

## 8.0 Participating Jurisdictions

This portion of the Lewis County Multi-Jurisdictional Hazard Mitigation Plan consists of the ‘Participant Sections’ with information and risk assessments relating specifically to the jurisdictions represented in this plan.

This section of the Plan is comprised of the “County and Municipalities” and then the “Other Participants”. The County and Municipalities chapters provide a more in depth analysis than other participant sections because of the populations that live within their jurisdictions. The other participants interrelate or are generally part of or adjacent to either the county or one of the municipalities. Therefore, a detailed analysis for each participant would be duplicative. The analyses and mitigation strategies that were completed and mapping is attached as part of their individual section.

### County and Municipalities

9. Lewis County
10. City of Centralia
11. City of Chehalis
12. City of Morton
13. City of Mossyrock
14. City of Napavine
15. City of Toledo
16. City of Vader
17. City of Winlock
18. Town of Pe Ell

### Other Plan Participants

19. Cemetery District 4 – Evergreen/Packwood, Silvercreek/Randle, Rainey Valley/Glenoma
20. Cemetery District 5 – Lone Hill Cemetery
21. Cemetery District 7 - Toledo Cemetery
22. Centralia College - Centralia
23. Centralia School District
24. Chehalis School District
25. Cowlitz Tribe
26. Cowlitz-Lewis Fire District 20
27. Energy Northwest
28. Lewis County Fire District 1 – Onalaska
29. Lewis County Fire District 2 – Toledo
30. Lewis County Fire District 3 – Mossyrock
31. Lewis County Fire District 5 – Napavine
32. Lewis County Fire District 8 – Salkum
33. Lewis County Fire District 9 – Mineral
34. Lewis County Fire District 10 – Packwood
35. Lewis County Fire District 11 – Pe Ell
36. Lewis County Fire District 13 – Curtis
37. Lewis County Fire District 14 – Randle
38. Lewis County Fire District 15 – Winlock

39. Lewis County Fire District 16 – Doty
40. Lewis County Fire District 17 – Ashford
41. Lewis County Fire District 18 – Glenoma
42. Lewis County PUD
43. Morton General Hospital
44. Pe Ell School District
45. Port of Chehalis
46. Providence Hospital – Centralia
47. Riverside Fire Authority
48. TwinTransit
49. Winlock School District



**HAZARD MITIGATION PLAN POINT OF CONTACT**

Primary Point of Contact	Alternate Point of Contact
Lee Napier, CDD 2025 NE Kresky Ave. Chehalis WA 98532 (360) 740-1146 <a href="mailto:Lee.Napier@lewiscountywa.gov">Lee.Napier@lewiscountywa.gov</a>	Steve Mansfield 351 NW North St. Chehalis WA 98532 (360) 740-3310 <a href="mailto:Steve.Mansfield@lewiscountywa.gov">Steve.Mansfield@lewiscountywa.gov</a>

**Profile:** Lewis County is located in western Washington. It is approximately half way between Seattle and Portland. It is approximately 20 miles south of Olympia. Lewis County lies in southwestern Washington with a total landmass of 2,452 square-miles, and measures about 90 miles (east to west) by 25 miles (north to south).

According to the U.S. Census Bureau, the county has a total area of 2,436 square miles, of which, 2,408 square miles of it is land and 29 square miles of it or 1.18% is water.

Census-Recognized Communities: Centralia, Chehalis, Morton, Mossyrock, Napavine, Toledo, Vader, Winlock and the Town of Pe Ell.

Other Communities in Lewis County include: Adna, Ajune, Alpha, Boistfort, Bunker, Carlson, Carriage Hill, Ceres, Cinebar, Claquato, Curtis, Doty, Dryad, Ethel, Evaline, Forest, Galvin, Glenoma, Guerrier, Harmony, Kalber, Klaber, Knab, Kosmos, Lacamas, Lindberg, Littell, Marys Corner, Mineral, Newaukum, Onalaska, Packwood, Randle, Saint Urbans, Salkum, Silver Creek, Waunch Prairie, and Wildwood.

Climate: Lewis County has a predominately marine climate characterized by mild temperatures both summer and winter. Extreme temperatures are unusual for the area because prevailing westerly winds bring maritime air over the basin and provide a moderating influence throughout the year.

Climate in Lewis County	
Rainfall (in.)	56.1
Snowfall (in.)	13.5
Precipitation Days	170
Sunny Days	138
Avg. July High	77.1
Avg. Jan. Low	31.8
Comfort Index (higher=better)	67
UV Index	2.5
Source: Sperling's BestPlaces / Fast Forward, Inc. <a href="http://www.bestplaces.net/County/Lewis_WA-45304100021.aspx">www.bestplaces.net/County/Lewis_WA-45304100021.aspx</a>	

During the spring and summer, high-pressure centers predominate over the northeastern Pacific, sending a northwesterly flow of dry, warm air over the basin. The dry season extends from late spring to midsummer, with precipitation frequently limited to a few light showers. Average summer temperatures are in the 70s or 80s (degrees Fahrenheit), but occasionally hot, dry easterly winds cross the Cascade Mountains and raise daytime temperatures into the 90s. The Aleutian low-pressure center normally predominates during the winter, causing a counterclockwise circulation of cool, moist air over the basin and prevailing southwesterly winds. The area from the Pacific Ocean to the crest of the Olympic Mountains, the western slopes of the Cascade Range, and the Black and Willapa Hills receives the full force of winter storms. Virtually every fall and winter (October through March), strong winds and heavy precipitation occur throughout the basin. Storms are frequent and may continue for several days. Successive secondary weather fronts with variable rainfall, wind, and temperatures may move onshore at daily intervals or less.

Precipitation in the County is affected by distance from the Pacific Ocean, elevation, and seasonal conditions. Generally, the southern slopes of the Olympic Range and the more easterly, higher slopes along the Cascade Range receive the greatest precipitation. The Black Hills in the northeast portion of the basin and Willapa Hills between the coast and the Centralia-Chehalis area often receive moderate to heavy rainfall during the movement of oceanic storms through the basin.

The greatest amount of rainfall occurs between the months of October and March. The abundance of rainfall during this period is due to the frequent storm systems that pass over western Washington.

Snowfall in the region is not heavy, but potential does exist for extremely large amounts on occasion. The average annual snowfall in the basin area is approximately nine inches, with recorded extreme annual maximums at 45 inches. Most of the snowfall occurs in the month of January, with the monthly average at about 4.5 inches in the basin and Packwood receiving around 11.6 inches.

Winds in the region rarely exceed 30 mph; winds of this speed usually only occur during the fall and winter months in conjunction with rainstorms and/or thunderstorms that pass through the vicinity. Approximately 10 percent of the winds between the months of November and February have speeds between 15 and 30 mph, compared with approximately two percent of the winds for the other months. The rest of the wind speeds typically range between zero and 15 mph, about 90 percent of the time. Wind speeds have been measured in excess of 70 mph during the winter months. The majority of the highest wind speeds measured have originated from the south and southwest directions.

**Ranking of Identified Hazards**



# JURISDICTION Lewis County

Hazard Type	Previous Occurrence?		Likely to Experience?		Probability				Extent				Percentage	Rank
	Yes	No	Yes	No	Highly Likely (100% next yr)	Likely (10-100% or 1 in 10 yrs)	Possible (1-10% next year or 1/100 yrs)	Unlikely (less than 1% in 100 yrs)	Catastrophic: more than 50% affected	Severe: 25-50% affected	Limited: 0-25% affected	None: 0% affected		
<b>Rating Points</b>	<b>20</b>	<b>0</b>	<b>10</b>	<b>0</b>	<b>20</b>	<b>10</b>	<b>6</b>	<b>0</b>	<b>20</b>	<b>10</b>	<b>4</b>	<b>0</b>		
Flooding	20		10		20				20				70%	1
Earthquake	20		10			10			20				60%	2
Landslide	20		10		20					10			60%	2
Volcano	20		10			10			20				60%	2
Levee Failure	20		10			10				10			50%	3
Wind Storm	20		10			10				10			50%	3
Winter Storm	20		10			10				10			50%	3
Dam Failure	20						6		20				46%	4
Debris Flow	20		10				6			10			46%	4
Thunder Storm	20						6				4		30%	5
Wildfire	20						6				4		30%	5

**Probability:**

- Highly Likely: Near 100% probability in the next year.
- Likely: Between 10 and 100% probability in the next year, or at least one chance in 10 years.
- Possible: Between 1 and 10% probability in the next year, or at least one chance in next 100 years.
- Unlikely: Less than 1% probability in next 100 years.

**Extent of damage is defined as follows:**

- Catastrophic: More than 50% of the jurisdiction can be affected
- Severe: 25 to 50% of the jurisdiction can be affected
- Limited: 0 to 25% of the jurisdiction can be affected

**None: 0% of the jurisdiction can be affected**

### Current Hazard Mitigation Codes/Plans/Ordinances

- Lewis County Multi-Jurisdictional Hazard Mitigation Plan adopted June 2010, Amended in 2011.
- Lewis County Comprehensive Plan adopted in December 2008; Amendments August 2009.
- Lewis County Zoning Ordinance adopted in August 2009.
- Lewis County Critical Areas Ordinance adopted in August 2009.
- Comprehensive Emergency Management Plan adopted in March 2007.
- Skookumchuck Dam Emergency Action Plan revised in December 2007.
- Lewis County Emergency Alert System (EAS). The revised plan was adopted in 2004
- Lewis County Multi-Jurisdictional Hazard Mitigation Plan adopted in February 2005, Amended 2010.
- Centralia Flood Damage Reduction Project by USACE, July 2002
- 1993 Flood Phase Guidelines Manual and Map – USACE: Seattle District
- Flood Hazard Analyses Salzer-Coal Creeks, May 1975
- Flood Hazard Analyses China Creek, March 1997
- 2006 International Building Code
- SEPA Adopted 2008
- Growth Management Act Compliant 2010

### Agency Specific Natural Hazard Event History – 1980 to 2015

Type of Disaster	FEMA Disaster #	Date	Comments
Severe Winter Storm, Flooding, Landslides, Mudslides	DR-4056	3/5/2012	Incident 1/14-1/23/2012





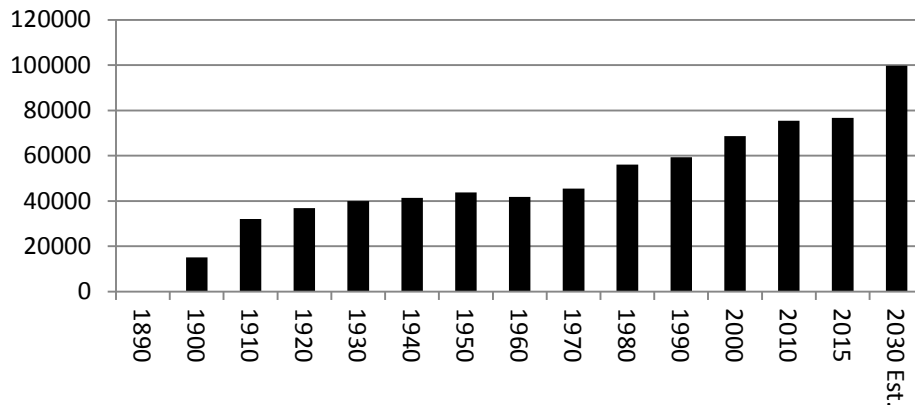
JURISDICTION  Lewis County

Severe Winter Storm, Flooding, Landslides, Mudslides	DR-1963	3/25/2011	Incident 1/11-1/21/2011
Severe Winter Storm and Record and Near Record Snow	DR-1825	3/2/2009	Incident 12/12/2008-1/5/2009
Severe Winter Storm, Landslides, Mudslides, Flooding	DR-1817	1/30/2009	1/6-/16/2009
Severe Storms, Flooding, Landslides, Mudslides	DR-1734	12/8/2007	Incident 12/1-12/17/2007
Severe Winter Storm, Landslides, Mudslides	DR-1682	2/14/2007	Incident 12/14-12/15/2006
Severe Storms, Flooding, Landslides, Mudslides	DR-1671	12/12/2006	Incident 11/2-11/11/2006
Earthquake	DR-1361	3/1/2001	Incident 2/28-3/16/2001
Severe Winter Storms/Flooding	DR-1159	1/17/1997	Incident 12/26/1996-2/10/1997
Severe Storms, Flooding	DR-1100	Feb. 9, 1996	Incident 1/26-2/23/1996
Storms, High Winds, Floods	DR-1079	Jan. 3, 1996	Incident 11/7-Dec 18, 1995
Severe Storm, High Winds	DR-981	March 4, 1993	Incident 1/20-1/21/1993
Severe Storms, Flooding	DR-784	Dec 15, 1986	Incident 11/22-11/29/1986
Volcanic Eruption – Mt. St. Helens	DR-623	May 21, 1980	

**Demographics**

Population	1990	2000	2010	2015	2030 -Projected
	59,358	68,600	75,455	76,660	99,746

**Population - State of Washington  
Office of Financial Management (OFM)  
1890-2015**



Quick Facts (US Census)	Lewis County	Washington
Population, percent change - April 1, 2010 to July 1, 2013	-0.4%	5%
Persons under 5 years, percent, 2010	5.9%	6.4%
Persons under 18 years, percent definition and source info Persons under 18 years, percent, 2010	22.2%	22.9%
Persons 65 years and over, percent definition and source info Persons 65 years and over, percent, 2010	19%	13.6%
High school graduate or higher, percent of persons age 25+, 2009-2013	85.9%	90.0%
Bachelor's degree or higher, percent of persons age 25+, 2009-2013	14.0%	31%
Homeownership rate, 2009-2013	68.6%	63.2%
Housing units in multi-unit structures, percent, 2009-2013	11.5%	25.6%
Median value of owner-occupied housing units, 2009-2013	180,200	\$262,100
Per capita money income in past 12 months (2013 dollars), 2009-2013	\$22,212	\$30,742
Median household income definition and source info Median household income, 2009-2013	\$42,860	\$59,478
Persons below poverty level, percent definition and source info Persons below poverty level, percent, 2009-2013	15.4%	13.4%

Source: U.S. Census – Quickfacts, Date Accessed: July 12, 2015. Website: quickfacts.census.gov

**Land Designations**

Total Land Area in Lewis County	
Land Area within City limits:	
Land area within Urban Growth Area:	
<b>Land Area by Uses</b>	<b>Acres</b>
Residential	70,895
Commercial	1,589



# JURISDICTION Lewis County

Industrial	1,306
Institutional	0
Public	9,815
Transportation and Utility	17,684
Agricultural	96,478
Parks and Wilderness	145,448
Forestry and Mining	1,135,198
Water	6,286
Undeveloped	58,623
Other	15,045

**Current and Anticipated Development and Population Trends:**

### Infrastructure

Categories	2014	Approximate Value (\$)
Miles of Street and Roads	1,046	
Miles of Sanitary Sewer	N/A	
Miles of Storm Sewer	N/A	
Miles of water lines	N/A	
Miles of Electrical lines	N/A – Centralia or LCPUD	

### Critical Facilities

Critical Facilities	Address	Approximate Value (\$)
Courthouse	351 NW North, Chehalis	
Health Service Bldg	360 NW North, Chehalis	
Law & Justice Center	345 W. Main, Chehalis	
Motor Pool	476 W. Main, Chehalis	
Jail	28 SW Chehalis, Chehalis	
Training Facility (old WSECU)	156 Chehalis, Chehalis	
Coroner/Evidence (OLD)	585 NW Center St., Chehalis	
Facilities Bldg	571 NW Prindle St, Chehalis	
Public Services Building	2025 Kresky Ave, Chehalis	
Fairgrounds	2555 No National, Chehalis	
Central Shop	109 Forest Napavine, Chehalis	
Area 1 Shop	148 Big Hanaford Rd, Centralia	
Area 2 Shop Bunker Garage	307 Spooner Rd (St Hwy 6)	
Area 3 Shop	111 Pleasant Valley Rd., Winlock	
Area 5 Shop	162 Brim Rd., Ethel	
Sheriff Storage	187 Kirkland Rd., Chehalis	
Area 7 Shop	8911 US Hwy 12, Randle	
Toledo Sand Shed	134 Collins Rd #125, Toledo	
Search and Rescue Shop	951 Hwy 508, Onalaska	
South County Park Storage	212 Ray Rd., Toledo	
Shaefer Park Kitchen/Serv	n/s Hwy 507 1 mi N of Centralia	
Rose Park Picnic, Shelter	2 mi No of Adna on Penning Rd	



# JURISDICTION Lewis County

Back Memorial Park	146 Dieckman Rd., Adna	
Senior Center & Storage	2545 No. National Ave, Chehalis	
Senior Center	103 Westlake Ave & 1 <sup>st</sup> , Morton	
Olequa Senior Center	119 SW Kerron, Winlock	
Packwood Senior Center	12931 US Hwy 12, Packwood	
Toledo Senior Center	150 Coal St., Toledo	
Lewis Co. Historical Museum	599 NW Front, Chehalis	
Central Transfer Station	1411 So Tower, Centralia	
Morton Transfer Station	6745 US Hwy 12, Morton	
Juvenile Detention Center	1255 SW Pacific, Chehalis	
Ed Carlson Memorial-South Lewis County Airport	5235 Jackson Hwy, Toledo	
Animal Shelter	560 Centralia Alpha, Chehalis	
Claquato Church	Water Street, Chehalis	
Sheriff's Substation	12990 US Hwy 12, Packwood	
PA Victims Assistance Services	17 NW Cascade, Chehalis	
St. Urban Church	Military Road, Winlock	
Coroner & Evidence	172 NW State, Chehalis	
Packwood Airport	133 Main St W., Packwood	
Radio Towers	Various	
Vader Water Intake	0 State Route 506, Vader	
Sheriff Storage	187 Kirkland Rd., Chehalis	
Engineering/Design	2015 NE Kresky Ave., Chehalis	
Larson Pit	Larson Rd., Mossyrock	
Animal Shelter Sand Shed	560 Centralia Alpha, Chehalis	
Vader Water Treatment Plant	1333 S. Military Rd., Vader	

<b>Flood Information</b>		
Percentage of existing city limits within the 100-year flood plain		4.5%
Assessor's valuation of private properties within the 100-year flood plain		

<b>Critical Facilities within the 100-year flood plain</b>		
Facility	Address	Approximate Value (\$)
Courthouse	351 NW North Street- Chehalis	17M
Health Service Bldg	360 NW North, Chehalis	3.6M
Law & Justice Center	345 W. Main, Chehalis	16.4M
Motor Pool	476 W. Main, Chehalis	2.3M
Jail	28 SW Chehalis, Chehalis	30M
Training Facility (old WSECU)	156 Chehalis, Chehalis	450K
Facilities Bldg	571 NW Prindle St, Chehalis	2.1M
Public Services Building	2025 Kresky Ave, Chehalis	2.6M
Fairgrounds	2555 No National, Chehalis	21M
Area 1 Shop	148 Big Hanaford Rd, Centralia	1.4M
Sheriff Storage	187 Kirkland Rd., Chehalis	795K
Area 7 Shop	8911 US Hwy 12, Randle	1.5M



JURISDICTION  Lewis County

Toledo Sand Shed	134 Collins Rd #125, Toledo	110K
Search and Rescue Shop	951 Hwy 508, Onalaska	519K
South County Park Storage	212 Ray Rd., Toledo	384K
Shaefer Park Kitchen/Serv	n/s Hwy 507 1 mi N of Centralia	180K
Back Memorial Park	146 Dieckman Rd., Adna	98K
Senior Center & Storage	2545 No. National Ave, Chehalis	1.8M
Morton Senior Center	103 Westlake Ave & 1 <sup>st</sup> Morton	630K
Olequa Senior Center	119 SW Kerron, Winlock	755K
Toledo Senior Center	150 Coal St., Toledo	581K
Central Transfer Station	1411 So Tower, Centralia	3.2M
Juvenile Detention Center	1255 SW Pacific, Chehalis	3.9M
Ed Carlson Memorial-South Lewis County Airport	5239 Jackson Hwy, Toledo	509K
Coroner & Evidence	172 NW State, Chehalis	4.8M
Packwood Airport	133 Main St W., Packwood	800K
Vader Water Intake	0 State Route 506, Vader	804k
Engineering/Design	2015 NE Kresky Ave., Chehalis	Rental

NFIP/CRS Section	
NFIP/CRS Community	Yes
Floodplain Administrator	Emil Pierson, Community Development Director
Certified Floodplain Manager	Yes
Floodplain Ordinance Adoption	Adopted 2009. Amended Ord 2350 April 2015.
Recently Community Assistant Visit or Community Assistance Contact	6/7/2005
NFIP Membership	Yes, 3/15/1974
NFIP Compliance Violations?	None
FEMA Floodplain Maps Adopted	Yes, 6/1/1982
Community Rating Classification	Class 6, 2015/2016
Building Code Effective Grading Schedule	Class 3
StormReady Jurisdiction	No
Firewise Jurisdiction	No

Previous Action Plan Implementation
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Action #	Completed	Carry Over to 2010 Plan Update
Incorporate early warning procedures in local ERPs	Yes	Yes
Create prioritized plans for road/street clearance	Yes	Yes
Review adequacy of existing mutual aid agreements	Yes	Yes
Define evacuation routes for areas of high volcanic probability	No	Yes
Continue to enforce the flood damage prevention code.	Yes	Yes
Continue participation and implementation of project recommended by the Chehalis River Basin Flood Authority	Yes	Yes
Evaluate potential benefits of HMGP Home Elevation program	Yes	Yes
Include a compensatory storage element (storage in floodplain) and ensure consistency with County floodplain ordinances	Yes	Yes
Update road addressing and incorporate into addressing ordinance	No	Yes
Lewis County PUD tree maintenance program trims trees around power lines	Yes	Yes
Retrofit existing overhead lines to underground as practicable and where time/budge allows	No	Yes
Explore the feasibility of creating wildfire zones for incorporation into critical areas ordinance	No	Yes



# JURISDICTION Lewis County

Incorporate the channel migration zones in the critical areas ordinance. Do necessary studies for mapping other river basins; utilize public process through Planning Commission to incorporate CMZ into critical areas ordinance	No	Yes
Review critical areas ordinance to update flood zones, seismic zones, and landslides	Yes	Yes
Evaluate feasibility of creating high wind zones for incorporation into critical areas ordinance	No	Yes
Evaluate feasibility of creating high wind zones for incorporation into critical areas ordinance	No	Yes
Ensure wind ratings in building code are adequate and consistent	No	Yes
Explore feasibility of considering volcanic evacuation in determining building occupancy limits	No	Yes
Continue to maintain concurrency with all building, plumbing, electrical and other codes that reduce vulnerability of new structures to natural hazards	No	Yes
Maintain/update HMP Mitigation database	Yes	Yes
Coordinate annual participation of Opt-ins in HMP review/update	No	Yes
Improve NOAA radio coverage for East County	Yes	Yes
Apply for Hazard Mitigation grants to purchase and distribute NOAA radios with EAS to public. See Neighborhood Mitigation Strategies for "Priority" neighborhoods	Yes	Yes
Lobby Federal Government to fully implement EAS technology in consumer electronics	Yes	Yes
Educate public on what to do before, after, and during an emergency	Yes	Yes
Educate public about need to create buffer zones between home and timber	Yes	Yes
LC Solid Waste Transfer Station: Update EAP plan for dumping of damaged materials	No	Yes
LC Juvenile Court: Update Emergency Action Plan and educate staff	No	Yes
LC Juvenile Court: Update agreements with other agencies to hold prisoners in the event of damage to local facility	No	Yes
LC Sheriff Packwood Monitor flooding and take action to move equipment in event	No	Yes
LC Public Services Create EAP plan for building and train employees on use	No	Yes
LC Public Services Maintenance staff monitor for any damage to facility	No	Yes
LC Courthouse Create EAP plan for building and train employees on use	No	Yes
LC Courthouse Maintenance staff monitor for any damage to facility	No	Yes
Ed Carlson Memorial-South Lewis County Airport: Develop a plan to keep facility operations – Mt. St. Helens	No	Yes
Packwood Airport Develop a plan to keep facility operations – Mt. St. Rainier	No	Yes
Ed Carlson Memorial –South Lewis County Airport: Assess buildings for seismic and ash fall capabilities	Yes	Yes
Packwood Airport: Update Airport Layout Plan	No	Yes
LC Public Health & Social Services: Create EAP Plan for building and train employees on use	No	Yes
LC Public Health & Social Services: Maintenance staff monitor for any damage to facility	No	Yes
LC Law & Justice: Create EAP Plan for building and train employees on use	No	Yes
LC Law & Justice: Maintenance staff monitor for any damage to facility	No	Yes
LC Motor Pool: Create EAP Plan for building and train employees on use	No	Yes
LC Motor Pool: Maintenance staff monitor for any damage to facility	No	Yes
Skookumchuck Dam: Coordinate warning system for potential break with other stakeholders	No	Yes
Bridges: Ensure bridges associated to the neighborhood has a high priority for inspection and retrofit	Yes	Yes

## Attached Documents

### **A. Lewis County Multi-Jurisdictional Hazard Mitigation Plan Worksheets**

1. Hazard Identification Worksheet
2. Asset Inventory Worksheet 2A
3. Asset Inventory Worksheet 2B
4. Mitigation Strategies Worksheet 3A – STAPLEE
5. Mitigation Strategies 3B
6. Mitigation Strategies – 3C Critical Facilities

### **B. HAZUS-MH: Earthquake**

### **C. HAZUS-MH: Flood Results**

# HAZARD IDENTIFICATION WORKSHEET

Date Completed: 6/2015

Which Agency are you representing? **Lewis County**

Name:	Title:
Email:	Telephone #:
Address:	City: ZIP:

**For each Hazard, please fill out the table below based on the following questions:**

- **Previous Occurrence:** Is there a historic record of this type of hazard happening here? *Yes or No*
- **Likely to Experience:** Are you likely to experience this type of hazard in the future? *Yes or No*
- **Probability:** Based on history, what is the likelihood of this event happening again? *Highly Likely, Likely, Possible, Unlikely*
- **Extent:** If this hazard event were to happen, how extensive could the damage be? *Catastrophic, Severe, Limited, None*

Hazard Type	Previous Occurrence?		Likely to Experience?		Probability				Extent			
	Yes	No	Yes	No	Highly Likely	Likely	Possible	Unlikely	Catastrophic	Severe	Limited	None
Avalanche		X		X				X				X
Coastal Erosion		X		X				X				X
Coastal Storm		X		X				X				X
Dam Failure	X			X			X		X			
Debris Flow	X		X				X			X		
Drought		X		X				X				X
Earthquake	X		X			X			X			
Expansive Soils		X		X				X				X
Extreme Heat		X		X				X				X
Flooding	X		X		X				X			
Hailstorm		X		X			X					X
Hurricane		X		X				X				X
Land Subsidence		X		X				X				X
Landslide	X		X		X					X		
Levee Failure	X		X			X				X		
Severe Thunder Storm	X			X			X				X	
Severe Wind Storm	X		X			X				X		
Severe Winter Storm	X		X			X				X		
Tornado		X		X				X				X
Tsunami		X		X				X				X
Volcano	X		X			X			X			
Wildfire	X			X			X				X	
Other:												

**Which of the following does your agency have? (Circle One)**

Comprehensive Plan	Yes / No / NA	Date completed: 2010
Critical Areas Ordinance	Yes / No / NA	Date completed: 2008
Does your agency have an emergency plan?	Yes / No / NA	

<b>ASSET INVENTORY WORKSHEET 2A</b>	<b>Date Completed: 5-4-2014</b>
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**Which Agency are you representing? Lewis County**

**Name: Edna J Fund** **Title: Chair, BOCC**

**Email: [edna.fund@lewiscountywa.gov](mailto:edna.fund@lewiscountywa.gov)** **Telephone #: 360.740.1120**

**Address: 351 NW North Street** **City: Chehalis** **ZIP: 98532**

**Task A: Inventory the critical facilities that can be damaged by a hazard event.**  
Please fill out the table below.

Name of Building/Business	Address	Contact Information (Telephone #)	Occupancy #	Structure Use							
				Educational	Government	Hospital	Non/Profit	Public Safety	Residential	Utilities	Other
Courthouse	351 NW North, Chehalis	360-740-1192			X						
Health Service Bldg	360 NW North, Chehalis	360-740-1148			X			X			
Law & Justice Center	345 W. Main, Chehalis	360-740-1266			X			X			
Motor Pool	476 W. Main, Chehalis	360-740-1191			X						
Jail	28 SW Chehalis, Chehalis	360-740-1344			X			X			
Training Facility (old WSECU)	156 Chehalis, Chehalis	360-740-1192			X						
Coroner/Evidence (OLD)	585 NW Center St., Chehalis	360-740-1192			X						
Facilities Bldg	571 NW Prindle St, Chehalis	360-740-1192			X						
Public Services Building	2025 Kresky Ave, Chehalis	360-740-1146			X						
Fairgrounds	2555 No National, Chehalis	360-740-1495			X						
Central Shop	109 Forest Napavine, Chehalis	360-740-1150			X						
Area 1 Shop	148 Big Hanaford Rd, Centralia	360-736-9222			X						
Area 2 Shop Bunker Garage	307 Spooner Rd (St Hwy 6)	360-748-2359			X						
Area 3 Shop	111 Pleasant Valley Rd., Winlock	360-785-3304			X						
Area 5 Shop	162 Brim Rd., Ethel	360-978-5879			X						
Sheriff Storage	187 Kirkland Rd., Chehalis	360-740-1360			X						
Area 7 Shop	8911 US Hwy 12, Randle	360-497-3182			X						
Toledo Sand Shed	134 Collins Rd #125, Toledo	360-740-1123			X						
Search and Rescue Shop	951 Hwy 508, Onalaska	360-740-1459			X						
South County Park Storage	212 Ray Rd., Toledo	360-740-1459			X						
Shaefer Park Kitchen/Serv	n/s Hwy 507 1 mi N of Centralia	360-740-1459			X						
Rose Park Picnic, Shelter	2 mi No of Adna on Penning Rd	360-740-1459			X						
Back Memorial Park	146 Dieckman Rd., Adna	360-740-1459			X						
Senior Center & Storage	2545 No. National Ave, Chehalis	360-740-2646			X						
Senior Center	103 Westlake Ave & 1 <sup>st</sup> , Morton	360-740-2646			X						
Olequa Senior Center	119 SW Kerron, Winlock	360-740-2646			X						
Packwood Senior Center	12931 US Hwy 12, Packwood	360-740-2646			X						
Toledo Senior Center	150 Coal St., Toledo	360-740-2646			X						
Lewis Co. Historical Museum	599 NW Front, Chehalis	360-748-0831			X						
Central Transfer Station	1411 So Tower, Centralia	360-740-1481			X						
Morton Transfer Station	6745 US Hwy 12, Morton	360-496-5095			X						
Juvenile Detention Center	1255 SW Pacific, Chehalis	360-740-1178			X			X			
Ed Carlson Memorial-South Lewis County Airport	5235 Jackson Hwy, Toledo	360-864-4966			X			X			
Animal Shelter	560 Centralia Alpha, Chehalis	360-740-1290			X						
Claquato Church	Water Street, Chehalis	360-740-1192									X
Sheriff's Substation	12990 US Hwy 12, Packwood	360-497-5500			X			X			
PA Victims Assistance Services	17 NW Cascade, Chehalis	360-740-1284			X						
St. Urban Church	Military Road, Winlock	360-740-1192									X
Coroner & Evidence	172 NW State, Chehalis	360-740-1470			X						
Packwood Airport	133 Main St W., Packwood	360-864-4966			X			X			
Radio Towers	Various	360-740-1292			X			X			
Vader Water Intake	0 State Route 506, Vader				X					X	
Sheriff Storage	187 Kirkland Rd., Chehalis				X						

Engineering/Design	2015 NE Kresky Ave., Chehalis				X						
Larson Pit	Larson Rd., Mossyrock				X						
Animal Shelter Sand Shed	560 Centralia Alpha, Chehalis				X						
Vader Water Treatment Plant	1333 S. Military Rd., Vader				X					X	



ASSET INVENTORY WORKSHEET 2B - 2015											Date Completed: May 6, 2015				
Which Agency are you representing: Lewis County															
Name: Edna J. Fund											Title: Chair Board of County Commissioners				
Email edna.fund@lewiscountywa.gov											Telephone #: 360.740.1120				
Address: 351 NW North Street							City: Chehalis				Zip: 98532				
<b>Task B: Compile a detailed inventory of what can be damaged by a hazard event.</b> Inventory the assets (critical facilities, businesses, historic, cultural, natural resource areas and areas of special consideration) that can be damaged by a hazard event.															
<b>HAZARDS</b> 1. Avalanche 2. Dam Failure 3. Debris Flow 4. Drought 5. Earthquake 6. Expansive Soils 7. Extreme Heat 8. Flooding 9. Hailstorm 10. Hurricane 11. Land Subsidence 12. Landslide 13. Levee Failure 14. Severe Thunder Storm 15. Severe Wind Storm 16. Severe Winter Storm 17. Tornado 18. Volcano 19. Wildfire											<b>BUILDING MATERIALS</b> a. Masonry b. concrete c. Concrete Block d. Brick e. Stick f. Metal g. Steel h. Asphalt				
Name or description of Asset (building)	Address	Hazard(s) List all that apply (See legend above)	Critical Facility	Transportation	Utility System	Comm. System	Economic Assets	Special consideration	Historic/Other	Size of Building (sq. ft.)	Replacement Value (\$)	Contents Value (\$)	Displacement (\$ per day)	Occupancy or capacity (#)	Structural – building materials
Courthouse	351 NW North Street–Chehalis	5,8,14,15,16,17,18	X						X	55,894	17M	4.2M	61,483	300	B
Health Service Bldg	360 NW North, Chehalis	5,8,14,15,16,17,18	X							17,775	3.6M	889K	19,553	150	B
Law & Justice Center	345 W. Main, Chehalis	5,8,14,15,16,17,18	X							65,680	16.4M	4.1M	72,248	500	D
Motor Pool	476 W. Main, Chehalis	5,8,15,16,17,18		X						11,000	2.3M	500K	11,000	20	C
Jail	28 SW Chehalis, Chehalis	5,8,15,16,17,18	X							93,920	30M	7.4M	103,312	400	B
Training Facility (old WSECU)	156 Chehalis, Chehalis	5,8,15,16,17,18	X							2,250	450K	112K	2,475	40	E
Facilities Bldg	571 NW Prindle St, Chehalis	5,8,14,15,16,17,18	X							12,328	2.1M	539K	13,561	25	C
Public Services Building	2025 Kresky Ave, Chehalis	5,8,12,13,14,15,16,17,18	X							12,537	2.6M	625K	14,850	150	E
Fairgrounds	2555 No National, Chehalis	5,8,13,15,16,17,18	X						Yes	204,313	21M	5.3M	224,744	20000	F,C,F,G

Central Shop	109 Forest Napavine, Chehalis	5,14,15,16,17,18		X						40,848	6.1M	1.2M	41,954	40	E,F,C
Area 1 Shop	148 Big Hanaford Rd, Centralia	2,3,5,8,14,15,16,17,18	X							9,916	1.4M	2.1M	9,625	25	B,E,G
Area 2 Shop Bunker Garage	307 Spooner Rd (St Hwy 6)	5,12,14,15,16,17,18	X							10,231	1.4M	2.1M	6,930	25	B,F
Area 3 Shop	111 Pleasant Valley Rd., Winlock	5,14,15,16,17,18	X							15,860	2.2M	3.2M	11,942	25	B,E,F,G
Area 5 Shop	162 Brim Rd., Ethel	5,14,15,16,17,18	X							20,876	3M	4.8M	14,784	50	B,E,G
Sheriff Storage	187 Kirkland Rd., Chehalis	3,5,8,14,15,16,17,18	X							9,200	795K	119K	6,981	10	E
Area 7 Shop	8911 US Hwy 12, Randle	5,8,12,14,15,16,17,18	X							13,612	1.5M	2.1M	12,043	25	B,E,G
Toledo Sand Shed	134 Collins Rd #125, Toledo	2,5,8,12,14,15,16,17,18	X							1,920	110K	16K	1,430	1	B,E,G
Search and Rescue Shop	951 Hwy 508, Onalaska	5,8,15,16,17,18	X							5,994	519K	81K	4,752	20	F
South County Park Storage	212 Ray Rd., Toledo	5,8,15,16,17,18								3,120	384K	96K	3,432	5	C
Shaefer Park Kitchen/Serv	n/s Hwy 507 1 mi N of Centralia	5,8,15,16,17,18								1,800	180K	45K	1,980	25	E
Rose Park Picnic, Shelter	2 mi No of Adna on Penning Rd	5,15,16,17,18								480	72K	18K	528	15	E
Back Memorial Park	146 Dieckman Rd., Adna	5,8,15,16,17,18								1,302	98K	24K	1,432	50	M
Senior Center & Storage	2545 No. National Ave, Chehalis	5,8,13,14,15,16,17,18	X							9,440	1.8M	456K	10,384	150	E,F
Morton Senior Center	103 Westlake Ave & 1 <sup>st</sup> Morton	5,8,14,15,16,17,18	X							4,200	630K	158K	4,620	75	E
Olequa Senior Center	119 SW Kerron, Winlock	5,8,14,15,16,17,18	X							5,036	755K	189K	5,540	75	E
Packwood Senior Center	12931 US Hwy 12, Packwood	5,14,15,16,17,18	X							3,888	562K	140K	4,277	75	E
Toledo Senior Center	150 Coal St., Toledo	5,8,12,14,15,16,17,18	X							3,872	581K	145K	5,259	75	E
Lewis Co. Historical Museum	599 NW Front, Chehalis	5,14,15,16,17,18							Yes	8,752	2.1M	547K	9,627	50	D
Central Transfer Station	1411 So Tower, Centralia	5,8,13,14,15,16,17,18	X							15,900	3.2M	703K	17,490	50	B,E
Morton Transfer Station	6745 US Hwy 12, Morton	5,12,14,15,16,17,18	X							11,200	1.9M	321K	8,427	25	E,G
Juvenile Detention Center	1255 SW Pacific, Chehalis	5,8,14,15,16,17,18	X	X						13,13	3.9M	985K	14,443	100	B
Ed Carlson Memorial-South Lewis County Airport	5239 Jackson Hwy, Toledo	5,8,9,14,15,16,17,18	X							8,682	509K	127K	9,550	20	B,F,H

Animal Shelter	560 Centralia Alpha, Chehalis	5,12,14,15,16,17,18	X							2,624	525K	131K	2,886	15	C
Claquato Church	Water Street, Chehalis	5,15,16,17,18							X	625	125K	31K	688	40	E
Sheriff's Substation	12990 US Hwy 12, Packwood	5,15,16,17,18	X							1,232	RENTAL	0	1,355	10	B
PA Family Support Services	17 NW Cascade, Chehalis	5,14,15,16,18								2,172	272K	68K	2,389	20	E
St. Urban Church	Military Road, Winlock	5,15,16,17,18							X	1,500	300K	75K	1,650	50	E
Coroner & Evidence	172 NW State, Chehalis	5,8,14,15,16,17,18	X							16,000	4.8M	1.2M	17,600	50	C
Packwood Airport	133 Main St W., Packwood	5,8,12,14,15,16,17,18	X	X						2000ft runway	800K	25K		1	H
Radio Towers	Various	5,12,14,15,16,17,18			X					22 sites	750K TOTAL	VARIES	UNKN	NA	VARIES
Vader Water Intake	0 State Route 506, Vader	2,3,8,12,16,18,								120	804k	-	7,500	1	E
Engineering/Design	2015 NE Kresky Ave., Chehalis	8,12,13,16,18								2,608	Rental	130K	3,104	20	E
Larson Pit	Larson Rd., Mossyrock	16,18								1,920	110K	16K	1,430	1	E
Animal Shelter Sand Shed	560 Centralia Alpha, Chehalis	16,18								1,224	71K	10K	906	1	E
Vader Water Treatment Plant	1333 S. Military Rd., Vader	12,16,18								1,364	3.7M	—	3,411	10	E

<b>ASSET INVENTORY WORKSHEET 2C</b>		Date Completed: 5/28/15	
Which Agency are you representing? <b>County of Lewis</b>			
Name: Edna J Fund		Title: Chairman BOCC	
Email: edna.fund@lewiscountywa.gov		Telephone #: 740-1120	
Address: 351 NW North St.		City: Chehalis	ZIP: 98532

**Task C.** Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.

**Hazard:** **AVALANCHE (NEW)**

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	29832	0		3593 M	0		76300	0	
Commercial	2077	0		559 M	0				
Industrial	241	0		163 M	0				
Agricultural	561	0		69 M	0				
Religious/ Non-profit	301	0		78 M	0				
Government	184	0		102 M	0				
Education	199	0		200 M	0				
Utilities	120	0		677 M	0				
<b>Total</b>	<b>33515</b>	<b>0</b>		<b>5440 M</b>	<b>0</b>				

**Task D. Determine whether (and where) you want to collect additional inventory data. (circle one)**

- Do you know where your greatest damages may occur in your hazard areas? **Yes** or No
- Do you know whether your critical facilities will be operational after a hazard event? **Yes** or No
- Is there enough data to determine which assets are subject to the greatest potential damages? **Yes** or No
- Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards? **Yes** or No
- Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards? **Yes** or No
- Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence? **Yes** or No
- Is additional data needed to justify the expenditure of community or state funds for mitigation? Yes or **No**

<b>ASSET INVENTORY WORKSHEET 2C</b>	<b>Date Completed: 5/28/15</b>
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**Which Agency are you representing? County of Lewis**

**Name: Edna J Fund** **Title: Chairman BOCC**

**Email: edna.fund@lewiscountywa.gov** **Telephone #: 740-1120**

**Address: 351 NW North St.** **City: Chehalis** **ZIP: 98532**

**Task C.** Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.

**Hazard: DAM FAILURE**

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	29832	7002	24	3593 M	742 M	21	76300	19524	26
Commercial	2077	823	40	559 M	195 M	35			
Industrial	241	49	20	163 M	15 M	9.2			
Agricultural	561	52	9.3	69 M	6.1 M	8.8			
Religious/ Non-profit	301	89	30	78 M	22 M	28			
Government	184	46	25	102 M	19 M	18			
Education	199	65	33	200 M	82 M	41			
Utilities	120	25	21	677 M	27 M	4.0			
<b>Total</b>	<b>33515</b>	<b>8151</b>	<b>24</b>	<b>5440 M</b>	<b>1108 M</b>	<b>20</b>			

**Task D. Determine whether (and where) you want to collect additional inventory data. (circle one)**

1. Do you know where your greatest damages may occur in your hazard areas? **Yes** or No
2. Do you know whether your critical facilities will be operational after a hazard event? **Yes** or No
3. Is there enough data to determine which assets are subject to the greatest potential damages? **Yes** or No
4. Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards? **Yes** or No
5. Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards? **Yes** or No
6. Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence? **Yes** or No
7. Is additional data needed to justify the expenditure of community or state funds for mitigation? Yes or **No**

<b>ASSET INVENTORY WORKSHEET 2C</b>	<b>Date Completed: 5/28/15</b>
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**Which Agency are you representing? County of Lewis**

**Name: Edna J Fund** **Title: Chairman BOCC**

**Email: edna.fund@lewiscountywa.gov** **Telephone #: 740-1120**

**Address: 351 NW North St.** **City: Chehalis** **ZIP: 98532**

**Task C.** Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.

**Hazard: DEBRIS FLOW**

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	29832			3593 M			76300		
Commercial	2077			559 M					
Industrial	241			163 M					
Agricultural	561			69 M					
Religious/ Non-profit	301			78 M					
Government	184			102 M					
Education	199			200 M					
Utilities	120			677 M					
<b>Total</b>	<b>33515</b>			<b>5440 M</b>					

**Task D. Determine whether (and where) you want to collect additional inventory data. (circle one)**

- Do you know where your greatest damages may occur in your hazard areas? **Yes** or No
- Do you know whether your critical facilities will be operational after a hazard event? **Yes** or No
- Is there enough data to determine which assets are subject to the greatest potential damages? **Yes** or No
- Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards? **Yes** or No
- Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards? **Yes** or No
- Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence? **Yes** or No
- Is additional data needed to justify the expenditure of community or state funds for mitigation? Yes or **No**

<b>ASSET INVENTORY WORKSHEET 2C</b>	<b>Date Completed: 5/28/15</b>
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**Which Agency are you representing? County of Lewis**

**Name: Edna J Fund** **Title: Chairman BOCC**

**Email: edna.fund@lewiscountywa.gov** **Telephone #: 740-1120**

**Address: 351 NW North St.** **City: Chehalis** **ZIP: 98532**

**Task C.** Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.

**Hazard: DROUGHT (NEW)**

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	29832	29832	100	3593 M	3593 M	100	76300	76300	100
Commercial	2077	2077	100	559 M	559 M	100			
Industrial	241	241	100	163 M	163 M	100			
Agricultural	561	561	100	69 M	69 M	100			
Religious/ Non-profit	301	301	100	78 M	78 M	100			
Government	184	184	100	102 M	102 M	100			
Education	199	199	100	200 M	200 M	100			
Utilities	120	120	100	677 M	677 M	100			
<b>Total</b>	<b>33515</b>	<b>33515</b>	<b>100</b>	<b>5440 M</b>	<b>5440 M</b>	<b>100</b>			

**Task D. Determine whether (and where) you want to collect additional inventory data. (circle one)**

1. Do you know where your greatest damages may occur in your hazard areas? **Yes** or No
2. Do you know whether your critical facilities will be operational after a hazard event? Yes or **No**
3. Is there enough data to determine which assets are subject to the greatest potential damages? Yes or **No**
4. Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards? Yes or **No**
5. Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards? Yes or **No**
6. Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence? **Yes** or No
7. Is additional data needed to justify the expenditure of community or state funds for mitigation? **Yes** or No

<b>ASSET INVENTORY WORKSHEET 2C</b>	<b>Date Completed: 5/28/15</b>
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**Which Agency are you representing? County of Lewis**

**Name: Edna J Fund** **Title: Chairman BOCC**

**Email: edna.fund@lewiscountywa.gov** **Telephone #: 740-1120**

**Address: 351 NW North St.** **City: Chehalis** **ZIP: 98532**

**Task C.** Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.

**Hazard: EARTHQUAKE**

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	29832	29832	100	3593 M	3593 M	100	76300	76300	100
Commercial	2077	2077	100	559 M	559 M	100			
Industrial	241	241	100	163 M	163 M	100			
Agricultural	561	561	100	69 M	69 M	100			
Religious/ Non-profit	301	301	100	78 M	78 M	100			
Government	184	184	100	102 M	102 M	100			
Education	199	199	100	200 M	200 M	100			
Utilities	120	120	100	677 M	677 M	100			
<b>Total</b>	<b>33515</b>	<b>33515</b>	<b>100</b>	<b>5440 M</b>	<b>5440 M</b>	<b>100</b>			

**Task D. Determine whether (and where) you want to collect additional inventory data. (circle one)**

- Do you know where your greatest damages may occur in your hazard areas? **Yes** or **No**
- Do you know whether your critical facilities will be operational after a hazard event? **Yes** or **No**
- Is there enough data to determine which assets are subject to the greatest potential damages? **Yes** or **No**
- Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards? **Yes** or **No**
- Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards? **Yes** or **No**
- Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence? **Yes** or **No**
- Is additional data needed to justify the expenditure of community or state funds for mitigation? **Yes** or **No**



<b>ASSET INVENTORY WORKSHEET 2C</b>	<b>Date Completed: 5/28/15</b>
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**Which Agency are you representing? County of Lewis**

**Name: Edna J Fund** **Title: Chairman BOCC**

**Email: edna.fund@lewiscountywa.gov** **Telephone #: 740-1120**

**Address: 351 NW North St.** **City: Chehalis** **ZIP: 98532**

**Task C.** Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.

**Hazard: FLOOD**

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	29832	3684	12	3593 M	403 M	11	76300	9538	13
Commercial	2077	431	21	559 M	110 M	20			
Industrial	241	41	17	163 M	11 M	6.5			
Agricultural	561	48	8.6	69 M	5.9 M	8.7			
Religious/ Non-profit	301	28	9.3	78 M	11 M	14			
Government	184	34	19	102 M	31 M	30			
Education	199	23	12	200 M	23 M	11			
Utilities	120	12	13	677 M	17 M	2.5			
<b>Total</b>	<b>33515</b>	<b>4304</b>	<b>13</b>	<b>5440 M</b>	<b>610 M</b>	<b>11</b>			

**Task D. Determine whether (and where) you want to collect additional inventory data. (circle one)**

1. Do you know where your greatest damages may occur in your hazard areas? **Yes** or No
2. Do you know whether your critical facilities will be operational after a hazard event? Yes or **No**
3. Is there enough data to determine which assets are subject to the greatest potential damages? Yes or **No**
4. Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards? Yes or **No**
5. Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards? Yes or **No**
6. Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence? **Yes** or No
7. Is additional data needed to justify the expenditure of community or state funds for mitigation? **Yes** or No

<b>ASSET INVENTORY WORKSHEET 2C</b>	<b>Date Completed: 5/28/15</b>
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**Which Agency are you representing? County of Lewis**

<b>Name: Edna J Fund</b>	<b>Title: Chairman BOCC</b>
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<b>Email: edna.fund@lewiscountywa.gov</b>	<b>Telephone #: 740-1120</b>
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<b>Address: 351 NW North St.</b>	<b>City: Chehalis</b>	<b>ZIP: 98532</b>
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**Task C.** Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.

**Hazard: LAND SLIDE**

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	29832			3593 M			76300		
Commercial	2077			559 M					
Industrial	241			163 M					
Agricultural	561			69 M					
Religious/ Non-profit	301			78 M					
Government	184			102 M					
Education	199			200 M					
Utilities	120			677 M					
<b>Total</b>	<b>33515</b>			<b>5440 M</b>					

**Task D. Determine whether (and where) you want to collect additional inventory data. (circle one)**

- Do you know where your greatest damages may occur in your hazard areas? **Yes** or No
- Do you know whether your critical facilities will be operational after a hazard event? Yes or **No**
- Is there enough data to determine which assets are subject to the greatest potential damages? Yes or **No**
- Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards? Yes or **No**
- Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards? Yes or **No**
- Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence? **Yes** or No
- Is additional data needed to justify the expenditure of community or state funds for mitigation? **Yes** or No

<b>ASSET INVENTORY WORKSHEET 2C</b>	<b>Date Completed: 5/28/15</b>
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**Which Agency are you representing? County of Lewis**

<b>Name: Edna J Fund</b>	<b>Title: Chairman BOCC</b>
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<b>Email: edna.fund@lewiscountywa.gov</b>	<b>Telephone #: 740-1120</b>
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<b>Address: 351 NW North St.</b>	<b>City: Chehalis</b>	<b>ZIP: 98532</b>
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**Task C.** Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.

**Hazard: *LEVEE FAILURE***

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	29832			3593 M			76300		
Commercial	2077			559 M					
Industrial	241			163 M					
Agricultural	561			69 M					
Religious/ Non-profit	301			78 M					
Government	184			102 M					
Education	199			200 M					
Utilities	120			677 M					
<b>Total</b>	<b>33515</b>			<b>5440 M</b>					

**Task D. Determine whether (and where) you want to collect additional inventory data. (circle one)**

- Do you know where your greatest damages may occur in your hazard areas? **Yes** or No
- Do you know whether your critical facilities will be operational after a hazard event? Yes or **No**
- Is there enough data to determine which assets are subject to the greatest potential damages? Yes or **No**
- Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards? Yes or **No**
- Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards? Yes or **No**
- Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence? **Yes** or No
- Is additional data needed to justify the expenditure of community or state funds for mitigation? **Yes** or No

<b>ASSET INVENTORY WORKSHEET 2C</b>	<b>Date Completed: 5/28/15</b>
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**Which Agency are you representing? County of Lewis**

**Name: Edna J Fund** **Title: Chairman BOCC**

**Email: edna.fund@lewiscountywa.gov** **Telephone #: 740-1120**

**Address: 351 NW North St.** **City: Chehalis** **ZIP: 98532**

**Task C.** Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.

**Hazard: SEVERE THUNDER STORM**

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	29832	29832	100	3593 M	3593 M	100	76300	76300	100
Commercial	2077	2077	100	559 M	559 M	100			
Industrial	241	241	100	163 M	163 M	100			
Agricultural	561	561	100	69 M	69 M	100			
Religious/ Non-profit	301	301	100	78 M	78 M	100			
Government	184	184	100	102 M	102 M	100			
Education	199	199	100	200 M	200 M	100			
Utilities	120	120	100	677 M	677 M	100			
<b>Total</b>	<b>33515</b>	<b>33515</b>	<b>100</b>	<b>5440 M</b>	<b>5440 M</b>	<b>100</b>			

**Task D. Determine whether (and where) you want to collect additional inventory data. (circle one)**

1. Do you know where your greatest damages may occur in your hazard areas? **Yes** or No
2. Do you know whether your critical facilities will be operational after a hazard event? Yes or **No**
3. Is there enough data to determine which assets are subject to the greatest potential damages? Yes or **No**
4. Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards? Yes or **No**
5. Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards? Yes or **No**
6. Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence? **Yes** or No
7. Is additional data needed to justify the expenditure of community or state funds for mitigation? **Yes** or No

<b>ASSET INVENTORY WORKSHEET 2C</b>	<b>Date Completed: 5/28/15</b>
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**Which Agency are you representing? County of Lewis**

**Name: Edna J Fund** **Title: Chairman BOCC**

**Email: edna.fund@lewiscountywa.gov** **Telephone #: 740-1120**

**Address: 351 NW North St.** **City: Chehalis** **ZIP: 98532**

**Task C.** Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.

**Hazard: SEVERE WIND STORM**

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	29832	29832	100	3593 M	3593 M	100	76300	76300	100
Commercial	2077	2077	100	559 M	559 M	100			
Industrial	241	241	100	163 M	163 M	100			
Agricultural	561	561	100	69 M	69 M	100			
Religious/ Non-profit	301	301	100	78 M	78 M	100			
Government	184	184	100	102 M	102 M	100			
Education	199	199	100	200 M	200 M	100			
Utilities	120	120	100	677 M	677 M	100			
<b>Total</b>	<b>33515</b>	<b>33515</b>	<b>100</b>	<b>5440 M</b>	<b>5440 M</b>	<b>100</b>			

**Task D. Determine whether (and where) you want to collect additional inventory data. (circle one)**

- Do you know where your greatest damages may occur in your hazard areas? **Yes** or **No**
- Do you know whether your critical facilities will be operational after a hazard event? **Yes** or **No**
- Is there enough data to determine which assets are subject to the greatest potential damages? **Yes** or **No**
- Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards? **Yes** or **No**
- Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards? **Yes** or **No**
- Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence? **Yes** or **No**
- Is additional data needed to justify the expenditure of community or state funds for mitigation? **Yes** or **No**

<b>ASSET INVENTORY WORKSHEET 2C</b>		<b>Date Completed: 5/28/15</b>	
<b>Which Agency are you representing? County of Lewis</b>			
<b>Name: Edna J Fund</b>		<b>Title: Chairman BOCC</b>	
<b>Email: edna.fund@lewiscountywa.gov</b>		<b>Telephone #: 740-1120</b>	
<b>Address: 351 NW North St.</b>		<b>City: Chehalis</b>	<b>ZIP: 98532</b>

**Task C.** Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.

**Hazard: SEVERE WINTER STORM**

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	29832	29832	100	3593 M	3593 M	100	76300	76300	100
Commercial	2077	2077	100	559 M	559 M	100			
Industrial	241	241	100	163 M	163 M	100			
Agricultural	561	561	100	69 M	69 M	100			
Religious/ Non-profit	301	301	100	78 M	78 M	100			
Government	184	184	100	102 M	102 M	100			
Education	199	199	100	200 M	200 M	100			
Utilities	120	120	100	677 M	677 M	100			
<b>Total</b>	<b>33515</b>	<b>33515</b>	<b>100</b>	<b>5440 M</b>	<b>5440 M</b>	<b>100</b>			

**Task D. Determine whether (and where) you want to collect additional inventory data. (circle one)**

1. Do you know where your greatest damages may occur in your hazard areas? **Yes** or No
2. Do you know whether your critical facilities will be operational after a hazard event? Yes or **No**
3. Is there enough data to determine which assets are subject to the greatest potential damages? Yes or **No**
4. Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards? **Yes** or No
5. Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards? **Yes** or No
6. Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence? **Yes** or No
7. Is additional data needed to justify the expenditure of community or state funds for mitigation? **Yes** or No

<b>ASSET INVENTORY WORKSHEET 2C</b>	<b>Date Completed: 5/28/15</b>
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**Which Agency are you representing? County of Lewis**

**Name: Edna J Fund** **Title: Chairman BOCC**

**Email: edna.fund@lewiscountywa.gov** **Telephone #: 740-1120**

**Address: 351 NW North St.** **City: Chehalis** **ZIP: 98532**

**Task C.** Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.

**Hazard: VOLCANO: ASH**

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	29832	29832	100	3593 M	3593 M	100	76300	76300	100
Commercial	2077	2077	100	559 M	559 M	100			
Industrial	241	241	100	163 M	163 M	100			
Agricultural	561	561	100	69 M	69 M	100			
Religious/ Non-profit	301	301	100	78 M	78 M	100			
Government	184	184	100	102 M	102 M	100			
Education	199	199	100	200 M	200 M	100			
Utilities	120	120	100	677 M	677 M	100			
<b>Total</b>	<b>33515</b>	<b>33515</b>	<b>100</b>	<b>5440 M</b>	<b>5440 M</b>	<b>100</b>			

**Task D. Determine whether (and where) you want to collect additional inventory data. (circle one)**

1. Do you know where your greatest damages may occur in your hazard areas? **Yes** or No
2. Do you know whether your critical facilities will be operational after a hazard event? Yes or **No**
3. Is there enough data to determine which assets are subject to the greatest potential damages? **Yes** or No
4. Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards? **Yes** or No
5. Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards? **Yes** or No
6. Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence? **Yes** or No
7. Is additional data needed to justify the expenditure of community or state funds for mitigation? Yes or **No**

<b>ASSET INVENTORY WORKSHEET 2C</b>	<b>Date Completed: 5/28/15</b>
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**Which Agency are you representing? County of Lewis**

**Name: Edna J Fund** **Title: Chairman BOCC**

**Email: edna.fund@lewiscountywa.gov** **Telephone #: 740-1120**

**Address: 351 NW North St.** **City: Chehalis** **ZIP: 98532**

**Task C.** Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.

**Hazard: VOLCANO: LAHAR/BLAST/LAVA**

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	29832	2652	8.9	3593 M	272 M	7.6	76300	6016	7.9
Commercial	2077	103	5.0	559 M	16 M	2.8			
Industrial	241	2	0.8	163 M	91,884	0.1			
Agricultural	561	25	4.5	69 M	7.3 M	10.7			
Religious/ Non-profit	301	12	4.0	78 M	3.1 M	4.0			
Government	184	37	20	102 M	5.7 M	5.6			
Education	199	16	8.0	200 M	17 M	8.5			
Utilities	120	6	5.0	677 M	16 M	2.3			
<b>Total</b>	<b>33515</b>	<b>2853</b>	<b>8.5</b>	<b>5440 M</b>	<b>337 M</b>	<b>6.2</b>			

**Task D. Determine whether (and where) you want to collect additional inventory data. (circle one)**

- Do you know where your greatest damages may occur in your hazard areas? **Yes** or **No**
- Do you know whether your critical facilities will be operational after a hazard event? **Yes** or **No**
- Is there enough data to determine which assets are subject to the greatest potential damages? **Yes** or **No**
- Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards? **Yes** or **No**
- Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards? **Yes** or **No**
- Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence? **Yes** or **No**
- Is additional data needed to justify the expenditure of community or state funds for mitigation? **Yes** or **No**



<b>ASSET INVENTORY WORKSHEET 2C</b>	<b>Date Completed: 5/28/15</b>
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**Which Agency are you representing? County of Lewis**

**Name: Edna J Fund** **Title: Chairman BOCC**

**Email: edna.fund@lewiscountywa.gov** **Telephone #: 740-1120**

**Address: 351 NW North St.** **City: Chehalis** **ZIP: 98532**

**Task C.** Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.

**Hazard: WILDFIRE**

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	29832	3997	13	3593 M	565 M	16	76300	9075	12
Commercial	2077	73	3.5	559 M	9.1 M	1.6			
Industrial	241	7	2.9	163 M	772,464	0.5			
Agricultural	561	109	19	69 M	12 M	17			
Religious/ Non-profit	301	27	9.0	78 M	6.6 M	8.6			
Government	184	6	3.3	102 M	1.6 M	1.5			
Education	199	11	5.5	200 M	9.3 M	4.7			
Utilities	120	15	12.5	677 M	425 M	63			
<b>Total</b>	<b>33515</b>	<b>4245</b>	<b>13</b>	<b>5440 M</b>	<b>1029 M</b>	<b>19</b>			

**Task D.** Determine whether (and where) you want to collect additional inventory data. (circle one)

- Do you know where your greatest damages may occur in your hazard areas? **Yes** or **No**
- Do you know whether your critical facilities will be operational after a hazard event? **Yes** or **No**
- Is there enough data to determine which assets are subject to the greatest potential damages? **Yes** or **No**
- Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards? **Yes** or **No**
- Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards? **Yes** or **No**
- Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence? **Yes** or **No**
- Is additional data needed to justify the expenditure of community or state funds for mitigation? **Yes** or **No**

# Ranking Mitigation Strategies: Using STAPLEE - Worksheet 3A

Date: 5-15-2015

Agency: Lewis County

Category Description/Action Items (Mitigation Strategy)	Hazard Addressed (flood, earthquake, wind, winter, landslide, etc.)	Social (Yes or No)	Technical (Yes or No)	Administrative (Yes or No)	Political (Yes or No)	Legal (Yes or No)	Economical (Yes or No)	Environmental (Yes or No)	Responsible Department/Agency
Update EAP plan for dumping of damaged materials	Expansive/submissive soils	Y	Y	Y	Y	Y	Y	Y	BOCC
Update Emergency Action Plan & educate staff	Earthquake, Flood, Volcano	Y	Y	Y	Y	Y	Y	Y	Juvenile Court Manager /Facilities Manager
Update agreements with other agencies to hold prisoners in the event of damage to local facility (LC Jail Facilities)	Earthquake, Volcano	Y	Y	Y	Y	Y	Y	N	LC Juvenile Court Mgr
Monitor flooding and take action to move equipment in event (LC Jail Facilities)	Earthquake, flood, volcano	Y	Y	Y	Y	Y	Y	Y	Sheriff's Office
Create EAP Plan for building (LC Public Services) & train employees on use	Earthquake, volcano	Y	Y	Y	Y	Y	Y	Y	Facilities Manager
Maintenance staff monitor for any damage to facility (LC Public Services)	Earthquake, flood, volcano	Y	Y	Y	Y	Y	Y	Y	Facilities Manager
Create EAP Plan for building (LC Courthouse) & train employees on use	Earthquake, volcano	Y	Y	Y	Y	Y	Y	Y	Facilities Manager
Maintenance staff monitor for any damage to facility (LC Courthouse)	Earthquake, volcano	Y	Y	Y	Y	Y	Y	Y	Facilities Manager
Develop a plan to keep facility operational – Mt. St Helens (Ed Carlson Memorial –South Lewis County Airport)	Volcano	Y	Y	Y	Y	Y	Y	Y	Airport Systems Manager
Develop a plan to keep facility operational – Mt. Rainer (Packwood airport)	Volcano	Y	Y	Y	Y	Y	Y	Y	Airport Systems Manager
Check hangars for security/check aircraft tie downs	High winds, severe storms	Y	Y	Y	Y	Y	Y	N	Airport Systems Manager
Create EAP Plan for building (LC Health Bldg) & train employees to use	Earthquake	Y	Y	Y	Y	Y	Y	Y	Facilities Manager
Maintenance Staff monitor for any damage to facility (LCPH)	Earthquake	Y	Y	Y	Y	Y	Y	Y	Facilities Manager
Create EAP Plan for building (LC Law & Justice) & train employees to use	Earthquake	Y	Y	Y	Y	Y	Y	Y	Facilities Manager
Maintenance Staff monitor for any damage to facility (LC Law & Justice)	Earthquake	Y	Y	Y	Y	Y	Y	Y	Facilities Manager
Create EAP Plan for building (LC Motor Pool) & train employees to use	Earthquake	Y	Y	Y	Y	Y	Y	Y	Facilities Manager
Maintenance Staff monitor for any damage to facility (LC Motor Pool)	Earthquake	Y	Y	Y	Y	Y	Y	Y	Facilities Manager
Coordinate warning system for potential break with other stakeholders (Skookumchuck Dam)	Flood	Y	Y	Y	Y	Y	Y	Y	Emergency Mgmt Mgr
Ensure bridge associated to the neighborhood has a high priority for inspection and retrofit (Bridges)	Earthquake, flood, volcano	Y	Y	Y	Y	Y	Y	Y	Public Works Director

# Ranking Mitigation Strategies: Using STAPLEE - Worksheet 3A

Date: 5-15-2015

Agency: Lewis County

Category Description/Action Items (Mitigation Strategy)	Hazard Addressed (flood, earthquake, wind, winter, landslide, etc.)	Social (Yes or No)	Technical (Yes or No)	Administrative (Yes or No)	Political (Yes or No)	Legal (Yes or No)	Economical (Yes or No)	Environmental (Yes or No)	Responsible Department/Agency
Incorporate early warning procedures in local ERPs	Earthquake, flood, volcano	Y	Y	Y	Y	Y	Y	Y	Emergency Mgmt Mgr
Create prioritized plans for road/street clearance (ERP)	Severe winter storm	Y	Y	Y	Y	Y	Y	Y	Public Works Director
Review adequacy of existing mutual aid agreements (ERP)	Earthquake, flood, volcano	Y	Y	Y	Y	Y	Y	Y	Public Works Director
Define evacuation routes for areas of high volcanic probability (ERP)	Volcano activity	Y	Y	Y	Y	Y	Y	Y	Emergency Mgmt Mgr
Continue to enforce the flood damage protection code	Flooding	Y	Y	Y	Y	Y	Y	Y	Community Development Director
Continue participation and implementation of project recommended by the Chehalis River Basin Flood Authority	Flooding	Y	Y	Y	Y	Y	Y	Y	Cooperative Effort; County Commissioner
Evaluate potential benefits of HMGP Home Elevation program (Floodplain Mgmt)	Flood	Y	Y	Y	Y	Y	Y	Y	Community Development Director
Include a compensatory storage element (storage in flood plain) and ensure consistency with County floodplain ordinances (Floodplain Mgmt)	Flooding	Y	Y	Y	Y	Y	Y	Y	Cooperative Effort; County Commissioner, Community Development Director
Update road addressing and incorporate into addressing ordinance	Fire	Y	Y	Y	Y	Y	Y	N	Community Development Director
Lewis County PUD tree maintenance program trims trees around power lines (Protect utilities)	Severe Winter Storms	Y	Y	Y	Y	Y	Y	Y	Lewis County PUD Engineering Supervisor
Retrofit existing overhead lines to underground as practicable and where time/budget allows (Protect utilities)	Severe Winter Storms	Y	Y	Y	Y	Y	N	Y	Lewis County PUD Engineering Supervisor
Explore the feasibility of creating wildfire zones for incorporation into critical areas ordinance (CAO Ord Update)	Fire	Y	Y	Y	Y	Y	Y	Y	Community Development Director
Incorporate the channel migration zones in the critical areas ordinance. Do necessary studies for mapping other river basins; Utilize public process through planning commission to incorporate CMA into critical areas ordinance (CAO Ord update)	Flooding	Y	Y	Y	Y	Y	N	Y	Community Development Director
Review critical areas ordinance to update flood zones, seismic zones, and landslides (CAO Ord update)	Earthquake, flood, volcano	Y	Y	Y	Y	Y	Y	Y	Community Development Director
Evaluate feasibility of creating high wind zones for incorporation into critical areas ordinance (CAO Ord update)	High Winds	Y	Y	Y	Y	Y	Y	Y	Community Development Director
Ensure wind ratings in building code are adequate and consistent (CAO Ordinance Update)	High Winds	Y	Y	Y	Y	Y	Y	Y	Community Development Director

# Ranking Mitigation Strategies: Using STAPLEE - Worksheet 3A

Date: 5-15-2015

Agency: Lewis County

Category Description/Action Items (Mitigation Strategy)	Hazard Addressed (flood, earthquake, wind, winter, landslide, etc.)	Social (Yes or No)	Technical (Yes or No)	Administrative (Yes or No)	Political (Yes or No)	Legal (Yes or No)	Economical (Yes or No)	Environmental (Yes or No)	Responsible Department/Agency
Explore feasibility of considering volcanic evacuation in determining building occupancy limits (CAO Ord update)	Volcano Activity	Y	Y	Y	Y	Y	N	Y	Community Development Director
Continue to maintain concurrency with all building, plumbing, electrical and other codes that reduce vulnerability of new structures to natural hazards (Development Review)	Earthquake, flood, volcano	Y	Y	Y	Y	Y	Y	Y	Community Development Director
Coordinate annual participation of Opt-ins in HMP review/update (Countywide)	Earthquake, flood, volcano	Y	Y	Y	Y	Y	Y	Y	Community Development Director
Improve NOAA radio coverage for East County (Improve Emergency Alert System Coverage)	Earthquake, flood, volcano	Y	Y	Y	Y	Y	Y	N	County Emergency Mgmt Mgr/Fire District Chiefs
Lobby Federal Government to fully implement EAS technology in consumer electronics (Improve Emergency Alert System Coverage)	Earthquake, flood, volcano	Y	Y	Y	Y	Y	Y	N	HMP Planning Committee
Educate public on what to do before, after, and during an emergency (Public Education)	Earthquake, flood, volcano	Y	Y	Y	Y	Y	Y	N	Emergency Mgmt Mgr
Educate public about need to create buffer zones between home and timber	Fire	Y	Y	Y	Y	Y	Y	Y	Fire District Chiefs, Emergency Mgmt Mgr, DNR
Educate public about water conservation and what to do in the event their water system dries up (Public Education)	Drought	Y	Y	Y	Y	Y	Y	Y	Emergency Mgmt Mgr, Public Health & Social Services
Review existing ESF # 36 Draft "Drought" discuss any needed revisions and additions to plan. Finalize plan and train staff appropriately	Drought	Y	Y	Y	Y	Y	Y	Y	Public Health & Social Services Emergency Management

**Notes**

- S: Social – The public must support the overall implementation strategy and specific mitigation actions.
- T: Technical – It is important to determine if the proposed action is technically feasible, will help reduce losses in the long term, and has minimal secondary impacts.
- A: Administrative – Under this part of the evaluation criteria, examine the anticipated staffing, funding, and maintenance requirements for the mitigation action to be implemented.
- P: Political – Understanding how your community and State leadership feels about issues related to the environment, economic development, safety, and emergency management.
- L: Legal – When considering this criterion, determine whether your agency has the legal authority at the State, or local level to implement the action, or if new laws will need to be passed.
- E: Economic – Cost-effective mitigation actions that can be funded in current or upcoming budget cycles are much more likely to be implemented.
- E: Environmental – Evaluate whether, when implementing mitigation actions, there would be negative consequences to environmental assets (wetlands, endangered species, protected resources).

