

# Chapter 4. City of Ellensburg Annex

## 4.1. HAZARD MITIGATION PLAN POINT OF CONTACT

### Primary Point of Contact

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## 4.2. JURISDICTION PROFILE

The following is a summary of key information about the jurisdiction and its history:

- **Date of Incorporation** —1883
- **Current Population** —18,174 as of 2010 Census. The American Community Survey estimated a population of 18,957 in 2016.
- **Population Growth** — The population growth rate for the City of Ellensburg has remained low but consistent throughout the past few decades, with clear correlation to changes in student population at Central Washington University (CWU). The highest percent increase occurred between the 1990 and 2000 Census, at 19.8%. The decade between the 2000 and the 2010 Census, saw the City population increase by 2,760, an 18 percent increase and an average annual growth rate of 1.8 percent. During the seven years after the 2010 census, the City population increased by 2,152, a 10.3 percent increase and an average annual growth rate of 1.47%.
- **Location and Description** — The City of Ellensburg is in central Kittitas County at the intersection of Interstate 90, Interstate 82, and US Highway 97 and is near the center of Washington State. The elevation is approximately 1,500 feet with topography sloping gradually from northeast to southwest and the Yakima River. The City is located in a fertile plateau valley adjacent to the Yakima River, with ridges and mountains associated with the Cascade mountain range surrounding it. The surrounding area is primarily composed of irrigated agricultural land or semi-arid desert lands that are not irrigated. Six perennial creeks that convey runoff and snow melt water from the mountain range watersheds to the north run through the developed City from the northeast to the southwest where they flow into the Yakima River which then flows into the Columbia River some 130 miles to the south. In addition, three large irrigation canals traverse the City from the northwest to the southeast and provide irrigation water to the surrounding agricultural lands.

Interstate 90, Interstate 82 and US Highway 97, which all intersect at Ellensburg, provide direct access to the Puget Sound area in the west, Canada to the north, and the greater US to the south and east. BNSF Railway has a main line that runs through the City.

Central Washington University is located in Ellensburg and as of 2018 has a student population of approximately 11,500, in addition to the associated staff.

The City has two national historic districts—the Downtown National Historic District and the First Railroad Historic District—which consist of commercial and residential structures from the late 1800s and help make the City a regional historic preservation destination.

- **Jurisdiction Vulnerability to Hazards**— Ellensburg, along with all jurisdictions in Kittitas County, has an overall low vulnerability to avalanche, drought, landslide, and volcano hazards, and an overall high vulnerability to severe weather events. Based on the three dam failure scenarios used in this plan, 8% of Ellensburg’s population and 5% of property is at risk of dam failure. Ellensburg has high exposure to earthquakes, and various earthquake scenarios result in losses up to 3% of building value. Ellensburg has 791 buildings (17% of assessed building value) located in the 100- or 500-year floodplain, and therefore a high vulnerability to flood events. Ellensburg has moderate vulnerability to wildfires, with 5% of buildings exposed to the 0-30 Year Fire Interval.
- **Brief History**—Ellensburg is located on the western slopes of the Columbia Plateau, site of some dramatic geological events that have occurred over time. Basaltic lava flows took place some 15 million years ago, with a series of giant glacial flood events after the ice age. The largest documented flood in geologic history occurred when a very large water body in the Montana region suddenly breached, causing huge volumes of water to rapidly sweep across the basaltic plateau as it made its way westward to sea level at the Pacific Ocean. More recently, in 1980 Mt. St. Helens, one of a string of active volcanoes in the Cascade Mountain Range, erupted and caused significant property damage and loss of life in the immediate vicinity of the mountain; Ellensburg was impacted with significant ash from that eruption, causing property damage, health issues, and general disruption to the normal activities of the community. Those events have shaped the landscape of central and eastern Washington where Ellensburg is located.

The first inhabitants of the Ellensburg area were the *Psch-wan-wap-pams* (stony ground people) also known as the Kittitas band of the Yakama or Upper Yakama Tribe. The Ellensburg area was one of the few areas in Washington where both camas and kouse (a root used make to bread) grew, which made it an important gathering place for regional tribes. Eventually fur trading and missionary activity entered the valley in the 1860s and by the end of that decade a trading post known as “Robber’s Roost” was established.

The late 1800s saw the community prosper as the Northern Pacific Railroad established a rail siding facility in Ellensburg in 1886 that helped create markets for cattle, dairy products, timber, wool and hay. There was speculation that as part of the region’s effort to petition Congress to admit Washington into the union in 1889, Ellensburg would be named the new state capitol due to its central location. A disastrous fire on July 4, 1889, fanned by the winds that regularly flow down from the Cascade Mountain Range to the west, ended that speculation and destroyed most of the downtown business district and many homes. The community rebuilt itself, using brick and stone masonry rather than wood, within a year.

Although Ellensburg lost the state capitol decision to Olympia, the new State Legislature established the Washington State Normal School (a teacher’s college now known as Central Washington University) in Ellensburg. The school opened in 1891 with 86 students and today CWU has an enrollment exceeding 11,000 students, occupies approximately 380 acres, is the county’s largest employer with more than 1,300 employees, and is estimated to contribute some \$190 million annually to the local economy.

The timing of the fire and the rapid reconstruction of the destroyed downtown produced a unified and attractive appearance dominated by late Victorian architectural styles that have subsequently been filled in with a few early twentieth-century neoclassic and art deco-styled buildings. That historical style has defined the community and continues to serve as one of its biggest assets. Ellensburg has grown from its re-birth and has established itself as a vital, rooted, and unique community in which the residents consider it as being a quiet, clean, comfortable, safe, and family-oriented city.

- **Climate**—Ellensburg has strong summers and winters. Temperatures vary considerably within the seasons. There are four distinct seasons and a strong and regular breeze from the west throughout much of the year. Average mean temperatures range in the high 50s F with summertime temperatures averaging near 80° F and winter lows often getting below freezing. The mountains to the west and north effectively block much of the rain from the “wet” side of the state, producing a dry climate with less than 10 inches of rain a year. The combination of large snow pack in the mountains, strong westerly winds and occasional unseasonal warm rain events, however, results in regular flood events from February through May for the streams that run from the mountains through the city to the Yakima River.
- **Governing Body Format**—The City of Ellensburg utilizes the council-manager form of government with a city manager hired by the city council. The city council elects a mayor and mayor pro tem from the council to serve two-year terms. The City also uses an appointed planning commission to provide land use policy recommendations to City Council and to hear conditional use permit applications. The City also retains the services of a Hearing Examiner to hear quasi-judicial land use permit application matters and provide recommendations to City Council. A number of citizen boards and commissions have been established to provide recommendation and guidance to council on a variety of issues, including the downtown, the environment, energy, historic preservation, parks and recreation, library, arts and affordable housing.
- **Development Trends**—Beginning in the late 1990s and continuing up to the economic downturn in the late 2000s, the City experienced greater than usual growth, primarily in residential structures, although the population growth did not match that rate of residential growth. That is primarily due to the housing boom in the early to mid-2000s and the reality that Ellensburg is a college town and it became easier for some families to purchase a second, speculative residence in which to house their child while attending CWU and to utilize the rent payment from roommates to pay the mortgage. The economic downturn of the late 2000s, stifled the growth spurt for a period of time, but Ellensburg is again seeing slow and steady growth.

### 4.3. JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 4-1 lists all past occurrences of natural hazards in the county. A Repetitive Loss (RL) property is any insurable building for which two or more claims of more than \$1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978. Repetitive loss records in the City of Ellensburg are as follows:

- Number of FEMA Identified Repetitive Flood Loss Properties: 0
- Number of Repetitive Flood Loss Properties that have been mitigated: 0

### 4.4. HAZARD RISK RANKING

Table 4-2 presents the ranking of the hazards of concern.

