FEMA modernized the Falls City Flood Insurance Rate Maps (FIRMs) in December 2006. Table FCA-10 shows that as of September 2016, Falls City has 0 National Flood Insurance Program (NFIP) policies in force. There has not been a Community Assistance Visit (CAV) for Falls City. Falls City is not a member of the Community Rating System (CRS).

[2] URS, 2009 Polk County Natural Hazards Mitigation Plan; values are in 2009 dollars.

The Community Repetitive Loss record for Falls City identifies no Repetitive Loss Properties[3] and no Severe Repetitive Loss Properties[4].

Table FCA-10 Flood Insurance Detail

Jurisdiction	Effective FIRM and FIS	Initial FIRM Date	Total Policies	Pre-FIRM Policies	Policies by Building Type: Single Family	2 to 4 Family	Other Residential	Non-Residential	Minus Rated A Zone
Polk County	-	-	428	183	334	27	25	42	28
Falls City	12/19/2006	7/7/1981	0	0	0	0	0	0	0

Jurisdiction	Insurance in Force	Total Paid Claims	Pre-FIRM Claims Paid	Substantial Damage Claims	Total Paid Amount	Repetitive Loss Properties	Severe Repetitive Loss Properties	CRS Class Rating	Last CAV
Polk County	$ 93,520,500	40	33	0	$ 682,241	1	0	-	-
Falls City	$ -	0	0	0	$ -	0	0		none

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

Riverine 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 Map FCA-3 (Attachment A). 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.

A comprehensive risk and vulnerability assessment is not available at this time. As of the publication of this NHMP FEMA is providing an opportunity for the county and city to participate in a Risk Mapping, Assessment, and Planning (Risk MAP) process that would generate additional data on risks and vulnerabilities. According to the previous version of this plan approximately 101 residential structures (value $9.8M), two government facilities (value $749K), one emergency response facility (value $1.2M), six community facilities (value $414K), and three bridges (value $2.2M) considered at risk.[5]

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

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

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

[5] URS, 2009 Polk County Natural Hazards Mitigation Plan; values are in 2009 dollars.

Landslide

The steering committee determined that the city's probability for landslide is **high** (which is the same as the county's rating) and that their vulnerability to landslide is **moderate** (which is higher than the county's rating).

Falls City is underlain by igneous and sedimentary rock. Igneous bedrocks (volcanic) origin is found primarily in the higher and steeper southwest portion of the city and along the Little Luckiamute River from the city's bridge upstream. Sedimentary rock is primarily siltstone with some sandstone and dip slightly toward the east. Sedimentary rock is less resistant to stream action than the igneous rock and when the sedimentary rock is eroded away the igneous rock is undermined causing large-scale block sliding.[6] Volume I, Section 2, *Risk Assessment*, adequately describes the causes and characteristics of landslides, and appropriately identifies previous landslide occurrences within the region.

Landslide susceptibility exposure for Falls City is shown in Figure FCA-5 and Map FCA-4 (Attachment A). Approximately 59% of Falls City has High, and approximately 16% Moderate, landslide susceptibility exposure[7].

Figure FCA-5 Landslide Susceptibility Exposure

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

[6] Falls City Comprehensive Plan (2013)

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

Potential landslide-related impacts are adequately described within the county's plan, and include infrastructural damages, economic impacts (due to isolation and/or arterial road closures), property damages, and obstruction to evacuation routes. Rain-induced landslides and debris flows can potentially occur during any winter in Polk County, and highway and other major roads beyond city limits are susceptible to obstruction as well.

A comprehensive risk and vulnerability assessment is not available at this time. As of the publication of this NHMP FEMA is providing an opportunity for the county and city to participate in a Risk Mapping, Assessment, and Planning (Risk MAP) process that would generate additional data on risks and vulnerabilities. According to the previous version of this plan approximately 419 residential structures (value $40.6M), three government facilities (value $1.2M), one emergency response facility (value $1.2M), two educational facilities (value $1.7M), ten community facilities (value $866K), three bridges (value $2.2M), and two utility facilities (value $8.4M) were located in moderate risk areas. There are 206 residential structures (value $20M), one educational facility (value $1M), and three community facilities (values unknown) located within high landslide risk areas.[8]

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

Volcano

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

Volume I, Section 2, *Risk Assessment*, adequately describes Falls City's risk to volcanic events. Generally, an event that affects the county is likely to affect Falls City as well. The causes and characteristics of a volcanic event are appropriately described within the county's plan, as well as the location and extent of potential hazards. Previous occurrences are well-documented within the county's plan, and the community impacts described by the county would generally be the same for Falls City as well. Falls City is very unlikely to experience anything more than volcanic ash during a volcanic event. When Mt. Saint Helens erupted in 1980, the city was not impacted.