# Mitigation Strategies – Worksheet 3B

Date: 5-15-2015

Agency: Lewis County

Mitigation Measures		Hazard Addressed (flood, earthquake, wind, winter, landslide, etc.)	2010 Plan		Mitigation Identification (Prevention, Property Protection, Public Education & Awareness, Natural Resource Protection, Structural Projects)	Cost-Benefit and Prioritization			Implementation			
Category	Description/Action Items (Mitigation Strategy)		Task in 2010 Plan (yes or no)	Task completed as part of 2010 Plan (yes or no)		Relative Cost 1 = Highest 3 = Lowest	Relative Effectiveness 1 = Lowest 3 = Highest	Priority Rating (Low, Medium, High)	Timeline (schedule for approx. completion)	Potential Funding (grants, budget, donations, etc..)	Cost Est.	Administrative Responsibility
Emergency Response Planning	Incorporate early warning procedures in local ERPs	Earthquake, flood, volcano	Yes	Yes	Prevention, Property Protection, Public Education & Awareness	3	3	High	On-going	Current Expense	\$0	Emergency Mgmt Mgr
Emergency Response Planning	Create prioritized plans for road/street clearance	Severe winter storm	Yes	Yes	Prevention	3	2	Low	On-going	Current Expense	\$0	Public Works Director
Emergency Response Planning	Review adequacy of existing mutual aid agreements	Earthquake, flood, volcano	Yes	Yes	Prevention	3	3	High	2010	Current Expense	\$0	Public Works Director
Emergency Response Planning	Define evacuation routes for areas of high volcanic probability	Volcano Activity	Yes	No	Prevention, Property Protection, Public Education & Awareness	2	1	Med	On-going	Current Expense	\$0	Emergency Mgmt Mgr
Floodplain Management	Continue to enforce the flood damage prevention code.	Flooding	Yes	Yes	Prevention, Property Protection, Public Education & Awareness	1	2	High	On-going	Current Expense	\$0	Community Development Director
Floodplain Management	Continue participation and implementation of project recommended by the Chehalis River Basin Flood Authority	Flooding	Yes	Yes	Prevention, Property Protection, Public Education & Awareness	1	2	Med	On-going	Current Expense	\$0	Cooperative Effort; County Commissioner
Floodplain Management	Evaluate potential benefits of HMGP Home Elevation program	Flood	Yes	Yes	Prevention, Property Protection, Public Education & Awareness	3	2	High	2009	Grant	220K	Community Development Director
Floodplain Management	Include a compensatory storage element (storage in floodplain) and ensure consistency with County floodplain ordinances	Flooding	Yes	Yes	Prevention, Property Protection, Public Education & Awareness	2	2	Med	On-going	Current Expense	\$0	Cooperative Effort; County Commissioner, Community Development Director

# Mitigation Strategies – Worksheet 3B

Date: 5-15-2015

Agency: Lewis County

Mitigation Measures		Hazard Addressed (flood, earthquake, wind, winter, landslide, etc.)	2010 Plan		Mitigation Identification (Prevention, Property Protection, Public Education & Awareness, Natural Resource Protection, Structural Projects)	Cost-Benefit and Prioritization			Implementation			
Category	Description/Action Items (Mitigation Strategy)		Task in 2010 Plan (yes or no)	Task completed as part of 2010 Plan (yes or no)		Relative Cost 1 = Highest 3 = Lowest	Relative Effectiveness 1 = Lowest 3 = Highest	Priority Rating (Low, Medium, High)	Timeline (schedule for approx. completion)	Potential Funding (grants, budget, donations, etc..)	Cost Est.	Administrative Responsibility
Property Addressing	Update road addressing and incorporate into addressing ordinance	Fire	Yes	No	Prevention, Property Protection, Public Education & Awareness	2	1	Med	On-going	Current Expense	\$0	Community Development Director
Protect Utilities	Lewis County PUD tree maintenance program trims trees around power lines	Severe Winter Storms	Yes	Yes	Prevention, Property protection	1	3	High	On-going	Current Expense	250K	Lewis County PUD Engineering Supervisor
Protect Utilities	Retrofit existing overhead lines to underground as practicable and where time/budge allows	Severe Winter Storms	Yes	No	Structural Projects	1	2	Low	On-going	Current Expense	50M	Lewis County PUD Engineering Supervisor
Critical Areas Ordinance Update	Explore the feasibility of creating wildfire zones for incorporation into critical areas ordinance	Fire	Yes	No	Prevention, Property Protection, Public Education & Awareness	2	1	Low	On-going	Current Expense	\$0	Community Development Director
Critical Areas Ordinance Update	Incorporate the channel migration zones in the critical areas ordinance. Do necessary studies for mapping other river basins; utilize public process through Planning Commission to incorporate CMZ into critical areas ordinance	Flooding	Yes	No	Prevention, Property Protection, Public Education & Awareness	2	2	High	2010	Current Expense	\$0	Community Development Director
Critical Areas Ordinance Update	Review critical areas ordinance to update flood zones, seismic zones, and landslides	Earthquake, flood, volcano	Yes	Yes	Prevention, Property Protection, Public Education & Awareness	3	2	High	2012	Current Expense	\$0	Community Development Director
Critical Areas Ordinance Update	Evaluate feasibility of creating high wind zones for incorporation into critical areas ordinance	High Winds	Yes	No	Prevention, Property Protection	2	1	Low	2010	Current Expense	\$0	Community Development Director

# Mitigation Strategies – Worksheet 3B

Date: 5-15-2015

Agency: Lewis County

Mitigation Measures		Hazard Addressed (flood, earthquake, wind, winter, landslide, etc.)	2010 Plan		Mitigation Identification (Prevention, Property Protection, Public Education & Awareness, Natural Resource Protection, Structural Projects)	Cost-Benefit and Prioritization			Implementation			
Category	Description/Action Items (Mitigation Strategy)		Task in 2010 Plan (yes or no)	Task completed as part of 2010 Plan (yes or no)		Relative Cost 1 = Highest 3 = Lowest	Relative Effectiveness 1 = Lowest 3 = Highest	Priority Rating (Low, Medium, High)	Timeline (schedule for approx. completion)	Potential Funding (grants, budget, donations, etc.)	Cost Est.	Administrative Responsibility
Critical Areas Ordinance Update	Evaluate feasibility of creating high wind zones for incorporation into critical areas ordinance	High Winds	Yes	No	Prevention, Property Protection	2	1	Low	2010	Current Expense	\$0	Community Development Director
Critical Areas Ordinance Update	Ensure wind ratings in building code are adequate and consistent	High Winds	Yes	No	Prevention, Property Protection	2	1	Low	On-going	Current Expense	\$0	Community Development Director
Critical Areas Ordinance Update	Explore feasibility of considering volcanic evacuation in determining building occupancy limits	Volcano activity	Yes	No	Prevention, Property Protection, Public Education & Awareness	1	1	Low	On-going	Current Expense	\$0	Community Development Director
Development Review	Continue to maintain concurrency with all building, plumbing, electrical and other codes that reduce vulnerability of new structures to natural hazards	Earthquake, flood, volcano	Yes	No	Prevention, Property Protection, Public Education & Awareness	3	3	High	On-going	Existing	\$0	Community Development Director
Countywide	Maintain/update HMP Mitigation database	Earthquake, Flood, Volcano	Yes	Yes	Prevention	3	2	High	On-going	Existing	\$25K	GIS Group Lead/County Emergency Mgmt Mgr
Countywide	Coordinate annual participation of Opt-ins in HMP review/update	Earthquake, Flood, Volcano	Yes	No	Public Education & Awareness	3	2	Med	On-going	Existing	\$0	County Emergency Mgmt Mgr
Improve Emergency Alert System Coverage	Improve NOAA radio coverage for East County	Earthquake, Flood, Volcano	Yes	Yes	Prevention, Property Protection, Public Education & Awareness	3	3	High	2009	Agreement by NOAA	\$0	County Emergency Mgmt Mgr/Fire District Chiefs

# Mitigation Strategies – Worksheet 3B

Date: 11-5-2015

Agency: Lewis County

Mitigation Measures		Hazard Addressed (flood, earthquake, wind, winter, landslide, etc.)	2010 Plan		Mitigation Identification (Prevention, Property Protection, Public Education & Awareness, Natural Resource Protection, Structural Projects)	Cost-Benefit and Prioritization			Implementation			
Category	Description/Action Items (Mitigation Strategy)		Task in 2010 Plan (yes or no)	Task completed as part of 2010 Plan (yes or no)		Relative Cost 1 = Highest 3 = Lowest	Relative Effectiveness 1 = Lowest 3 = Highest	Priority Rating (Low, Medium, High)	Timeline (schedule for approx. completion)	Potential Funding (grants, budget, donations, etc.)	Cost Est.	Administrative Responsibility
Improve Emergency Alert System Coverage	Lobby Federal Government to fully implement EAS technology in consumer electronics	Earthquake, Flood, Volcano	Yes	Yes	Prevention, Property Protection, Public Education & Awareness	3	3	High	On-going	None	\$0	HMP Planning Committee
Public Education	Educate public on what to do before, after, and during an emergency	Earthquake, Flood, Volcano	Yes	Yes	Prevention, Property Protection, Public Education & Awareness	3	3	High	On-going	Current Expense	\$10K	County Emergency Mgmt Mgr
Public Education	Educate public about need to create buffer zones between home and timber	Fire	Yes	Yes	Prevention, Property Protection, Public Education & Awareness	3	3	High	On-going	DNR Grant	\$2K	Fire District Chiefs, County Emergency Mgmt Mgr, DNR
Emergency Response Planning	Review existing ESF # 36 Draft "Drought" discuss any needed revisions and additions to plan. Finalize plan and train staff appropriately	Drought	No	No	Protection, Public Education & Awareness	2	2	High	2015	Grants and current expense	\$30	Public Health & Social Services Emergency Mgmt Mgr

**Notes**

2010 Plan: rate task(s) if it was in the 2010 Plan  
 Cost Estimate: a very rough estimate cost of implementing task  
 Administrative Responsibility: who will accomplish the task



# Critical Facilities Mitigation Strategies - Worksheet 3C

Date: 5-15-2015

Agency: Lewis County

Mitigation Measures		Hazard Addressed (All, flooding, landslide, earthquake, volcanic, etc....)	2010 Plan		Mitigation Identification (Prevention, Property Protection, Public Education & Awareness, Natural Resource Protection, Structural Projects)	Cost-Benefit and Prioritization			Implementation			
Facility	Mitigation Strategy		Task listed in the 2010 Plan (yes or no)	Task completed as part of 2010 Plan (yes or no)		Relative Cost 1 = Highest 3 = Lowest	Relative Effectiveness 1 = Lowest 3 = Highest	Priority Rating (Low, Med, High)	Timeline (schedule)	Potential Funding (grants, budget, donations, etc..)	Cost Est.	Administrative Responsibility
LC Solid Waste Transfer Station	Update EAP plan for dumping of damaged materials	Earthquake, flood, volcano	Yes	No	Prevention	1	2	Med	Yearly	Declared Disaster	0	BOCC
LC Juvenile Court	Update Emergency Action Plan and educate staff	Earthquake, flood, volcano	Yes	No	Prevention	3	3	High	Yearly	Current Expense	0	Juvenile Court Mgr / Facilities Mgr
LC Juvenile Court	Update agreements with other agencies to hold prisoners in the event of damage to local facility	Earthquake, volcano	Yes	No	Prevention	3	3	High	Yearly	Current Expense	0	Juvenile Court Manager
LC Sheriff Packwood	Monitor flooding and take action to move equipment in event	Flood, Earthquake, Volcano	Yes	No	Prevention	3	3	High	2010	Current Expense	0	Sheriff
LC Public Services	Create EAP plan for building and train employees on use	Earthquake, volcano	Yes	No	Prevention	2	3	High	2010	Current Expense	0	Facilities Manager
LC Public Services	Maintenance staff monitor for any damage to facility	Earthquake, volcano	Yes	No	Prevention	3	3	High	Ongoing	Current Expense	0	Facilities Manager
LC Courthouse	Create EAP plan for building and train employees on use	Earthquake, volcano	Yes	No	Prevention	2	3	High	2010	Current Expense	0	Facilities Manager
LC Courthouse	Maintenance staff monitor for any damage to facility	Earthquake, volcano	Yes	No	Prevention	3	3	High	Ongoing	Current Expense	0	Facilities Manager
Ed Carlson Memorial-South Lewis County Airport	Develop a plan to keep facility operations – Mt. St. Helens	Volcano	Yes	No	Prevention	2	2	Med	2010-11	Current Expense	0	Airport Systems Manager
Packwood Airport	Develop a plan to keep facility operations – Mt. St. Rainier	Volcano	Yes	No	Prevention	2	3	Med	2010-11	Current Expense	0	Airport Systems Manager

**Notes**

Facility: Critical facility  
 Mitigation Strategy: description of mitigation or task  
 2010 Plan: rate task(s) if it was in the 2010 Plan  
 Timeline: give approximate timeframe of completing this task  
 Cost Estimate: a very rough estimate cost of implementing task  
 Administrative Responsibility: who will accomplish the task

# Critical Facilities Mitigation Strategies - Worksheet 3C

Date: 5-15-2015

Agency: Lewis County

Mitigation Measures		Hazard Addressed (All, flooding, landslide, earthquake, volcanic, etc....)	2010 Plan		Mitigation Identification (Prevention, Property Protection, Public Education & Awareness, Natural Resource Protection, Structural Projects)	Cost-Benefit and Prioritization			Implementation			
Facility	Mitigation Strategy		Task listed in the 2010 Plan (yes or no)	Task completed as part of 2010 Plan (yes or no)		Relative Cost 3 = Highest 1 = Lowest	Relative Effectiveness 2 = Highest 1 = Lowest	Priority Rating (Low, Medium, High)	Timeline (schedule)	Potential Funding (grants, budget, donations, etc..)	Cost Est.	Administrative Responsibility
Ed Carlson Memorial –South Lewis County Airport	Assess buildings for seismic and ash fall capabilities	Earthquake/volcanic	Yes	Yes	<i>Prevention, Property Protection</i>	2	2	Med	2017	Current Expense	\$1000	
Packwood Airport	Update Airport Layout Plan	Flood, hail, debris, land subsidence	Yes	No	<i>Property, prevention protection</i>	2	3	High	2016	Grants and Current Expense		Airport Systems Manager
LC Public Health & Social Services	Create EAP Plan for building and train employees on use	Earthquake	Yes	No	<i>Prevention</i>	3	3	High	2010	Current Expense	0	Facilities Manager
LC Public Health & Social Services	Maintenance staff monitor for any damage to facility	Earthquake	Yes	No	<i>Prevention</i>	2	3	High	Ongoing	Current Expense	0	Facilities Manager
LC Law & Justice	Create EAP Plan for building and train employees on use	Earthquake	Yes	No	<i>Prevention</i>	2	3	High	2010	Current Expense	0	Facilities Manager
LC Law & Justice	Maintenance staff monitor for any damage to facility	Earthquake	Yes	No	<i>Prevention</i>	3	3	High	Ongoing	Current Expense	0	Facilities Manager
LC Motor Pool	Create EAP Plan for building and train employees on use	Earthquake	Yes	No	<i>Prevention</i>	2	3	High	2010	Current Expense	0	Facilities Manager
LC Motor Pool	Maintenance staff monitor for any damage to facility	Earthquake	Yes	No	<i>Prevention</i>	3	3	High	2010	Current Expense	0	Facilities Manager
Skookumchuck Dam	Coordinate warning system for potential break with other stakeholders	Flood	Yes	No	<i>Prevention</i>	1	3	High	Ongoing	Current Expense	0	Emergency Management Manager

**Notes**

Facility: Critical facility  
 Mitigation Strategy: description of mitigation or task  
 2010 Plan: rate task(s) if it was in the 2010 Plan  
 Timeline: give approximate timeframe of completing this task  
 Cost Estimate: a very rough estimate cost of implementing task  
 Administrative Responsibility: who will accomplish the task

# Critical Facilities Mitigation Strategies - Worksheet 3C

Date: 5-15-2015

Agency: Lewis County

Mitigation Measures		Hazard Addressed (All, flooding, landslide, earthquake, volcanic, etc....)	2010 Plan		Mitigation Identification (Prevention, Property Protection, Public Education & Awareness, Natural Resource Protection, Structural Projects)	Cost-Benefit and Prioritization			Implementation			
Facility	Mitigation Strategy		Task listed in the 2010 Plan (yes or no)	Task completed as part of 2010 Plan (yes or no)		Relative Cost 1 = Highest 3 = Lowest	Relative Effectiveness 1 = Lowest 3 = Highest	Priority Rating (Low, Medium, High)	Timeline (schedule)	Potential Funding (grants, budget, donations, etc..)	Cost Est.	Administrative Responsibility
Bridges	Ensure bridges associated to the neighborhood has a high priority for inspection and retrofit	Earthquake, flood, volcano	Yes	Yes	Prevention	3	3	High	Ongoing	Current Expense	0	Public Works Director
County-wide		Drought	No	No	Awareness, Natural Resource Protection	2	2	High	2015	Grant, Current Expense	\$40,0000	Public Health & Social Services, Emergency Management

**Notes**

Facility: Critical facility  
 Mitigation Strategy: description of mitigation or task  
 2010 Plan: rate task(s) if it was in the 2010 Plan  
 Timeline: give approximate timeframe of completing this task  
 Cost Estimate: a very rough estimate cost of implementing task  
 Administrative Responsibility: who will accomplish the task

# Hazus-MH: Earthquake Event Report

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**Region Name:** Lewis County EQ 2015 Cascadia

**Earthquake Scenario:** Cascadia M9 USGS Shakemap

**Print Date:** July 17, 2015

**Disclaimer:**

*This version of Hazus utilizes 2010 Census Data.*

*Totals only reflect data for those census tracts/blocks included in the user's study region.*

*The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.*

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## General Description of the Region

Hazus is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop earthquake losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from earthquakes and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Washington

Note:

Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 2,435.61 square miles and contains 20 census tracts. There are over 29 thousand households in the region which has a total population of 75,455 people (2010 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 33 thousand buildings in the region with a total building replacement value (excluding contents) of 7,328 (millions of dollars). Approximately 92.00 % of the buildings (and 75.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 5,246 and 1,382 (millions of dollars) , respectively.

## Building and Lifeline Inventory

### **Building Inventory**

Hazus estimates that there are 33 thousand buildings in the region which have an aggregate total replacement value of 7,328 (millions of dollars) . Appendix B provides a general distribution of the building value by State and County.

In terms of building construction types found in the region, wood frame construction makes up 74% of the building inventory. The remaining percentage is distributed between the other general building types.

### **Critical Facility Inventory**

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 142 beds. There are 45 schools, 13 fire stations, 8 police stations and 0 emergency operation facilities. With respect to high potential loss facilities (HPL), there are 0 dams identified within the region. Of these, 0 of the dams are classified as 'high hazard'. The inventory also includes 22 hazardous material sites, 0 military installations and 0 nuclear power plants.

### **Transportation and Utility Lifeline Inventory**

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 6,628.00 (millions of dollars). This inventory includes over 460 kilometers of highways, 332 bridges, 6,315 kilometers of pipes.

**Table 1: Transportation System Lifeline Inventory**

<b>System</b>	<b>Component</b>	<b># Locations/ # Segments</b>	<b>Replacement value (millions of dollars)</b>
<b>Highway</b>	Bridges	332	2,674.00
	Segments	88	2,239.00
	Tunnels	0	0.00
	<b>Subtotal</b>		<b>4,913.00</b>
<b>Railways</b>	Bridges	0	0.00
	Facilities	3	8.00
	Segments	69	129.50
	Tunnels	0	0.00
	<b>Subtotal</b>		<b>137.50</b>
<b>Light Rail</b>	Bridges	0	0.00
	Facilities	0	0.00
	Segments	0	0.00
	Tunnels	0	0.00
	<b>Subtotal</b>		<b>0.00</b>
<b>Bus</b>	Facilities	1	1.20
	<b>Subtotal</b>		<b>1.20</b>
<b>Ferry</b>	Facilities	0	0.00
	<b>Subtotal</b>		<b>0.00</b>
<b>Port</b>	Facilities	0	0.00
	<b>Subtotal</b>		<b>0.00</b>
<b>Airport</b>	Facilities	4	42.60
	Runways	4	151.90
	<b>Subtotal</b>		<b>194.50</b>
		<b>Total</b>	<b>5,246.10</b>



**Table 2: Utility System Lifeline Inventory**

<b>System</b>	<b>Component</b>	<b># Locations / Segments</b>	<b>Replacement value (millions of dollars)</b>
<b>Potable Water</b>	Distribution Lines	NA	63.20
	Facilities	1	36.60
	Pipelines	0	0.00
		<b>Subtotal</b>	<b>99.80</b>
<b>Waste Water</b>	Distribution Lines	NA	37.90
	Facilities	10	732.60
	Pipelines	0	0.00
		<b>Subtotal</b>	<b>770.50</b>
<b>Natural Gas</b>	Distribution Lines	NA	25.30
	Facilities	6	7.20
	Pipelines	0	0.00
		<b>Subtotal</b>	<b>32.50</b>
<b>Oil Systems</b>	Facilities	0	0.00
	Pipelines	0	0.00
		<b>Subtotal</b>	<b>0.00</b>
<b>Electrical Power</b>	Facilities	5	605.00
		<b>Subtotal</b>	<b>605.00</b>
<b>Communication</b>	Facilities	8	0.90
		<b>Subtotal</b>	<b>0.90</b>
		<b>Total</b>	<b>1,508.60</b>

## Earthquake Scenario

Hazus uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.

<b>Scenario Name</b>	Cascadia M9 USGS Shakemap
<b>Type of Earthquake</b>	User-defined
<b>Fault Name</b>	NA
<b>Historical Epicenter ID #</b>	NA
<b>Probabilistic Return Period</b>	NA
<b>Longitude of Epicenter</b>	NA
<b>Latitude of Epicenter</b>	NA
<b>Earthquake Magnitude</b>	9.00
<b>Depth (Km)</b>	NA
<b>Rupture Length (Km)</b>	NA
<b>Rupture Orientation (degrees)</b>	NA
<b>Attenuation Function</b>	NA

## Building Damage

### Building Damage

Hazus estimates that about 7,074 buildings will be at least moderately damaged. This is over 21.00 % of the buildings in the region. There are an estimated 397 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

**Table 3: Expected Building Damage by Occupancy**

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
<b>Agriculture</b>	80	0.46	41	0.44	46	1.08	36	1.52	7	1.76
<b>Commercial</b>	248	1.41	288	3.15	668	15.48	496	20.99	96	24.23
<b>Education</b>	17	0.10	11	0.13	19	0.45	15	0.64	3	0.65
<b>Government</b>	16	0.09	8	0.09	15	0.36	11	0.47	2	0.47
<b>Industrial</b>	86	0.49	89	0.98	204	4.73	160	6.78	33	8.28
<b>Other Residential</b>	1,357	7.73	1,318	14.45	2,257	52.31	1,460	61.78	237	59.47
<b>Religion</b>	47	0.27	27	0.30	44	1.01	37	1.55	7	1.69
<b>Single Family</b>	15,714	89.46	7,337	80.46	1,061	24.58	148	6.28	14	3.44
<b>Total</b>	<b>17,566</b>		<b>9,119</b>		<b>4,314</b>		<b>2,363</b>		<b>398</b>	

**Table 4: Expected Building Damage by Building Type (All Design Levels)**

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
<b>Wood</b>	16,061	91.43	7673	84.15	1,124	26.06	32	1.36	1	0.28
<b>Steel</b>	79	0.45	58	0.64	188	4.36	221	9.37	63	15.81
<b>Concrete</b>	64	0.36	69	0.75	190	4.39	142	6.03	23	5.83
<b>Precast</b>	61	0.35	49	0.54	181	4.19	209	8.83	44	11.11
<b>RM</b>	205	1.17	125	1.37	388	9.00	300	12.71	29	7.24
<b>URM</b>	27	0.16	29	0.31	72	1.66	56	2.39	15	3.78
<b>MH</b>	1,069	6.08	1116	12.24	2,171	50.33	1,402	59.32	223	55.96
<b>Total</b>	<b>17,566</b>		<b>9,119</b>		<b>4,314</b>		<b>2,363</b>		<b>398</b>	

\*Note:

RM Reinforced Masonry  
URM Unreinforced Masonry  
MH Manufactured Housing

## **Essential Facility Damage**

Before the earthquake, the region had 142 hospital beds available for use. On the day of the earthquake, the model estimates that only 1 hospital beds (1.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 21.00% of the beds will be back in service. By 30 days, 88.00% will be operational.

**Table 5: Expected Damage to Essential Facilities**

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	1	1	0	0
Schools	45	0	0	38
EOCs	0	0	0	0
PoliceStations	8	0	0	8
FireStations	13	0	0	12

## Transportation and Utility Lifeline Damage

Table 6 provides damage estimates for the transportation system.

**Table 6: Expected Damage to the Transportation Systems**

System	Component	Number of Locations_				
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	88	0	0	88	88
	Bridges	332	10	0	322	332
	Tunnels	0	0	0	0	0
Railways	Segments	69	0	0	69	69
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	3	0	0	3	3
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	1	0	0	1	1
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	4	0	0	4	4
	Runways	4	0	0	4	4

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

**Table 7 : Expected Utility System Facility Damage**

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	1	0	0	0	1
Waste Water	10	0	0	3	10
Natural Gas	6	0	0	6	6
Oil Systems	0	0	0	0	0
Electrical Power	5	0	0	1	5
Communication	8	0	0	8	8

**Table 8 : Expected Utility System Pipeline Damage (Site Specific)**

System	Total Pipelines Length (kms)	Number of Leaks	Number of Breaks
Potable Water	3,158	275	69
Waste Water	1,895	197	49
Natural Gas	1,263	57	14
Oil	0	0	0

**Table 9: Expected Potable Water and Electric Power System Performance**

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	29,743	302	0	0	0	0
Electric Power		0	0	0	0	0

### **Fire Following Earthquake**

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

### **Debris Generation**

Hazus estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 0.30 million tons of debris will be generated. Of the total amount, Brick/Wood comprises 25.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 12,040 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

### **Shelter Requirement**

Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 675 households to be displaced due to the earthquake. Of these, 429 people (out of a total population of 75,455) will seek temporary shelter in public shelters.

### **Casualties**

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake



Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
<b>2 AM</b>	Commercial	3	1	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	6	1	0	0
	Other-Residential	79	15	1	2
	Single Family	21	2	0	0
	<b>Total</b>	<b>109</b>	<b>19</b>	<b>2</b>	<b>3</b>
<b>2 PM</b>	Commercial	194	47	7	13
	Commuting	0	0	0	0
	Educational	77	18	3	5
	Hotels	0	0	0	0
	Industrial	42	10	1	3
	Other-Residential	19	4	0	1
	Single Family	5	0	0	0
	<b>Total</b>	<b>337</b>	<b>79</b>	<b>11</b>	<b>22</b>
<b>5 PM</b>	Commercial	140	33	5	10
	Commuting	1	2	3	1
	Educational	4	1	0	0
	Hotels	0	0	0	0
	Industrial	26	6	1	2
	Other-Residential	29	5	0	1
	Single Family	8	1	0	0
	<b>Total</b>	<b>208</b>	<b>48</b>	<b>9</b>	<b>13</b>

## Economic Loss

The total economic loss estimated for the earthquake is 951.02 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

### Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 742.50 (millions of dollars); 23 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 36 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

**Table 11: Building-Related Economic Loss Estimates**

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
<b>Income Losses</b>							
	Wage	0.00	4.62	38.44	2.24	2.17	47.48
	Capital-Related	0.00	1.95	31.20	1.41	0.53	35.09
	Rental	1.76	7.43	19.65	0.84	0.98	30.66
	Relocation	5.98	10.29	31.40	3.62	8.06	59.35
	<b>Subtotal</b>	<b>7.74</b>	<b>24.29</b>	<b>120.70</b>	<b>8.11</b>	<b>11.74</b>	<b>172.58</b>
<b>Capital Stock Losses</b>							
	Structural	15.56	22.08	61.67	17.48	13.62	130.41
	Non_Structural	83.71	67.23	108.69	34.67	23.24	317.54
	Content	36.01	11.19	40.56	20.24	8.74	116.73
	Inventory	0.00	0.00	1.42	3.62	0.20	5.24
	<b>Subtotal</b>	<b>135.28</b>	<b>100.50</b>	<b>212.33</b>	<b>76.01</b>	<b>45.80</b>	<b>569.92</b>
	<b>Total</b>	<b>143.03</b>	<b>124.79</b>	<b>333.03</b>	<b>84.12</b>	<b>57.53</b>	<b>742.50</b>

## Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

Hazus estimates the long-term economic impacts to the region for 15 years after the earthquake. The model quantifies this information in terms of income and employment changes within the region. Table 14 presents the results of the region for the given earthquake.

**Table 12: Transportation System Economic Losses**  
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	2,239.01	\$0.00	0.00
	Bridges	2,673.99	\$55.11	2.06
	Tunnels	0.00	\$0.00	0.00
	<b>Subtotal</b>	<b>4913.00</b>	<b>55.10</b>	
Railways	Segments	129.50	\$0.00	0.00
	Bridges	0.00	\$0.00	0.00
	Tunnels	0.00	\$0.00	0.00
	Facilities	7.99	\$1.60	19.99
	<b>Subtotal</b>	<b>137.50</b>	<b>1.60</b>	
Light Rail	Segments	0.00	\$0.00	0.00
	Bridges	0.00	\$0.00	0.00
	Tunnels	0.00	\$0.00	0.00
	Facilities	0.00	\$0.00	0.00
	<b>Subtotal</b>	<b>0.00</b>	<b>0.00</b>	
Bus	Facilities	1.20	\$0.27	22.64
	<b>Subtotal</b>	<b>1.20</b>	<b>0.30</b>	
Ferry	Facilities	0.00	\$0.00	0.00
	<b>Subtotal</b>	<b>0.00</b>	<b>0.00</b>	
Port	Facilities	0.00	\$0.00	0.00
	<b>Subtotal</b>	<b>0.00</b>	<b>0.00</b>	
Airport	Facilities	42.60	\$6.38	14.98
	Runways	151.86	\$0.00	0.00
	<b>Subtotal</b>	<b>194.50</b>	<b>6.40</b>	
	<b>Total</b>	<b>5246.10</b>	<b>63.40</b>	

**Table 13: Utility System Economic Losses**

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.00	\$0.00	0.00
	Facilities	36.60	\$5.06	13.81
	Distribution Lines	63.20	\$1.24	1.96
	<b>Subtotal</b>	<b>99.78</b>	<b>\$6.30</b>	
Waste Water	Pipelines	0.00	\$0.00	0.00
	Facilities	732.60	\$72.80	9.94
	Distribution Lines	37.90	\$0.89	2.34
	<b>Subtotal</b>	<b>770.49</b>	<b>\$73.69</b>	
Natural Gas	Pipelines	0.00	\$0.00	0.00
	Facilities	7.20	\$0.76	10.54
	Distribution Lines	25.30	\$0.25	1.01
	<b>Subtotal</b>	<b>32.45</b>	<b>\$1.01</b>	
Oil Systems	Pipelines	0.00	\$0.00	0.00
	Facilities	0.00	\$0.00	0.00
	<b>Subtotal</b>	<b>0.00</b>	<b>\$0.00</b>	
Electrical Power	Facilities	605.00	\$64.06	10.59
	<b>Subtotal</b>	<b>605.00</b>	<b>\$64.06</b>	
Communication	Facilities	0.90	\$0.10	11.06
	<b>Subtotal</b>	<b>0.88</b>	<b>\$0.10</b>	
<b>Total</b>		<b>1,508.61</b>	<b>\$145.16</b>	

**Table 14. Indirect Economic Impact with outside aid**

(Employment as # of people and Income in millions of \$)

LOSS	Total	%

**Appendix A: County Listing for the Region**

Lewis,WA

**Appendix B: Regional Population and Building Value Data**

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Washington	Lewis	75,455	5,480	1,847	7,328
Total State		<b>75,455</b>	<b>5,480</b>	<b>1,847</b>	<b>7,328</b>
Total Region		<b>75,455</b>	<b>5,480</b>	<b>1,847</b>	<b>7,328</b>

# Hazus-MH: Earthquake Event Report

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**Region Name:** Lewis County EQ 2015 Nisqually

**Earthquake Scenario:** Nisqually M7.2 USGS Shakemap

**Print Date:** July 17, 2015

**Disclaimer:**

*This version of Hazus utilizes 2010 Census Data.*

*Totals only reflect data for those census tracts/blocks included in the user's study region.*

*The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.*

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## General Description of the Region

Hazus is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop earthquake losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from earthquakes and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Washington

Note:

Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 2,435.61 square miles and contains 20 census tracts. There are over 29 thousand households in the region which has a total population of 75,455 people (2010 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 33 thousand buildings in the region with a total building replacement value (excluding contents) of 7,328 (millions of dollars). Approximately 92.00 % of the buildings (and 75.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 5,246 and 1,382 (millions of dollars) , respectively.

## Building and Lifeline Inventory

### **Building Inventory**

Hazus estimates that there are 33 thousand buildings in the region which have an aggregate total replacement value of 7,328 (millions of dollars) . Appendix B provides a general distribution of the building value by State and County.

In terms of building construction types found in the region, wood frame construction makes up 74% of the building inventory. The remaining percentage is distributed between the other general building types.

### **Critical Facility Inventory**

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 142 beds. There are 45 schools, 13 fire stations, 8 police stations and 0 emergency operation facilities. With respect to high potential loss facilities (HPL), there are 0 dams identified within the region. Of these, 0 of the dams are classified as 'high hazard'. The inventory also includes 22 hazardous material sites, 0 military installations and 0 nuclear power plants.

### **Transportation and Utility Lifeline Inventory**

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 6,628.00 (millions of dollars). This inventory includes over 460 kilometers of highways, 332 bridges, 6,315 kilometers of pipes.

**Table 1: Transportation System Lifeline Inventory**

<b>System</b>	<b>Component</b>	<b># Locations/ # Segments</b>	<b>Replacement value (millions of dollars)</b>
<b>Highway</b>	Bridges	332	2,674.00
	Segments	88	2,239.00
	Tunnels	0	0.00
	<b>Subtotal</b>		<b>4,913.00</b>
<b>Railways</b>	Bridges	0	0.00
	Facilities	3	8.00
	Segments	69	129.50
	Tunnels	0	0.00
	<b>Subtotal</b>		<b>137.50</b>
<b>Light Rail</b>	Bridges	0	0.00
	Facilities	0	0.00
	Segments	0	0.00
	Tunnels	0	0.00
	<b>Subtotal</b>		<b>0.00</b>
<b>Bus</b>	Facilities	1	1.20
	<b>Subtotal</b>		<b>1.20</b>
<b>Ferry</b>	Facilities	0	0.00
	<b>Subtotal</b>		<b>0.00</b>
<b>Port</b>	Facilities	0	0.00
	<b>Subtotal</b>		<b>0.00</b>
<b>Airport</b>	Facilities	4	42.60
	Runways	4	151.90
	<b>Subtotal</b>		<b>194.50</b>
		<b>Total</b>	<b>5,246.10</b>

**Table 2: Utility System Lifeline Inventory**

<b>System</b>	<b>Component</b>	<b># Locations / Segments</b>	<b>Replacement value (millions of dollars)</b>
<b>Potable Water</b>	Distribution Lines	NA	63.20
	Facilities	1	36.60
	Pipelines	0	0.00
		<b>Subtotal</b>	<b>99.80</b>
<b>Waste Water</b>	Distribution Lines	NA	37.90
	Facilities	10	732.60
	Pipelines	0	0.00
		<b>Subtotal</b>	<b>770.50</b>
<b>Natural Gas</b>	Distribution Lines	NA	25.30
	Facilities	6	7.20
	Pipelines	0	0.00
		<b>Subtotal</b>	<b>32.50</b>
<b>Oil Systems</b>	Facilities	0	0.00
	Pipelines	0	0.00
		<b>Subtotal</b>	<b>0.00</b>
<b>Electrical Power</b>	Facilities	5	605.00
		<b>Subtotal</b>	<b>605.00</b>
<b>Communication</b>	Facilities	8	0.90
		<b>Subtotal</b>	<b>0.90</b>
		<b>Total</b>	<b>1,508.60</b>

## Earthquake Scenario

Hazus uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.

<b>Scenario Name</b>	Nisqually M7.2 USGS Shakemap
<b>Type of Earthquake</b>	User-defined
<b>Fault Name</b>	NA
<b>Historical Epicenter ID #</b>	NA
<b>Probabilistic Return Period</b>	NA
<b>Longitude of Epicenter</b>	NA
<b>Latitude of Epicenter</b>	NA
<b>Earthquake Magnitude</b>	7.20
<b>Depth (Km)</b>	NA
<b>Rupture Length (Km)</b>	NA
<b>Rupture Orientation (degrees)</b>	NA
<b>Attenuation Function</b>	NA

## Building Damage

### Building Damage

Hazus estimates that about 2,629 buildings will be at least moderately damaged. This is over 8.00 % of the buildings in the region. There are an estimated 22 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

**Table 3: Expected Building Damage by Occupancy**

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
<b>Agriculture</b>	144	0.57	35	0.59	24	1.08	6	1.52	0	1.91
<b>Commercial</b>	890	3.54	422	7.09	373	16.97	104	25.37	7	30.37
<b>Education</b>	39	0.16	13	0.21	11	0.49	3	0.79	0	0.86
<b>Government</b>	35	0.14	11	0.18	6	0.27	1	0.18	0	0.11
<b>Industrial</b>	304	1.21	126	2.11	111	5.03	31	7.59	2	9.68
<b>Other Residential</b>	3,154	12.53	1,884	31.65	1,353	61.53	226	55.28	11	50.46
<b>Religion</b>	98	0.39	31	0.53	24	1.10	7	1.62	0	1.78
<b>Single Family</b>	20,512	81.47	3,432	57.65	298	13.53	31	7.65	1	4.84
<b>Total</b>	<b>25,176</b>		<b>5,954</b>		<b>2,199</b>		<b>409</b>		<b>22</b>	

**Table 4: Expected Building Damage by Building Type (All Design Levels)**

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
<b>Wood</b>	20,982	83.34	3627	60.93	278	12.65	4	0.99	0	0.33
<b>Steel</b>	307	1.22	116	1.95	134	6.10	49	11.90	5	21.35
<b>Concrete</b>	232	0.92	118	1.98	107	4.89	29	7.02	2	7.55
<b>Precast</b>	244	0.97	108	1.82	138	6.27	50	12.33	3	15.63
<b>RM</b>	615	2.44	168	2.82	200	9.10	63	15.40	2	9.83
<b>URM</b>	86	0.34	64	1.07	42	1.90	7	1.71	0	1.78
<b>MH</b>	2,711	10.77	1753	29.44	1,299	59.09	207	50.65	10	43.52
<b>Total</b>	<b>25,176</b>		<b>5,954</b>		<b>2,199</b>		<b>409</b>		<b>22</b>	

\*Note:

RM Reinforced Masonry  
 URM Unreinforced Masonry  
 MH Manufactured Housing

## **Essential Facility Damage**

Before the earthquake, the region had 142 hospital beds available for use. On the day of the earthquake, the model estimates that only 74 hospital beds (53.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 94.00% of the beds will be back in service. By 30 days, 100.00% will be operational.

**Table 5: Expected Damage to Essential Facilities**

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	1	0	0	1
Schools	45	0	0	45
EOCs	0	0	0	0
PoliceStations	8	0	0	8
FireStations	13	0	0	13

## Transportation and Utility Lifeline Damage

Table 6 provides damage estimates for the transportation system.

**Table 6: Expected Damage to the Transportation Systems**

System	Component	Locations/ Segments	Number of Locations_			
			With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	88	0	0	88	88
	Bridges	332	9	0	323	332
	Tunnels	0	0	0	0	0
Railways	Segments	69	0	0	69	69
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	3	0	0	3	3
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	1	0	0	1	1
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	4	0	0	4	4
	Runways	4	0	0	4	4

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.



**Table 7 : Expected Utility System Facility Damage**

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	1	0	0	1	1
Waste Water	10	0	0	3	10
Natural Gas	6	0	0	6	6
Oil Systems	0	0	0	0	0
Electrical Power	5	0	0	3	5
Communication	8	0	0	8	8

**Table 8 : Expected Utility System Pipeline Damage (Site Specific)**

System	Total Pipelines Length (kms)	Number of Leaks	Number of Breaks
Potable Water	3,158	130	33
Waste Water	1,895	93	23
Natural Gas	1,263	27	7
Oil	0	0	0

**Table 9: Expected Potable Water and Electric Power System Performance**

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	29,743	0	0	0	0	0
Electric Power		0	0	0	0	0

### **Fire Following Earthquake**

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

### **Debris Generation**

Hazus estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 0.07 million tons of debris will be generated. Of the total amount, Brick/Wood comprises 27.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 2,800 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

### **Shelter Requirement**

Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 158 households to be displaced due to the earthquake. Of these, 100 people (out of a total population of 75,455) will seek temporary shelter in public shelters.

### **Casualties**

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
<b>2 AM</b>	Commercial	1	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	1	0	0	0
	Other-Residential	17	2	0	0
	Single Family	7	0	0	0
	<b>Total</b>	<b>25</b>	<b>3</b>	<b>0</b>	<b>0</b>
<b>2 PM</b>	Commercial	34	5	0	1
	Commuting	0	0	0	0
	Educational	14	2	0	0
	Hotels	0	0	0	0
	Industrial	7	1	0	0
	Other-Residential	4	0	0	0
	Single Family	2	0	0	0
	<b>Total</b>	<b>60</b>	<b>9</b>	<b>1</b>	<b>2</b>
<b>5 PM</b>	Commercial	24	4	0	1
	Commuting	1	2	3	1
	Educational	1	0	0	0
	Hotels	0	0	0	0
	Industrial	5	1	0	0
	Other-Residential	6	1	0	0
	Single Family	2	0	0	0
	<b>Total</b>	<b>39</b>	<b>7</b>	<b>3</b>	<b>1</b>

## Economic Loss

The total economic loss estimated for the earthquake is 397.32 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

### Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 237.97 (millions of dollars); 21 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 45 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

**Table 11: Building-Related Economic Loss Estimates**

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
<b>Income Losses</b>							
	Wage	0.00	1.49	9.86	0.69	0.56	12.60
	Capital-Related	0.00	0.64	8.33	0.45	0.16	9.57
	Rental	0.50	2.67	6.04	0.30	0.21	9.72
	Relocation	1.52	3.15	9.30	1.37	2.23	17.55
	<b>Subtotal</b>	<b>2.02</b>	<b>7.94</b>	<b>33.53</b>	<b>2.81</b>	<b>3.15</b>	<b>49.44</b>
<b>Capital Stock Losses</b>							
	Structural	5.24	6.56	14.71	5.19	3.42	35.12
	Non_Structural	39.90	20.72	27.18	10.19	6.73	104.72
	Content	20.19	4.52	12.71	6.44	3.22	47.07
	Inventory	0.00	0.00	0.43	1.11	0.07	1.62
	<b>Subtotal</b>	<b>65.33</b>	<b>31.80</b>	<b>55.03</b>	<b>22.93</b>	<b>13.43</b>	<b>188.52</b>
	<b>Total</b>	<b>67.35</b>	<b>39.75</b>	<b>88.56</b>	<b>25.73</b>	<b>16.58</b>	<b>237.97</b>

## Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

Hazus estimates the long-term economic impacts to the region for 15 years after the earthquake. The model quantifies this information in terms of income and employment changes within the region. Table 14 presents the results of the region for the given earthquake.

**Table 12: Transportation System Economic Losses**  
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	2,239.01	\$0.00	0.00
	Bridges	2,673.99	\$41.14	1.54
	Tunnels	0.00	\$0.00	0.00
	<b>Subtotal</b>	<b>4913.00</b>	<b>41.10</b>	
Railways	Segments	129.50	\$0.00	0.00
	Bridges	0.00	\$0.00	0.00
	Tunnels	0.00	\$0.00	0.00
	Facilities	7.99	\$1.39	17.37
	<b>Subtotal</b>	<b>137.50</b>	<b>1.40</b>	
Light Rail	Segments	0.00	\$0.00	0.00
	Bridges	0.00	\$0.00	0.00
	Tunnels	0.00	\$0.00	0.00
	Facilities	0.00	\$0.00	0.00
	<b>Subtotal</b>	<b>0.00</b>	<b>0.00</b>	
Bus	Facilities	1.20	\$0.22	18.67
	<b>Subtotal</b>	<b>1.20</b>	<b>0.20</b>	
Ferry	Facilities	0.00	\$0.00	0.00
	<b>Subtotal</b>	<b>0.00</b>	<b>0.00</b>	
Port	Facilities	0.00	\$0.00	0.00
	<b>Subtotal</b>	<b>0.00</b>	<b>0.00</b>	
Airport	Facilities	42.60	\$5.15	12.09
	Runways	151.86	\$0.00	0.00
	<b>Subtotal</b>	<b>194.50</b>	<b>5.20</b>	
	<b>Total</b>	<b>5246.10</b>	<b>47.90</b>	

**Table 13: Utility System Economic Losses**

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.00	\$0.00	0.00
	Facilities	36.60	\$3.86	10.54
	Distribution Lines	63.20	\$0.59	0.93
	<b>Subtotal</b>	<b>99.78</b>	<b>\$4.45</b>	
Waste Water	Pipelines	0.00	\$0.00	0.00
	Facilities	732.60	\$56.39	7.70
	Distribution Lines	37.90	\$0.42	1.11
	<b>Subtotal</b>	<b>770.49</b>	<b>\$56.81</b>	
Natural Gas	Pipelines	0.00	\$0.00	0.00
	Facilities	7.20	\$0.44	6.18
	Distribution Lines	25.30	\$0.12	0.48
	<b>Subtotal</b>	<b>32.45</b>	<b>\$0.57</b>	
Oil Systems	Pipelines	0.00	\$0.00	0.00
	Facilities	0.00	\$0.00	0.00
	<b>Subtotal</b>	<b>0.00</b>	<b>\$0.00</b>	
Electrical Power	Facilities	605.00	\$49.57	8.19
	<b>Subtotal</b>	<b>605.00</b>	<b>\$49.57</b>	
Communication	Facilities	0.90	\$0.06	7.31
	<b>Subtotal</b>	<b>0.88</b>	<b>\$0.06</b>	
<b>Total</b>		<b>1,508.61</b>	<b>\$111.45</b>	

**Table 14. Indirect Economic Impact with outside aid**

(Employment as # of people and Income in millions of \$)

LOSS	Total	%

## **Appendix A: County Listing for the Region**

Lewis,WA



**Appendix B: Regional Population and Building Value Data**

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Washington	Lewis	75,455	5,480	1,847	7,328
Total State		<b>75,455</b>	<b>5,480</b>	<b>1,847</b>	<b>7,328</b>
Total Region		<b>75,455</b>	<b>5,480</b>	<b>1,847</b>	<b>7,328</b>

# Hazus-MH: Earthquake Event Report

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**Region Name:** Lewis County EQ 2015 St Helens

**Earthquake Scenario:** St Helens M7 USGS Shakemap

**Print Date:** July 17, 2015

**Disclaimer:**

*This version of Hazus utilizes 2010 Census Data.*

*Totals only reflect data for those census tracts/blocks included in the user's study region.*

*The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.*

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## General Description of the Region

Hazus is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop earthquake losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from earthquakes and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Washington

Note:

Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 2,435.61 square miles and contains 20 census tracts. There are over 29 thousand households in the region which has a total population of 75,455 people (2010 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 33 thousand buildings in the region with a total building replacement value (excluding contents) of 7,328 (millions of dollars). Approximately 92.00 % of the buildings (and 75.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 5,246 and 1,382 (millions of dollars) , respectively.

## Building and Lifeline Inventory

### **Building Inventory**

Hazus estimates that there are 33 thousand buildings in the region which have an aggregate total replacement value of 7,328 (millions of dollars) . Appendix B provides a general distribution of the building value by State and County.

In terms of building construction types found in the region, wood frame construction makes up 74% of the building inventory. The remaining percentage is distributed between the other general building types.

### **Critical Facility Inventory**

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 142 beds. There are 45 schools, 13 fire stations, 8 police stations and 0 emergency operation facilities. With respect to high potential loss facilities (HPL), there are 0 dams identified within the region. Of these, 0 of the dams are classified as 'high hazard'. The inventory also includes 22 hazardous material sites, 0 military installations and 0 nuclear power plants.

### **Transportation and Utility Lifeline Inventory**

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 6,628.00 (millions of dollars). This inventory includes over 460 kilometers of highways, 332 bridges, 6,315 kilometers of pipes.

**Table 1: Transportation System Lifeline Inventory**

<b>System</b>	<b>Component</b>	<b># Locations/ # Segments</b>	<b>Replacement value (millions of dollars)</b>
<b>Highway</b>	Bridges	332	2,674.00
	Segments	88	2,239.00
	Tunnels	0	0.00
		<b>Subtotal</b>	<b>4,913.00</b>
<b>Railways</b>	Bridges	0	0.00
	Facilities	3	8.00
	Segments	69	129.50
	Tunnels	0	0.00
		<b>Subtotal</b>	<b>137.50</b>
<b>Light Rail</b>	Bridges	0	0.00
	Facilities	0	0.00
	Segments	0	0.00
	Tunnels	0	0.00
		<b>Subtotal</b>	<b>0.00</b>
<b>Bus</b>	Facilities	1	1.20
		<b>Subtotal</b>	<b>1.20</b>
<b>Ferry</b>	Facilities	0	0.00
		<b>Subtotal</b>	<b>0.00</b>
<b>Port</b>	Facilities	0	0.00
		<b>Subtotal</b>	<b>0.00</b>
<b>Airport</b>	Facilities	4	42.60
	Runways	4	151.90
		<b>Subtotal</b>	<b>194.50</b>
		<b>Total</b>	<b>5,246.10</b>

**Table 2: Utility System Lifeline Inventory**

<b>System</b>	<b>Component</b>	<b># Locations / Segments</b>	<b>Replacement value (millions of dollars)</b>
<b>Potable Water</b>	Distribution Lines	NA	63.20
	Facilities	1	36.60
	Pipelines	0	0.00
		<b>Subtotal</b>	<b>99.80</b>
<b>Waste Water</b>	Distribution Lines	NA	37.90
	Facilities	10	732.60
	Pipelines	0	0.00
		<b>Subtotal</b>	<b>770.50</b>
<b>Natural Gas</b>	Distribution Lines	NA	25.30
	Facilities	6	7.20
	Pipelines	0	0.00
		<b>Subtotal</b>	<b>32.50</b>
<b>Oil Systems</b>	Facilities	0	0.00
	Pipelines	0	0.00
		<b>Subtotal</b>	<b>0.00</b>
<b>Electrical Power</b>	Facilities	5	605.00
		<b>Subtotal</b>	<b>605.00</b>
<b>Communication</b>	Facilities	8	0.90
		<b>Subtotal</b>	<b>0.90</b>
		<b>Total</b>	<b>1,508.60</b>

## Earthquake Scenario

Hazus uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.

<b>Scenario Name</b>	St Helens M7 USGS Shakemap
<b>Type of Earthquake</b>	User-defined
<b>Fault Name</b>	NA
<b>Historical Epicenter ID #</b>	NA
<b>Probabilistic Return Period</b>	NA
<b>Longitude of Epicenter</b>	NA
<b>Latitude of Epicenter</b>	NA
<b>Earthquake Magnitude</b>	7.00
<b>Depth (Km)</b>	NA
<b>Rupture Length (Km)</b>	NA
<b>Rupture Orientation (degrees)</b>	NA
<b>Attenuation Function</b>	NA



## Building Damage

### Building Damage

Hazus estimates that about 1,281 buildings will be at least moderately damaged. This is over 4.00 % of the buildings in the region. There are an estimated 1 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

**Table 3: Expected Building Damage by Occupancy**

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
<b>Agriculture</b>	170	0.58	24	0.77	14	1.18	2	1.87	0	2.51
<b>Commercial</b>	1,482	5.04	202	6.52	101	8.58	11	11.32	0	16.07
<b>Education</b>	57	0.19	6	0.19	3	0.26	0	0.30	0	0.39
<b>Government</b>	42	0.14	6	0.19	4	0.30	0	0.41	0	0.55
<b>Industrial</b>	462	1.57	67	2.17	39	3.30	5	4.54	0	5.55
<b>Other Residential</b>	4,374	14.89	1,282	41.44	895	75.76	76	76.60	1	72.84
<b>Religion</b>	137	0.47	16	0.50	8	0.68	1	0.78	0	1.06
<b>Single Family</b>	22,660	77.12	1,493	48.23	117	9.94	4	4.17	0	1.03
<b>Total</b>	<b>29,384</b>		<b>3,095</b>		<b>1,181</b>		<b>99</b>		<b>1</b>	

**Table 4: Expected Building Damage by Building Type (All Design Levels)**

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
<b>Wood</b>	23,251	79.13	1545	49.91	96	8.10	1	0.56	0	0.00
<b>Steel</b>	479	1.63	74	2.38	52	4.40	6	5.77	0	7.43
<b>Concrete</b>	402	1.37	57	1.86	26	2.22	2	1.69	0	1.29
<b>Precast</b>	427	1.45	60	1.95	49	4.11	7	7.53	0	7.19
<b>RM</b>	906	3.08	78	2.51	58	4.92	7	6.65	0	1.80
<b>URM</b>	147	0.50	35	1.14	15	1.27	2	2.08	0	10.68
<b>MH</b>	3,773	12.84	1246	40.25	885	74.98	75	75.72	1	71.61
<b>Total</b>	<b>29,384</b>		<b>3,095</b>		<b>1,181</b>		<b>99</b>		<b>1</b>	

\*Note:

RM Reinforced Masonry  
 URM Unreinforced Masonry  
 MH Manufactured Housing

## **Essential Facility Damage**

Before the earthquake, the region had 142 hospital beds available for use. On the day of the earthquake, the model estimates that only 139 hospital beds (98.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 100.00% of the beds will be back in service. By 30 days, 100.00% will be operational.

**Table 5: Expected Damage to Essential Facilities**

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	1	0	0	1
Schools	45	0	0	42
EOCs	0	0	0	0
PoliceStations	8	0	0	7
FireStations	13	0	0	12

## Transportation and Utility Lifeline Damage

Table 6 provides damage estimates for the transportation system.

**Table 6: Expected Damage to the Transportation Systems**

System	Component	Locations/ Segments	Number of Locations_			
			With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	88	0	0	88	88
	Bridges	332	0	0	332	332
	Tunnels	0	0	0	0	0
Railways	Segments	69	0	0	69	69
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	3	0	0	3	3
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	1	0	0	1	1
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	4	0	0	4	4
	Runways	4	0	0	4	4

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

**Table 7 : Expected Utility System Facility Damage**

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	1	0	0	1	1
Waste Water	10	1	0	8	10
Natural Gas	6	0	0	6	6
Oil Systems	0	0	0	0	0
Electrical Power	5	0	0	5	5
Communication	8	0	0	8	8

**Table 8 : Expected Utility System Pipeline Damage (Site Specific)**

System	Total Pipelines Length (kms)	Number of Leaks	Number of Breaks
Potable Water	3,158	52	13
Waste Water	1,895	37	9
Natural Gas	1,263	11	3
Oil	0	0	0

**Table 9: Expected Potable Water and Electric Power System Performance**

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	29,743	0	0	0	0	0
Electric Power		0	0	0	0	0

### **Fire Following Earthquake**

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

### **Debris Generation**

Hazus estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 0.01 million tons of debris will be generated. Of the total amount, Brick/Wood comprises 47.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 480 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

### **Shelter Requirement**

Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 4 households to be displaced due to the earthquake. Of these, 2 people (out of a total population of 75,455) will seek temporary shelter in public shelters.

### **Casualties**

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
<b>2 AM</b>	Commercial	0	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	0	0	0	0
	Other-Residential	6	1	0	0
	Single Family	2	0	0	0
	<b>Total</b>	<b>8</b>	<b>1</b>	<b>0</b>	<b>0</b>
<b>2 PM</b>	Commercial	6	1	0	0
	Commuting	0	0	0	0
	Educational	2	0	0	0
	Hotels	0	0	0	0
	Industrial	1	0	0	0
	Other-Residential	1	0	0	0
	Single Family	1	0	0	0
	<b>Total</b>	<b>12</b>	<b>1</b>	<b>0</b>	<b>0</b>
<b>5 PM</b>	Commercial	4	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	1	0	0	0
	Other-Residential	2	0	0	0
	Single Family	1	0	0	0
	<b>Total</b>	<b>8</b>	<b>1</b>	<b>0</b>	<b>0</b>

## Economic Loss

The total economic loss estimated for the earthquake is 132.00 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

### Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 68.03 (millions of dollars); 13 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 58 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

**Table 11: Building-Related Economic Loss Estimates**

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
<b>Income Losses</b>							
	Wage	0.00	0.19	1.39	0.13	0.24	1.96
	Capital-Related	0.00	0.08	1.16	0.08	0.03	1.35
	Rental	0.17	0.47	0.93	0.05	0.04	1.66
	Relocation	0.50	1.35	1.36	0.21	0.47	3.89
	<b>Subtotal</b>	<b>0.68</b>	<b>2.10</b>	<b>4.83</b>	<b>0.48</b>	<b>0.78</b>	<b>8.86</b>
<b>Capital Stock Losses</b>							
	Structural	1.86	2.06	2.14	0.78	0.89	7.74
	Non_Structural	16.78	5.92	6.08	2.73	2.23	33.73
	Content	8.77	1.27	3.75	1.87	1.51	17.17
	Inventory	0.00	0.00	0.13	0.35	0.05	0.52
	<b>Subtotal</b>	<b>27.42</b>	<b>9.25</b>	<b>12.09</b>	<b>5.73</b>	<b>4.68</b>	<b>59.16</b>
	<b>Total</b>	<b>28.09</b>	<b>11.35</b>	<b>16.92</b>	<b>6.20</b>	<b>5.46</b>	<b>68.03</b>



## **Transportation and Utility Lifeline Losses**

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

Hazus estimates the long-term economic impacts to the region for 15 years after the earthquake. The model quantifies this information in terms of income and employment changes within the region. Table 14 presents the results of the region for the given earthquake.

**Table 12: Transportation System Economic Losses**  
(Millions of dollars)

<b>System</b>	<b>Component</b>	<b>Inventory Value</b>	<b>Economic Loss</b>	<b>Loss Ratio (%)</b>
<b>Highway</b>	Segments	2,239.01	\$0.00	0.00
	Bridges	2,673.99	\$10.59	0.40
	Tunnels	0.00	\$0.00	0.00
	<b>Subtotal</b>	<b>4913.00</b>	<b>10.60</b>	
<b>Railways</b>	Segments	129.50	\$0.00	0.00
	Bridges	0.00	\$0.00	0.00
	Tunnels	0.00	\$0.00	0.00
	Facilities	7.99	\$0.60	7.56
	<b>Subtotal</b>	<b>137.50</b>	<b>0.60</b>	
<b>Light Rail</b>	Segments	0.00	\$0.00	0.00
	Bridges	0.00	\$0.00	0.00
	Tunnels	0.00	\$0.00	0.00
	Facilities	0.00	\$0.00	0.00
	<b>Subtotal</b>	<b>0.00</b>	<b>0.00</b>	
<b>Bus</b>	Facilities	1.20	\$0.09	7.56
	<b>Subtotal</b>	<b>1.20</b>	<b>0.10</b>	
<b>Ferry</b>	Facilities	0.00	\$0.00	0.00
	<b>Subtotal</b>	<b>0.00</b>	<b>0.00</b>	
<b>Port</b>	Facilities	0.00	\$0.00	0.00
	<b>Subtotal</b>	<b>0.00</b>	<b>0.00</b>	
<b>Airport</b>	Facilities	42.60	\$5.30	12.45
	Runways	151.86	\$0.00	0.00
	<b>Subtotal</b>	<b>194.50</b>	<b>5.30</b>	
	<b>Total</b>	<b>5246.10</b>	<b>16.60</b>	

**Table 13: Utility System Economic Losses**

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.00	\$0.00	0.00
	Facilities	36.60	\$0.94	2.58
	Distribution Lines	63.20	\$0.23	0.37
	<b>Subtotal</b>	<b>99.78</b>	<b>\$1.18</b>	
Waste Water	Pipelines	0.00	\$0.00	0.00
	Facilities	732.60	\$29.56	4.03
	Distribution Lines	37.90	\$0.17	0.44
	<b>Subtotal</b>	<b>770.49</b>	<b>\$29.73</b>	
Natural Gas	Pipelines	0.00	\$0.00	0.00
	Facilities	7.20	\$0.12	1.73
	Distribution Lines	25.30	\$0.05	0.19
	<b>Subtotal</b>	<b>32.45</b>	<b>\$0.17</b>	
Oil Systems	Pipelines	0.00	\$0.00	0.00
	Facilities	0.00	\$0.00	0.00
	<b>Subtotal</b>	<b>0.00</b>	<b>\$0.00</b>	
Electrical Power	Facilities	605.00	\$16.28	2.69
	<b>Subtotal</b>	<b>605.00</b>	<b>\$16.28</b>	
Communication	Facilities	0.90	\$0.03	3.14
	<b>Subtotal</b>	<b>0.88</b>	<b>\$0.03</b>	
<b>Total</b>		<b>1,508.61</b>	<b>\$47.39</b>	

**Table 14. Indirect Economic Impact with outside aid**

(Employment as # of people and Income in millions of \$)

LOSS	Total	%

**Appendix A: County Listing for the Region**

Lewis,WA

**Appendix B: Regional Population and Building Value Data**

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Washington	Lewis	75,455	5,480	1,847	7,328
Total State		<b>75,455</b>	<b>5,480</b>	<b>1,847</b>	<b>7,328</b>
Total Region		<b>75,455</b>	<b>5,480</b>	<b>1,847</b>	<b>7,328</b>

# Hazus-MH: Flood Event Report

**Region Name:** LC Chehalis Flood with 2009 DG

**Flood Scenario:** Chehalis Flood

**Print Date:** Tuesday, August 04, 2015

**Disclaimer:**

*This version of Hazus utilizes 2010 Census Data.*

*Totals only reflect data for those census tracts/blocks included in the user's study region.*

*The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.*

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## General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Washington

**Note:**

Appendix A contains a complete listing of the counties contained in the region .

The geographical size of the region is 2,436 square miles and contains 4,288 census blocks. The region contains over 30 thousand households and has a total population of 75,455 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B .

There are an estimated 33,760 buildings in the region with a total building replacement value (excluding contents) of 7,329 million dollars (2010 dollars). Approximately 91.53% of the buildings (and 74.79% of the building value) are associated with residential housing.

## General Building Stock

Hazus estimates that there are 33,760 buildings in the region which have an aggregate total replacement value of 7,329 million (2010 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

**Table 1  
Building Exposure by Occupancy Type for the Study Region**

<b>Occupancy</b>	<b>Exposure (\$1000)</b>	<b>Percent of Total</b>
Residential	5,480,925	74.8%
Commercial	1,119,023	15.3%
Industrial	402,707	5.5%
Agricultural	59,229	0.8%
Religion	122,667	1.7%
Government	45,225	0.6%
Education	99,056	1.4%
<b>Total</b>	<b>7,328,832</b>	<b>100.00%</b>

**Table 2  
Building Exposure by Occupancy Type for the Scenario**

<b>Occupancy</b>	<b>Exposure (\$1000)</b>	<b>Percent of Total</b>
Residential	1,383,795	74.0%
Commercial	283,557	15.2%
Industrial	143,432	7.7%
Agricultural	13,951	0.7%
Religion	28,658	1.5%
Government	3,368	0.2%
Education	12,900	0.7%
<b>Total</b>	<b>1,869,661</b>	<b>100.00%</b>

## Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 142 beds. There are 45 schools, 13 fire stations, 8 police stations and no emergency operation centers.



## Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

<b>Study Region Name:</b>	LC Chehalis Flood with 2009 DG
<b>Scenario Name:</b>	Chehalis Flood
<b>Return Period Analyzed:</b>	100
<b>Analysis Options Analyzed:</b>	No What-Ifs

## General Building Stock Damage

Hazus estimates that about 691 buildings will be at least moderately damaged. This is over 43% of the total number of buildings in the scenario. There are an estimated 27 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

**Table 3: Expected Building Damage by Occupancy**

Occupancy	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	2	100.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	2	66.67	0	0.00	1	33.33	0	0.00
Religion	0	0.00	1	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	1	0.15	71	10.32	379	55.09	80	11.63	130	18.90	27	3.92
<b>Total</b>	<b>3</b>		<b>72</b>		<b>381</b>		<b>80</b>		<b>131</b>		<b>27</b>	

**Table 4: Expected Building Damage by Building Type**

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	1	50.00	0	0.00	1	50.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	18	100.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	1	100.00	0	0.00	0	0.00	0	0.00
Wood	1	0.15	71	10.60	379	56.57	80	11.94	130	19.40	9	1.34

## Essential Facility Damage

Before the flood analyzed in this scenario, the region had 142 hospital beds available for use. On the day of the scenario flood event, the model estimates that 142 hospital beds are available in the region.

**Table 5: Expected Damage to Essential Facilities**

Classification	Total	# Facilities		
		At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	13	0	0	0
Hospitals	1	0	0	0
Police Stations	8	0	0	0
Schools	45	5	0	5

If this report displays all zeros or is blank, two possibilities can explain this.

- (1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.
- (2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

## Induced Flood Damage

### **Debris Generation**

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

**Analysis has not been performed for this Scenario.**

## Social Impact

### **Shelter Requirements**

**Analysis has not been performed for this Scenario.**

## Economic Loss

The total economic loss estimated for the flood is 326.20 million dollars, which represents 17.45 % of the total replacement value of the scenario buildings.

### **Building-Related Losses**

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 325.53 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 49.23% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

**Table 6: Building-Related Economic Loss Estimates**  
(Millions of dollars)

<b>Category</b>	<b>Area</b>	<b>Residential</b>	<b>Commercial</b>	<b>Industrial</b>	<b>Others</b>	<b>Total</b>
<b><u>Building Loss</u></b>						
	Building	95.37	16.69	18.58	2.07	132.71
	Content	65.02	49.74	60.72	9.21	184.70
	Inventory	0.00	1.02	6.89	0.23	8.13
	<b>Subtotal</b>	<b>160.39</b>	<b>67.45</b>	<b>86.19</b>	<b>11.50</b>	<b>325.53</b>
<b><u>Business Interruption</u></b>						
	Income	0.02	0.15	0.01	0.01	0.19
	Relocation	0.06	0.03	0.01	0.00	0.11
	Rental Income	0.04	0.02	0.00	0.00	0.06
	Wage	0.07	0.19	0.01	0.04	0.31
	<b>Subtotal</b>	<b>0.19</b>	<b>0.39</b>	<b>0.04</b>	<b>0.05</b>	<b>0.67</b>
<b>ALL</b>	<b>Total</b>	<b>160.58</b>	<b>67.84</b>	<b>86.23</b>	<b>11.55</b>	<b>326.20</b>

## **Appendix A: County Listing for the Region**

Washington  
- Lewis

**Appendix B: Regional Population and Building Value Data**

	<b>Building Value (thousands of dollars)</b>			
	<b>Population</b>	<b>Residential</b>	<b>Non-Residential</b>	<b>Total</b>
<b>Washington</b>				
Lewis	75,455	5,480,925	1,847,907	7,328,832
<b>Total</b>	<b>75,455</b>	<b>5,480,925</b>	<b>1,847,907</b>	<b>7,328,832</b>
<b>Total Study Region</b>	<b>75,455</b>	<b>5,480,925</b>	<b>1,847,907</b>	<b>7,328,832</b>

# Hazus-MH: Flood Event Report

**Region Name:** Cowlitz Flood with 2009 DG

**Flood Scenario:** Cowlitz Flood

**Print Date:** Monday, August 03, 2015

**Disclaimer:**

*This version of Hazus utilizes 2010 Census Data.*

*Totals only reflect data for those census tracts/blocks included in the user's study region.*

*The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.*



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## General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Washington

**Note:**

Appendix A contains a complete listing of the counties contained in the region .

The geographical size of the region is 2,045 square miles and contains 2,481 census blocks. The region contains over 14 thousand households and has a total population of 34,580 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B .

There are an estimated 17,533 buildings in the region with a total building replacement value (excluding contents) of 3,104 million dollars (2010 dollars). Approximately 93.17% of the buildings (and 82.32% of the building value) are associated with residential housing.

### General Building Stock

Hazus estimates that there are 17,533 buildings in the region which have an aggregate total replacement value of 3,104 million (2010 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

**Table 1**  
**Building Exposure by Occupancy Type for the Study Region**

<b>Occupancy</b>	<b>Exposure (\$1000)</b>	<b>Percent of Total</b>
Residential	2,554,854	82.3%
Commercial	277,369	8.9%
Industrial	124,254	4.0%
Agricultural	36,711	1.2%
Religion	44,326	1.4%
Government	21,564	0.7%
Education	44,531	1.4%
<b>Total</b>	<b>3,103,609</b>	<b>100.00%</b>

**Table 2**  
**Building Exposure by Occupancy Type for the Scenario**

<b>Occupancy</b>	<b>Exposure (\$1000)</b>	<b>Percent of Total</b>
Residential	911,777	80.6%
Commercial	108,296	9.6%
Industrial	52,860	4.7%
Agricultural	14,904	1.3%
Religion	21,506	1.9%
Government	9,011	0.8%
Education	13,458	1.2%
<b>Total</b>	<b>1,131,812</b>	<b>100.00%</b>

### Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 25 schools, 8 fire stations, 5 police stations and no emergency operation centers.

## Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

<b>Study Region Name:</b>	Cowlitz Flood with 2009 DG
<b>Scenario Name:</b>	Cowlitz Flood
<b>Return Period Analyzed:</b>	100
<b>Analysis Options Analyzed:</b>	No What-Ifs

## General Building Stock Damage

Hazus estimates that about 274 buildings will be at least moderately damaged. This is over 26% of the total number of buildings in the scenario. There are an estimated 84 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

**Table 3: Expected Building Damage by Occupancy**

Occupancy	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	1	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	12	4.41	84	30.88	23	8.46	69	25.37	84	30.88
<b>Total</b>	<b>0</b>		<b>13</b>		<b>84</b>		<b>24</b>		<b>69</b>		<b>84</b>	

**Table 4: Expected Building Damage by Building Type**

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	80	100.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	1	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	12	6.25	84	43.75	23	11.98	69	35.94	4	2.08

## Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

**Table 5: Expected Damage to Essential Facilities**

Classification	Total	# Facilities		
		At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	8	0	0	0
Hospitals	0	0	0	0
Police Stations	5	0	0	0
Schools	25	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

- (1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.
- (2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

## Induced Flood Damage

### **Debris Generation**

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

**Analysis has not been performed for this Scenario.**

## Social Impact

### **Shelter Requirements**

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 607 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 908 people (out of a total population of 34,580) will seek temporary shelter in public shelters.

## Economic Loss

The total economic loss estimated for the flood is 105.02 million dollars, which represents 9.28 % of the total replacement value of the scenario buildings.

### **Building-Related Losses**

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 104.85 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 67.96% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

**Table 6: Building-Related Economic Loss Estimates**

(Millions of dollars)

<b>Category</b>	<b>Area</b>	<b>Residential</b>	<b>Commercial</b>	<b>Industrial</b>	<b>Others</b>	<b>Total</b>
<b><u>Building Loss</u></b>						
	Building	44.58	3.86	2.91	1.32	52.67
	Content	26.76	11.40	6.77	5.89	50.81
	Inventory	0.00	0.25	1.03	0.09	1.37
	<b>Subtotal</b>	<b>71.34</b>	<b>15.50</b>	<b>10.71</b>	<b>7.29</b>	<b>104.85</b>
<b><u>Business Interruption</u></b>						
	Income	0.00	0.01	0.00	0.01	0.01
	Relocation	0.02	0.00	0.00	0.00	0.02
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.01	0.00	0.12	0.13
	<b>Subtotal</b>	<b>0.02</b>	<b>0.02</b>	<b>0.00</b>	<b>0.12</b>	<b>0.17</b>
<b>ALL</b>	<b>Total</b>	<b>71.37</b>	<b>15.52</b>	<b>10.71</b>	<b>7.42</b>	<b>105.02</b>



## **Appendix A: County Listing for the Region**

Washington  
- Lewis

**Appendix B: Regional Population and Building Value Data**

	Building Value (thousands of dollars)			
	Population	Residential	Non-Residential	Total
<b>Washington</b>				
Lewis	34,580	2,554,854	548,755	3,103,609
<b>Total</b>	<b>34,580</b>	<b>2,554,854</b>	<b>548,755</b>	<b>3,103,609</b>
<b>Total Study Region</b>	<b>34,580</b>	<b>2,554,854</b>	<b>548,755</b>	<b>3,103,609</b>

# Hazus-MH: Flood Event Report

**Region Name:** Nisqually Flood with 2009 DG

**Flood Scenario:** Nisqually Flood

**Print Date:** Tuesday, August 04, 2015

**Disclaimer:**

*This version of Hazus utilizes 2010 Census Data.*

*Totals only reflect data for those census tracts/blocks included in the user's study region.*

*The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.*

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## General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Washington

**Note:**

Appendix A contains a complete listing of the counties contained in the region .

The geographical size of the region is 1,335 square miles and contains 1,002 census blocks. The region contains over 4 thousand households and has a total population of 10,017 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B .

There are an estimated 6,457 buildings in the region with a total building replacement value (excluding contents) of 1,091 million dollars (2010 dollars). Approximately 94.02% of the buildings (and 82.49% of the building value) are associated with residential housing.

## General Building Stock

Hazus estimates that there are 6,457 buildings in the region which have an aggregate total replacement value of 1,091 million (2010 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

**Table 1  
Building Exposure by Occupancy Type for the Study Region**

<b>Occupancy</b>	<b>Exposure (\$1000)</b>	<b>Percent of Total</b>
Residential	900,173	82.5%
Commercial	95,645	8.8%
Industrial	37,179	3.4%
Agricultural	10,012	0.9%
Religion	21,991	2.0%
Government	15,637	1.4%
Education	10,609	1.0%
<b>Total</b>	<b>1,091,246</b>	<b>100.00%</b>

**Table 2  
Building Exposure by Occupancy Type for the Scenario**

<b>Occupancy</b>	<b>Exposure (\$1000)</b>	<b>Percent of Total</b>
Residential	70,342	89.1%
Commercial	2,630	3.3%
Industrial	1,606	2.0%
Agricultural	350	0.4%
Religion	958	1.2%
Government	3,078	3.9%
Education	0	0.0%
<b>Total</b>	<b>78,964</b>	<b>100.00%</b>

## Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 7 schools, 5 fire stations, 1 police station and no emergency operation centers.

## Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

<b>Study Region Name:</b>	Nisqually Flood with 2009 DG
<b>Scenario Name:</b>	Nisqually Flood
<b>Return Period Analyzed:</b>	100
<b>Analysis Options Analyzed:</b>	No What-Ifs

## General Building Stock Damage

Hazus estimates that about 5 buildings will be at least moderately damaged. This is over 20% of the total number of buildings in the scenario. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

**Table 3: Expected Building Damage by Occupancy**

Occupancy	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	0	0.00	4	80.00	0	0.00	1	20.00	0	0.00
<b>Total</b>	<b>0</b>		<b>0</b>		<b>4</b>		<b>0</b>		<b>1</b>		<b>0</b>	

**Table 4: Expected Building Damage by Building Type**

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	0	0.00	4	80.00	0	0.00	1	20.00	0	0.00



## Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

**Table 5: Expected Damage to Essential Facilities**

Classification	Total	# Facilities		
		At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	5	1	0	1
Hospitals	0	0	0	0
Police Stations	1	0	0	0
Schools	7	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

- (1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.
- (2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

## Induced Flood Damage

### **Debris Generation**

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

**Analysis has not been performed for this Scenario.**

## Social Impact

### **Shelter Requirements**

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 25 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 13 people (out of a total population of 10,017) will seek temporary shelter in public shelters.

## Economic Loss

The total economic loss estimated for the flood is 2.12 million dollars, which represents 2.69 % of the total replacement value of the scenario buildings.

### **Building-Related Losses**

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 2.11 million dollars. 1% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 91.19% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

**Table 6: Building-Related Economic Loss Estimates**

(Millions of dollars)

<b>Category</b>	<b>Area</b>	<b>Residential</b>	<b>Commercial</b>	<b>Industrial</b>	<b>Others</b>	<b>Total</b>
<b><u>Building Loss</u></b>						
	Building	1.22	0.02	0.01	0.01	1.26
	Content	0.72	0.06	0.02	0.06	0.85
	Inventory	0.00	0.00	0.00	0.00	0.00
	<b>Subtotal</b>	<b>1.94</b>	<b>0.08</b>	<b>0.03</b>	<b>0.07</b>	<b>2.11</b>
<b><u>Business Interruption</u></b>						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	0.00	0.00	0.00	0.00	0.00
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.00	0.00	0.01	0.01
	<b>Subtotal</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.01</b>	<b>0.01</b>
<b>ALL</b>	<b>Total</b>	<b>1.94</b>	<b>0.08</b>	<b>0.03</b>	<b>0.08</b>	<b>2.12</b>

## **Appendix A: County Listing for the Region**

Washington  
- Lewis

**Appendix B: Regional Population and Building Value Data**

	Building Value (thousands of dollars)			Total
	Population	Residential	Non-Residential	
<b>Washington</b>				
Lewis	10,017	900,173	191,073	1,091,246
<b>Total</b>	<b>10,017</b>	<b>900,173</b>	<b>191,073</b>	<b>1,091,246</b>
<b>Total Study Region</b>	<b>10,017</b>	<b>900,173</b>	<b>191,073</b>	<b>1,091,246</b>





**HAZARD MITIGATION PLAN POINT OF CONTACT**

Primary Point of Contact	Alternate Point of Contact
Emil Pierson, Community Development Director PO Box 609 118 W Maple Street Centralia WA 98531 (360) 330-7662 <a href="mailto:epierson@cityofcentralia.com">epierson@cityofcentralia.com</a> <a href="http://www.cityofcentralia.com">www.cityofcentralia.com</a>	LG Nelson, Building Official PO Box 609 118 W Maple Street Centralia WA 98531 (360) 330-7684 <a href="mailto:lgnelson@cityofcentralia.com">lgnelson@cityofcentralia.com</a> <a href="http://www.cityofcentralia.com">www.cityofcentralia.com</a>

**Profile:** The City of Centralia is the most populated city in Lewis County. Located 25 miles south of Olympia, the City covers an area of 7.4 square miles. The City of Centralia was settled in 1852 along the junction of the Chehalis and Skookumchuck Rivers. Once known as a “Hub City,” or midway point, between Seattle and Portland, major rail routes transferred in Centralia to transport goods across the state. Rail industry and passenger trains spurred local economic activity.

The City of Centralia and its Urban Growth Area have a rich diversity of terrain and natural features. The City is surrounded by Ham Hill, Seminary Hill, Cooks Hill, Davis Hill, and Widgeon Hill. The hills surround the City while the Chehalis River and the Skookumchuck River: are dominant features in the lowlands. The diverse landscape contains features such as steep slopes and floodplains that make development challenging and contain habitats that contribute to the biological diversity. The northern portions of the City contain high quality glacial deposits and alluvial river gravels. It is here that the City's aquifers and gravel mines are located. Historic coal mines are located in the Urban Growth Area and northeast of the City's jurisdiction.

**Ranking of Identified Hazards**

Hazard Type	Previous Occurrence?		Likely to Experience?		Probability				Extent				Percentage	Rank
	Yes	No	Yes	No	Highly Likely (100% next yr)	Likely (10-100% or 1 in 10 yrs)	Possible (1-10% next year or 1/100 yrs)	Unlikely (less than 1% in 100 yrs)	Catastrophic: more than 50% affected	Severe: 25-50% affected	Limited: 0-25% affected	None: 0% affected		
<b>Rating Points</b>	<b>20</b>	<b>0</b>	<b>10</b>	<b>0</b>	<b>20</b>	<b>10</b>	<b>6</b>	<b>0</b>	<b>20</b>	<b>10</b>	<b>4</b>	<b>0</b>		
Flooding	20		10		20						4		54%	1
Earthquake	20	0	10			10				10			50%	2
Wind Storm	20		10			10					4		44%	3
Winter Storm	20		10			10					4		44%	3
Volcano	20		10			10					4		44%	3
Levee Failure	20			0			6				4		30%	4
Dam Failure		0		0			6		20				26%	5
Landslide		0		0			6				4		10%	6
Drought		0		0			6					0	6%	7
Expansive Soils				0			6					0	6%	7

**Probability:**  
 Highly Likely: Near 100% probability in the next year.  
 Likely: Between 10 and 100% probability in the next year, or at least one chance in 10 years.  
 Possible: Between 1 and 10% probability in the next year, or at least one chance in next 100 years.  
 Unlikely: Less than 1% probability in next 100 years.

**Extent of damage is defined as follows:**  
 Catastrophic: More than 50% of the jurisdiction can be affected  
 Severe: 25 to 50% of the jurisdiction can be affected  
 Limited: 0 to 25% of the jurisdiction can be affected  
**None: 0% of the jurisdiction can be affected**

**Current Hazard Mitigation Codes/Plans/Ordinances**



- Lewis County Multi-Jurisdictional Hazard Mitigation Plan adopted June 2010.
- City of Centralia Comprehensive Plan adopted in July 2015.
- City of Centralia Zoning Ordinance adopted in March 2015.
- City of Centralia Critical Areas Ordinance adopted in May 2009.
- Comprehensive Emergency Management Plan (CEMP) adopted in November 2014.
- City of Centralia Hazard Identification and Vulnerability Assessment (HIVA) adopted 2009.
- Surface/Storm Water Management Plan adopted in 2008.
- Skookumchuck Dam Emergency Action Plan revised in December 2007.
- City of Centralia Water System Plan adopted in December 2005
- General Sewer Plan and Wastewater Treatment Plant Facilities Plan adopted in 2000.
- City Light and the Yelm Project Comprehensive Plan approved in December 2002.

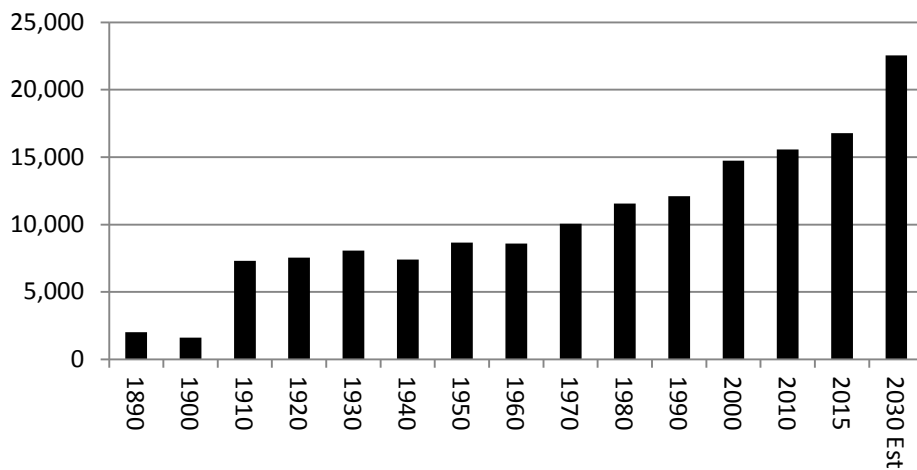
**Agency Specific Natural Hazard Event History – 1980 to 2015**

Type of Disaster	FEMA Disaster #	Date	Comments
Severe Winter Storm and Record and Near Record Snow	DR-1825	3/2/2009	Incident 12/12/2008-1/5/2009
Severe Winter Storm, Landslides, Mudslides, Flooding	DR-1817	1/30/2009	1/6-/16/2009
Severe Storms, Flooding, Landslides, Mudslides	DR-1734	12/8/2007	Incident 12/1-12/17/2007
Severe Winter Storm, Landslides, Mudslides	DR-1682	2/14/2007	Incident 12/14-12/15/2006
Severe Storms, Flooding, Landslides, Mudslides	DR-1671	12/12/2006	Incident 11/2-11/11/2006
Earthquake	DR-1361	3/1/2001	Incident 2/28-3/16/2001
Severe Winter Storms/Flooding	DR-1159	1/17/1997	Incident 12/26/1996-2/10/1997
Severe Storms, Flooding	DR-1100	Feb. 9, 1996	Incident 1/26-2/23/1996
Storms, High Winds, Floods	DR-1079	Jan. 3, 1996	Incident 11/7-Dec 18, 1995
Severe Storm, High Winds	DR-981	March 4, 1993	Incident 1/20-1/21/1993
Severe Storms, Flooding	DR-784	Dec 15, 1986	Incident 11/22-11/29/1986
Volcanic Eruption – Mt. St. Helens	DR-623	May 21, 1980	

**Demographics**

Population	1990	2000	2010	2015	2030 -Projected
	12,101	14,742	15,570	16,790	22,535

**Centralia**



Quick Facts (US Census)	Centralia	Washington
Population, percent change - April 1, 2010 to July 1, 2013	0.6	3.7%
Persons under 5 years, percent, 2010	8%	6.5%
Persons under 18 years, percent definition and source info Persons under 18 years, percent, 2010	24.7%	23.5%
Persons 65 years and over, percent definition and source info Persons 65 years and over, percent, 2010	16.6%	12.3%
High school graduate or higher, percent of persons age 25+, 2009-2013	80.3%	90.0%
Bachelor's degree or higher, percent of persons age 25+, 2009-2013	13.8%	31.9%
Homeownership rate, 2009-2013	50.5%	63.2%
Housing units in multi-unit structures, percent, 2009-2013	27.8%	25.6%
Median value of owner-occupied housing units, 2009-2013	160,600	\$262,100
Per capita money income in past 12 months (2013 dollars), 2009-2013	\$19,517	\$30,742





## JURISDICTION City of Centralia

Median household income definition and source info Median household income, 2009-2013	\$36,257	\$59,478
Persons below poverty level, percent definition and source info Persons below poverty level, percent, 2009-2013	21.1%	13.4%

Source: U.S. Census – Quickfacts, Date Accessed: July 12, 2015. Website: quickfacts.census.gov

Land Designations	
Land Area within the existing city limits:	4,925
Land area within urban growth area:	5,242
Total land area within city limits and urban growth area	10,167
Land area of park, forest, and/or open space	1,028
Land area of residential	6,402
Land area of commercial	949
Land area of industrial	1787

**Current and Anticipated Development and Population Trends**  
 The City expects to see slow growth below 2% to continue with steady infill Development. The City is does show signs of life by new growth at the College (new buildings) and Centralia Station (a commercial development owned by the Port of Centralia). Providence hospital and the surrounding area has seen growth with additions or new buildings. The City expects to see that continue into the future as it become a service oriented community.