### 4.5. CAPABILITY ASSESSMENT

The assessment of the jurisdiction’s legal and regulatory capabilities is presented in Table 4-3. The assessment of the jurisdiction’s administrative and technical capabilities is presented in Table 4-4. The assessment of the jurisdiction’s fiscal capabilities is presented in Table 4-5. Classifications under various community mitigation programs are presented in Table 4-6.

## **4.6. HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED INITIATIVES**

Table 4-7 lists the initiatives that make up the jurisdiction's hazard mitigation plan. Table 4-8 identifies the priority for each initiative. Table 4-9 summarizes the mitigation initiatives by hazard of concern and the six mitigation types.

## **4.7. FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY**

The biggest future need to better understand risk/vulnerability would be a re-mapping of the floodplain by FEMA. Ellensburg annually experiences sheet-flow floods, and the floods are not uniformly in flood locations identified on the 1981 FIRM maps. People suffer property damage but are not within a FIRM floodplain and are not eligible for federal flood insurance. People want to develop their properties that are not identified in the floodplain but that consistently flood, and it becomes a regulatory issue for which there is no solid documented basis to regulate the property for flooding. FEMA is in the process of digitizing the existing 1981 FIRMs, and is currently working with Kittitas County to remap tributaries that run through the City using LiDAR technology.

## **4.8. ADDITIONAL COMMENTS**

Due to its climate and topography, Ellensburg is prone to unpredictable flood events when there is significant snow pack in the foothills surrounding the City during early and late winter and a heavy rain event occurs combined with warm temperatures and strong winds (strong winds are the norm for this area). The creek that experiences the flood event varies and is dependent on the temperature and the degree of compactness of the snowpack within the creek watersheds. The result is significant overbank flow in the six creeks that run northeast to southwest through the developed city toward the Yakima River, which becomes sheet-flow flooding over large areas of the community. This regular pattern of flooding does not pose major risks to life, but it does cause significant annual damage to public and private property. Although the City's risk rating for the flood hazard is 36 the regularity of annual flooding and associated property damage makes this hazard risk much higher. The City of Ellensburg already incorporates green infrastructure into its stormwater development standards, which are approved by the Department of Ecology to minimize flood impacts and improve water quality.

In addition, because most of the City's historic downtown structures are masonry buildings constructed in the late 1880s, they are not likely to perform well in earthquake events. The 2001 Nisqually Earthquake, while causing significant damage to the Puget Sound region, in particular the older historic structures, did not cause significant damage in Ellensburg. However, a more local earthquake event, or a much stronger event in the Puget Sound region would likely cause significant property loss and the potential for significant personal injury in the historic downtown area if the two-story brick buildings were to collapse. Retrofitting those historic structures would be an expensive task that is beyond the City's ability to address and beyond the individual property owner's ability to finance.

Large earthquake events in the Puget Sound region also will likely result in significant logistical problems for the Ellensburg community. I-90 is the major east/west interstate that connects the more rural eastern Washington to the more populated western Washington. Large-scale earthquake damage in the Puget Sound region will likely cause serious disruption to food service delivery from the regional warehouses located in Puget Sound, as well as damage to telecommunications. And if the event is serious enough there is likely to be an exodus of displaced Puget Sound residents seeking shelter elsewhere and if the interstate is open Ellensburg is the first larger city over the mountain passes from Puget Sound and is likely to be impacted by displaced Puget Sound people seeking a safe place.

## **4.9. HAZARD AREA EXTENT AND LOCATION**

Hazard area extent and location maps for the City of Ellensburg are included at the end of this chapter. These maps are based on the best available data at the time of the preparation of this plan, and are considered to be adequate for planning purposes.

**Table 4-1. Natural Hazard Events**

Type of Event	Date	Preliminary Damage Assessment
Severe Flooding	05/24/17	N/A
Severe Flooding	03/12/17	N/A
Severe Flooding	02/18/16	N/A
Severe Flooding	02/22/12	N/A
Severe Flooding	5/15/11	N/A
Severe Flooding	03/31/11	N/A
Severe Flooding	3/25/11	N/A
Severe Flooding	01/17/11	N/A
Severe Flooding	01/30/09	N/A
Severe Flooding	01/07/09	N/A
Earthquake (Nisqually)	03/01/01	N/A
Severe Winter Storm	01/17/97	N/A
Severe Winter Storm/Flooding	02/09/96	N/A
Storms/High Winds/Floods	01/03/96	N/A
Flooding, Severe Storm	11/26/90	N/A
Severe Flooding	8/21/90	N/A
Severe Winter Weather	01/18/86	N/A
Severe Storm	12/24/80	N/A
Volcanic Eruption, Mt. St. Helens	05/21/80	N/A
Severe Storms, Flooding	12/10/77	N/A
Severe Storms, Flooding	12/13/75	N/A
Heavy Rains & Flooding	12/29/64	N/A

**Table 4-2. Hazard Risk Ranking**

Rank	Hazard Type	Risk Rating Score (Probability x Impact)
1	Earthquake	36
2	Flood	36
3	Severe Weather	36
4	Dam Failure	30
5	Volcano	24
6	Landslide	6
7	Drought	3
8	Wildfire	3
9	Avalanche	0
10	Seiche	0

**Table 4-3. Legal and Regulatory Capability**

	Local Authority	State or Federal Prohibitions	Other Jurisdictional Authority	State Mandated	Comments
<b>Codes, Ordinances &amp; Requirements</b>					
Building Code	Y	N	N	Y	2015 International Building Codes
Zoning Code	Y	N	N	Y	Title 15 ECC
Subdivisions	Y	N	N	N	Title 15 ECC
Post Disaster Recovery	Y	N	N	Y	Stormwater Utility Adopted
Real Estate Disclosure	N	N	N	N	
Growth Management	Y	N	N	N	Comprehensive Plan, SEPA and Critical Areas
Site Plan Review	Y	N	N	N	GMA compliant 2013 ECC Update
Special Purpose (flood management, critical areas)	Y	N	N	N	Site plans are reviewed for compliance with codes and development regulations
Building Code	Y	N	N	Y	2015 International Building Codes
<b>Planning Documents</b>					
General or Comprehensive Plan	Y	N	N	Y	
Floodplain or Basin Plan	Y	Y	N	Y	GMA compliant with 2017 Update
Stormwater Plan	N	N	N	N	
Capital Improvement Plan	Y	Y	N	Y	Adopted stormwater utility in 2009 and adopted the Eastern Washington Stormwater Development Guidance Manual 2004, updated 2018 and the current stormwater development standards with the City of Ellensburg
Habitat Conservation Plan	Y	N	N	N	Specific 6-Year and more general 12 and 18-year plans included in Comp Plan
Economic Development Plan	N	N	N	Y	Regulated through Critical Area Ordinance in ECC Division VI
Emergency Response Plan	Y	N	N	N	An element in the City Comp Plan, in conjunction with Ellensburg Business Development Authority Strategic Plan
Shoreline Management Plan	Y	N	N	N	Contracted for through Fire District
Post Disaster Recovery Plan	N	N	N	Y	Adopted by reference the Kittitas County SMP. City SMP adopted 2016

**Table 4-4. Administrative and Technical Capability**

Staff/Personnel Resources	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Y	Community Development – Planners Public Works and Energy Services-Engineers
Engineers or professionals trained in building or infrastructure construction practices	Y	Building Department – Building Inspectors Public Works and Energy Services-Engineers
Planners or engineers with an understanding of natural hazards	Y	Public Works – Flood Hazards
Staff with training in benefit/cost analysis	Y	Various departments with basic capability
Floodplain manager	Y	Community Development Director
Surveyors	Y	Hire as needed
Personnel skilled or trained in GIS applications	Y	IT Department – GIS division
Scientist familiar with natural hazards in local area	Y	Hire as needed
Emergency manager	Y	Contracted with Fire District
Grant writers	Y	On-call contract grant writers