A comprehensive risk and vulnerability assessment is not available at this time. As of the publication of this NHMP FEMA is providing an opportunity for the county and city to participate in a Risk Mapping, Assessment, and Planning (Risk MAP) process that would generate additional data on risks and vulnerabilities. According to the previous version of this plan approximately 395 residential structures (value $47M), three government facilities (value $1.2M), one emergency response facility (value $1.2M), two educational facilities (value $1.7M), ten community facilities (value $866K), three bridges (value $2.2M), and two utilities (value $8.4M) which would be impacted by a volcanic ash event.[9]

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

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[8] URS, 2009 Polk County Natural Hazards Mitigation Plan; values are in 2009 dollars.

[9] URS, 2009 Polk County Natural Hazards Mitigation Plan; values are in 2009 dollars.

Wildfire

The steering committee determined that the city's probability for wildfire is **high** (which is higher than the county's rating) and that their vulnerability to wildfire is **high** (which is higher than the county's rating).

Volume I, Section 2, *Risk Assessment*, adequately describes the causes and characteristics of wildfires, as well as the county and city's history of wildfire events. There are no known large wildfire events in Falls City. The location and extent of a wildfire vary depending on fuel, topography, and weather conditions. Weather and urbanization conditions are primarily at cause for the hazard level.

The potential community impacts and vulnerabilities described in the county's plan are generally accurate for the city as well. Polk County developed a Community Wildfire Protection Plan (CWPP) in 2009, which mapped wildland urban interface areas and developed actions to mitigate wildfire risk (see Attachment A, Map FCA-5). The city is a participant in the CWPP and will update the city's wildfire risk assessment if the CWPP presents better data during future updates.

Forestland surrounds much of Falls City, particularly to the west. The city also includes a forestry zoning designation within the city.

A comprehensive risk and vulnerability assessment is not available at this time. As of the publication of this NHMP FEMA is providing an opportunity for the county and city to participate in a Risk Mapping, Assessment, and Planning (Risk MAP) process that would generate additional data on risks and vulnerabilities. According to the previous version of this plan Falls City has critical facilities and infrastructure located within areas of moderate, high, very high and extreme risk.[10]

Moderate risk areas contain 439 residential structures (value $42.5M), three government facilities (value $1.2M), one emergency response facility (value $1.2M), two educational facilities (value $1.7M), ten community facilities (value $886K), three bridges (value $2.2M), and one utility facility (value $2.2M).

High risk areas contain 415 residential structures (value $40.2M), three government facilities (value $1.2M), one emergency response facility (value $1.2M), two educational facilities (value $1.7M), ten community facilities (value $866K), three bridges (value $2.2M), and one utility facility (value $2.2M).

Very high risk areas contain 250 residential structures (value $24.2M), one educational facility (value $983K), four community facilities (values unknown), and one utility facility (value $6.2M).

Extreme risk areas contain 23 residential structures (value $2.2M) and one utility facility (value$6.2M).

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

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[10] URS, 2009 Polk County Natural Hazards Mitigation Plan; values are in 2009 dollars.

Windstorm

The steering committee determined that the city's probability for windstorm is **high** (which is the same as the county's rating) and that their vulnerability to windstorm is **moderate** (which is lower than the county's rating).

Volume I, Section 2, *Risk Assessment*, adequately describes the causes and characteristics of windstorms, as well as the location and extent of windstorm hazards. The region's (and city's) history of events is adequately described within the county's plan as well. Because windstorms typically occur during winter months, they are sometimes accompanied by ice, freezing rain, flooding, and very rarely, snow.

History:

About once or twice per year the city will experience a windstorm event that will interrupt services, experience downed trees, and cause power outages. Since the previous plan the following incident has occurred:

- 01/17/2012-01/21/2012 DR-4055: High winds, heavy rains and flooding inundated Falls City, Oregon with record amounts of rainfall and damaged local streets.