Infrastructure		
Categories	2014	Approximate Value (\$)
Miles of Street and Roads	80 miles	55,902,000
Miles of Sanitary Sewer	65 miles	
Miles of Storm Sewer	116,100 linear feet (21.99 miles)	
Miles of water lines	124 miles	
Miles of Electrical lines	250 miles	

Critical Facilities		
Critical Facilities	Address	Approximate Value (\$)
Centralia City Hall	118 W Maple St.	1,636,200
Centralia Timberland Library	110 S Silver St.	2,079,800
Utility Customer Service Center	500 North Pearl	629,550
Utility Building (shops)	1100 North Tower	1,287,850
Wastewater Building	1401 W Mellen	1,171,500
Sewer Treatment Facility	1545 Goodrich Rd.	1,918,500
Parks and Recreation Bldg	902 Johnson Road	3,703,800
Streets Shop	2600 W Reynolds Ave	\$909,900
JNL Building	415 North Pearl	294,000
UP Train Depot	210 Railroad Ave.	
China Creek Lift Station	1401 W Mellen	
Tennis Court Well	2500 Pioneer Way	

Flood Information	
Percentage of existing city limits within the 100-year flood plain	2,549 acres or 25%
Assessor’s valuation of private properties within the 100-year flood plain	\$325,289,790

Critical Facilities within the 100-year flood plain		
Facility	Address	Approximate Value (\$)
Wastewater Building	1401 W Mellen	1,171,500
Sewer Treatment Facility	1545 Goodrich Rd.	1,918,500
China Creek Lift Station	1401 W Mellen	
Tennis Court Well	2500 Pioneer Way	

NFIP/CRS Section	
NFIP/CRS Community	Yes
Community Rating Classification	Class 6, 2015/2016



## JURISDICTION City of Centralia

Building Code Effective Grading Schedule	Class 3
NFIP Membership	Yes, 3/15/1974
NFIP Compliance Violations?	None
FEMA Floodplain Maps Adopted	Yes, 6/1/1982
Recently Community Assistant Visit or Community Assistance Contact	6/7/2005
Floodplain Administrator	Emil Pierson, Community Development Director
Certified Floodplain Manager	Yes
Floodplain Ordinance Adoption	Adopted 2009. Amended Ord 2350 April 2015.
StormReady Jurisdiction	No
Firewise Jurisdiction	No

### Previous Action Plan Implementation

Mitigation Strategy	Completed 2010-2014	Carried Over to 2015 Plan	Removed or No Longer Feasible
The Floodway, the Special Flood Risk Zone and the 100-year Floodplain shall be regulated to protect human life, property and the public health and safety of the citizens of Centralia; minimize the expenditure of public money; and maintain the city's flood insurance eligibility while avoiding regulations which are unnecessarily restrictive or difficult to administer.	Yes	Yes, Ongoing	
Frequently flooded areas; It is the purpose of this section to promote the public health, safety, and general welfare, and to minimize public and private losses due to flood conditions in the floodplain and the floodway according to the provisions established under the Floodplain Ordinance.	Yes	Yes, Ongoing	
Manage stormwater runoff to improve drainage, control stormwater quantity, prevent localized flooding of streets and private property during high water table and rainy conditions, and protect and enhance water quality through using Stormwater Management Manual for Western Washington, Best Management Practices, and Best Available Science as established by the Department of Ecology.	Yes	Yes, Ongoing	
The City shall participate in the Community Rating System to obtain the maximum possible reduction in Flood Insurance Rates from the Federal Emergency Management Agency (FEMA).	Yes	Yes, Ongoing	
Consider other regulations and programs associated with flood hazard management. Where there is a conflict, the more stringent in terms of long-term management of the ecological resource and natural geohydrological systems shall take precedence.	Yes	Yes, Ongoing	
Restrict development in the 100 year floodplain that potentially increases flood hazard unless it complies Zoning Ordinance, International Building Code and the Critical Areas Ordinance (CAO).	Yes	Yes, Ongoing	
Provide protection of geological hazards areas which are areas susceptible to the effects of erosion, sliding, earthquake, steep slopes, flooding, wetlands, or other geologic events through the City's adopted Critical Areas Ordinance or Shoreline Plan.	Yes	Yes, Ongoing	
Centralia will continue to meet the requirements of the state municipal stormwater permit program, called NPDES Phase II. This program includes a number of components such as water quality monitoring, annual stormwater inspections, and public education, all of which the city is already engaged in to some extent.	Yes	Yes, Ongoing	
Utilize the latest adopted building code to ensure adequate protection in construction against earthquakes utilizing the adopted bldg. code and land movement Grading Standards	Yes	Yes, Ongoing	
Nonstructural solutions to flood hazards shall be encouraged including restricting development in flood-prone areas, storm water runoff management, up-stream watershed vegetation management.	Yes	Yes, Ongoing	
Ensure that standards for flood control measures protect and enhance the biological systems and public access opportunities of the shoreline and adjacent uplands.	Yes	Yes, Ongoing	
The Building Official will continue to require and maintain elevation certificates for permitted development within the floodplain. Elevation certificates are maintained by address.	Yes	Yes, Ongoing	
Provide emergency generator or secondary power capability for all pump stations; upgrade construction at all pump stations to latest seismic and wind standards.	Yes	Yes, Ongoing	
Plan the stormwater management system to be consistent with policies regarding flooding, wetlands, land use and water quality.	Yes	Yes, Ongoing	
Develop an integrated program for quantity and quality control that recognizes the unique situation faced by the City within its location in the 100 year floodplain and its needs for flood control in larger	Yes	Yes, Ongoing	
Apply best management practices to reduce pollutant loading and minimize the effects of contaminated sediments on the city's waterways. Increase preservation of the open space and drainage corridor through easements, deeding land to city, improve water quality, eliminate failed septic systems, fence out livestock, improve wildlife habitat, do restoration planting projects, increase regulations such as greater setbacks where applicable, implement specialized best management practices to minimize problems in the long run.	Yes	Yes, Ongoing	



JURISDICTION City of Centralia

Encourage the retention of open space and development of recreational opportunities, conserve fish and wildlife habitat, increase access to natural resource lands and water, and develop parks. Integrate these concepts with natural functions such as drainage, agriculture and topographic features	Yes	Yes, Ongoing	
Encourage residents to sign up for the Lewis County's Code Red System	Yes	Yes, Ongoing	
Encourage all critical facilities including nursing homes, chemical storage facilities, schools, electric and telephone substations have a working emergency plan in place and that contacts are up-to-date.	Yes	Yes, Ongoing	
Maintain the emergency operations center (EOC) and have training on a regular basis pertaining to flooding and all hazards.	Yes	Yes, Ongoing	
Upgrade all city owned critical facilities to ensure continued operations during hazard events.	Yes	Yes, Ongoing	
Provide on-going public education at all levels, from the renter to the homeowner, regarding residential, commercial and industrial best management practice issues, flood hazard mitigation, water quality, and related local issues.	Yes	Yes, Ongoing	
The City shall provide on-going public education about flooding. Outreach efforts shall include but are not limited to: newsletter, special targeted mailings to realtors, insurance agents and lenders, training sessions at neighborhood meetings, the public library, and any other means identified.	Yes	Yes, Ongoing	
Provide on-going public education aimed at residents, businesses, and industries about stormwater and its effects on water quality, flooding, fish/wildlife habitat and to discourage dumping of waste material or pollutants into storm drains.	Yes	Yes, Ongoing	
The Community Development Department and Building Official will continue to make flood map determinations in response to public inquiry.	Yes	Yes, Ongoing	
The Community Development Department will maintain the Flood Protection information and add updated materials as needed at the Centralia Public Library. Information in this collection includes but is not limited to: natural and beneficial functions of floodplains, flood plan, floodplain map, local early warning and evacuation routes and updated local, state and federal materials.	Yes	Yes, Ongoing	
Maintain updated maps and continue to work on automated base maps and overlays, leading to a planning level geographic information system. Continue data collection and data entry as new information and data sources become accessible.	Yes	Yes, Ongoing	
Maintain and update on a regular basis the City's flood website to provide information and encourage public education about how to reduce flood impacts.	Yes	Yes, Ongoing	
Expand the Public Information program to address other natural hazards where additional public information will be helpful, such as seismic retrofits for homes and other hazard related topics	Yes	Yes, Ongoing	
Improve communication and public awareness of natural hazards to residents and businesses before, during and following emergencies	Yes	Yes, Ongoing	
Continue annual bridge inspections	Yes	Yes, Ongoing	
Operate Incident Command Post in time of emergency	Yes	Yes, Ongoing	
Isolate utilities in damaged areas	Yes	Yes, Ongoing	
Require engineered foundation systems and geotechnical reports for building in critical areas	Yes	Yes, Ongoing	
Maintain map of landslide areas in permit application office	Yes	Yes, Ongoing	
Coordinate with Lewis County for growth in critical areas	Yes	Yes, Ongoing	
City light tree maintenance program to trim trees around power lines	Yes	Yes, Ongoing	
Retrofit existing overhead lines to underground as time and budget allows	Yes	Yes, Ongoing	
Continue current City Light practice of burying new utility lines as appropriate	Yes	Yes, Ongoing	Remove
Continue contract with Lewis County to provide statutory emergency services.	Yes	Yes (on-going)	

**Attached Documents**

- Hazard Identification Worksheet
- Asset Inventory
- Compiled detailed inventory of what can be damaged by a hazard event
- Identification of buildings, the value of buildings, and the population that is located in hazard areas
- Ranking Mitigation Strategies: Using STAPLEE
- Mitigation Strategies
- Critical Facilities Mitigation Strategies
- Maps

# HAZARD IDENTIFICATION WORKSHEET

Date Completed: June 2015

Which Agency are you representing? City of Centralia

Name:	Title:
Email:	Telephone #:
Address:	City: ZIP:

For each Hazard, please fill out the table below based on the following questions:

- **Previous Occurrence:** Is there a historic record of this type of hazard happening here? *Yes or No*
- **Likely to Experience:** Are you likely to experience this type of hazard in the future? *Yes or No*
- **Probability:** Based on history, what is the likelihood of this event happening again? *Highly Likely, Likely, Possible, Unlikely*
- **Extent:** If this hazard event were to happen, how extensive could the damage be? *Catastrophic, Severe, Limited, None*

Hazard Type	Previous Occurrence?		Likely to Experience?		Probability				Extent			
	Yes	No	Yes	No	Highly Likely	Likely	Possible	Unlikely	Catastrophic	Severe	Limited	None
Avalanche		X		X				X				X
Coastal Erosion		X		X				X				X
Coastal Storm		X		X				X				X
Dam Failure		X		X			X		X			
Debris Flow		X		X				X				X
Drought		X		X			X					X
Earthquake	X		X			X				X		
Expansive Soils				X			X					X
Extreme Heat		X		X				X				X
Flooding	X		X		X						X	
Hailstorm		X		X				X				X
Hurricane		X		X				X				X
Land Subsidence		X		X				X				X
Landslide		X		X			X				X	
Levee Failure	X			X			X				X	
Severe Thunder Storm		X		X				X				X
Severe Wind Storm	X		X			X					X	
Severe Winter Storm	X		X			X					X	
Tornado		X		X				X				X
Tsunami		X		X				X				X
Volcano	X		X			X					X	
Wildfire		X		X				X				X
Other:												

**Which of the following does your agency have? (Circle One)**

Comprehensive Plan	Yes / No / NA	Date completed:	July 2015
Critical Areas Ordinance	Yes / No / NA	Date completed:	May 2009
Does your agency have an emergency plan?	Yes / No / NA		2014



**Which Agency are you representing:** City of Centralia

<b>Name:</b>	<b>Title:</b>
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<b>Email:</b>	<b>Telephone #:</b>
---------------	---------------------

<b>Address:</b>	<b>City:</b>	<b>Zip:</b>
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**Task B: Compile a detailed inventory of what can be damaged by a hazard event.**  
 Inventory the assets (critical facilities, businesses, historic, cultural, natural resource areas and areas of special consideration) that can be damaged by a hazard event.

- |                |  |   |  |                           |  |                        |
|----------------|--|---|--|---------------------------|--|------------------------|
| <b>HAZARDS</b> | 1. Avalanche<br>2. Dam Failure<br>3. Debris Flow<br>4. Drought<br>5. Earthquake<br>6. Expansive Soils<br>7. Extreme Heat | 8. Flooding<br>9. Hailstorm<br>10. Hurricane<br>11. Land Subsidence<br>12. Landslide<br>13. Levee Failure<br>14. Severe Thunder Storm | 15. Severe Wind Storm<br>16. Severe Winter Storm<br>17. Tornado<br>18. Volcano<br>19. Wildfire | <b>BUILDING MATERIALS</b> | a. Masonry<br>b. concrete<br>c. Concrete Block<br>d. Brick<br>e. Stick<br>f. Metal | g. Steel<br>h. Asphalt |
|----------------|--|---|--|---------------------------|--|------------------------|

Name or description of Asset (building)	Address	Hazard(s) List all that apply (See legend above)	Critical Facility	Transportation	Utility System	Comm. System	Economic Assets	Special consideration	Historic/Other	Size of Building (sq. ft.)	Replacement Value (\$)	Contents Value (\$)	Displacement (\$ per day)	Occupancy or capacity (#)	Structural – building materials
Centralia City Hall	118 West Maple St.	2,5,8,15,16,18	X							22,000	6.0M	1.5M		50+	d,e,h
Centralia Library	110 S. Silver St.	2,5, 15,16,18								13,500	3.0M	300,000		50+	d,e
Utility Customer Service Center	500 North Pearl	2,5,8,15,16,18	X					X		1,750					
City Light Building (P.W.)	1100 North Tower	2,5, 15,16,18	X		X			X		21,800					
Police Training Facility	1401 West Mellen	2,5,8, 15,16,18	X							10,950					
WWTP Facility	1545 Goodrich Road	2,5, 15,16,18	X		X										
Parks and Recreation Building	902 Johnson Road	2,5, 15,16,18								20,000	3.0M	300,000		3+	e,f
Rifle Club Building	908 Johnson Road	2,5, 15,16,18									500,000	50,000			e,f
JNL Storage Building	415 North Pearl	2,5, 15,16,18													

Train Depot	210 Railroad Avenue	2,5, 15,16,18								15,000	5.5M	1.0M		10+	d,e,h
China Creek Lift Station	1401 W. Mellon	2,5, 15,16,18	X		X										
Tennis Court Well	Pioneer Way	2,5,8, 15,16,18	X		X										
Street Shop	Reynolds	2,5, 15,16,18		X											a,e,f
City Shop	1219 N. Pearl	2,5,13, 15,16,18		X											e,f

# ASSET INVENTORY WORKSHEET 2C

Date Completed:

Which Agency are you representing? City of Centralia

Name: Emil Pierson

Title: CDD

Email: epierson@cityofcentralia.com

Telephone #: 360-330-7662

Address: 118 West Maple

City: Centralia

ZIP: 98531

**Task C. Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.**

Hazard:     Flooding    

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	6316	1579	25%		377 M	25%	16660	3,892	23%
Commercial	2308	16							
Industrial									
Agricultural		3							
Religious/ Non-profit		0							
Government									
Education									
Utilities		3			3 M				
<b>Total</b>							<b>16,660</b>	<b>3,892</b>	<b>23%</b>

**Task D. Determine whether (and where) you want to collect additional inventory data. (circle one)**

- Do you know where your greatest damages may occur in your hazard areas? **Yes** or No
- Do you know whether your critical facilities will be operational after a hazard event? **Yes** or No
- Is there enough data to determine which assets are subject to the greatest potential damages? **Yes** or No
- Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards? Yes or **No**
- Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards? **Yes** or No
- Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence? Yes or **No**
- Is additional data needed to justify the expenditure of community or state funds for mitigation? **Yes** or No



# ASSET INVENTORY WORKSHEET 2C

Date Completed:

Which Agency are you representing? City of Centralia

Name: Emil Pierson

Title: CDD

Email: epierson@cityofcentralia.com

Telephone #: 360-330-7662

Address: 118 West Maple

City: Centralia

ZIP: 98531

**Task C. Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.**

Hazard: \_\_\_\_\_ Volcano, Earthquake, Wind, Winter \_\_\_\_\_

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	7,600	7,600	100%				16,660	16,660	100
Commercial	2308	2308	100						
Industrial			100						
Agricultural			100						
Religious/ Non-profit			100						
Government			100						
Education			100						
Utilities			100						
<b>Total</b>			<b>100%</b>				<b>16,660</b>	<b>16,660</b>	<b>100</b>

**Task D. Determine whether (and where) you want to collect additional inventory data. (circle one)**

1. Do you know where your greatest damages may occur in your hazard areas? **Yes** or No
2. Do you know whether your critical facilities will be operational after a hazard event? **Yes** or No
3. Is there enough data to determine which assets are subject to the greatest potential damages? **Yes** or No
4. Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards? Yes or **No**
5. Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards? **Yes** or No
6. Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence? Yes or **No**
7. Is additional data needed to justify the expenditure of community or state funds for mitigation? **Yes** or No

# Ranking Mitigation Strategies: Using STAPLEE - Worksheet 3A

Date: June 2015

Agency: Centralia

Category Description/Action Items (Mitigation Strategy)	Hazard Addressed (flood, earthquake, wind, winter, landslide, etc.)	Social (Yes or No)	Technical (Yes or No)	Administrative (Yes or No)	Political (Yes or No)	Legal (Yes or No)	Economical (Yes or No)	Environmental (Yes or No)	Responsible Department/Agency
The Floodway, the Special Flood Risk Zone and the 100-year Floodplain shall be regulated to protect human life, property and the public health and safety of the citizens of Centralia; minimize the expenditure of public money; and maintain the city's flood insurance eligibility while avoiding regulations which are unnecessarily restrictive or difficult to administer.	Flood	Y	Y	Y	Y	Y	Y	Y	Community Development
Frequently flooded areas; It is the purpose of this section to promote the public health, safety, and general welfare, and to minimize public and private losses due to flood conditions in the floodplain and the floodway according to the provisions established under the Floodplain Ordinance.	Flood	Y	Y	Y	Y	Y	Y	Y	Community Development
Manage stormwater runoff to improve drainage, control stormwater quantity, prevent localized flooding of streets and private property during high water table and rainy conditions, and protect and enhance water quality through using Stormwater Management Manual for Western Washington, Best Management Practices, and Best Available Science as established by the Department of Ecology.	Flood	Y	Y	Y	Y	Y	Y	Y	Public Works, Stormwater
The City shall participate in the Community Rating System to obtain the maximum possible reduction in Flood Insurance Rates from the Federal Emergency Management Agency (FEMA).	Flood	Y	Y	Y	Y	Y	Y	Y	Community Development
Consider other regulations and programs associated with flood hazard management. Where there is a conflict, the more stringent in terms of long-term management of the ecological resource and natural geohydrological systems shall take precedence.	Flood	Y	Y	Y	Y	Y	Y	Y	Community Development
Restrict development in the 100 year floodplain that potentially increases flood hazard unless it complies Zoning Ordinance, International Building Code and the Critical Areas Ordinance (CAO). The impacts of floodplain shall be addressed by one of the following means: - The CAO shall prohibit structural flood control measures for new development that would potentially increase the risk of flooding, considerably alter the course, speed or flow of the waterway, reduce flood storage capacity, or increase flood heights on unprotected property; or - CAO or Shoreline Plan shall be established and implemented to retain or restore natural conditions of shorelands associated with frequently flooded areas. - Develop a program for operation and maintenance of storm drains, detention systems, ditches and culverts.	Flood	Y	Y	Y	Y	Y	Y	Y	Community Development
Provide protection of geologically hazards areas which are areas susceptible to the effects of erosion, sliding, earthquake, steep slopes, flooding, wetlands, or other geologic events through the City's adopted Critical Areas Ordinance or Shoreline Plan.	Flood, Landslide, Earthquake	Y	Y	Y	Y	Y	Y	Y	Community Development
Centralia will continue to meet the requirements of the state municipal stormwater permit program, called NPDES Phase II. This program includes a number of components such as water quality monitoring, annual stormwater inspections, and public education, all of which the city is already	Flood, Landslide, Earthquake	Y	Y	Y	Y	Y	Y	Y	Community Development

engaged in to some extent.									
Utilize the latest adopted building code to ensure adequate protection in construction against earthquakes in Seismic Zone 3, severe storms with Wind Exposure B, fire with Fire Resistive Construction Standards, and land movement with Grading Standards	Earthquake, Severe Storm, Fire, Land Movement	Y	Y	Y	Y	Y	Y	Y	Community Development
Nonstructural solutions to flood hazards shall be encouraged including restricting development in flood-prone areas, storm water runoff management, up-stream watershed vegetation management.	Flood	Y	Y	Y	Y	Y	Y	Y	Community Development
Ensure that standards for flood control measures protect and enhance the biological systems and public access opportunities of the shoreline and adjacent uplands.	Flood	Y	Y	Y	Y	Y	Y	Y	Community Development
The Building Official will continue to require and maintain elevation certificates for permitted development within the floodplain. Elevation certificates are maintained by address.	Flood	Y	Y	Y	Y	Y	Y	Y	Community Development
Provide emergency generator or secondary power capability for all pump stations; upgrade construction at all pump stations to latest seismic and wind standards.	Earthquake, Severe Storm, Landslide	Y	Y	Y	Y	Y	Y	Y	Community Development
Plan the stormwater management system to be consistent with policies regarding flooding, wetlands, land use and water quality.	Flood	Y	Y	Y	Y	Y	Y	Y	Community Development
Develop an integrated program for quantity and quality control that recognizes the unique situation faced by the City within its location in the 100 year floodplain and its needs for flood control in larger storm events, while at the same time needing to control the effects of smaller storms in terms of both quantity and quality of runoff.	Flood	Y	Y	Y	Y	Y	Y	Y	Community Development
Apply best management practices to reduce pollutant loading and minimize the effects of contaminated sediments on the city's waterways. Increase preservation of the open space and drainage corridor through easements, deeding land to city, improve water quality, eliminate failed septic systems, fence out livestock, improve wildlife habitat, do restoration planting projects, increase regulations such as greater setbacks where applicable, implement specialized best management practices to minimize problems in the long run.	Flood	Y	Y	Y	Y	Y	Y	Y	Community Development
Encourage the retention of open space and development of recreational opportunities, conserve fish and wildlife habitat, increase access to natural resource lands and water, and develop parks. Integrate these concepts with natural functions such as drainage, agriculture and topographic features	Flood, Earthquake, Landslide, Fire, Severe Storm	Y	Y	Y	Y	Y	Y	Y	Community Development
Encourage residents to sign up for the Lewis County's Code Red System	All	Y	Y	Y	Y	Y	Y	Y	Community Development
Encourage all critical facilities including nursing homes, chemical storage facilities, schools, electric and telephone substations have a working emergency plan in place and that contacts are up-to-date.	All	Y	Y	Y	Y	Y	Y	Y	Community Development
Maintain the emergency operations center (EOC) and have training on a regular basis pertaining to flooding and all hazards.	All	Y	Y	Y	Y	Y	Y	Y	Community Development
Upgrade all city owned critical facilities to ensure continued operations during hazard events.	All	Y	Y	Y	Y	Y	Y	Y	Community Development
Provide on-going public education at all levels, from the renter to the homeowner, regarding residential, commercial and industrial best management practice issues, flood hazard mitigation, water quality, and related local issues.	Flood	Y	Y	Y	Y	Y	Y	Y	Community Development
The City shall provide on-going public education about flooding. Outreach efforts shall include but are not limited to: newsletter, special targeted mailings to realtors, insurance agents and lenders, training sessions at neighborhood meetings, the public library, and any other means identified.	Flood	Y	Y	Y	Y	Y	Y	Y	Community Development
Provide on-going public education aimed at residents, businesses, and industries about stormwater and its effects on water quality, flooding, fish/wildlife habitat and to discourage dumping of waste material or	All	Y	Y	Y	Y	Y	Y	Y	Community Development

pollutants into storm drains.									
The Community Development Department and Building Official will continue to make flood map determinations in response to public inquiry.	Flood	Y	Y	Y	Y	Y	Y	Y	Community Development
The Community Development Department will maintain the Flood Protection information and add updated materials as needed at the Centralia Public Library. Information in this collection includes but is not limited to: natural and beneficial functions of floodplains, flood plan, floodplain map, local early warning and evacuation routes and updated local, state and federal materials.	Flood	Y	Y	Y	Y	Y	Y	Y	Community Development
Maintain updated maps and continue to work on automated base maps and overlays, leading to a planning level geographic information system. Continue data collection and data entry as new information and data sources become accessible.	All	Y	Y	Y	Y	Y	Y	Y	Community Development
Maintain and update on a regular basis the City's flood website to provide information and encourage public education about how to reduce flood impacts.	Flood	Y	Y	Y	Y	Y	Y	Y	Community Development
Expand the Public Information program to address other natural hazards where additional public information will be helpful, such as seismic retrofits for homes and other hazard related topics	All	Y	Y	Y	Y	Y	Y	Y	Community Development
Improve communication and public awareness of natural hazards to residents and businesses before, during and following emergencies	All	Y	Y	Y	Y	Y	Y	N	Police Department
Continue annual bridge inspections	Flood	Y	Y	Y	Y	Y	Y	Y	Engineering Department
Operate Incident Command Post in time of emergency	All	Y	Y	Y	Y	Y	Y	Y	Police Department
Isolate utilities in damaged areas	All	Y	Y	Y	Y	Y	Y	Y	Utilities (water, wastewater, city light)
Continue and enhance annual fire inspections for life safety	All	Y	Y	Y	Y	Y	Y	Y	Riverside Fire Authority
Require engineered foundation systems and geotechnical reports for building in critical areas	Landslide	Y	Y	Y	Y	Y	Y	Y	Building Department
Maintain map of landslide areas in permit application office	Landslide	Y	Y	Y	Y	Y	Y	Y	Community Development
Coordinate with Lewis County for growth in critical areas	All	Y	Y	Y	Y	Y	Y	Y	Community Development
City light tree maintenance program to trim trees around power lines	Wind, Winter	Y	Y	Y	Y	Y	Y	Y	City Light
Retrofit existing overhead lines to underground as time and budget allows	Wind, Winter Storm	Y	Y	Y	Y	Y	Y	Y	City Light
Continue current City Light practice of burying new utility lines as appropriate	Winter, winter, flooding	Y	Y	Y	Y	Y	Y	Y	City Light

**Notes**

S: Social – The public must support the overall implementation strategy and specific mitigation actions.

T: Technical – It is important to determine if the proposed action is technically feasible, will help reduce losses in the long term, and has minimal secondary impacts.

A: Administrative – Under this part of the evaluation criteria, examine the anticipated staffing, funding, and maintenance requirements for the mitigation action to be implemented.

P: Political – Understanding how your community and State leadership feels about issues related to the environment, economic development, safety, and emergency management.

L: Legal – When considering this criterion, determine whether your agency has the legal authority at the State, or local level to implement the action, or if new laws will need to be passed.

E: Economic – Cost-effective mitigation actions that can be funded in current or upcoming budget cycles are much more likely to be implemented.

E: Environmental – Evaluate whether, when implementing mitigation actions, there would be negative consequences to environmental assets (wetlands, endangered species, protected resources).

# Mitigation Strategies – Worksheet 3B

Date: June 2015

Agency: Centralia

Mitigation Measures		Hazard Addressed (flood, earthquake, wind, winter, landslide, etc.)	2010 Plan		Mitigation Identification (Prevention, Property Protection, Public Education & Awareness, Natural Resource Protection, Structural Projects)	Cost-Benefit and Prioritization			Implementation			
Category	Description/Action Items (Mitigation Strategy)		Task in 2010 Plan (yes or no)	Task completed as part of 2010 Plan (yes or no)		Relative Cost 1 = Highest 3 = Lowest	Relative Effectiveness 1 = Lowest 3 = Highest	Priority Rating (Low, Medium, High)	Timeline (schedule for approx. completion)	Potential Funding (grants, budget, donations, etc.)	Cost Est.	Administrative Responsibility
	The Floodway, the Special Flood Risk Zone and the 100-year Floodplain shall be regulated to protect human life, property and the public health and safety of the citizens of Centralia; minimize the expenditure of public money; and maintain the city's flood insurance eligibility while avoiding regulations which are unnecessarily restrictive or difficult to administer.	Flood	Yes	Yes, Ongoing	Prevention, Property Protection	3	3	M	2015-2020	Grants/Budget		Community Development
	Frequently flooded areas; It is the purpose of this section to promote the public health, safety, and general welfare, and to minimize public and private losses due to flood conditions in the floodplain and the floodway according to the provisions established under the Floodplain Ordinance.	Flood	Yes	Yes, Ongoing	Prevention, Property Protection	3	3	M	2015-2020	Grants/Budget		Community Development
	Manage stormwater runoff to improve drainage, control stormwater quantity, prevent localized flooding of streets and private property during high water table and rainy conditions, and protect and enhance water quality through using Stormwater Management Manual for Western Washington, Best Management Practices, and Best Available Science as established by the Department of Ecology.	Flood	Yes	Yes, Ongoing	Prevention, Property Protection, Natural Resource Protection	3	3	M	2015-2020	Grants/Budget		Community Development, Public Works
	The City shall participate in the Community Rating System to obtain the maximum possible reduction in Flood Insurance Rates from the Federal Emergency Management Agency (FEMA).	Flood	Yes	Yes, Ongoing	Prevention, Property Protection, Natural Resource Protection	3	3	H	2015-2020	Grants/Budget		Community Development

	Consider other regulations and programs associated with flood hazard management. Where there is a conflict, the more stringent in terms of long-term management of the ecological resource and natural geohydrological systems shall take precedence.	Flood	Yes	Yes, Ongoing	Prevention, Property Protection	3	3	H	2015-2020	Grants/Budget		Community Development
	Restrict development in the 100 year floodplain that potentially increases flood hazard unless it complies Zoning Ordinance, International Building Code and the Critical Areas Ordinance (CAO).	Flood	Yes	Yes, Ongoing	Prevention, Property Protection, Natural Resource Protection	3	3	H	2015-2020	Grants/Budget		Community Development
	Provide protection of geologically hazards areas which are areas susceptible to the effects of erosion, sliding, earthquake, steep slopes, flooding, wetlands, or other geologic events through the City's adopted Critical Areas Ordinance or Shoreline Plan.	Flood, Landslide, Earthquake	Yes	Yes, Ongoing	Prevention, Property Protection, Natural Resource Protection	3	3	H	2015-2020	Grants/Budget		Community Development
	Centralia will continue to meet the requirements of the state municipal stormwater permit program, called NPDES Phase II. This program includes a number of components such as water quality monitoring, annual stormwater inspections, and public education, all of which the city is already engaged in to some extent.	Flood, Landslide, Earthquake	Yes	Yes, Ongoing	Prevention, Property Protection, Natural Resource Protection	3	3	H	2015-2020	Grants/Budget		Community Development, Public Works
	Utilize the latest adopted building code to ensure adequate protection in construction against earthquakes in Seismic Zone 3, severe storms with Wind Exposure B, fire with Fire Resistant Construction Standards, and land movement with Grading Standards	Earthquake, Severe Storm, Fire, Land Movement	Yes	Yes, Ongoing	Prevention, Property Protection	3	3	H	2015-2020	Grants/Budget		Community Development
	Nonstructural solutions to flood hazards shall be encouraged including restricting development in flood-prone areas, storm water runoff management, up-stream watershed vegetation management.	Flood	Yes	Yes, Ongoing	Prevention, Property Protection, Natural Resource Protection	3	3	H	2015-2020	Grants/Budget		Community Development
	Ensure that standards for flood control measures protect and enhance the biological systems and public access opportunities of the shoreline and adjacent uplands.	Flood	Yes	Yes, Ongoing	Prevention, Property Protection, Natural Resource Protection	3	2	M	2015-2020	Grants/Budget		Community Development
	The Building Official will continue to require and maintain elevation certificates for permitted development within the floodplain. Elevation certificates are maintained by address.	Flood	Yes	Yes, Ongoing	Prevention, Property Protection,	3	3	H	2015-2020	Grants/Budget		Community Development
	Provide emergency generator or secondary power capability for all pump stations; upgrade construction at all pump stations to latest seismic and wind standards.	Earthquake, Severe Storm, Landslide	Yes	Yes, Ongoing	Prevention, Property Protection,	2	2	M	2015-2020	Grants/Budget		Public Works, City Light

	Plan the stormwater management system to be consistent with policies regarding flooding, wetlands, land use and water quality.	Flood	Yes	Yes, Ongoing	Prevention, Property Protection, Natural Resource Protection	3	3	M	2015-2020	Grants/Budget		Community Development, Public Works
	Develop an integrated program for quantity and quality control that recognizes the unique situation faced by the City within its location in the 100 year floodplain and its needs for flood control in larger storm events, while at the same time needing to control the effects of smaller storms in terms of both quantity and quality of runoff.	Flood	Yes	Yes, Ongoing	Prevention, Property Protection, Natural Resource Protection, Structural Projects	3	2	M	2015-2020	Grants/Budget		Community Development
	Apply best management practices to reduce pollutant loading and minimize the effects of contaminated sediments on the city's waterways. Increase preservation of the open space and drainage corridor through easements, deeding land to city, improve water quality, eliminate failed septic systems, fence out livestock, improve wildlife habitat, do restoration planting projects, increase regulations such as greater setbacks where applicable, implement specialized best management practices to minimize problems in the long run.	Flood	Yes	Yes, Ongoing	Prevention, Property Protection, Natural Resource Protection	3	2	M	2015-2020	Grants/Budget		Community Development
	Encourage the retention of open space and development of recreational opportunities, conserve fish and wildlife habitat, increase access to natural resource lands and water, and develop parks. Integrate these concepts with natural functions such as drainage, agriculture and topographic features	Flood, Earthquake, Landslide, Fire, Severe Storm	Yes	Yes, Ongoing	Prevention, Property Protection, Natural Resource Protection	2	3	M	2015-2020	Grants/Budget		Community Development
	Encourage residents to sign up for the Lewis County's Code Red System	All	Yes	Yes, Ongoing	Prevention, Property Protection	3	3	H	2015-2020	Grants/Budget		Community Development, Police Depart.
	Encourage all critical facilities including nursing homes, chemical storage facilities, schools, electric and telephone substations have a working emergency plan in place and that contacts are up-to-date.	All	Yes	Yes, Ongoing	Prevention, Property Protection	3	2	M	2015-2020	Grants/Budget		Community Development, Police Dept.
	Maintain the emergency operations center (EOC) and have training on a regular basis pertaining to flooding and all hazards.	All	Yes	Yes, Ongoing	Prevention, Property Protection,	3	3	H	2015-2020	Grants/Budget		Police Department
	Upgrade all city owned critical facilities to ensure continued operations during hazard events.	All	Yes	Yes, Ongoing	Prevention, Property Protection, Structural Projects	1	3	L	2015-2020	Grants/Budget		Public works, City Light
	Provide on-going public education at all levels, from the renter to the homeowner, regarding residential, commercial and industrial best management practice issues, flood hazard mitigation, water quality, and related local issues.	Flood	Yes	Yes, Ongoing	Prevention, Property Protection, Public Education	3	3	M	2015-2020	Grants/Budget		Community Development

	The City shall provide on-going public education about flooding. Outreach efforts shall include but are not limited to: newsletter, special targeted mailings to realtors, insurance agents and lenders, training sessions at neighborhood meetings, the public library, and any other means identified.	Flood	Yes	Yes, Ongoing	Prevention, Property Protection, Public Education	3	3	M	2015-2020	Grants/Budget		Community Development
	Provide on-going public education aimed at residents, businesses, and industries about stormwater and its effects on water quality, flooding, fish/wildlife habitat and to discourage dumping of waste material or pollutants into storm drains.	All	Yes	Yes, Ongoing	Prevention, Property Protection, Public Education	3	3	M	2015-2020	Grants/Budget		Community Development
	The Community Development Department and Building Official will continue to make flood map determinations in response to public inquiry.	Flood	Yes	Yes, Ongoing	Prevention, Property Protection, Public Education	3	3	H	2015-2020	Grants/Budget		Community Development
	The Community Development Department will maintain the Flood Protection information and add updated materials as needed at the Centralia Public Library. Information in this collection includes but is not limited to: natural and beneficial functions of floodplains, flood plan, floodplain map, local early warning and evacuation routes and updated local, state and federal materials.	Flood	Yes	Yes, Ongoing	Prevention, Property Protection, Public Education	3	3	H	2015-2020	Grants/Budget		Community Development
	Maintain updated maps and continue to work on automated base maps and overlays, leading to a planning level geographic information system. Continue data collection and data entry as new information and data sources become accessible.	All	Yes	Yes, Ongoing	Prevention, Property Protection, Public Education	2	3	M	2015-2020	Grants/Budget		Community Development
	Maintain and update on a regular basis the City's flood website to provide information and encourage public education about how to reduce flood impacts.	Flood	Yes	Yes, Ongoing	Prevention, Property Protection, Public Education	3	3	H	2015-2020	Grants/Budget		Community Development
	Expand the Public Information program to address other natural hazards where additional public information will be helpful, such as seismic retrofits for homes and other hazard related topics	All	Yes	Yes, Ongoing	Prevention, Property Protection, Public Education	3	3	H	2015-2020	Grants/Budget		Community Development
	Improve communication and public awareness of natural hazards to residents and businesses before, during and following emergencies	All	Yes	Yes, Ongoing	Prevention, Property Protection, Public Education	3	3	H	2015-2020	Grants/Budget		Community Development
	Continue annual bridge inspections	Flood	Yes	Yes, Ongoing	Prevention, Property Protection,	2	2	M	2015-2020	Grants/Budget		Public Works
	Operate Incident Command Post in time of emergency	All	Yes	Yes, Ongoing	Prevention, Property Protection,	3	3	H	2015-2020	Grants/Budget		Police Department
	Isolate utilities in damaged areas	All	Yes	Yes, Ongoing	Prevention, Property Protection,	1	3	L	2015-2020	Grants/Budget		Public Works and City Light



	Require engineered foundation systems and geotechnical reports for building in critical areas	Landslide	Yes	Yes, Ongoing	Prevention, Property Protection	2	2	M	2015-2020	Grants/Budget		Community Development
	Maintain map of landslide areas in permit application office	Landslide	Yes	Yes, Ongoing	Prevention, Property Protection, Public Education	3	3	H	2015-2020	Grants/Budget		Community Development
	Coordinate with Lewis County for growth in critical areas	All	Yes	Yes, Ongoing	Prevention, Property Protection, Public Education	3	3	H	2015-2020	Grants/Budget		Community Development
	City light tree maintenance program to trim trees around power lines	Wind, Winter	Yes	Yes, Ongoing	Prevention, Property Protection	2	3	H	2015-2020	Grants/Budget		City Light
	Retrofit existing overhead lines to underground as time and budget allows	Wind, Winter Storm	Yes	Yes, Ongoing	Prevention, Property Protection	1	2	L	2015-2020	Grants/Budget		City Light
	Continue current City Light practice of burying new utility lines as appropriate	Winter, winter, flooding	Yes	Yes, Ongoing	Prevention, Property Protection	1	2	L	2015-2020	Grants/Budget		City Light

**Notes**

2010 Plan: rate task(s) if it was in the 2010 Plan  
 Cost Estimate: a very rough estimate cost of implementing task  
 Administrative Responsibility: who will accomplish the task

# Critical Facilities Mitigation Strategies - Worksheet 3C

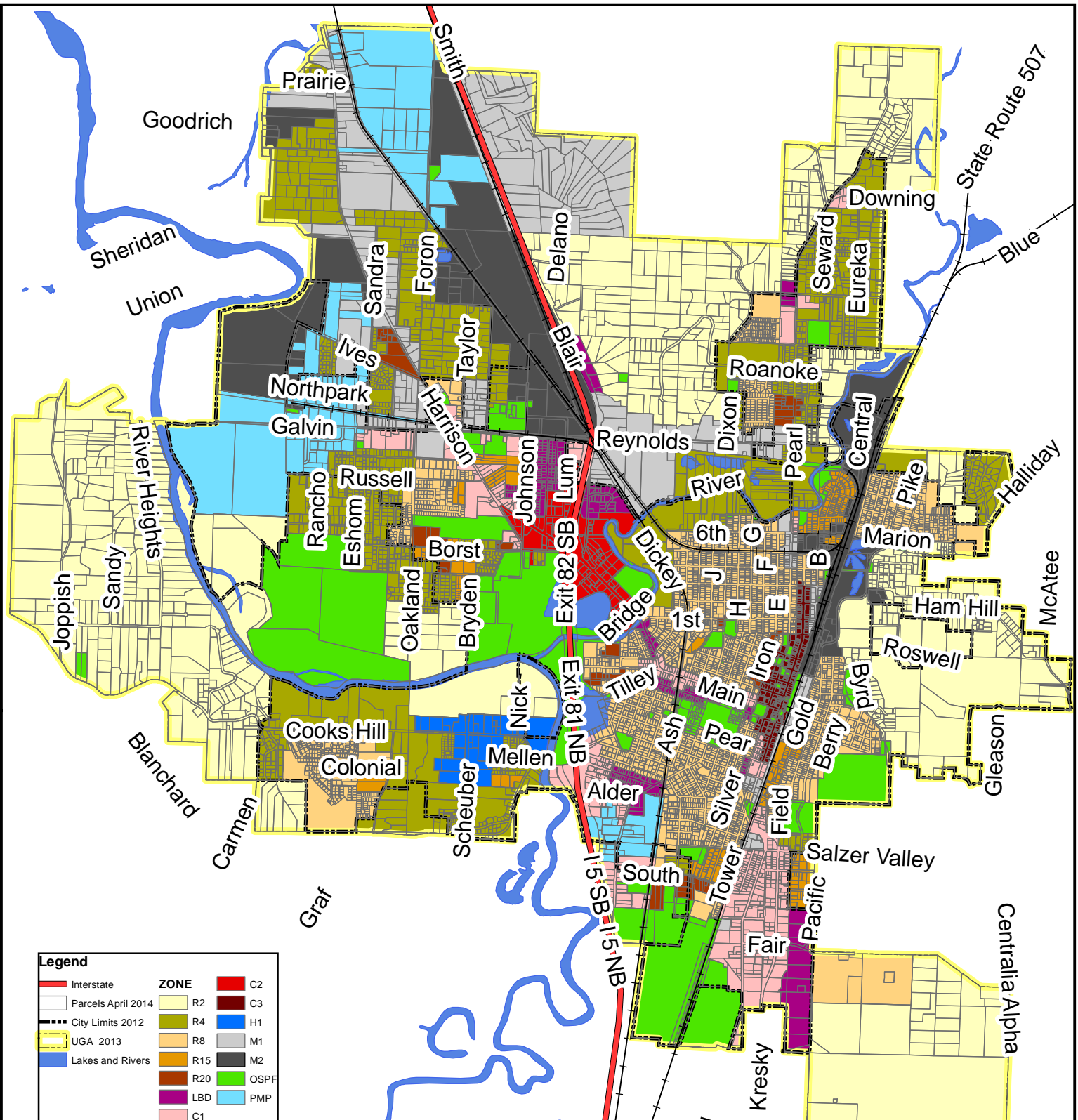
Date: July 2015

Agency: Centralia

Mitigation Measures		Hazard Addressed (All, flooding, landslide, earthquake, volcanic, etc....)	2010 Plan		Mitigation Identification (Prevention, Property Protection, Public Education & Awareness, Natural Resource Protection, Structural Projects)	Cost-Benefit and Prioritization			Implementation			
Facility	Mitigation Strategy		Task listed in the 2010 Plan (yes or no)	Task completed as part of 2010 Plan (yes or no)		Relative Cost 1 = Highest 3 = Lowest	Relative Effectiveness 1 = Lowest 3 = Highest	Priority Rating (Low, Medium, High)	Timeline (schedule)	Potential Funding (grants, budget, donations, etc..)	Cost Est.	Administrative Responsibility
City Hall	Assess building for structural integrity to determine strength in withstanding an earthquake, or volcanic ash fallout on roof	Earthquake, volcanic	Yes	No	Prevention, property protection	1	2	Med.	2010	Budget		Police Chief
City Light HQ	Assess building for structural integrity to determine strength in withstanding an earthquake, or volcanic ash fallout on roof	Earthquake, volcanic	No	No	Prevention, Property Protection, Structural Projects	2	2	Med.		Budget		City light
WWTP	Build new WWTP outside of flood plain and building new flood proof pump station at existing TP site	Flood	Yes	Yes	Prevention, Property Protection, Natural Resource Protection, Structural Projects	1	3	High		Budget		Utilities
Skookumchuck Harrison Ave Bridge	Inspect annually and after every flood or other disaster	Flood	Yes	Yes - Ongoing	Prevention, Property Protection, Natural Resource Protection, Structural Projects	3	2	Med.		Budget		Engineering
Skookumchuck Dam	Raise height of dam to increase storage capacity. Improve spillway control for flood control purposes	Flood	Yes	Yes - Ongoing		2	3	High		Budget		Com Dev / Utilities
	Perform an engineering review of dam's seismic stability	Seismic	Yes	Yes		2	3	High		Grants		Public Works
City/Lewis County	Update improve area-wide alarm system.	All natural hazards	Yes	Yes - Ongoing		2	3	High		Budget		Com Dev.
City Hall	Perform vulnerability assessment to identify actions needed to improve security.	Terrorist	Yes	Completed		2	3	High		Proposed		Com Dev
Emergency Response Planning	Contract with Lewis County to provide statutory emergency services	All	Yes	Yes - Ongoing		2	1	Med		Budget		Com Dev

	Operate Incident Command Post in time of emergency services	All	Yes	Yes - Ongoing		2	1	Med		Budget		Com Dev
	Isolate utilities in damaged areas	All	Yes	Yes		3	1	Med		Budget		Public Works, Utilities
	Continue and enhance annual fire inspections for life safety	All	Yes	Yes-ongoing		3	1	Med				Fire Chief
Critical Areas Ordinance Planning	Update critical areas ordinance utilizing best available science	All	Yes	Yes		2	1	Med				Com Dev
Critical Areas Ordinance Update	Require engineered foundation systems and geotechnical reports for building in critical areas	Landslide	Yes	Yes - Ongoing		1	3	Med		Property Owner		Com Dev, Building
	Maintain map of landslide areas in permit application office	Landslide	Yes	Yes - ongoing		3	2	High				Com Dev, Building
	Continue to coordinate with Lewis County for growth in critical areas	All	Yes	Yes - Ongoing		2	1	Med				Com Dev, Building
Public Education	Continue public education on building maintenance related to seismic activity and supplement with information on façade improvement program	Earthquake	Yes	Yes - Ongoing		1	1	Low		Grants		Com Dev, Building
Development Review	Continue to maintain building, plumbing, electrical and other codes that reduce vulnerability of new structures to natural hazards.	All	Yes	Yes- Ongoing		3	3	High				Com Dev, Building
Floodplain Management	Continue to enforce the flood ordinance which is based on NFIP Model	Flood	Yes	Yes - Ongoing		3	3	High		Budget		Com Dev
Floodplain Management	Implement Centralia/Chehalis Flood Control Project through USACE	Flood	Yes	Yes - Ongoing		3	3	High		WA State US Corps		Com Dev
Floodplain Management	Continue to participate in CRS program	Flood	Yes	Yes - Ongoing		2	2	Med		Budget		Com Dev
Floodplain Management	Continue applying for grant to elevate homes	Flood	Yes	Yes - Ongoing		1	3	Med		HMGP grants		Com Dev

Floodplain Management	Continue annual levy inspection	Flood	Yes	Yes- Annual		3	3	High		Budget		Com Dev, USACE
Evacuation Planning	Continue annual bridge inspections	Flood	Yes	Yes- Annual		3	3	High		Budget		City Engineer
Protect Utilities	Continue tree maintenance program for street trees	Severe weather storm	Yes	Yes - Ongoing		2	2	Med		Budget		Com Dev, Parks
Protect Utilities	City light tree maintenance program to trim trees around power lines	Severe weather storm	Yes	Yes - Ongoing		2	2	Med		Budget		Public Works, Light
Protect Utilities	Continue current City Light practice of burying new utility lines as appropriate	Severe weather storm	Yes	Yes - Ongoing		3	3	High		Budget		Public Works, Light
Protect Utilities	Retrofit existing overhead lines to underground as time and budget allows	Severe weather storm	Yes	Yes- ongoing		3	3	High		Budget		Public Works, Light
Protect Utilities	Continue flood proofing utilities in flood prone areas (electrical power)	Flood	Yes	Yes - Ongoing		1	3	Med		Budget		Public Works, Light



Legend	
	Interstate
	Parcels April 2014
	City Limits 2012
	UGA_2013
	Lakes and Rivers
	C2
	C3
	H1
	R2
	R4
	R8
	R15
	R20
	LBD
	PMP
	M1
	M2
	OSPF
	C1

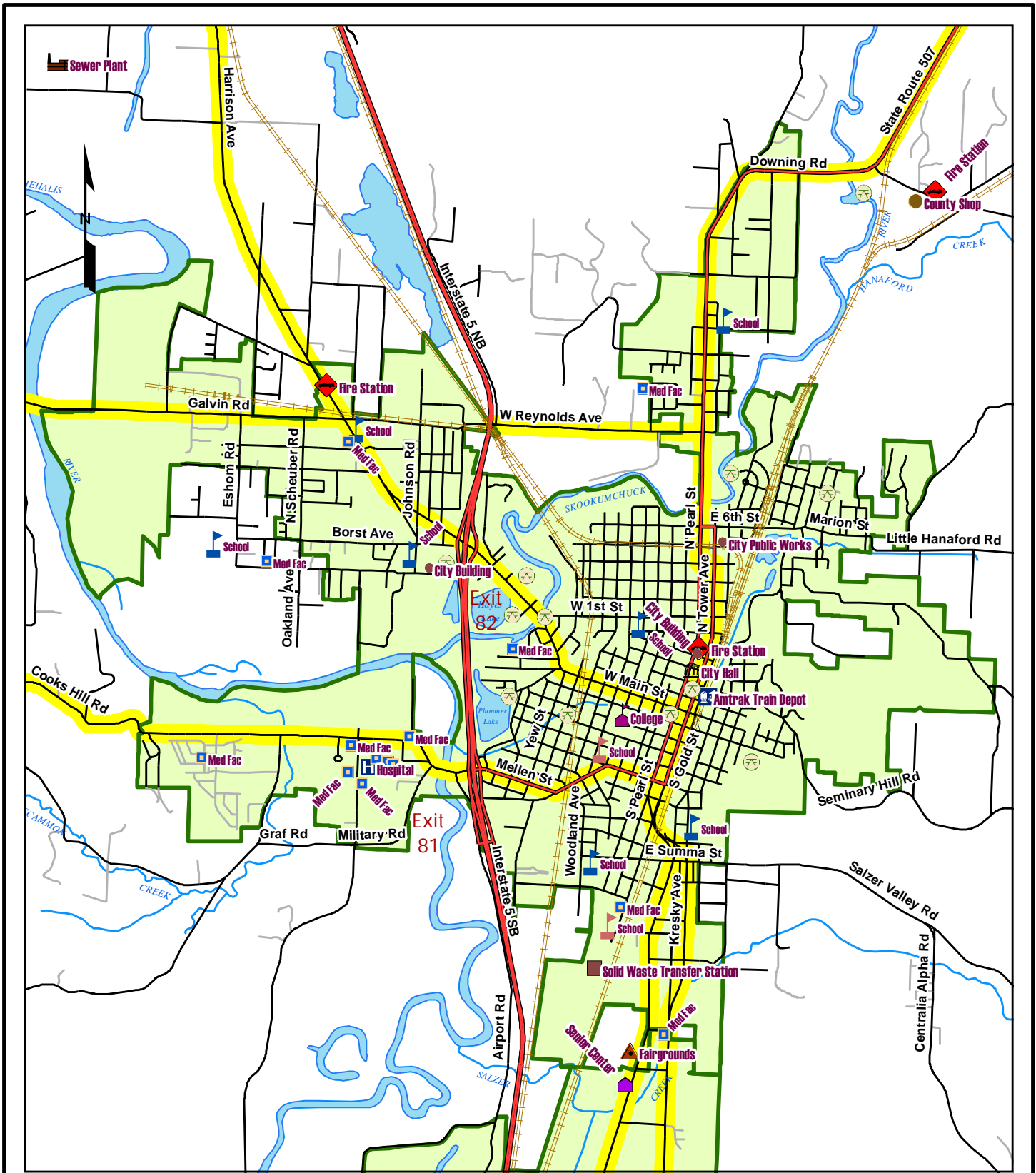
0 950 1,900 3,800 Feet

1 inch = 3,542 feet

Created June 26, 2014

## Centralia Zoning Map

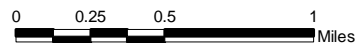
### Effective October 2013



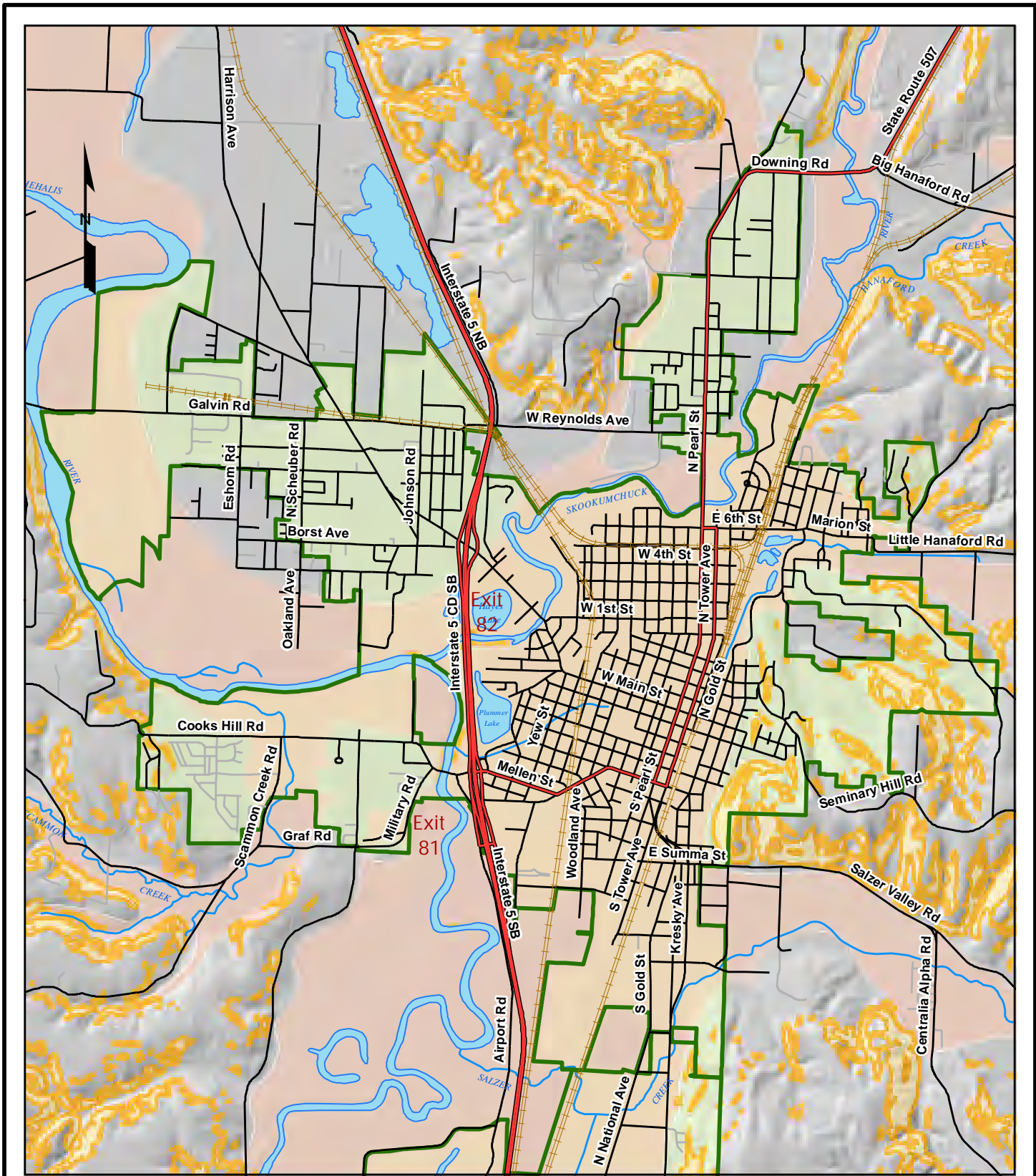
City Limits
  Evacuation Route

Lewis County, Washington  
2015 Multi-jurisdictional Hazard Mitigation Plan

## Centralia Facilities & Evacuation Routes





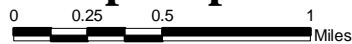


- █ City Limits
- █ Mod to High Liquefaction Potential
- █ Slope > 30%

Lewis County, Washington  
 2015 Multi-jurisdictional Hazard Mitigation Plan

## Centralia

## Steep Slopes & Liquefaction



## Building Damage by Count by General Occupancy

October 09, 2009

	# of Buildings					Total
	None	Slight	Moderate	Extensive	Complete	
<b>Washington</b>						
<b>Lewis</b>						
<i>Agriculture</i>	4	1	1	0	0	6
<i>Single Family</i>	4,886	746	163	15	1	5,811
<i>Commercial</i>	89	25	20	5	0	139
<i>Other Residential</i>	692	252	243	49	4	1,239
<i>Government</i>	3	1	1	0	0	5
<i>Religion</i>	9	2	2	0	0	13
<i>Education</i>	3	1	1	0	0	5
<i>Industrial</i>	22	6	6	2	0	35
<b>Total</b>	<b>5,708</b>	<b>1,033</b>	<b>435</b>	<b>71</b>	<b>5</b>	<b>7,253</b>
<b>Region Total</b>	<b>5,708</b>	<b>1,033</b>	<b>435</b>	<b>71</b>	<b>5</b>	<b>7,253</b>

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/states were selected at the time of study region creation.



# Direct Economic Losses For Buildings

October 9, 2009

All values are in thousands of dollars

	Capital Stock Losses				Loss Ratio %	Income Losses				Total Loss
	Cost Structural Damage	Cost Non-struct. Damage	Cost Contents Damage	Inventory Loss		Relocation Loss	Capital Related Loss	Wages Losses	Rental Income Loss	
<b>Washington</b>										
Lewis	4,527	13,838	6,246	240	1.44	3,981	2,176	2,836	2,184	36,028
<b>Total</b>	<b>4,527</b>	<b>13,838</b>	<b>6,246</b>	<b>240</b>	<b>1.44</b>	<b>3,981</b>	<b>2,176</b>	<b>2,836</b>	<b>2,184</b>	<b>36,028</b>
<b>Region Total</b>	<b>4,527</b>	<b>13,838</b>	<b>6,246</b>	<b>240</b>	<b>1.44</b>	<b>3,981</b>	<b>2,176</b>	<b>2,836</b>	<b>2,184</b>	<b>36,028</b>

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/states were selected at the time of study region creation.

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## Shelter Summary Report

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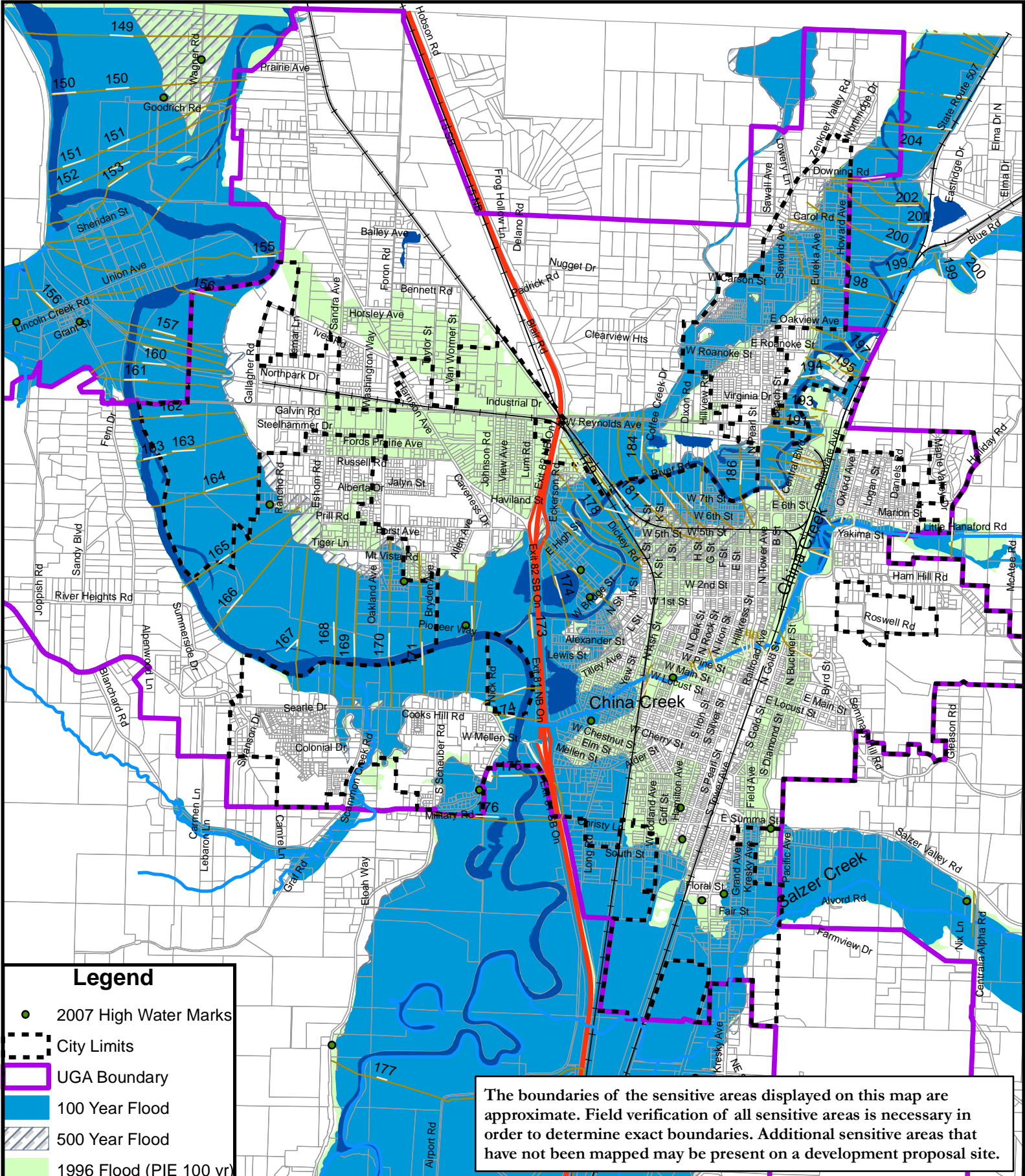
October 09, 2009

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	# of Displaced Households	# of People Needing Short Term Shelter
<b>Washington</b>		
Lewis	26	19
<b>Total</b>	<b>26</b>	<b>19</b>
<b>Region Total</b>	<b>26</b>	<b>19</b>

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*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/states were selected at the time of study region creation.*



# Centralia Floodplain Map

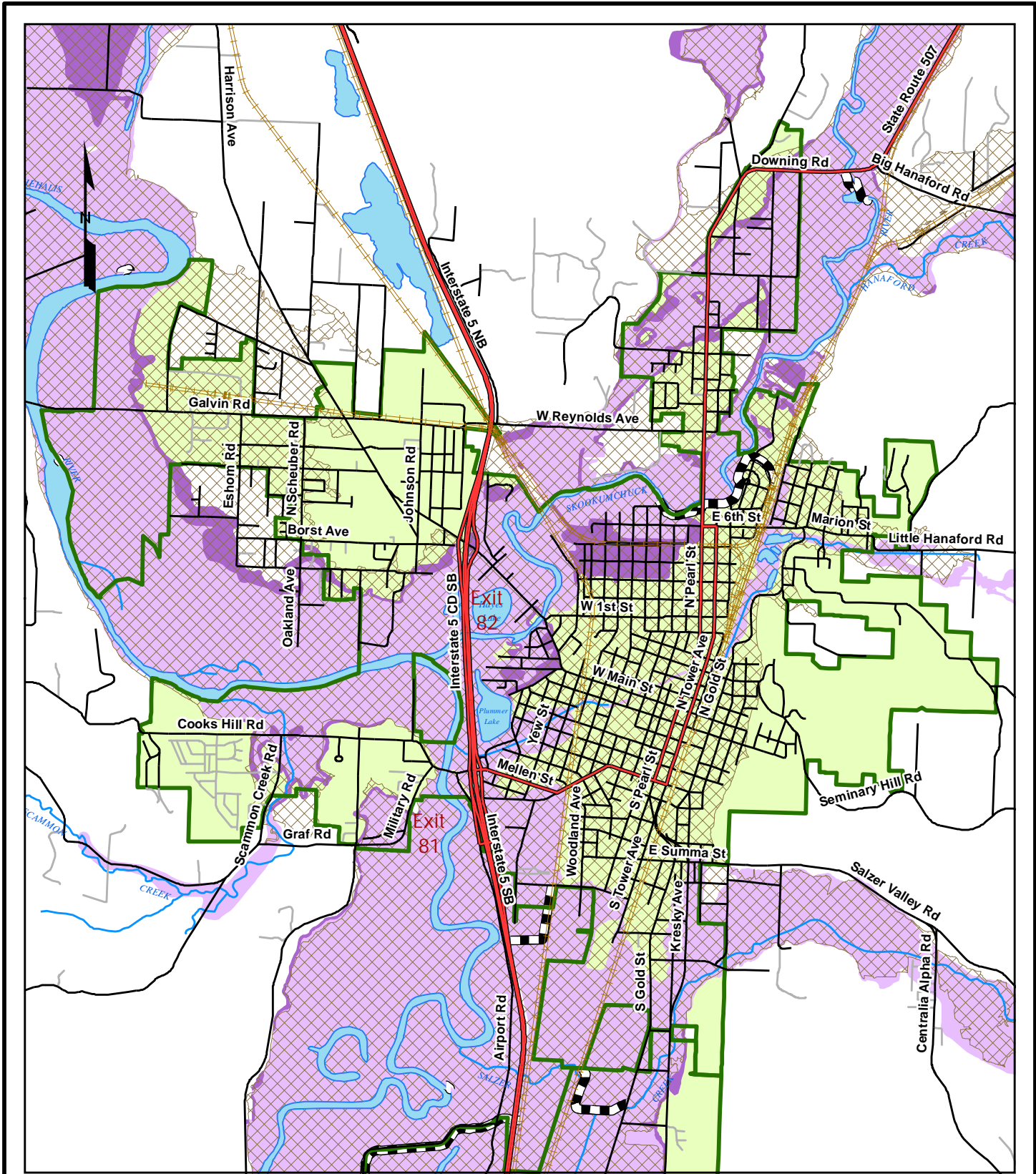


0.05 1 0.2 0.3 0.4  
 Miles

1 inch equals 0.62 miles

LCMJHP VER 1/6/2016, Page 361

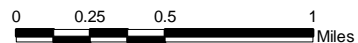
Created on June 12, 2008



- City Limits
- 100-yr flood
- 500-yr flood
- Dam Inundation
- Levees/revet.

Lewis County, Washington  
2015 Multi-jurisdictional Hazard Mitigation Plan

## Centralia Facilities & Evacuation Routes



## Building Damage Count by General Occupancy

October 09, 2009

	Count of Buildings (#) by Range of Damage (%)							Total
	None	1-10	11-20	21-30	31-40	41-50	Substantial	
<b>Washington</b>								
<b>Lewis</b>								
Agriculture	2	0	1	0	0	0	0	3
Commercial	1	0	10	1	0	1	3	16
Education	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	2	0	1	3
Religion	0	0	0	0	0	0	0	0
Residential	498	0	87	372	77	135	77	1,246
<b>Total</b>	<b>501</b>	<b>0</b>	<b>98</b>	<b>373</b>	<b>79</b>	<b>136</b>	<b>81</b>	<b>1,268</b>
<b>Total</b>	<b>501</b>	<b>0</b>	<b>98</b>	<b>373</b>	<b>79</b>	<b>136</b>	<b>81</b>	<b>1,268</b>
<b>Scenario Total</b>	<b>501</b>	<b>0</b>	<b>98</b>	<b>373</b>	<b>79</b>	<b>136</b>	<b>81</b>	<b>1,268</b>

### Special Notice Regarding Building Count:

Unlike the earthquake and hurricane models, the flood model performs its analysis at the census block level. This means that the analysis starts with a small number of buildings within each census block and applies a series of distributions necessary for analyzing the potential damage. The application of these distributions and the small number of buildings make the flood model more sensitive to rounding errors that introduces uncertainty into the building count results. Please use these results with suitable caution.

*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.*

**Study Region:** Centralia Flood  
**Scenario:** 100-Year with 2007 data  
**Return Period:** Mix0

Page : 1 of 1



## Direct Economic Losses for Buildings

October 09, 2009

All values are in thousands of dollars

	Capital Stock Losses			Building Loss Ratio %	Income Losses				Total Loss
	Cost Building Damage	Cost Contents Damage	Inventory Loss		Relocation Loss	Capital Related Loss	Wages Losses	Rental Income Loss	
<b>Washington</b>									
Lewis	66,704	99,020	1,468	12.1	232	333	670	120	169,860
<b>Total</b>	<b>66,704</b>	<b>99,020</b>	<b>1,468</b>	<b>12.1</b>	<b>232</b>	<b>333</b>	<b>670</b>	<b>120</b>	<b>169,860</b>
<b>Scenario Total</b>	<b>66,704</b>	<b>99,020</b>	<b>1,468</b>	<b>12.1</b>	<b>232</b>	<b>333</b>	<b>670</b>	<b>120</b>	<b>169,860</b>

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: Centralia Flood  
 Scenario: 100-Year with 2007 data  
 Return Period: Mix0

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## Shelter Summary Report

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October 09, 2009

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	# of Displaced People	# of People Needing Short Term Shelter
<b>Washington</b>		
Lewis	4,971	3,806
<b>Total</b>	<b>4,971</b>	<b>3,806</b>
<b>Scenario Total</b>	<b>4,971</b>	<b>3,806</b>

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*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.*

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**Study Region:** Centralia Flood  
**Scenario:** 100-Year with 2007 data  
**Return Period:** Mix0

Page : 1 of 1







# JURISDICTION City of Chehalis

## HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact	Alternate Point of Contact
Dennis Osborn, CDD 1321 S Market Blvd. Chehalis WA 98532 (360) 345-2227 <a href="mailto:dosborn@ci.chehalis.wa.us">dosborn@ci.chehalis.wa.us</a>	Rick Sahlin, Public Works Director 1321 S Market Blvd. Chehalis WA 98532 <a href="mailto:rsahlin@ci.chehalis.wa.us">rsahlin@ci.chehalis.wa.us</a>

**Profile:** The City of Chehalis is the second most populated city in Lewis County. The city straddles Interstate 5 at a point almost exactly halfway between Seattle, Washington and Portland, Oregon. The historic downtown and most of the city's amenities lie on the east side of the freeway, nestled at the base of a small range of forested hills. On the west side of the freeway are parks, farms, and a few subdivisions developed in the hills to the west. A small airport is located immediately west of the freeway towards the northern end of the city. The primary development on the west side of the interstate is a large commercial development featuring numerous big box stores, a strip mall and restaurants. From numerous vantage points in the hills just west of town, one can see Mount Rainier, Mount Adams, and Mount St. Helens—weather permitting.

According to the United States Census Bureau, the city has a total area of 5.6 square miles all of it land. The City of Chehalis is characterized by a broad floodplain and low terraces surrounded by upland valleys of low to moderate relief that have broad, rounded ridges. The Chehalis River winds its way through the valley in which the city resides, and is there joined by a tributary, the Newaukum River. Both rivers are prone to flooding during periods of abnormally heavy or persistent rain, and the lowlands from the freeway westward are particularly susceptible to inundation.

## Ranking of Identified Hazards

Hazard Type	Previous Occurrence?		Likely to Experience?		Probability				Extent				Percentage	Rank
	Yes	No	Yes	No	Highly Likely (100% next yr)	Likely (10-100% or 1 in 10 yrs)	Possible (1-10% next year or 1/100 yrs)	Unlikely (less than 1% in 100 yrs)	Catastrophic: more than 50% affected	Severe: 25-50% affected	Limited: 0-25% affected	None: 0% affected		
<b>Rating Points</b>	<b>20</b>	<b>0</b>	<b>10</b>	<b>0</b>	<b>20</b>	<b>10</b>	<b>6</b>	<b>0</b>	<b>20</b>	<b>10</b>	<b>4</b>	<b>0</b>		
Earthquake	20		10			10			20				60%	1
Flooding	20		10		20					10			60%	1
Volcano	20						6			10			36%	2
Landslide	20							6			4		30%	3
Levee Failure	20							6			4		30%	3
Wind Storm	20							6			4		30%	3
Tsunami									20				20%	4
Hurricane								6		10			16%	5
Winter Storm								6		10			16%	5
Tornado								6		10			16%	5

**Probability:**

- Highly Likely: Near 100% probability in the next year.
- Likely: Between 10 and 100% probability in the next year, or at least one chance in 10 years.
- Possible: Between 1 and 10% probability in the next year, or at least one chance in next 100 years.
- Unlikely: Less than 1% probability in next 100 years.

**Extent of damage is defined as follows:**

- Catastrophic: More than 50% of the jurisdiction can be affected
- Severe: 25 to 50% of the jurisdiction can be affected
- Limited: 0 to 25% of the jurisdiction can be affected

**None: 0% of the jurisdiction can be affected**

## Current Hazard Mitigation Codes/Plans/Ordinances

- Comprehensive Land Use Plan, 2011
- Uniform Development Regulations Title 17 – Zoning Ordinance, 2009
- Critical Areas Ordinance, 2009



# JURISDICTION City of Chehalis

- City of Chehalis Emergency Management Plan
- Lewis County Multi-Jurisdictional Hazard Mitigation Plan, 2010
- Development Engineering Standards
- International Building Code (IBC), Adopted 2014
- State Environmental Policy Act (SEPA)

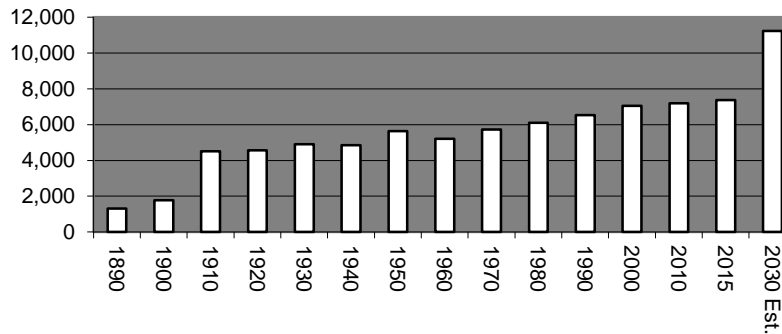
## Agency Specific Natural Hazard Event History – 1980 to 2015

Type of Disaster	FEMA Disaster #	Date	Comments
Severe Winter Storm and Record and Near Record Snow	DR-1825	3/2/2009	Incident 12/12/2008-1/5/2009
Severe Winter Storm, Landslides, Mudslides, Flooding	DR-1817	1/30/2009	1/6-/16/2009
Severe Storms, Flooding, Landslides, Mudslides	DR-1734	12/8/2007	Incident 12/1-12/17/2007
Severe Winter Storm, Landslides, Mudslides	DR-1682	2/14/2007	Incident 12/14-12/15/2006
Severe Storms, Flooding, Landslides, Mudslides	DR-1671	12/12/2006	Incident 11/2-11/11/2006
Earthquake	DR-1361	3/1/2001	Incident 2/28-3/16/2001
Severe Winter Storms/Flooding	DR-1159	1/17/1997	Incident 12/26/1996-2/10/1997
Severe Storms, Flooding	DR-1100	Feb. 9, 1996	Incident 1/26-2/23/1996
Storms, High Winds, Floods	DR-1079	Jan. 3, 1996	Incident 11/7-Dec 18, 1995
Severe Storm, High Winds	DR-981	March 4, 1993	Incident 1/20-1/21/1993
Severe Storms, Flooding	DR-784	Dec 15, 1986	Incident 11/22-11/29/1986
Volcanic Eruption – Mt. St. Helens	DR-623	May 21, 1980	

## Demographics

Population	1990	2000	2010	2015	2030 -Projected
	6,527	7,057	7,185	7,365	11,230

**Chehalis Population 1890-2015**  
Office of Financial Management (OFM)  
April 2015



## Quick Facts (US Census)

	Chehalis	Washington
Population, percent change - April 1, 2010 to July 1, 2013	0.1%	3.7%
Persons under 5 years, percent, 2010	6.5%	6.5%
Persons under 18 years, percent definition and source info Persons under 18 years, percent, 2010	24.5%	23.5%
Persons 65 years and over, percent definition and source info Persons 65 years and over, percent, 2010	14.4%	12.3%
High school graduate or higher, percent of persons age 25+, 2009-2013	84.3%	90.0%
Bachelor's degree or higher, percent of persons age 25+, 2009-2013	19.9%	31.9%
Homeownership rate, 2009-2013	47.8%	63.2%
Housing units in multi-unit structures, percent, 2009-2013	33.8%	25.6%
Median value of owner-occupied housing units, 2009-2013	\$179,500	\$262,100
Per capita money income in past 12 months (2013 dollars), 2009-2013	\$20,861	\$30,742
Median household income definition and source info Median household income, 2009-2013	\$35,271	\$59,478
Persons below poverty level, percent definition and source info Persons below poverty level, percent, 2009-2013	15.2%	13.4%

Source: U.S. Census – Quickfacts, Date Accessed: July 12, 2015. Website: quickfacts.census.gov

## Land Designations

Land Area within the existing city limits:	1,714
Land area within urban growth area:	5,102
Total land area within city limits and urban growth area	6,816
Land area of park, forest, and/or open space	1,853



# JURISDICTION City of Chehalis

Land area of residential	878
Land area of commercial	1,463
Land area of industrial	377

## Current and Anticipated Development and Population Trends

The City of Chehalis anticipates slow growth, below 2%. Historic development trends for residential construction have been primarily in the Urban Growth Areas south of the existing city limits and east of Jackson Highway. Some infill residential development has occurred within established neighborhoods. The type and age of housing stock varies throughout the city. The central and west-side neighborhoods were established in the 1920's to 1940's. The hillside and southern neighborhoods date from the 1940's. The 'Snively' area was developed through the 1950's and 1960's. A few subdivisions have been approved since the 1970's but large-scale residential development has not occurred since then.

Commercial development occurred around the central business district and expanded outward. Market Blvd. and Main Street have been the focus of the commercial district for many years. The construction of Interstate 5 in the 1950's generated significant commercial development near the three interchanges. Tourist oriented businesses continue to be developed in those locations today. In the 1990's, significant commercial development began west of the freeway around the Chehalis-Centralia airport. Future residential development will continue to occur south of the existing city limits in the vicinity of Jackson Highway. The Chehalis Urban Growth Area abuts the city of Napavine and their commercial areas at Exit 72. Commercial development will continue west of the freeway in the vicinity of the airport. Infill tourist oriented development will occur at all three of the existing freeway interchanges within the city limits, and also around the new interchange at LaBree Road in the southern Chehalis UGA. Redevelopment of existing, aged commercial buildings will continue in established commercial districts. Chehalis has adopted an economic development program called the Renaissance Project. Significant interest has been shown in both redevelopment of the central business district and enhancement of the historic significance of all three Chehalis historic districts.