**Table 4-5. Fiscal Capability**

Financial Resources	Accessible or Eligible to Use?
Community Development Block Grants	Y
Capital Improvements Project Funding	Y
Authority to Levy Taxes for Specific Purposes	Y
User Fees for Water, Sewer, Gas or Electric Service	Y
Incur Debt through General Obligation Bonds	Y
Incur Debt through Special Tax Bonds	Y
Incur Debt through Private Activity Bonds	N
Withhold Public Expenditures in Hazard-Prone Areas	N
State Sponsored Grant Programs	Y
Development Impact Fees for Homebuyers or Developers	Y
Other	

**Table 4-6. Community Classifications**

	Participating?	Classification	Date Classified
Community Rating System	No	—	—
Building Code Effectiveness Grading Schedule	Yes	4/4	—
Public Protection	Yes	4/9	—
Storm Ready	No	—	—
Firewise	No	—	—

**Table 4-7. Hazard Mitigation Action Plan Matrix**

Applies to new or existing assets	Hazards Mitigated	Objectives Met	Lead Agency	Estimated Cost	Sources of Funding	Timeline
<b>Initiative E-1</b> —West Ellensburg Flood Mitigation Project – Reecer and Currier Creeks from I-90 to University Way, Alliance Short Plat/CenterPoint Business Park Acquisition to Create Floodplain and Extend Levee						
Existing/New	Flooding	1, 3, 6, 7, 9, 10	City	\$7,000,000, High	Grants	Included in 6-Year Capital Facility Plan
<b>Initiative E-2</b> —Wilson Creek Flood Control Project						
Existing/New	Flooding	1, 3, 6, 7, 9, 10	City	\$8,900,000, High	General Fund, Bonds, Grants	Long-term, depends on funding
<b>Initiative E-3</b> —Update FEMA Floodplain Maps						
Existing/New	Flooding	1, 3, 4, 5, 6, 7, 9, 10	City	High	General Fund, FEMA RiskMAP program, Grants	Long Term, depends on funding
<b>Initiative E-4</b> —Clear storm drains and culverts for stormwater management						
Existing	Flooding	1, 6, 7, 10	City	High	Stormwater Utility Funds	Seasonally Clean ½ the City every 2 Years
<b>Initiative E-5</b> —Enhance existing stormwater facilities that lack capacity or functionality and construct new local stormwater facilities where there is identified need.						
Existing/New	Flooding	1, 6, 7, 10	City	High	Stormwater Utility, Grants	Ongoing
<b>Initiative E-6</b> —Control land use in flood-prone areas (by zoning setbacks, greenways, and buffers)						
New	Flooding	1, 2, 3, 4, 5, 6, 7, 9, 10	City	Low	HMGP	Long Term
<b>Initiative E-7</b> —Acquisition of flood-prone structures and conversion of land to open space						
Existing/New	Flooding	1, 2, 3, 4, 5, 6, 7, 8, 10	City	High	Grants	Ongoing, depends on funding
<b>Initiative E-8</b> —Continue to maintain compliance and good standing under the National Flood Insurance Program.						
Existing/New	Flooding	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	City	low	General fund	Ongoing
<b>Initiative E-9</b> —Where appropriate, support retrofitting, purchase, or relocation of structures in hazard-prone areas to protect structures from future damage, with repetitive loss and severe repetitive loss properties as priority.						
Existing	All Hazards	1, 2, 8, 10	City	high	HMGP	Long Term
<b>Initiative E-10</b> —Conduct a seismic retrofit of the Ellensburg Public Safety Building that houses the Ellensburg Police Department and Kittitas Valley Fire And Rescue (Fire District) Headquarters.						
Existing	Earthquake	1, 2, 5, 6, 7, 8, 9, 10	City	medium	HMGP, General Funds, Bonds	Long Term

Applies to new or existing assets	Hazards Mitigated	Objectives Met	Lead Agency	Estimated Cost	Sources of Funding	Timeline
<b>Initiative E-11</b> —Collect improved data (hydrologic, geologic, topographic, etc.) to assess risks and vulnerabilities.						
Existing/New	All Hazards	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	City	medium	Grants, General fund	Ongoing
<b>Initiative E-12</b> —Consider adoption of appropriate regulatory standards, through updates as needed and/or required, affecting critical areas regulations, flood hazard regulations, shoreline regulations, and to the city’s growth management comprehensive plan.						
New	Flooding	1, 2, 3, 4, 5, 6, 7, 9, 10	City	medium	General fund	Ongoing
<b>Initiative E-13</b> —Inform and educate the public on hazard mitigation and preparedness via the city’s website.						
Existing	All Hazards	1, 2, 5, 6, 10	City	low	General fund	Ongoing
<b>Initiative E-14</b> —Replace inadequately sized culvert for Reecer Creek at University Way.						
Existing	Flooding	1, 2, 7, 8, 9, 10	City	high	Grants, Road Fund, CIP	Long Term
<b>Initiative E-15</b> —Relocate City-owned critical facilities out of identified high hazard risk zones						
Existing	All Hazards	1, 2, 5, 7, 8, 9, 10	City	Unknown	HMGP, Bond	Long Term
<b>Initiative E-16</b> —Install stream gauge stations with communication links for early flood warning on all local tributaries						
Existing/New	Flooding	1, 7, 9	City	\$160,000	Stormwater Utility, Grants, Kittitas County Flood District	Short-term
<b>Initiative E-17</b> —Consider participation in the Community Rating System						
New and existing	Flood	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	City	low	General fund	Short-term
<b>Initiative E-18</b> —Continue to support the implementation, monitoring, maintenance and updating of this plan.						
New and Existing	All Hazards	All	City Council, Community Development	Low	HMGP, General Fund, Road Fund	Short-term, ongoing
<b>Initiative E-19</b> —Continue to support through active participation the countywide initiatives identified in Volume 1 of the Kittitas County Hazard Mitigation Plan.						
New and Existing	All Hazards	5,6,9	All City Agencies	Low	General Fund	Short-term, Ongoing
<b>Initiative E-20</b> —Consider participation in the National Weather Service “Storm Ready” program.						
New and Existing	Flood, Severe Weather	6, 7, 9	Public Works	Low	General Fund	Short-term
<b>Initiative E-21</b> — Gateway Project: \$4 million dollar project to treat (infiltrate) 2 miles of stormwater on University Way. Funded by Ecology, slated for 2019-2021.						
New	Flooding	1, 6, 7, 10	City	High	Stormwater Utility, Grants	Funded

**Table 4-8. Mitigation Strategy Priority Schedule**

Initiative #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/Budgets?	Priority*
E-1	6	High	High	Y	Y	Y	High
E-2	6	High	High	Y	Y	N	High
E-3	8	High	High	Y	Y	N	High
E-4	4	High	High	Y	N	Y	High
E-5	4	High	High	Y	Y	Y	High
E-6	9	High	Medium	Y	Y	N	High
E-7	9	High	High	Y	Y	Y	High
E-8	10	High	Low	Y	N	Y	High
E-9	4	Medium	High	N	Y	N	Low
E-10	8	Medium	High	N	Y	N	High
E-11	10	High	High	Y	Y	N	High
E-12	9	Medium	Medium	Y	N	N	Medium
E-13	5	Medium	Low	Y	N	Y	Medium
E-14	6	High	High	Y	Y	N	High
E-15	7	Medium	High	N	Y	N	Medium
E-16	3	High	Low	Y	Y	Y	High
E-17	10	Medium	Low	Y	N	Y	Medium
E-18	10	High	Low	Y	Y	Y	High
E-19	3	Medium	Low	Y	N	Y	High
E-20	3	High	Low	Y	Y	Y	High
E-21	4	High	High	Y	Y	Y	High

\* See Section 1.3 for definitions of high, medium and low priorities.