Polk County's plan adequately describes the impacts caused by windstorms, including power outages, downed trees, heavy precipitation, building damages, and storm-related debris. Additionally, transportation and economic disruptions result as well.

A comprehensive risk and vulnerability assessment is not available at this time. As of the publication of this NHMP FEMA is providing an opportunity for the county and city to participate in a Risk Mapping, Assessment, and Planning (Risk MAP) process that would generate additional data on risks and vulnerabilities. According to the previous version of this plan all areas within Falls City are at risk from a windstorm event. Including, approximately 395 residential structures (value $47M), three government facilities (value $1.2M), one emergency response facility (value $1.2M), two educational facilities (value $1.7M), ten community facilities (value $886K), three bridges (value $2.2M), and two utilities (value $8.4M) are impacted by windstorms.[11]

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

Winter Storm (Snow/ Ice)

The steering committee determined that the city's probability for winter storm is **high** (which is the same as the county's rating) and that their vulnerability to winter storm is **low** (which is lower than the county's rating).

Volume I, Section 2, *Risk Assessment*, adequately describes the causes and characteristics of winter storms, as well as the location and extent of winter storm hazards. The region's (and city's) history of events is adequately described within the county's plan as well. Severe winter storms can consist of rain, freezing rain, ice, snow, cold temperatures, and wind.

[11] URS, 2009 Polk County Natural Hazards Mitigation Plan; values are in 2009 dollars.

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

Major winter storms can and have occurred in the Falls City area, and while they typically do not cause significant damage, they are frequent and have the potential to impact economic activity. Road closures on major roads due to winter weather are an uncommon occurrence, but can interrupt commuter and large truck traffic.

A comprehensive risk and vulnerability assessment is not available at this time. As of the publication of this NHMP FEMA is providing an opportunity for the county and city to participate in a Risk Mapping, Assessment, and Planning (Risk MAP) process that would generate additional data on risks and vulnerabilities. According to the previous version of this plan all areas within Falls City are at risk from a winter storm event. Including, approximately 395 residential structures (value $47M), three government facilities (value $1.2M), one emergency response facility (value $1.2M), two educational facilities (value $1.7M), ten community facilities (value $886K), three bridges (value $2.2M), and two utilities (value $8.4M) are impacted by winter storms.[12]

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

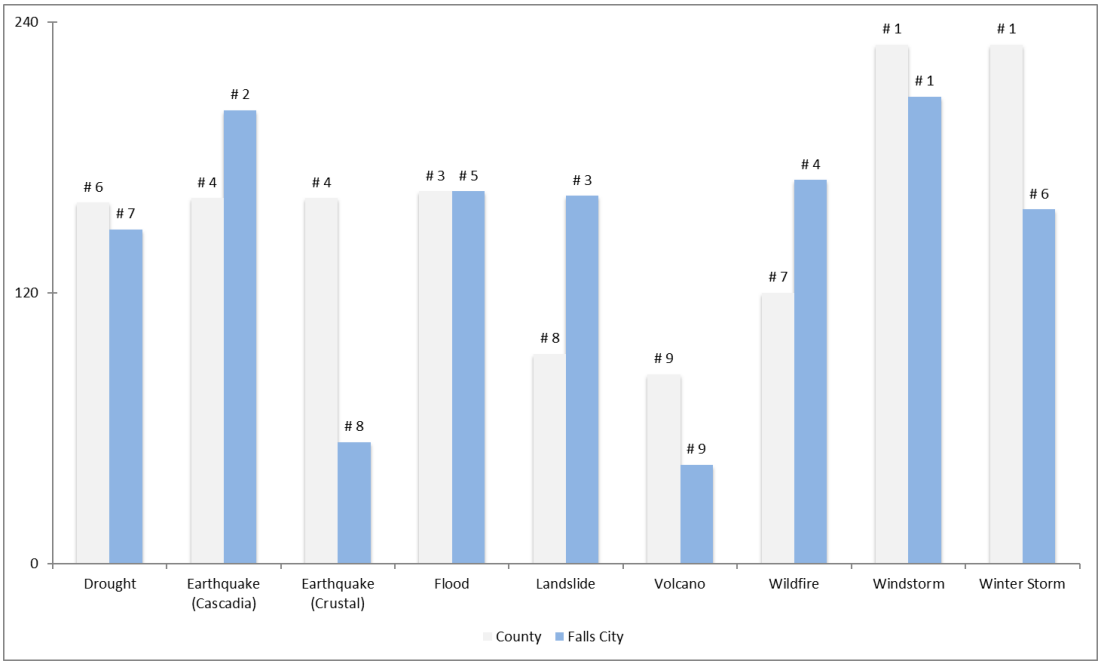
Summary

Figure FCA-6 presents a summary of the hazard analysis for the City of Falls City and compares the results to the assessment completed by Polk County.