## Infrastructure

Categories	2008-09	Approximate Value (\$)
Miles of Street and Roads	50.5	35+M
Miles of Sanitary Sewer		
Miles of Storm Sewer		
Miles of Water Lines		
Miles of Electrical lines	Lewis County PUD	

## Critical Facilities

Critical Facilities	Address	Approximate Value (\$)
Station 48 (Fire)	455 NW Park St.	1.5M
City Hall (Police)	350 N Market Blvd.	2M
Activity Bldg (EOC)	1321 S Market Blvd.	500000
Wastewater Facility	425 NW Louisiana Ave.	20M
Plantation Pump Station	SR 6	10M
Riverside Pump Station	SW Riverside Ave.	5M
Prindle Pump Station	SW Prindle St.	5M
Water Reservoir	305 SE Parkhill Dr.	20M
Water Intake	Newaukum River	10M
Water Intake	Chehalis River	10M
Chamber Wy Bridge	NW Chamber Way	50M
Main St Overcrossing	W Main / SR 6	30M
13 <sup>th</sup> St Overcrossing	SW 13 <sup>th</sup> / Rice Rd	30M

## Flood Information

Percentage of existing city limits within the 100-year flood plain	9%
Assessor's valuation of private properties within the 100-year flood plain	

## Critical Facilities within the 100-year flood plain

Facility	Address	Approximate Value (\$)
Station 48 (Fire)	455 NW Park St.	1.5M
City Hall (Police)	350 N Market Blvd.	2M
Activity Bldg (EOC)	1321 S Market Blvd.	500000



## JURISDICTION City of Chehalis

Wastewater Facility	425 NW Louisiana Ave.	20M
Plantation Pump St	SR 6	10M
Riverside Pump Sta	SW Riverside Ave.	5M
Prindle Pump Sta	SW Prindle St.	5M
Water Reservoir	305 SE Parkhill Dr.	20M
Water Intake	Newaukum River	10M
Water Intake	Chehalis River	10M
Chamber Way Bridge	NW Chamber Way	50M
Main St Overcrossng	W Main / SR 6	30M
13 <sup>th</sup> St Overcrossng	SW 13 <sup>th</sup> / Rice Rd	30M
Residential structrs	100yr floodplain	40M
Commercial structrs	100yr floodplain	100M
Street system	100yr floodplain	100M

### NFIP/CRS Section

NFIP/CRS Community	Yes
Community Rating Classification	Class 6
Building Code Effective Grading Schedule	Class 3
NFIP Membership	Yes, 6/7/1974
NFIP Compliance Violations?	None
FEMA Floodplain Maps Adopted	Yes, 7/17/2006
Recently Community Assistant Visit or Community Assistance Contact	3/26/2004
Floodplain Administrator	Dennis Osborn, Community Development Director
Certified Floodplain Manager	No
Floodplain Ordinance Adoption	Adopted 2009
StormReady Jurisdiction	No
Firewise Jurisdiction	No

### Previous Action Plan Implementation

Mitigation Strategy	Completed 2010-2014	Carried Over to 2015 Plan	Removed or No Longer Feasible
Continue contract with Lewis County to provide statutory emergency services.	Yes (on-going)	Yes	
Operate incident command post during event	Yes (on-going)	Yes	
Continue annual bridge inspections	Yes (on-going)	Yes	
Maintain mapping of critical areas for public information	Yes (on-going)	Yes	
Continue using 'Statement of Restrictions' form for notice to public	Yes (on-going)	Yes	
Continue requiring engineered foundations in critical slope or vicinity of fault line areas	Yes (on-going)	Yes	
Continue using SEPA authority to mitigate identified hazards	Yes (on-going)	Yes	
Continue participation in the Community Rating System (CRS) program	Yes (on-going)	Yes	
Continue applications for Hazard Mitigation Grant funding when available	Yes (on-going)	Yes	
Continue annual levee inspection/maintenance	Yes (on-going)	Yes	
Continue requirements for undergrounding utilities in new subdivisions	Yes (on-going)	Yes	
Continue updates to utility plans (water, wastewater and stormwater systems)	Yes (on-going)	Yes	

### Attached Documents

- Hazard Identification Worksheet
- Asset Inventory
- Compiled detailed inventory of what can be damaged by a hazard event



## JURISDICTION City of Chehalis

- Identification of buildings, the value of buildings, and the population that is located in hazard areas
- Ranking Mitigation Strategies: Using STAPLEE
- Mitigation Strategies
- Critical Facilities Mitigation Strategies
- Maps

# HAZARD IDENTIFICATION WORKSHEET

Date Completed: June 2015

Which Agency are you representing? **City of Chehalis**

Name:	Title:
Email:	Telephone #:
Address:	City: ZIP:

**For each Hazard, please fill out the table below based on the following questions:**

- **Previous Occurrence:** Is there a historic record of this type of hazard happening here? *Yes or No*
- **Likely to Experience:** Are you likely to experience this type of hazard in the future? *Yes or No*
- **Probability:** Based on history, what is the likelihood of this event happening again? *Highly Likely, Likely, Possible, Unlikely*
- **Extent:** If this hazard event were to happen, how extensive could the damage be? *Catastrophic, Severe, Limited, None*

Hazard Type	Previous Occurrence?		Likely to Experience?		Probability				Extent			
	Yes	No	Yes	No	Highly Likely	Likely	Possible	Unlikely	Catastrophic	Severe	Limited	None
Avalanche		X		X				X			X	
Coastal Erosion		X		X				X				X
Coastal Storm		X		X				X				X
Dam Failure		X		X				X			X	
Debris Flow		X		X			X				X	
Drought		X		X			X				X	
Earthquake	X		X			X			X			
Expansive Soils		X		X			X				X	
Extreme Heat		X		X			X				X	
Flooding	X		X		X					X		
Hailstorm		X		X			X				X	
Hurricane		X		X			X			X		
Land Subsidence		X		X			X				X	
Landslide	X			X			X				X	
Levee Failure	X			X			X				X	
Severe Thunder Storm		X		X			X				X	
Severe Wind Storm	X			X			X				X	
Severe Winter Storm		X		X			X			X		
Tornado		X		X			X			X		
Tsunami		X		X				X	X			
Volcano	X			X			X			X		
Wildfire		X		X			X				X	
Other:												

**Which of the following does your agency have? (Circle One)**

Comprehensive Plan	Yes / No / NA	Date completed: 2009
Critical Areas Ordinance	Yes / No / NA	Date completed: 2009
Does your agency have an emergency plan?	Yes / No / NA	

# ASSET INVENTORY WORKSHEET 2A

Date Completed: June, 2015

Which Agency are you representing? City of Chehalis

Name: Dennis Osborn

Title: Community Development Director

Email: dosborn@ci.chehalis.wa.us

Telephone #:

Address: 1321 S. Market Blvd.

City: Chehalis

ZIP: 98532

**Task A: Inventory the critical facilities that can be damaged by a hazard event.**  
Please fill out the table below.

Name of Building/Business	Address	Contact Information (Telephone #)	Occupancy #	Structure Use							
				Educational	Government	Hospital	Non/Profit	Public Safety	Residential	Utilities	Other
<i>Example....City Hall</i>	<i>123 Hall Drive</i>	<i>360-123-4567</i>	<i>1234</i>		X						
Station 48 (Fire)	455 NW Park St.	(360) 748-3394	6					X			
City Hall (Police)	350 N Market Blvd.	(360) 748-8605	16		X			X			
Activity Bldg (EOC)	1321 S Market Blvd.	(360) 748-0271	0					X			
Wastewater Facility	42 NW Louisiana Ave.	(360) 748-0238	10							X	
Plantation Pump St	SR 6	(360) 748-0238	0							X	
Riverside Pump Sta	SW Riverside Ave.	(360) 748-0238	0							X	
Prindle Pump Sta	SW Prindle St.	(360) 748-0238	0							X	
Water Reservoir	405 SE Parkhill Dr.	(360) 748-0238	2							X	
Water Intake	Newaukum River	(360) 748-0238	1							X	
Water Intake	Chehalis River	(360) 748-0238	0							X	
Chamber Wy Bridge	NW Chamber Way	(360) 748-0238	0								X
Main St Ovrccrsing	W Main / SR 6	(360) 748-0238	0								X
13 <sup>th</sup> St Ovrccrsing	SW 13 <sup>th</sup> / Rice Rd	(360) 748-0238	0								X
Water Utility System	See adopted water system plan	(360) 748-0238	0							X	
Wastewater Utility System	See adopted water system plan	(360) 748-0238	0							X	
Stormwater Utility System	See adopted water system plan	(360) 748-0238	0							X	
Chehalis River Pump Station	540 SW Riverside	(360) 748-0238	0								
Public Works Office		(360) 345-1223	10							X	
High Level Pump Station	405 S E Park Hill	(360) 748-0238	0							X	
High Level Reservoir	Above McFadden Park	(360) 748-0238	0							X	
Valley View Pump Station	285 SE Prospect	(360) 748-0238	0							X	
Valley View Reservoir	End of SE Prospect	(360) 748-0238	0							X	
Kennicott Reservoir	149-A Kennicott Rd.	(360) 748-0238	0							X	
Yates Reservoir	133 Yates Rd.	(360) 748-0238	0							X	
18 <sup>th</sup> St. Pump Station	71 SW 18 <sup>th</sup> St.	(360) 748-0238	0							X	
South End Pump Station	299-A Jackson Highway	(360) 748-0238	0							X	
Centralia Alpha Rd.	909 N Fork Rd.	(360) 748-0238	0							X	
WTRR B	404 Coal Creek Rd.	(360) 748-0238	0							X	

<b>ASSET INVENTORY WORKSHEET 2B - 2015</b>			<b>Date Completed: June 2015</b>		
<b>Which Agency are you representing:</b> City of Chehalis					
<b>Name:</b> Dennis Osborn			<b>Title:</b> Community Development Director		
<b>Email:</b> dosborn@ci.chehalis.wa.us			<b>Telephone #:</b>		
<b>Address:</b> 1321 S. Market Blvd.		<b>City:</b> Chehalis		<b>Zip:</b> 98532	

**Task B: Compile a detailed inventory of what can be damaged by a hazard event.**  
 Inventory the assets (critical facilities, businesses, historic, cultural, natural resource areas and areas of special consideration) that can be damaged by a hazard event.

<b>HAZARDS</b>	1. Avalanche	8. Flooding	<b>BUILDING MATERIALS</b>
	2. Dam Failure	9. Hailstorm	
	3. Debris Flow	10. Hurricane	a. Masonry
	4. Drought	11. Land Subsidence	b. concrete
	5. Earthquake	12. Landslide	c. Concrete Block
	6. Expansive Soils	13. Levee Failure	d. Brick
	7. Extreme Heat	14. Severe Thunder Storm	e. Stick
		15. Severe Wind Storm	f. Metal
		16. Severe Winter Storm	g. Steel
		17. Tornado	h. Asphalt
		18. Volcano	
		19. Wildfire	

Name or description of Asset (building)	Address	Hazard(s) List all that apply (See legend above)	Critical Facility	Transportation	Utility System	Comm. System	Economic Assets	Special consideration	Historic/Other	Size of Building (sq. ft.)	Replacement Value (\$)	Contents Value (\$)	Displacement (\$ per day)	Occupancy or capacity (#)	Structural – building materials
<i>Example – A Building</i>	123 Hall Dr.	5,8,15,18	X							250,000	2.5 M	1.0 M	5,000	25	d,e
City Hall (Police)	350 N Market Blvd.	5,8	X							8000	1.5M	3M	5000	10	b
Activity Bldg (EOC)	1321 S Market Blvd.	5,8	X							9000	2M	1M	1000	90	e
Wastewater Facility	425 NW Louisiana Ave.	5,8	X							2000	500000	500000	100	50	b
Plantation Pump St	SR 6	5,8	X		X					50000	20M	10M	5000	50	f
Riverside Pump Station	SW Riverside Ave.	5,8	X		X					1000	10M	incl	1000	0	b
Prindle Pump Station	SW Prindle St.	5,8	X		X					500	5M	incl	50000	0	b



Water Reservoir	305 SE Parkhill Dr.	5,8	X		X					500	5M	incl	50000	0	b
Water Intake	Newaukum River	5,8	X		X					40000	20M	incl	100000	3	b
Water Intake	Chehalis River	5,8	X		X					1000	10M	incl	50000	0	b
Chamber Way Bridge	NW Chamber Way	5,8	X		X					1000	10M	incl	50000	0	b
Main St Over-crossing	W Main / SR 6	5,8	X	X						10000	50M	incl	10000	0	b
13 <sup>th</sup> St Overcrossng	SW 13 <sup>th</sup> / Rice Rd	5,8	X	X						10000	30M	incl	10000	0	b
Residential structrs	City limits	5,8	X	X						10000	30M	incl	10000	0	e
Commercial structrs	City limits	5,8					X	X		3M	300M	1B	1M	7500	e
Street system	City limits	5,8					X	X		5M	500M	1B	1M	500	h
Underground pipes	City limits and UGA	5	X	X			X			25m	500M	incl	100000	0	

<b>ASSET INVENTORY WORKSHEET 2C</b>		<b>Date Completed: June 2015</b>	
<b>Which Agency are you representing?</b> City of Chehalis			
<b>Name: Dennis Osborn</b>		<b>Title: Community Development Director</b>	
<b>Email: <a href="mailto:dosborn@ci.chehalis.wa.us">dosborn@ci.chehalis.wa.us</a></b>		<b>Telephone #: (360) 345-2227</b>	
<b>Address: 1321 S Market Blvd.</b>		<b>City: Chehalis</b>	<b>ZIP: 98532</b>

**Task C.** Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.

**Hazard: Flooding**

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	2571	2500	100	100M	100m	100	7365	7365	100
Commercial	150	150	100	500M	500m	100	25000	25000	100
Industrial	50	50	100	20M	20M	100	200	200	100
Agricultural	0	0	0	0	0	0	0	0	0
Religious/ Non-profit	20	20	100	1M	1M	100	1000	1000	100
Government	20	20	100	3M	3M	100	80	80	100
Education	8	8	100	30M	30M	100	1000	1000	100
Utilities	10	10	100	50M	50M	100	10	10	100
<b>Total</b>	<b>2829</b>	<b>2829</b>	<b>100</b>	<b>704M</b>	<b>704M</b>	<b>100</b>	<b>34665</b>	<b>34665</b>	<b>100</b>

**Task D.** Determine whether (and where) you want to collect additional inventory data. (circle one)

- Do you know where your greatest damages may occur in your hazard areas? Yes or No
- Do you know whether your critical facilities will be operational after a hazard event? Yes or No
- Is there enough data to determine which assets are subject to the greatest potential damages? Yes or No
- Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards? Yes or No
- Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards? Yes or No
- Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence? Yes or No
- Is additional data needed to justify the expenditure of community or state funds for mitigation? Z  
Yes or No

<b>ASSET INVENTORY WORKSHEET 2C</b>		<b>Date Completed: June 2015</b>	
<b>Which Agency are you representing?</b> City of Chehalis			
<b>Name: Dennis Osborn</b>		<b>Title: Community Development Director</b>	
<b>Email: <a href="mailto:dosborn@ci.chehalis.wa.us">dosborn@ci.chehalis.wa.us</a></b>		<b>Telephone #: (360) 345-2227</b>	
<b>Address: 1321 S Market Blvd.</b>		<b>City: Chehalis</b>	<b>ZIP: 98532</b>

**Task C.** Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.

**Hazard: Earthquake**

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	2571	2500	100	100M	100m	100	7365	7365	100
Commercial	150	150	100	500M	500m	100	25000	25000	100
Industrial	50	50	100	20M	20M	100	200	200	100
Agricultural	0	0	0	0	0	0	0	0	0
Religious/ Non-profit	20	20	100	1M	1M	100	1000	1000	100
Government	20	20	100	3M	3M	100	80	80	100
Education	8	8	100	30M	30M	100	1000	1000	100
Utilities	10	10	100	50M	50M	100	10	10	100
<b>Total</b>	<b>2829</b>	<b>2829</b>	<b>100</b>	<b>704M</b>	<b>704M</b>	<b>100</b>	<b>34665</b>	<b>34665</b>	<b>100</b>

**Task D.** Determine whether (and where) you want to collect additional inventory data. (circle one)

- Do you know where your greatest damages may occur in your hazard areas? Yes or No
- Do you know whether your critical facilities will be operational after a hazard event? Yes or No
- Is there enough data to determine which assets are subject to the greatest potential damages? Yes or No
- Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards? Yes or No
- Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards? Yes or No
- Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence? Yes or No
- Is additional data needed to justify the expenditure of community or state funds for mitigation? Z Yes or No

# Ranking Mitigation Strategies: Using STAPLEE - Worksheet 3A

Date: November 5, 2015

Agency: City of Chehalis

Category Description/Action Items (Mitigation Strategy)	Hazard Addressed (flood, earthquake, wind, winter, landslide, etc.)	Social (Yes or No)	Technical (Yes or No)	Administrative (Yes or No)	Political (Yes or No)	Legal (Yes or No)	Economical (Yes or No)	Environmental (Yes or No)	Responsible Department/Agency
<b>Example - Continue to enforce the flood ordinance which is based on NFIP model</b>	<b>Flood</b>	<b>Y</b>	<b>Y</b>	<b>Y</b>	<b>Y</b>	<b>Y</b>	<b>Y</b>	<b>N</b>	<b>Community Development</b>
Continue contract with Lewis County to provide statutory emergency services.	All	Y	Y	Y	Y	Y	Y	Y	Fire Dept
Operate incident command post during event	All	Y	Y	Y	Y	Y	Y	Y	Fire Dept
Continue annual bridge inspections	All	Y	Y	Y	Y	Y	Y	Y	Public Works Dept
Continue update of critical areas ordinance	All	Y	Y	Y	Y	Y	Y	Y	Comm Dev Dept
Adopt new earthquake hazard maps (when available from DNR)	Earthquake	Y	Y	Y	Y	Y	Y	Y	Comm Dev Dept
Maintain mapping of critical areas for public information	All	Y	Y	Y	Y	Y	Y	Y	Comm Dev Dept
Continue using 'Statement of Restrictions' form for notice to public	Flooding	Y	Y	Y	Y	Y	Y	Y	Comm Dev Dept
Continue requiring engineered foundations in critical slope or vicinity of fault line areas	Earthquake	Y	Y	Y	Y	Y	Y	Y	Comm Dev Dept
Continue using SEPA authority to mitigate identified hazards	All	Y	Y	Y	Y	Y	Y	Y	Comm Dev Dept
Continue annual fire inspections of existing business occupancies	All	Y	Y	N	Y	Y	Y	Y	Fire Dept
Continue participation in the Community Rating System (CRS) program	Flooding	Y	Y	Y	Y	Y	Y	Y	Comm Dev Dept
Continue participation in the Chehalis River Basin Flood Authority (the Flood Authority)	Flooding	Y	Y	Y	Y	Y	Y	Y	Comm Dev Dept
Continue applications for Hazard Mitigation Grant funding when available for vent retrofitting, home elevation, home buyout, and other similar type mitigation projects.	All (primarily flooding)	Y	Y	Y	Y	Y	Y	Y	Comm Dev Dept
Continue annual levee inspection/maintenance	Flooding	Y	Y	Y	Y	Y	Y	Y	Airport Board
Continue requirements for undergrounding utilities in new subdivisions	All	Y	Y	Y	Y	Y	Y	Y	Comm Dev Dept
Relocate Fire station (first responders)	All	Y	Y	N	Y	Y	N	Y	Fire Dept
Continue updates to utility plans (water, wastewater and stormwater systems)	All	Y	Y	Y	Y	Y	N	Y	Public Works Dept
Replace Chamber Way bridge	Earthquake	Y	Y	N	Y	Y	N	Y	Public Works Dept

**Notes**

S: Social – The public must support the overall implementation strategy and specific mitigation actions.

T: Technical – It is important to determine if the proposed action is technically feasible, will help reduce losses in the long term, and has minimal secondary impacts.

A: Administrative – Under this part of the evaluation criteria, examine the anticipated staffing, funding, and maintenance requirements for the mitigation action to be implemented.

P: Political – Understanding how your community and State leadership feels about issues related to the environment, economic development, safety, and emergency management.

L: Legal – When considering this criterion, determine whether your agency has the legal authority at the State, or local level to implement the action, or if new laws will need to be passed.

E: Economic – Cost-effective mitigation actions that can be funded in current or upcoming budget cycles are much more likely to be implemented.

E: Environmental – Evaluate whether, when implementing mitigation actions, there would be negative consequences to environmental assets (wetlands, endangered species, protected resources).

# Mitigation Strategies – Worksheet 3B

Date: June 2015

Agency: City of Chehalis

Mitigation Measures		Hazard Addressed (flood, earthquake, wind, winter, landslide, etc.)	2010 Plan		Mitigation Identification (Prevention, Property Protection, Public Education & Awareness, Natural Resource Protection, Structural Projects)	Cost-Benefit and Prioritization			Implementation			
Category	Description/Action Items (Mitigation Strategy)		Task in 2010 Plan (yes or no)	Task completed as part of 2010 Plan (yes or no)		Relative Cost 1 = Highest 3 = Lowest	Relative Effectiveness 1 = Lowest 3 = Highest	Priority Rating (Low, Medium, High)	Timeline (schedule for approx. completion)	Potential Funding (grants, budget, donations, etc..)	Cost Est.	Administrative Responsibility
Administration	Continue contract with Lewis County to provide statutory emergency services.	All	Yes	Yes (on-going)	Property Protection	2	3	H	On-going	General Fund	1,000 / annual	Fire Dept
Administration	Operate incident command post during event	All	Yes	Yes (on-going)	Property Protection	3	3	H	On-going	General Fund	varies	Fire Dept
Planning	Continue annual bridge inspections	All	Yes	Yes (on-going)	Damage Prevention	3	2	H	On-going	General Fund	500 / annual	Public Works
Planning	Continue update of critical areas ordinance	All	Yes	No	Damage Prevention , Public Education	3	1	M	On-going	General Fund, Grants	50,000	Comm Dev
Planning	Adopt new earthquake hazard maps (when available from DNR)	Earthquake	Yes	No	Damage Prevention , Public Education	3	1	M	Unknown	General Fund	included	Comm Dev
Education	Maintain mapping of critical areas for public information	All	Yes	Yes (on-going)	Damage Prevention , Public Education	3	2	H	On-going	General Fund	included	Comm Dev
Education	Continue using 'Statement of Restrictions' form for notice to public	Flooding	Yes	Yes (on-going)	Damage Prevention , Public Education	3	1	M	On-going	General Fund	included	Comm Dev

Administration	Continue requiring engineered foundations in critical slope or vicinity of fault line areas	Earthquake	Yes	Yes (on-going)	Property Protection, Damage Prevention	3	2	H	On-going	Developer	varies	Comm Dev
Administration	Continue using SEPA authority to mitigate identified hazards	All	Yes	Yes (on-going)	Property Protection, Damage Prevention	3	2	H	On-going	General Fund	included	Comm Dev
Education	Continue annual fire inspections of existing business occupancies	All	Yes	No	Property Protection, Damage Prevention, Public Education	3	2	H	2010	General Fund	included	Fire Dept
Administration	Continue participation in the Community Rating System (CRS) program	Flooding	Yes	Yes (on-going)	Property Protection, Damage Prevention	3	2	H	On-going	General Fund	1,000 / annual	Comm Dev
Planning	Continue participation in the Chehalis River Basin Flood Authority (the Flood Authority)	Flooding	No	N/A	Damage Prevention	3	3	H	On-going	General Fund	included	Comm Dev
Administration	Continue applications for Hazard Mitigation Grant funding when available for vent retrofitting, home elevation, home buyout, and other similar type mitigation projects.	All - focus on flooding	Yes	Yes (on-going)	Property Protection, Damage Prevention	3	2	H	After every declaration	Grants	included	Comm Dev
Administration	Continue annual levee inspection/maintenance	Flooding	Yes	Yes (on-going)	Property Protection, Damage Prevention	3	1	M	On-going	Airport Board	5,000 / annual	Airport Board
Administration	Continue requirements for undergrounding utilities in new subdivisions	All	Yes	Yes (on-going)	Property Protection, Damage Prevention	3	3	H	On-going	Developer	included	Comm Dev
Mitigation	Relocate Fire station (first responders)	All	Yes	No	Damage Prevention	1	3	M	Unknown	General Fund / Grants / Loans	4M	Fire Dept

Administration	Continue updates to utility plans (water, wastewater and stormwater systems)	All	Yes	Yes (on-going)	Damage Prevention , Public Education	3	2	H	On-going	Utility Funds / Grants	50,000	Public Works
Planning	Obtain seismic analysis for water reservoir	Earthquake	Yes	No	Damage Prevention	2	3	H	Unknown	Utility Funds / Grants	100,000	Public Works
Mitigation	Replace Chamber Way Bridge	Earthquake	Yes	No	Damage Prevention	1	3	H	Unknown	Arterial Street / Grants	4M	Public Works
<b>Notes</b> 2010 Plan: rate task(s) if it was in the 2010 Plan Cost Estimate: a very rough estimate cost of implementing task Administrative Responsibility: who will accomplish the task												



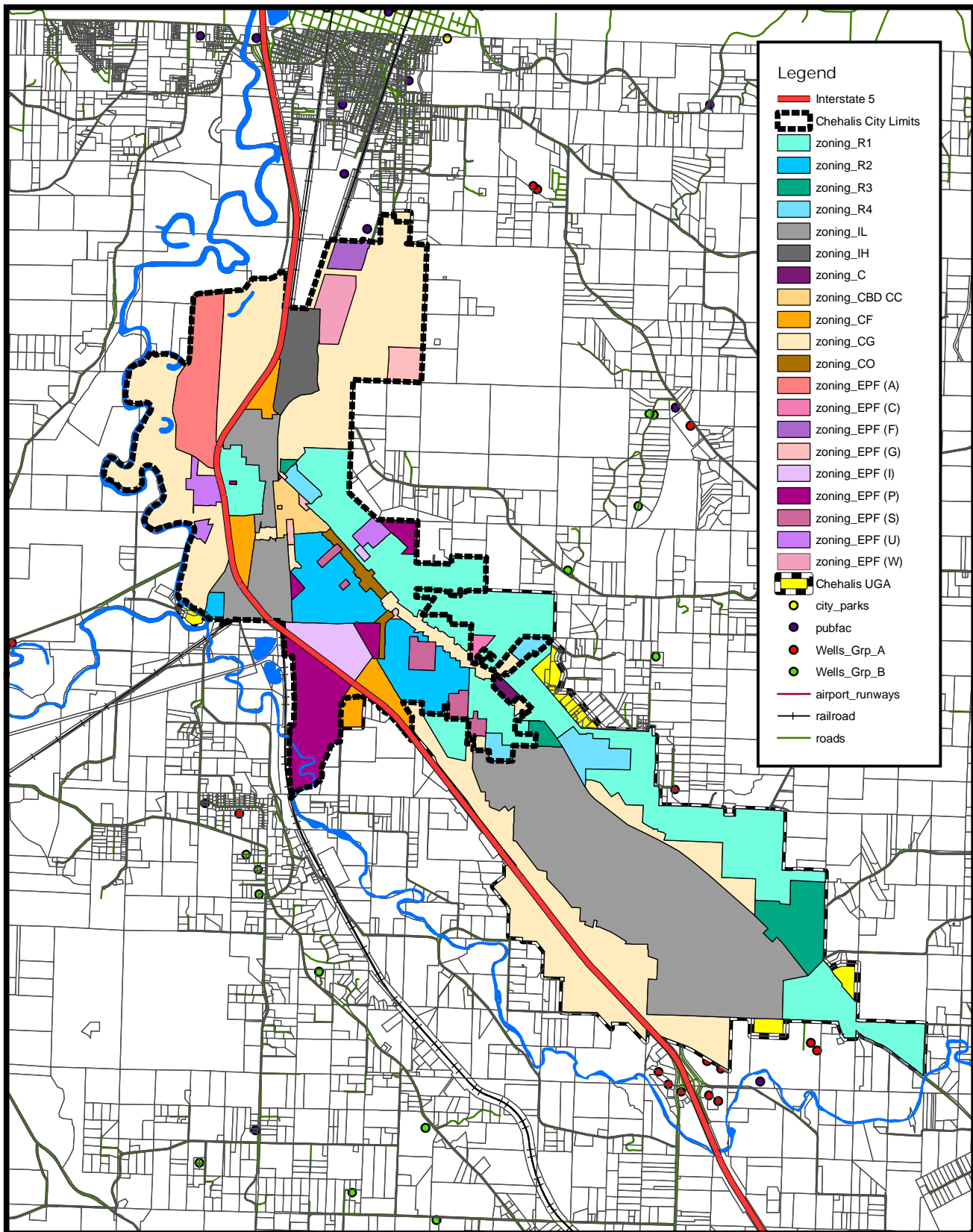
# Critical Facilities Mitigation Strategies - Worksheet 3C

Date: 11/5/2015

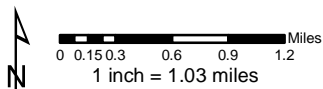
Agency: City of Chehalis

Mitigation Measures		Hazard Addressed (All, flooding, landslide, earthquake, volcanic, etc....)	2010 Plan		Mitigation Identification (Prevention, Property Protection, Public Education & Awareness, Natural Resource Protection, Structural Projects)	Cost-Benefit and Prioritization			Timeline (schedule)	Implementation		
Facility	Mitigation Strategy		Task listed in the 2010 Plan (yes or no)	Task completed as part of 2010 Plan (yes or no)		Relative Cost 1 = Highest 3 = Lowest	Relative Effectiveness 1 = Lowest 3 = Highest	Priority Rating (Low, Medium, High)		Potential Funding (grants, budget, donations, etc..)	Cost Est.	Administrative Responsibility
Mitigation	Relocate Fire station (first responders)	All	Yes	No	Damage Prevention	1	3	M	Unknown	General Fund / Grants / Loans	4M	Fire Dept
Planning	Obtain seismic analysis for water reservoir	Earthquake	Yes	No	Damage Prevention	2	3	H	Unknown	Utility Funds / Grants	100,000	Public Works
Mitigation	Replace Chamber Way Bridge	Earthquake	Yes	No	Damage Prevention	1	3	H	Unknown	Arterial Street / Grants	4M	Public Works

**Notes**  
 Facility: Critical facility  
 Mitigation Strategy: description of mitigation or task  
 2010 Plan: rate task(s) if it was in the 2010 Plan  
 Timeline: give approximate timeframe of completing this task  
 Cost Estimate: a very rough estimate cost of implementing task  
 Administrative Responsibility: who will accomplish the task



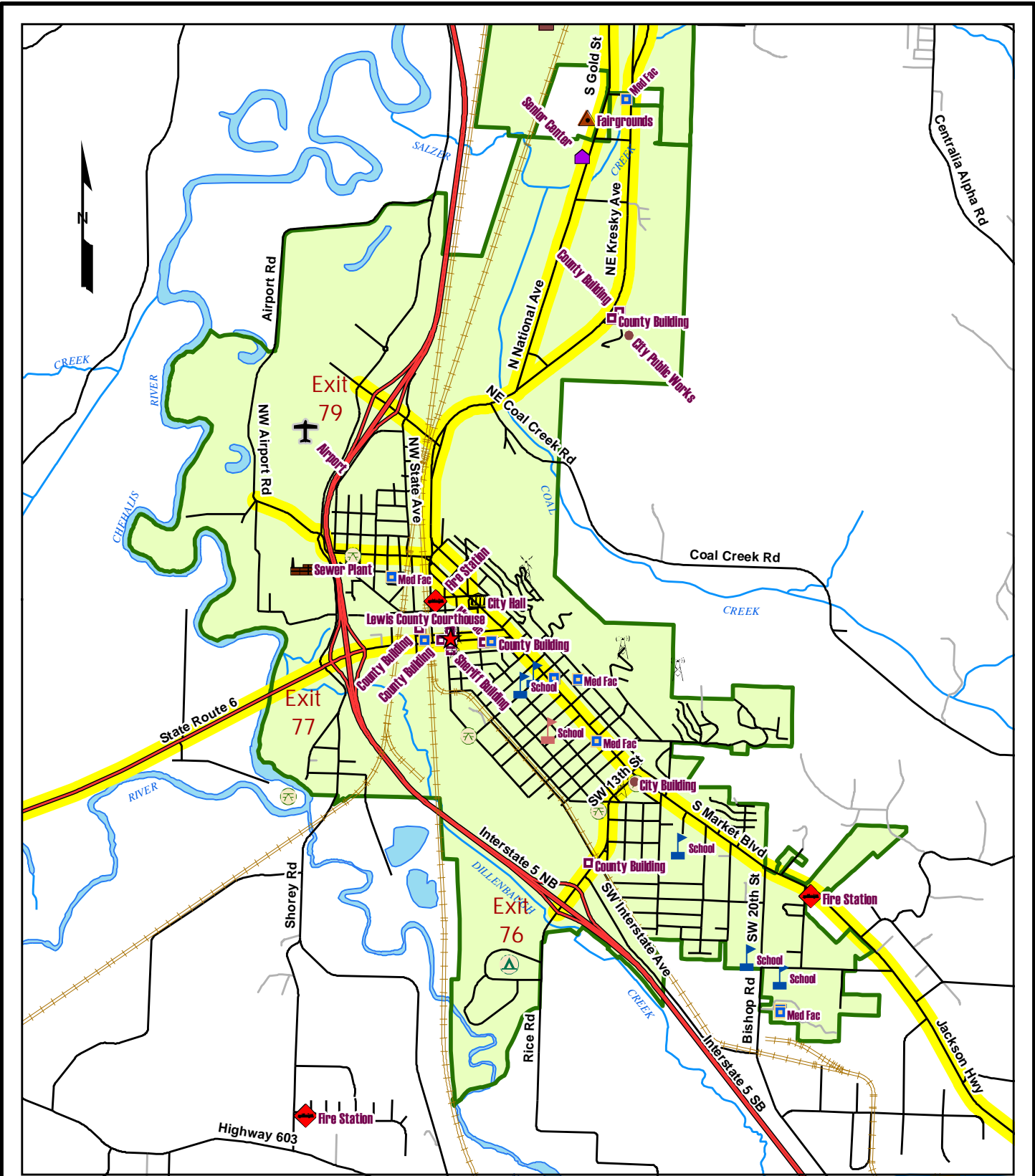
- Legend**
- Interstate 5
  - Chehalis City Limits
  - zoning\_R1
  - zoning\_R2
  - zoning\_R3
  - zoning\_R4
  - zoning\_IL
  - zoning\_IH
  - zoning\_C
  - zoning\_CBD CC
  - zoning\_CF
  - zoning\_CG
  - zoning\_CO
  - zoning\_EPF (A)
  - zoning\_EPF (C)
  - zoning\_EPF (F)
  - zoning\_EPF (G)
  - zoning\_EPF (I)
  - zoning\_EPF (P)
  - zoning\_EPF (S)
  - zoning\_EPF (U)
  - zoning\_EPF (W)
  - Chehalis UGA
  - city\_parks
  - pubfac
  - Wells\_Grp\_A
  - Wells\_Grp\_B
  - airport\_runways
  - railroad
  - roads



**City of Chehalis  
2009 Zoning Map**



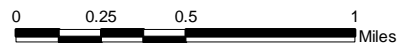
Created: November 19, 2009  
LaJane Schopfer



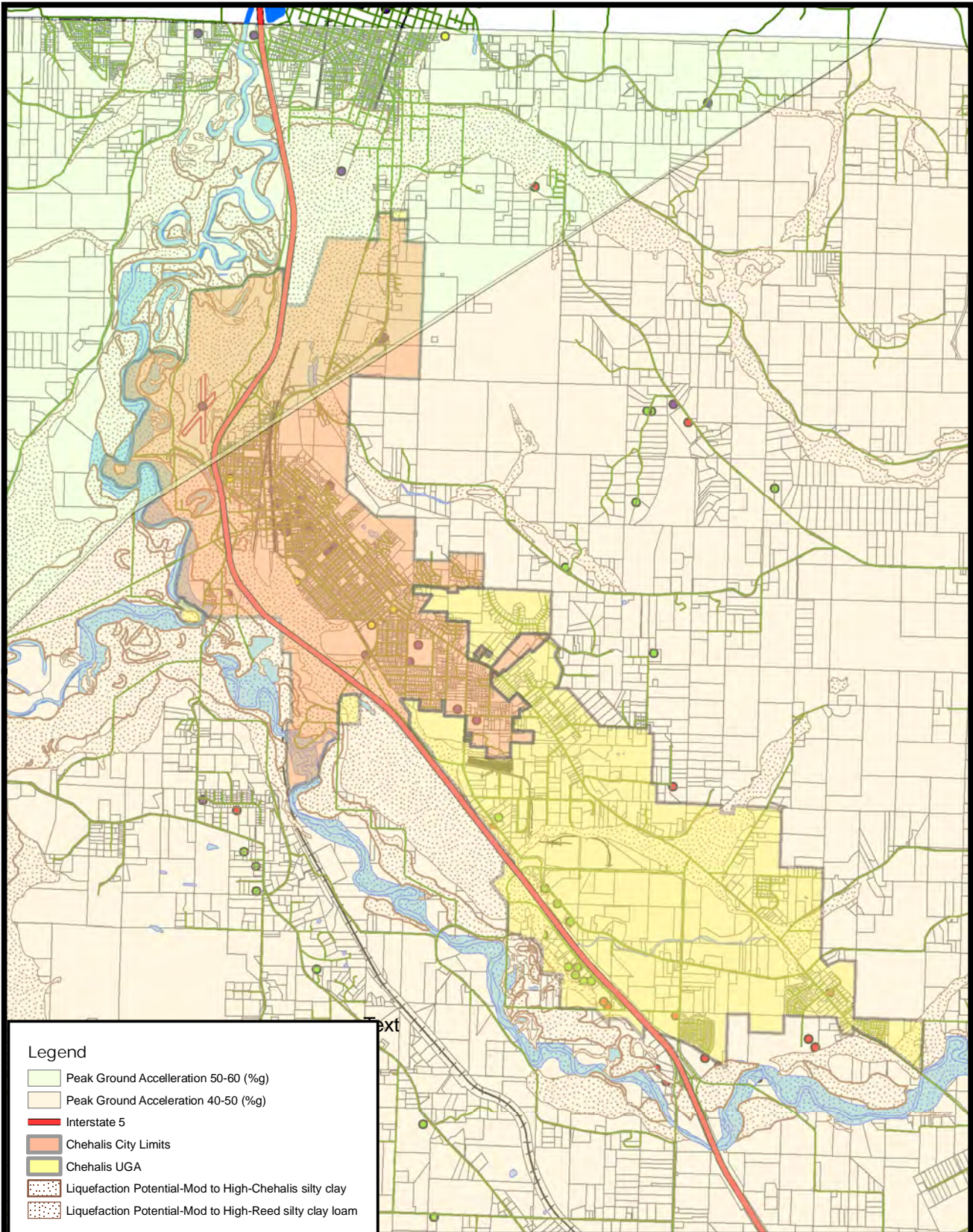
City Limits
  Evacuation Route

Lewis County, Washington  
 2015 Multi-jurisdictional Hazard Mitigation Plan

## Chehalis Facilities & Evacuation Routes







**Legend**

- Peak Ground Acceleration 50-60 (%g)
- Peak Ground Acceleration 40-50 (%g)
- Interstate 5
- Chehalis City Limits
- Chehalis UGA
- Liquefaction Potential-Mod to High-Chehalis silty clay
- Liquefaction Potential-Mod to High-Reed silty clay loam



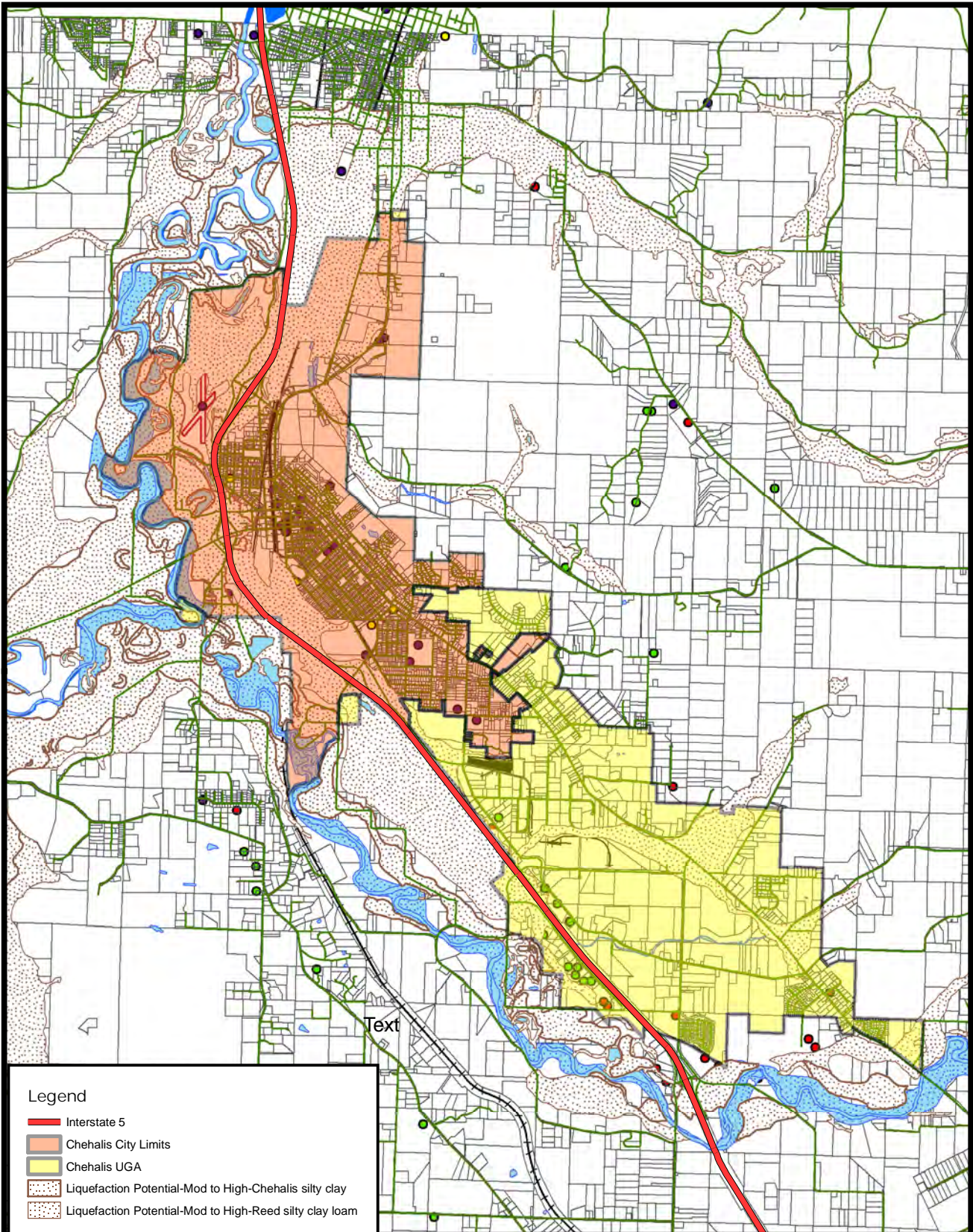
0 0.15 0.3 0.6 0.9 1.2 Miles  
1 inch = 1.03 miles

# City of Chehalis Earthquake Hazards Map








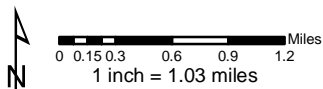
Created: October 27, 2009  
LaJane Schopfer





**Legend**

-  Interstate 5
-  Chehalis City Limits
-  Chehalis UGA
-  Liquefaction Potential-Mod to High-Chehalis silty clay
-  Liquefaction Potential-Mod to High-Reed silty clay loam



## City of Chehalis Seismic Hazard Map



Created: October 27, 2009  
LaJane Schopfer

## Building Damage by Count by General Occupancy

October 09, 2009

	# of Buildings					Total
	None	Slight	Moderate	Extensive	Complete	
<b>Washington</b>						
<b>Lewis</b>						
<i>Agriculture</i>	2	0	0	0	0	3
<i>Single Family</i>	1,930	304	68	6	0	2,308
<i>Commercial</i>	59	17	14	4	0	95
<i>Other Residential</i>	216	68	61	13	1	359
<i>Government</i>	6	2	1	0	0	9
<i>Religion</i>	5	1	1	0	0	7
<i>Education</i>	3	1	1	0	0	4
<i>Industrial</i>	15	4	4	1	0	25
<b>Total</b>	<b>2,235</b>	<b>398</b>	<b>150</b>	<b>25</b>	<b>2</b>	<b>2,810</b>
<b>Region Total</b>	<b>2,235</b>	<b>398</b>	<b>150</b>	<b>25</b>	<b>2</b>	<b>2,810</b>

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/states were selected at the time of study region creation.

# Direct Economic Losses For Buildings

October 9, 2009

All values are in thousands of dollars

	Capital Stock Losses					Income Losses				Total Loss
	Cost Structural Damage	Cost Non-struct. Damage	Cost Contents Damage	Inventory Loss	Loss Ratio %	Relocation Loss	Capital Related Loss	Wages Losses	Rental Income Loss	
<b>Washington</b>										
Lewis	2,780	7,351	4,091	207	1.68	2,808	1,407	1,878	1,514	22,036
<b>Total</b>	<b>2,780</b>	<b>7,351</b>	<b>4,091</b>	<b>207</b>	<b>1.68</b>	<b>2,808</b>	<b>1,407</b>	<b>1,878</b>	<b>1,514</b>	<b>22,036</b>
<b>Region Total</b>	<b>2,780</b>	<b>7,351</b>	<b>4,091</b>	<b>207</b>	<b>1.68</b>	<b>2,808</b>	<b>1,407</b>	<b>1,878</b>	<b>1,514</b>	<b>22,036</b>

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/states were selected at the time of study region creation.

Study Region :

Scenario :

---

# Shelter Summary Report

---

October 09, 2009

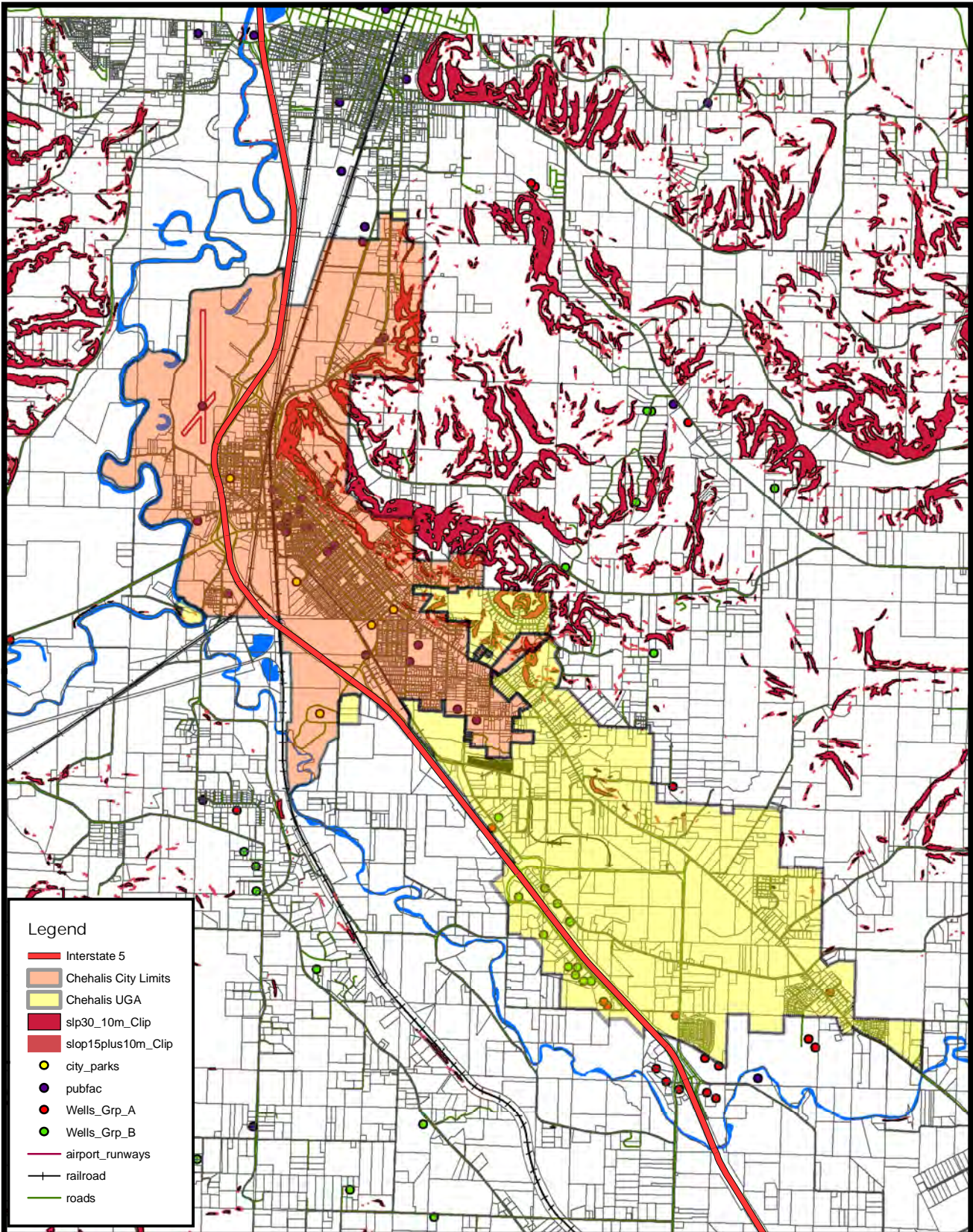
---

	# of Displaced Households	# of People Needing Short Term Shelter
<b>Washington</b>		
Lewis	14	10
<b>Total</b>	<b>14</b>	<b>10</b>
<b>Region Total</b>	<b>14</b>	<b>10</b>

---

*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/states were selected at the time of study region creation.*





Legend

- Interstate 5
- Chehalis City Limits
- Chehalis UGA
- slp30\_10m\_Clip
- slp15plus10m\_Clip
- city\_parks
- pubfac
- Wells\_Grp\_A
- Wells\_Grp\_B
- airport\_runways
- railroad
- roads



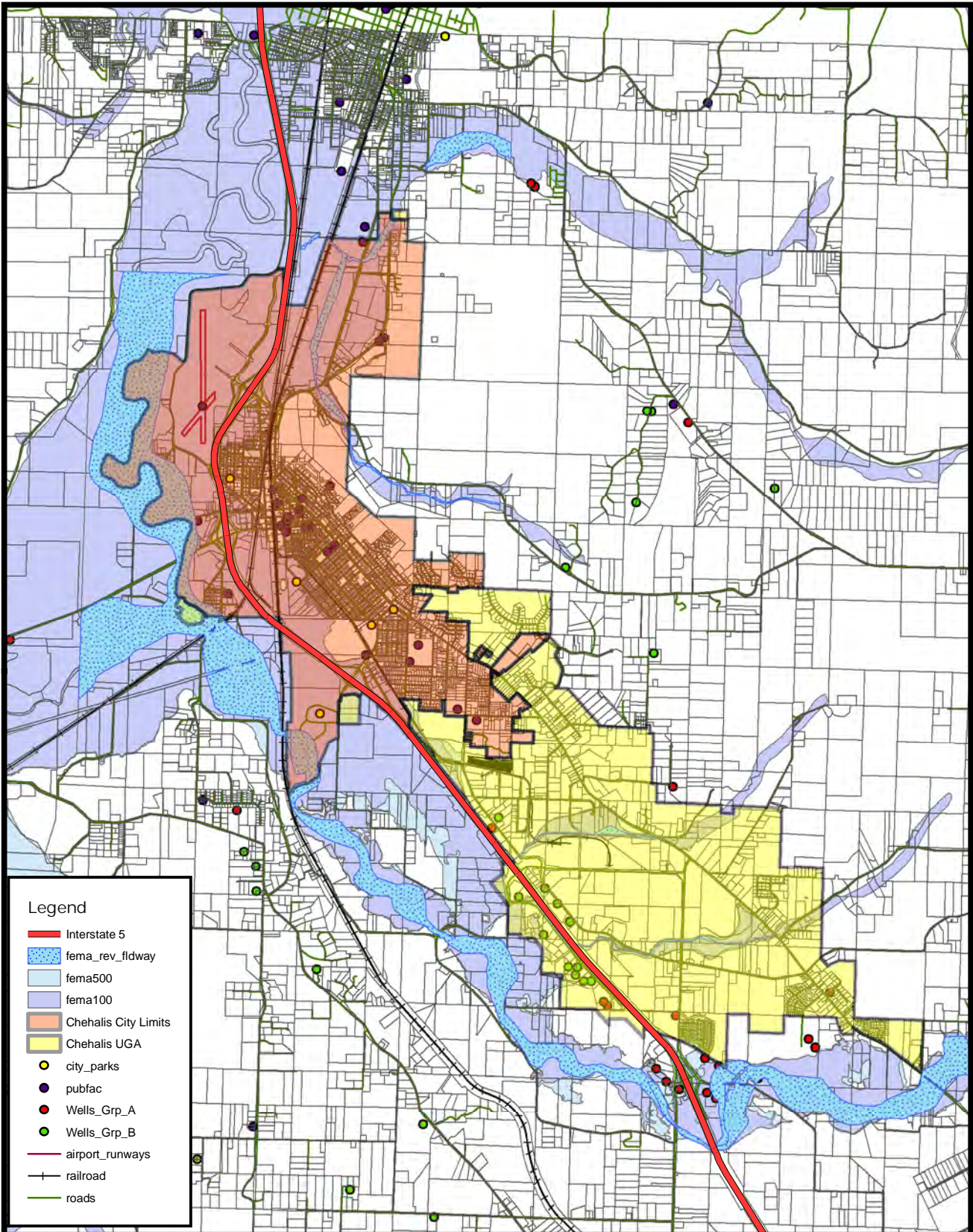
0 0.15 0.3 0.6 0.9 1.2 Miles  
1 inch = 1.03 miles

## City of Chehalis Steep Slopes



Created: October 27, 2009  
LaJane Schopfer





**Legend**

- Interstate 5
- ▨ fema\_rev\_fldway
- ▨ fema500
- ▨ fema100
- ▨ Chehalis City Limits
- ▨ Chehalis UGA
- city\_parks
- pubfac
- Wells\_Grp\_A
- Wells\_Grp\_B
- airport\_runways
- railroad
- roads



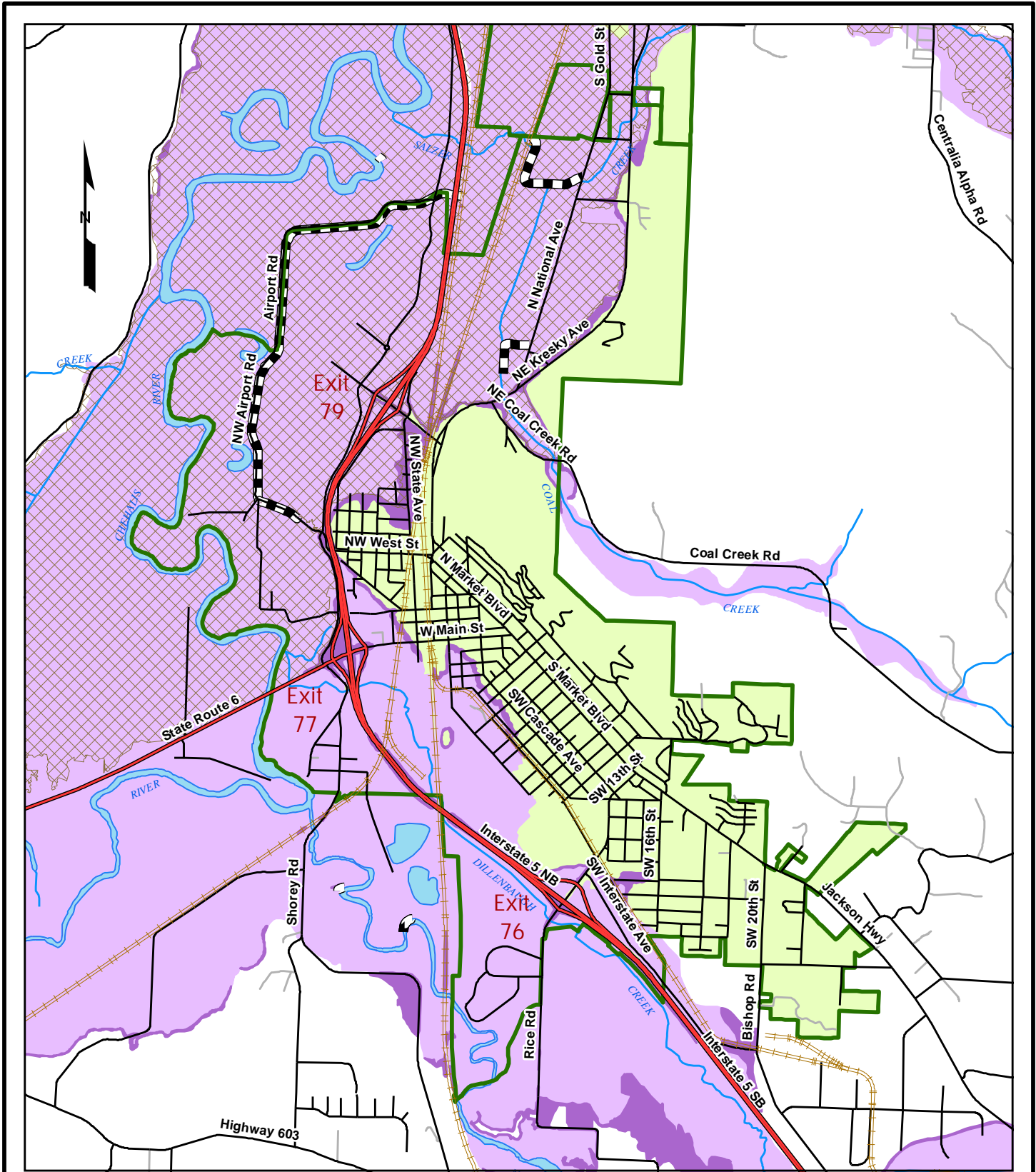
0 0.15 0.3 0.6 0.9 1.2 Miles  
1 inch = 1.03 miles

# City of Chehalis Floodplain Map



Created: October 27, 2009  
LaJane Schopfer

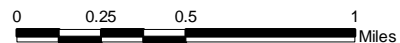




- City Limits
- 100-yr flood
- 500-yr flood
- Dam Inundation
- Levees/revet.

Lewis County, Washington  
2015 Multi-jurisdictional Hazard Mitigation Plan

## Chehalis Facilities & Evacuation Routes



## Building Damage Count by General Occupancy

October 09, 2009

	Count of Buildings (#) by Range of Damage (%)							Total
	None	1-10	11-20	21-30	31-40	41-50	Substantial	
<b>Washington</b>								
<b>Lewis</b>								
Agriculture	0	0	0	0	0	0	0	0
Commercial	0	0	1	0	0	0	0	1
Education	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	0	0	0	0
Religion	0	0	0	0	0	0	0	0
Residential	32	0	2	18	5	24	7	88
<b>Total</b>	<b>32</b>	<b>0</b>	<b>3</b>	<b>18</b>	<b>5</b>	<b>24</b>	<b>7</b>	<b>89</b>
<b>Total</b>	<b>32</b>	<b>0</b>	<b>3</b>	<b>18</b>	<b>5</b>	<b>24</b>	<b>7</b>	<b>89</b>
<b>Scenario Total</b>	<b>32</b>	<b>0</b>	<b>3</b>	<b>18</b>	<b>5</b>	<b>24</b>	<b>7</b>	<b>89</b>

Special Notice Regarding Building Count:

Unlike the earthquake and hurricane models, the flood model performs its analysis at the census block level. This means that the analysis starts with a small number of buildings within each census block and applies a series of distributions necessary for analyzing the potential damage. The application of these distributions and the small number of buildings make the flood model more sensitive to rounding errors that introduces uncertainty into the building count results. Please use these results with suitable caution.

*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.*

**Study Region:** Chehalis Flood  
**Scenario:** 100-Year with 2007 data  
**Return Period:** Mix0

## Direct Economic Losses for Buildings

October 09, 2009

All values are in thousands of dollars

	Capital Stock Losses			Building Loss Ratio %	Income Losses				Total Loss
	Cost Building Damage	Cost Contents Damage	Inventory Loss		Relocation Loss	Capital Related Loss	Wages Losses	Rental Income Loss	
<b>Washington</b>									
Lewis	21,862	44,557	2,338	13.9	88	144	271	51	69,887
<b>Total</b>	<b>21,862</b>	<b>44,557</b>	<b>2,338</b>	<b>13.9</b>	<b>88</b>	<b>144</b>	<b>271</b>	<b>51</b>	<b>69,887</b>
<b>Scenario Total</b>	<b>21,862</b>	<b>44,557</b>	<b>2,338</b>	<b>13.9</b>	<b>88</b>	<b>144</b>	<b>271</b>	<b>51</b>	<b>69,887</b>

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: Chehalis Flood  
 Scenario: 100-Year with 2007 data  
 Return Period: Mix0

---

## Shelter Summary Report

---

---

October 09, 2009

---

	# of Displaced People	# of People Needing Short Term Shelter
<b>Washington</b>		
Lewis	519	368
<b>Total</b>	<b>519</b>	<b>368</b>
<b>Scenario Total</b>	<b>519</b>	<b>368</b>

---

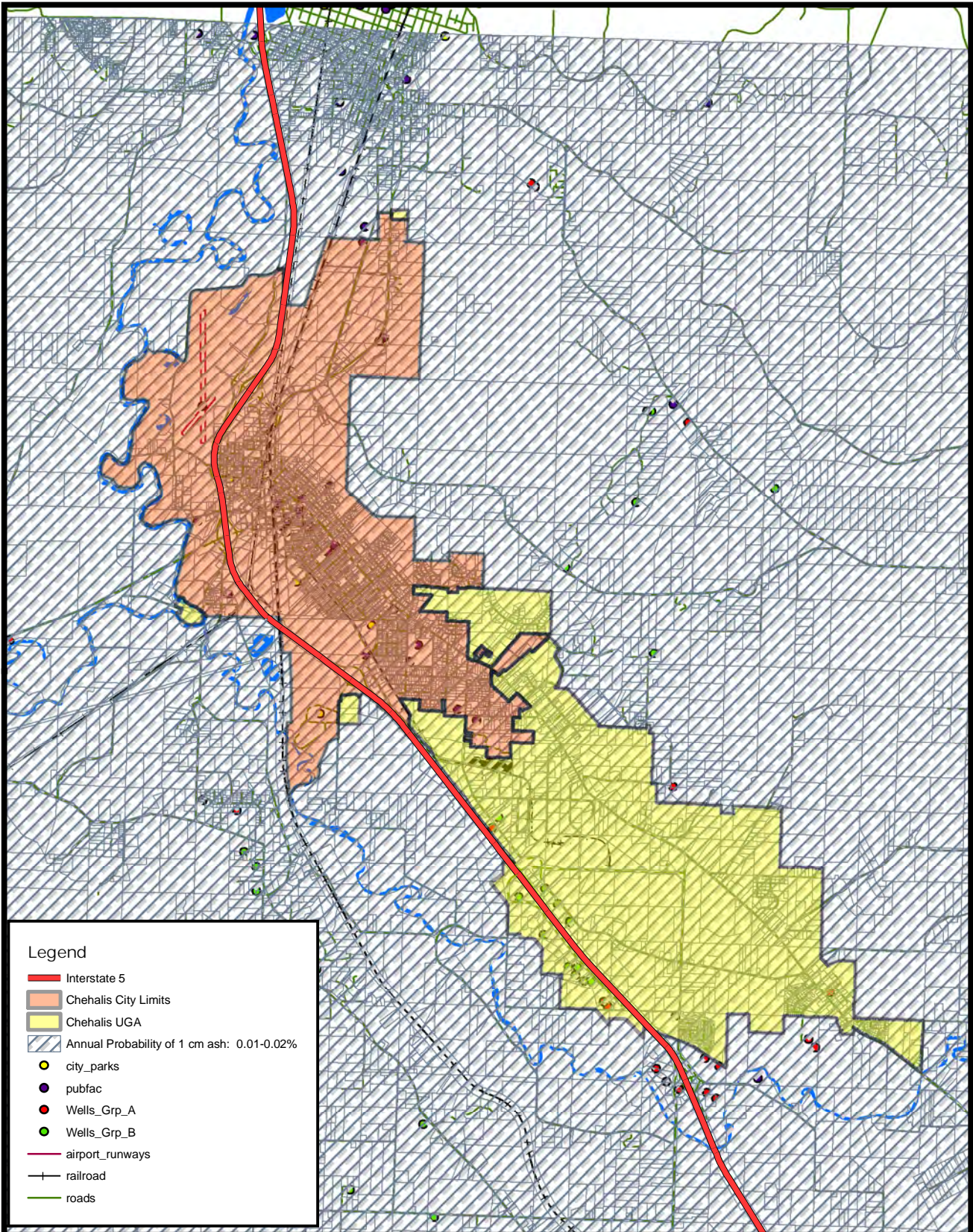
*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.*

---

**Study Region:** Chehalis Flood  
**Scenario:** 100-Year with 2007 data  
**Return Period:** Mix0

Page : 1 of 1





Legend

- Interstate 5
- Chehalis City Limits
- Chehalis UGA
- Annual Probability of 1 cm ash: 0.01-0.02%
- city\_parks
- pubfac
- Wells\_Grp\_A
- Wells\_Grp\_B
- airport\_runways
- railroad
- roads



0 0.15 0.3 0.6 0.9 1.2 Miles  
1 inch = 1.03 miles

## City of Chehalis Volcanic Hazards Map



Created: October 27, 2009  
LaJane Schopfer



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## HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact	Alternate Point of Contact
Keith Cournyer, Public Works Superintendent PO Box 1089 Morton WA 98356 (360) 496-5210 <a href="mailto:dpowell@visitmorton.com">dpowell@visitmorton.com</a>	

**Profile:** Morton is located 31 miles west of Interstate 5 on U.S. 12. Washington state routes 508 and 7 join with U.S. 12 in According to the United States Census Bureau, the city has a total area of 1.0 square miles, all of it land. Morton is nestled in a valley between Mt. Rainier National Park and Mt. St. Helens National Volcanic Monument at the junction of Washington SR 7 (National Park Highway) and US Highway 12, a Washington Scenic byway.

The Tilton River winds its way through the valley in which the city resides, and is there joined by tributaries, Lake Creek and Highland Creek. The City is prone to flooding during periods of abnormally heavy or persistent rain, and the lowlands from the freeway westward are particularly susceptible to inundation. Bellicum Peak, Bergen Mountain, Johnson Mountain and Cottlers Rock are major land features that surround Morton.

## Ranking of Identified Hazards

Hazard Type	Previous Occurrence?		Likely to Experience?		Probability				Extent				Percent %	Rank
	Yes	No	Yes	No	Highly Likely (100% next yr)	Likely (10-100% or 1 in 10 yrs)	Possible (1-10% next year or 1/100 yrs)	Unlikely (less than 1% in 100 yrs)	Catastrophic: more than 50% affected	Severe: 25-50% affected	Limited: 0-25% affected	None: 0% affected		
<b>Rating Points</b>	<b>20</b>	<b>0</b>	<b>10</b>	<b>0</b>	<b>20</b>	<b>10</b>	<b>6</b>	<b>0</b>	<b>20</b>	<b>10</b>	<b>4</b>	<b>0</b>		
Winter Storm	20		10		20					10			60%	1
Volcano	20		10			10			20				60%	1
Earthquake	20					10			20				50%	2
Flooding	20		10			10				10			50%	2
Landslide	20		10			10					4		44%	3
Debris Flow	20		10				6				4		40%	4
Wind Storm			10				6			10	4		30%	5
Wildfire			10				6			10	4		30%	5
Hailstorm			10				6				4		20%	6
Thunder Storm			10				6				4		20%	6

**Probability:**

- Highly Likely: Near 100% probability in the next year.
- Likely: Between 10 and 100% probability in the next year, or at least one chance in 10 years.
- Possible: Between 1 and 10% probability in the next year, or at least one chance in next 100 years.
- Unlikely: Less than 1% probability in next 100 years.

**Extent of damage is defined as follows:**

- Catastrophic: More than 50% of the jurisdiction can be affected
- Severe: 25 to 50% of the jurisdiction can be affected
- Limited: 0 to 25% of the jurisdiction can be affected

**None: 0% of the jurisdiction can be affected**

## Current Hazard Mitigation Codes/Plans/Ordinances

- Lewis County Multi-Jurisdictional Hazard Mitigation Plan adopted June 2010.
- City of Morton Comprehensive Land Use Plan, 1992/Amended 2005
- City of Morton Critical Areas Ordinance, 1992/Amended 2005
- City of Morton Emergency Management Plan, 1999
- Zoning Ordinance

- State Environmental Policy Act
- Shoreline Management Master Program

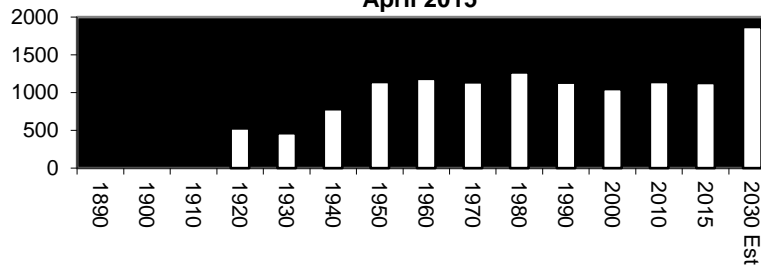
### Agency Specific Natural Hazard Event History – 1980 to 2015

Type of Disaster	FEMA Disaster #	Date	Comments
Severe Winter Storm and Record and Near Record Snow	DR-1825	3/2/2009	Incident 12/12/2008-1/5/2009
Severe Winter Storm, Landslides, Mudslides, Flooding	DR-1817	1/30/2009	1/6-/16/2009
Severe Storms, Flooding, Landslides, Mudslides	DR-1734	12/8/2007	Incident 12/1-12/17/2007
Severe Winter Storm, Landslides, Mudslides	DR-1682	2/14/2007	Incident 12/14-12/15/2006
Severe Storms, Flooding, Landslides, Mudslides	DR-1671	12/12/2006	Incident 11/2-11/11/2006
Earthquake	DR-1361	3/1/2001	Incident 2/28-3/16/2001
Severe Winter Storms/Flooding	DR-1159	1/17/1997	Incident 12/26/1996-2/10/1997
Severe Storms, Flooding	DR-1100	Feb. 9, 1996	Incident 1/26-2/23/1996
Storms, High Winds, Floods	DR-1079	Jan. 3, 1996	Incident 11/7-Dec 18, 1995
Severe Storm, High Winds	DR-981	March 4, 1993	Incident 1/20-1/21/1993
Severe Storms, Flooding	DR-784	Dec 15, 1986	Incident 11/22-11/29/1986
Volcanic Eruption – Mt. St. Helens	DR-623	May 21, 1980	

### Demographics

Population	1990	2000	2010	2015	2030 -Projected
	1,130	1,045	1,140	1,125	1,869

City of Morton Population 1890 to 2030  
Office of Financial Management (OFM)  
April 2015



Quick Facts (US Census)	Morton	Washington
Population, percent change - April 1, 2010 to July 1, 2013		3.7%
Persons under 5 years, percent, 2010	21.1%	6.5%
Persons under 18 years, percent definition and source info Persons under 18 years, percent, 2010	45.0%	23.5%
Persons 65 years and over, percent definition and source info Persons 65 years and over, percent, 2010	9.6%	12.3%
High school graduate or higher, percent of persons age 25+, 2009-2013	85%	90.0%
Bachelor's degree or higher, percent of persons age 25+, 2009-2013	15.4%	31.9%
Homeownership rate, 2009-2013	66.9%	63.2%
Housing units in multi-unit structures, percent, 2009-2013	33.1%	25.6%
Median value of owner-occupied housing units, 2009-2013	\$141,700	\$262,100
Per capita money income in past 12 months (2013 dollars), 2009-2013	\$23,357	\$30,742
Median household income definition and source info Median household income, 2009-2013	\$36,184	\$59,478
Persons below poverty level, percent definition and source info Persons below poverty level, percent, 2009-2013	14.2%	13.4%

Source: U.S. Census – Date Accessed: July 12, 2015. Website: <http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk>

### Land Designations

Land Area within the existing city limits:	486
Land area within urban growth area:	933
Total land area within city limits and urban growth area	1557
Land area of park, forest, and/or open space	501
Land area of residential	406
Land area of commercial	56
Land area of industrial	56

### Current and Anticipated Development and Population Trends



JURISDICTION City of Morton

The City of Morton anticipates slow growth (under 2%) to no growth will continue into the future. The existing City of Morton limits contain 486 acres. The City provides a base of operation for services critical to Eastern Lewis County, supporting the Morton Elementary School, Junior High and High School, Centralia College East, County Center and Employment Security. The community is mostly residential with 262 households. Morton contains a commercial business district consisting of Main Street and State Route 7.

Tourism is a growing industry in Morton with a number of new restaurants along US 12. Recent residential growth has taken place along SR 508 north and west of the city. Of current vacant industrial lands, only two parcels were large enough to serve as anything more than as cottage industry. Likewise 36 acres of land designated vacant commercial has had improvements.

**Infrastructure**

Categories	2014	Approximate Value (\$)
Miles of Street and Roads	6.83	6,881,000
Miles of Sanitary Sewer	8 miles	
Miles of Storm Sewer	4 mile	
Miles of water lines	10 mile	
Miles of Electrical lines	N/A- provided by LCPUD	

**Critical Facilities**

Facility	Address	Approximate Value (\$)
Fire Department	105 Third Street	\$386,000
Water Treatment Plant	117 Klasey Rd.	4.1 M
WW Treatment Plant	200 Sewer Plant Rd.	3.4 M
Water Reservoir #1	135 Longmire Lane	\$661,000
Water Reservoir #2	O'Neil Road	\$225,000
Public Works Equipment Yard	551 Westlake Ave.	\$238,000
Water Intake	Connelly Creek	\$250,000
Morton Airport	809 Airport Way	\$102,500

**Flood Information**

Percentage of existing city limits within the 100-year flood plain	
Assessor's valuation of private properties within the 100-year flood plain	

**Critical Facilities within the 100-year flood plain**

Facility	Address	Approximate Value (\$)
Water treatment plant	117 Klasey Road	4.1 M
WWTP	200 Sewer Plant Road	3.4 M
Water Intake	Connelly Creek	\$250,000
Gus Backstorm City Park	750 Main	
Bob Lyle Community Center	700 Main	1.5 M
Old Settlers Museum	750 Main Ave	\$150,000

**NFIP/CRS Section**

NFIP/CRS Community	No
Floodplain Administrator	None
Certified Floodplain Manager	None
Floodplain Ordinance Adoption	Critical Areas Ordinance, 1992/Amended 2005
Recently community Assistant Visit or Community Assistance Contact	N/A
NFIP Compliance Violations?	N/A
FEMA Floodplain Maps Adopted	Flood map is number 5301050001C, effective on 03/02/1982
Community Rating Classification	N/A
Building Code Effective Grading Schedule	

StormReady Community	No		
Firewise Community	No		
Previous Action Plan Implementation			
Mitigation Strategy	Completed 2010-2014	Carried Over to 2015 Plan	Removed or No Longer Feasible (updated 10/23/2015)
Continue to enforce the flood ordinance & update as needed	Yes	Yes	Ongoing
Train Planning Commission, Elected Officials and staff when sessions are available	Yes	Yes	Ongoing
Make information available to the public	Yes	Yes	Ongoing
Contract with Lewis County for emergency services	Yes	Yes	Ongoing
Upgrade Radio Communications	Yes	Yes	Ongoing
Operate Incident Command Post in time of emergency	Yes	Yes	Ongoing
Continuing Education	Yes	Yes	Ongoing
Continue to require water & sewer locates for new developments, new construction and	Yes	Yes	Ongoing
Continue inspections of manholes and storm drain facilities	Yes	Yes	Ongoing
Continue routine maintenance & repairs/replacement of backup generators & inspections of	Yes	Yes	Ongoing
Keep ditches clean and infringing trees removed from Water and Wastewater treatment plant, reservoirs and water intake	Yes	Yes	Ongoing
Routinely do structural assessments of all critical utility facilities	Yes	Yes	Ongoing
Continue to require water & sewer locates for new developments, new construction and other utility pole or underground placement	Yes	Yes	Ongoing
Continue inspections of manholes and storm drain facilities	Yes	Yes	Ongoing
Continue routine maintenance & repairs/replacement of backup generators & inspections of	Yes	Yes	Ongoing
Keep ditches clean and infringing trees removed from Water and Wastewater treatment plants, reservoirs and water intake	Yes	Yes	Ongoing
Routinely do structural assessments of all critical utility facilities	Yes	Yes	Ongoing
WWTP, Water Reservoir, Fire Department, City Hall, Police Station: Assess buildings for structural integrity to determine strength in withstanding an earthquake, volcanic ash	Yes	No	Completed
WWTP: Culvert cleanout, storm drain and outfall line inspection as protection from flooding.	Yes	Yes - ongoing	Ongoing
WWTP: Replacement of backup generator.	Yes	No	No funding
Fire Department: Routine maintenance on backup generator.	Yes	Yes. Ongoing	Fire District responsibility
Fire Department: Dependable Water supply	Yes	Yes.	Fire District responsibility
City Hall/Police Station: Purchase of backup power supply	Yes		No funding
City Hall/Police Station: Upgrade radio communications, training, office protective measures.	Yes	Yes. Ongoing	Ongoing
Water Reservoir: Removal of surrounding trees	Yes	Yes & ongoing	Ongoing
Water System Intake: Install Chemical additive pumps at City's back-up emergency well.	Yes	No	No funding
Water System Intake: Routine maintenance on structure.	Yes	No	No funding
Water System Intake: Roads graded and ditches cleaned. Bridge is a more recent concern	Yes	Yes & ongoing	Ongoing

**Attached Documents:**

- Land Use Map
- Public Facilities Map
- Hazard Identification Worksheet(s)
- Mitigation Strategies Worksheet(s)
- Steep Slopes and Liquefaction Map
- Flood Hazard Map
- HAZUS-MH: Flood Results

# HAZARD IDENTIFICATION WORKSHEET

Date Completed:

Which Agency are you representing? City of Morton

Name: James GERwig

Title: Mayor

Email: mayor@visitmorton.com

Telephone #: (360) 496-8496

Address: PO Box 1089

City: Morton

ZIP: 98356

**For each Hazard, please fill out the table below based on the following questions:**

- **Previous Occurrence:** Is there a historic record of this type of hazard happening here? *Yes or No*
- **Likely to Experience:** Are you likely to experience this type of hazard in the future? *Yes or No*
- **Probability:** Based on history, what is the likelihood of this event happening again? *Highly Likely, Likely, Possible, Unlikely*
- **Extent:** If this hazard event were to happen, how extensive could the damage be? *Catastrophic, Severe, Limited, None*

Hazard Type	Previous Occurrence?		Likely to Experience?		Probability				Extent			
	Yes	No	Yes	No	Highly Likely	Likely	Possible	Unlikely	Catastrophic	Severe	Limited	None
Avalanche		X		X			X	X		X		X
Coastal Erosion		X		X				X				X
Coastal Storm		X		X				X				X
Dam Failure		X		X				X				X
Debris Flow	X		X				X				X	
Drought		X		X				X			X	
Earthquake	X					X			X			
Expansive Soils		X		X				X				X
Extreme Heat												
Flooding	X		X			X				X		
Hailstorm		X	X				X				X	
Hurricane		X		X				X				X
Land Subsidence		X		X				X				X
Landslide	X		X			X					X	
Levee Failure		X		X				X				X
Severe Thunder Storm		X	X				X				X	
Severe Wind Storm		X	X				X			X	X	
Severe Winter Storm	X		X		X					X		
Tornado		X		X				X			X	
Tsunami		X		X				X				X
Volcano	X		X			X			X			
Wildfire		X	X				X			X	X	
Other:												

**Which of the following does your agency have? (Circle One)**

Comprehensive Plan (Yes) / No / NA Date completed: 1998/Amended 2005

Critical Areas Ordinance (Yes) / No / NA Date completed: 1998/Amended 2005

Does your agency have an emergency plan? (Yes) / No / NA 1999

**Which Agency are you representing:** City of Morton

<b>Name:</b> Keith Cournyer	<b>Title:</b> Public Works Superintendent
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<b>Email:</b> mortonwatertx@gmail.com	<b>Telephone #:</b> (360) 496-5210
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<b>Address:</b> PO Box 1089	<b>City:</b> Morton	<b>Zip:</b> 98356
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**Task B: Compile a detailed inventory of what can be damaged by a hazard event.**  
 Inventory the assets (critical facilities, businesses, historic, cultural, natural resource areas and areas of special consideration) that can be damaged by a hazard event.