**Table 4-9. Analysis of Mitigation Initiatives: Initiative Addressing Hazard, by Mitigation Type**

Hazard Type	1. Prevention	2. Property Protection	3. Public Education and Awareness	4. Natural Resource Protection	5. Emergency Services	6. Structural Projects
Avalanche	18		18, 19		19	
Dam Failure	18	6, 9, 11, 12, 13, 15	13, 18, 19		19	9, 15
Drought	18		18, 19		19	
Earthquake	18	9, 10, 11, 15	13, 18		10, 19	9, 10, 15
Flood	1, 2, 3, 4, 5, 16, 17, 18	1, 2, 3, 4, 5, 6, 7, 9, 11, 12, 13, 14, 15, 16, 17	6, 8, 12, 13, 16, 17, 18, 19	3, 11, 12, 17	17, 19, 20	1, 2, 3, 4, 5, 9, 14, 15, 16, 17, 21
Landslide	18		18, 19		19	
Severe Weather	18	1, 2	13, 18, 19	1, 2	19, 20	1, 2
Seiche	18		18, 19		19	
Volcano	18		13, 18, 19		19	
Wildfire	18		18, 19		19	

1. Prevention: Government, administrative or regulatory actions that influence the way land and buildings are developed to reduce hazard losses. Includes planning and zoning, floodplain laws, capital improvement programs, open space preservation, and stormwater management regulations.
2. Property Protection: Modification of buildings or structures to protect them from a hazard or removal of structures from a hazard area. Includes acquisition, elevation, relocation, structural retrofit, storm shutters, and shatter-resistant glass.
3. Public Education and Awareness: Actions to inform citizens and elected officials about hazards and ways to mitigate them. Includes outreach projects, real estate disclosure, hazard information centers, and school-age and adult education.
4. Natural Resource Protection: Actions that minimize hazard loss and preserve or restore the functions of natural systems. Includes sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.
5. Emergency Services: Actions that protect people and property during and immediately after a hazard event. Includes warning systems, emergency response services, and the protection of essential facilities.
6. Structural Projects: Actions that involve the construction of structures to reduce the impact of a hazard. Includes dams, setback levees, floodwalls, retaining walls, and safe rooms.