The city rated their threat to the Cascadia Subduction Zone earthquake, landslide, and wildfire hazards higher than the county. The top four hazards for the city are windstorm, Cascadia Subuction Zone earthquake, wildfire, and flood.

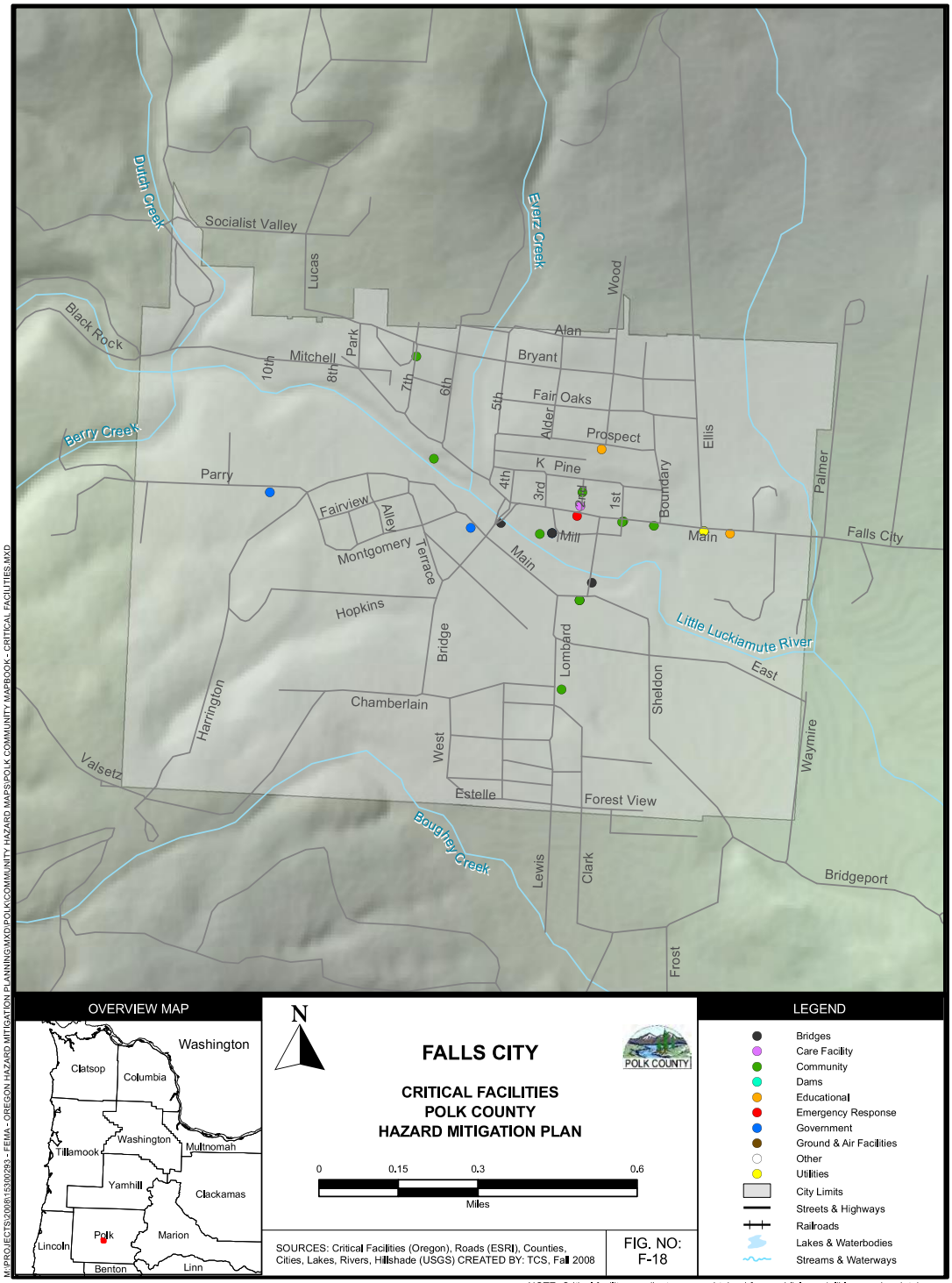
[12] URS, 2009 Polk County Natural Hazards Mitigation Plan; values are in 2009 dollars.