- |                |  |   |  |                           |  |                        |
|----------------|--|---|--|---------------------------|--|------------------------|
| <b>HAZARDS</b> | 1. Avalanche<br>2. Dam Failure<br>3. Debris Flow<br>4. Drought<br>5. Earthquake<br>6. Expansive Soils<br>7. Extreme Heat | 8. Flooding<br>9. Hailstorm<br>10. Hurricane<br>11. Land Subsidence<br>12. Landslide<br>13. Levee Failure<br>14. Severe Thunder Storm | 15. Severe Wind Storm<br>16. Severe Winter Storm<br>17. Tornado<br>18. Volcano<br>19. Wildfire | <b>BUILDING MATERIALS</b> | a. Masonry<br>b. concrete<br>c. Concrete Block<br>d. Brick<br>e. Stick<br>f. Metal | g. Steel<br>h. Asphalt |
|----------------|--|---|--|---------------------------|--|------------------------|

Name or description of Asset (building)	Address	Hazard(s) List all that apply (See legend above)	Critical Facility	Transportation	Utility System	Comm. System	Economic Assets	Special consideration	Historic/Other	Size of Building (sq. ft.)	Replacement Value (\$)	Contents Value (\$)	Displacement (\$ per day)	Occupancy or capacity (#)	Structural — building materials
<i>Example – A Building</i>	<i>123 Hall Dr.</i>	<i>5,8,15,18</i>	<i>X</i>							<i>250,000</i>	<i>2.5 M</i>	<i>1.0 M</i>	<i>5,000</i>	<i>25</i>	<i>d,e</i>
Public works shed	551 Westlake Ave.	5, 16, 18, 12													
Water Intake	Connelly Creek	5, 16, 8, 3, 18, 12													
Gus Backstrom City Park	750 Main Ave.	5, 16, 8, 3, 18													
Bob Lyle Community Center	700 Main Ave.	5, 16, 8, 3, 18													
Jubilee Park/Arena	451 Knittles Way	5, 16, 18, 19													
Morton Airport	809 Airport Way	5, 8, 15, 16, 19													
Old Settlers Museum	750 Main Ave.	5, 8, 15, 16													

**Which Agency are you representing:** City of Morton

<b>Name:</b> Keith Cournyer	<b>Title:</b> Public Works Superintendent
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<b>Email:</b> mortonwatertx@gmail.com	<b>Telephone #:</b> (360) 496-5210
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|--|---|--|---|------------------------|
| <b>HAZARDS</b><br>1. Avalanche<br>2. Dam Failure<br>3. Debris Flow<br>4. Drought<br>5. Earthquake<br>6. Expansive Soils<br>7. Extreme Heat | 8. Flooding<br>9. Hailstorm<br>10. Hurricane<br>11. Land Subsidence<br>12. Landslide<br>13. Levee Failure<br>14. Severe Thunder Storm | 15. Severe Wind Storm<br>16. Severe Winter Storm<br>17. Tornado<br>18. Volcano<br>19. Wildfire | <b>BUILDING MATERIALS</b><br>a. Masonry<br>b. concrete<br>c. Concrete Block<br>d. Brick<br>e. Stick<br>f. Metal | g. Steel<br>h. Asphalt |
|--|---|--|---|------------------------|

Name or description of Asset (building)	Address	Hazard(s) List all that apply (See legend above)	Critical Facility	Transportation	Utility System	Comm. System	Economic Assets	Special consideration	Historic/Other	Size of Building (sq. ft.)	Replacement Value (\$)	Contents Value (\$)	Displacement (\$ per day)	Occupancy or capacity (#)	Structural — building materials
Old Settlers Museum	750 Main Ave.	5, 8, 15, 16													
Main Ave. Lift Station	781 Main Ave.	3, 5, 8, 15, 16, 19													
Heritage Lift Station	Endof W Main Ave.	3, 5, 8, 15, 16, 19													
Water Dist. System		5, 8, 12, 18													
Sewer Collection System		3, 5, 8, 12, 16, 18													
Storm Collection System		3, 5, 8, 12, 16, 18													
City Hall Police Dept.	250 Main Ave.	5, 16, 18													

**Which Agency are you representing:** City of Morton

<b>Name:</b> Keith Cournyer	<b>Title:</b> Public Works Superintendent
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<b>Email:</b> mortonwatertx@gmail.com	<b>Telephone #:</b> (360) 496-5210
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**Task B: Compile a detailed inventory of what can be damaged by a hazard event.**  
 Inventory the assets (critical facilities, businesses, historic, cultural, natural resource areas and areas of special consideration) that can be damaged by a hazard event.

- |                |  |   |  |                           |  |                        |
|----------------|--|---|--|---------------------------|--|------------------------|
| <b>HAZARDS</b> | 1. Avalanche<br>2. Dam Failure<br>3. Debris Flow<br>4. Drought<br>5. Earthquake<br>6. Expansive Soils<br>7. Extreme Heat | 8. Flooding<br>9. Hailstorm<br>10. Hurricane<br>11. Land Subsidence<br>12. Landslide<br>13. Levee Failure<br>14. Severe Thunder Storm | 15. Severe Wind Storm<br>16. Severe Winter Storm<br>17. Tornado<br>18. Volcano<br>19. Wildfire | <b>BUILDING MATERIALS</b> | a. Masonry<br>b. concrete<br>c. Concrete Block<br>d. Brick<br>e. Stick<br>f. Metal | g. Steel<br>h. Asphalt |
|----------------|--|---|--|---------------------------|--|------------------------|

Name or description of Asset (building)	Address	Hazard(s) List all that apply (See legend above)	Critical Facility	Transportation	Utility System	Comm. System	Economic Assets	Special consideration	Historic/Other	Size of Building (sq. ft.)	Replacement Value (\$)	Contents Value (\$)	Displacement (\$ per day)	Occupancy or capacity (#)	Structural — building materials
Fire Hall	105 3 <sup>rd</sup> St.	5, 16, 18													
Water Treatment Plant	117 Klasey Rd.	5, 16, 8, 3, 18, 12													
Wastewater Treatment Plant	200 Sewer Plant Rd.	5, 16, 8, 3, 18, 12													
Water Reservoir #1	135 Longmire Ln.	5, 16, 18, 12													
Water Reservoir #2	701 O'Neil Rd.	5, 16, 18, 12													
Morton Cemetery	7 <sup>th</sup> & Westlake	8, 12, 15						X		100	5000	2000			A



<b>ASSET INVENTORY WORKSHEET 2C</b>		<b>Date Completed: 4/9/2015</b>	
<b>Which Agency are you representing?</b> City of Morton			
<b>Name: James Gerwig</b>		<b>Title: Mayor</b>	
<b>Email: mayor@visitmorton.com</b>		<b>Telephone #: (360) 496-8496</b>	
<b>Address: PO Box 1089</b>		<b>City: Morton</b>	<b>ZIP: 98356</b>

**Task C.** Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.

**Hazard: VOLCANIC ERUPTION**

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	534	534	100	76,864,560	76,864,560	100	1040	1040	100
Commercial	87	87	100						0
Industrial	2	2	100						
Agricultural									
Religious/ Non-profit	5	5	100						
Government	3	3	100						
Education	3	3	100						
Utilities	10	10	100						
<b>Total</b>	<b>644</b>	<b>644</b>	<b>100</b>	<b>76,864,560</b>	<b>76,864,560</b>	<b>100</b>	<b>1040</b>	<b>1040</b>	<b>100</b>

**Task D. Determine whether (and where) you want to collect additional inventory data. (circle one)**

- Do you know where your greatest damages may occur in your hazard areas?  Yes or No
- Do you know whether your critical facilities will be operational after a hazard event? Yes or  No
- Is there enough data to determine which assets are subject to the greatest potential damages?  Yes or No
- Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards?  Yes or No
- Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards? Yes or  No
- Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence?  Yes or No
- Is additional data needed to justify the expenditure of community or state funds for mitigation?  Yes or No

<b>ASSET INVENTORY WORKSHEET 2C</b>		<b>Date Completed: 4/9/2015</b>	
<b>Which Agency are you representing?</b> City of Morton			
<b>Name: James Gerwig</b>		<b>Title: Mayor</b>	
<b>Email: mayor@visitmorton.com</b>		<b>Telephone #: (360) 496-8496</b>	
<b>Address: PO Box 1089</b>		<b>City: Morton</b>	<b>ZIP: 98356</b>

**Task C.** Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.

**Hazard: WINTER STORM/HEAVY SNOW**

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	534	534	100	76,864,560	76,864,560	100	1040	1040	100
Commercial	87	87	100						0
Industrial	2	2	100						
Agricultural									
Religious/ Non-profit	5	5	100						
Government	3	3	100						
Education	3	3	100						
Utilities	10	10	100						
<b>Total</b>	<b>644</b>	<b>644</b>	<b>100</b>	<b>76,864,560</b>	<b>76,864,560</b>	<b>100</b>	<b>1040</b>	<b>1040</b>	<b>100</b>

**Task D. Determine whether (and where) you want to collect additional inventory data. (circle one)**

- Do you know where your greatest damages may occur in your hazard areas?  Yes or No
- Do you know whether your critical facilities will be operational after a hazard event?  Yes or No
- Is there enough data to determine which assets are subject to the greatest potential damages?  Yes or No
- Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards?  Yes or No
- Is there enough data to determine whether historic environmental, political, or cultural significance are vulnerable to potential hazards?  Yes or No
- Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence?  Yes or No
- Is additional data needed to justify the expenditure of community or state funds for mitigation?  Yes or  No

<b>ASSET INVENTORY WORKSHEET 2C</b>		<b>Date Completed: 4/9/2015</b>	
<b>Which Agency are you representing?</b> City of Morton			
<b>Name: James Gerwig</b>		<b>Title: Mayor</b>	
<b>Email: mayor@visitmorton.com</b>		<b>Telephone #: (360) 496-8496</b>	
<b>Address: PO Box 1089</b>		<b>City: Morton</b>	<b>ZIP: 98356</b>

**Task C.** Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.

**Hazard: FLOOD**

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	534	10	.02	76,864,560	15,372	.02	1040	25	.03
Commercial	87	0	0					0	0
Industrial	2	1	50		25,000,000	.33		0	0
Agricultural								0	0
Religious/ Non-profit	5	0	0					0	0
Government	3	0	0					0	0
Education	3	0	0					0	0
Utilities	10	3	30		7,861,778	10		0	0
<b>Total</b>	<b>644</b>	<b>14</b>		<b>76,864,560</b>	<b>15,563,606</b>	<b>43.02</b>	<b>1040</b>	<b>25</b>	<b>.03</b>

**Task D.** Determine whether (and where) you want to collect additional inventory data. (circle one)

- Do you know where your greatest damages may occur in your hazard areas?  Yes or  No
- Do you know whether your critical facilities will be operational after a hazard event? Yes or  No
- Is there enough data to determine which assets are subject to the greatest potential damages?  Yes or  No
- Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards?  Yes or  No
- Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards? Yes or  No
- Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence?  Yes or  No
- Is additional data needed to justify the expenditure of community or state funds for mitigation? Yes or  No

<b>ASSET INVENTORY WORKSHEET 2C</b>		<b>Date Completed: 4/9/2015</b>	
<b>Which Agency are you representing?</b> City of Morton			
<b>Name: James Gerwig</b>		<b>Title: Mayor</b>	
<b>Email: mayor@visitmorton.com</b>		<b>Telephone #: (360) 496-8496</b>	
<b>Address: PO Box 1089</b>		<b>City: Morton</b>	<b>ZIP: 98356</b>

**Task C.** Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.

**Hazard: EARTHQUAKE**

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	534	10	.02	76,864,560	15,372	.02	1040	25	.03
Commercial	87	0	0					0	0
Industrial	2	1	50		25,000,000	.33		0	0
Agricultural								0	0
Religious/ Non-profit	5	0	0					0	0
Government	3	0	0					0	0
Education	3	0	0					0	0
Utilities	10	3	30		7,861,778	10		0	0
<b>Total</b>	<b>644</b>	<b>14</b>		<b>76,864,560</b>	<b>15,563,606</b>	<b>43.02</b>	<b>1040</b>	<b>25</b>	<b>.03</b>

**Task D. Determine whether (and where) you want to collect additional inventory data. (circle one)**

- Do you know where your greatest damages may occur in your hazard areas?  Yes or  No
- Do you know whether your critical facilities will be operational after a hazard event? Yes or  No
- Is there enough data to determine which assets are subject to the greatest potential damages?  Yes or  No
- Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards?  Yes or  No
- Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards? Yes or  No
- Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence?  Yes or  No
- Is additional data needed to justify the expenditure of community or state funds for mitigation? Yes or  No

<b>ASSET INVENTORY WORKSHEET 2C</b>	<b>Date Completed: 4/9/2015</b>
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**Which Agency are you representing?** City of Morton

<b>Name: James Gerwig</b>	<b>Title: Mayor</b>
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<b>Email: mayor@visitmorton.com</b>	<b>Telephone #: (360) 496-8496</b>
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<b>Address: PO Box 1089</b>	<b>City: Morton</b>	<b>ZIP: 98356</b>
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**Task C.** Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.

**Hazard: WINDSTORM**

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	534	10	.02	76,864,560	15,372	.02	1040	25	.03
Commercial	87	0	0					0	0
Industrial	2	1	50		25,000,000	.33		0	0
Agricultural								0	0
Religious/ Non-profit	5	0	0					0	0
Government	3	0	0					0	0
Education	3	0	0					0	0
Utilities	10	3	30		7,861,778	10		0	0
<b>Total</b>	<b>644</b>	<b>14</b>		<b>76,864,560</b>	<b>15,563,606</b>	<b>43.02</b>	<b>1040</b>	<b>25</b>	<b>.03</b>

**Task D.** Determine whether (and where) you want to collect additional inventory data. (circle one)

- Do you know where your greatest damages may occur in your hazard areas?  Yes or  No
- Do you know whether your critical facilities will be operational after a hazard event? Yes or  No
- Is there enough data to determine which assets are subject to the greatest potential damages?  Yes or  No
- Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards?  Yes or  No
- Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards? Yes or  No
- Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence?  Yes or  No
- Is additional data needed to justify the expenditure of community or state funds for mitigation? Yes or  No

# Ranking Mitigation Strategies: Using STAPLEE - Worksheet 3A

Date: June 25, 2015

## Agency: City of Morton

Category Description/Action Items (Mitigation Strategy)	Hazard Addressed (flood, earthquake, wind, winter, landslide, etc.)	Social (Yes or No)	Technical (Yes or No)	Administrative (Yes or No)	Political (Yes or No)	Legal (Yes or No)	Economical (Yes or No)	Environmental (Yes or No)	Responsible Department/Agency
Continue to enforce the flood ordinance.	Flood	Y	Y	Y	Y	Y	Y	N	City Clerk, City Council Planning Commission
Train Planning Commission, Elected Officials and staff when sessions are available	Flood	Y	Y	Y	Y	Y	Y	N	City Clerk, City Council Planning Commission
Make information available to the public	Flood	Y	Y	Y	Y	N	Y	N	City Clerk, City Council Planning Commission
Contract with Lewis County for emergency services	All	Y	Y	Y	Y	Y	Y	N	Mayor, City Council Police Chief
Upgrade radio communications	All	Y	Y	Y	Y	N	Y	N	Mayor, City Council Police Chief
Operate Incident Command Post in time of emergency	All	Y	Y	Y	Y	N	Y	N	Mayor, City Council Police Chief
Continuing education	All	Y	Y	Y	Y	N	Y	N	City Council, Planning Commission, City Clerk
Continue coordination with Lewis County for managing development in UGAs to address critical areas concerns	All	Y	Y	Y	Y	Y	Y	N	City Council, Planning Commission, City Clerk
Maintain map of critical and hazard areas in City Hall	All	Y	Y	Y	Y	N	Y	N	City Council, Planning Commission, City Clerk
Continuing education for Planning Commission	All	Y	Y	Y	Y	Y	Y	N	Public Works Supt.
Continue to require water & sewer locates for new developments, new construction and other utility pole or underground placement	All	Y	Y	Y	Y	Y	Y	N	Public Works Supt.
Continue inspection of manholes and storm drain facilities	All	Y	Y	Y	Y	N	Y	N	Public Works Supt.
Continue routine maintenance & repairs/replacement of backup generators & inspections of water reservoirs	All	Y	Y	Y	Y	N	Y	N	Public Works Supt.
Keep ditches clean and infringing trees removed from water and wastewater treatment plants, reservoirs and water intake	All	Y	Y	Y	Y	N	Y	N	Public Works Supt.
Routinely do structural assessments of all critical utility facilities	All	Y	Y	Y	Y	N	Y	N	Public Works Supt.
Continue using SEPA authority to ensure large projects provide for hazard mitigation	All	Y	Y	Y	Y	Y	Y	N	City Clerk, Planning Commission, City Council
Continue following guidelines in Morton's Zoning & Development Regulations	All	Y	Y	Y	Y	Y	Y	N	City Clerk, Planning Commission, City Council
WWTP: Assess building for structural integrity to determine strength in withstanding an earthquake, volcanic ash and snow loading on roof	Earthquake, volcanic eruption, winter storms (wind & snow)	N	Y	N	N	N	Y	N	Public Works Supt./ WWTP Operator
WWTP: Inspection to evaluate structural	Earthquake, flooding,	N	Y	N	N	N	Y	N	Public Works Supt./

integrity to withstand earthquake, ash and snow loading on roof.	volcanic activity, winter snow and wind storms								WWTP Operator
WWTP: Culvert cleanout, storm drain and outfall line inspection as protection from flooding.	Flooding,	N	Y	N	N	N	Y	N	Public Works Supt./ WWTP Operator
WWTP: Replacement of backup generator.	Earthquake, flooding, volcanic activity, winter snow and wind storms, fire	N	Y	N	Y/N	N	Y	N	Public Works Supt./ WWTP Operator
Fire Department: Inspections to evaluate structural integrity to withstand earthquake and snow/ash loading on roof.	Earthquake, volcanic activity, winter snow, wind storms.	N	Y	N	N	N	Y	N	Public Works Supt./Fire Chief
Fire Department: Routine maintenance on backup generator.	Earthquake, flooding, volcanic activity, winter snow and wind storms, fire	N	Y	N	N	N	Y	N	Public Works Supt./Fire Chief
Fire Department: Dependable Water supply	Earthquake, volcanic activity, rain storms, fire	N	Y	N	Y/N	N	Y	N	Public Works Supt./Fire Chief
City Hall/Police Station: Purchase of backup power supply	Earthquake, flooding, volcanic activity, winter snow and wind storms, fire	N	Y	N	Y/N	N	Y	N	City Clerk/Police Chief
City Hall/Police Station: Upgrade radio communications, training, office protective measures.	Earthquake, Volcanic Activity, Winter snow, wind & rain storms, fire	N	Y	N	Y/N	N	Y	N	City Clerk/Police Chief
City Hall/Police Station: Inspection to evaluate structural integrity to withstand earthquake and snow or ash loading on roof	Earthquake, Volcanic Activity, Winter snow	N	Y	N	N	N	Y	N	City Clerk/Police Chief
Water Reservoir: Removal of surrounding trees	Earthquake, Landslide, wind, snow and rain storms	N	Y	N	N	N	Y	N	Public Works Supt.
Water Reservoir: Inspections to evaluate structural integrity to withstand earthquake and snow/ash loading on roof	Earthquake, Landslide, wind, snow and rain storms	N	Y	N	N	N	Y	N	Public Works Supt.
Water System Intake: Install Chemical additive pumps at City's back-up emergency well.	Earthquake, Landslides, Flooding	N	Y	N	Y/N	N	Y	N	Public Works Supt.
Water System Intake: Routine maintenance on structure.	Earthquake, Landslide, wind, snow and rain storms	N	Y	N	N	N	Y	N	Public Works Supt.
Water System Intake: Roads graded and ditches cleaned. Bridge is a more recent concern	Snow and rain storms	N	Y	N	Y/N	N	Y	N	Public Works Supt.

**Notes**

S: Social – The public must support the overall implementation strategy and specific mitigation actions.

T: Technical – It is important to determine if the proposed action is technically feasible, will help reduce losses in the long term, and has minimal secondary impacts.

A: Administrative – Under this part of the evaluation criteria, examine the anticipated staffing, funding, and maintenance requirements for the mitigation action to be implemented.

P: Political – Understanding how your community and State leadership feels about issues related to the environment, economic development, safety, and emergency management.

L: Legal – When considering this criterion, determine whether your agency has the legal authority at the State, or local level to implement the action, or if new laws will need to be passed.

E: Economic – Cost-effective mitigation actions that can be funded in current or upcoming budget cycles are much more likely to be implemented.

E: Environmental – Evaluate whether, when implementing mitigation actions, there would be negative consequences to environmental assets (wetlands, endangered species, protected resources).

# Mitigation Strategies – Worksheet 3B

Date: 4/9/2015

Agency: City of Morton

Mitigation Measures		Hazard Addressed (flood, earthquake, wind, winter, landslide, etc.)	2010 Plan		Mitigation Identification (Prevention, Property Protection, Public Education & Awareness, Natural Resource Protection, Structural Projects)	Cost-Benefit and Prioritization			Implementation			
Category	Description/Action Items (Mitigation Strategy)		Task in 2010 Plan (yes or no)	Task completed as part of 2010 Plan (yes or no)		Relative Cost 1 = Highest 3 = Lowest	Relative Effectiveness 1 = Lowest 3 = Highest	Priority Rating (Low, Medium, High)	Timeline (schedule for approx. completion)	Potential Funding (grants, budget, donations, etc..)	Cost Est.	Administrative Responsibility
Floodplain Management	Continue to enforce the flood ordinance & update as needed	Flood	Yes	Yes On-going	Prevention, Property Protection, Public Education & Awareness	2	3	High	On-going	Budget	1,000	City Clerk, Planning Commission City Council
Floodplain Management	Train Planning Commission, Elected Officials and staff when sessions are available	Flood	Yes	Yes On-going	Prevention, Property Protection, Public Education & Awareness	2	3	High	On-going	Budget	1,000	City Clerk Planning Commission City Council
Floodplain Management	Make information available to the public	Flood	Yes	Yes On-going	Prevention, Property Protection, Public Education & Awareness	2	3	High	On-going	Budget	1,000	City Clerk Planning Commission City Council
Emergency Response	Contract with Lewis County for emergency services	All	Yes	Yes On-going	Prevention, Property Protection, Public Education & Awareness	2	2	High	On-going	Budget	1,000	Police Chief Mayor
Emergency Response	Upgrade Radio Communications	All	Yes	Yes On-going	Prevention, Property Protection, Public Education & Awareness	2	2	High	On-going	Budget	1,000	Police Chief Mayor
Emergency Response	Operate Incident Command Post in time of emergency	All	Yes	Yes On-going	Prevention, Property Protection, Public Education & Awareness	2	2	High	On-going	Budget	1,000	Police Chief Mayor
Emergency Response	Continuing Education	All	Yes	Yes, and On-going	Prevention, Property Protection, Public Education & Awareness	2	2	High	On-going	Budget	1,000	Police Chief Mayor
Critical Areas Ordinance Enforcement	Continue coordination with Lewis County for managing development in UGAs to address critical areas concerns	All	No	No	Prevention, Property protection, Natural Resource protection	3	2	Medium	On-going	Budget	1,000	City Clerk Planning Commission City Council
Critical Areas Ordinance Enforcement	Maintain map of critical and hazard areas in City Hall	All	No	No	Prevention, Property protection, Natural Resource protection	3	2	Medium	On-going	Budget	1,000	City Clerk Planning Commission City Council



Critical Areas Ordinance Enforcement	Continuing education for Planning Commission	All	No	No	Prevention, Property protection, Natural Resource protection	3	2	Medium	On-going	Budget	1,000	City Clerk Planning Commission City Council
Protect Utilities	Continue to require water & sewer locates for new developments, new construction and other utility pole or underground placement	All	Yes	Yes Ongoing	Prevention, Property Protection, Natural Resource protection and Structural projects.	2	2	High	2010 Ongoing	Grants Budget	30,000	Public Works Supt.
Protect Utilities	Continue inspections of manholes and storm drain facilities	All	Yes	Yes Ongoing	Prevention, Property Protection, Natural Resource protection and Structural projects.	2	2	High	2010 Ongoing	Grants Budget	30,000	Public Works Supt.
Protect Utilities	Continue routine maintenance & repairs/replacement of backup generators & inspections of water reservoirs.	All	Yes	Yes Ongoing	Prevention, Property Protection, Natural Resource protection and Structural projects.	2	2	High	2010 Ongoing	Grants Budget	30,000	Public Works Supt.
Protect Utilities	Keep ditches clean and infringing trees removed from Water and Wastewater treatment plants, reservoirs and water intake	All	Yes	Yes Ongoing	Prevention, Property Protection, Natural Resource protection and Structural projects.	2	2	High	2010 Ongoing	Grants Budget	30,000	Public Works Supt.
Protect Utilities	Routinely do structural assessments of all critical utility facilities	All	Yes	Yes Ongoing	Prevention, Property Protection, Natural Resource protection and Structural projects.	2	2	High	2010 Ongoing	Grants Budget	30,000	Public Works Supt.
Development Review	Continue using SEPA authority to ensure large projects provide for hazard mitigation	All	No	Yes	Prevention, Property Protection, Public Education & Awareness, Natural Resource protection	3	2	Med	On-going	Budget	0	P.W.S.
Development Review	Continue following guidelines in Morton's Zoning & Development Regulations	All	No	Yes	Prevention, Property Protection, Public Education & Awareness, Natural Resource protection	3	2	Med	On-going	Budget	0	P.W.S.
Wastewater Treatment Plant	Protective clothing to curtail disease outbreak.	Disease outbreak,	Yes	Yes Ongoing	Prevention	2	2	High	Ongoing	Budget	500	Wastewater Treatment Plant Operator and Public Works Supt.
<b>Notes</b> 2010 Plan: rate task(s) if it was in the 2010 Plan Cost Estimate: a very rough estimate cost of implementing task Administrative Responsibility: who will accomplish the task												

# Critical Facilities Mitigation Strategies - Worksheet 3C

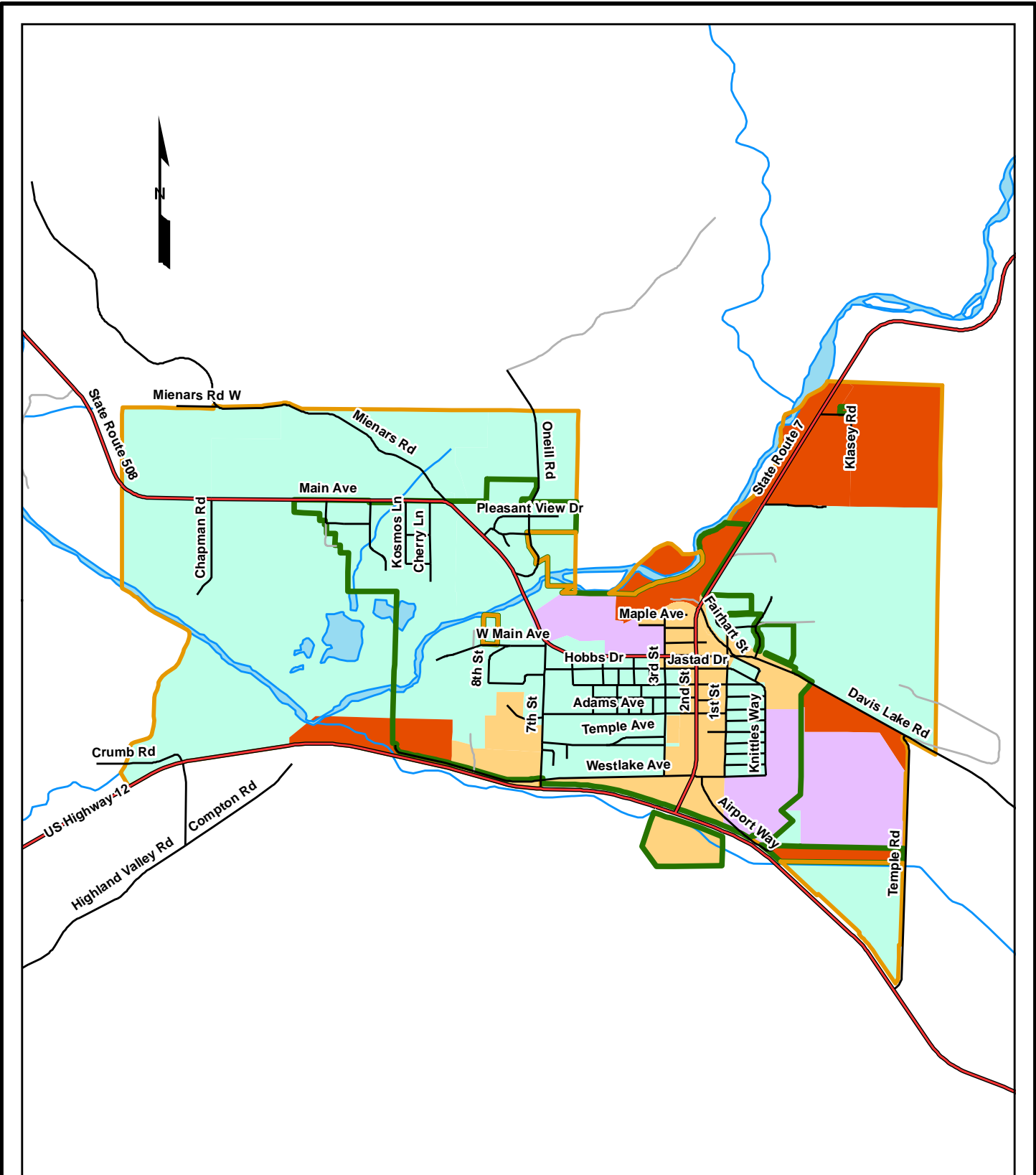
Date: 4/9/2015

Agency: City of Morton

Mitigation Measures		Hazard Addressed (All, flooding, landslide, earthquake, volcanic, etc....)	2010 Plan		Mitigation Identification (Prevention, Property Protection, Public Education & Awareness, Natural Resource Protection, Structural Projects)	Cost-Benefit and Prioritization			Implementation			
Facility	Mitigation Strategy		Task listed in the 2010 Plan (yes or no)	Task completed as part of 2010 Plan (yes or no)		Relative Cost 1 = Highest 3 = Lowest	Relative Effectiveness 1 = Lowest 3 = Highest	Priority Rating (Low, Medium, High)	Timeline (schedule)	Potential Funding (grants, budget, donations, etc..)	Cost Est.	Administrative Responsibility
Water Treatment Plant	Assess building for structural integrity to determine strength in withstanding an earthquake, volcanic ash and snow loading on roof	Earthquake, volcanic eruption, winter storms (wind & snow)	Yes	No	Prevention, property protection,	2	3	High	Ongoing	Budget	1,800	Public Works Supt.
Wastewater Treatment Plant	Inspection to evaluate structural integrity to withstand earthquake, ash and snow loading on roof.	Earthquake, flooding, volcanic activity, winter snow and wind storms	Yes	No	Prevention, property protection	2	2	High	Ongoing	Budget	1,800	Wastewater Treatment Plant Operator and Public Works Supt.
Wastewater Treatment Plant	Culvert cleanout, storm drain and outfall line inspection as protection from flooding.	Flooding,	Yes	Yes - ongoing	Prevention, property protection,	2	2	High	Ongoing	Budget	7,000	Wastewater Treatment Plant Operator and Public Works Supt.
Wastewater Treatment Plant	Replacement of backup generator.	Earthquake, flooding, volcanic activity, winter snow and wind storms, fire	Yes	No	Prevention, property protection, structural projects and natural resource protection	2	2	High	Ongoing	Budget	7,500	Wastewater Treatment Plant Operator and Public Works Supt.
Morton Fire Department - roof	Inspections to evaluate structural integrity to withstand earthquake and snow/ash loading	Earthquake, volcanic activity, winter snow, wind storms.	Yes	No	Prevention, Property protection	2	2	High	On going	Budget	1,800	Fire Chief
Morton Fire Department	Routine maintenance on backup generator.	Earthquake, flooding, volcanic activity, winter snow and wind storms, fire	Yes	Yes. Ongoing maintenance	Prevention, Property protection, Natural resource protection, structural projects	2	2	High	On going	Budget	3500	Fire Chief

Morton Fire Department	Dependable Water supply	Earthquake, volcanic activity, rain storms, fire	Yes	Yes. Second reservoir constructed.	Prevention, Property protection, Natural resource protection, structural projects	2	2	High	Ongoing	Budget	3500	Fire Chief
City Hall & Police Department	Purchase of backup power supply	Earthquake, flooding, volcanic activity, winter snow and wind storms, fire	Yes	No. Have not purchased backup power supply	Prevention, Property protection	2	2	Med.	Ongoing	Budget	9,000	City Clerk & Police Chief
City Hall & Police Department	Upgrade radio communications, training, office protective measures.	Earthquake, volcanic activity, Winter snow, wind & rain storms, fire	Yes	Yes/No. Partially - Radio communications upgraded, office protective measures done	Prevention, Property protection, Public Education & Awareness	2	2	Med.	ongoing	Budget	1,000	City Clerk & Police Chief
City Hall & Police Department	Inspection to evaluate structural integrity to withstand earthquake and snow or ash loading on roof	Earthquake, Volcanic Activity, Winter snow	Yes	No.	Prevention, Property protection	2	2	Med.	ongoing	Budget	1,800	City Clerk & Police Chief
Water Reservoir	Removal of surrounding trees	Earthquake, Landslide, wind, snow and rain storms	Yes	Yes & ongoing	Prevention, Property protection	2	2	Med	ongoing	Budget	3,500	Public Works Supt.
Water Reservoir Bldg – roof	Inspections to evaluate structural integrity to withstand earthquake and snow/ash loading	Earthquake, Landslide, wind, snow and rain storms	Yes	No	Prevention, Property protection	2	2	Med	ongoing	Budget	1,800	Public Works Supt.
Water System Intake	Install Chemical additive pumps at City's back-up emergency well.	Earthquake, Landslides, Flooding	Yes	No	Prevention	1	3	High	2010 & ongoing	Budget/Grants	100,000+	Public Works Supt.
Water System Intake	Routine maintenance on structure.	Earthquake, Landslide, wind, snow & rain storms	Yes	No	Prevention, Property protection	1	3	High	2010 & ongoing	Budget/Grants	10,000	Public Works Supt.
Water System Intake	Roads graded and ditches cleaned. Bridge is a concern	Snow and rain storms	Yes	Yes & ongoing	Prevention, Property protection	1	3	High	2010 & ongoing	Budget/Grants	300,000	Public Works Supt.

**Notes** Facility: Critical facility, Mitigation Strategy: description of mitigation or task, 2010 Plan: rate task(s) if it was in the 2010 Plan, Timeline: give approximate timeframe of completing this task, Cost Estimate: a very rough estimate cost of implementing task, Administrative Responsibility: who will accomplish the task



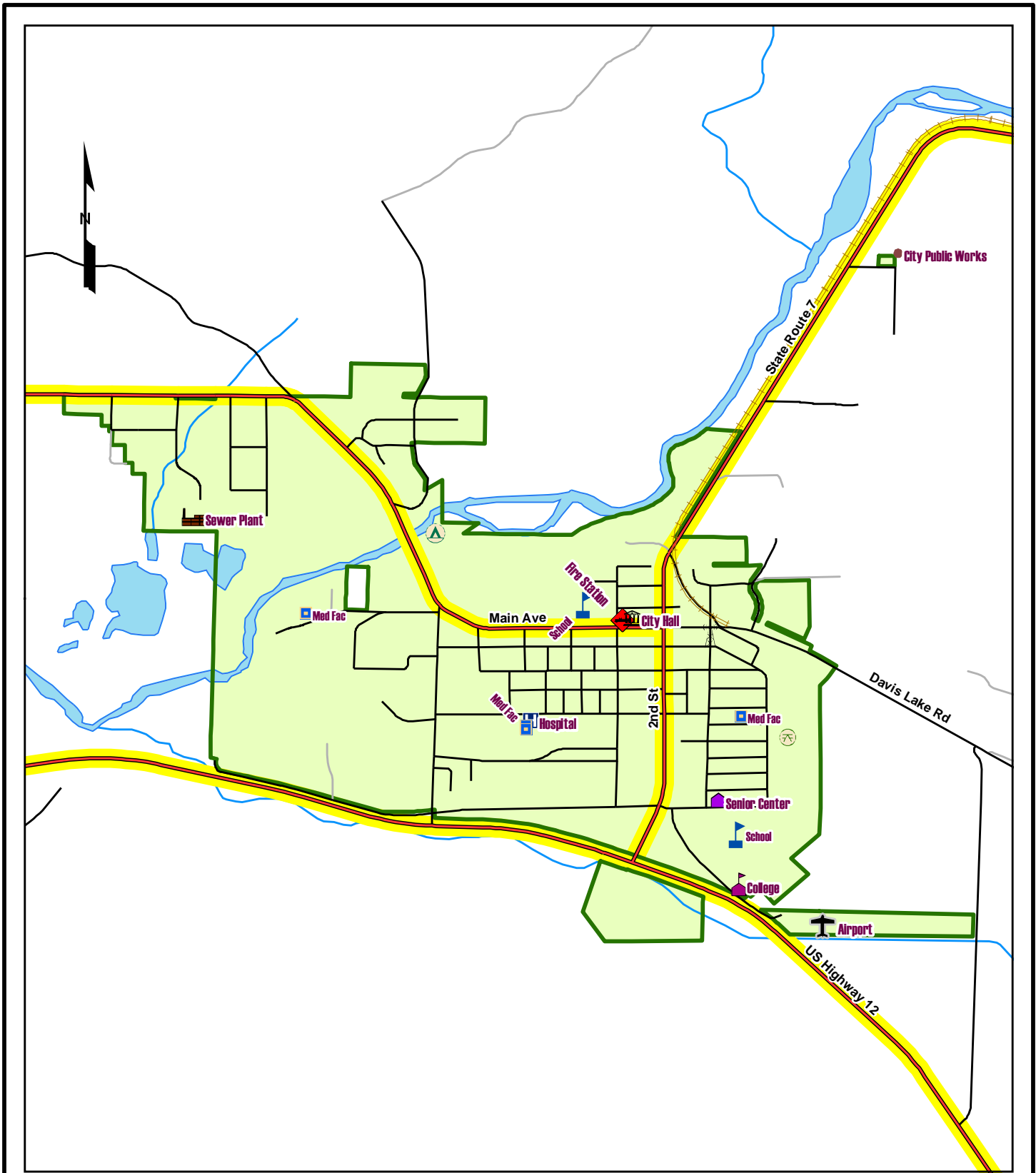
- City Limits
- UGA
- Industrial
- Commercial
- Residential
- OS/ Public
- UGA Default

## ZONING CLASSIFICATIONS

# City of Morton



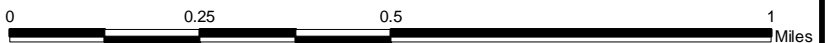
Lewis County, Washington

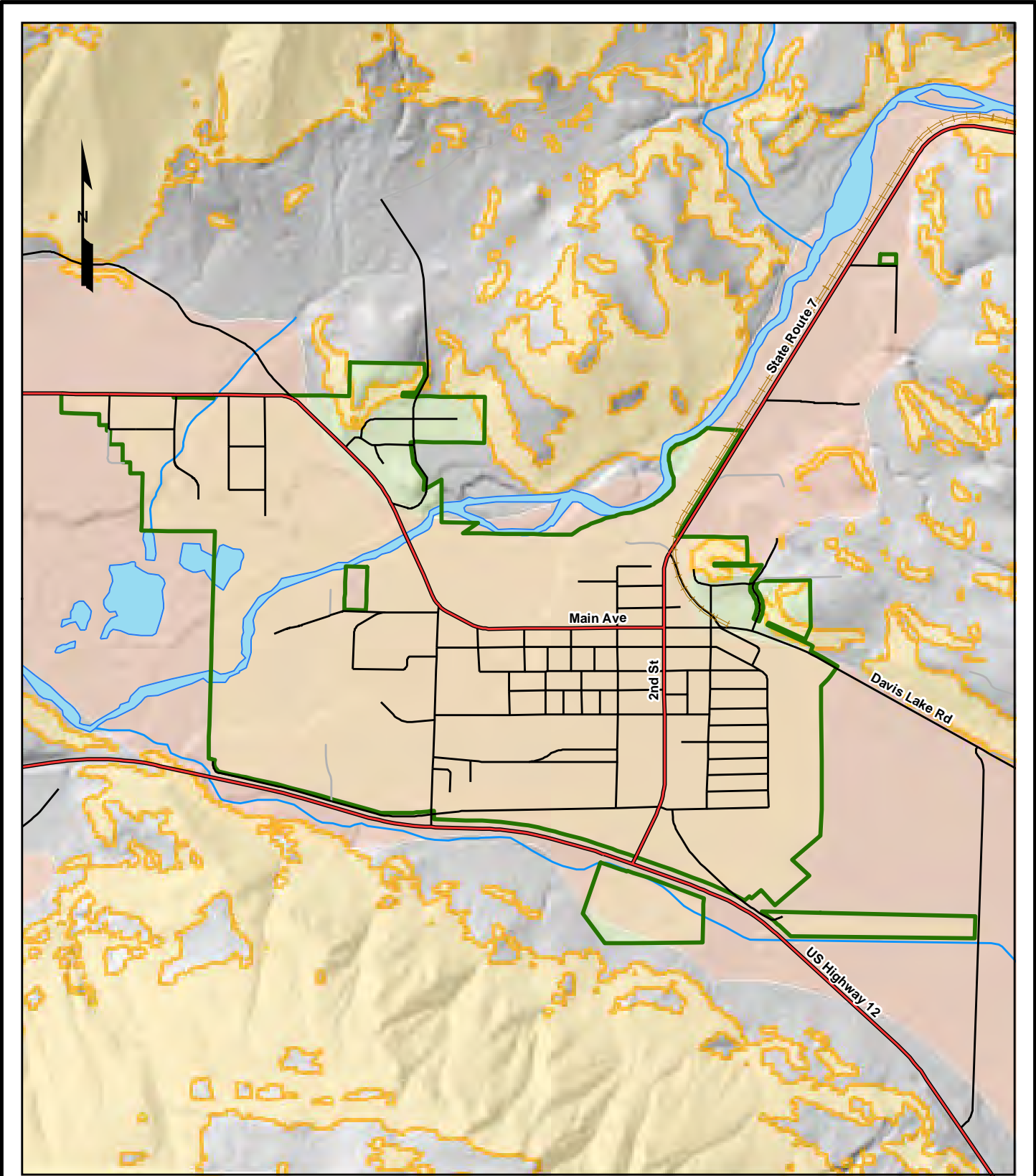


City Limits
  Evacuation Route

Lewis County, Washington  
 2015 Multi-jurisdictional Hazard Mitigation Plan

## Morton Facilities & Evacuation Routes

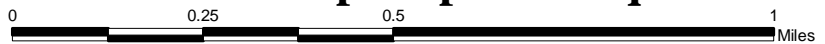


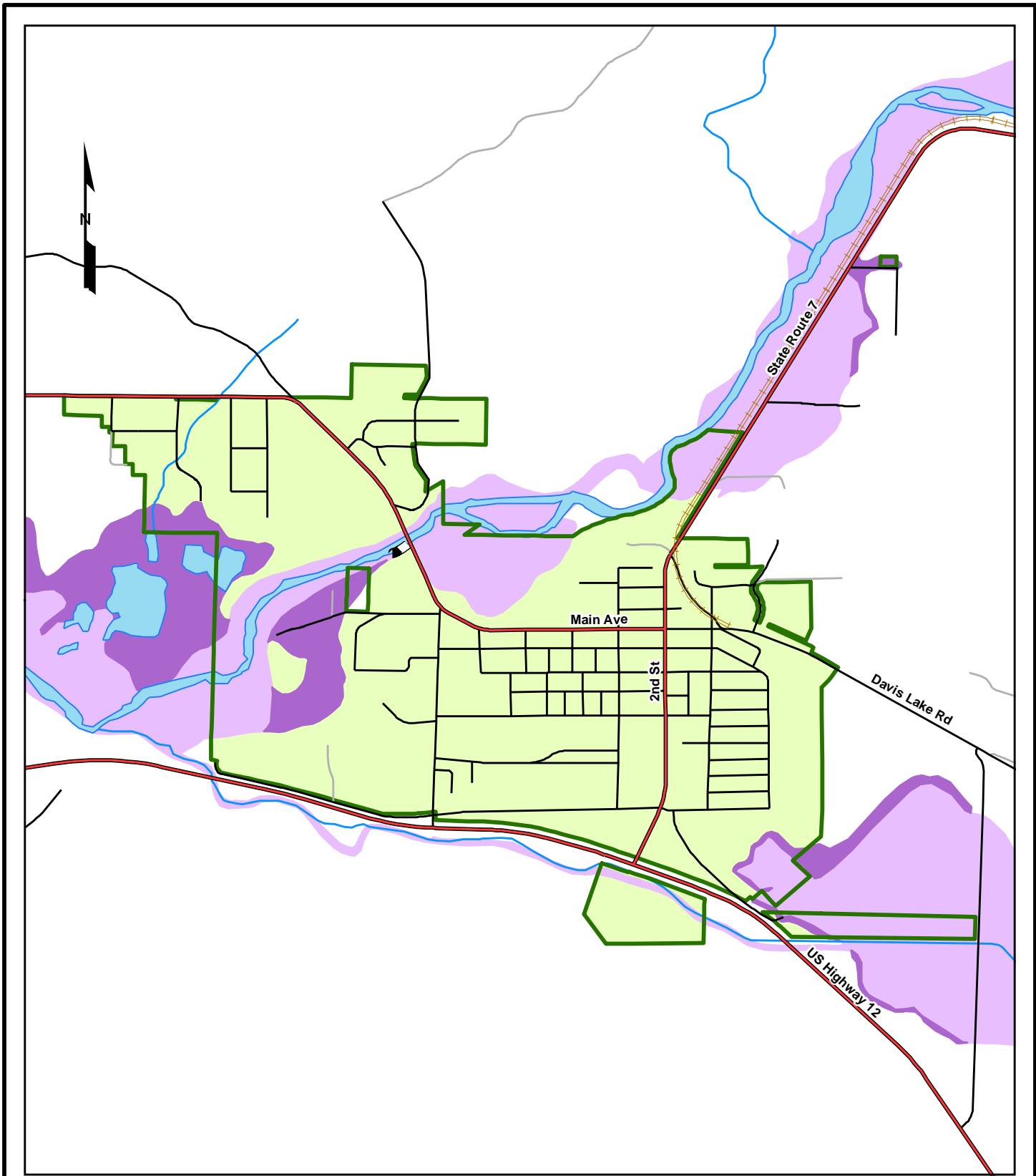


- City Limits
- Mod to High Liquefaction Potential
- Slope > 30%

Lewis County, Washington  
2015 Multi-jurisdictional Hazard Mitigation Plan

**Morton                      Steep Slopes & Liquefaction**

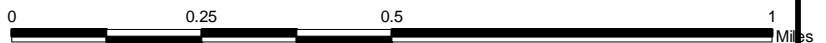




- City Limits
- 100-yr flood
- 500-yr flood
- Dam Inundation
- Levees/revet.

Lewis County, Washington  
2015 Multi-jurisdictional Hazard Mitigation Plan

## Morton      Facilities & Evacuation Routes



## Building Damage Count by General Occupancy

October 06, 2009

	Count of Buildings (#) by Range of Damage (%)							Total
	None	1-10	11-20	21-30	31-40	41-50	Substantial	
<b>Washington</b>								
<b>Lewis</b>								
Agriculture	0	0	0	0	0	0	0	0
Commercial	0	0	0	0	0	0	0	0
Education	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0
Industrial	0	0	1	0	0	0	0	1
Religion	0	0	0	0	0	0	0	0
Residential	8	0	0	5	0	0	0	13
<b>Total</b>	<b>8</b>	<b>0</b>	<b>1</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>14</b>
<b>Total</b>	<b>8</b>	<b>0</b>	<b>1</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>14</b>
<b>Scenario Total</b>	<b>8</b>	<b>0</b>	<b>1</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>14</b>

Special Notice Regarding Building Count:

Unlike the earthquake and hurricane models, the flood model performs its analysis at the census block level. This means that the analysis starts with a small number of buildings within each census block and applies a series of distributions necessary for analyzing the potential damage. The application of these distributions and the small number of buildings make the flood model more sensitive to rounding errors that introduces uncertainty into the building count results. Please use these results with suitable caution.

*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.*

**Study Region:** Morton Flood  
**Scenario:** Morton 100-Year  
**Return Period:** 100



## Direct Economic Losses for Buildings

October 06, 2009

All values are in thousands of dollars

	Capital Stock Losses			Building Loss Ratio %	Income Losses				Total Loss
	Cost Building Damage	Cost Contents Damage	Inventory Loss		Relocation Loss	Capital Related Loss	Wages Losses	Rental Income Loss	
<b>Washington</b>									
Lewis	1,343	3,514	533	6.6	6	4	33	0	5,503
<b>Total</b>	<b>1,343</b>	<b>3,514</b>	<b>533</b>	<b>6.6</b>	<b>6</b>	<b>4</b>	<b>33</b>	<b>0</b>	<b>5,503</b>
<b>Scenario Total</b>	<b>1,343</b>	<b>3,514</b>	<b>533</b>	<b>6.6</b>	<b>6</b>	<b>4</b>	<b>33</b>	<b>0</b>	<b>5,503</b>

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: Morton Flood  
 Scenario: Morton 100-Year  
 Return Period: 100

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## Shelter Summary Report

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October 06, 2009

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	# of Displaced People	# of People Needing Short Term Shelter
<b>Washington</b>		
Lewis	76	40
<b>Total</b>	<b>76</b>	<b>40</b>
<b>Scenario Total</b>	<b>76</b>	<b>40</b>

---

*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.*

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**Study Region:** Morton Flood  
**Scenario:** Morton 100-Year  
**Return Period:** 100

Page : 1 of 1



JURISDICTION City of Mossyrock

**HAZARD MITIGATION PLAN POINT OF CONTACT**

Primary Point of Contact	Alternate Point of Contact
Thomas Meade, Mayor PO Box 96 Mossyrock WA 98564 (360) 983-3300 <a href="mailto:cityofmossyrock@tds.net">cityofmossyrock@tds.net</a>	

**Profile:** The City of Mossyrock is located on U.S. 12 where Washington Route 122 converge. Mossyrock is approximately 20 miles east of Interstate 5. According to the United States Census Bureau, the city has a total area of 0.4 square miles. The City is nestled between Mayfield and Rifle lakes along Klickitat Creek. The City of Mossyrock is characterized by a broad floodplain and low terraces surrounded by upland valleys of low to moderate relief that have broad, rounded ridges.

**Ranking of Identified Hazards**

Hazard Type	Previous Occurrence?		Likely to Experience?		Probability				Extent				Percentage	Rank
	Yes	No	Yes	No	Highly Likely (100% next yr)	Likely (10-100% or 1 in 10 yrs)	Possible (1-10% next year or 1/100 yrs)	Unlikely (less than 1% in 100 yrs)	Catastrophic: more than 50% affected	Severe: 25-50% affected	Limited: 0-25% affected	None: 0% affected		
<b>Rating Points</b>	<b>20</b>	<b>0</b>	<b>10</b>	<b>0</b>	<b>20</b>	<b>10</b>	<b>6</b>	<b>0</b>	<b>20</b>	<b>10</b>	<b>4</b>	<b>0</b>		
Extreme Heat	20		10			10				10			50%	1
Winter Storm	20		10			10				10			50%	1
Earthquake	20		10			10					4		44%	2
Flooding	20		10			10					4		44%	2
Volcano	20		10			10					4		44%	2
Landslide							6			10			16%	3
Debris Flow						10					4		14%	4
Wind Storm						10					4		14%	4
Dam Failure							6				4		10%	5
Hailstorm							6				4		10%	5

**Probability:**  
 Highly Likely: Near 100% probability in the next year.  
 Likely: Between 10 and 100% probability in the next year, or at least one chance in 10 years.  
 Possible: Between 1 and 10% probability in the next year, or at least one chance in next 100 years.  
 Unlikely: Less than 1% probability in next 100 years.

**Extent of damage is defined as follows:**  
 Catastrophic: More than 50% of the jurisdiction can be affected  
 Severe: 25 to 50% of the jurisdiction can be affected  
 Limited: 0 to 25% of the jurisdiction can be affected  
 None: 0% of the jurisdiction can be affected

**Current Hazard Mitigation Codes/Plans/Ordinances**

- Lewis County Multi-Jurisdictional Hazard Mitigation Plan adopted June 2010.
- Comprehensive Plan, December 2008
- Critical Ordinance
- Zoning Ordinance
- Lewis County Building Codes



## JURISDICTION City of Mossyrock

- Lewis County Floodplain Management Plan
- Capital Facilities Plan

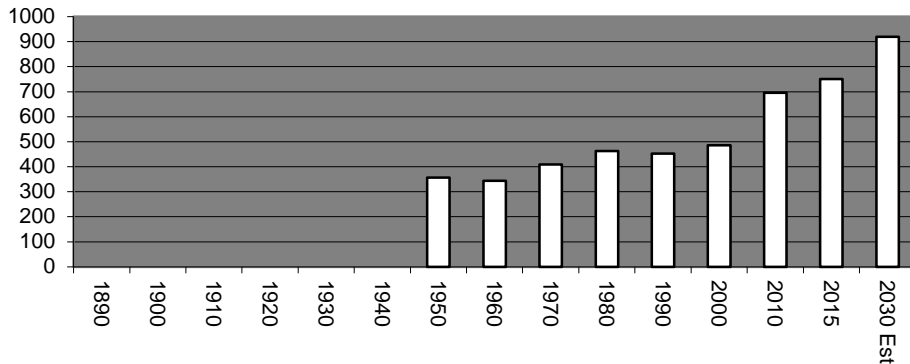
### Agency Specific Natural Hazard Event History – 1980 to 2015

Type of Disaster	FEMA Disaster #	Date	Comments
Severe Winter Storm and Record and Near Record Snow	DR-1825	3/2/2009	Incident 12/12/2008-1/5/2009
Severe Winter Storm, Landslides, Mudslides, Flooding	DR-1817	1/30/2009	1/6-/16/2009
Severe Storms, Flooding, Landslides, Mudslides	DR-1734	12/8/2007	Incident 12/1-12/17/2007
Severe Winter Storm, Landslides, Mudslides	DR-1682	2/14/2007	Incident 12/14-12/15/2006
Severe Storms, Flooding, Landslides, Mudslides	DR-1671	12/12/2006	Incident 11/2-11/11/2006
Earthquake	DR-1361	3/1/2001	Incident 2/28-3/16/2001
Severe Winter Storms/Flooding	DR-1159	1/17/1997	Incident 12/26/1996-2/10/1997
Severe Storms, Flooding	DR-1100	Feb. 9, 1996	Incident 1/26-2/23/1996
Storms, High Winds, Floods	DR-1079	Jan. 3, 1996	Incident 11/7-Dec 18, 1995
Severe Storm, High Winds	DR-981	March 4, 1993	Incident 1/20-1/21/1993
Severe Storms, Flooding	DR-784	Dec 15, 1986	Incident 11/22-11/29/1986
Volcanic Eruption – Mt. St. Helens	DR-623	May 21, 1980	

### Demographics

Population	1990	2000	2010	2015	2030 -Projected
	452	486	695	750	920

## MOSSYROCK



Quick Facts (US Census)	Mossyrock	Washington
Population, percent change - April 1, 2010 to July 1, 2013		3.7%
Persons under 5 years, percent, 2010	4.5%	6.5%
Persons under 18 years, percent definition and source info Persons under 18 years, percent, 2010	20.5%	23.5%
Persons 65 years and over, percent definition and source info Persons 65 years and over, percent, 2010	16.9%	12.3%
High school graduate or higher, percent of persons age 25+, 2009-2013		90.0%
Bachelor's degree or higher, percent of persons age 25+, 2009-2013		31.9%
Homeownership rate, 2009-2013		63.2%
Housing units in multi-unit structures, percent, 2009-2013		25.6%
Median value of owner-occupied housing units, 2009-2013		\$262,100
Per capita money income in past 12 months (2013 dollars), 2009-2013		\$30,742
Median household income definition and source info Median household income, 2009-2013	38,971	\$59,478
Persons below poverty level, percent definition and source info Persons below poverty level, percent, 2009-2013	18%	13.4%

Source: U.S. Census – Quickfacts, Date Accessed: July 12, 2015. Website: quickfacts.census.gov

### Land Designations

Land Area within the existing city limits:	192
Land area within urban growth area:	323
Total land area within city limits and urban growth area	515
Land area of park, forest, and/or open space	391
Land area of residential	159
Land area of commercial	71
Land area of industrial	0

### Current and Anticipated Development and Population Trends



## JURISDICTION City of Mossyrock

The City of Mossyrock anticipates slow to no growth (under 2%). The population for Mossyrock by 2030 is estimated to be around 920 people. The City envisions maintaining its two active retail areas, preserving and adding to its base of open space and agricultural land, and maintaining neighborhoods with diverse housing options.

The Neighborhood District is structured to provide single family and duplex homes, schools, churches, parks, agricultural activities, manufactured homes and apartments, home-businesses, professional offices, and bed and breakfast business. The density for this district will be no more than five dwelling units per acre for single family residences and 25 dwelling units per acre for apartments. The Market District provides for shopping and service uses including retail sales and services, small equipment sales and repair, offices, public buildings, motels, recreational vehicle parks and light industry.

### Infrastructure

Categories	2014	Approximate Value (\$)
Miles of Street and Roads	5.5	\$870,000
Miles of Sanitary Sewer	4	\$317,000
Miles of Storm Sewer	2	\$106,000
Miles of water lines	7	\$185,000
Miles of Electrical lines	Lewis County PUD	

### Critical Facilities

Facility	Address	Approximate Value (\$)
City Hall	231 E State ST.	\$ 97,700
Lift Station #1, #2		
Police Dept.	231 E State ST.	
WW Treatment Plant	3963 E Hwy 112	
PW Lab	3963 E Hwy 112	
Wells (2)		
Community Center	219 E State St.	\$ 224,300
Reservoirs (2)	3963 E Hwy 112	

### Flood Information

Percentage of existing city limits within the 100-year flood plain	0%
Assessor's valuation of private properties within the 100-year flood plain	

### Critical Facilities within the 100-year flood plain

Facility	Address	Approximate Value (\$)
P.W. LAB	3963 E Hwy 112	30,000

### NFIP/CRS Section

NFIP/CRS Community	No
Community Rating Classification	N/A
Building Code Effective Grading Schedule	
NFIP Membership	No
NFIP Compliance Violations?	N/A
FEMA Floodplain Maps Adopted	FEMA has not studied Mossyrock
Recently Community Assistant Visit or Community Assistance Contact	N/A
Floodplain Administrator	No
Certified Floodplain Manager	No
Floodplain Ordinance Adoption	
StormReady Jurisdiction	No
Firewise Jurisdiction	No

### Previous Action Plan Implementation



## JURISDICTION City of Mossyrock

Mitigation Strategy	Completed 2010-2014	Carried Over to 2015 Plan	Removed or No Longer Feasible
Lift Station #1:	No	Yes	
Purchase generator and set at site, sandbags for flood control (Lift Station #2)	No	Yes	
Access building for seismic/ash load capabilities (City Hall)	No	Yes	
Video camera system, alarm for unauthorized entry, assessment for structural retrofit	No	Yes	
Video camera system, alarm for unauthorized entry, assessment for structural retrofit	No	Yes	
Police Department: Portable generator to run radio base station. Purchase satellite phone	No	Yes	
Gravel and sandbags for flood control. Purchase video camera system. (Wastewater	No	Yes	
Sandbags for flood control, have gravel at site, purchase generator, alarm system for	No	Yes	
Access existing generator to power lift station. (Lift #1)	No	Yes	
Access existing generator to power lift station (Lift #2)	No	Yes	
Elevate above flood level (Lift #2)	No	Yes	
Have sandbags available during flood event (Lift #2)	No	Yes	
Access well and determine if a generator can run it. Have sandbags on hand in case of hazard (Wells)	No	Yes	

### Attached Documents

- Land Use Map
- Public Facilities Map
- Hazard Identification Worksheet(s)
- Mitigation Strategies Worksheet(s)
- Steep Slopes and Liquefaction Map
- Flood Hazard Map
- HAZUS-MH: Flood Results

# HAZARD IDENTIFICATION WORKSHEET

Date Completed: 7/2015

Which Agency are you representing? **City of Mossyrock**

Name:	Title:
Email:	Telephone #:
Address:	City: ZIP:

**For each Hazard, please fill out the table below based on the following questions:**

- **Previous Occurrence:** Is there a historic record of this type of hazard happening here? *Yes or No*
- **Likely to Experience:** Are you likely to experience this type of hazard in the future? *Yes or No*
- **Probability:** Based on history, what is the likelihood of this event happening again? *Highly Likely, Likely, Possible, Unlikely*
- **Extent:** If this hazard event were to happen, how extensive could the damage be? *Catastrophic, Severe, Limited, None*

Hazard Type	Previous Occurrence?		Likely to Experience?		Probability				Extent			
	Yes	No	Yes	No	Highly Likely	Likely	Possible	Unlikely	Catastrophic	Severe	Limited	None
Avalanche		X		X				X				X
Coastal Erosion		X		X				X				X
Coastal Storm		X		X				X				X
Dam Failure		X		X			X				X	
Debris Flow		X		X		X					X	
Drought		X		X				X			X	
Earthquake	X		X			X					X	
Expansive Soils		X		X				X				X
Extreme Heat	X		X			X				X		
Flooding	X		X			X					X	
Hailstorm		X		X			X				X	
Hurricane		X		X				X				X
Land Subsidence		X		X				X				X
Landslide		X		X			X			X		
Levee Failure		X		X				X				X
Severe Thunder Storm		X		X				X			X	
Severe Wind Storm		X		X		X					X	
Severe Winter Storm	X		X			X				X		
Tornado		X		X				X				X
Tsunami		X		X				X				X
Volcano	X		X			X					X	
Wildfire		X		X				X			X	
Other:												

<b>Which of the following does your agency have? (Circle One)</b>		
Comprehensive Plan	Yes / No / NA	Date completed: 12/11/08
Critical Areas Ordinance	Yes / No / NA	Date completed:
Does your agency have an emergency plan?	Yes / No / NA	

**ASSET INVENTORY WORKSHEET 2A**

Date Completed: July 2015

Which Agency are you representing? **Mossyrock**

Name: \_\_\_\_\_ Title: \_\_\_\_\_

Email: \_\_\_\_\_ Telephone #: \_\_\_\_\_

Address: \_\_\_\_\_ City: \_\_\_\_\_ ZIP: \_\_\_\_\_

**Task A: Inventory the critical facilities that can be damaged by a hazard event.**  
Please fill out the table below.

Name of Building/Business	Address	Contact Information (Telephone #)	Occupancy #	Structure Use								
				Educational	Government	Hospital	Non-/Profit	Public Safety	Residential	Utilities	Other	
City Hall	231 E State ST.	360.983.3300			X							
Lift Station #1											X	
Lift Station #2											X	
Police Dept.	231 E State ST.	360.983.8115						X				
WW Treatment Plant	3963 E Hwy 112	360.983.8001									X	
PW Lab	3963 E Hwy 112	360.983.8001									X	
Wells (2)											X	
Community Center	219 E State St.	360.983.3300										X
Reservoirs (2)	3963 E Hwy 112	360.983.8001									X	



**Which Agency are you representing:**      **Mossyrock**

**Name:** Doneia Santiago      **Title:** City Clerk

**Email:** doneias@tds.net      **Telephone #:** 360-983-3300

**Address:** 231 E State St      **City:** Mossyrock      **Zip:** 98564

**Task B: Compile a detailed inventory of what can be damaged by a hazard event.**  
 Inventory the assets (critical facilities, businesses, historic, cultural, natural resource areas and areas of special consideration) that can be damaged by a hazard event.

- |  |   |  |
|--|---|--|
| <p><b>HAZARDS</b></p> <ul style="list-style-type: none"> <li>1. Avalanche</li> <li>2. Dam Failure</li> <li>3. Debris Flow</li> <li>4. Drought</li> <li>5. Earthquake</li> <li>6. Expansive Soils</li> <li>7. Extreme Heat</li> </ul> | <ul style="list-style-type: none"> <li>8. Flooding</li> <li>9. Hailstorm</li> <li>10. Hurricane</li> <li>11. Land Subsidence</li> <li>12. Landslide</li> <li>13. Levee Failure</li> <li>14. Severe Thunder Storm</li> </ul> | <ul style="list-style-type: none"> <li>15. Severe Wind Storm</li> <li>16. Severe Winter Storm</li> <li>17. Tornado</li> <li>18. Volcano</li> <li>19. Wildfire</li> </ul> |
| <p><b>BUILDING MATERIALS</b></p>   |   |  |
| <ul style="list-style-type: none"> <li>a. Masonry</li> <li>b. concrete</li> <li>c. Concrete Block</li> <li>d. Brick</li> <li>e. Stick</li> <li>f. Metal</li> <li>g. Steel</li> <li>h. Asphalt</li> </ul>                             |   |  |

Name or description of Asset (building)	Address	Hazard(s) List all that apply (See legend above)	Critical Facility	Transportation	Utility System	Comm. System	Economic Assets	Special consideration	Historic/Other	Size of Building (sq. ft.)	Replacement Value (\$)	Contents Value (\$)	Displacement (\$ per day)	Occupancy or capacity (#)	Structural – building materials
City Hall	231 E State ST.	2,5,16,18	X							5244	150,000	60,000			b,e,f
Lift Station #1	130 Isbell Rd	2,5,18	X		X						30,000				
Lift Station #2	Meadow Ln	2,5,18	X		X						30,000				
Police Dept.	231 E State ST.	2,5,16,18	X								See City Hall				
WW Treatment Plant/	3963 E Hwy 112	2,5,8,16,18,19	X		X						See PW Lab				
PW Lab	3963 E Hwy 112	2,5,8,16,18,19	X		X					1536	1,250,000	200,000			b,c,e,f,g,h
Wells (2)	130 Isbell RD	5,			X					1852	165,000				e,f,g
Community Center	221 E State St.	5,								4000	228,600	30,000			b,e
Reservoirs (3)	Coleman Rd/Mossyrock Rd E	5,	X		X						200,000			220,000 gals	b,c,f

# ASSET INVENTORY WORKSHEET 2C

Date Completed: 7/2015

Which Agency are you representing? **City of Mossyrock**

<b>Name:</b>	<b>Title:</b>
<b>Email:</b>	<b>Telephone #:</b>
<b>Address: 231 E State St./PO Box 96</b>	<b>City: Mossyrock ZIP: 98564</b>

**Task C. Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.**

Hazard: **FLOOD**

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	322	0	0						
Commercial	45	0	0						
Industrial	-	0	0						
Agricultural	3	0	0						
Religious	5	0	0						
Non-profit	2	0	0						
Government	3	0	0						
Education	8	0	0						
Utilities	6	2	33%	\$1,200,000	140,000	12%			
<b>Total</b>	<b>394</b>	<b>2</b>	<b>1%</b>	<b>\$32,504.225</b>	<b>140,000</b>	<b>43%</b>	<b>688</b>	<b>0</b>	<b>0</b>

**Task D. Determine whether (and where) you want to collect additional inventory data. (circle one)**

- Do you know where your greatest damages may occur in your hazard areas? **Yes** or No
- Do you know whether your critical facilities will be operational after a hazard event? **Yes** or No
- Is there enough data to determine which assets are subject to the greatest potential damages? **Yes** or No
- Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards? **Yes** or No
- Is there enough data to determine whether the historic, environmental, political, or cultural significance are vulnerable to potential hazards? **Yes** or No
- Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence? Yes or **No**
- Is additional data needed to justify the expenditure of community or state funds for mitigation? Yes or **No**

# Ranking Mitigation Strategies: Using STAPLEE - Worksheet 3A

Date: July 2015

Agency: Mossyrock

Category Description/Action Items (Mitigation Strategy)	Hazard Addressed (flood, earthquake, wind, winter, landslide, etc.)	Social (Yes or No)	Technical (Yes or No)	Administrative (Yes or No)	Political (Yes or No)	Legal (Yes or No)	Economical (Yes or No)	Environmental (Yes or No)	Responsible Department/Agency
Lift Station #1: Purchase generator and set at site, sandbags for floor control (Lift Station #1)	All	N	N	Y	N	N	Y	N	PW
Purchase generator and set at site, sandbags for flood control (Lift Station #2)	All	N	N	Y	N	N	Y	N	PW
Access building for seismic/ash load capabilities (City Hall)	Volcano	N	Y	Y	N	N	Y	N	PW
Video camera system, alarm for unauthorized entry, assessment for structural retrofit (Reservoir #1 & #2)	All	N	N	Y	N	N	Y	N	PW
Video camera system, alarm for unauthorized entry, assessment for structural retrofit (Reservoir #3)	All	N	N	Y	N	N	Y	N	PW
Police Department: Portable generator to run radio base station. Purchase satellite phone (PD)	All	N	N	Y	N	N	Y	N	Police
Gravel and sandbags for flood control. Purchase video camera system. (Wastewater Treatment Plant)	Flood	N	N	Y	N	N	Y	N	PW
Sandbags for flood control, have gravel at site, purchase generator, alarm system for unauthorized entry. (Well)	Flood	N	N	Y	N	N	Y	N	PW
Access existing generator to power lift station. (Lift #1)	All	N	Y	Y	N	N	Y	N	PW
Access existing generator to power lift station (Lift #2)	All	N	Y	Y	N	N	Y	N	PW
Elevate above flood level (Lift #2)	Flood	N	Y	Y	N	N	Y	N	PW
Have sandbags available during flood event (Lift #2)	Flood	N	N	Y	N	N	Y	N	PW
Access well and determine if a generator can run it. Have sandbags on hand in case of hazard (Wells)	All	N	N	Y	N	N	Y	N	PW

**Notes**

S: Social – The public must support the overall implementation strategy and specific mitigation actions.

T: Technical – It is important to determine if the proposed action is technically feasible, will help reduce losses in the long term, and has minimal secondary impacts.

A: Administrative – Under this part of the evaluation criteria, examine the anticipated staffing, funding, and maintenance requirements for the mitigation action to be implemented.

P: Political – Understanding how your community and State leadership feels about issues related to the environment, economic development, safety, and emergency management.

L: Legal – When considering this criterion, determine whether your agency has the legal authority at the State, or local level to implement the action, or if new laws will need to be passed.

E: Economic – Cost-effective mitigation actions that can be funded in current or upcoming budget cycles are much more likely to be implemented.

E: Environmental – Evaluate whether, when implementing mitigation actions, there would be negative consequences to environmental assets (wetlands, endangered species, protected resources).

# Mitigation Strategies – Worksheet 3B

Date: July 2015

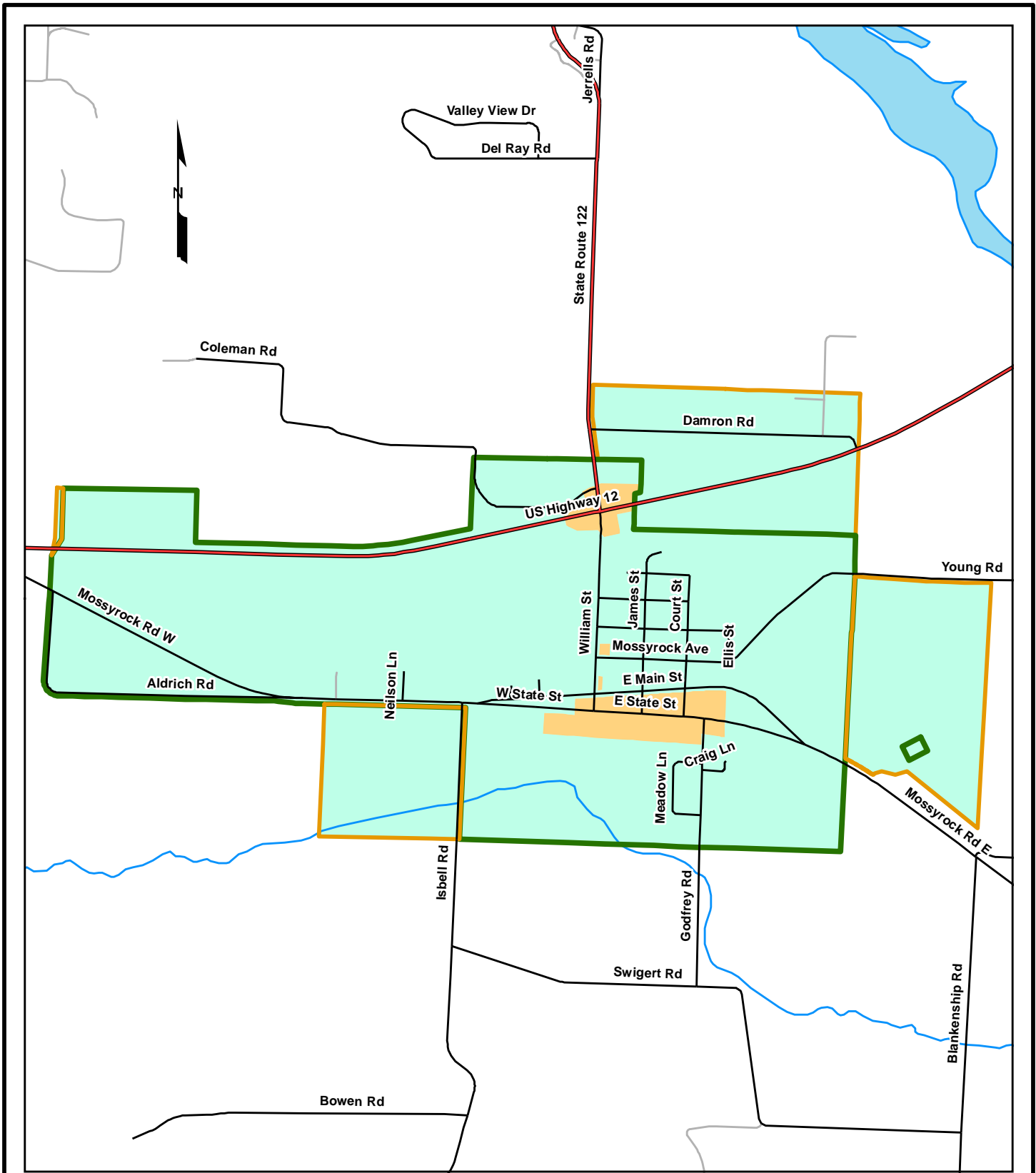
Agency: Mossyrock

Mitigation Measures		Hazard Addressed (flood, earthquake, wind, winter, landslide, etc.)	2010 Plan		Mitigation Identification (Prevention, Property Protection, Public Education & Awareness, Natural Resource Protection, Structural Projects)	Cost-Benefit and Prioritization			Implementation			
Category	Description/Action Items (Mitigation Strategy)		Task in 2010 Plan (yes or no)	Task completed as part of 2010 Plan (yes or no)		Relative Cost 1 = Highest 3 = Lowest	Relative Effectiveness 1 = Lowest 3 = Highest	Priority Rating (Low, Medium, High)	Timeline (schedule for approx. completion)	Potential Funding (grants, budget, donations, etc..)	Cost Est.	Administrative Responsibility
Hazard Management	Lift Station #1: Purchase generator and set at site, sandbags for floor control (Lift Station #1)	All	Yes	No (on-going)	Prevention, Property Protection	2	3	2	2015-2020	Grants, Budget		PW
Hazard Management	Purchase generator and set at site, sandbags for flood control (Lift Station #2)	All	Yes	No (on-going)	Prevention, Property Protection	2	3	2	2015-2020	Grants, Budget		PW
Hazard Management	Access building for seismic/ash load capabilities (City Hall)	Volcano	Yes	No (on-going)	Prevention, Property Protection	2	3	2	2015-2020	Grants, Budget		PW
Hazard Management	Video camera system, alarm for unauthorized entry, assessment for structural retrofit (Reservoir #1 & #2)	All	Yes	No (on-going)	Prevention, Property Protection	2	3	2	2015-2020	Grants, Budget		PW
Hazard Management	Video camera system, alarm for unauthorized entry, assessment for structural retrofit (Reservoir #3)	All	Yes	No (on-going)	Prevention, Property Protection	2	3	2	2015-2020	Grants, Budget		PW
Hazard Management	Police Department: Portable generator to run radio base station. Purchase satellite phone (PD)	All	Yes	No (on-going)	Prevention, Property Protection	2	3	2	2015-2020	Grants, Budget		Police
Hazard Management	Gravel and sandbags for flood control. Purchase video camera system. (Wastewater Treatment Plant)	Flood	Yes	No (on-going)	Prevention, Property Protection	2	3	2	2015-2020	Grants, Budget		PW

Hazard Management	Sandbags for flood control, have gravel at site, purchase generator, alarm system for unauthorized entry. (Well)	Flood	Yes	No (on-going)	Prevention, Property Protection	2	3	2	2015-2020	Grants, Budget		PW
Hazard Management	Access existing generator to power lift station. (Lift #1)	All	Yes	No (on-going)	Prevention, Property Protection	2	3	2	2015-2020	Grants, Budget		PW
Hazard Management	Access existing generator to power lift station (Lift #2)	All	Yes	No (on-going)	Prevention, Property Protection	2	3	2	2015-2020	Grants, Budget		PW
Hazard Management	Elevate above flood level (Lift #2)	Flood	Yes	No (on-going)	Prevention, Property Protection	2	3	2	2015-2020	Grants, Budget		PW
Hazard Management	Have sandbags available during flood event (Lift #2)	Flood	Yes	No (on-going)	Prevention, Property Protection	2	3	2	2015-2020	Grants, Budget		PW
Hazard Management	Access well and determine if a generator can run it. Have sandbags on hand in case of hazard (Wells)	All	Yes	No (on-going)	Prevention, Property Protection	2	3	2	2015-2020	Grants, Budget		PW

**Notes**

2010 Plan: rate task(s) if it was in the 2010 Plan  
 Cost Estimate: a very rough estimate cost of implementing task  
 Administrative Responsibility: who will accomplish the task



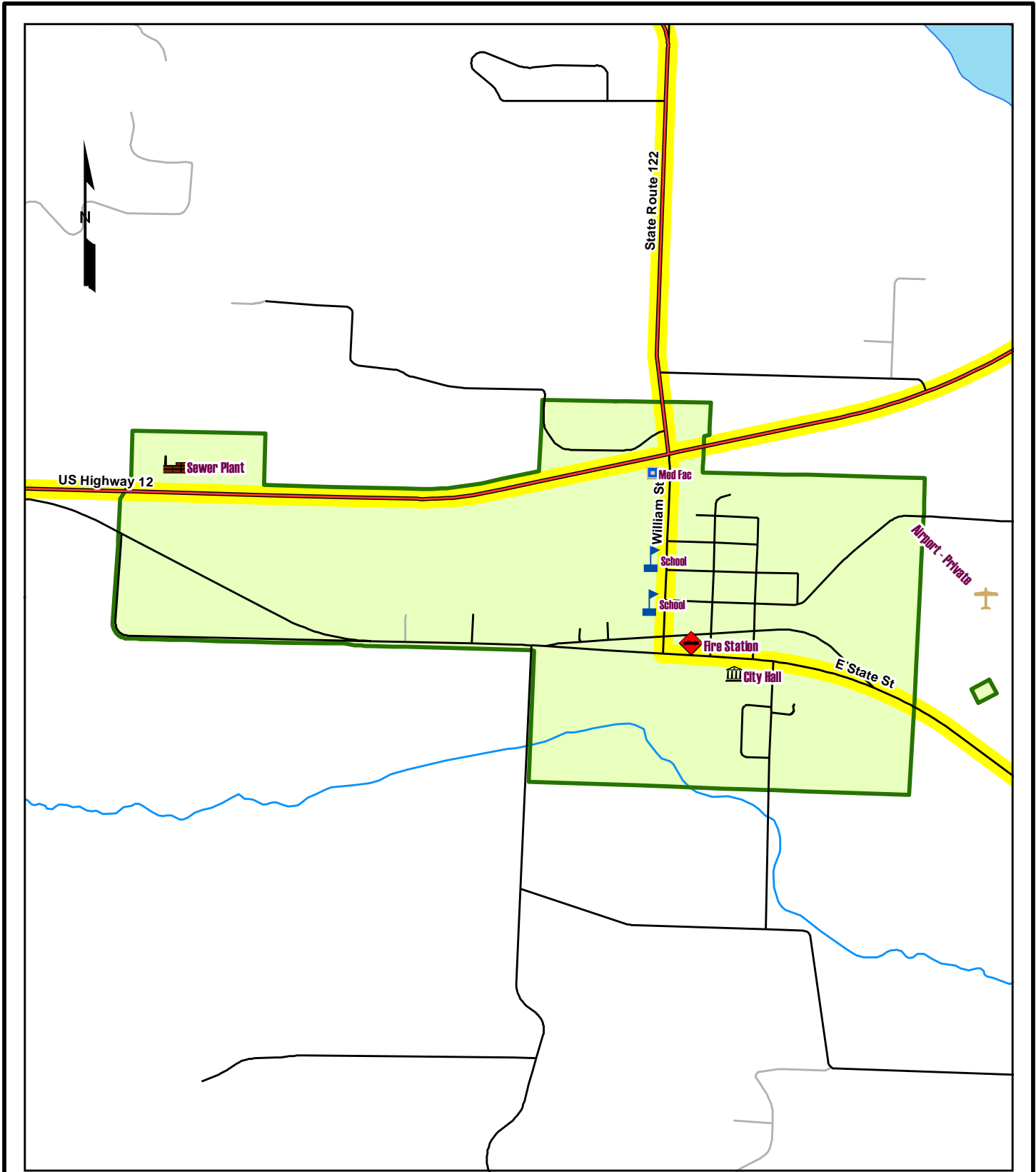
- City Limits
- UGA
- Industrial
- Commercial
- Residential
- OS/ Public
- UGA Default

## ZONING CLASSIFICATIONS

# City of Mossyrock



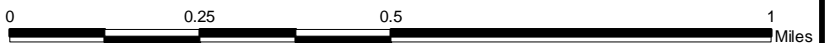
Lewis County, Washington

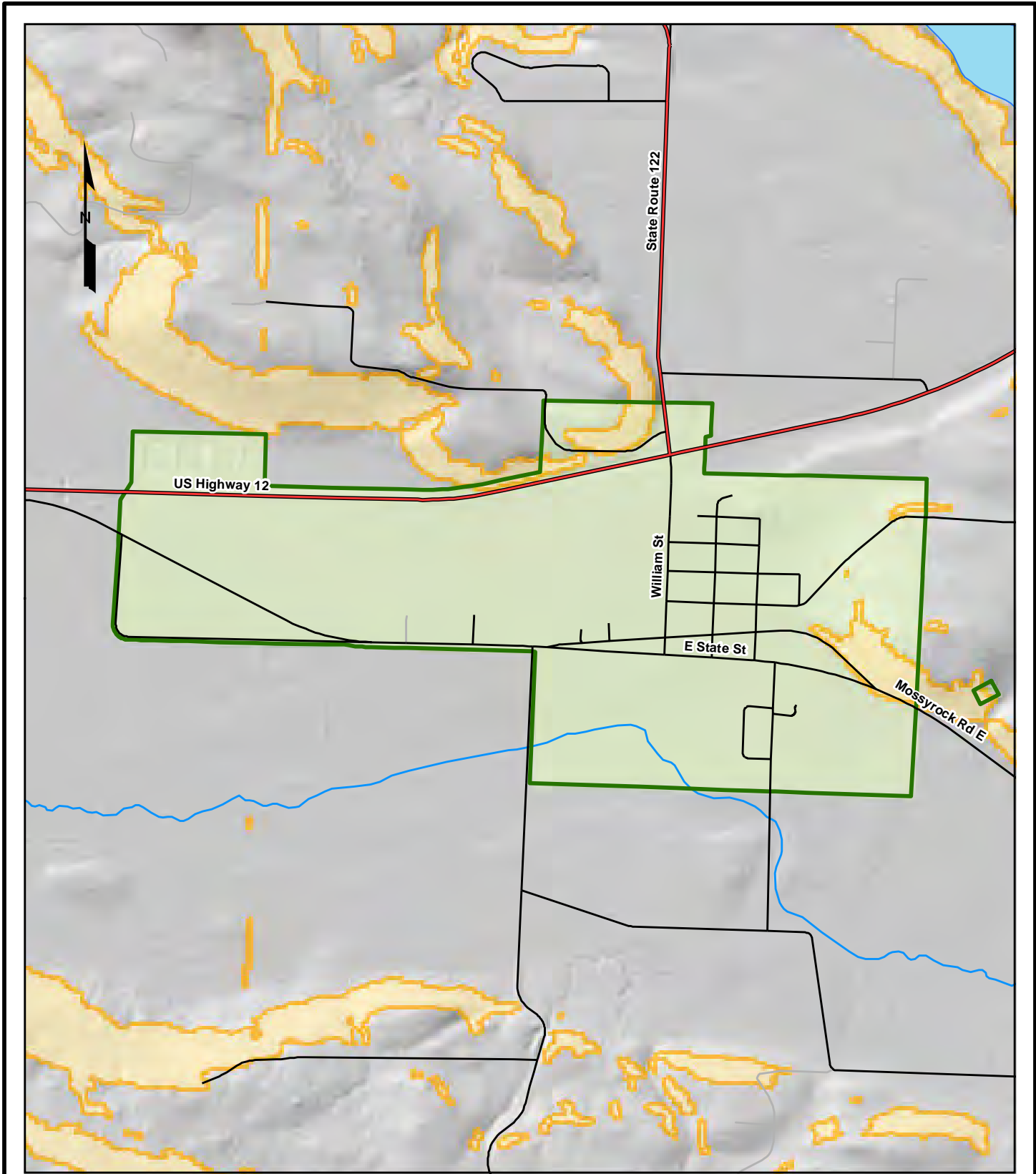


City Limits
  Evacuation Route

Lewis County, Washington  
 2015 Multi-jurisdictional Hazard Mitigation Plan

## Mossyrock Facilities & Evacuation Routes

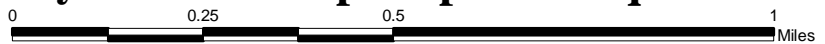




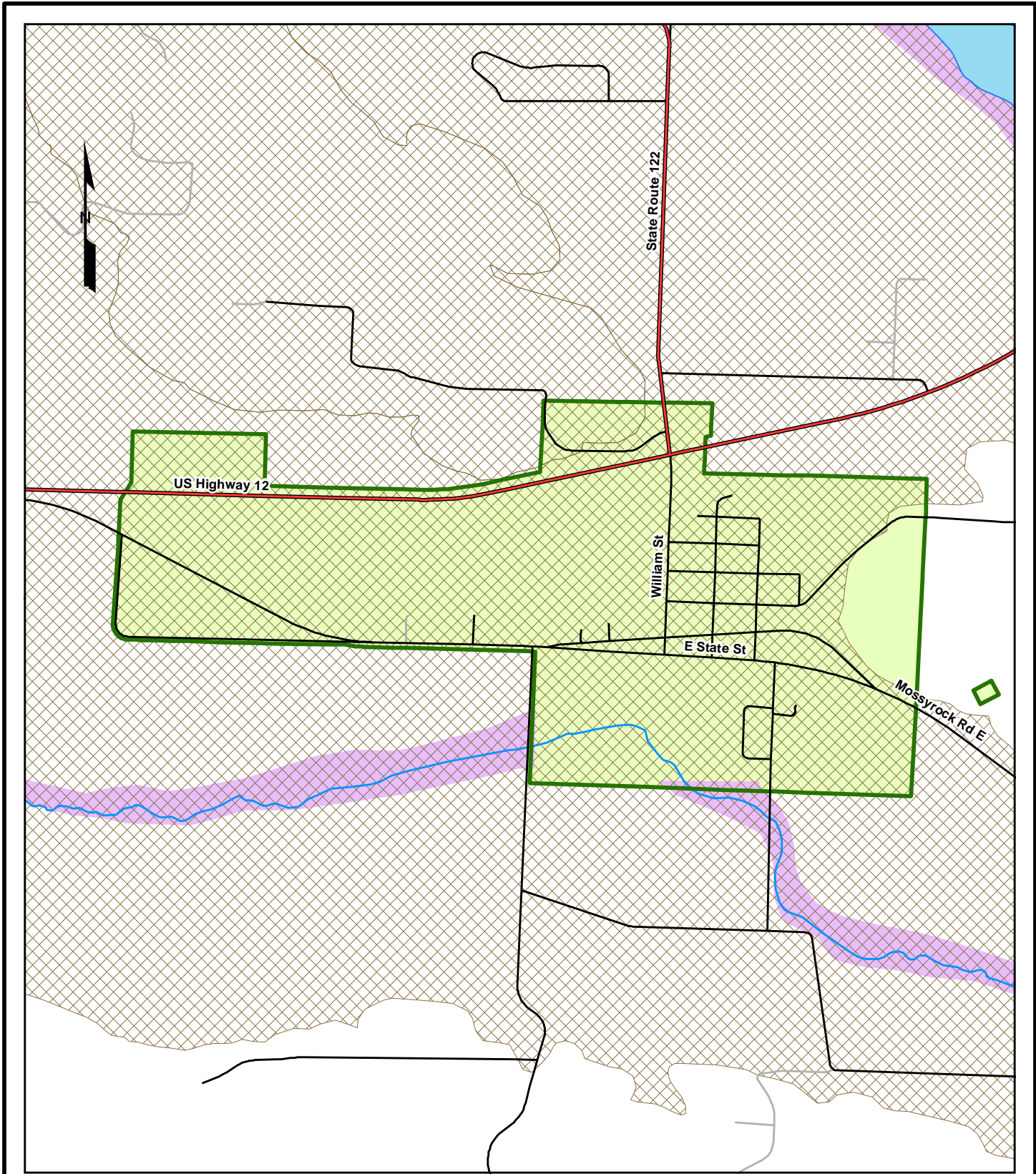
- City Limits
- Mod to High Liquefaction Potential
- Slope > 30%

Lewis County, Washington  
2015 Multi-jurisdictional Hazard Mitigation Plan

## Mossyrock Steep Slopes & Liquefaction



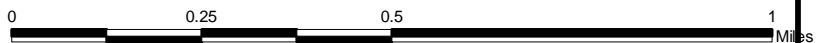




- City Limits
- 100-yr flood
- 500-yr flood
- Dam Inundation
- Levees/revet.