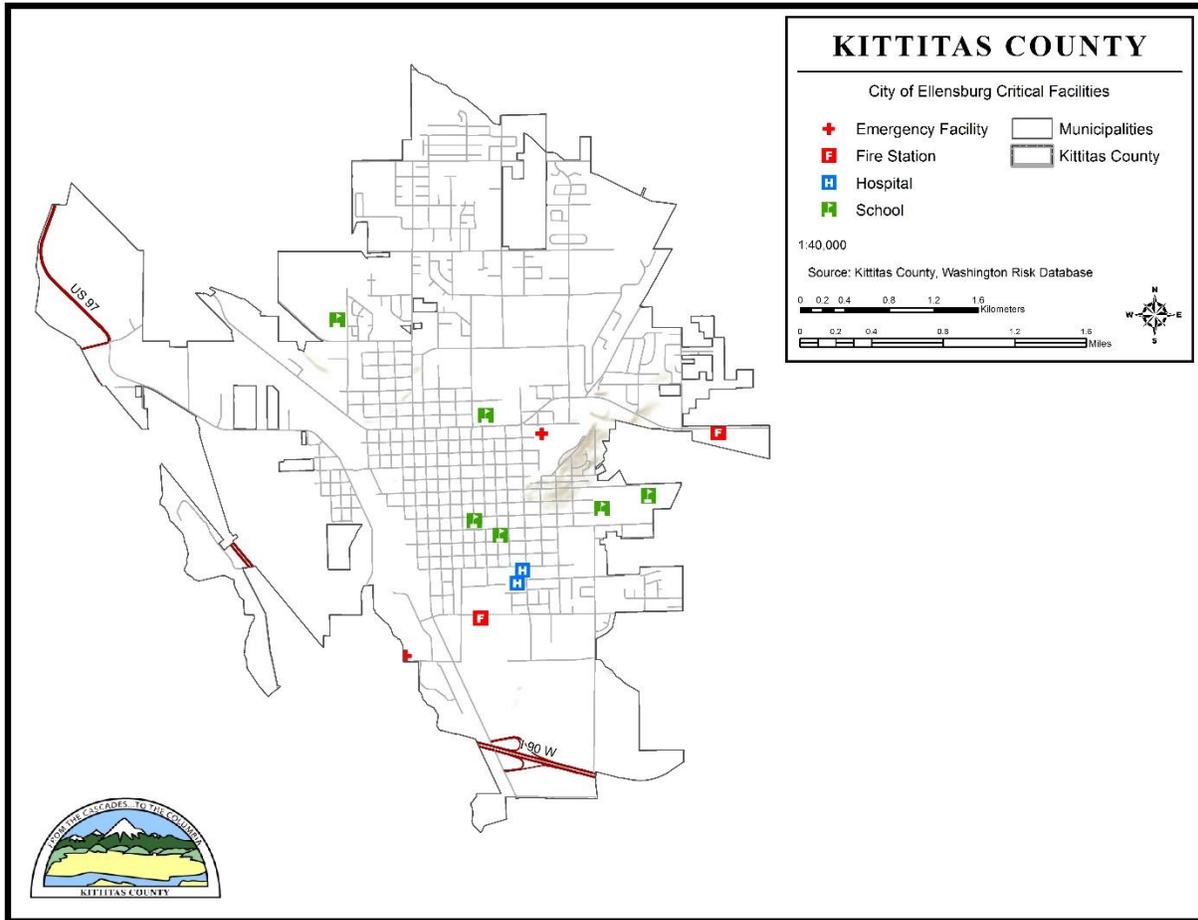


Figure 4-1. Ellensburg Critical Facilities

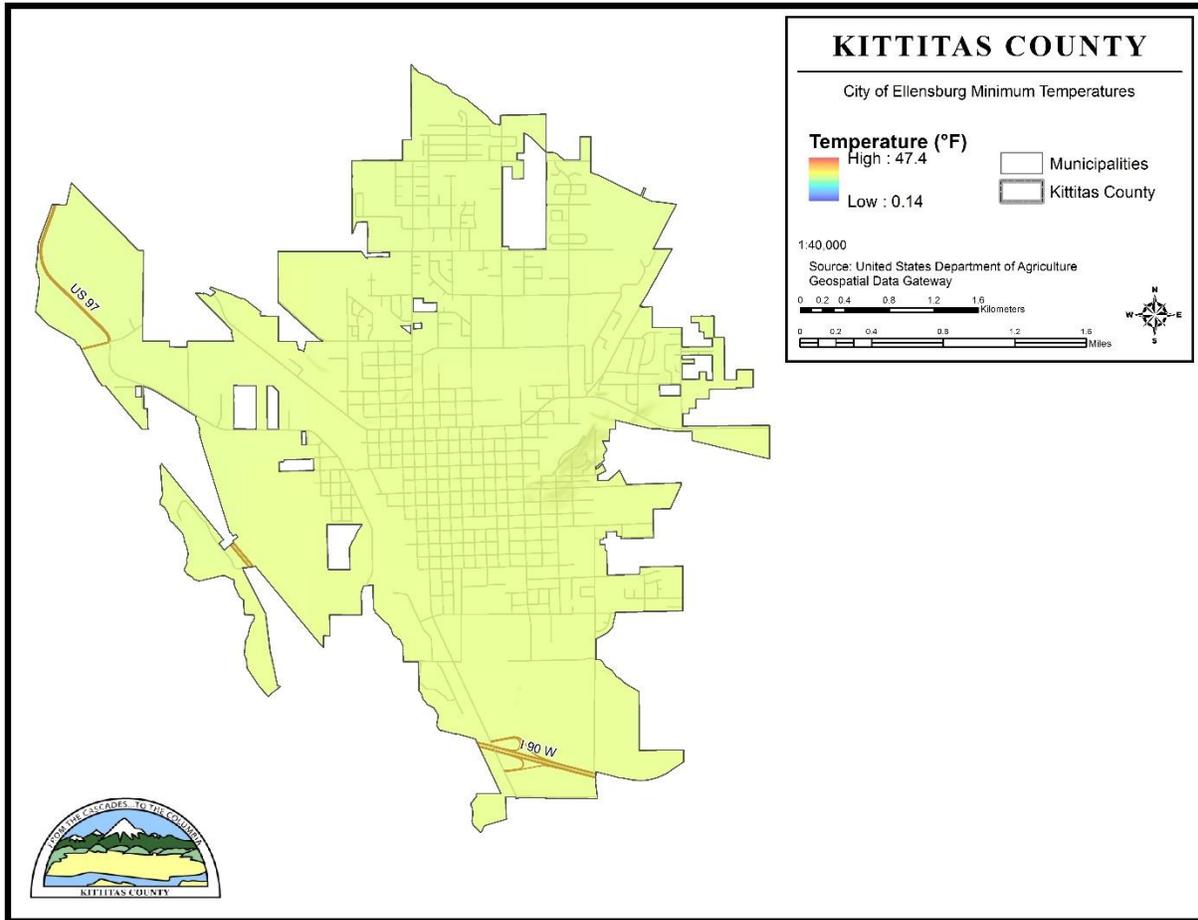


Figure 4-2. Ellensburg Minimum Temperatures

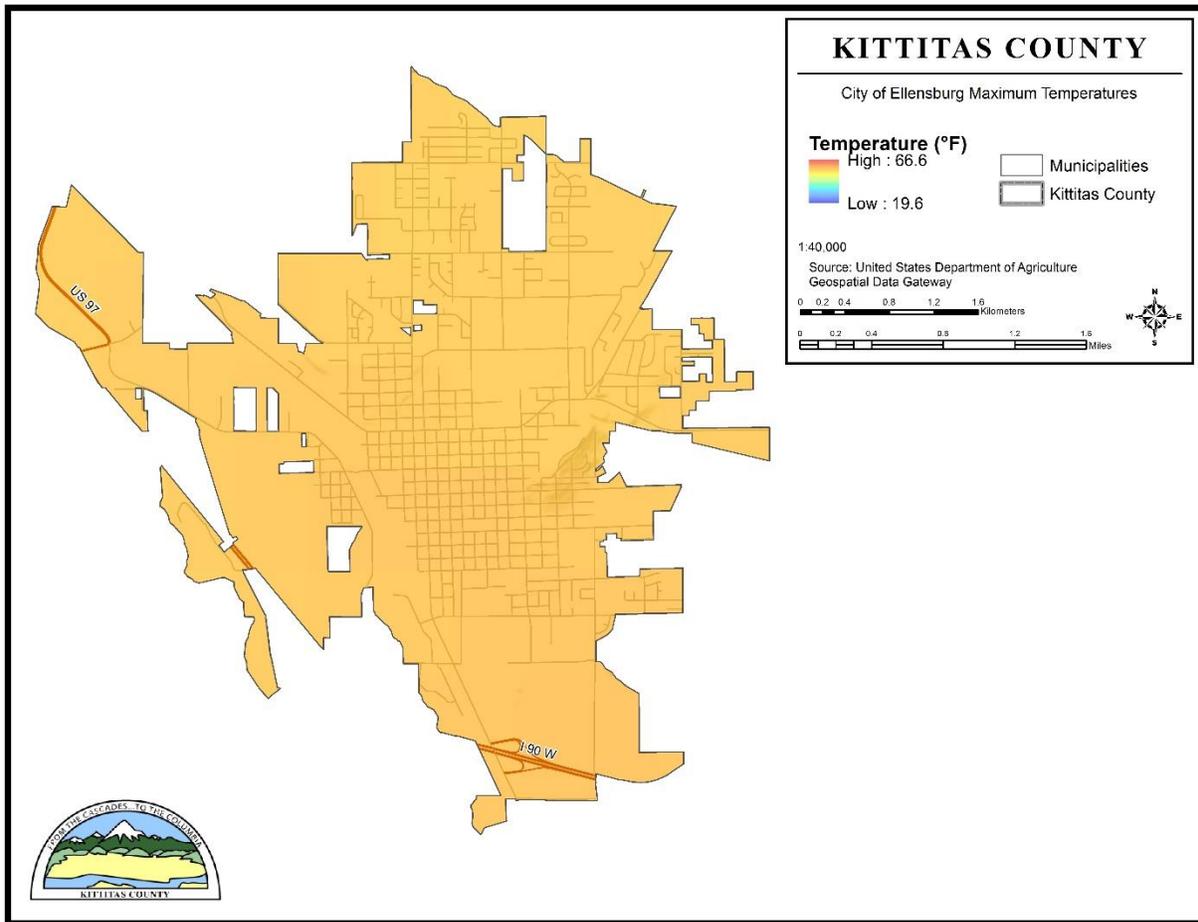