Figure FCA-6 Overall Hazard Analysis Comparison –Polk County/ Falls City



Source: City of Falls City NHMP Steering Committee and Polk County NHMP Steering Committee

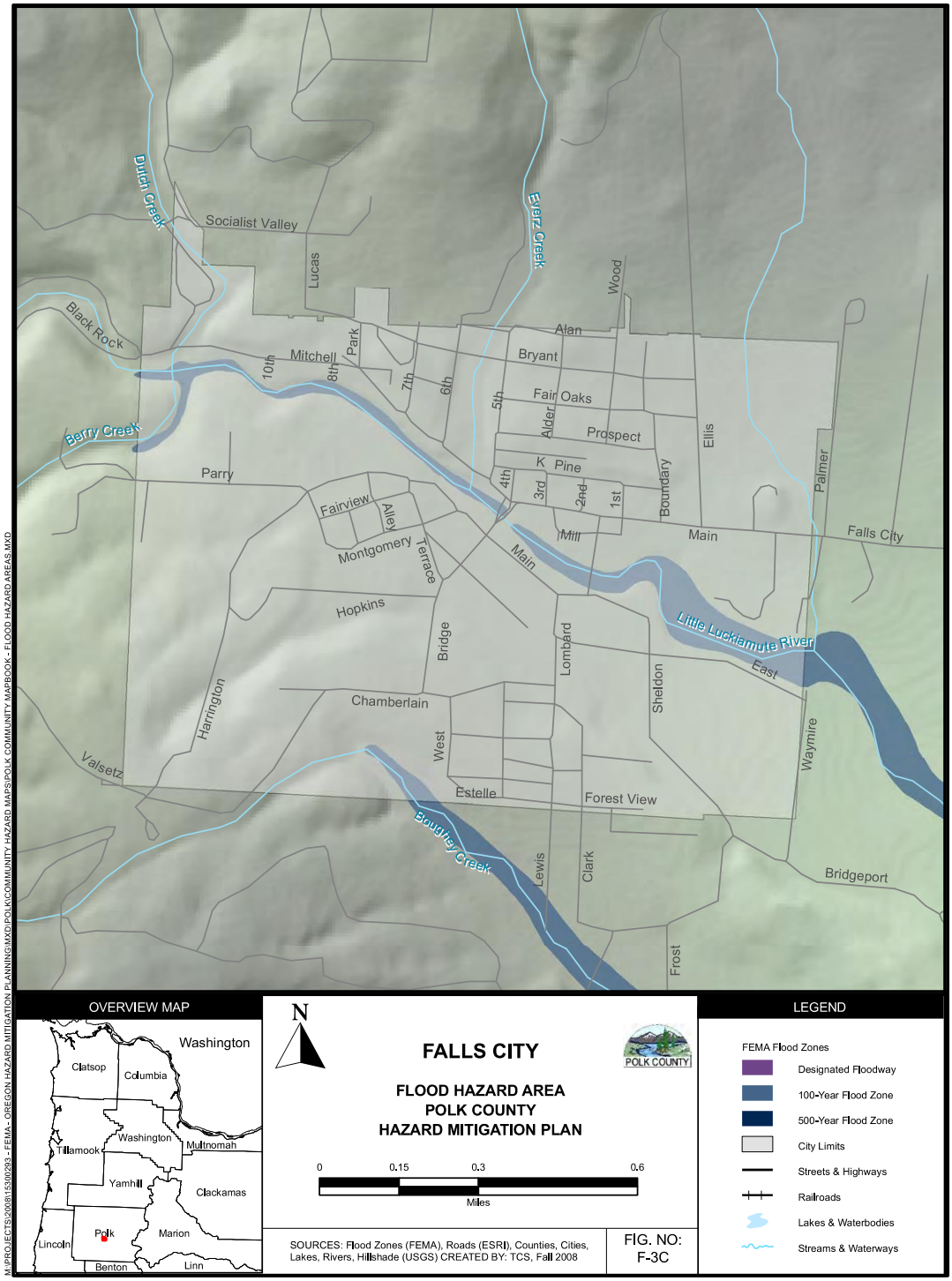
Map FCA-1 Critical Facilities - Falls City



NOTE: Critical facility coordinates were obtained from publicly avaialible mapping databases.