Lewis County, Washington  
2015 Multi-jurisdictional Hazard Mitigation Plan

## Mossyrock Facilities & Evacuation Routes







## HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact	Alternate Point of Contact
Penny Jo Haney, Deputy Clerk PO Box 810 Napavine WA 98565 (360) 262-3547 <a href="mailto:phaney@cityofnapavine.com">phaney@cityofnapavine.com</a>	Cris Dodd PO Box 810 Napavine WA 98565 (360) 262-3547 <a href="mailto:cdodd@cityofnapavine.com">cdodd@cityofnapavine.com</a>

**Profile:** The City of Napavine is the third most populated city in Lewis County with a population of 1,690. The city's downtown and amenities lie on the west side of the freeway. On the west side of the freeway are farms, a few businesses, and a few developed subdivisions. According to the United States Census Bureau, the city has a total area of 0.8 square miles.

The City of Napavine is characterized by a broad floodplain and low terraces surrounded by upland valleys of low to moderate relief that have broad, rounded ridges. The elevation of the City is 459 feet above sea level. The Chehalis River winds its way through the valley in which the city resides, and is there joined by a tributary, the Newaukum River. Both rivers are prone to flooding during periods of abnormally heavy or persistent rain, and the lowlands from the freeway westward are particularly susceptible to inundation.

## Ranking of Identified Hazards

Hazard Type	Previous Occurrence?		Likely to Experience?		Probability				Extent				Percentage	Rank
	Yes	No	Yes	No	Highly Likely (100% next yr)	Likely (10-100% or 1 in 10 yrs)	Possible (1-10% next year or 1/100 yrs)	Unlikely (less than 1% in 100 yrs)	Catastrophic: more than 50% affected	Severe: 25-50% affected	Limited: 0-25% affected	None: 0% affected		
<b>Rating Points</b>	<b>20</b>	<b>0</b>	<b>10</b>	<b>0</b>	<b>20</b>	<b>10</b>	<b>6</b>	<b>0</b>	<b>20</b>	<b>10</b>	<b>4</b>	<b>0</b>		
Flooding	20		10		20						4		54%	1
Debris Flow	20		10				6				4		40%	2
Earthquake	20		10				6				4		40%	2
Wind Storm	20		10				6				4		40%	2
Winter Storm	20		10				6				4		40%	2
Volcano	20		10				6				4		40%	2

**Probability:**  
 Highly Likely: Near 100% probability in the next year.  
 Likely: Between 10 and 100% probability in the next year, or at least one chance in 10 years.  
 Possible: Between 1 and 10% probability in the next year, or at least one chance in next 100 years.  
 Unlikely: Less than 1% probability in next 100 years.

**Extent of damage is defined as follows:**  
 Catastrophic: More than 50% of the jurisdiction can be affected  
 Severe: 25 to 50% of the jurisdiction can be affected  
 Limited: 0 to 25% of the jurisdiction can be affected  
 None: 0% of the jurisdiction can be affected

## Current Hazard Mitigation Codes/Plans/Ordinances

- Comprehensive Plan, 1997 – updated 2006
- Critical Areas Ordinance, 1992 - updated 2009
- Water System, 1999 – updated 2006
- Sanitary Sewer System, 1980 – updated 2004
- Zoning, 1989 – updated 2006
- Capital Facilities (improvement) plan, 1997 – updated 2008
- Emergency Plan, 2004 – updated 2008
- Building Codes, 1974 – updated 2006



- Floodplain Plans/regulations, 1989 – updated 2004
- SEPA, 1997 – updated 2006
- Lewis County Multi-Jurisdictional Hazard Mitigation Plan, January 2010

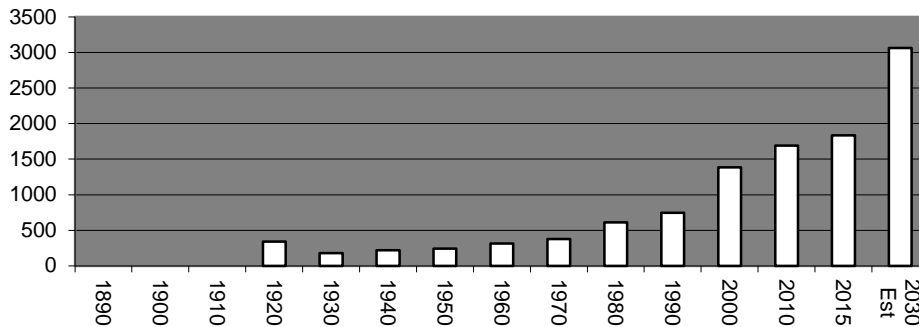
**Agency Specific Natural Hazard Event History – 1980 to 2015**

Type of Disaster	FEMA Disaster #	Date	Comments
Severe Winter Storm and Record and Near Record Snow	DR-1825	3/2/2009	Incident 12/12/2008-1/5/2009
Severe Winter Storm, Landslides, Mudslides, Flooding	DR-1817	1/30/2009	1/6-/16/2009
Severe Storms, Flooding, Landslides, Mudslides	DR-1734	12/8/2007	Incident 12/1-12/17/2007
Severe Winter Storm, Landslides, Mudslides	DR-1682	2/14/2007	Incident 12/14-12/15/2006
Severe Storms, Flooding, Landslides, Mudslides	DR-1671	12/12/2006	Incident 11/2-11/11/2006
Earthquake	DR-1361	3/1/2001	Incident 2/28-3/16/2001
Severe Winter Storms/Flooding	DR-1159	1/17/1997	Incident 12/26/1996-2/10/1997
Severe Storms, Flooding	DR-1100	Feb. 9, 1996	Incident 1/26-2/23/1996
Storms, High Winds, Floods	DR-1079	Jan. 3, 1996	Incident 11/7-Dec 18, 1995
Severe Storm, High Winds	DR-981	March 4, 1993	Incident 1/20-1/21/1993
Severe Storms, Flooding	DR-784	Dec 15, 1986	Incident 11/22-11/29/1986
Volcanic Eruption – Mt. St. Helens	DR-623	May 21, 1980	

**Demographics**

Population	1990	2000	2010	2015	2030 -Projected
	745	1,383	1,690	1835	3063

**City of Napavine Population 1890 to 2015  
Office of Financial Management (OFM)  
April 2015**



Quick Facts (US Census)	Napavine	Washington
Population, percent change - April 1, 2010 to July 1, 2013		3.7%
Persons under 5 years, percent, 2010	5.3%	6.5%
Persons under 18 years, percent definition and source info Persons under 18 years, percent, 2010	29.3%	23.5%
Persons 65 years and over, percent definition and source info Persons 65 years and over, percent, 2010	18.3%	12.3%
High school graduate or higher, percent of persons age 25+, 2009-2013	39.3%	90.0%
Bachelor's degree or higher, percent of persons age 25+, 2009-2013	8.9%	31.9%
Homeownership rate, 2009-2013		63.2%
Housing units in multi-unit structures, percent, 2009-2013		25.6%
Median value of owner-occupied housing units, 2009-2013	\$161,300	\$262,100
Per capita money income in past 12 months (2013 dollars), 2009-2013	\$23,240	\$30,742
Median household income definition and source info Median household income, 2009-2013		\$59,478
Persons below poverty level, percent definition and source info Persons below poverty level, percent, 2009-2013		13.4%

Source: U.S. Census – Quickfacts, Date Accessed: July 12, 2015. Website: quickfacts.census.gov

**Land Designations**

Land area within the existing city limits:	639
Land area within the urban growth area	926
Total land area within city limits and urban growth area	1,565
Land area of residential	423
Land area of commercial	133
Land area of industrial	67



Land area of park, forest, open space		
<b>Current and Anticipated Development and Population Trends</b>		
<p>The City of Napavine anticipates slow growth, below 2%, to continue with steady infill development. The City of Napavine is currently home for 1,835 people and is comprised of around 926 acres. Residential uses make up 45% of the city land use, 37% single-family, 7% mobile-home, 1% multi-family using 314 acres of land. There are 59 acres of commercial land (9% of total), 38 acres of industrial land (6% of total). Vacant lands make up a large portion of the total acreage with around 14% as residential, 17% as commercial, and 3% as industrial. However, most of these parcels are scattered lots or contain lands with some environmental constraints such as wetlands or steep-slopes.</p>		
<b>Infrastructure</b>		
<b>Categories</b>	<b>2014</b>	<b>Approximate Value (\$)</b>
Miles of Street and Roads	15.5	10+ M
Sanitary Sewer	18	14+ M
Storm Sewer	7	3+ M
Water lines	14	11+ M
Electrical lines	N/A- provided by LCPUD	
<b>Critical Facilities</b>		
<b>Critical Facilities</b>	<b>Address</b>	<b>Approximate Value (\$)</b>
Booster Pump Station	407 Birch St.	275,368
Napavine City Hall	407 Birch Ave. SW	116,856
Public Works Building #2	115 Second Ave. SE	438,000
Rush Road Bridge	Rush Road	
Sewer Pump Station #1	Rush Road	413,051
Sewer Pump Station #2	Jefferson St. E. & 2nd Ave. NE	413,051
Sewer Pump Station #3	207 Washington St. W.	27,538
Sewer Pump Station #4	Third Ave. NW	50,400
Sewer Pump Station #5	Chieri Court – Napa Estates	13,769
Water Well #1	214 Front Ave. SE	99,271
Water Well #2	214 Front Ave. SE	16,523
Water Well #3	401 Rowell St. E	16,523
Water Well #4	323 Birch Ave. SW	22,030
Water Well #5	323 Birch Ave. SW	12,000
<b>Flood Information</b>		
Percentage of existing city limits within the 100-year flood plain		
Assessor's valuation of private properties within the 100-year flood plain		
<b>Critical Facilities within the 100-year flood plain</b>		
<b>Facility</b>	<b>Address</b>	<b>Approximate Value (\$)</b>
<b>NFIP/CRS Section</b>		
NFIP/CRS Community		No
Community Rating Classification		N/A
Building Code Effective Grading Schedule		Class XX
NFIP Membership		No
NFIP Compliance Violations?		Yes, Sanctioned 2/14/1976
FEMA Floodplain Maps Adopted	Yes, Flood map is number 5302541781A, 5302541782A, 530254IND0A, effective on 7/17/2006	
Recently Community Assistant Visit or Community Assistance Contact		N/A



JURISDICTION City of Napavine

Floodplain Administrator	No
Certified Floodplain Manager	No
Floodplain Ordinance Adoption	Adopted 2009
StormReady Jurisdiction	No
Firewise Jurisdiction	No

<b>Previous Action Plan Implementation</b>			
<b>Mitigation Strategy</b>	<b>Completed 2010-2014</b>	<b>Carried Over to 2015 Plan</b>	<b>Removed or No Longer Feasible</b>
Continue to evaluate large trees and high wind hazards and upkeep of control equipment	No	Yes	
Continue to monitor flood ways at Exit 72 in flood area and keeping free of blockage and debris	No	Yes	
Keep equipment and emergency vehicles available for likely occurrences	No	Yes	
Booster Pump Station: Assess building and infrastructure for structural integrity	No	Yes	
City Hall: Assess building for structural damage	No	Yes	
Rush Road Bridge: Assess structure for integral damage	No	Yes	
Sewer Pump Stations #1-5: Assess buildings and infrastructure for damage	No	Yes	
Water Wells #1-5: Assess buildings and infrastructure for damage	No	Yes	
Continue to enforce the CAO's	No	Yes	
Continue to enforce Shorelines' Management Plan	No	Yes	

**Attached Documents**

- Public Facilities Map
- Hazard Identification Worksheet(s)
- Mitigation Strategies Worksheet(s)
- Steep Slopes and Liquefaction Map
- Flood Hazard Map
- HAZUS-MH: Flood Results

# HAZARD IDENTIFICATION WORKSHEET

Date Completed: 7/25/2015

Which Agency are you representing? **City of Napavine**

Name: Penny Jo Haney

Title: Deputy Clerk

Email: phaney@cityofnapavine.com

Telephone #: 360.262.3547 x228

Address:

City:

ZIP:

**For each Hazard, please fill out the table below based on the following questions:**

- **Previous Occurrence:** Is there a historic record of this type of hazard happening here? *Yes or No*
- **Likely to Experience:** Are you likely to experience this type of hazard in the future? *Yes or No*
- **Probability:** Based on history, what is the likelihood of this event happening again? *Highly Likely, Likely, Possible, Unlikely*
- **Extent:** If this hazard event were to happen, how extensive could the damage be? *Catastrophic, Severe, Limited, None*

Hazard Type	Previous Occurrence?		Likely to Experience?		Probability				Extent			
	Yes	No	Yes	No	Highly Likely	Likely	Possible	Unlikely	Catastrophic	Severe	Limited	None
Avalanche		X		X				X				X
Coastal Erosion		X		X				X				X
Coastal Storm		X		X				X				X
Dam Failure		X		X				X				X
Debris Flow	X		X				X				X	
Drought		X		X				X				X
Earthquake	X		X				X				X	
Expansive Soils		X		X				X				X
Extreme Heat		X		X				X				X
Flooding	X		X		X						X	
Hailstorm		X		X				X				X
Hurricane		X		X				X				X
Land Subsidence		X		X				X				X
Landslide		X		X				X				X
Levee Failure		X		X				X				X
Severe Thunder Storm		X		X				X				X
Severe Wind Storm	X		X				X				X	
Severe Winter Storm	X		X				X				X	
Tornado		X		X				X				X
Tsunami		X		X				X				X
Volcano	X		X				X				X	
Wildfire		X		X								
Other:												

**Which of the following does your agency have? (Circle One)**

Comprehensive Plan **Yes** / No / NA Date completed: **August 2006**

Critical Areas Ordinance **Yes** / No / NA Date completed: **Adopted 2009**

Does your agency have an emergency plan? **Yes** / No / NA





**Which Agency are you representing:** City of Napavine

<b>Name:</b>	<b>Title:</b>
--------------	---------------

<b>Email:</b>	<b>Telephone #:</b>
---------------	---------------------

<b>Address:</b>	<b>City:</b>	<b>Zip:</b>
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**Task B: Compile a detailed inventory of what can be damaged by a hazard event.**  
 Inventory the assets (critical facilities, businesses, historic, cultural, natural resource areas and areas of special consideration) that can be damaged by a hazard event.

- |                |  |   |  |                           |  |                        |
|----------------|--|---|--|---------------------------|--|------------------------|
| <b>HAZARDS</b> | 1. Avalanche<br>2. Dam Failure<br>3. Debris Flow<br>4. Drought<br>5. Earthquake<br>6. Expansive Soils<br>7. Extreme Heat | 8. Flooding<br>9. Hailstorm<br>10. Hurricane<br>11. Land Subsidence<br>12. Landslide<br>13. Levee Failure<br>14. Severe Thunder Storm | 15. Severe Wind Storm<br>16. Severe Winter Storm<br>17. Tornado<br>18. Volcano<br>19. Wildfire | <b>BUILDING MATERIALS</b> | a. Masonry<br>b. concrete<br>c. Concrete Block<br>d. Brick<br>e. Stick<br>f. Metal | g. Steel<br>h. Asphalt |
|----------------|--|---|--|---------------------------|--|------------------------|

Name or description of Asset (building)	Address	Hazard(s) List all that apply (See legend above)	Critical Facility	Transportation	Utility System	Comm. System	Economic Assets	Special consideration	Historic/Other	Size of Building (sq. ft.)	Replacement Value (\$)	Contents Value (\$)	Displacement (\$ per day)	Occupancy or capacity (#)	Structural — building materials
Booster Pump Station	407 Birch St.	3,5,8,15,16,18			X					800	275,368	229,473	629	0	
Napavine City Hall	407 Birch Ave. SW	5,15,16,18	X							6,400	116,856	97,380	267	15	E
Public Works Building #2	115 Second Ave. SE	5,15,16,18	X							3,168	438,000	365,000	1,000	3	E,f
Rush Road Bridge	Rush road	3,5,8,15,16,18		X											B
Sewer Pump Station #1	Rush Road	3,5,8,15,16,18			X					576	413,051	344,209	943	0	B,d
Sewer Pump Station #2	Jefferson St. E. & 2 <sup>nd</sup> Ave. NE	3,5,8,15,16,18			X					120	413,051	344,209	943	0	B,d
Sewer Pump Station #3	207 Washington St. W.	3,5,8,15,16,18			X					120	27,538	22,948	63	0	B,d
Sewer Pump Station #4	Third Ave. NW	3,5,8,15,16,18			X					120	50,400	42,000	115	0	B,d
Sewer Pump Station #5	Chieri Court-Napa Estates	3,5,8,15,16,18			X					120	13,769	11,474	31	0	Wet well

Water Well #1	214 Front Ave. SE	3,5,8,15,16,18			X					576	99,271	82,726	227	0	B,d
Water Well #2	214 Front Ave. SE	3,5,8,15,16,18			X					100	16,523	13,769	38	0	B,d
Water Well #3	401 Rowell St. E	3,5,8,15,16,18			X					100	16,523	13,769	38	0	B,d
Water Well #4	323 Birch Ave. SW	3,5,8,15,16,18			X					120	22,030	18,358	50	0	B,d
Water Well #5	323 Birch Ave. SW	3,5,8,15,16,18			X					100	12,000	10,000	16	0	Hot box

# ASSET INVENTORY WORKSHEET 2C

Date Completed:  
July 2015

Which Agency are you representing? **City of Napavine**

Name: **Steve Ashley and Penny Jo Haney**

Title: **Public Works Director & Deputy Clerk**

Email: [sashley@cityofnapavine.com](mailto:sashley@cityofnapavine.com) and [phaney@cityofnapavine.com](mailto:phaney@cityofnapavine.com)

Telephone #: **360.262.9344 and 360.262.3547 x228**

Address: **P.O. Box 810**

City: **Napavine** ZIP: **98565**

**Task C. Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.**

Hazard: Debris Flow

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	624	2	.003				1710	5	.003
Commercial	17	8	47						
Industrial									
Agricultural									
Religious/ Non-profit	3	0	0					0	0
Government	14	0	0	1,595,315	0	0	15	0	0
Education									
Utilities									
<b>Total</b>	<b>658</b>	<b>10</b>	<b>47.003</b>	<b>1,595,315</b>	<b>0</b>	<b>0</b>	<b>1725</b>	<b>5</b>	<b>.003</b>

**Task D. Determine whether (and where) you want to collect additional inventory data. (circle one)**

- Do you know where your greatest damages may occur in your hazard areas? Yes or No
- Do you know whether your critical facilities will be operational after a hazard event? Yes or No
- Is there enough data to determine which assets are subject to the greatest potential damages? Yes or No
- Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards? Yes or No
- Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards? Yes or No
- Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence? Yes or No
- Is additional data needed to justify the expenditure of community or state funds for mitigation? Yes or No

# ASSET INVENTORY WORKSHEET 2C

Date Completed:  
July 2015

Which Agency are you representing? City of Napavine

Name: Steve Ashley and Penny Jo Haney

Title: Public Works Director & Deputy Clerk

Email: sashley@cityofnapavine.com and phaney@cityofnapavine.com

Telephone #: 360.262.9344 and 360.262.3547 x228

Address: P.O. Box 810

City: Napavine ZIP: 98565

**Task C. Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.**

Hazard: Earthquake

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	624	2	.003				1710	5	.003
Commercial	17	8	47						
Industrial									
Agricultural									
Religious/ Non-profit	3	0	0					0	0
Government	14	0	0	1,595,315	0	0	15	0	0
Education									
Utilities									
<b>Total</b>	<b>658</b>	<b>10</b>	<b>47.003</b>	<b>1,595,315</b>	<b>0</b>	<b>0</b>	<b>1725</b>	<b>5</b>	<b>.003</b>

**Task D. Determine whether (and where) you want to collect additional inventory data. (circle one)**

8. Do you know where your greatest damages may occur in your hazard areas? Yes or No
9. Do you know whether your critical facilities will be operational after a hazard event? Yes or No
10. Is there enough data to determine which assets are subject to the greatest potential damages?  
Yes or No
11. Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards? Yes or No
12. Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards? Yes or No
13. Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence? Yes or No
14. Is additional data needed to justify the expenditure of community or state funds for mitigation?  
Yes or No

# ASSET INVENTORY WORKSHEET 2C

Date Completed:  
July 2015

Which Agency are you representing? **City of Napavine**

Name: **Steve Ashley and Penny Jo Haney**

Title: **Public Works Director & Deputy Clerk**

Email: [sashley@cityofnapavine.com](mailto:sashley@cityofnapavine.com) and [phaney@cityofnapavine.com](mailto:phaney@cityofnapavine.com)

Telephone #: **360.262.9344 and 360.262.3547 x228**

Address: **P.O. Box 810**

City: **Napavine** ZIP: **98565**

**Task C. Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.**

Hazard:        **Flooding**       

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	624	2	.003				1710	5	.003
Commercial	17	8	47						
Industrial									
Agricultural									
Religious/ Non-profit	3	0	0					0	0
Government	14	0	0	1,595,315	0	0	15	0	0
Education									
Utilities									
<b>Total</b>	<b>658</b>	<b>10</b>	<b>47.003</b>	<b>1,595,315</b>	<b>0</b>	<b>0</b>	<b>1725</b>	<b>5</b>	<b>.003</b>

**Task D. Determine whether (and where) you want to collect additional inventory data. (circle one)**

15. Do you know where your greatest damages may occur in your hazard areas? Yes or No

16. Do you know whether your critical facilities will be operational after a hazard event? Yes or No

17. Is there enough data to determine which assets are subject to the greatest potential damages?  
Yes or No

18. Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards? Yes or No

19. Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards? Yes or No

20. Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence? Yes or No

21. Is additional data needed to justify the expenditure of community or state funds for mitigation?  
Yes or No

# ASSET INVENTORY WORKSHEET 2C

Date Completed:  
July 2015

Which Agency are you representing? **City of Napavine**

Name: **Steve Ashley and Penny Jo Haney**

Title: **Public Works Director & Deputy Clerk**

Email: [sashley@cityofnapavine.com](mailto:sashley@cityofnapavine.com) and [phaney@cityofnapavine.com](mailto:phaney@cityofnapavine.com)

Telephone #: **360.262.9344 and 360.262.3547 x228**

Address: **P.O. Box 810**

City: **Napavine** ZIP: **98565**

**Task C. Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.**

Hazard: Severe Wind Storm

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	624	2	.003				1710	5	.003
Commercial	17	8	47						
Industrial									
Agricultural									
Religious/ Non-profit	3	0	0					0	0
Government	14	0	0	1,595,315	0	0	15	0	0
Education									
Utilities									
<b>Total</b>	<b>658</b>	<b>10</b>	<b>47.003</b>	<b>1,595,315</b>	<b>0</b>	<b>0</b>	<b>1725</b>	<b>5</b>	<b>.003</b>

**Task D. Determine whether (and where) you want to collect additional inventory data. (circle one)**

22. Do you know where your greatest damages may occur in your hazard areas? Yes or No

23. Do you know whether your critical facilities will be operational after a hazard event? Yes or No

24. Is there enough data to determine which assets are subject to the greatest potential damages?  
Yes or No

25. Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards? Yes or No

26. Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards? Yes or No

27. Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence? Yes or No

28. Is additional data needed to justify the expenditure of community or state funds for mitigation?  
Yes or No

# ASSET INVENTORY WORKSHEET 2C

Date Completed:  
July 2015

Which Agency are you representing? **City of Napavine**

Name: **Steve Ashley and Penny Jo Haney**

Title: **Public Works Director & Deputy Clerk**

Email: [sashley@cityofnapavine.com](mailto:sashley@cityofnapavine.com) and [phaney@cityofnapavine.com](mailto:phaney@cityofnapavine.com)

Telephone #: **360.262.9344 and 360.262.3547 x228**

Address: **P.O. Box 810**

City: **Napavine** ZIP: **98565**

**Task C. Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.**

Hazard: Severe Snow/Winter Storm

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	624	2	.003				1710	5	.003
Commercial	17	8	47						
Industrial									
Agricultural									
Religious/ Non-profit	3	0	0					0	0
Government	14	0	0	1,595,315	0	0	15	0	0
Education									
Utilities									
<b>Total</b>	<b>658</b>	<b>10</b>	<b>47.003</b>	<b>1,595,315</b>	<b>0</b>	<b>0</b>	<b>1725</b>	<b>5</b>	<b>.003</b>

**Task D. Determine whether (and where) you want to collect additional inventory data. (circle one)**

29. Do you know where your greatest damages may occur in your hazard areas? Yes or No

30. Do you know whether your critical facilities will be operational after a hazard event? Yes or No

31. Is there enough data to determine which assets are subject to the greatest potential damages?  
Yes or No

32. Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards? Yes or No

33. Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards? Yes or No

34. Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence? Yes or No

35. Is additional data needed to justify the expenditure of community or state funds for mitigation?  
Yes or No

# ASSET INVENTORY WORKSHEET 2C

Date Completed:  
July 2015

Which Agency are you representing? **City of Napavine**

Name: **Steve Ashley and Penny Jo Haney**

Title: **Public Works Director & Deputy Clerk**

Email: [sashley@cityofnapavine.com](mailto:sashley@cityofnapavine.com) and [phaney@cityofnapavine.com](mailto:phaney@cityofnapavine.com)

Telephone #: **360.262.9344 and 360.262.3547 x228**

Address: **P.O. Box 810**

City: **Napavine** ZIP: **98565**

**Task C. Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.**

Hazard:        **Volcano**       

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	624	2	.003				1710	5	.003
Commercial	17	8	47						
Industrial									
Agricultural									
Religious/ Non-profit	3	0	0					0	0
Government	14	0	0	1,595,315	0	0	15	0	0
Education									
Utilities									
<b>Total</b>	<b>658</b>	<b>10</b>	<b>47.003</b>	<b>1,595,315</b>	<b>0</b>	<b>0</b>	<b>1725</b>	<b>5</b>	<b>.003</b>

**Task D. Determine whether (and where) you want to collect additional inventory data. (circle one)**

36. Do you know where your greatest damages may occur in your hazard areas? Yes or No

37. Do you know whether your critical facilities will be operational after a hazard event? Yes or No

38. Is there enough data to determine which assets are subject to the greatest potential damages?  
Yes or No

39. Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards? Yes or No

40. Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards? Yes or No

41. Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence? Yes or No

42. Is additional data needed to justify the expenditure of community or state funds for mitigation?  
Yes or No



# Ranking Mitigation Strategies: Using STAPLEE - Worksheet 3A

Date: 7/25/2015

Agency: Napavine

Category Description/Action Items (Mitigation Strategy)	Hazard Addressed (flood, earthquake, wind, winter, landslide, etc.)	Social (Yes or No)	Technical (Yes or No)	Administrative (Yes or No)	Political (Yes or No)	Legal (Yes or No)	Economical (Yes or No)	Environmental (Yes or No)	Responsible Department/Agency
Continue to evaluate large trees and high wind hazards and upkeep of control equipment	Wind	Y	Y	Y	Y	Y	Y	Y	Public Works
Continue to monitor flood ways at Exit 72 in flood area and keeping free of blockage and debris	Flood	Y	Y	Y	Y	Y	Y	Y	Public Works
Keep equipment and emergency vehicles available for likely occurrences	Earthquake	Y	Y	Y	Y	Y	Y	Y	Public Works
Booster Pump Station: Assess building and infrastructure for structural integrity	Earthquake	Y	Y	Y	Y	Y	Y	N	Public Works
City Hall: Assess building for structural damage	Earthquake	Y	Y	Y	Y	Y	Y	N	Public Works
Rush Road Bridge: Assess structure for integral damage	Flooding	Y	Y	Y	Y	Y	Y	N	Public Works
Sewer Pump Stations #1-5: Assess buildings and infrastructure for damage	Earthquake	Y	Y	Y	Y	Y	Y	N	Public Works
Water Wells #1-5: Assess buildings and infrastructure for damage	Earthquake	Y	Y	Y	Y	Y	Y	N	Public Works
Continue to enforce the CAO's	Flooding and water retention	N	Y	Y	Y	N	Y	Y	Community Development
Continue to enforce Shorelines' Management Plan	Flooding	N	Y	Y	Y	N	Y	Y	Community Development

**Notes**  
 S: Social – The public must support the overall implementation strategy and specific mitigation actions.  
 T: Technical – It is important to determine if the proposed action is technically feasible, will help reduce losses in the long term, and has minimal secondary impacts.  
 A: Administrative – Under this part of the evaluation criteria, examine the anticipated staffing, funding, and maintenance requirements for the mitigation action to be implemented.  
 P: Political – Understanding how your community and State leadership feels about issues related to the environment, economic development, safety, and emergency management.  
 L: Legal – When considering this criterion, determine whether your agency has the legal authority at the State, or local level to implement the action, or if new laws will need to be passed.  
 E: Economic – Cost-effective mitigation actions that can be funded in current or upcoming budget cycles are much more likely to be implemented.  
 E: Environmental – Evaluate whether, when implementing mitigation actions, there would be negative consequences to environmental assets (wetlands, endangered species, protected resources).



# Critical Facilities Mitigation Strategies - Worksheet 3C

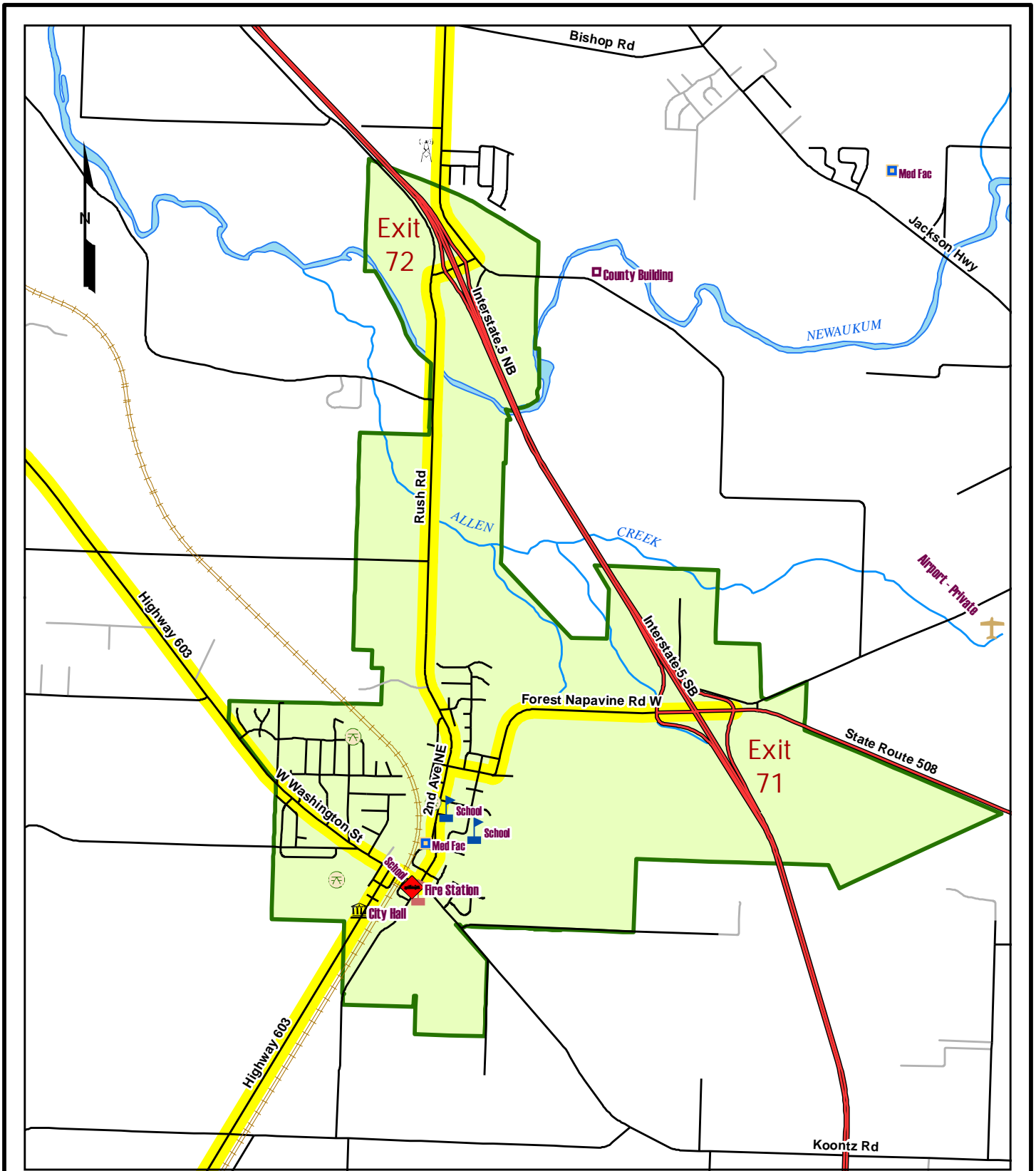
Date: 7/25/2015

Agency: Napavine

Mitigation Measures		Hazard Addressed (All, flooding, landslide, earthquake, volcanic, etc....)	2010 Plan		Mitigation Identification (Prevention, Property Protection, Public Education & Awareness, Natural Resource Protection, Structural Projects)	Cost-Benefit and Prioritization			Implementation			
Facility	Mitigation Strategy		Task listed in the 2010 Plan (yes or no)	Task completed as part of 2010 Plan (yes or no)		Relative Cost 1 = Highest 3 = Lowest	Relative Effectiveness 1 = Lowest 3 = Highest	Priority Rating (Low, Med, High)	Timeline (schedule)	Potential Funding (grants, budget, donations, etc..)	Cost Est.	Administrative Responsibility
Booster Pump Station	Assess building and infrastructure for structural integrity (Booster Pump Station)	Earthquake	Yes	No	Prevention, property protection	3	3	Low	2015-2020	Project planning, grants,	1,000	Public Works Director
Napavine City Hall	Assess building for structural damage (City Hall)	Earthquake	Yes	No	Prevention, property protection	3	3	Low	2015-2020	Budget, project planning, grants	1,000	Building Official
Rush Road Bridge	Assess structure for integral damage (Rush Road Bridge)	Flooding	Yes	Yes – ongoing	Prevention property protection, structural projects	3	3	Low	2015-2020	Budget, grants	2,500	Lewis County
Sewer Pump Stations #1-5	Assess buildings and infrastructure for damage (Sewer Pump Stations #1-5)	Earthquake	Yes	No	Prevention property protection	3	3	Low	2015-2020	Project planning, grants	5,000	Sewer Department
Water Wells #1-5	Assess buildings and infrastructure for damage (Water Wells #1-5)	Earthquake	Yes	No	Prevention property protection	3	3	Low	2015-2020	Project planning, grants	5,000	Water Department

**Notes**

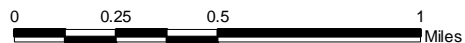
Facility: Critical facility  
 Mitigation Strategy: description of mitigation or task  
 2010 Plan: rate task(s) if it was in the 2010 Plan  
 Timeline: give approximate timeframe of completing this task  
 Cost Estimate: a very rough estimate cost of implementing task  
 Administrative Responsibility: who will accomplish the task

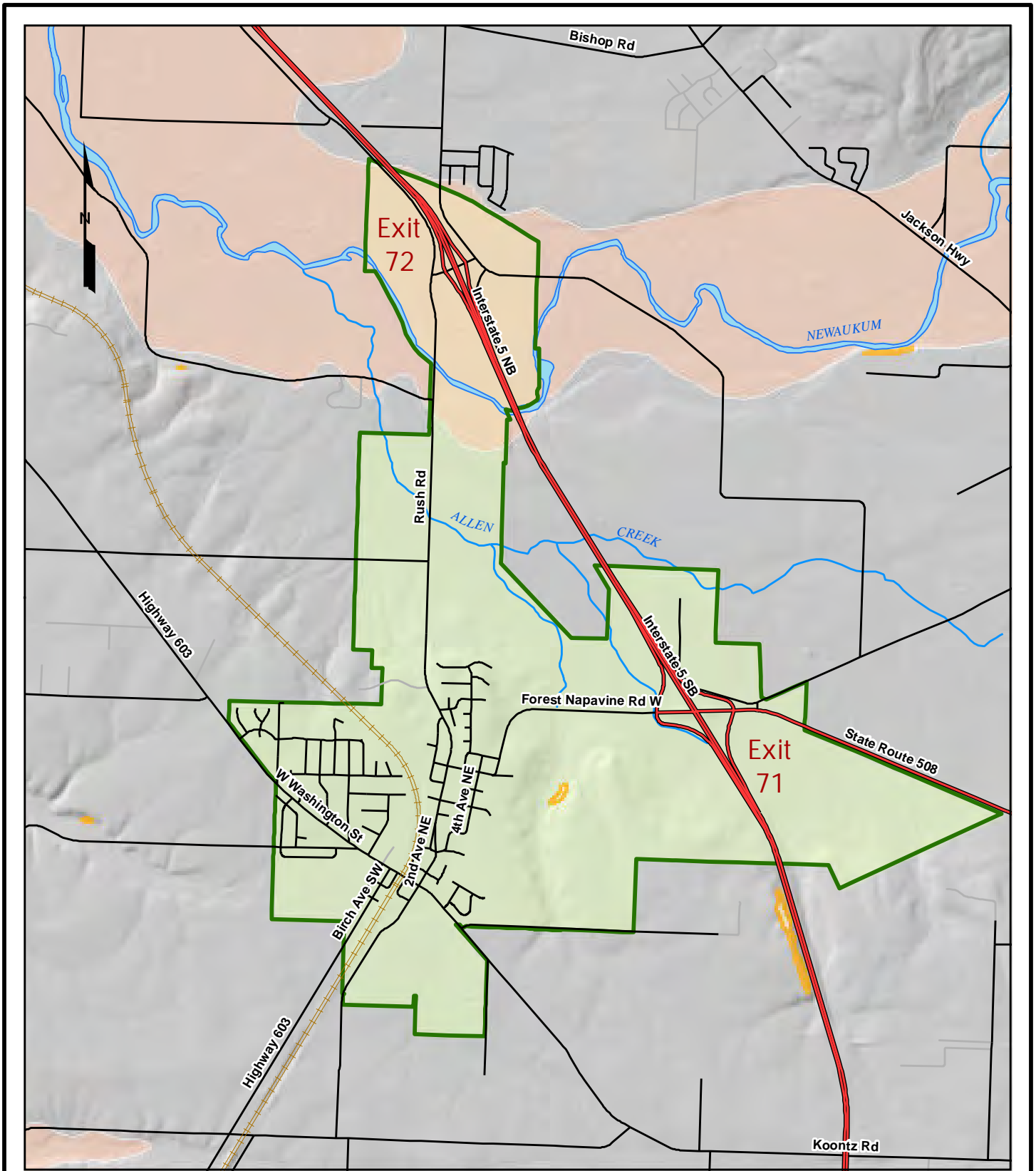


City Limits
  Evacuation Route

Lewis County, Washington  
 2015 Multi-jurisdictional Hazard Mitigation Plan

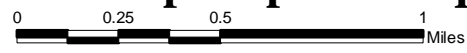
## Napavine Facilities & Evacuation Routes



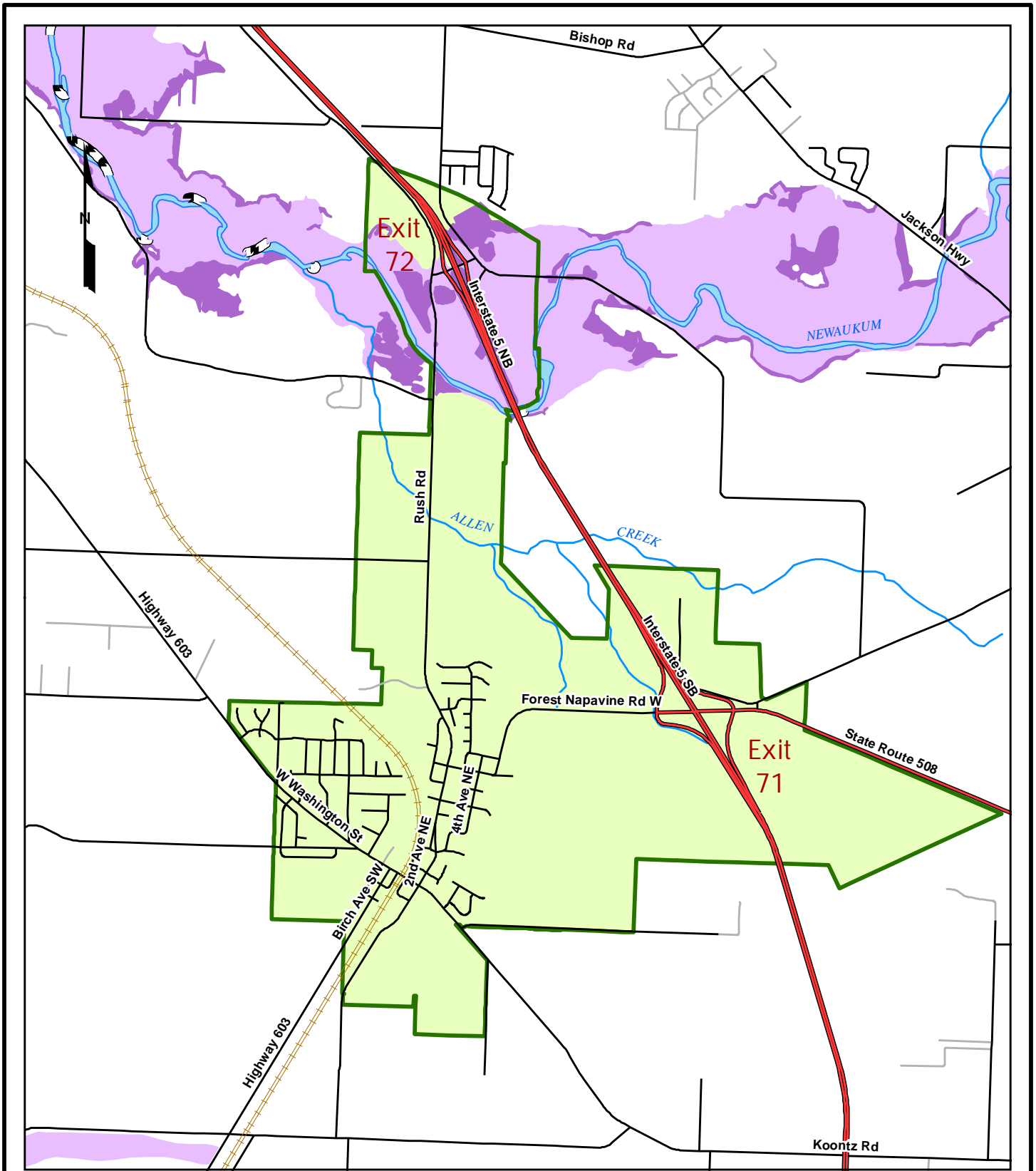


Lewis County, Washington  
 2015 Multi-jurisdictional Hazard Mitigation Plan

**Napavine Steep Slopes & Liquefaction**



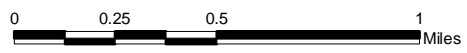
- █ City Limits
- Mod to High Liquefaction Potential
- Slope > 30%



Lewis County, Washington  
 2015 Multi-jurisdictional Hazard Mitigation Plan

**Napavine Facilities & Evacuation Routes**

- City Limits
- 100-yr flood
- 500-yr flood
- Dam Inundation
- Levees / revet.





## JURISDICTION City of Toledo

### HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact	Alternate Point of Contact
Michelle Whitten PO Box 236 Toledo WA 98591 (360) 864-4564 <a href="mailto:cityoftoledo@toledotel.com">cityoftoledo@toledotel.com</a>	

**Profile:** The City of Toledo is the sixth most populated city in Lewis County. The city is east of Interstate 5 at a point almost exactly halfway between Seattle, Washington and Portland, Oregon. The city is constructed along State Route 505 which runs right through the middle of the community.

The City's downtown and its amenities lie on the east side of the freeway, nestled at the base of a small range of hills. The Cowlitz River skirts the eastside of the community and is a major natural feature of the City. There are parks, schools, farms, and a small lake in the community. There is a small airport located north of the city.

According to the United States Census Bureau, the city has a total area of .3 square miles and an elevation of 121 feet. The City of Toledo is characterized by a broad floodplain and low terraces surrounded by upland valleys of low to moderate relief that have broad, rounded ridges.

### Ranking of Identified Hazards

Hazard Type	Previous Occurrence?		Likely to Experience?		Probability				Extent				Percentage	Rank
	Yes	No	Yes	No	Highly Likely (100% next yr)	Likely (10-100% or 1 in 10 yrs)	Possible (1-10% next year or 1/100 yrs)	Unlikely (less than 1% in 100 yrs)	Catastrophic: more than 50% affected	Severe: 25-50% affected	Limited: 0-25% affected	None: 0% affected		
<b>Rating Points</b>	<b>20</b>	<b>0</b>	<b>10</b>	<b>0</b>	<b>20</b>	<b>10</b>	<b>6</b>	<b>0</b>	<b>20</b>	<b>10</b>	<b>4</b>	<b>0</b>		
Volcano	20		10				6			10			46%	1
Thunder Storm	20		10			10					4		44%	2
Wind Storm	20		10			10					4		44%	2
Earthquake	20		10				6				4		40%	3
Flooding	20		10				6				4		40%	3
Landslide	20		10				6				4		40%	3
Winter Storm	20		10				6				4		40%	3

**Probability:**  
 Highly Likely: Near 100% probability in the next year.  
 Likely: Between 10 and 100% probability in the next year, or at least one chance in 10 years.  
 Possible: Between 1 and 10% probability in the next year, or at least one chance in next 100 years.  
 Unlikely: Less than 1% probability in next 100 years.

**Extent of damage is defined as follows:**  
 Catastrophic: More than 50% of the jurisdiction can be affected  
 Severe: 25 to 50% of the jurisdiction can be affected  
 Limited: 0 to 25% of the jurisdiction can be affected  
**None: 0% of the jurisdiction can be affected**

### Current Hazard Mitigation Codes/Plans/Ordinances

- Lewis County Multi-Jurisdictional Hazard Mitigation Plan, 2010
- Comprehensive Land Use Plan, December 2005
- Critical Areas Ordinance, April 1998
- Subdivision Ordinance
- Emergency Plan

### Agency Specific Natural Hazard Event History – 1980 to 2015

Type of Disaster	FEMA Disaster #	Date	Comments



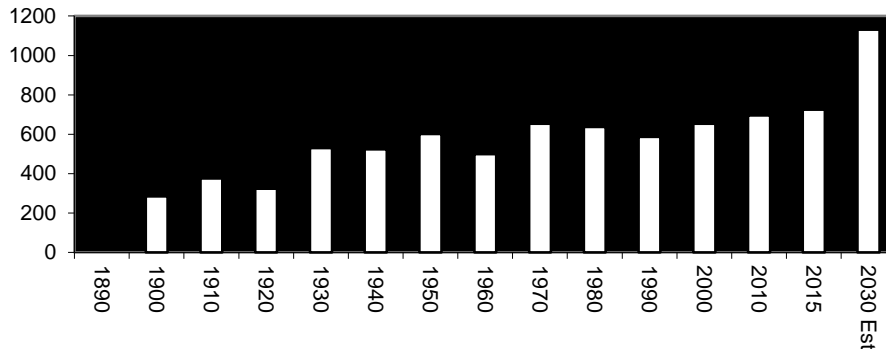
## JURISDICTION City of Toledo

Severe Winter Storm and Record and Near Record Snow	DR-1825	3/2/2009	Incident 12/12/2008-1/5/2009
Severe Winter Storm, Landslides, Mudslides, Flooding	DR-1817	1/30/2009	1/6-/16/2009
Severe Storms, Flooding, Landslides, Mudslides	DR-1734	12/8/2007	Incident 12/1-12/17/2007
Severe Winter Storm, Landslides, Mudslides	DR-1682	2/14/2007	Incident 12/14-12/15/2006
Severe Storms, Flooding, Landslides, Mudslides	DR-1671	12/12/2006	Incident 11/2-11/11/2006
Earthquake	DR-1361	3/1/2001	Incident 2/28-3/16/2001
Severe Winter Storms/Flooding	DR-1159	1/17/1997	Incident 12/26/1996-2/10/1997
Severe Storms, Flooding	DR-1100	Feb. 9, 1996	Incident 1/26-2/23/1996
Storms, High Winds, Floods	DR-1079	Jan. 3, 1996	Incident 11/7-Dec 18, 1995
Severe Storm, High Winds	DR-981	March 4, 1993	Incident 1/20-1/21/1993
Severe Storms, Flooding	DR-784	Dec 15, 1986	Incident 11/22-11/29/1986
Volcanic Eruption – Mt. St. Helens	DR-623	May 21, 1980	

### Demographics

Population	1990	2000	2010	2015	2030 -Projected
	586	653	695	725	1131

## TOLEDO



Quick Facts (US Census)	Toledo	Washington
Population, percent change - April 1, 2010 to July 1, 2013		3.7%
Persons under 5 years, percent, 2010	6.0%	6.5%
Persons under 18 years, percent definition and source info Persons under 18 years, percent, 2010	20.6%	23.5%
Persons 65 years and over, percent definition and source info Persons 65 years and over, percent, 2010	14.3%	12.3%
High school graduate or higher, percent of persons age 25+, 2009-2013	90.2%	90.0%
Bachelor's degree or higher, percent of persons age 25+, 2009-2013	10%	31.9%
Homeownership rate, 2009-2013		63.2%
Housing units in multi-unit structures, percent, 2009-2013		25.6%
Median value of owner-occupied housing units, 2009-2013		\$262,100
Per capita money income in past 12 months (2013 dollars), 2009-2013		\$30,742
Median household income definition and source info Median household income, 2009-2013	35,521	\$59,478
Persons below poverty level, percent definition and source info Persons below poverty level, percent, 2009-2013	23.3%	13.4%

Source: U.S. Census – Quickfacts, Date Accessed: July 12, 2015. Website: quickfacts.census.gov

### Land Designations

Land Area within the existing city limits:	149
Total land area within city limits and urban growth area	334
Land area of residential	89
Land area of commercial	12
Land area of park, forest, open space	208

### Current and Anticipated Development and Population Trends





## JURISDICTION City of Toledo

The City of Toledo expects slow growth to continue. Residential areas make up 607 acres almost one third of the land used in the community and consist primarily of single family homes although there are also a small number of duplexes and apartments. Single family housing densities generally range from 4.4 to 7.3 dwellings per acre. Public rights-of-way both developed and non-developed covers 48.7 acres (25% of total area), and 25.2 acres (13%) of city land is used for public buildings facilities and parks.

The City of Toledo contains 6 acres of commercial land (3% of total area) concentrated mostly in the downtown and along Kellogg Way and 5th Street. School and churches make up 9% of the total area, and non-urban uses such as agriculture use 5 %. Vacant land at 28 acres makes up 14% of total area. However most of this land consists of steep-slopes, drainage areas, creek beds, and wetlands. These areas could only be developed at a significant financial cost or environmental impact. The majority of this land as well as the 10 acres of agricultural land will be encouraged to remain as open space as this is integral to the rural development patterns of the city.

### Infrastructure

Categories	2014	Approximate Value (\$)
Miles of Street and Roads	6	\$3,948,000
Sanitary Sewer	25,710 feet	
Storm Sewer	Unknown	
Water lines	36,006 feet	
Electrical lines	N/A - Provided by LCPUD	

### Miles of Street and Roads

Critical Facilities	Address	Approximate Value (\$)
City Hall	130 N Second Street	990,000
Water Tower	1166 St Rt 505	250,000
Sewer System	801 S First St	8.0 M

### Flood Information

Percentage of existing city limits within the 100-year flood plain

Assessor's valuation of private properties within the 100-year flood plain

### Critical Facilities within the 100-year flood plain

Facility	Address	Approximate Value (\$)
WWTP	801 S First	WWTP

### NFIP/CRS Section

NFIP/CRS Community	No
Community Rating Classification	N/A
Building Code Effective Grading Schedule	Class XX
NFIP Membership	Yes, 9/14/1979
NFIP Compliance Violations?	None
FEMA Floodplain Maps Adopted	Flood maps number 5303030001A, effective on 11/05/1980 & flood map number 5301020465B, effective on 12/15/1981
Recently Community Assistant Visit or Community Assistance Contact	N/A
Floodplain Administrator	No
Certified Floodplain Manager	No
Floodplain Ordinance Adoption	CAO, April 1998
StormReady Jurisdiction	No
Firewise Jurisdiction	No

### Previous Action Plan Implementation

Mitigation Strategies	Completed 2010-2014	Carried Over to 2015 Plan
Continue to enforce the flood ordinance which is based on NFIP model	Yes	Yes-ongoing



## JURISDICTION City of Toledo

Continue to require and maintain elevation certificates for permitted development within the floodplain	Yes	Yes-ongoing
Contract with Lewis County to provide emergency services	Yes	Yes-ongoing
Maintain map of Critical Areas in permit application office	Yes	Yes-ongoing
Continue using SEPA authority to ensure large projects provide for Hazard Mitigation	Yes	Yes-ongoing
City Hall: Inspect and evaluate building annually	Yes	Yes – ongoing
WWTP: Inspect and evaluate building annually	YEs	Yes-ongoing

### Attached Documents

- Land Use Map
- Public Facilities Map
- Hazard Identification Worksheet(s)
- Mitigation Strategies Worksheet(s)
- Steep Slopes and Liquefaction Map
- Flood Hazard Map
- HAZUS-MH: Flood Results

# HAZARD IDENTIFICATION WORKSHEET

Date Completed:  
May 6, 2015

Which Agency are you representing?

**City of Toledo**

Name: **Michelle Whitten**

Title: **City Clerk/Treasurer**

Email: **cityoftoledo@toledotel.com**

Telephone #: **360-864-4564**

Address: **PO Box 236**

City: **Toledo**

ZIP: **98591**

**For each Hazard, please fill out the table below based on the following questions:**

- **Previous Occurrence:** Is there a historic record of this type of hazard happening here? *Yes or No*
- **Likely to Experience:** Are you likely to experience this type of hazard in the future? *Yes or No*
- **Probability:** Based on history, what is the likelihood of this event happening again? *Highly Likely, Likely, Possible, Unlikely*
- **Extent:** If this hazard event were to happen, how extensive could the damage be? *Catastrophic, Severe, Limited, None*

Hazard Type	Previous Occurrence?		Likely to Experience?		Probability				Extent			
	Yes	No	Yes	No	Highly Likely	Likely	Possible	Unlikely	Catastrophic	Severe	Limited	None
Avalanche		X		X				X				X
Coastal Erosion		X		X				X				X
Coastal Storm		X		X				X				X
Dam Failure		X		X				X				X
Debris Flow		X		X				X				X
Drought		X		X				X				X
Earthquake	X		X				X				X	
Expansive Soils		X		X				X				X
Extreme Heat		X		X				X				X
Flooding	X		X				X				X	
Hailstorm		X		X				X				X
Hurricane		X		X				X				X
Land Subsidence		X		X				X				X
Landslide	X		X				X				X	
Levee Failure		X		X				X				X
Severe Thunder Storm	X		X			X					X	
Severe Wind Storm	X		X			X					X	
Severe Winter Storm	X		X				X				X	
Tornado		X		X				X				X
Tsunami		X		X				X				X
Volcano	X		X				X			X		
Wildfire		X		X				X				X
Other:												

**Which of the following does your agency have? (Circle One)**

Comprehensive Plan **Yes / No / NA** Date completed: **December 2005**

Critical Areas Ordinance **Yes / No / NA** Date completed: **April 1998**

Does your agency have an emergency plan? **Yes / No / NA**



Which Agency are you representing: **City of Toledo**

Name: **Michelle Whitten** Title: **City Clerk/Treasurer**

Email: **cityoftoledo@toledotel.com** Telephone #: **360-864-4564**

Address: **PO Box 236** City: **Toledo** Zip: **98591**

**Task B: Compile a detailed inventory of what can be damaged by a hazard event.**

Inventory the assets (critical facilities, businesses, historic, cultural, natural resource areas and areas of special consideration) that can be damaged by a hazard event.

<b>HAZARDS</b>	1. Avalanche 2. Dam Failure 3. Debris Flow 4. Drought 5. Earthquake 6. Expansive Soils 7. Extreme Heat	8. Flooding 9. Hailstorm 10. Hurricane 11. Land Subsidence 12. Landslide 13. Levee Failure 14. Severe Thunder Storm	15. Severe Wind Storm 16. Severe Winter Storm 17. Tornado 18. Volcano 19. Wildfire	<b>BUILDING MATERIALS</b>	a. Masonry b. concrete c. Concrete Block d. Brick e. Stick f. Metal	g. Steel h. Asphalt
----------------	--	---	--	---------------------------	--	------------------------

Name or description of Asset (building)	Address	Hazard(s) List all that apply (See legend above)	Critical Facility	Transportation	Utility System	Comm. System	Economic Assets	Special consideration	Historic/Other	Size of Building (sq. ft.)	Replacement Value (\$)	Contents Value (\$)	Displacement (\$ per day)	Occupancy or capacity (#)	Structural – building materials
<i>Example – A Building</i>	<i>123 Hall Dr.</i>	<i>5,8,15,18</i>	X							<i>250,000</i>	<i>2.5 M</i>	<i>1.0 M</i>	<i>5,000</i>	<i>25</i>	<i>d,e</i>
City Hall	130 N. Second St.	2, 5, 14, 15, 16	X							8816	990,000	250,000		50	e, f
WWTP	1000 S. Fifth St.	2, 5, 8, 15, 16			X					9.0 M	9.0M				d, e
Water Tower	1166 St. Rte. 505	5, 14			X					250,000g	250,000				a
Water Lines		5			X										
Sewer Lines		5			X										
Lovell's	112 Cowlitz St.	2, 5, 16					X			6092	130,000				e, d
Short Stop	560 N. Fifth St.	5, 16					X			2280	469,000				c, f
Valley View Health Ctr.	117 Ramsey Way	2, 5, 16	X							3290	411,000				e
IGA Fresh Market	400 Cowlitz St.	2, 5, 16					X			14392	438,000				c, f
Toledo Tel (equipment)	116 Ramsey Way	2, 5				X				2734	227,000				a

<b>ASSET INVENTORY WORKSHEET 2C</b>		Date Completed: <b>May 6, 2015</b>	
Which Agency are you representing? <b>City of Toledo</b>			
Name: <b>Michelle Whitten</b>		Title: <b>City Clerk/Treasurer</b>	
Email: <b>cityoftoledo@toledotel.com</b>		Telephone #: <b>360-864-4564</b>	
Address: <b>PO Box 236</b>		City: <b>Toledo</b>	ZIP: <b>98591</b>

**Task C.** Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.

**Hazard: EARTHQUAKE**

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	305	305	100%	32,684,690.00	32,684,690.00	100%	722	722	100%
Commercial	23	23	100%	2,964,950.00	2,964,950.00	100%	100	100	100%
Industrial	0	0	0	0	0	0	0	0	0
Agricultural	0	0	0	0	0	0	0	0	0
Religious/ Non-profit	5	5	100%	1,896,600.00	1,896,600.00	100%	150	150	100%
Government	4	4	100%	990,000.00	990,000.00	100%	17	17	100%
Education	7	7	100%	4,338,000.00	4,338,000.00	100%	564	564	100%
Utilities	2	2	100%	9,250,000.00	9,250,000.00	100%	2	2	100%
<b>Total</b>	<b>352</b>	<b>352</b>	<b>100%</b>	<b>52,124,240.00</b>	<b>52,124,240.00</b>	<b>100%</b>	<b>1545</b>	<b>1545</b>	<b>100%</b>

**Task D. Determine whether (and where) you want to collect additional inventory data. (Circle one)**

- Do you know where your greatest damages may occur in your hazard areas? **Yes** or No
- Do you know whether your critical facilities will be operational after a hazard event? **Yes** or No
- Is there enough data to determine which assets are subject to the greatest potential damages? **Yes** or No
- Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards? **Yes** or No
- Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards? **Yes** or No
- Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence? Yes or **No**
- Is additional data needed to justify the expenditure of community or state funds for mitigation? Z Yes or **No**

<b>ASSET INVENTORY WORKSHEET 2C</b>		Date Completed: <b>May 6, 2015</b>	
Which Agency are you representing? <b>City of Toledo</b>			
Name: <b>Michelle Whitten</b>		Title: <b>City Clerk/Treasurer</b>	
Email: <b>cityoftoledo@toledotel.com</b>		Telephone #: <b>360-864-4564</b>	
Address: <b>PO Box 236</b>		City: <b>Toledo</b>	ZIP: <b>98591</b>

**Task C.** Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.

**Hazard: FLOODING**

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	305	0	0%	32,684,690.00	0	0	722	0	0%
Commercial	23	0	0%	2,964,950.00	0	0%	100	0	0%
Industrial	0	0	0	0	0	0	0	0	0
Agricultural	0	0	0	0	0	0	0	0	0
Religious/ Non-profit	5	0	0%	1,896,600.00	0	0%	150	0	0%
Government	4	0	0%	990,000.00			7	2	
Education	7	2		4,338,000.00			564	316	
Utilities	4	1		9,250,000.00	9,000,000.00		2	2	100%
<b>Total</b>	<b>348</b>	<b>3</b>	<b>0%</b>	<b>52,124,240.00</b>			<b>1545</b>	<b>320</b>	

**Task D. Determine whether (and where) you want to collect additional inventory data. (Circle one)**

- Do you know where your greatest damages may occur in your hazard areas? **Yes** or No
- Do you know whether your critical facilities will be operational after a hazard event? **Yes** or No
- Is there enough data to determine which assets are subject to the greatest potential damages? **Yes** or No
- Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards? **Yes** or No
- Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards? **Yes** or No
- Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence? Yes or **No**
- Is additional data needed to justify the expenditure of community or state funds for mitigation? Z  
Yes or **No**

# Ranking Mitigation Strategies: Using STAPLEE - Worksheet 3A

Date: June 3, 2015

Agency: *City of Toledo*

Category Description/Action Items (Mitigation Strategy)	Hazard Addressed (flood, earthquake, wind, winter, landslide, etc.)	Social (Yes or No)	Technical (Yes or No)	Administrative (Yes or No)	Political (Yes or No)	Legal (Yes or No)	Economical (Yes or No)	Environmental (Yes or No)	Responsible Department/Agency
<b>Example - Continue to enforce the flood ordinance which is based on NFIP model</b>	<b>Flood</b>	<b>Y</b>	<b>Y</b>	<b>Y</b>	<b>Y</b>	<b>Y</b>	<b>Y</b>	<b>N</b>	<b>Community Development</b>
Continue to enforce the flood ordinance which is based on NFIP Model	Flood	Y	Y	Y	Y	Y	Y	N	City Clerk
Continue to updates and enforcement of Critical Areas Ordinance	All	Y	Y	Y	Y	Y	Y	Y	City Clerk
Continue Development Reviews	All	Y	Y	Y	Y	Y	Y	N	City Clerk
Continue working with/contracting with Lewis County Emergency Management	All	Y	Y	Y	Y	Y	Y	N	City Clerk
Inspect and evaluate building annually (City Hall)	All	Y	Y	Y	Y	Y	Y	N	City Clerk
Backup Generator for emergencies (WWTP)	All	Y	Y	Y	Y	Y	Y	N	Public Works
Coordinate with other agencies (WWTP)	All	Y	Y	Y	Y	Y	Y	N	City Clerk/Public Works
Continue to require and maintain elevation certificates for permitted development within the flood plain	Flood	Y	Y	Y	Y	Y	Y	Y	City Clerk

**Notes**  
 S: Social – The public must support the overall implementation strategy and specific mitigation actions.  
 T: Technical – It is important to determine if the proposed action is technically feasible, will help reduce losses in the long term, and has minimal secondary impacts.  
 A: Administrative – Under this part of the evaluation criteria, examine the anticipated staffing, funding, and maintenance requirements for the mitigation action to be implemented.  
 P: Political – Understanding how your community and State leadership feels about issues related to the environment, economic development, safety, and emergency management.  
 L: Legal – When considering this criterion, determine whether your agency has the legal authority at the State, or local level to implement the action, or if new laws will need to be passed.  
 E: Economic – Cost-effective mitigation actions that can be funded in current or upcoming budget cycles are much more likely to be implemented.  
 E: Environmental – Evaluate whether, when implementing mitigation actions, there would be negative consequences to environmental assets (wetlands, endangered species, protected resources).