Figure 4-3. Ellensburg Maximum Temperatures

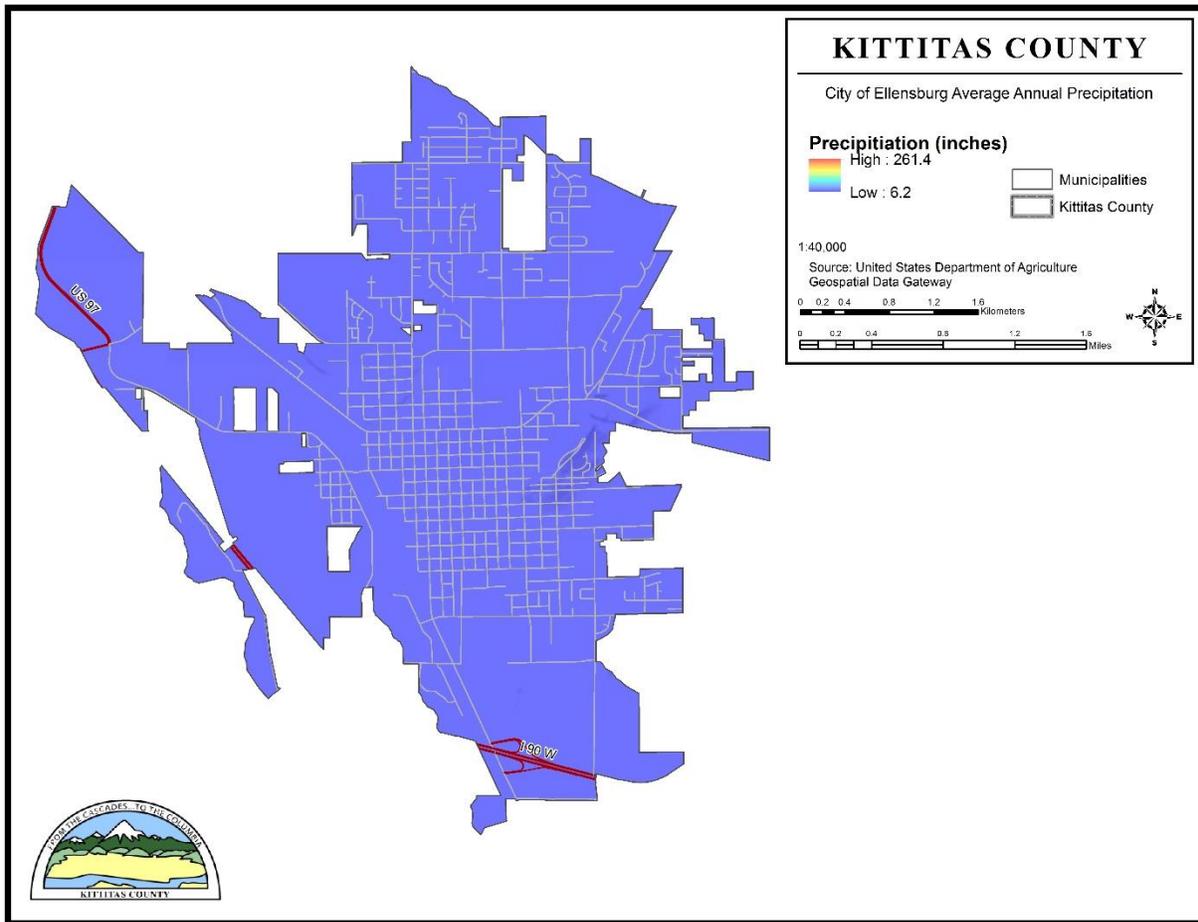


Figure 4-4. Ellensburg Average Annual Precipitation

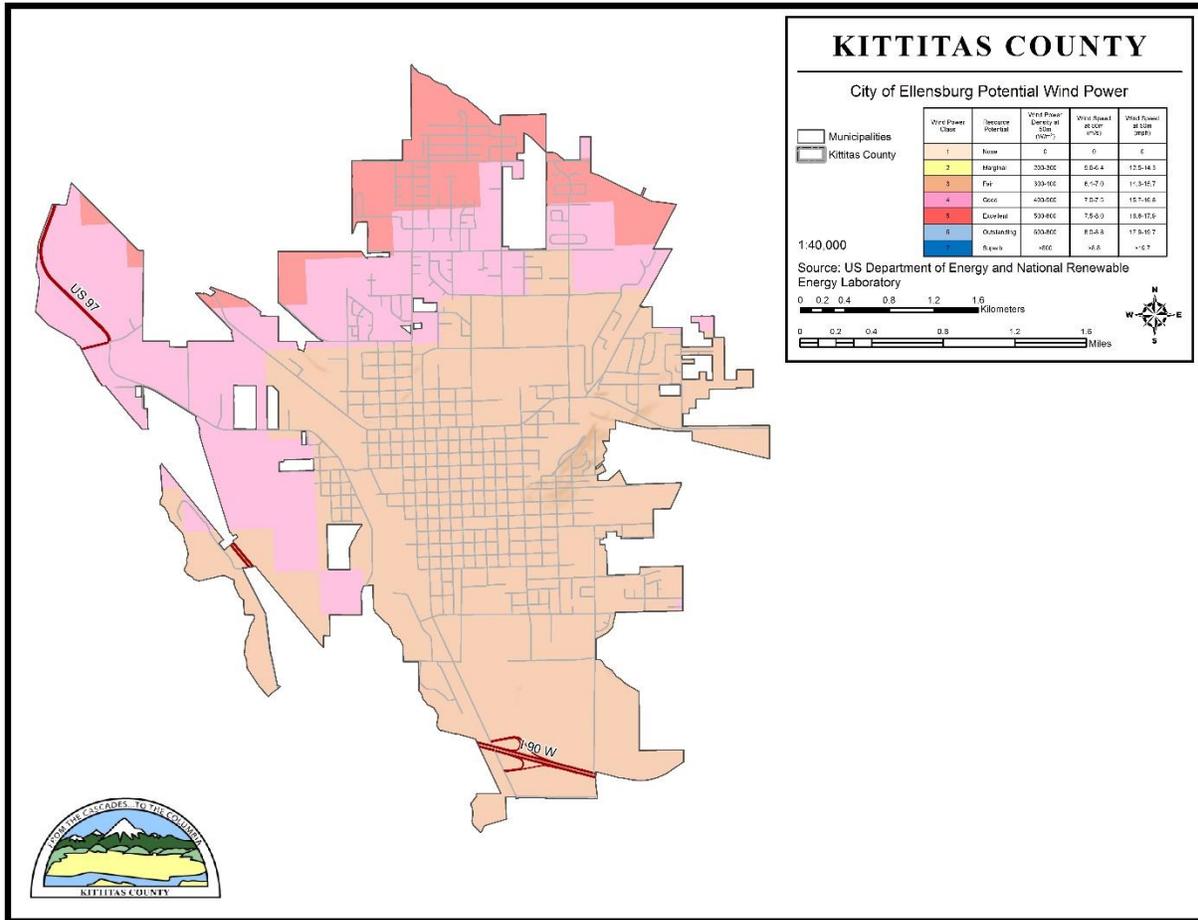


Figure 4-5. Ellensburg Potential Wind Power

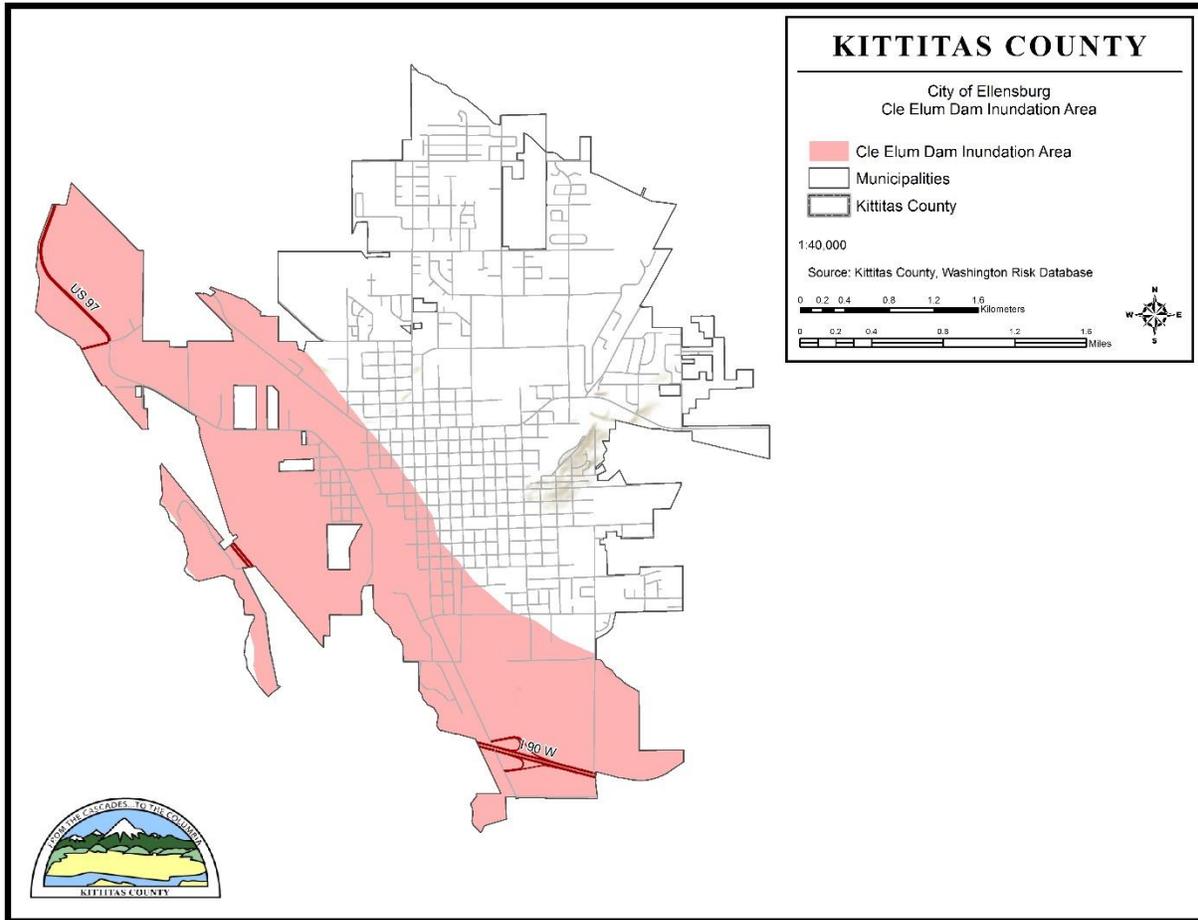