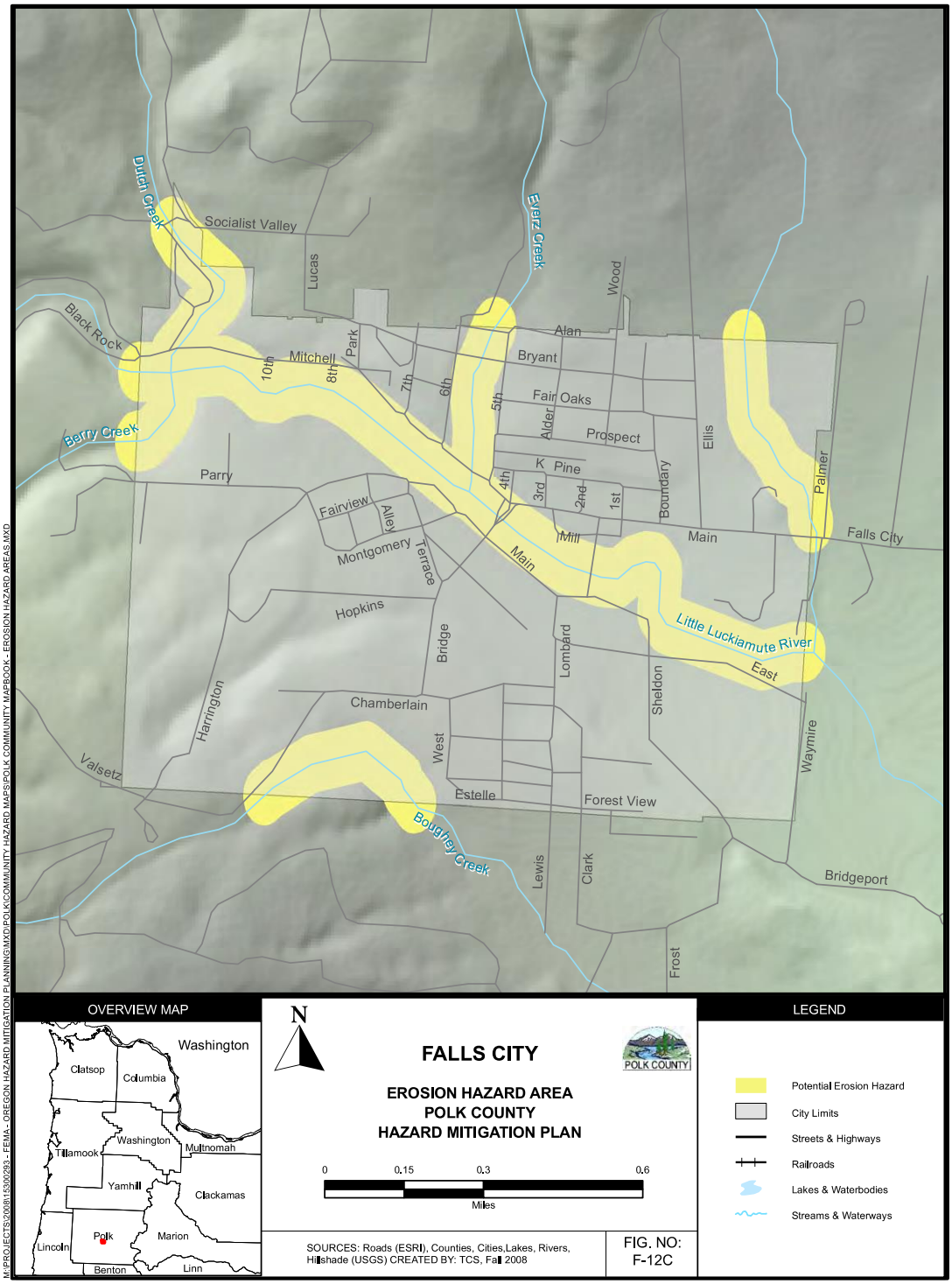
Source: Polk County NHMP (2009).