# Mitigation Strategies – Worksheet 3B

Date: June 3, 2015

Agency: *City of Toledo*

Mitigation Measures		Hazard Addressed (flood, earthquake, wind, winter, landslide, etc.)	2010 Plan		Mitigation Identification (Prevention, Property Protection, Public Education & Awareness, Natural Resource Protection, Structural Projects)	Cost-Benefit and Prioritization			Timeline (schedule for approx. completion)	Implementation		
Category	Description/Action Items (Mitigation Strategy)		Task in 2010 Plan (yes or no)	Task completed as part of 2010 Plan (yes or no)		Relative Cost 1 = Highest 3 = Lowest	Relative Effectiveness 1 = Lowest 3 = Highest	Priority Rating (Low, Medium, High)		Potential Funding (grants, budget, donations, etc..)	Cost Est.	Administrative Responsibility
Floodplain Management	Continue to enforce the flood ordinance which is based on NFIP model	Flood	Yes	Yes	Prevention, Property Protection, Public Education & Awareness	3	3	High	On-going	Grants/Budget	\$0	City Clerk
Flooding	Continue to require and maintain elevation certificates for permitted development within the floodplain	Flood	Yes	Yes	Prevention, Property Protection, Public Education & Awareness	3	3	High	On-going	Budget	\$0	Building Inspections
Emergency Response Planning	Contract with Lewis County to provide emergency services	All	Yes	Yes	Prevention, Property Protection, Public Education & Awareness	2	2	High	On-going	Budget	\$0	City Clerk/Police Department/Public Works
Critical Areas Ordinance Enforcement	Maintain map of Critical Areas in permit application office	All	Yes	Yes	Prevention, Property Protection, Public Education, & Awareness, Natural Resource Protection	3	2	Medium	On-going	Budget	\$0	City Clerk
Development Review	Continue using SEPA authority to ensure large projects provide for Hazard Mitigation	All	Yes	Yes	Prevention, Property Protection, Public Education & Awareness	3	2	Medium	On-going	Applicant	\$0	City Clerk
Kemp Olson Memorial Park	Remove hazardous dead trees from City Park	Winter/Wind	No	No	Prevention, Property Protection, Natural Resource Protection	3	3	High	Jan.2015	Budget	\$600	Public Works
Shoreline Management Plan	Continue to enforce the SMP and SMP Ordinance	All	No	No	Prevention, Property Protection, Public Education & Awareness, Natural Resource Protection	2	3	Medium	April 2015	Grants/Budget	\$38,000	

**Notes**

2010 Plan: rate task(s) if it was in the 2010 Plan  
 Cost Estimate: a very rough estimate cost of implementing task  
 Administrative Responsibility: who will accomplish the task

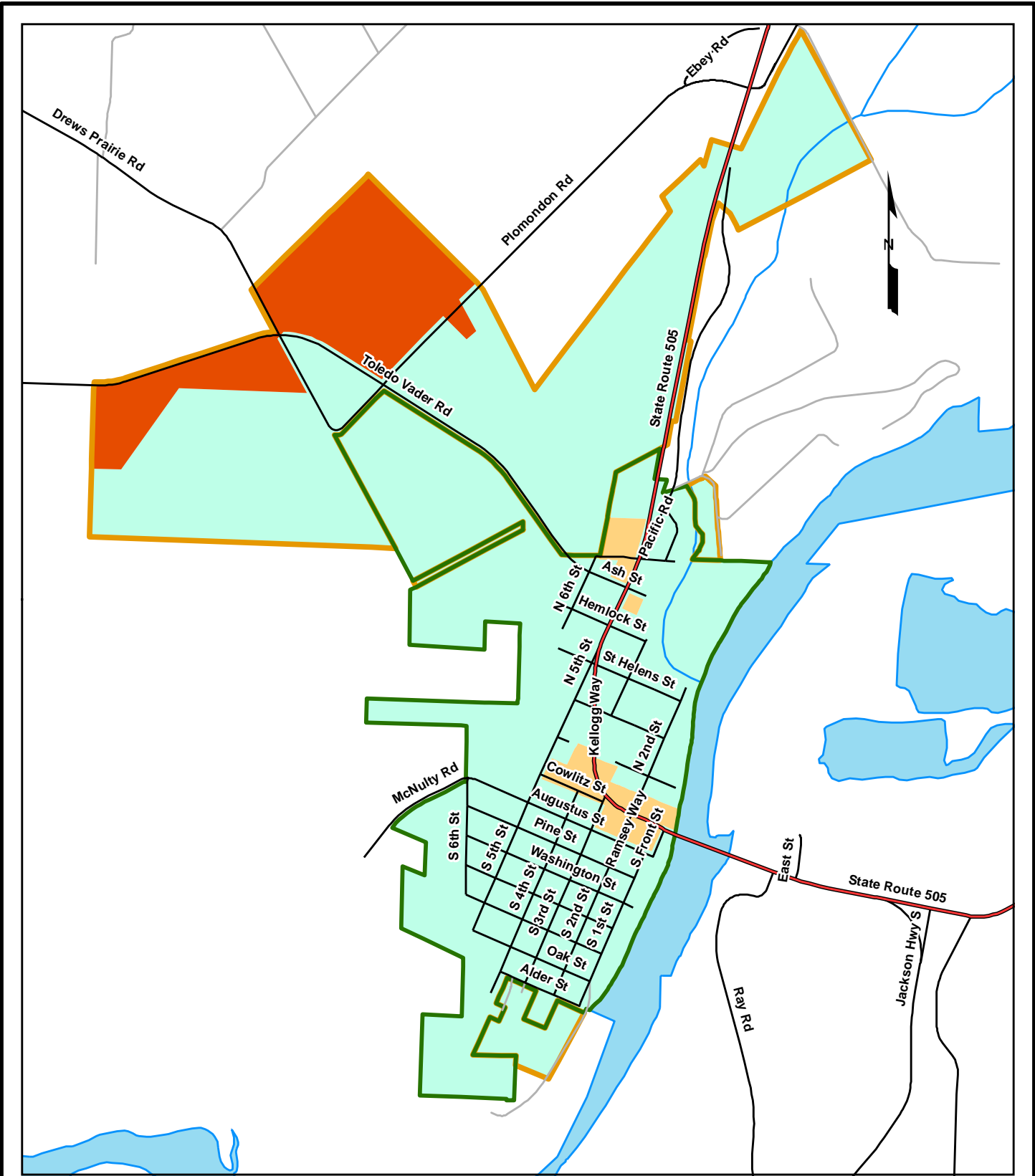
# Critical Facilities Mitigation Strategies - Worksheet 3C

Date: June 3, 2015

Agency: *City of Toledo*

Mitigation Measures		Hazard Addressed (All, flooding, landslide, earthquake, volcanic, etc....)	2010 Plan		Mitigation Identification (Prevention, Property Protection, Public Education & Awareness, Natural Resource Protection, Structural Projects)	Cost-Benefit and Prioritization			Implementation			
Facility	Mitigation Strategy		Task listed in the 2010 Plan (yes or no)	Task completed as part of 2010 Plan (yes or no)		Relative Cost 1 = Highest 3 = Lowest	Relative Effectiveness 1 = Lowest 3 = Highest	Priority Rating (Low, Medium, High)	Timeline (schedule)	Potential Funding (grants, budget, donations, etc..)	Cost Est.	Administrative Responsibility
Example-Station #1	Assess building for structural integrity to determine strength in withstanding an earthquake, or volcanic ash fallout on roof	Earthquake, volcanic	Yes	No	Prevention, property protection	1	2	Med.	2010	Budget	1,000	Fire Chief
City Hall	Inspect and evaluate building annually	All	Yes	Yes	Prevention, Property Protection	3	3	High	Annually	Budget	\$0	Public Works
WWTP	Inspect and evaluate building annually	All	Yes	Yes	Prevention, Property Protection	3	3	High	Annually	Budget	\$0	Public Works

**Notes**  
 Facility: Critical facility  
 Mitigation Strategy: description of mitigation or task  
 2010 Plan: rate task(s) if it was in the 2010 Plan  
 Timeline: give approximate timeframe of completing this task  
 Cost Estimate: a very rough estimate cost of implementing task  
 Administrative Responsibility: who will accomplish the task



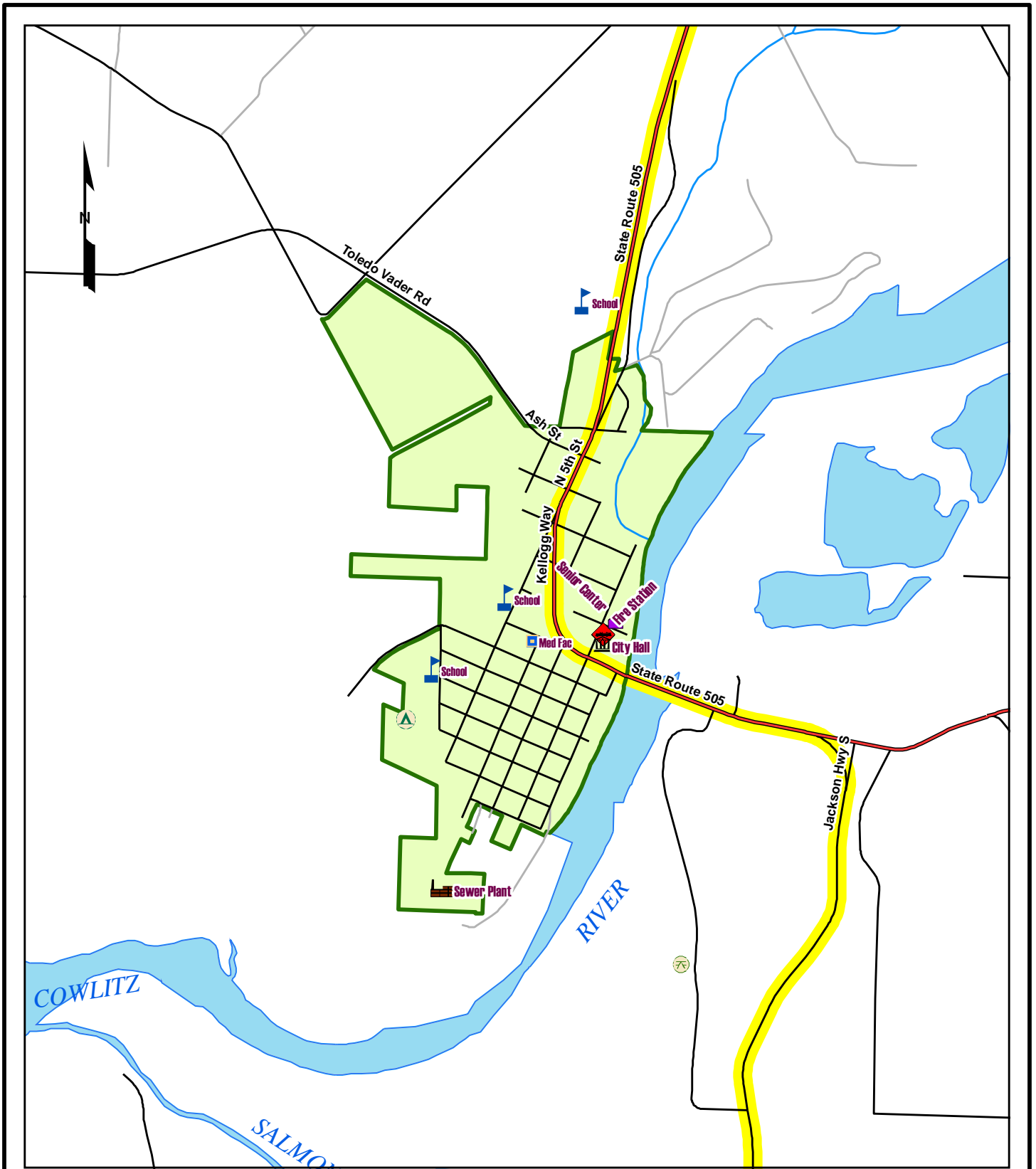
- City Limits
- UGA
- Industrial
- Residential
- OS/ Public
- Commercial
- UGA Default

## ZONING CLASSIFICATIONS

# City of Toledo



Lewis County, Washington

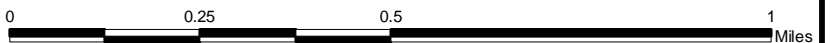


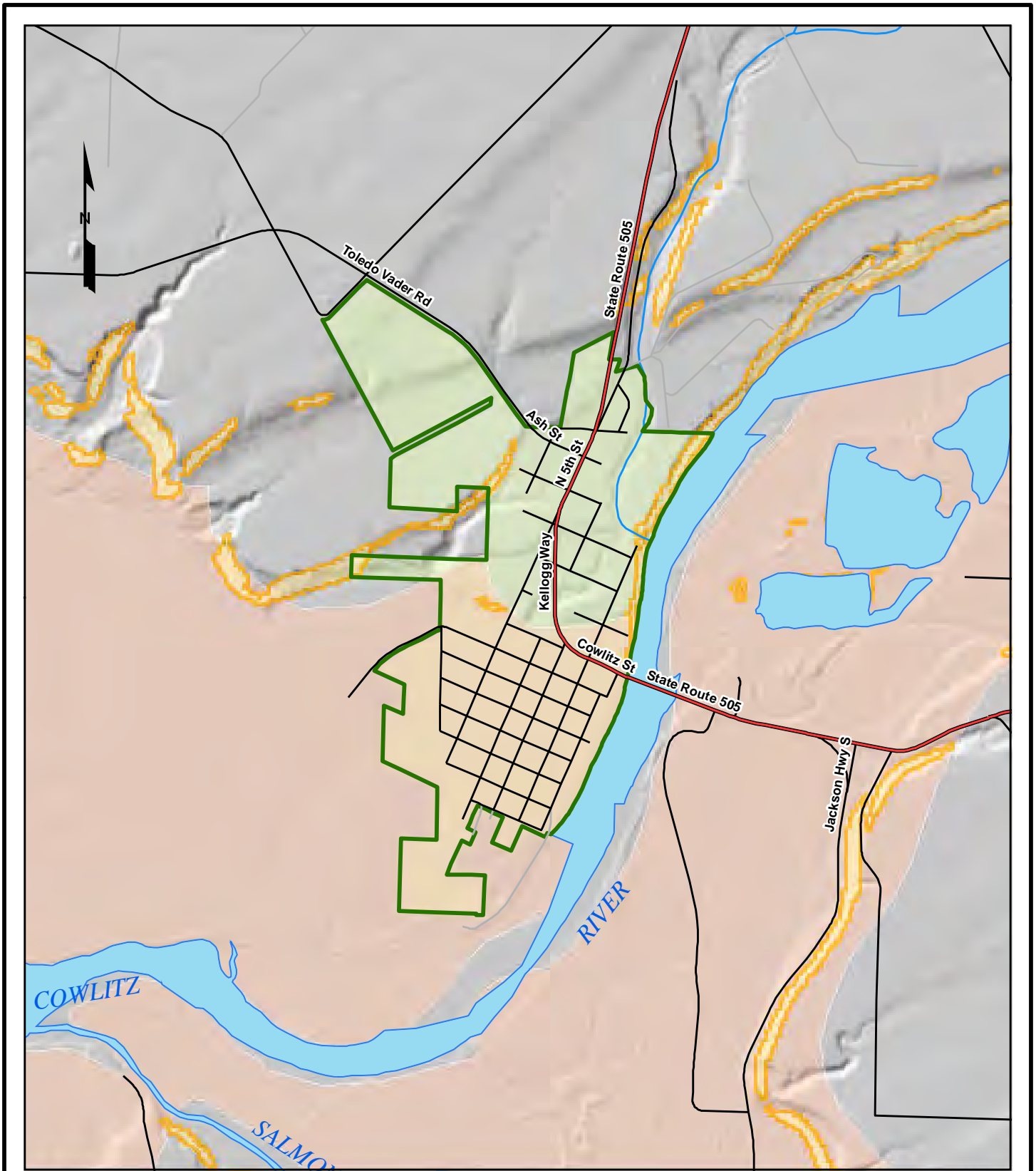
City Limits
  Evacuation Route

Lewis County, Washington  
2015 Multi-jurisdictional Hazard Mitigation Plan

**Toledo**

**Facilities & Evacuation Routes**



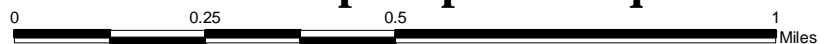


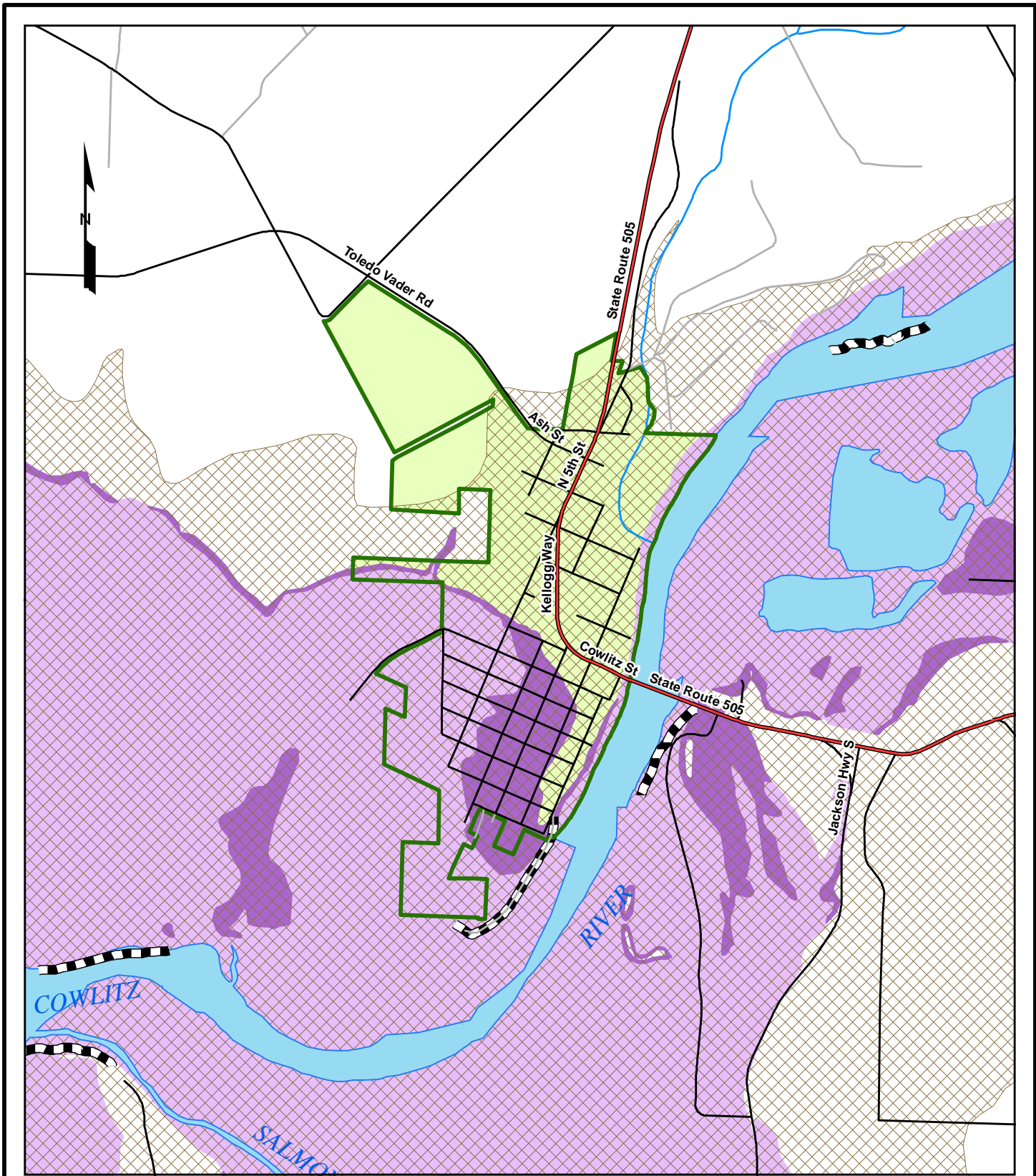
- City Limits
- Mod to High Liquefaction Potential
- Slope > 30%

Lewis County, Washington  
2015 Multi-jurisdictional Hazard Mitigation Plan

**Toledo**

**Steep Slopes & Liquefaction**



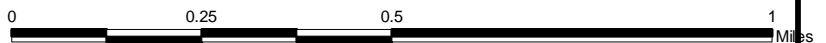


- City Limits
- 100-yr flood
- 500-yr flood
- Dam Inundation
- Levees/revet.

Lewis County, Washington  
2015 Multi-jurisdictional Hazard Mitigation Plan

**Toledo**

**Facilities & Evacuation Routes**



## Building Damage Count by General Occupancy

October 06, 2009

	Count of Buildings (#) by Range of Damage (%)							Total
	None	1-10	11-20	21-30	31-40	41-50	Substantial	
<b>Washington</b>								
<b>Lewis</b>								
Agriculture	0	0	0	0	0	0	0	0
Commercial	0	0	0	0	0	0	0	0
Education	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	0	0	0	0
Religion	0	0	1	0	0	0	0	1
Residential	3	0	0	3	5	5	6	22
<b>Total</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>3</b>	<b>5</b>	<b>5</b>	<b>6</b>	<b>23</b>
<b>Total</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>3</b>	<b>5</b>	<b>5</b>	<b>6</b>	<b>23</b>
<b>Scenario Total</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>3</b>	<b>5</b>	<b>5</b>	<b>6</b>	<b>23</b>

Special Notice Regarding Building Count:

Unlike the earthquake and hurricane models, the flood model performs its analysis at the census block level. This means that the analysis starts with a small number of buildings within each census block and applies a series of distributions necessary for analyzing the potential damage. The application of these distributions and the small number of buildings make the flood model more sensitive to rounding errors that introduces uncertainty into the building count results. Please use these results with suitable caution.

*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.*

**Study Region:** Toledo Flood  
**Scenario:** Toledo 100-Year  
**Return Period:** 100

## Direct Economic Losses for Buildings

October 06, 2009

All values are in thousands of dollars

	Capital Stock Losses			Building Loss Ratio %	Income Losses				Total Loss
	Cost Building Damage	Cost Contents Damage	Inventory Loss		Relocation Loss	Capital Related Loss	Wages Losses	Rental Income Loss	
<b>Washington</b>									
Lewis	1,977	2,695	57	13.3	4	9	41	0	4,899
<b>Total</b>	<b>1,977</b>	<b>2,695</b>	<b>57</b>	<b>13.3</b>	<b>4</b>	<b>9</b>	<b>41</b>	<b>0</b>	<b>4,899</b>
<b>Scenario Total</b>	<b>1,977</b>	<b>2,695</b>	<b>57</b>	<b>13.3</b>	<b>4</b>	<b>9</b>	<b>41</b>	<b>0</b>	<b>4,899</b>

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: Toledo Flood  
 Scenario: Toledo 100-Year  
 Return Period: 100



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## Shelter Summary Report

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October 06, 2009

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	# of Displaced People	# of People Needing Short Term Shelter
<b>Washington</b>		
Lewis	132	23
<b>Total</b>	<b>132</b>	<b>23</b>
<b>Scenario Total</b>	<b>132</b>	<b>23</b>

---

*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.*

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**Study Region:** Toledo Flood  
**Scenario:** Toledo 100-Year  
**Return Period:** 100

Page : 1 of 1





## HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact	Alternate Point of Contact
Jill Nielson PO Box 189 Vader WA 98593 (360) 295-3222 <a href="mailto:vadercity@centurylink.net">vadercity@centurylink.net</a>	Ken Smith, Mayor PO Box 189 Vader, WA 98593 (360) 295-3222 <a href="mailto:vadercity@centurylink.net">vadercity@centurylink.net</a>

**Profile:** Vader was originally named Little Falls and incorporated as such on January 12, 1906. The name was changed to Sopenah by the Northern Pacific Railway because there was already a Little Falls on their rail lines, Little Falls, Minnesota. The townspeople did not like the new name and petitioned the state legislature to change it to Toronto. A dispute then arose which was resolved by a compromise agreement to name the town after a German resident named Vader. The town name was changed to Vader by the legislature on March 25, 1913. Mr. Vader later moved to Florida. It is the birthplace of the novelist and critic Robert Cantwell.

The City of Vader is the smallest city in Lewis County with a population of approximately 630 people. The city is located west of Interstate 5 on State Route 506. The City is nestled at the base of a small range of forested hills. On the outskirts of the community are farms, and a few residential subdivisions. From numerous vantage points in the hills just east of town, one can see Mount Rainier, Mount Adams, and Mount St. Helens—weather permitting.

According to the United States Census Bureau, the city has a total area of .9 square miles. The City of Vader is characterized by a broad floodplain and low terraces surrounded by upland valleys of low to moderate relief that have broad, rounded ridges. The Cowlitz River winds its way through the valley in which the city resides. The river is prone to flooding during periods of abnormally heavy or persistent rain.

## Ranking of Identified Hazards

Hazard Type	Previous Occurrence?		Likely to Experience?		Probability				Extent				Percentage	Rank
	Yes	No	Yes	No	Highly Likely (100% next yr)	Likely (10-100% or 1 in 10 yrs)	Possible (1-10% next year or 1/100 yrs)	Unlikely (less than 1% in 100 yrs)	Catastrophic: more than 50% affected	Severe: 25-50% affected	Limited: 0-25% affected	None: 0% affected		
<b>Rating Points</b>	<b>20</b>	<b>0</b>	<b>10</b>	<b>0</b>	<b>20</b>	<b>10</b>	<b>6</b>	<b>0</b>	<b>20</b>	<b>10</b>	<b>4</b>	<b>0</b>		
Flooding	20		10		20						4		54%	1
Wind Storm	20		10		20						4		54%	1
Winter Storm	20		10		20						4		54%	1
Debris Flow	20		10			10				10			50%	2
Earthquake	20		10			10				10			50%	2
Hailstorm	20		10			10					4		44%	3
Extreme Heat	20						6			10			36%	4
Volcano	20						6			10			36%	4
Wildfire						10			20				30%	5
Dam Failure									20				20%	6
Expansive Soils							6			10			16%	7



**Probability:**

Highly Likely: Near 100% probability in the next year.  
 Likely: Between 10 and 100% probability in the next year, or at least one chance in 10 years.  
 Possible: Between 1 and 10% probability in the next year, or at least one chance in next 100 years.  
 Unlikely: Less than 1% probability in next 100 years.

**Extent of damage is defined as follows:**

Catastrophic: More than 50% of the jurisdiction can be affected  
 Severe: 25 to 50% of the jurisdiction can be affected  
 Limited: 0 to 25% of the jurisdiction can be affected

**None: 0% of the jurisdiction can be affected**

### Current Hazard Mitigation Codes/Plans/Ordinances

- Comprehensive Land Use Plan, August 2005
- Critical Areas Ordinance, August 2005
- City of Vader Emergency Plan, 2010
- Capital Improvement Plan, 2000
- Stormwater Management Plan, 2001
- Transportation Plan, 2014

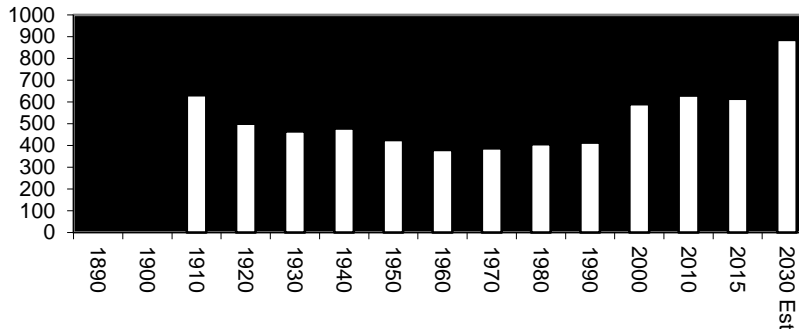
### Agency Specific Natural Hazard Event History – 1980 to 2015

Type of Disaster	FEMA Disaster #	Date	Comments
Severe Winter Storm and Record and Near Record Snow	DR-1825	3/2/2009	Incident 12/12/2008-1/5/2009
Severe Winter Storm, Landslides, Mudslides, Flooding	DR-1817	1/30/2009	1/6-/16/2009
Severe Storms, Flooding, Landslides, Mudslides	DR-1734	12/8/2007	Incident 12/1-12/17/2007
Severe Winter Storm, Landslides, Mudslides	DR-1682	2/14/2007	Incident 12/14-12/15/2006
Severe Storms, Flooding, Landslides, Mudslides	DR-1671	12/12/2006	Incident 11/2-11/11/2006
Earthquake	DR-1361	3/1/2001	Incident 2/28-3/16/2001
Severe Winter Storms/Flooding	DR-1159	1/17/1997	Incident 12/26/1996-2/10/1997
Severe Storms, Flooding	DR-1100	Feb. 9, 1996	Incident 1/26-2/23/1996
Storms, High Winds, Floods	DR-1079	Jan. 3, 1996	Incident 11/7-Dec 18, 1995
Severe Storm, High Winds	DR-981	March 4, 1993	Incident 1/20-1/21/1993
Severe Storms, Flooding	DR-784	Dec 15, 1986	Incident 11/22-11/29/1986
Volcanic Eruption – Mt. St. Helens	DR-623	May 21, 1980	

### Demographics

Population	1990	2000	2010	2015	2030 -Projected
	414	590	630	615	885

### VADER



Quick Facts (US Census)	Vader	Washington
Population, percent change - April 1, 2010 to July 1, 2013		3.7%
Persons under 5 years, percent, 2010	10.6%	6.5%
Persons under 18 years, percent definition and source info Persons under 18 years, percent, 2010		23.5%
Persons 65 years and over, percent definition and source info Persons 65 years and over, percent, 2010	11.8%	12.3%
High school graduate or higher, percent of persons age 25+, 2009-2013		90.0%
Bachelor's degree or higher, percent of persons age 25+, 2009-2013		31.9%
Homeownership rate, 2009-2013		63.2%



Housing units in multi-unit structures, percent, 2009-2013		25.6%
Median value of owner-occupied housing units, 2009-2013		\$262,100
Per capita money income in past 12 months (2013 dollars), 2009-2013		\$30,742
Median household income definition and source info Median household income, 2009-2013	45,651	\$59,478
Persons below poverty level, percent definition and source info Persons below poverty level, percent, 2009-2013	20.6%	13.4%
Source: U.S. Census – Quickfacts, Date Accessed: July 12, 2015. Website: quickfacts.census.gov		

### Land Designations

Land Area within the existing city limits:	
Total land area within city limits and urban growth area	1708
Land area of agriculture	149
Land area of transportation/utility	207
Undeveloped/vacant	415
Land area of public/quasi-public	28
Land area of residential	381
Land area of commercial	12
Land area of mining/forestry	516

### Current and Anticipated Development and Population Trends

Slow growth to no growth will continue in the future. There are many places available for infill development and industrial development.

### Infrastructure

Categories	2014	Approximate Value (\$)
Miles of Street and Roads	6.65 miles	\$4,655,000
Sanitary Sewer	19,300 feet, 520 feet forced main	
Storm Sewer	N/A	
Water lines		

### Critical Facilities

City Hall	317 8 <sup>th</sup> Street	106,370
Police/Fire Hall	801 B Street	950,000
City Garage/Shop	1072 7 <sup>th</sup> Street	146,356
Sewage Treatment Plant	1025 A Street	5,000,000
Sewer Pump Station	Alpine Court	50,000
Sewer Collection System	Throughout City	1,000,000
Water Treatment Plant & Reservoir	1333 S Military Rd	8,000,000
Water Distribution System	Throughout City	1,000,000
Water Intake Facility	Cowlitz River south of St Hwy 506	

### Flood Information

Percentage of existing city limits within the 100-year flood plain	
Assessor's valuation of private properties within the 100-year flood plain	

### Critical Facilities within the 100-year flood plain

Water Intake Facility	Cowlitz River, below State Hwy 506	\$ 5,404
-----------------------	------------------------------------	----------

### NFIP/CRS Section

NFIP/CRS Community	No
Floodplain Administrator	No
Certified Floodplain Manager	No
Floodplain Ordinance Adoption	CAO, August 2005
Recently community Assistant Visit or Community Assistance Contact	N/A
NFIP Compliance Violations?	N/A
FEMA Floodplain Maps Adopted	Flood map is number5302660001B, on 09/14/1979
Community Rating Classification	N/A



Building Code Effective Grading Schedule	
StormReady Community	No
Firewise Community	No
<b>Previous Action Plan Implementation</b>	
<b>Mitigation Strategy</b>	<b>Completed 2010-2014</b>
Continue to enforce the flood ordinances & building codes to reduce flood	Yes (on-going)
Develop a plan for flood damage control & staff training to implement	No
Develop a plan for emergency communications among staff during an event	No
Develop a plan for alternate facility to provide City Hall services	No
Develop a plan for regular evaluation of trees and cause pruning or removal	No
Purchase portable generators for emergency power outages	No

### Attached Documents

- Land Use Map
- Public Facilities Map
- Hazard Identification Worksheet(s)
- Mitigation Strategies Worksheet(s)
- Steep Slopes and Liquefaction Map
- Flood Hazard Map
- HAZUS-MH: Flood Results

# HAZARD IDENTIFICATION WORKSHEET

Date Completed: 5/6/2015

## CITY OF VADER

Name: JILL NIELSON

Title: CLERK/TREASURER

Email: [vadercity@centurylink.net](mailto:vadercity@centurylink.net)

Telephone #: 360-295-3222

Address: PO Box 189

City: Vader

ZIP: 98593

**For each Hazard, please fill out the table below based on the following questions:**

- **Previous Occurrence:** Is there a historic record of this type of hazard happening here? *Yes or No*
- **Likely to Experience:** Are you likely to experience this type of hazard in the future? *Yes or No*
- **Probability:** Based on history, what is the likelihood of this event happening again? *Highly Likely, Likely, Possible, Unlikely*
- **Extent:** If this hazard event were to happen, how extensive could the damage be? *Catastrophic, Severe, Limited, None*

Hazard Type	Previous Occurrence?		Likely to Experience?		Probability				Extent			
	Yes	No	Yes	No	Highly Likely	Likely	Possible	Unlikely	Catastrophic	Severe	Limited	None
Avalanche		X		X				X			X	
Coastal Erosion		X		X				X				X
Coastal Storm		X		X				X				X
Dam Failure		X		X				X	X			
Debris Flow	X		X			X				X		
Drought		X		X				X		X		
Earthquake	X		X			X				X		
Expansive Soils		X		X			X			X		
Extreme Heat	X			X			X			X		
Flooding	X		X		X						X	
Hailstorm	X		X			X					X	
Hurricane		X		X				X		X		
Land Subsidence		X		X				X			X	
Landslide		X		X			X				X	
Levee Failure		X		X				X				X
Severe Thunder Storm		X		X			X				X	
Severe Wind Storm	X		X		X						X	
Severe Winter Storm	X		X		X						X	
Tornado		X		X				X		X		
Tsunami		X		X				X				X
Volcano	X			X			X			X		
Wildfire		X		X		X			X			
Other:		X										

**Which of the following does your agency have? (Circle One)**

Comprehensive Plan  Yes / No / NA Date completed: 2005

Critical Areas Ordinance  Yes / No / NA Date completed: 1992

Does your agency have an emergency plan? Yes / No / NA





Agency: **CITY OF VADER**

Name: **Jill Nielson** Title: **Clerk/Treasurer**

Email: **vadercity@centurylink.net** Telephone #: **360-295-3222**

Address: **PO Box 189** City: **Vader** Zip: **98593**

Task B: Compile a detailed inventory of what can be damaged by a hazard event.  
Inventory the assets (critical facilities, businesses, historic, cultural, natural resource areas and areas of special consideration) that can be damaged by a hazard event.

<b>HAZARDS</b>	1. Avalanche 2. Dam Failure 3. Debris Flow 4. Drought 5. Earthquake 6. Expansive Soils 7. Extreme Heat	8. Flooding 9. Hailstorm 10. Hurricane 11. Land Subsidence 12. Landslide 13. Levee Failure 14. Severe Thunder Storm	15. Severe Wind Storm 16. Severe Winter Storm 17. Tornado 18. Volcano 19. Wildfire	<b>BUILDING MATERIALS</b>	a. Masonry b. concrete c. Concrete Block d. Brick e. Stick f. Metal	g. Steel h. Asphalt
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Name or description of Asset (building)	Address	Hazard(s) List all that apply (See legend above)	Critical Facility	Transportation	Utility System	Comm. System	Economic Assets	Special consideration	Historic/Other	Size of Building (sq. ft.)	Replacement Value (\$)	Contents Value (\$)	Displacement (\$ per day)	Occupancy or capacity (#)	Structural – building materials
City Hall	317 8 <sup>th</sup> Street	5,8,15,16	X		X					1728	106,370	26,522	1500	50	F
Police/Fire Hall	801 B Street	5,8,15,16	X							3904	950,000	250,000	500	50	F
City Garage/Shop	1072 7 <sup>th</sup> Street	5,8,15,16	X	X						2700	146,356	75,000	200	2	A
Werden Park Pavilion/Restrooms	510 A Street	5,8,15,16							X	2000	108,000	5,000	100	30	E
Sewage Treatment Plant	1025 A Street	3,5,8,15,16	X		X					250	5,000,000	200,000	500	2	C
Sewer Pump Station	Alpine Court	5,8,15	X		X					N/A	50,000	N/A	500	0	E
Sewer Collection System	Throughout City	5,8	X		X					N/A	1,000,000	N/A	100	0	E
Water Treatment Plant & Reservoir	1333 S Military Rd	5,8,15,16	X		X					1320	8,000,000	200,000	6000	0	A
Water Distribution System	Throughout City	5,8	X		X					N/A	1,000,000	N/A	100	0	E

Water Intake Facility	Cowlitz River south of St Hwy 506	3,5,8,15,16	X		X					1000	5,304,000	185,400	6000	0	E
Little Falls Masonic Lodge	826 A Street	5,8,15,16							X	1986	50,000	10,000	0	100	E
Historic City Jail	510 A Street	5,8,15,16							X	712	42,436	2000	0	40	E
Ben Olson House	1110 D Street	5,8,15,16							X	3615	441,969	250,000	100	2	E
Grace United Methodist Church	618 D Street	5,8,15,16							X	2516	345,950	25,000	100	175	E
US Post Office	627 A Street	5,8,15,16				X				648	79,224	50,000	100	3	C
CenturyTel Building	606 A Street	5,8,15,16				X				1157	141,455	150,000	100	2	C
Assembly of God Church	302 6 <sup>TH</sup> Street	5,8,15,16						X		9654	2,042,425	200,000	1000	500	A, F
MPM, LLC (Warehouse under construction)	747 Atlas Road	5,8,15,16					X			10,200	440,000	0	0	3	G
Little Crane Café	110 7 <sup>th</sup> Street	5,8,15,16					X			1557	250,000	80,000	1500	66	E
J & G Grocery	110 ½ 7 <sup>th</sup> Street	5,8,15,16					X			2112	300,000	35,000	2500	50	E
Dailey's Mini Storage	111 7 <sup>th</sup> Street	5,8,15,16					X			10,200	200,000	0	200	59	G

<b>ASSET INVENTORY WORKSHEET 2C</b>		<b>Date Completed:</b> 5/6/2015	
<b>Agency: CITY OF VADER</b>			
<b>Name:</b> JILL NIELSON		<b>Title:</b> CLERK/TREASURER	
<b>Email:</b> <a href="mailto:vadercity@centurylink.net">vadercity@centurylink.net</a>		<b>Telephone #:</b> 360-295-3222	
<b>Address:</b> PO BOX 189		<b>City:</b> VADER	<b>ZIP:</b> 98593

**Task C.** Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.

**Hazard:** Debris Flow

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	223	0	0%	22,451,465	0	0%	630	0	0%
Commercial	5	0	0%	970,679	0	0%	180	0	0%
Industrial	1	0	0%	440,000	0	0%	4	0	0%
Agricultural	-	-	-	-	-	-	-	-	-
Religious/ Non-profit	3	0	0%	2,438,375	0	0%	630	0	0%
Government	5	0	0%	1,353,162	0	0%	50	0	0%
Education	-	-	-	-	-	-	-	-	-
Utilities	6	2	33%	15,103,040	5,185,400	34%	630	630	100%
<b>Total</b>	<b>243</b>	<b>2</b>	<b>1%</b>	<b>42,756,721</b>	<b>5,185,400</b>	<b>12%</b>	<b>630</b>	<b>630</b>	<b>100%</b>

**Task D.** Determine whether (and where) you want to collect additional inventory data. (circle one)

- Do you know where your greatest damages may occur in your hazard areas? Yes or  No
- Do you know whether your critical facilities will be operational after a hazard event? Yes or  No
- Is there enough data to determine which assets are subject to the greatest potential damages?  Yes or No
- Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards?  Yes or No
- Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards?  Yes or No
- Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence?  Yes or No
- Is additional data needed to justify the expenditure of community or state funds for mitigation? Yes or  No

<b>ASSET INVENTORY WORKSHEET 2C</b>		<b>Date Completed:</b> 5/6/2015	
<b>Agency: CITY OF VADER</b>			
<b>Name:</b> JILL NIELSON		<b>Title:</b> CLERK/TREASURER	
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<b>Address:</b> PO BOX 189		<b>City:</b> VADER	<b>ZIP:</b> 98593

**Task C.** Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.

**Hazard:** Earthquake

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	223	223	100%	22,451,465	22,451,465	100%	630	630	100%
Commercial	5	5	100%	970,679	970,679	100%	180	180	100%
Industrial	1	1	100%	440,000	440,000	100%	4	4	100%
Agricultural	-	-	-	-	-	-	-	-	-
Religious/ Non-profit	3	3	100%	2,438,375	2,438,375	100%	630	630	100%
Government	5	5	100%	1,353,162	1,353,162	100%	50	50	100%
Education	-	-	-	-	-	-	-	-	-
Utilities	6	6	100%	15,103,040	15,103,040	100%	630	630	100%
<b>Total</b>	<b>243</b>	<b>243</b>	<b>100%</b>	<b>42,756,721</b>	<b>42,756,721</b>	<b>100%</b>	<b>630</b>	<b>630</b>	<b>100%</b>

**Task D.** Determine whether (and where) you want to collect additional inventory data. (circle one)

- Do you know where your greatest damages may occur in your hazard areas? Yes or  No
- Do you know whether your critical facilities will be operational after a hazard event? Yes or  No
- Is there enough data to determine which assets are subject to the greatest potential damages?  Yes or No
- Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards?  Yes or No
- Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards?  Yes or No
- Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence?  Yes or No
- Is additional data needed to justify the expenditure of community or state funds for mitigation? Yes or  No

<b>ASSET INVENTORY WORKSHEET 2C</b>		<b>Date Completed:</b> 5/6/2015	
<b>Agency: CITY OF VADER</b>			
<b>Name:</b> JILL NIELSON		<b>Title:</b> CLERK/TREASURER	
<b>Email:</b> <a href="mailto:vadercity@centurylink.net">vadercity@centurylink.net</a>		<b>Telephone #:</b> 360-295-3222	
<b>Address:</b> PO BOX 189		<b>City:</b> VADER	<b>ZIP:</b> 98593

**Task C.** Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.

**Hazard:** Flooding

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	223	8	4%	22,451,465	898,059	4%	630	25	4%
Commercial	5	0	0%	970,679	0	0%	180	0	0%
Industrial	1	1	100%	440,000	440,000	100%	4	4	100%
Agricultural	-	-	-	-	-	-	-	-	-
Religious/ Non-profit	3	0	0%	2,438,375	0	0%	630	0	0%
Government	5	0	0%	1,353,162	0	0%	50	0	0%
Education	-	-	-	-	-	-	-	-	-
Utilities	6	3	50%	15,103,040	6,185,400	41%	630	630	100%
<b>Total</b>	<b>243</b>	<b>12</b>	<b>5%</b>	<b>42,756,721</b>	<b>7,083,899</b>	<b>17%</b>	<b>630</b>	<b>630</b>	<b>31%</b>

**Task D.** Determine whether (and where) you want to collect additional inventory data. (circle one)

- Do you know where your greatest damages may occur in your hazard areas? Yes or  No
- Do you know whether your critical facilities will be operational after a hazard event? Yes or  No
- Is there enough data to determine which assets are subject to the greatest potential damages?  Yes or No
- Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards?  Yes or No
- Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards?  Yes or No
- Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence?  Yes or No
- Is additional data needed to justify the expenditure of community or state funds for mitigation? Yes or  No

<b>ASSET INVENTORY WORKSHEET 2C</b>		<b>Date Completed:</b> 5/6/2015	
<b>Agency: CITY OF VADER</b>			
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<b>Email:</b> <a href="mailto:vadercity@centurylink.net">vadercity@centurylink.net</a>		<b>Telephone #:</b> 360-295-3222	
<b>Address:</b> PO BOX 189		<b>City:</b> VADER	<b>ZIP:</b> 98593

**Task C.** Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.

**Hazard:** Severe Wind Storm

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	223	110	49%	22,451,465	11,001,217	49%	630	309	49%
Commercial	5	5	100%	970,679	970,679	100%	180	180	100%
Industrial	1	1	100%	440,000	440,000	100%	4	4	100%
Agricultural	-	-	-	-	-	-	-	-	-
Religious/ Non-profit	3	3	100%	2,438,375	2,438,375	100%	630	630	100%
Government	5	5	100%	1,353,162	1,353,162	100%	50	50	100%
Education	-	-	-	-	-	-	-	-	-
Utilities	6	4	66%	15,103,040	13,103,040	87%	630	630	100%
<b>Total</b>	<b>243</b>	<b>128</b>	<b>53%</b>	<b>42,756,721</b>	<b>29,306,473</b>	<b>69%</b>	<b>630</b>	<b>630</b>	<b>100%</b>

**Task D.** Determine whether (and where) you want to collect additional inventory data. (circle one)

- Do you know where your greatest damages may occur in your hazard areas? Yes or  No
- Do you know whether your critical facilities will be operational after a hazard event? Yes or  No
- Is there enough data to determine which assets are subject to the greatest potential damages?  Yes or No
- Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards?  Yes or No
- Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards?  Yes or No
- Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence?  Yes or No
- Is additional data needed to justify the expenditure of community or state funds for mitigation? Yes or  No

<b>ASSET INVENTORY WORKSHEET 2C</b>		<b>Date Completed:</b> 5/6/2015	
<b>Agency: CITY OF VADER</b>			
<b>Name:</b> JILL NIELSON		<b>Title:</b> CLERK/TREASURER	
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<b>Address:</b> PO BOX 189		<b>City:</b> VADER	<b>ZIP:</b> 98593

**Task C.** Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.

**Hazard:** Severe Winter Storm

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	223	223	100%	22,451,465	22,451,465	100%	630	630	49%
Commercial	5	5	100%	970,679	970,679	100%	180	180	100%
Industrial	1	1	100%	440,000	440,000	100%	4	4	100%
Agricultural	-	-	-	-	-	-	-	-	-
Religious/ Non-profit	3	3	100%	2,438,375	2,438,375	100%	630	630	100%
Government	5	5	100%	1,353,162	1,353,162	100%	50	50	100%
Education	-	-	-	-	-	-	-	-	-
Utilities	6	3	50%	15,103,040	13,185,400	87%	630	630	100%
<b>Total</b>	<b>243</b>	<b>240</b>	<b>99%</b>	<b>42,756,721</b>	<b>40,839,081</b>	<b>96%</b>	<b>630</b>	<b>630</b>	<b>100%</b>

**Task D.** Determine whether (and where) you want to collect additional inventory data. (circle one)

- Do you know where your greatest damages may occur in your hazard areas? Yes or  No
- Do you know whether your critical facilities will be operational after a hazard event? Yes or  No
- Is there enough data to determine which assets are subject to the greatest potential damages?  Yes or No
- Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards?  Yes or No
- Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards?  Yes or No
- Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence?  Yes or No
- Is additional data needed to justify the expenditure of community or state funds for mitigation? Yes or  No

## Ranking Mitigation Strategies: Using STAPLEE - Worksheet 3A

Date: June 11, 2015

Agency: City of Vader

Category Description/Action Items (Mitigation Strategy)	Hazard Addressed (flood, earthquake, wind, winter, landslide, etc.)	Social (Yes or No)	Technical (Yes or No)	Administrative (Yes or No)	Political (Yes or No)	Legal (Yes or No)	Economical (Yes or No)	Environmental (Yes or No)	Responsible Department/Agency
Continue to enforce the flood ordinance and building codes to reduce flood damages	Flood	Y	Y	Y	Y	Y	Y	N	Public Works
Develop plan for flood damage control. Train employees in flood plan for facility component protection. Develop post flood clean-up plan	Flood	N	N	Y	Y	N	Y	N	Public Works
Develop a plan for emergency communications among city staff during an event.(updated)	Earthquake, severe wind & winter storms,	N	Y	Y	N	N	Y	N	Administration
Develop a plan for alternate facility to provide City Hall services	Earthquake, severe wind & winter storms	Y	Y	Y	Y	Y	Y	N	Mayor
Develop a plan for regular evaluation of trees and cause pruning or removal	Severe Wind & Winter Storms	Y	N	Y	Y	Y	N	Y	Public Works
Purchase portable generators for emergency power outages	Earthquake, severe wind & winter storms, volcano	N	N	Y	N	N	Y	N	Public Works
Evaluate needs to anchor Outfall pipe at WWTP	Flood	N	Y	Y	N	Y	N	Y	Public Works

### Notes

S: Social – The public must support the overall implementation strategy and specific mitigation actions.

T: Technical – It is important to determine if the proposed action is technically feasible, will help reduce losses in the long term, and has minimal secondary impacts.

A: Administrative – Under this part of the evaluation criteria, examine the anticipated staffing, funding, and maintenance requirements for the mitigation action to be implemented.

P: Political – Understanding how your community and State leadership feels about issues related to the environment, economic development, safety, and emergency management.

L: Legal – When considering this criterion, determine whether your agency has the legal authority at the State, or local level to implement the action, or if new laws will need to be passed.

E: Economic – Cost-effective mitigation actions that can be funded in current or upcoming budget cycles are much more likely to be implemented.

E: Environmental – Evaluate whether, when implementing mitigation actions, there would be negative consequences to environmental assets (wetlands, endangered species, and protected resources).



# Mitigation Strategies – Worksheet 3B

Date: **June 11, 2015**

Agency: **City of Vader**

Mitigation Measures		Hazard Addressed (flood, earthquake, wind, winter, landslide, etc.)	2010 Plan		Mitigation Identification (Prevention, Property Protection, Public Education & Awareness, Natural Resource Protection, Structural Projects)	Cost-Benefit and Prioritization			Implementation			
Category	Description/Action Items (Mitigation Strategy)		Task in 2010 Plan (yes or no)	Task completed as part of 2010 Plan (yes or no)		Relative Cost 1 = Highest 3 = Lowest	Relative Effectiveness 1 = Lowest 3 = Highest	Priority Rating (Low, Medium, High)	Timeline (schedule for approx. completion)	Potential Funding (grants, budget, donations, etc..)	Cost Est.	Administrative Responsibility
Floodplain Management	Continue to enforce the flood ordinances & building codes to reduce flood damages	Flood	Yes	Yes (on-going)	Prevention, Prop. Protection, Public Education & Awareness	3	3	High	On-going	Budget	\$1,000	Planning & Development
Floodplain Management	Develop a plan for flood damage control & staff training to implement	Flood	Yes	No	Prevention, Prop. Protection, Natural Resource Protection	3	3	Medium	2016	Budget	\$1,000	Public Works & Wastewater Operations
Communications	Develop a plan for emergency communications among staff during an event	Earthquake, Sev. Wind & Winter storms, flood, volcano	Yes	No	Property Protection, Public Education and Awareness	3	3	High	2015	Budget	\$1,000	Administration

**Notes**  
 2010 Plan: rate task(s) if it was in the 2010 Plan  
 Cost Estimate: a very rough estimate cost of implementing task  
 Administrative Responsibility: who will accomplish the task

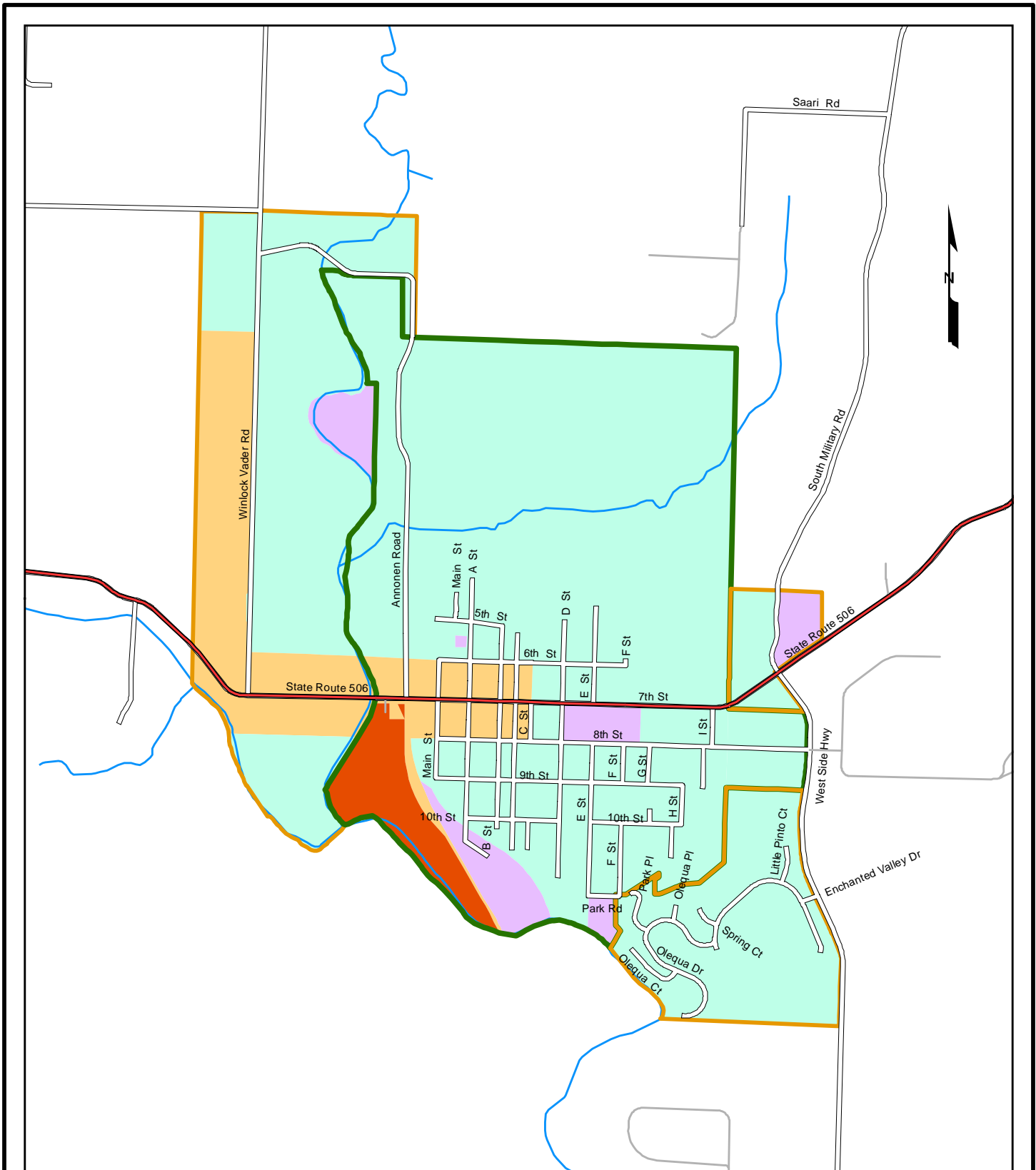
# Critical Facilities Mitigation Strategies - Worksheet 3C

Date: June 11, 2015

Agency: City of Vader

Mitigation Measures		Hazard Addressed (All, flooding, landslide, earthquake, volcanic, etc....)	2010 Plan		Mitigation Identification (Prevention, Property Protection, Public Education & Awareness, Natural Resource Protection, Structural Projects)	Cost-Benefit and Prioritization			Implementation			
Facility	Mitigation Strategy		Task listed in the 2010 Plan (yes or no)	Task completed as part of 2010 Plan (yes or no)		Relative Cost 1 = Highest 3 = Lowest	Relative Effectiveness 1 = Lowest 3 = Highest	Priority Rating (Low, Med, High)	Timeline (schedule)	Potential Funding (grants, budget, donations, etc..)	Cost Est.	Administrative Responsibility
Wastewater Treatment Plant & other city structures	Develop a plan to identify and remove tree & limb hazards	Severe Wind & Winter Storms	Yes	No	Prevention, property protection	2	3	High	2016	Budget	\$2,000	Public Works
Wastewater Treatment Plant	Purchase back-up generator(s) for power outages	Severe Wind & Winter Storms, Earthquake	N	No	Property protection, Prevention	2	3	High	2016	Budget, Grant	\$4,000	Public Works
City Hall	Develop a plan for alternate facility to provided City Hall services	Earthquake, Severe Wind & Winter Storms	Y	N	Prevention	3	3	Med	2015	Budget	\$0	Mayor
Wastewater Treatment Plant	Evaluate the need to anchor Outfall Pipe at WWTP	Flood	N		Prevention, Structural	2	2	Med	2017	Budget, Grant	\$5,000	Public Works

**Notes**  
 Facility: Critical facility  
 Mitigation Strategy: description of mitigation or task  
 2010 Plan: rate task(s) if it was in the 2010 Plan  
 Timeline: give approximate timeframe of completing this task  
 Cost Estimate: a very rough estimate cost of implementing task  
 Administrative Responsibility: who will accomplish the task



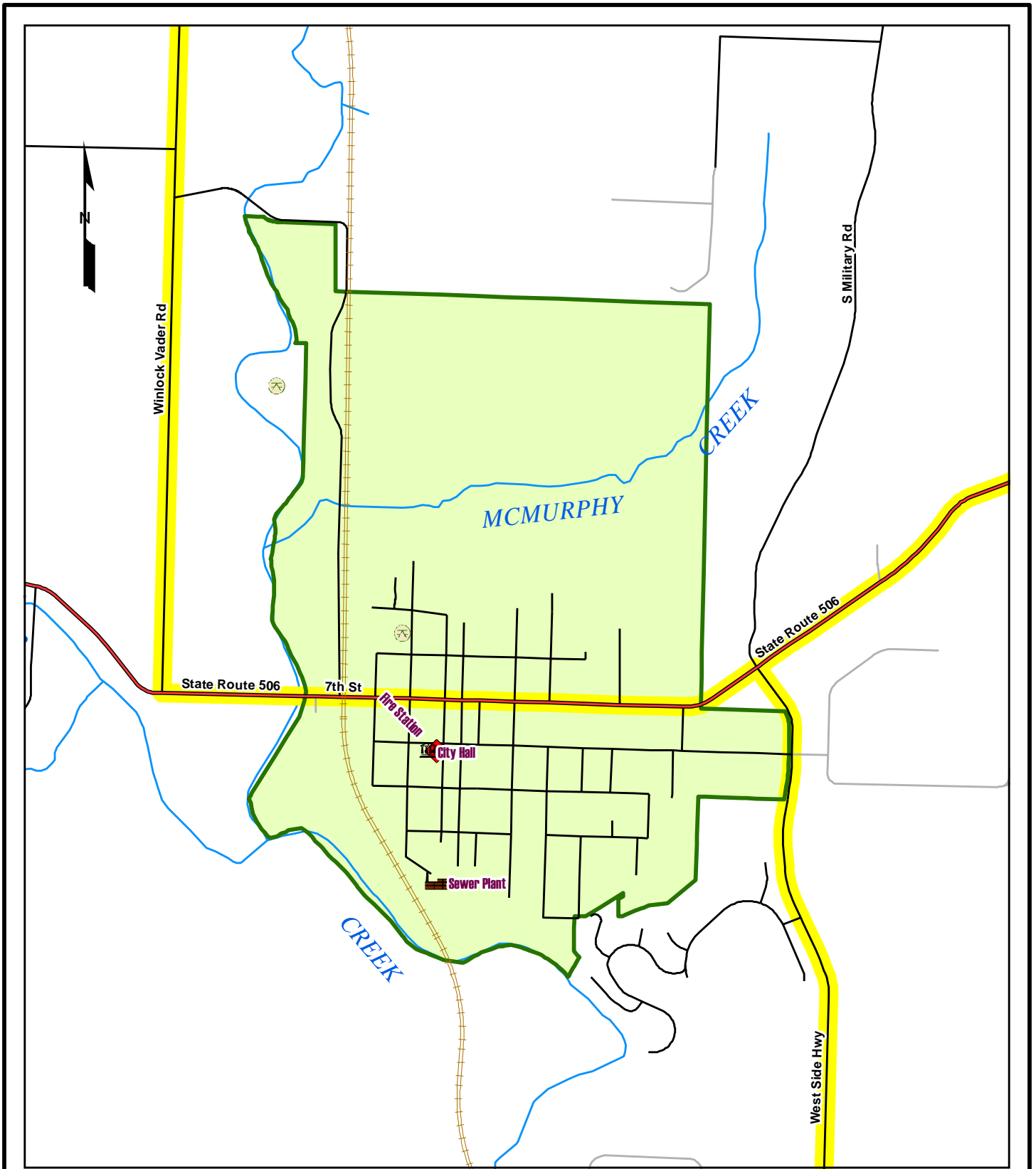
- City Limits
- UGA
- Industrial
- Commercial / Mixed
- Residential
- OS/ Public
- UGA Default

## ZONING CLASSIFICATIONS

# City of Vader



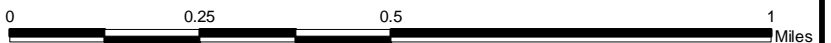
Lewis County, Washington

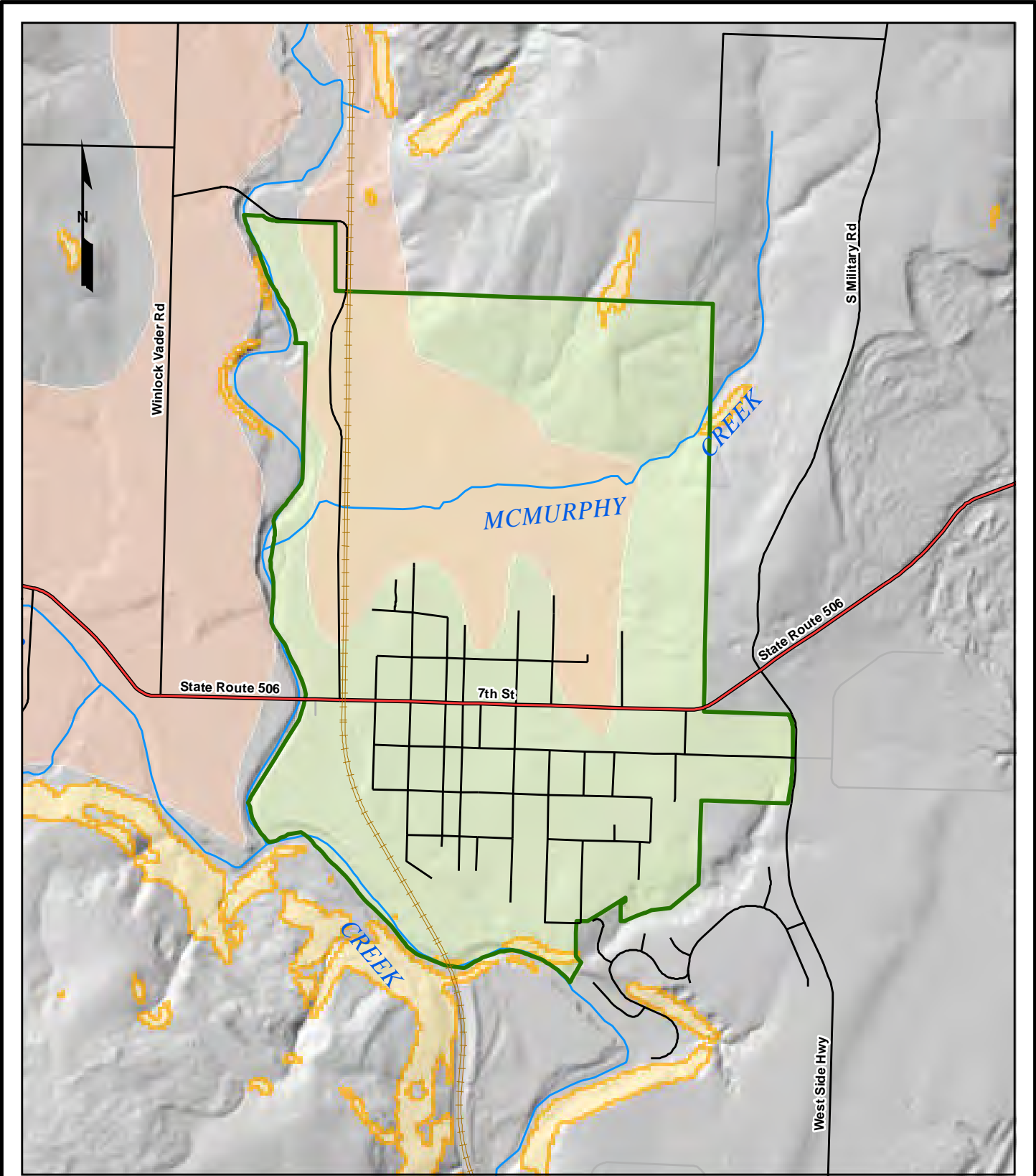


City Limits
  Evacuation Route

Lewis County, Washington  
 2015 Multi-jurisdictional Hazard Mitigation Plan

**Vader**                      **Facilities & Evacuation Routes**



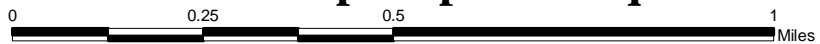


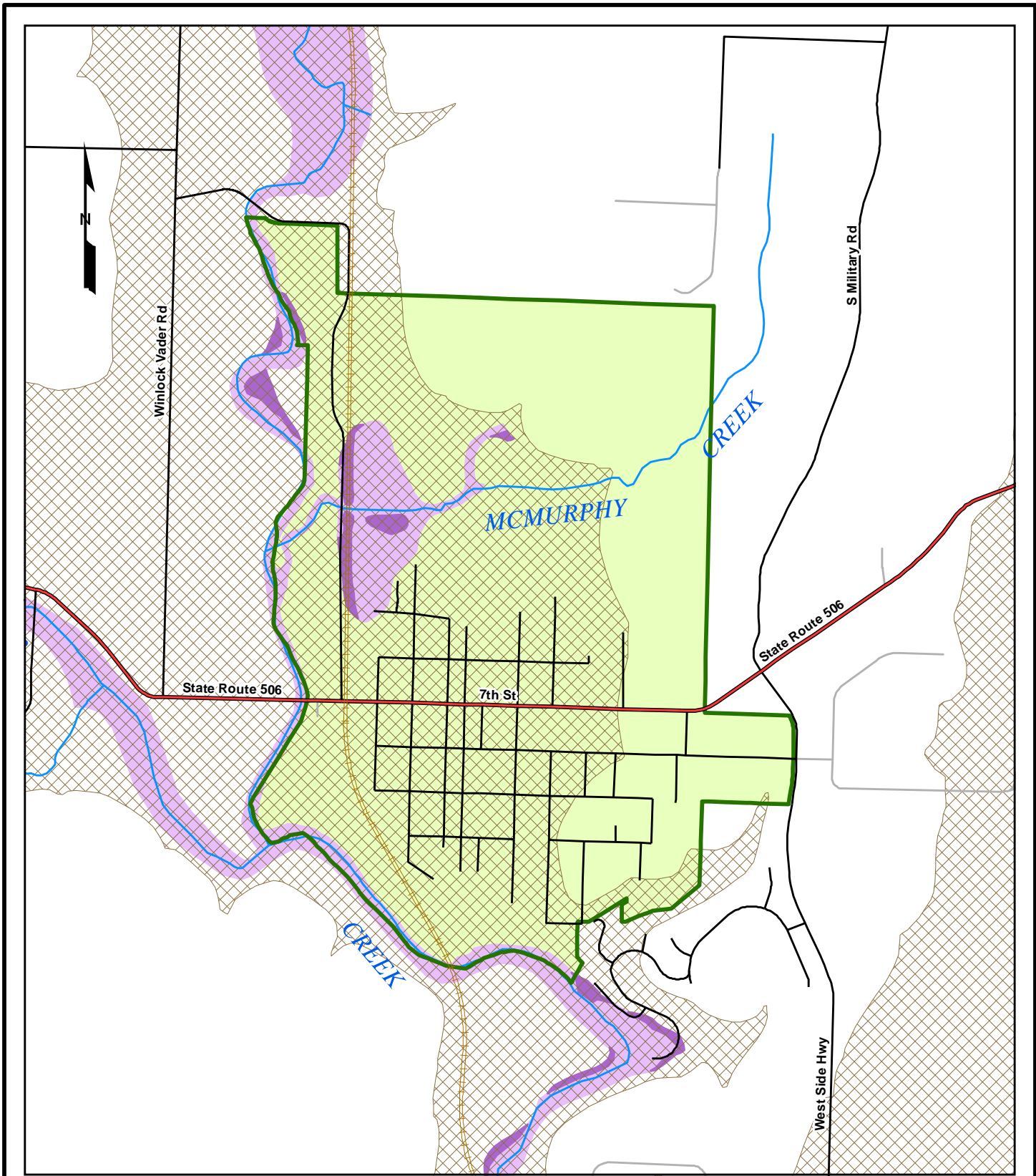
- City Limits
- Mod to High Liquefaction Potential
- Slope > 30%

Lewis County, Washington  
2015 Multi-jurisdictional Hazard Mitigation Plan

**Vader**

**Steep Slopes & Liquefaction**



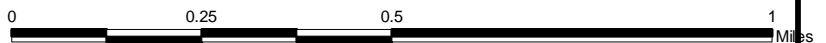


- City Limits
- 100-yr flood
- 500-yr flood
- Dam Inundation
- Levees/revet.

Lewis County, Washington  
2015 Multi-jurisdictional Hazard Mitigation Plan

**Vader**

**Facilities & Evacuation Routes**



## Building Damage Count by General Occupancy

October 06, 2009

	Count of Buildings (#) by Range of Damage (%)							Total
	None	1-10	11-20	21-30	31-40	41-50	Substantial	
<b>Washington</b>								
<b>Lewis</b>								
Agriculture	0	0	0	0	0	0	0	0
Commercial	0	0	0	0	0	0	0	0
Education	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	0	0	0	0
Religion	0	0	0	0	0	0	0	0
Residential	0	0	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Scenario Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

Special Notice Regarding Building Count:

Unlike the earthquake and hurricane models, the flood model performs its analysis at the census block level. This means that the analysis starts with a small number of buildings within each census block and applies a series of distributions necessary for analyzing the potential damage. The application of these distributions and the small number of buildings make the flood model more sensitive to rounding errors that introduces uncertainty into the building count results. Please use these results with suitable caution.

*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.*

**Study Region:** Vader Flood  
**Scenario:** Vader 100-Year  
**Return Period:** 100

## Direct Economic Losses for Buildings

October 06, 2009

All values are in thousands of dollars

	Capital Stock Losses			Building Loss Ratio %	Income Losses				Total Loss
	Cost Building Damage	Cost Contents Damage	Inventory Loss		Relocation Loss	Capital Related Loss	Wages Losses	Rental Income Loss	
<b>Washington</b>									
Lewis	55	35	0	1.2	0	0	0	0	90
<b>Total</b>	<b>55</b>	<b>35</b>	<b>0</b>	<b>1.2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>90</b>
<b>Scenario Total</b>	<b>55</b>	<b>35</b>	<b>0</b>	<b>1.2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>90</b>

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: Vader Flood  
 Scenario: Vader 100-Year  
 Return Period: 100



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## Shelter Summary Report

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October 06, 2009

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	# of Displaced People	# of People Needing Short Term Shelter
<b>Washington</b>		
Lewis	3	0
<b>Total</b>	<b>3</b>	<b>0</b>
<b>Scenario Total</b>	<b>3</b>	<b>0</b>

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*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.*

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**Study Region:** Vader Flood  
**Scenario:** Vader 100-Year  
**Return Period:** 100

Page : 1 of 1





# City of Winlock

## JURISDICTION

### HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact	Alternate Point of Contact
Lonnie Dowell, Mayor PO Box 777 Winlock WA 98596 (360) 785-3811 <a href="mailto:winmayor@toledotel.com">winmayor@toledotel.com</a>	

**Profile:** Winlock is approximately 3 miles west of Interstate 5 on SR 505. Winlock began as a Northern Pacific Railroad construction camp called Wheeler's Camp in c. 1871. The railroad was then in the process of extending its line from Kalama to Tacoma, WA. Dr. C. C. Pagett, an early resident, donated the land for the town site. In 1873 he named it for General William Winlock Miller of Olympia, a man of some renown in the area. Miller had promised to give a school bell to the town if it were to be named after him. The town was incorporated in 1883.

The Winlock Egg was listed as the world's largest egg by Ripley's Believe It Or Not in 1989. The current structure is the fourth reincarnation of the original egg. The first egg was built for a celebration of the opening of the Pacific Highway Bridge over the Columbia River between Washington and Oregon. The idea of an egg came from John G. Lawrence, the manager of the newly formed egg and poultry co-op as a way to represent the growing industry centered in Winlock in the 1920s. During that time farmers in Winlock were shipping as much as a quarter million cases of eggs to market a year.

According to the United States Census Bureau, the city has a total area of 1.1 square miles, all of it land. The City of Winlock is characterized by a broad floodplain and low terraces surrounded by upland valleys of low to moderate relief that have broad, rounded ridges. The Olequa River winds its way through the valley in which the city resides, and is there joined by a couple of tributaries, King Creek and Curtis Creek. They are all prone to flooding during periods of abnormally heavy or persistent rain.

### Ranking of Identified Hazards

Hazard Type	Previous Occurrence?		Likely to Experience?		Probability				Extent				Percentage	Rank
	Yes	No	Yes	No	Highly Likely (100% next yr)	Likely (10-100% or 1 in 10 yrs)	Possible (1-10% next year or 1/100 yrs)	Unlikely (less than 1% in 100 yrs)	Catastrophic: more than 50% affected	Severe: 25-50% affected	Limited: 0-25% affected	None: 0% affected		
<b>Rating Points</b>	<b>20</b>	<b>0</b>	<b>10</b>	<b>0</b>	<b>20</b>	<b>10</b>	<b>6</b>	<b>0</b>	<b>20</b>	<b>10</b>	<b>4</b>	<b>0</b>		
Earthquake	20		10			10			20				60%	1
Flooding	20		10			10				10			50%	2
Landslide	20		10			10				10			50%	2
Wind Storm	20		10			10				10			50%	2
Winter Storm	20		10			10				10			50%	2
Volcano	20			0			6		20				46%	3
Debris Flow	20		10			10					4		44%	4

**Probability:**

- Highly Likely: Near 100% probability in the next year.
- Likely: Between 10 and 100% probability in the next year, or at least one chance in 10 years.
- Possible: Between 1 and 10% probability in the next year, or at least one chance in next 100 years.
- Unlikely: Less than 1% probability in next 100 years.

**Extent of damage is defined as follows:**

- Catastrophic: More than 50% of the jurisdiction can be affected
- Severe: 25 to 50% of the jurisdiction can be affected
- Limited: 0 to 25% of the jurisdiction can be affected

**None: 0% of the jurisdiction can be affected**

### Current Hazard Mitigation Codes/Plans/Ordinances



# City of Winlock

## JURISDICTION

- City of Winlock Comprehensive Plan adopted in June 1998
- Capital Facilities Plan
- City of Winlock Zoning Ordinance, January 2009
- Winlock Development Regulations
- State Environmental Policy Act
- Building Codes
- City of Winlock Critical Areas Ordinance, January 2009

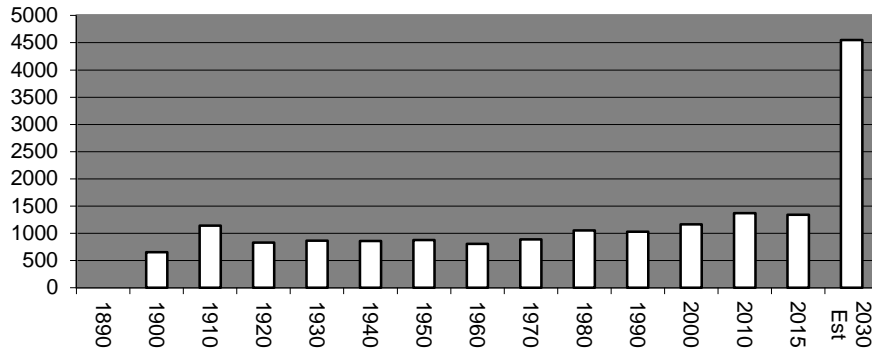
### Agency Specific Natural Hazard Event History – 1980 to 2015

Type of Disaster	FEMA Disaster #	Date	Comments
Severe Winter Storm and Record and Near Record Snow	DR-1825	3/2/2009	Incident 12/12/2008-1/5/2009
Severe Winter Storm, Landslides, Mudslides, Flooding	DR-1817	1/30/2009	1/6-/16/2009
Severe Storms, Flooding, Landslides, Mudslides	DR-1734	12/8/2007	Incident 12/1-12/17/2007
Severe Winter Storm, Landslides, Mudslides	DR-1682	2/14/2007	Incident 12/14-12/15/2006
Severe Storms, Flooding, Landslides, Mudslides	DR-1671	12/12/2006	Incident 11/2-11/11/2006
Earthquake	DR-1361	3/1/2001	Incident 2/28-3/16/2001
Severe Winter Storms/Flooding	DR-1159	1/17/1997	Incident 12/26/1996-2/10/1997
Severe Storms, Flooding	DR-1100	Feb. 9, 1996	Incident 1/26-2/23/1996
Storms, High Winds, Floods	DR-1079	Jan. 3, 1996	Incident 11/7-Dec 18, 1995
Severe Storm, High Winds	DR-981	March 4, 1993	Incident 1/20-1/21/1993
Severe Storms, Flooding	DR-784	Dec 15, 1986	Incident 11/22-11/29/1986
Volcanic Eruption – Mt. St. Helens	DR-623	May 21, 1980	

### Demographics

Population	1990	2000	2010	2015	2030 -Projected
	1,027	1,166	1,370	1,340	4,550

**City of Winlock Population 1890 to 2015**  
Office of Financial Management (OFM)  
April 2015



Quick Facts (US Census)	Winlock	Washington
Population, percent change - April 1, 2010 to July 1, 2013		3.7%
Persons under 5 years, percent, 2010	7.9%	6.5%
Persons under 18 years, percent definition and source info Persons under 18 years, percent, 2010	29.3	23.5%
Persons 65 years and over, percent definition and source info Persons 65 years and over, percent, 2010	7.1%	12.3%
High school graduate or higher, percent of persons age 25+, 2009-2013	73.8%	90.0%
Bachelor's degree or higher, percent of persons age 25+, 2009-2013	10.5%	31.9%
Homeownership rate, 2009-2013		63.2%
Housing units in multi-unit structures, percent, 2009-2013		25.6%
Median value of owner-occupied housing units, 2009-2013		\$262,100
Per capita money income in past 12 months (2013 dollars), 2009-2013	\$14,511	\$30,742
Median household income definition and source info Median household income, 2009-2013	\$39,784	\$59,478
Persons below poverty level, percent definition and source info Persons below poverty level, percent, 2009-2013	27.1%	13.4%

Source: U.S. Census – Quickfacts, Date Accessed: July 12, 2015. Website: quickfacts.census.gov

### Land Designations



# City of Winlock

## JURISDICTION

Land area within the existing city limits:	311
Land area within the urban growth area	755
Total land area within city limits and urban growth area	1066
Land area of residential	284
Land area of commercial	25
Land area of industrial	45
Land area of park, forest, open space	243

### Current and Anticipated Development and Population Trends

The City of Winlock expects to see slow growth in the near future. The total amount of land inventoried within the city limits of Winlock is 433 acres. Winlock is mostly a residential community with residential uses occupying 35 percent of the land within the city limits (150.03 acres). Of this total single family accounts for 83%, mobile homes for 13%, multi-family for 2%, and mobile home parks for another 2%.

There are a variety of commercial services offered in the City of Winlock comprising 15 acres or 4% of all uses. These include retail and wholesale trades, professional businesses, restaurants, service outlets and repair facilities. Industrial land makes up 3% and includes four major manufacturing industries. Forest/timber uses comprise 25 acres and agricultural uses take up another 43 acres.

Prior to 1990, Winlock had historically both gained and lost population at a very slow rate. The city's 1990 population was 1,027 with the 2000 Census at 1,166. The estimated 2009 population is 1,370. Winlock is feeling the pressure of increasing development in the past few years due to its proximity to Interstate 5, and neighboring cities like Napavine, Chehalis and the City of Kelso to the south.

### Infrastructure

Categories	2014	Approximate Value (\$)
Miles of Street and Roads	10.97	\$ 7,679,000
Sanitary Sewer	12 miles	
Storm Sewer	5 miles	
Water lines	14.5 miles	
Electrical lines	N/A- provided by LCPUD	

### Critical Facilities

Critical Facilities	Address	Approximate Value (\$)
City Hall/Police	323 NE First St.	1.2 M
Wastewater	1205 SW Mayer Ave.	16 M
PW Shop	Dexter	350,000
Fire Hall	609 N W Kerron	800,000
Community Bldg.	604 N Kerron	1.2 M
City Library	322 NE 1 <sup>st</sup> St.	600,000
Museum Fire Hall	400 NE 1 <sup>st</sup> St.	400,000
City Water System	223 St. Helens Way	40 M
Bridge	Walnut	3.5 M
Bridge	Fir	3.5 M
Bridge	Tennessee	3.5 M

### Flood Information

Percentage of existing city limits within the 100-year flood plain	
Assessor's valuation of private properties within the 100-year flood plain	

### Critical Facilities within the 100-year flood plain

Facility	Address	Approximate Value (\$)
Wastewater	1205 SW Mayer Ave.	16 M
Community Bldg.	604 N Kerron	1.2 M

### NFIP/CRS Section

NFIP/CRS Community	No
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# City of Winlock

## JURISDICTION

Community Rating Classification	N/A
Building Code Effective Grading Schedule	Class XX
NFIP Membership	Yes, 9/14/1979
NFIP Compliance Violations?	None
FEMA Floodplain Maps Adopted	Yes, Flood map is number 5303060001A, effective on 9/14/1979
Recently Community Assistant Visit or Community Assistance Contact	N/A
Floodplain Administrator	No
Certified Floodplain Manager	No
Floodplain Ordinance Adoption	Adopted 2009
StormReady Jurisdiction	No
Firewise Jurisdiction	No

### Previous Action Plan Implementation

Mitigation Strategy	Completed 2010-2014	Carried Over to 2015 Plan	Removed or No Longer Feasible
STORM DRAIN MAINTENANCE	No	Reworded	
City Hall: SIESMIC RETROFITTING	No	Reworded	
Comm Bldg. SLOPE EROSION GEOTECH	No	Reworded	
STP: REVETMANT MANAGEMENT	No	No	Not a priority
Continue to enforce the flood ordinances and building codes to reduce flood damages	No	Yes-ongoing	
Continue to enforce the flood ordinance which is based on NFIP model	No	Yes-ongoing	
STP: ASSESS BLDG FOR INTEGRITY TO WITHSTAND EARTHQUAKE	No	Yes-deferred	
WELLHEADS: ASSESS BLDG FOR INTEGRITY TO WITHSTAND EARTHQUAKE	No	Yes-deferred	
P.W.: ASSESS BLDG FOR INTEGRITY TO WITHSTAND EARTHQUAKE	No	Yes-deferred	
WELLHEADS: ASSESS BLDG FOR INTEGRITY TO WITHSTAND EARTHQUAKE	No	Yes-reworded	
P.W. ASSESS BLDG FOR INTEGRITY TO WITHSTAND EARTHQUAKE	No	Yes-reworded	
Sewer Plant: ASSESS REVETMENT DIKE	No	Yes-reworded	
LIBRARY: ASSESS BLDG FOR INTEGRITY TO WITHSTAND EARTHQUAKE	No	Yes-reworded	
Library: ASSESS PEREIMTER FOR LANDSLIDE	No	Yes-reworded	
MUSEUM: ASSESS BLDG FOR INTEGRITY TO WITHSTAND EARTHQUAKE	No	Yes-reworded	
Museum: ASSESS PEREIMTER FOR LANDSLIDE	No	Yes-reworded	

### Attached Documents

- Public Facilities Map
- Hazard Identification Worksheet(s)
- Mitigation Strategies Worksheet(s)
- Steep Slopes and Liquefaction Map
- Flood Hazard Map
- HAZUS-MH: Flood Results

# HAZARD IDENTIFICATION WORKSHEET

Date Completed: 6/26/2015

Which Agency are you representing? City of Winlock

Name: Lonnie Dowell

Title: Mayor

Email: winmayor@toledotel.com

Telephone #: (360)

Address: PO Box 777

City: Winlock

ZIP: 98596

**For each Hazard, please fill out the table below based on the following questions:**

- **Previous Occurrence:** Is there a historic record of this type of hazard happening here? *Yes or No*
- **Likely to Experience:** Are you likely to experience this type of hazard in the future? *Yes or No*
- **Probability:** Based on history, what is the likelihood of this event happening again? *Highly Likely, Likely, Possible, Unlikely*
- **Extent:** If this hazard event were to happen, how extensive could the damage be? *Catastrophic, Severe, Limited, None*

Hazard Type	Previous Occurrence?		Likely to Experience?		Probability				Extent			
	Yes	No	Yes	No	Highly Likely	Likely	Possible	Unlikely	Catastrophic	Severe	Limited	None
Avalanche		X		X				X				X
Coastal Erosion		X		X				X				X
Coastal Storm		X		X				X				X
Dam Failure	X			X				X				X
Debris Flow	X		X			X					X	
Drought		X		X				X				X
Earthquake	X		X			X			X			
Expansive Soils		X		X				X				X
Extreme Heat		X		X				X				X
Flooding	X		X			X				X		
Hailstorm		X		X				X				X
Hurricane		X		X				X				X
Land Subsidence		X		X				X				X
Landslide	X		X			X				X		
Levee Failure		X		X				X				X
Severe Thunder Storm		X		X				X				X
Severe Wind Storm	X		X			X				X		
Severe Winter Storm	X		X			X				X		
Tornado		X		X				X				X
Tsunami		X		X				X				X
Volcano	X			X			X		X			
Wildfire		X		X				X				X
Other:												

**Which of the following does your agency have? (Circle One)**

Comprehensive Plan **Yes / No / NA** Date completed:

Critical Areas Ordinance **Yes / No / NA** Date completed:

Does your agency have an emergency plan? **Yes / No / NA 2012**





**Which Agency are you representing:** City of Winlock

<b>Name:</b>	Lonnie Dowell	<b>Title:</b>	Mayor
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<b>Email:</b>	winmayor@toledotel.com	<b>Telephone #:</b>	
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<b>Address:</b>	<b>City:</b> Winlock	<b>Zip:</b>	
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**Task B: Compile a detailed inventory of what can be damaged by a hazard event.**  
 Inventory the assets (critical facilities, businesses, historic, cultural, natural resource areas and areas of special consideration) that can be damaged by a hazard event.