Figure 4-6. Cle Elum Dam Inundation Area for the City of Ellensburg

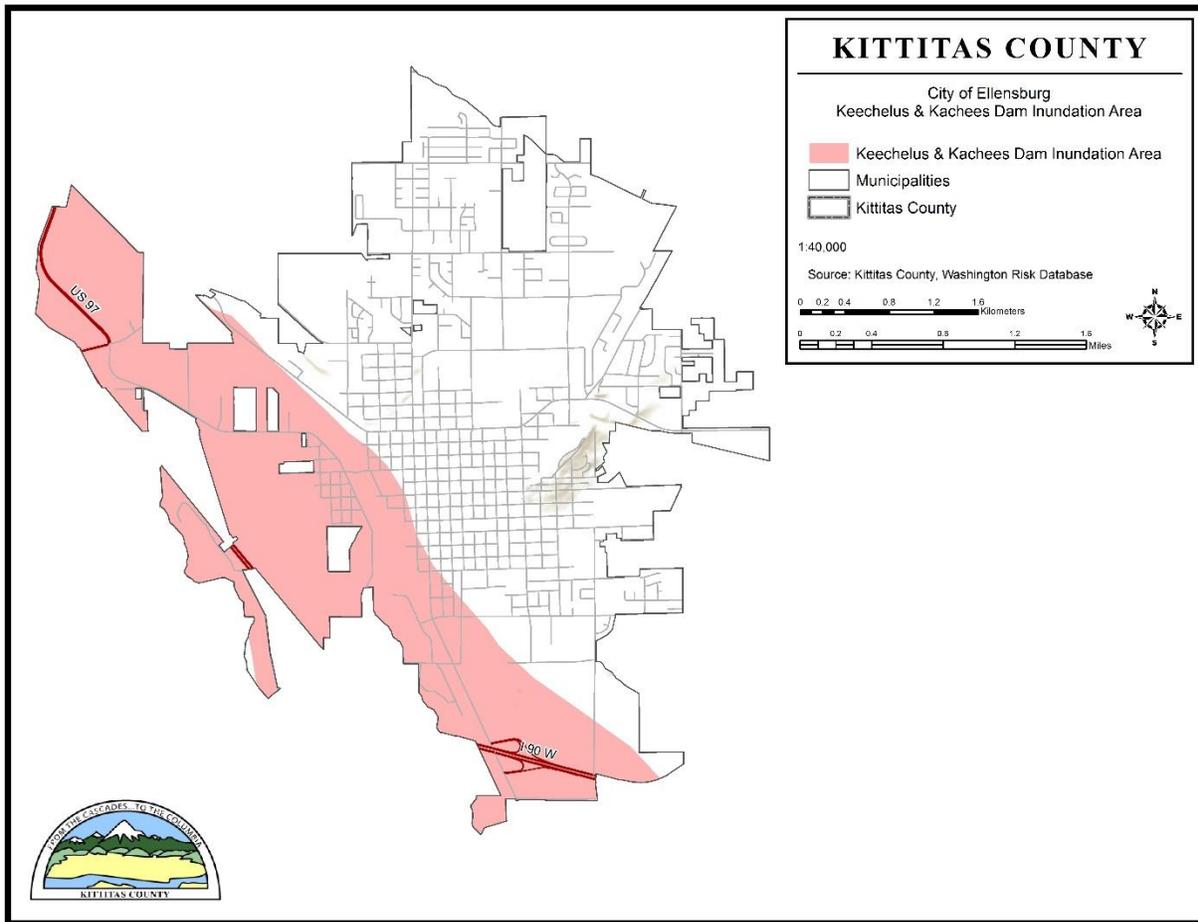


Figure 4-7. Keechelus & Kachees Dam Inundation Area for the City of Ellensburg

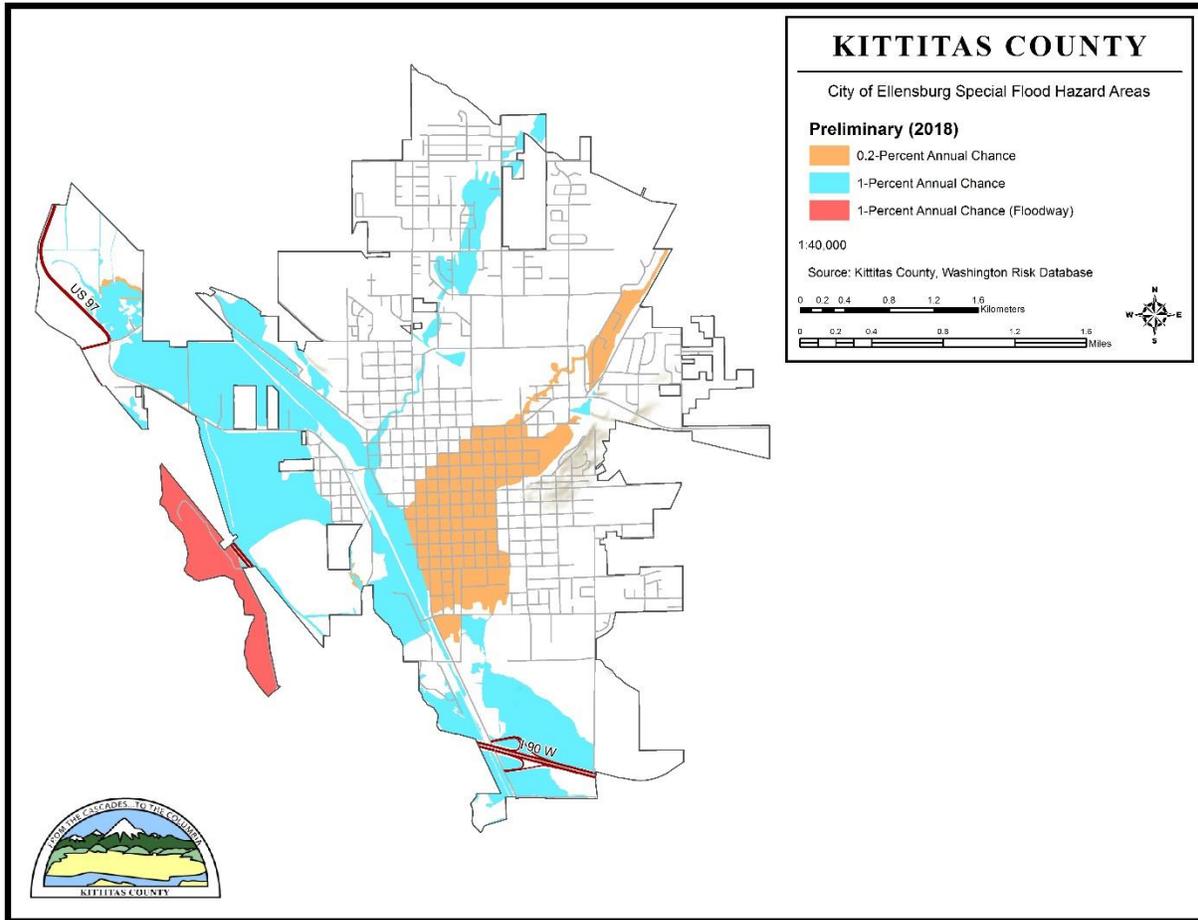