Map FCA-2 Flood Hazard Area - Falls City



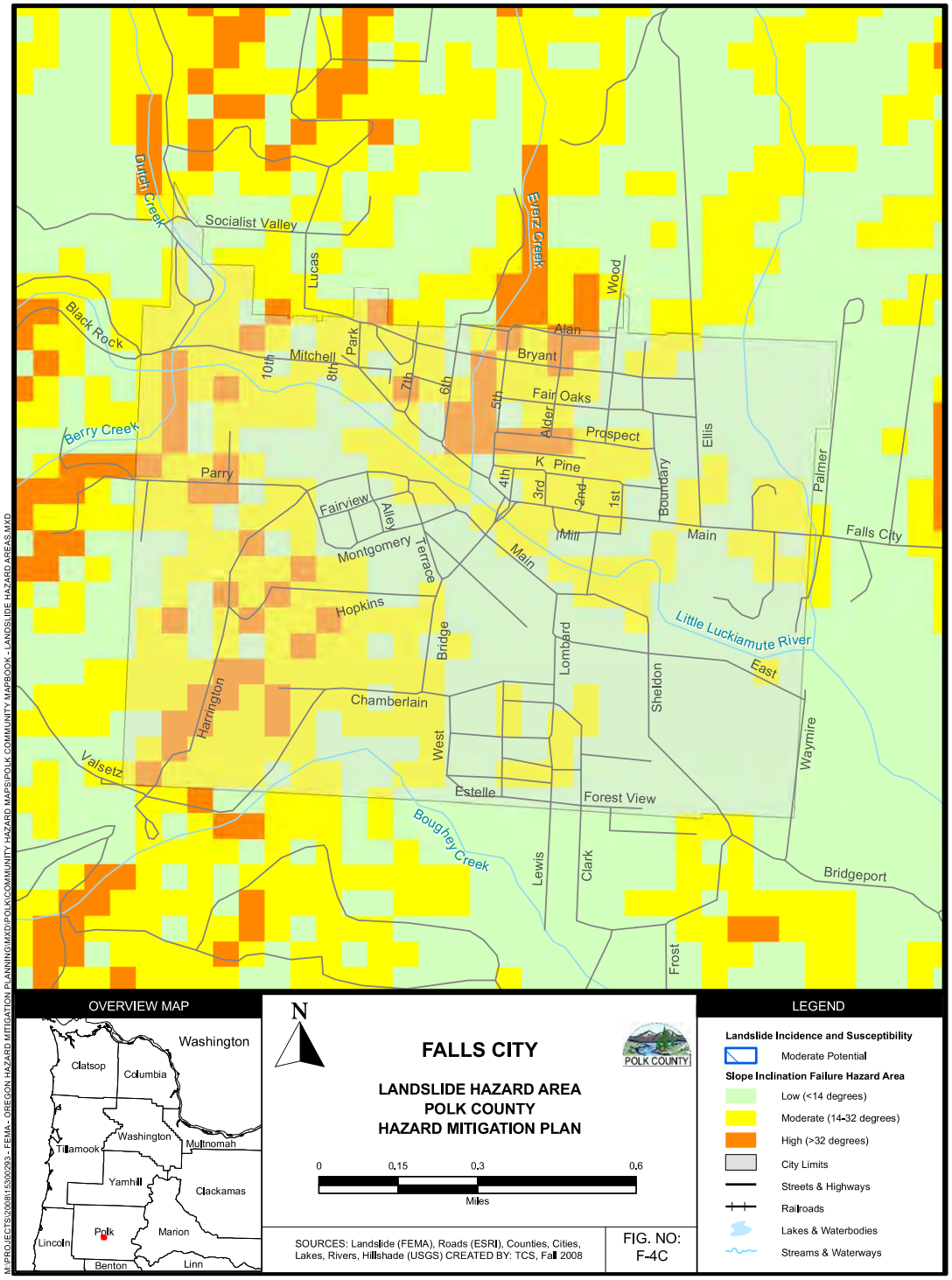
Source: Polk County NHMP (2009).