- |                |  |   |  |                           |  |                        |
|----------------|--|---|--|---------------------------|--|------------------------|
| <b>HAZARDS</b> | 1. Avalanche<br>2. Dam Failure<br>3. Debris Flow<br>4. Drought<br>5. Earthquake<br>6. Expansive Soils<br>7. Extreme Heat | 8. Flooding<br>9. Hailstorm<br>10. Hurricane<br>11. Land Subsidence<br>12. Landslide<br>13. Levee Failure<br>14. Severe Thunder Storm | 15. Severe Wind Storm<br>16. Severe Winter Storm<br>17. Tornado<br>18. Volcano<br>19. Wildfire | <b>BUILDING MATERIALS</b> | a. Masonry<br>b. concrete<br>c. Concrete Block<br>d. Brick<br>e. Stick<br>f. Metal | g. Steel<br>h. Asphalt |
|----------------|--|---|--|---------------------------|--|------------------------|

Name or description of Asset (building)	Address	Hazard(s) List all that apply (See legend above)	Critical Facility	Transportation	Utility System	Comm. System	Economic Assets	Special consideration	Historic/Other	Size of Building (sq. ft.)	Replacement Value (\$)	Contents Value (\$)	Displacement (\$ per day)	Occupancy or capacity (#)	Structural — building materials
City Hall/Police	323 NE First St.		X							4500	1.2M	300,000		73	a
Wastewater	1205 SW Mayer Ave.		X		X						18M	10,000		5	a
PW Shop	Dexter		X							5600	350,000	200,000		5	e, f
Fire Hall	609 N W Kerron		X							7400	800,000	1.8M		25	e,f
Community Bldg.	604 N Kerron		X							7800	1.2M	50,000		220	a, e
City Library	322 NE 1 <sup>st</sup> St.								X	3000	800,000	180,000		60	A
Bridge	Walnut			X							3.5M				b
Bridge	Fir			X							3.5M				b
Bridge	Tennessee			X							3.5M				b
City Water System	223 St. Helens Way		X												
Museum Fire Hall	400 NE 1 <sup>st</sup> St.								X	1600	400,000	100,000		20	A

<b>ASSET INVENTORY WORKSHEET 2C</b>	<b>Date Completed: 6/26/2015</b>
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**Which Agency are you representing?**  
 City of Winlock

**Name:** Lonnie Dowell      **Title:** Mayor

**Email:** winmayor@toledotel.com      **Telephone #:**

**Address:**      **City:** Winlock      **ZIP:**

**Task C.** Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.

**Hazard:** Earthquake, Volcano

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	535	535	100%				1,340	1,340	100
Commercial	10								
Industrial	2								
Agricultural									
Religious/ Non-profit									
Government	9								
Education									
Utilities	5	5	100						
<b>Total</b>		<b>535</b>	<b>100%</b>				<b>1,340</b>	<b>1,340</b>	<b>100%</b>

**Task D. Determine whether (and where) you want to collect additional inventory data. (circle one)**

- Do you know where your greatest damages may occur in your hazard areas? **Yes** or No
- Do you know whether your critical facilities will be operational after a hazard event? **Yes** or No
- Is there enough data to determine which assets are subject to the greatest potential damages? **Yes** or No
- Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards? Yes or **No**
- Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards? Yes or **No**
- Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence? Yes or **No**
- Is additional data needed to justify the expenditure of community or state funds for mitigation? Yes or No

<b>ASSET INVENTORY WORKSHEET 2C</b>	<b>Date Completed: 6/26/2015</b>
-------------------------------------	----------------------------------

**Which Agency are you representing?**  
City of Winlock

**Name:** Lonnie Dowell      **Title:** Mayor

**Email:** winmayor@toledotel.com      **Telephone #:**

**Address:**      **City:** Winlock      **ZIP:**

**Task C.** Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.

**Hazard:** Flooding/Debris Flow

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	535						1,340		
Commercial	10								
Industrial	2								
Agricultural									
Religious/ Non-profit									
Government	6	1							
Education									
Utilities/Bridges	5+3	8	100%	25M	25M	100%			
<b>Total</b>	<b>561</b>						<b>1,340</b>		

**Task D.** Determine whether (and where) you want to collect additional inventory data. (circle one)

- Do you know where your greatest damages may occur in your hazard areas? **Yes** or No
- Do you know whether your critical facilities will be operational after a hazard event? **Yes** or No
- Is there enough data to determine which assets are subject to the greatest potential damages? **Yes** or No
- Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards? Yes or **No**
- Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards? Yes or **No**
- Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence? Yes or **No**
- Is additional data needed to justify the expenditure of community or state funds for mitigation? Yes or No

<b>ASSET INVENTORY WORKSHEET 2C</b>	<b>Date Completed: 6/26/2015</b>
-------------------------------------	----------------------------------

**Which Agency are you representing?**  
 City of Winlock

**Name:** Lonnie Dowell      **Title:** Mayor

**Email:** winmayor@toledotel.com      **Telephone #:**

**Address:**      **City:** Winlock      **ZIP:**

**Task C.** Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.

**Hazard:** Wind or Winter Storm

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	535	535	100%				1,340	1,340	100
Commercial	10								
Industrial	2								
Agricultural									
Religious/ Non-profit									
Government	9								
Education									
Utilities	8	5		25M	14.5M				
<b>Total</b>		<b>535</b>	<b>100%</b>				<b>1,340</b>	<b>1,340</b>	<b>100%</b>

**Task D.** Determine whether (and where) you want to collect additional inventory data. (circle one)

- Do you know where your greatest damages may occur in your hazard areas? **Yes** or No
- Do you know whether your critical facilities will be operational after a hazard event? **Yes** or No
- Is there enough data to determine which assets are subject to the greatest potential damages? **Yes** or No
- Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards? Yes or **No**
- Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards? Yes or **No**
- Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence? Yes or **No**
- Is additional data needed to justify the expenditure of community or state funds for mitigation? Yes or No

# Ranking Mitigation Strategies: Using STAPLEE - Worksheet 3A

Date: 7/20/2015

Agency: Winlock

Category Description/Action Items (Mitigation Strategy)	Hazard Addressed (flood, earthquake, wind, winter, landslide, etc.)	Social (Yes or No)	Technical (Yes or No)	Administrative (Yes or No)	Political (Yes or No)	Legal (Yes or No)	Economical (Yes or No)	Environmental (Yes or No)	Responsible Department/Agency
Assess City building wellheads for seismic retrofit	Earthquake	Y	Y	Y	Y	Y	Y	N	Public works
Assess slopes behind city museum	Landslide	Y	Y	Y	Y	Y	Y	Y	Public works
Assess slopes behind city library	Landslide	Y	Y	Y	Y	Y	Y	N	Public works
Continue storm drain management	Flood	Y	Y	Y	Y	Y	Y	N	Public works
Seismic retrofit of city buildings	Earthquake	Y	Y	Y	Y	Y	Y	N	Public works
Erosion control bank stabilization of slope behind city museum and library	Landslide	Y	Y	Y	Y	Y	Y	Y	Public works
Continue to enforce the flood ordinances and building codes to reduce flood damages	Flood	Y	Y	Y	Y	Y	Y	Y	Planning/Building
Continue to enforce the flood ordinance which is based on NFIP model	Flood	Y	Y	Y	Y	Y	Y	Y	Planning/building

**Notes**

- S: Social – The public must support the overall implementation strategy and specific mitigation actions.
- T: Technical – It is important to determine if the proposed action is technically feasible, will help reduce losses in the long term, and has minimal secondary impacts.
- A: Administrative – Under this part of the evaluation criteria, examine the anticipated staffing, funding, and maintenance requirements for the mitigation action to be implemented.
- P: Political – Understanding how your community and State leadership feels about issues related to the environment, economic development, safety, and emergency management.
- L: Legal – When considering this criterion, determine whether your agency has the legal authority at the State, or local level to implement the action, or if new laws will need to be passed.
- E: Economic – Cost-effective mitigation actions that can be funded in current or upcoming budget cycles are much more likely to be implemented.
- E: Environmental – Evaluate whether, when implementing mitigation actions, there would be negative consequences to environmental assets (wetlands, endangered species, protected resources).

# Mitigation Strategies – Worksheet 3B

Date: 7/20/2015

Agency: Winlock

Mitigation Measures		Hazard Addressed (flood, earthquake, wind, winter, landslide, etc.)	2010 Plan		Mitigation Identification (Prevention, Property Protection, Public Education & Awareness, Natural Resource Protection, Structural Projects)	Cost-Benefit and Prioritization			Implementation			
Category	Description/Action Items (Mitigation Strategy)		Task in 2010 Plan (yes or no)	Task completed as part of 2010 Plan (yes or no)		Relative Cost 1 = Highest 3 = Lowest	Relative Effectiveness 1 = Lowest 3 = Highest	Priority Rating (Low, Medium, High)	Timeline (schedule for approx. completion)	Potential Funding (grants, budget, donations, etc..)	Cost Est.	Administrative Responsibility
FLOODPLAIN MANAGEMENT	STORM DRAIN MAINTENANCE	FLOOD	YES	NO	Prevention, Property protection	3	3	High	On-going	Budget	2000	Public works
EARTHQUAKE MANAGEMENT VOLCANIC MANGMT	SIEMIC RETROFITTING	EARTHQUAKE	YES	NO	Prevention, Property protection	3	3	High	2020	Grants	1000	Public works
LANDSLIDE MANAGEMENT	SLOPE EROSION GEOTECH	LANDSLIDE	YES	NO	Prevention, Property protection	1	3	Med	2020	Grants	5000	Public works
FLOOD MNGMNT	Continue to enforce the flood ordinances and building codes to reduce flood damages	FLOOD	YES	N/A	Prevention, Property Protection, Public Education & Awareness	3	3	High	On-going	Grants	\$ 0	Planning/Building
FLOOD MNGMNT	Continue to enforce the flood ordinance which is based on NFIP model	FLOOD	YES	N/A	Prevention, Property Protection, Public Education & Awareness	3	3	High	On-going	Grants	\$ 0	Planning/Building

**Notes**

2010 Plan: rate task(s) if it was in the 2010 Plan  
 Cost Estimate: a very rough estimate cost of implementing task  
 Administrative Responsibility: who will accomplish the task

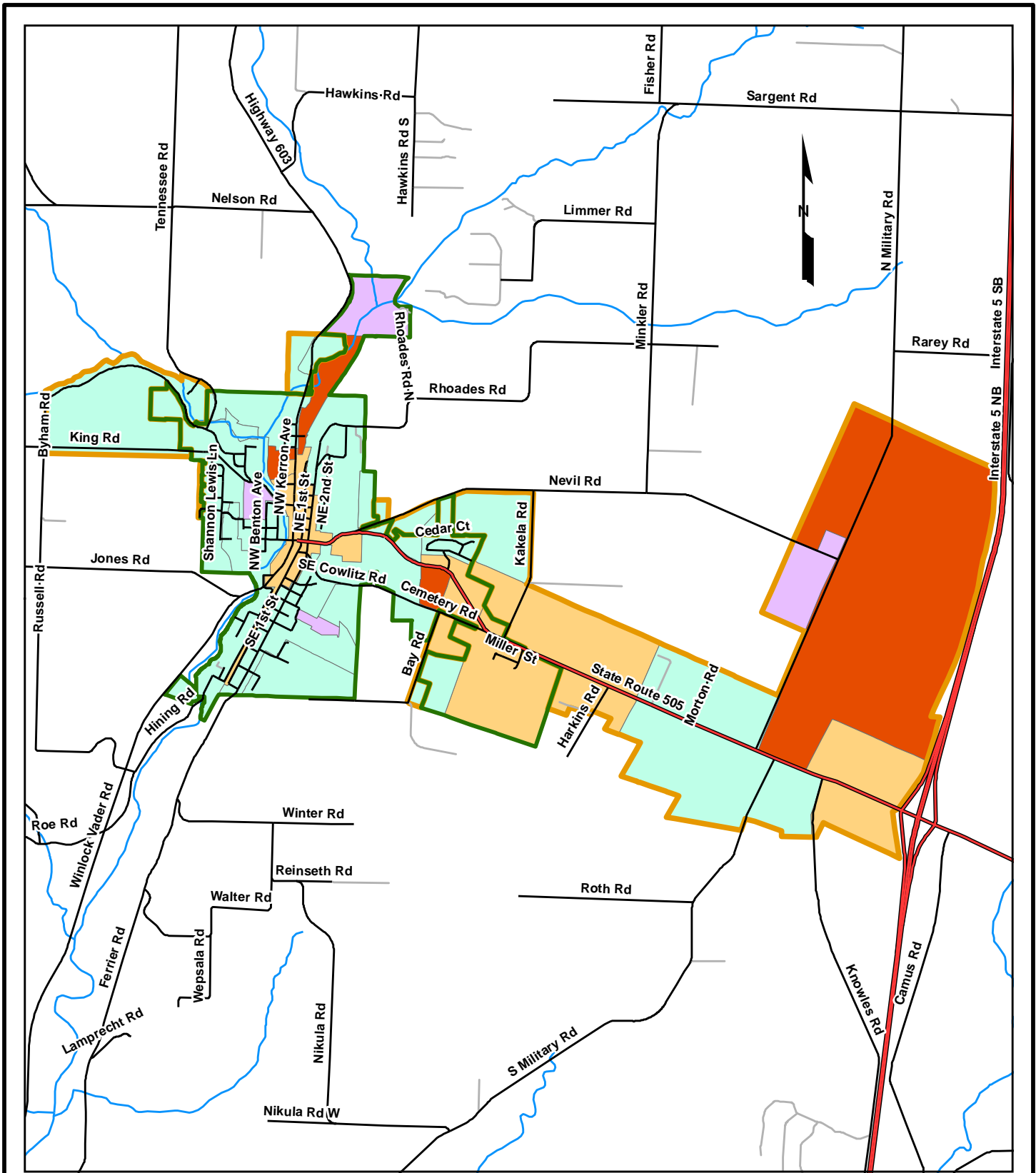
# Critical Facilities Mitigation Strategies - Worksheet 3C

Date: 7/20/2015

Agency: Winlock

Mitigation Measures		Hazard Addressed (All, flooding, landslide, earthquake, volcanic, etc....)	2010 Plan		Mitigation Identification (Prevention, Property Protection, Public Education & Awareness, Natural Resource Protection, Structural Projects)	Cost-Benefit and Prioritization			Implementation			
Facility	Mitigation Strategy		Task listed in the 2010 Plan (yes or no)	Task completed as part of 2010 Plan (yes or no)		Relative Cost 1 = Highest 3 = Lowest	Relative Effectiveness 1 = Lowest 3 = Highest	Priority Rating (Low, Med, High)	Timeline (schedule)	Potential Funding (grants, budget, donations, etc..)	Cost Est.	Administrative Responsibility
CITY HALL, MUSEUM, LIBRARY	Assess BLDG FOR INTEGRITY TO WITHSTAND EARTHQUAKE	EARTHQUAKE VOLCANIC	NO	NO	PREVENTION PROPERTY PROTECTION	1	2	MED	2015	BUDGET	1,200	BLDG INSP
COMMUNITY BLDG	Assess BLDG FOR INTEGRITY TO WITHSTAND EARTHQUAKE	EARTHQUAKE VOLCANIC	NO	NO	PREVENTION PROPERTY PROTECTION	1	2	MED	2015	BUDGET	500	BLDG INSP
SEWER PLANT	Assess BLDG FOR INTEGRITY TO WITHSTAND EARTHQUAKE	EARTHQUAKE VOLCANIC	NO	NO	PREVENTION PROPERTY PROTECTION	1	2	MED	2012	BUDGET	100	BLDG INSP
WELLHEADS	Assess BLDG FOR INTEGRITY TO WITHSTAND EARTHQUAKE	EARTHQUAKE VOLCANIC	NO	NO	PREVENTION PROPERTY PROTECTION	1	2	MED	2015	BUDGET	500	BLDG INSP
PUBLIC WORKS SHOP	Assess BLDG FOR INTEGRITY TO WITHSTAND EARTHQUAKE	EARTHQUAKE VOLCANIC	YES	NO	PREVENTION PROPERTY PROTECTION	1	2	MED	2015	BUDGET	500	BLDG INSP
SEWER PLANT	ASSESS REVETMENT DIKE	FLOODING	NO	NO	PREVENTION PROPERTY PROTECTION	1	2	MED	2015	BUDGET	500	BLDG INSP
LIBRARY, CITY HALL, MUSEUM	ASSESS PEREIMTER FOR LANDSLIDE	LANDSLIDE	NO	NO	PREVENTION PROPERTY PROTECTION	1	2	MED	2015	BUDGET	1,500	PUBLIC WORKS

**Notes:** Facility: Critical facility, Mitigation Strategy: description of mitigation or task, 2010 Plan: rate task(s) if it was in the 2010 Plan, Timeline: give approximate timeframe of completing this task  
 Cost Estimate: a very rough estimate cost of implementing task, Administrative Responsibility: who will accomplish the task



- City Limits
- UGA
- Residential
- Industrial
- OS/ Public
- Commercial / Mixed
- UGA Default

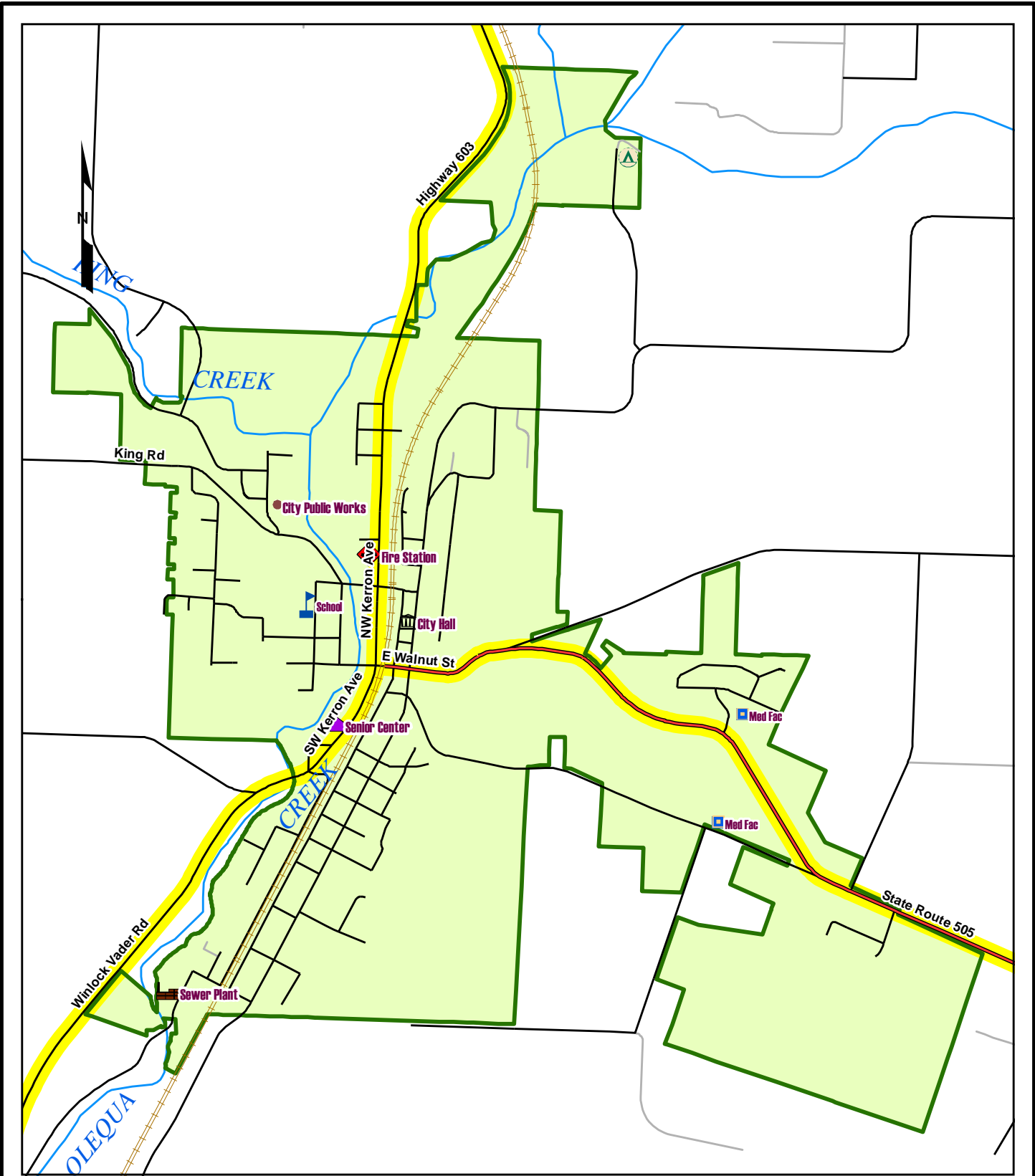
## ZONING CLASSIFICATIONS

# City of Winlock

0 1,000 2,000 4,000 6,000 Feet

Lewis County, Washington

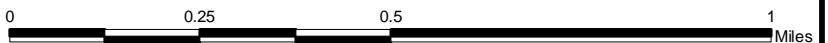


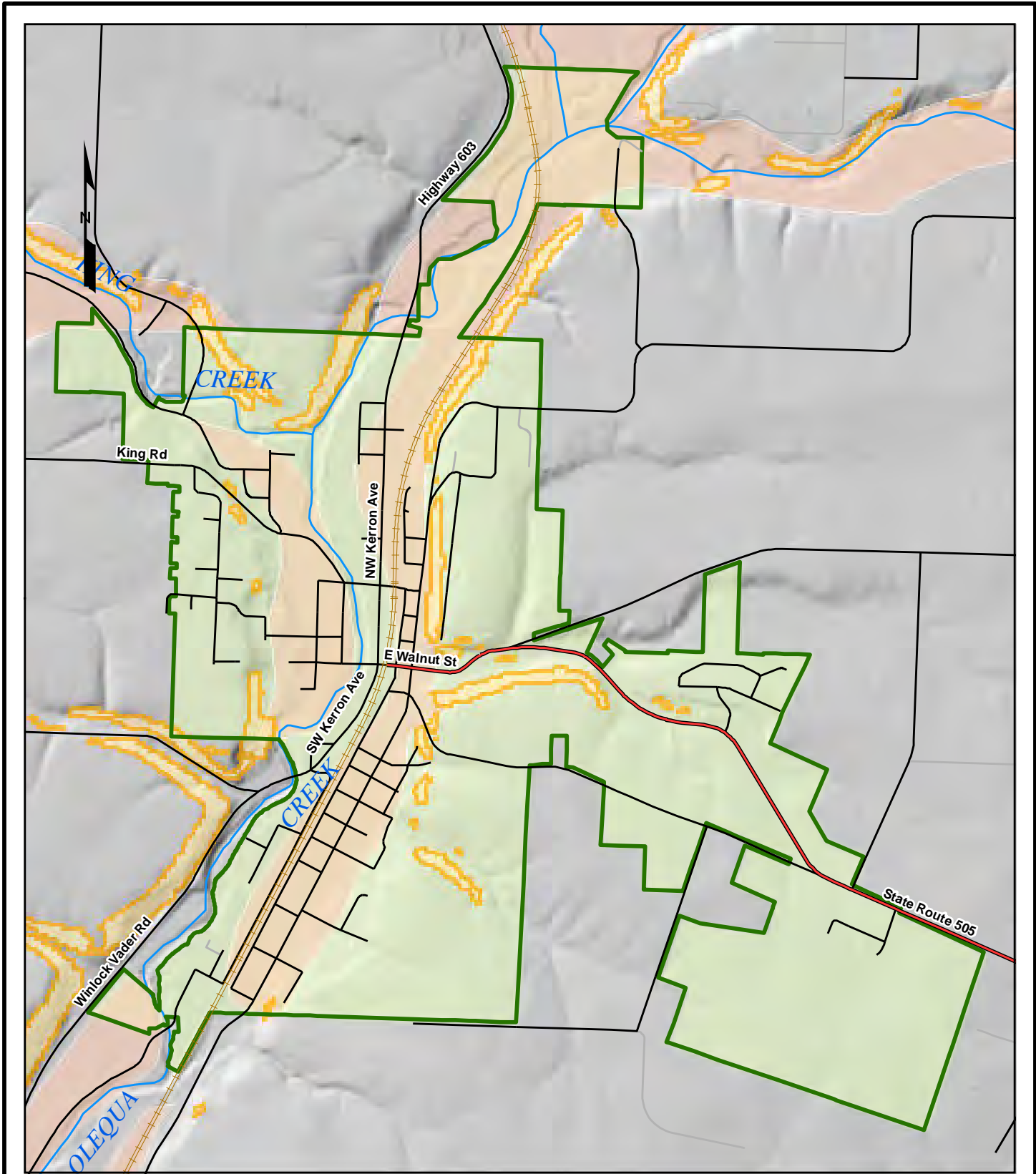


City Limits
  Evacuation Route

Lewis County, Washington  
 2015 Multi-jurisdictional Hazard Mitigation Plan

## Winlock Facilities & Evacuation Routes

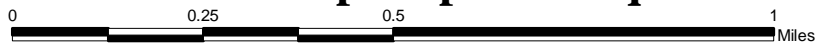


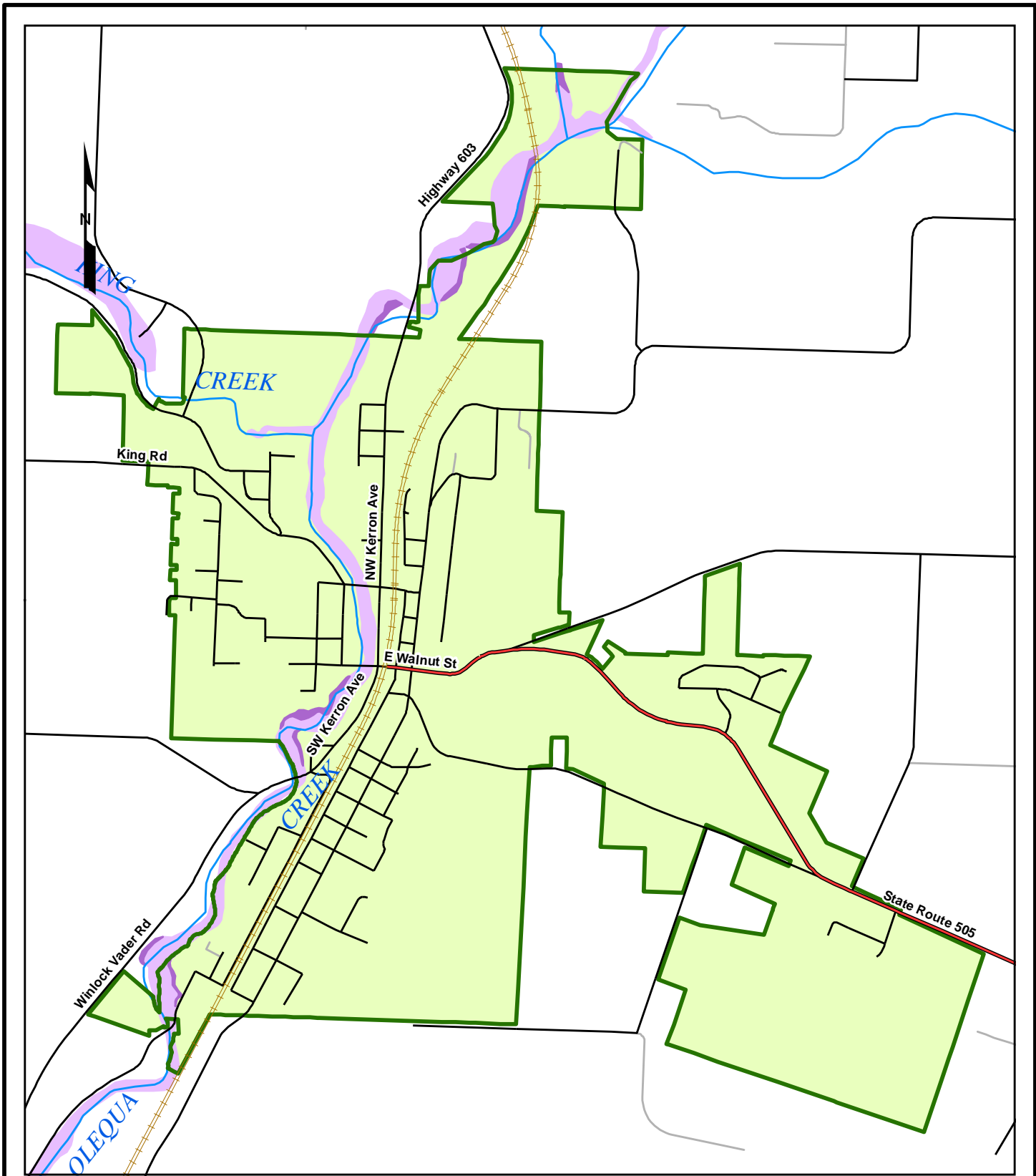


- City Limits
- Mod to High Liquefaction Potential
- Slope > 30%

Lewis County, Washington  
2015 Multi-jurisdictional Hazard Mitigation Plan

## Winlock Steep Slopes & Liquefaction

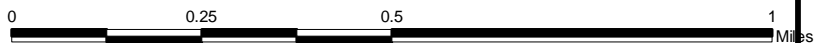




- City Limits
- 100-yr flood
- 500-yr flood
- Dam Inundation
- Levees / revet.

Lewis County, Washington  
2015 Multi-jurisdictional Hazard Mitigation Plan

## Winlock      Facilities & Evacuation Routes



## Building Damage Count by General Occupancy

October 06, 2009

	Count of Buildings (#) by Range of Damage (%)							Total
	None	1-10	11-20	21-30	31-40	41-50	Substantial	
<b>Washington</b>								
<b>Lewis</b>								
Agriculture	0	0	0	0	0	0	0	0
Commercial	0	0	0	0	0	0	0	0
Education	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	0	0	0	0
Religion	0	0	0	0	0	0	0	0
Residential	7	0	2	15	2	2	3	31
<b>Total</b>	<b>7</b>	<b>0</b>	<b>2</b>	<b>15</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>31</b>
<b>Total</b>	<b>7</b>	<b>0</b>	<b>2</b>	<b>15</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>31</b>
<b>Scenario Total</b>	<b>7</b>	<b>0</b>	<b>2</b>	<b>15</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>31</b>

Special Notice Regarding Building Count:

Unlike the earthquake and hurricane models, the flood model performs its analysis at the census block level. This means that the analysis starts with a small number of buildings within each census block and applies a series of distributions necessary for analyzing the potential damage. The application of these distributions and the small number of buildings make the flood model more sensitive to rounding errors that introduces uncertainty into the building count results. Please use these results with suitable caution.

*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.*

**Study Region:** Winlock Flood  
**Scenario:** Winlock 100-Year  
**Return Period:** 100

## Direct Economic Losses for Buildings

October 06, 2009

All values are in thousands of dollars

	Capital Stock Losses			Building Loss Ratio %	Income Losses				Total Loss
	Cost Building Damage	Cost Contents Damage	Inventory Loss		Relocation Loss	Capital Related Loss	Wages Losses	Rental Income Loss	
<b>Washington</b>									
Lewis	2,101	2,950	117	10.2	6	8	13	0	5,230
<b>Total</b>	<b>2,101</b>	<b>2,950</b>	<b>117</b>	<b>10.2</b>	<b>6</b>	<b>8</b>	<b>13</b>	<b>0</b>	<b>5,230</b>
<b>Scenario Total</b>	<b>2,101</b>	<b>2,950</b>	<b>117</b>	<b>10.2</b>	<b>6</b>	<b>8</b>	<b>13</b>	<b>0</b>	<b>5,230</b>

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: Winlock Flood  
 Scenario: Winlock 100-Year  
 Return Period: 100

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## Shelter Summary Report

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October 06, 2009

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	# of Displaced People	# of People Needing Short Term Shelter
<b>Washington</b>		
Lewis	201	95
<b>Total</b>	<b>201</b>	<b>95</b>
<b>Scenario Total</b>	<b>201</b>	<b>95</b>

---

*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.*

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**Study Region:** Winlock Flood  
**Scenario:** Winlock 100-Year  
**Return Period:** 100

Page : 1 of 1



## JURISDICTION Town of Pe Ell

### HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact	Alternate Point of Contact
Mike Hartnett PO Box 215 Pe Ell WA 98572 (360) 291-3543 <a href="mailto:peellmarshal@centurytel.net">peellmarshal@centurytel.net</a>	

**Profile:** Pe Ell was officially incorporated on March 9, 1906. In 1897, the North Pacific Railway built a railroad depot in the town. In 1907 Pe Ell's population was around 1,000—larger than it is today. The rich agricultural and timber resources of the region attracted farmers, millworkers, and loggers. By 1909, the town had a bank, three dry goods stores, two general stores, three grocery stores, two barber shops, five saloons, four hotels, a newspaper, a blacksmith, and even an opera house.

The Town of Pe Ell is located in western Lewis County on U.S. Highway 6, about 23 miles west of Interstate 5, and not far from the Lewis-Pacific county border. According to the United States Census Bureau, the town has a total area of 0.6 square miles. It is located in a valley that characterized by a broad plain called Pe Ell Prairie. Cherry Hill, Joy Mountain, Jones Bluff, Charlie's Hump and Muller's Canyon are prominent features that surround the Town. The Chehalis River winds its way through the town and converges with Rock Creek, Stowe Creek and Jones Creek in the valley area.

### Ranking of Identified Hazards

Hazard Type	Previous Occurrence?		Likely to Experience?		Probability				Extent				Percent %	Rank
	Yes	No	Yes	No	Highly Likely (100% next yr)	Likely (10-100% or 1 in 10 yrs)	Possible (1-10% next year or 1/100 yrs)	Unlikely (less than 1% in 100 yrs)	Catastrophic: more than 50% affected	Severe: 25-50% affected	Limited: 0-25% affected	None: 0% affected		
<b>Rating Points</b>	<b>20</b>	<b>0</b>	<b>10</b>	<b>0</b>	<b>20</b>	<b>10</b>	<b>6</b>	<b>0</b>	<b>20</b>	<b>10</b>	<b>4</b>	<b>0</b>		
Earthquake	20		10			10					4		44%	1
Landslide	20		10			10					4		44%	1
Wind Storm	20		10			10					4		44%	1
Winter Storm	20		10			10					4		44%	1
Volcano	20		10			10					4		44%	1
Flooding	20		10				6				4		40%	2
Wildfire	20		10				6				4		40%	2

**Probability:**  
 Highly Likely: Near 100% probability in the next year.  
 Likely: Between 10 and 100% probability in the next year, or at least one chance in 10 years.  
 Possible: Between 1 and 10% probability in the next year, or at least one chance in next 100 years.  
 Unlikely: Less than 1% probability in next 100 years.

**Extent of damage is defined as follows:**  
 Catastrophic: More than 50% of the jurisdiction can be affected  
 Severe: 25 to 50% of the jurisdiction can be affected  
 Limited: 0 to 25% of the jurisdiction can be affected  
**None: 0% of the jurisdiction can be affected**

### Current Hazard Mitigation Codes/Plans/Ordinances

- Lewis County Multi-Jurisdictional Hazard Mitigation Plan adopted June 2010.
- Emergency Plan, Adopted 9/06
- Water System Plan, Adopt 12/97 Updated 10/04
- Sewer System Plan, Adopt 3/98 Updated 12/01
- Lewis County Flood Management Plan, 2008
- Building Code Adopted 12/74
- Critical Areas Ordinance, Adopted 3/05
- Comprehensive Plan, Adopted 1997, Updated 11/05



## JURISDICTION Town of Pe Ell

- Zoning Ordinance, Adopted 1997, Updated 10/04
- Critical Areas Ordinance, Adopted Nov. 2005

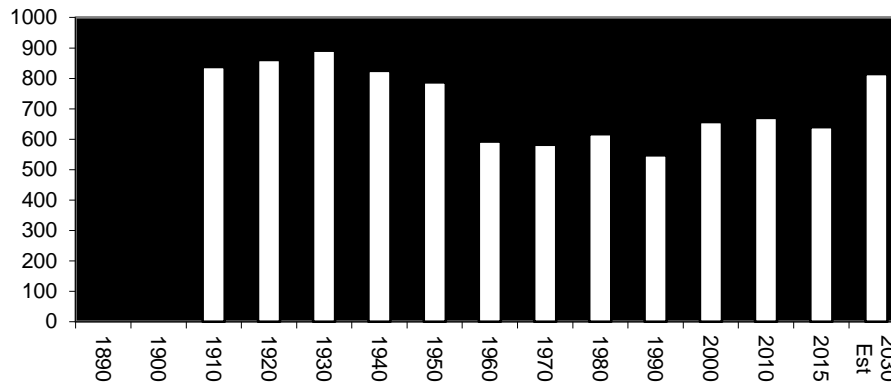
### Agency Specific Natural Hazard Event History – 1980 to 2015

Type of Disaster	FEMA Disaster #	Date	Comments
Severe Winter Storm and Record and Near Record Snow	DR-1825	3/2/2009	Incident 12/12/2008-1/5/2009
Severe Winter Storm, Landslides, Mudslides, Flooding	DR-1817	1/30/2009	1/6-/16/2009
Severe Storms, Flooding, Landslides, Mudslides	DR-1734	12/8/2007	Incident 12/1-12/17/2007
Severe Winter Storm, Landslides, Mudslides	DR-1682	2/14/2007	Incident 12/14-12/15/2006
Severe Storms, Flooding, Landslides, Mudslides	DR-1671	12/12/2006	Incident 11/2-11/11/2006
Earthquake	DR-1361	3/1/2001	Incident 2/28-3/16/2001
Severe Winter Storms/Flooding	DR-1159	1/17/1997	Incident 12/26/1996-2/10/1997
Severe Storms, Flooding	DR-1100	Feb. 9, 1996	Incident 1/26-2/23/1996
Storms, High Winds, Floods	DR-1079	Jan. 3, 1996	Incident 11/7-Dec 18, 1995
Severe Storm, High Winds	DR-981	March 4, 1993	Incident 1/20-1/21/1993
Severe Storms, Flooding	DR-784	Dec 15, 1986	Incident 11/22-11/29/1986
Volcanic Eruption – Mt. St. Helens	DR-623	May 21, 1980	

### Demographics

Population	1990	2000	2010	2015	2030 -Projected
	547	657	670	640	814

**Town of Pe Ell Population 1890 to 2015**  
Office of Financial Management (OFM)  
April 2015



Quick Facts (US Census)	Pe Ell	Washington
Population, percent change - April 1, 2010 to July 1, 2013		3.7%
Persons under 5 years, percent, 2010	5%	6.5%
Persons under 18 years, percent definition and source info Persons under 18 years, percent, 2010	19.2%	23.5%
Persons 65 years and over, percent definition and source info Persons 65 years and over, percent, 2010	15.5%	12.3%
High school graduate or higher, percent of persons age 25+, 2009-2013	88.7%	90.0%
Bachelor's degree or higher, percent of persons age 25+, 2009-2013	9.7%	31.9%
Median value of owner-occupied housing units, 2009-2013	\$122,800	\$262,100
Per capita money income in past 12 months (2013 dollars), 2009-2013	\$	\$30,742
Median household income definition and source info Median household income, 2009-2013	\$39,091	\$59,478
Persons below poverty level, percent definition and source info Persons below poverty level, percent, 2009-2013	16.7%	13.4%

Source: U.S. Census – Date Accessed: July 12, 2015. Website: <http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk>

### Land Designations

Land Area within the existing city limits:	196
Total land area within city limits and urban growth area	428
Land area of park, forest, and/or open space	85
Land area of residential	157
Land area of commercial	10
Land area of industrial	-





## JURISDICTION Town of Pe Ell

### Current and Anticipated Development and Population Trends

Slow to no growth. The predominant land use is single family residential homes on lots of less than one acre. Almost one-third of the town's land falls under this category. Additionally, low-density residential land categorized by single family residences on properties of one acre or more comprises another 17%. No multi-family housing currently exists in the town.

Morton is planning for a plan population of 1869 people creating the need for up additional residential units by the year 2030. The city continues to plan for slow growth and see more tourist related businesses.

### Infrastructure

Categories	2014	Approximate Value (\$)
Miles of Street and Roads	6.8 miles	\$ 4,725,000
Miles of Sanitary Sewer		
Miles of Storm Sewer		
Miles of water lines		
Miles of Electrical lines	N/A- provided by LCPUD	

### Critical Facilities

Facility	Address	Approximate Value (\$)
Town Hall	111 S. Main Street, Pe Ell, WA 98572	\$398,288
Water Plant	1100 Muller Rd., Pe Ell, WA 98572	\$ 1,985,681
Sewer Plant	1100 N 2 <sup>nd</sup> St., Pe Ell, WA 98572	\$ 4,853,888
Vets Hall / Community Center	401 S. 1 <sup>st</sup> St., Pe Ell, WA 98572	\$ 580,000
Clinic	102 E. 7 <sup>th</sup> Ave., Pe Ell, WA 98572	\$ 300,000
Dam	Lester Creek	\$ 250,000
Lift Station	3 <sup>rd</sup> Street, Pe Ell, WA 98572	\$ 400,000
Lift Station	6 <sup>th</sup> Ave. Pe Ell, WA 98572	\$ 400,000
Main Water Line	Lester Creek	\$ 1,600,000
Reservoir 180,000 gal	1100 Muller Rd., Pe Ell, WA 98572	\$ 110,316
Reservoir 500,000 gal	1100 Muller Rd., Pe Ell, WA 98572	\$ 110,316
River Pump Station	1000 Line	\$ 500,000
Storage Bldg.	202 N. Main St., Pe Ell, WA 98572	\$ 7,148

### Flood Information

Percentage of existing city limits within the 100-year flood plain	
Assessor's valuation of private properties within the 100-year flood plain	

### Critical Facilities within the 100-year flood plain

Facility	Address	Approximate Value (\$)
Water treatment plant	117 Klasey Road	4.1 M
WWTP	200 Sewer Plant Road	3.4 M
Water Intake	Connelly Creek	\$250,000
Gus Backstorm City Park	750 Main	
Bob Lyle Community Center	700 Main	1.5 M
Old Settlers Museum	750 Main Ave	\$150,000

### NFIP/CRS Section

NFIP/CRS Community	No
Floodplain Administrator	None
Certified Floodplain Manager	None
Floodplain Ordinance Adoption	Critical Areas Ordinance, 2005



JURISDICTION     Town of PeEll    

Recently community Assistant Visit or Community Assistance Contact	N/A
NFIP Compliance Violations?	N/A
FEMA Floodplain Maps Adopted	
Community Rating Classification	N/A
Building Code Effective Grading Schedule	
StormReady Community	No
Firewise Community	No

Previous Action Plan Implementation			
Mitigation Strategy	Completed 2010-2014	Carried Over to 2015 Plan	Removed or No Longer Feasible
Town Hall, Sewer Treatment Plant, Water Plant: Develop an earthquake response plan for	No	Yes	N/A
Town Hall, Water Plant: Inspect and evaluate building's ability to withstand volcanic ash fall	No	Yes	N/A
Town Hall, Sewer Treatment Plant, Water Plant: Secure contents to prevent injury to	No	Yes	N/A
Town Hall, Sewer Treatment Plant, Water Plant: Develop a plan/procedure for flood damage	No	Yes	N/A
Town Hall, Sewer Treatment Plant, Water Plant: Educate employees of flood risk for facility	No	Yes	N/A
Sewer Treatment Plant: Evaluate adequacy of hazardous materials storage locations at	No	Yes	N/A
Elderly Center develop a hazard response plan	No	Yes	N/A
Flood Mgmt: Continue to enforce the flood ordinances and building codes to reduce flood	No	Yes	N/A

**Attached Documents:**

- Land Use Map
- Public Facilities Map
- Hazard Identification Worksheet(s)
- Mitigation Strategies Worksheet(s)
- Steep Slopes and Liquefaction Map
- Flood Hazard Map
- HAZUS-MH: Flood Results

# HAZARD IDENTIFICATION WORKSHEET

Date Completed: 6/2015

Which Agency are you representing? **Pe Ell**

Name:	Title:
Email:	Telephone #:
Address:	City: ZIP:

**For each Hazard, please fill out the table below based on the following questions:**

- **Previous Occurrence:** Is there a historic record of this type of hazard happening here? *Yes or No*
- **Likely to Experience:** Are you likely to experience this type of hazard in the future? *Yes or No*
- **Probability:** Based on history, what is the likelihood of this event happening again? *Highly Likely, Likely, Possible, Unlikely*
- **Extent:** If this hazard event were to happen, how extensive could the damage be? *Catastrophic, Severe, Limited, None*

Hazard Type	Previous Occurrence?		Likely to Experience?		Probability				Extent			
	Yes	No	Yes	No	Highly Likely	Likely	Possible	Unlikely	Catastrophic	Severe	Limited	None
Avalanche		0		0				0				0
Coastal Erosion		0		0				0				0
Coastal Storm		0		0				0				0
Dam Failure		0		0				0				0
Debris Flow		0		0				0				0
Drought		0		0				0				0
Earthquake	X		X			X					X	
Expansive Soils		0		0				0				0
Extreme Heat		0		0				0				0
Flooding	X		X				X				X	
Hailstorm		0		0				0				0
Hurricane		0		0				0				0
Land Subsidence		0		0				0				0
Landslide	X		X			X					X	
Levee Failure		0		0				0				0
Severe Thunder Storm		0		0				0				0
Severe Wind Storm	X		X			X					X	
Severe Winter Storm	X		X			X					X	
Tornado		0		0				0				0
Tsunami		0		0				0				0
Volcano	X		X			X					X	
Wildfire	X		X				X				X	
Other:												

**Which of the following does your agency have? (Circle One)**

Comprehensive Plan	<b>Yes</b> / No / NA	Date completed: Nov 2005
Critical Areas Ordinance	<b>Yes</b> / No / NA	Date completed: Nov 2005
Does your agency have an emergency plan?	<b>Yes</b> / No / NA	

# ASSET INVENTORY WORKSHEET 2A

Date Completed:

June 2015

Which Agency are you representing?

Town of Pe Ell

Name:

Title:

Email:

Telephone #:

Address:

City:

ZIP:

**Task A: Inventory the critical facilities that can be damaged by a hazard event.**

Please fill out the table below.

Name of Building/Business	Address	Contact Information (Telephone #)	Occupancy #	Structure Use							
				Educational	Government	Hospital	Non/Profit	Public Safety	Residential	Utilities	Other
Town Hall	111 S. Main Street Pe Ell, WA 98572	(360) 291-3543	75		X			X			
Water Plant	1100 Muller Rd. Pe Ell, WA 98572	(360) 291-8890								X	
Sewer Plant	1100 N 2 <sup>nd</sup> St. Pe Ell, WA 98572	(360) 291-3263								X	
Vets Hall / Community Center	401 S. 1 <sup>st</sup> St. Pe Ell, WA 98572	N/A	150		X		X				
Clinic	102 E. 7 <sup>th</sup> Ave. Pe Ell, WA 98572	(360) 291-3232	25			X					
Dam	Lester Creek	N/A			X					X	
Lift Station	3 <sup>rd</sup> Street Pe Ell, WA 98572	N/A			X					X	
Lift Station	6 <sup>th</sup> Ave. Pe Ell, WA 98572	N/A			X					X	
Main Water Line	Lester Creek	N/A			X					X	
Reservoir 180,000 gal	1100 Muller Rd. Pe Ell, WA 98572	N/A			X					X	
Reservoir 500,000 gal	1100 Muller Rd. Pe Ell, WA 98572	N/A			X					X	
River Pump Station	1000 Line	N/A			X					X	
Storage Bldg.	202 N. Main St. Pe Ell, WA 98572	N/A			X					X	
Truck Shop	1101 N. 1 <sup>st</sup> St. Pe Ell, WA 98572	N/A	20								
Town Shop	111 S. Main Street Pe Ell, WA 98572	(360) 291-3543	20								
Pe Ell School	519 N 2 <sup>nd</sup> Street		305	X							

ASSET INVENTORY WORKSHEET 2B - 2015										Date Completed:		June 2015			
Which Agency are you representing: <b>Town of Pe Ell</b>										Name:		Title:			
Email:										Telephone #:					
Address:					City:			Zip:							
<b>Task B: Compile a detailed inventory of what can be damaged by a hazard event.</b> Inventory the assets (critical facilities, businesses, historic, cultural, natural resource areas and areas of special consideration) that can be damaged by a hazard event.															
<b>HAZARDS</b> 1. Avalanche 2. Dam Failure 3. Debris Flow 4. Drought 5. Earthquake 6. Expansive Soils 7. Extreme Heat 8. Flooding 9. Hailstorm 10. Hurricane 11. Land Subsidence 12. Landslide 13. Levee Failure 14. Severe Thunder Storm 15. Severe Wind Storm 16. Severe Winter Storm 17. Tornado 18. Volcano 19. Wildfire										<b>BUILDING MATERIALS</b> a. Masonry b. concrete c. Concrete Block d. Brick e. Stick f. Metal g. Steel h. Asphalt					
Name or description of Asset (building)	Address	Hazard(s) List all that apply (See legend above)	Critical Facility	Transportation	Utility System	Comm. System	Economic Assets	Special consideration	Historic/Other	Size of Building (sq. ft.)	Replacement Value (\$)	Contents Value (\$)	Displacement (\$ per day)	Occupancy or capacity (#)	Structural – building materials
Town Hall	111 S. Main Street Pe Ell, WA 98572	4,5,8,9,14,15,16,18,19	X							2,864	\$398,288	\$ 50,750	\$ 347,538	75	All Combustible
Water Plant	1100 Muller Rd. Pe Ell, WA 98572	4,5,8,9,14,15,16,18,19	X		X		X			2,400	\$ 1,985,681		\$ 1,985,681		Reinforced Concrete
Sewer Plant	1100 N 2 <sup>nd</sup> St. Pe Ell, WA 98572	4,5,8,9,13,14,15,16,18,19	X		X		X			1,100	\$ 4,853,888		\$ 4,853,888		Reinforced Concrete
Vets Hall / Community Center	401 S. 1 <sup>st</sup> St. Pe Ell, WA 98572	4,5,8,9,14,15,16,18,19					X			7,700	\$ 580,000		\$ 580,000	150	Wood
Clinic	102 E. 7 <sup>th</sup> Ave. Pe Ell, WA 98572	4,5,8,9,14,15,16,18,19	X				X			1,500	\$ 300,000	\$ 80,000	\$200,000	25	All Combustible
Dam	Lester Creek	2,4,5,6,8,11,12,14,15,16,18,19									\$ 250,000		\$ 250,000		Concrete
Lift Station	3 <sup>rd</sup> Street Pe Ell, WA 98572	5,8,18,19			X						\$ 400,000		\$ 400,000		Concrete
Lift Station	6 <sup>th</sup> Ave. Pe Ell, WA 98572	5,8,18,19			X						\$ 400,000		\$ 400,000		Concrete

Main Water Line	Lester Creek	4,5,6,11			X		X				\$ 1,600,000		\$ 1,600,000		
Reservoir 180,000 gal	1100 Muller Rd. Pe Ell, WA 98572	4,5,18			X		X				\$ 110,316		\$ 110,316		Reinforced Concrete
Reservoir 500,000 gal	1100 Muller Rd. Pe Ell, WA 98572	4,5,18			X		X				\$ 110,316		\$ 110,316		Steel
River Pump Station	1000 Line				X		X			100	\$ 500,000		\$ 500,000		Concrete
Storage Bldg.	202 N. Main St. Pe Ell, WA 98572									25	\$ 7,148		\$ 7,148		Wood
Truck Shop	1101 N. 1 <sup>st</sup> St. Pe Ell, WA 98572				X					2,400	\$ 55,000		\$ 55,000	20	Poll Bldg. Tin
Town Shop	111 S. Main Street Pe Ell, WA 98572				X					1,440	\$ 82,816	\$ 25, 375	\$ 57, 441	20	Steel

<b>ASSET INVENTORY WORKSHEET 2C</b>	<b>Date Completed: June 2015</b>
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**Which Agency are you representing?**  
Pe Ell

**Name:** \_\_\_\_\_ **Title:** \_\_\_\_\_

**Email:** \_\_\_\_\_ **Telephone #:** \_\_\_\_\_

**Address:** \_\_\_\_\_ **City:** \_\_\_\_\_ **ZIP:** \_\_\_\_\_

**Task C.** Determine the proportion of buildings, the value of buildings, and the population in your community that are located in hazard areas.

**Hazard:** Drought, Earthquake, Flooding, land sub., Levee failure, wind, winter, volcano, wildfire

Type of Structure (occupancy class)	Number of Structures			Value of Structures			Number of People		
	# in community	# in hazard area	% in hazard area	\$ in community	\$ in hazard area	% in hazard area	# in community	# in hazard area	% in hazard area
Residential	300	50	.33	\$3 M	\$ 1 M	.33	775	450	58
Commercial	20	5	.25	\$1 M	\$250,000	.25			
Industrial	0	0							
Agricultural	1	0							
Religious/ Non-profit	3	0							
Government	5	5	100	\$2M	\$2M	100			
Education	1	1	100	\$ 5 M	\$ 5M	100			
Utilities	3	3	100	\$ 2 M	\$ 2M	100			
<b>Total</b>	<b>333</b>	<b>64</b>		<b>\$13 M</b>	<b>\$10M</b>				

**Task D. Determine whether (and where) you want to collect additional inventory data. (circle one)**

- Do you know where your greatest damages may occur in your hazard areas? **Yes** or No
- Do you know whether your critical facilities will be operational after a hazard event? **Yes** or No
- Is there enough data to determine which assets are subject to the greatest potential damages? **Yes** or No
- Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards? **Yes** or No
- Is there enough data to determine whether historic, environmental, political, or cultural significance are vulnerable to potential hazards? **Yes** or No
- Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence? **Yes** or No
- Is additional data needed to justify the expenditure of community or state funds for mitigation? **Yes** or No

# Ranking Mitigation Strategies: Using STAPLEE - Worksheet 3A

Date: June 2015

Agency: Pe Ell

Category Description/Action Items (Mitigation Strategy)	Hazard Addressed (flood, earthquake, wind, winter, landslide, etc.)	Social (Yes or No)	Technical (Yes or No)	Administrative (Yes or No)	Political (Yes or No)	Legal (Yes or No)	Economical (Yes or No)	Environmental (Yes or No)	Responsible Department/Agency
Town Hall, Sewer Treatment Plant, Water Plant: Develop an earthquake response plan for facility personnel	Earthquake	Y	Y	Y	Y	Y	Y	Y	Pe Ell Police (EM)
Town Hall, Water Plant: Inspect and evaluate building's ability to withstand volcanic ash fall out.	Volcanic	Y	Y	Y	Y	Y	Y	Y	Pe Ell Police (EM)
Town Hall, Sewer Treatment Plant, Water Plant: Secure contents to prevent injury to occupants	Earthquake	Y	Y	Y	Y	Y	Y	Y	Pe Ell Police (EM)
Town Hall, Sewer Treatment Plant, Water Plant: Develop a plan/procedure for flood damage control, including temporary protection of facility	Flood	Y	Y	Y	Y	Y	Y	Y	Pe Ell Police (EM)
Town Hall, Sewer Treatment Plant, Water Plant: Educate employees of flood risk for facility and components.	Flood	Y	Y	Y	Y	Y	Y	Y	Pe Ell Police (EM)
Sewer Treatment Plant: Evaluate adequacy of hazardous materials storage locations at facility (STP)	All	Y	Y	Y	Y	Y	Y	Y	Pe Ell Police (EM)
Elderly Center develop a hazard response plan	All	Y	Y	Y	Y	Y	Y	Y	Pe Ell Police (EM)
Flood Mgmt: Continue to enforce the flood ordinances and building codes to reduce flood damages	Flood	Y	Y	Y	Y	Y	Y	Y	City Admin & Planning/Building County

**Notes**  
 S: Social – The public must support the overall implementation strategy and specific mitigation actions.  
 T: Technical – It is important to determine if the proposed action is technically feasible, will help reduce losses in the long term, and has minimal secondary impacts.  
 A: Administrative – Under this part of the evaluation criteria, examine the anticipated staffing, funding, and maintenance requirements for the mitigation action to be implemented.  
 P: Political – Understanding how your community and State leadership feels about issues related to the environment, economic development, safety, and emergency management.  
 L: Legal – When considering this criterion, determine whether your agency has the legal authority at the State, or local level to implement the action, or if new laws will need to be passed.  
 E: Economic – Cost-effective mitigation actions that can be funded in current or upcoming budget cycles are much more likely to be implemented.  
 E: Environmental – Evaluate whether, when implementing mitigation actions, there would be negative consequences to environmental assets (wetlands, endangered species, protected resources).



# Mitigation Strategies – Worksheet 3B

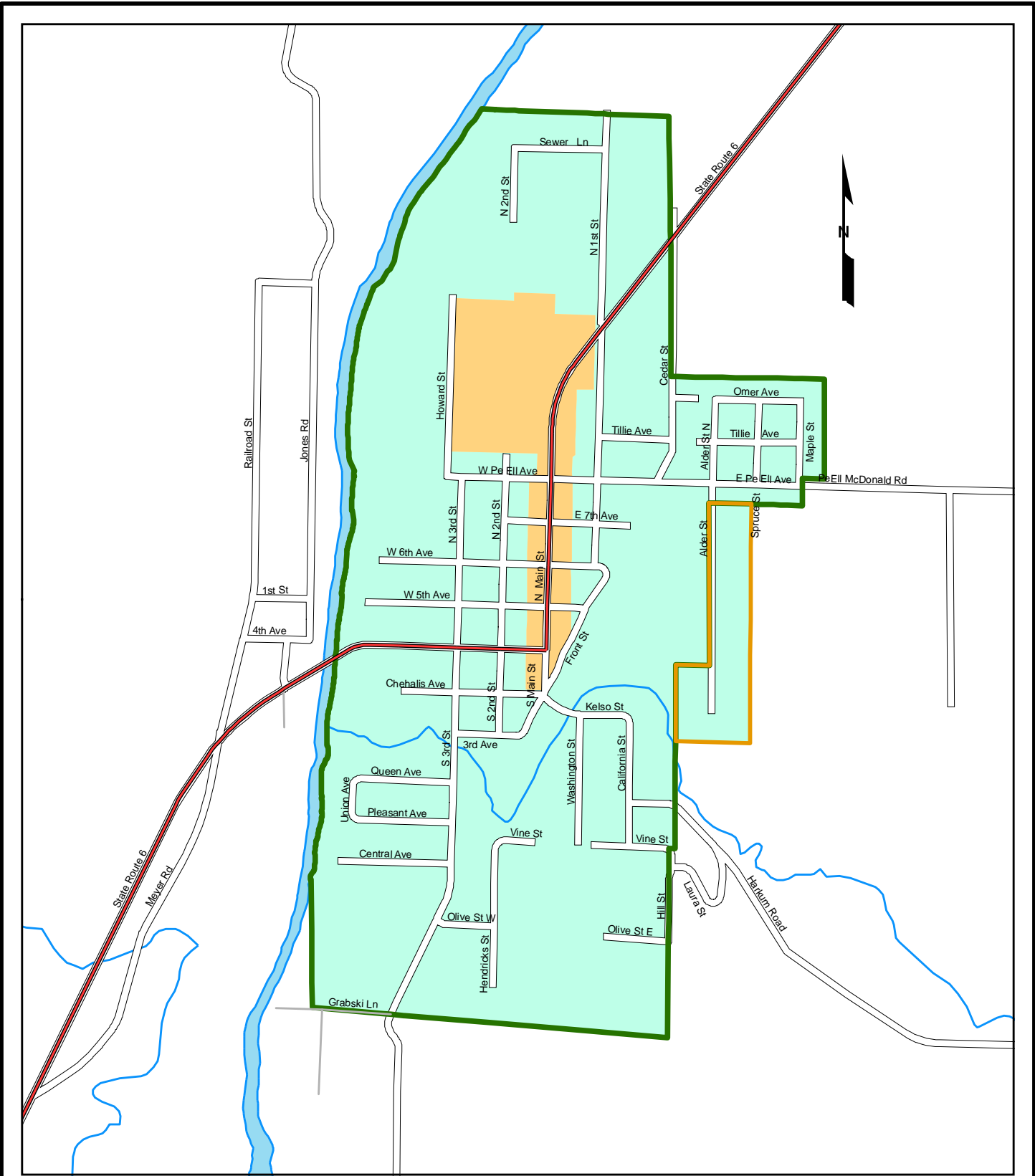
Date: June 2015

Agency: Pe Ell

Mitigation Measures		Hazard Addressed (flood, earthquake, wind, winter, landslide, etc.)	2010 Plan		Mitigation Identification (Prevention, Property Protection, Public Education & Awareness, Natural Resource Protection, Structural Projects)	Cost-Benefit and Prioritization			Implementation			
Category	Description/Action Items (Mitigation Strategy)		Task in 2010 Plan (yes or no)	Task completed as part of 2010 Plan (yes or no)		Relative Cost 1 = Highest 3 = Lowest	Relative Effectiveness 1 = Lowest 3 = Highest	Priority Rating (Low, Medium, High)	Timeline (schedule for approx. completion)	Potential Funding (grants, budget, donations, etc..)	Cost Est.	Administrative Responsibility
	Town Hall, Sewer Treatment Plant, Water Plant: Develop an earthquake response plan for facility personnel	Earthquake	Yes	No	PROPERTY PROTECTION	3	3	HIGH	ON-GOING	Budget, Grants	UNK	Pe Ell Police (EM)
	Town Hall, Water Plant: Inspect and evaluate building's ability to withstand volcanic ash fall out.	Volcanic	Yes	No	PROPERTY PROTECTION	3	3	HIGH	ON-GOING	Budget, Grants	UNK	Pe Ell Police (EM)
	Town Hall, Sewer Treatment Plant, Water Plant: Secure contents to prevent injury to occupants	Earthquake	Yes	No	PROPERTY PROTECTION	3	3	HIGH	ON-GOING	Budget, Grants	UNK	Pe Ell Police (EM)
	Town Hall, Sewer Treatment Plant, Water Plant: Develop a plan/procedure for flood damage control, including temporary protection of facility	Flood	Yes	No	PROPERTY PROTECTION	3	3	HIGH	ON-GOING	Budget, Grants	UNK	Pe Ell Police (EM)
	Town Hall, Sewer Treatment Plant, Water Plant: Educate employees of flood risk for facility and components.	Flood	Yes	No	PROPERTY PROTECTION	3	3	HIGH	ON-GOING	Budget, Grants	UNK	Pe Ell Police (EM)
	Sewer Treatment Plant: Evaluate adequacy of hazardous materials storage locations at facility (STP)	All	Yes	No	PROPERTY PROTECTION	3	3	HIGH	ON-GOING	Budget, Grants	UNK	Pe Ell Police (EM)
	Elderly Center develop a hazard response plan	All	Yes	No	PROPERTY PROTECTION	3	3	HIGH	ON-GOING	Budget, Grants	UNK	Pe Ell Police (EM)
	Flood Mgmt: Continue to enforce the flood ordinances and building codes to reduce flood damages	Flood	Yes	No	PROPERTY PROTECTION	3	3	HIGH	ON-GOING	Budget, Grants	UNK	Pe Ell Police (EM)

**Notes**

2010 Plan: rate task(s) if it was in the 2010 Plan, Cost Estimate: a very rough estimate cost of implementing task, Administrative Responsibility: who will accomplish the task



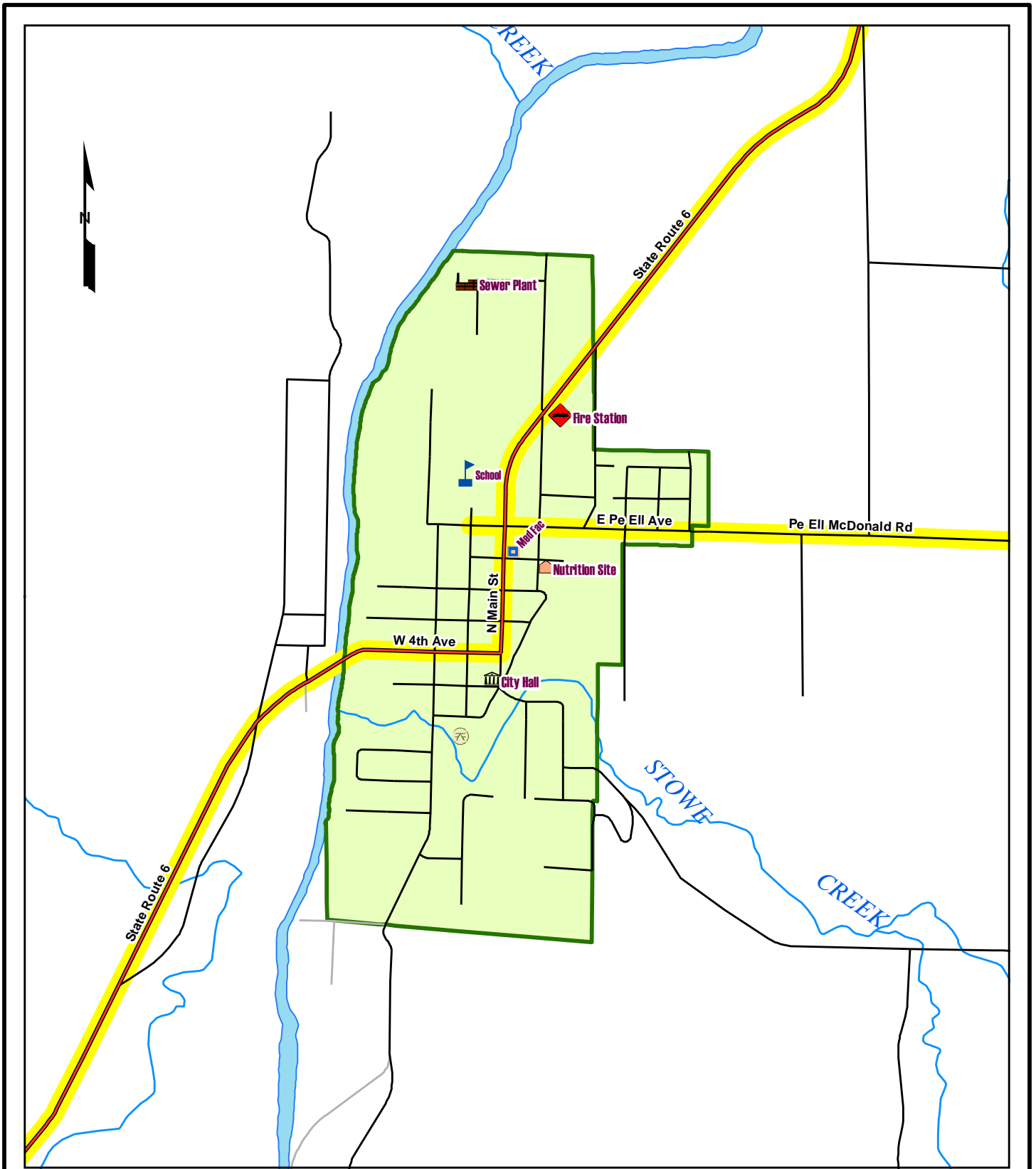
- City Limits
- UGA
- Industrial
- Commercial
- Residential / Mixed
- OS/ Public
- UGA Default

## ZONING CLASSIFICATIONS

# Town of PeEll



Lewis County, Washington

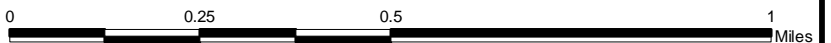


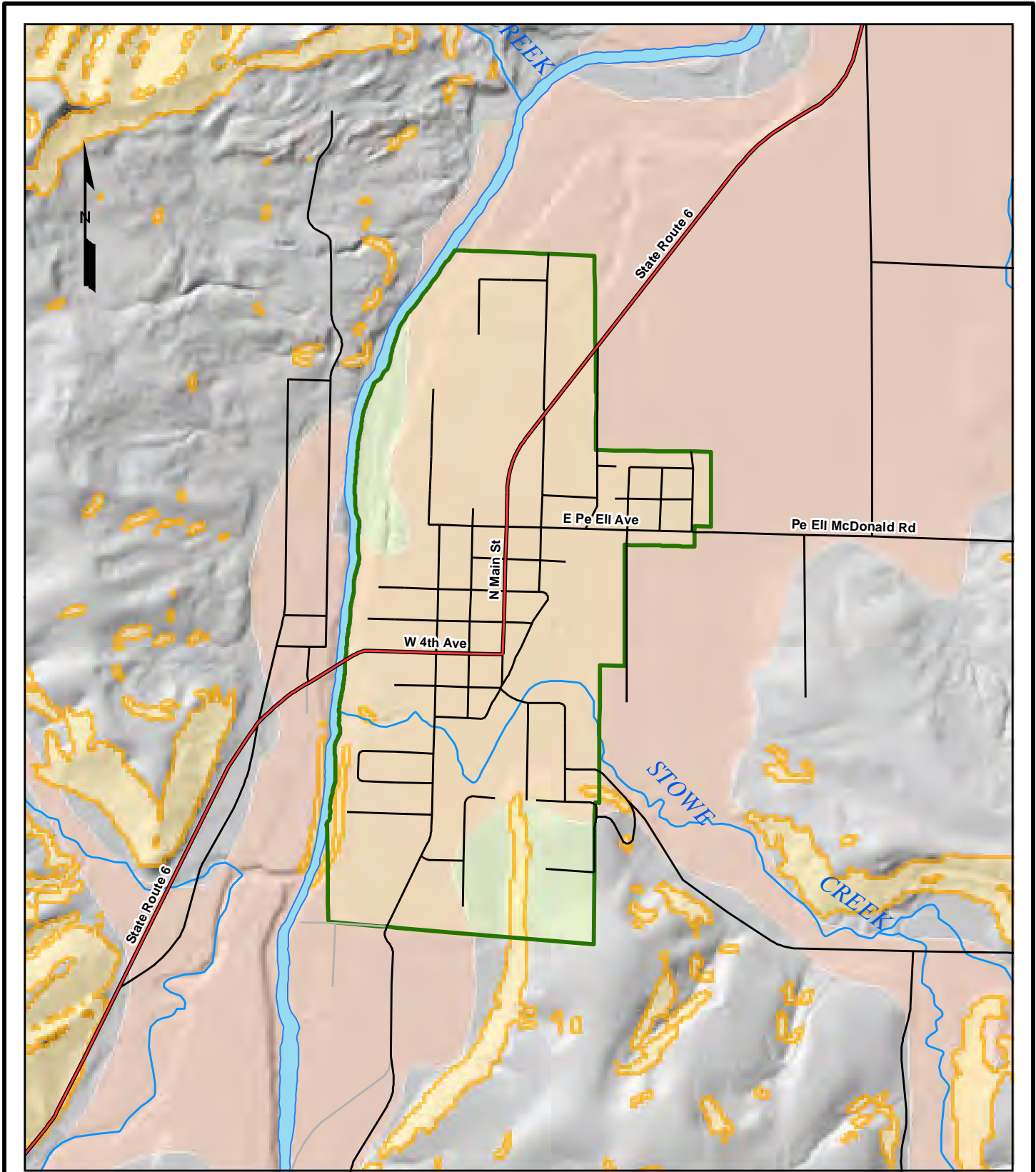
City Limits
  Evacuation Route

Lewis County, Washington  
 2015 Multi-jurisdictional Hazard Mitigation Plan

**Pe Ell**

**Facilities & Evacuation Routes**



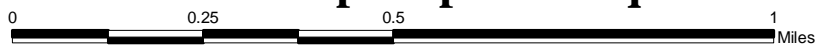


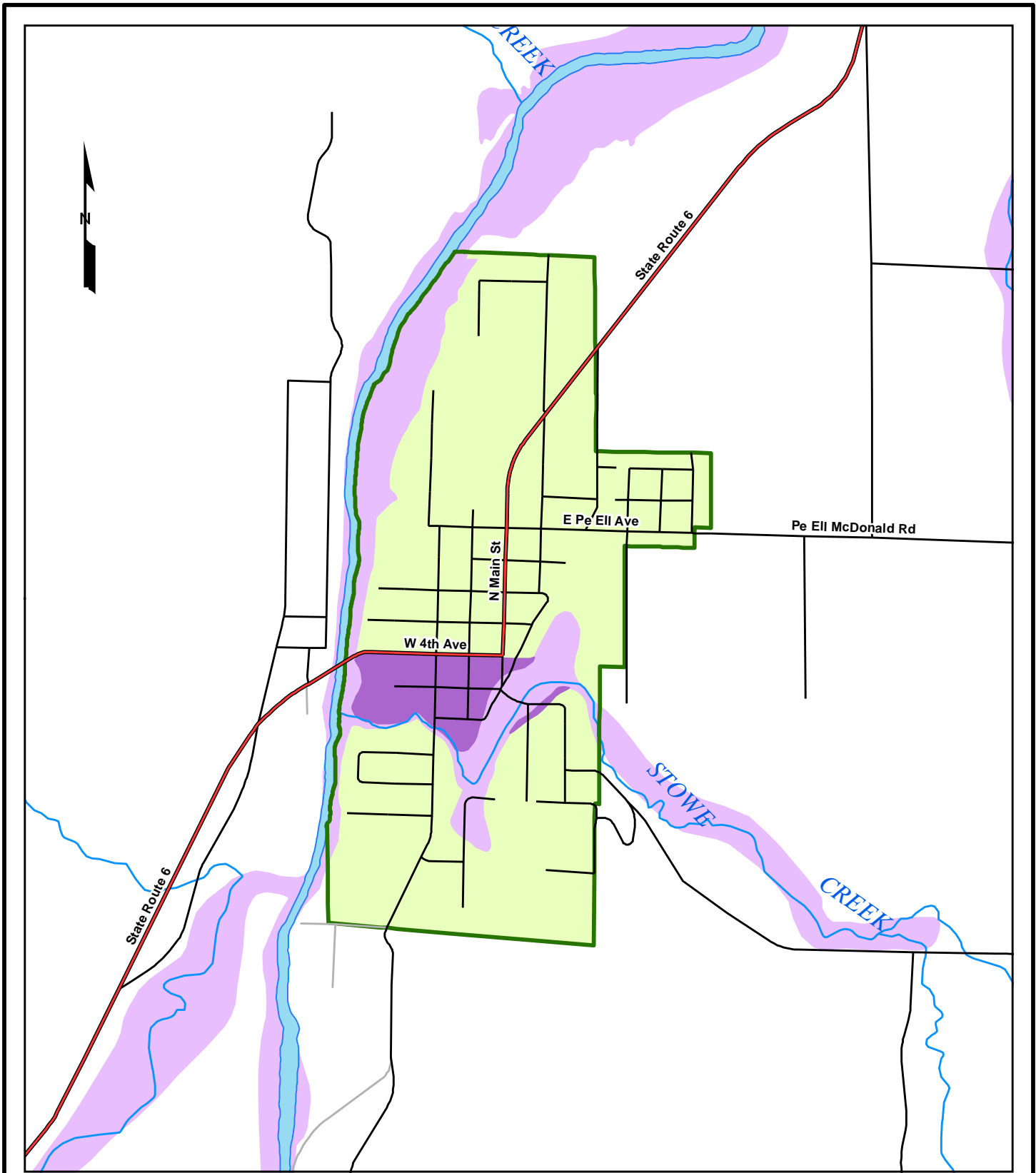
- █ City Limits
- █ Mod to High Liquefaction Potential
- █ Slope > 30%

Lewis County, Washington  
2015 Multi-jurisdictional Hazard Mitigation Plan

**Pe Ell**

**Steep Slopes & Liquefaction**



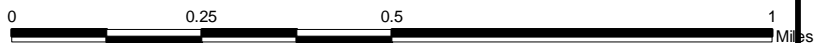


- City Limits
- 100-yr flood
- 500-yr flood
- Dam Inundation
- Levees/revet.

Lewis County, Washington  
2015 Multi-jurisdictional Hazard Mitigation Plan

**Pe Ell**

**Facilities & Evacuation Routes**



## Building Damage Count by General Occupancy

October 06, 2009

	Count of Buildings (#) by Range of Damage (%)							Total
	None	1-10	11-20	21-30	31-40	41-50	Substantial	
<b>Washington</b>								
<b>Lewis</b>								
Agriculture	0	0	0	0	0	0	0	0
Commercial	0	0	0	0	0	0	0	0
Education	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	0	0	0	0
Religion	0	0	0	0	0	0	0	0
Residential	1	0	0	2	1	2	3	9
<b>Total</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>9</b>
<b>Total</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>9</b>
<b>Scenario Total</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>9</b>

Special Notice Regarding Building Count:

Unlike the earthquake and hurricane models, the flood model performs its analysis at the census block level. This means that the analysis starts with a small number of buildings within each census block and applies a series of distributions necessary for analyzing the potential damage. The application of these distributions and the small number of buildings make the flood model more sensitive to rounding errors that introduces uncertainty into the building count results. Please use these results with suitable caution.

*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.*

**Study Region:** Pe Ell Flood  
**Scenario:** Pe Ell 100-Year  
**Return Period:** 100

## Direct Economic Losses for Buildings

October 06, 2009

All values are in thousands of dollars

	Capital Stock Losses			Building Loss Ratio %	Income Losses				Total Loss
	Cost Building Damage	Cost Contents Damage	Inventory Loss		Relocation Loss	Capital Related Loss	Wages Losses	Rental Income Loss	
<b>Washington</b>									
Lewis	687	459	0	7.6	2	0	0	0	1,149
<b>Total</b>	<b>687</b>	<b>459</b>	<b>0</b>	<b>7.6</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1,149</b>
<b>Scenario Total</b>	<b>687</b>	<b>459</b>	<b>0</b>	<b>7.6</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1,149</b>

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: Pe Ell Flood  
 Scenario: Pe Ell 100-Year  
 Return Period: 100

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## Shelter Summary Report

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October 06, 2009

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	# of Displaced People	# of People Needing Short Term Shelter
<b>Washington</b>		
Lewis	34	9
<b>Total</b>	<b>34</b>	<b>9</b>
<b>Scenario Total</b>	<b>34</b>	<b>9</b>

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*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.*

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**Study Region:** Pe EII Flood  
**Scenario:** Pe EII 100-Year  
**Return Period:** 100

Page : 1 of 1