Map FCA-3 Erosion Hazard Area - Falls City



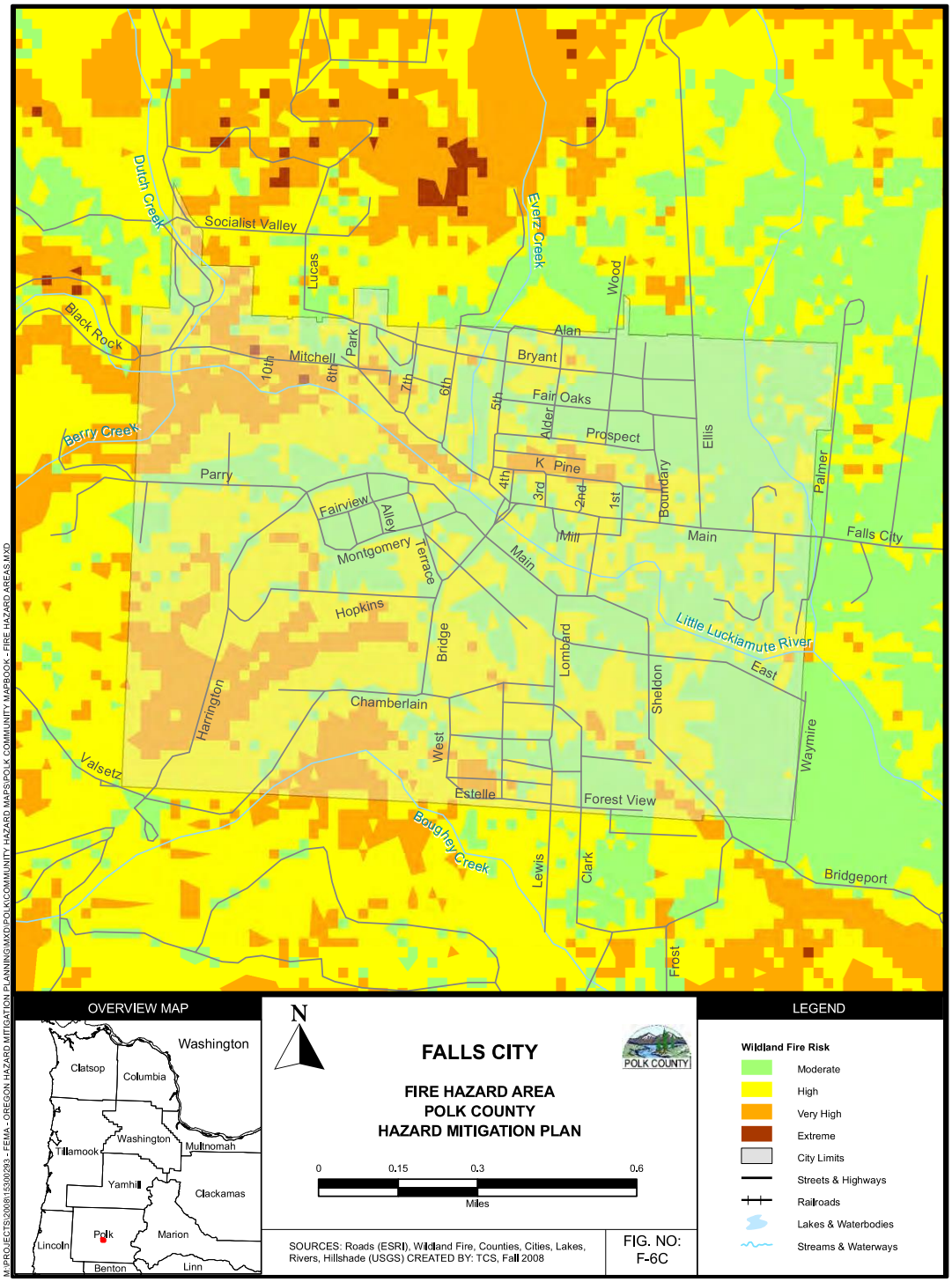
Source: Polk County NHMP (2009).

Map FCA-4 Landslide Hazard Area - Falls City



Source: Polk County NHMP (2009).

Map FCA-5 Wildfire Hazard Area – Falls City



Source: Polk County NHMP (2009).

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