Figure 4-8. Ellensburg Special Flood Hazard Areas

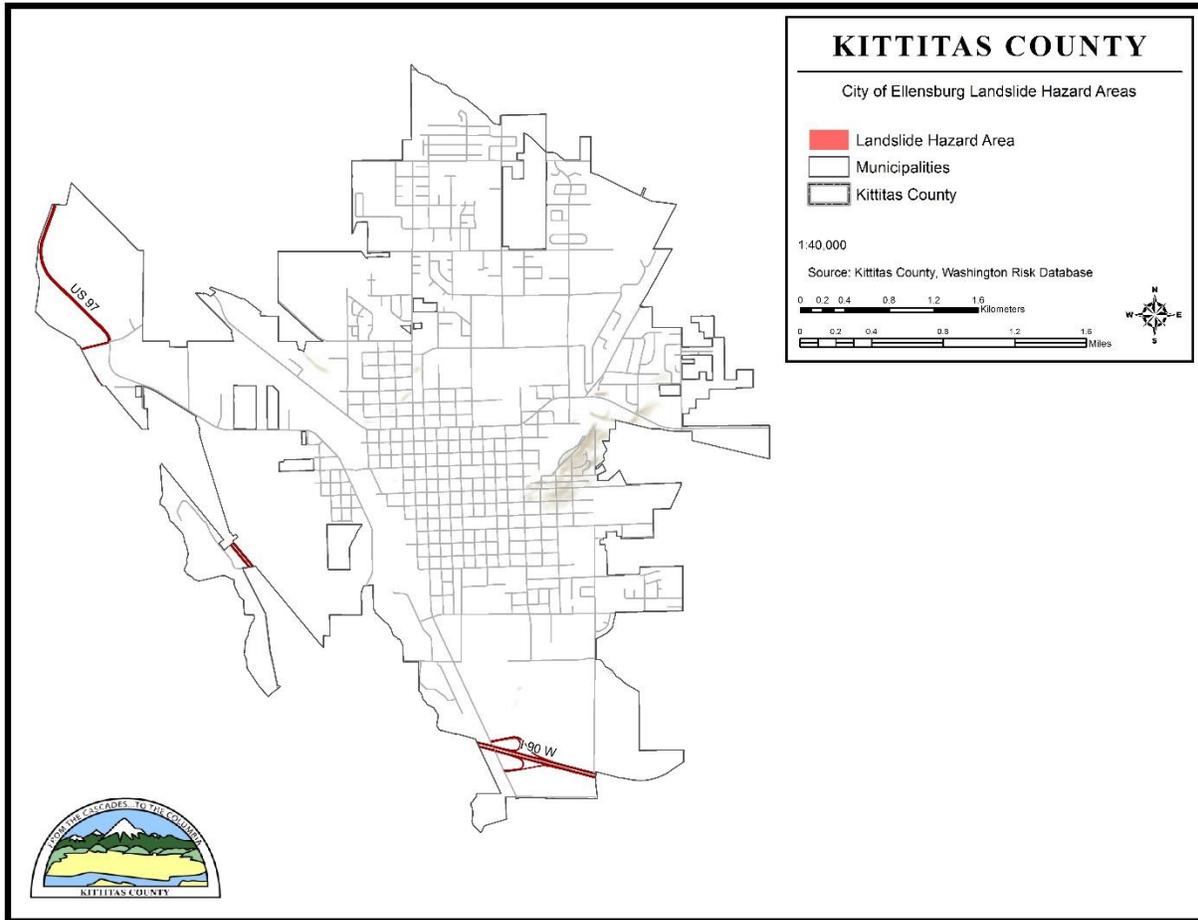


Figure 4-9. Ellensburg Landslide Hazard Areas

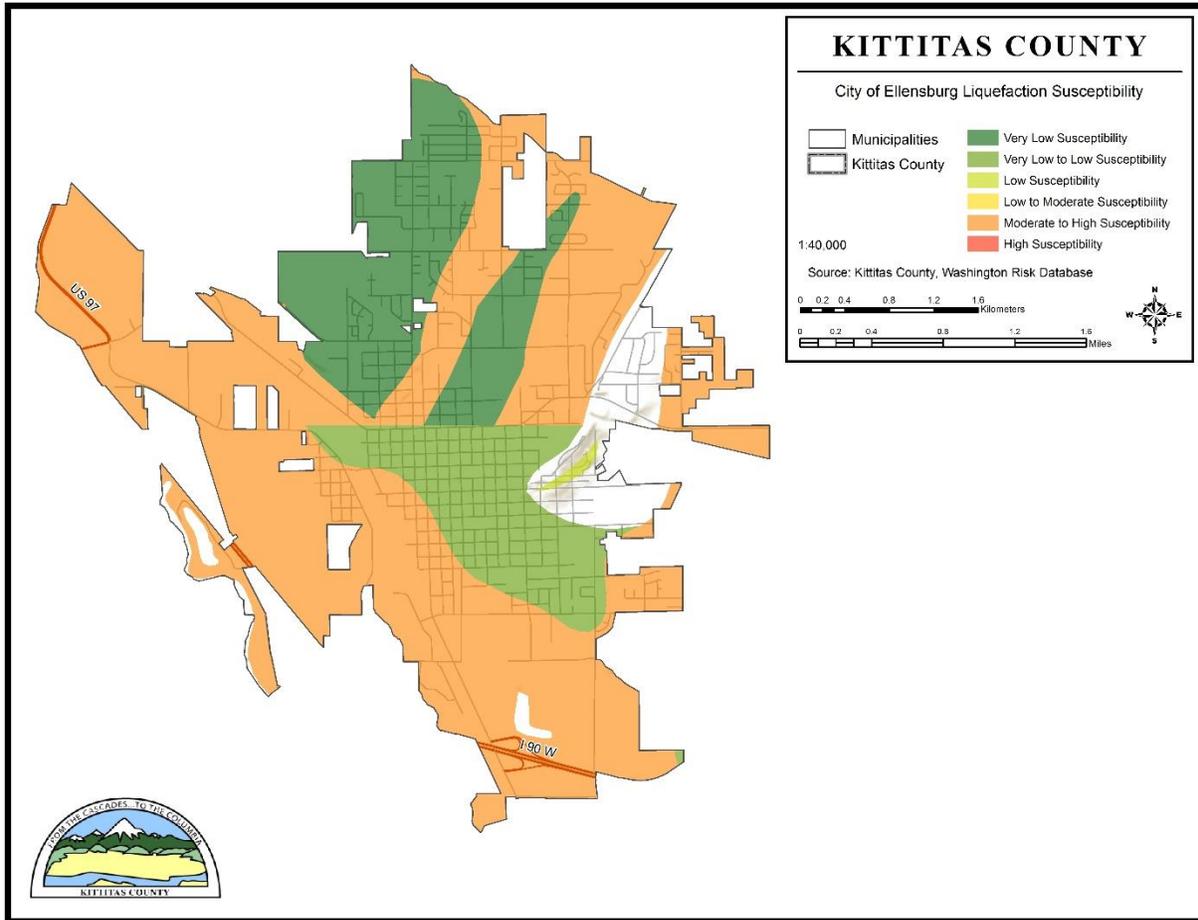


Figure 4-10. Ellensburg Liquefaction Susceptibility

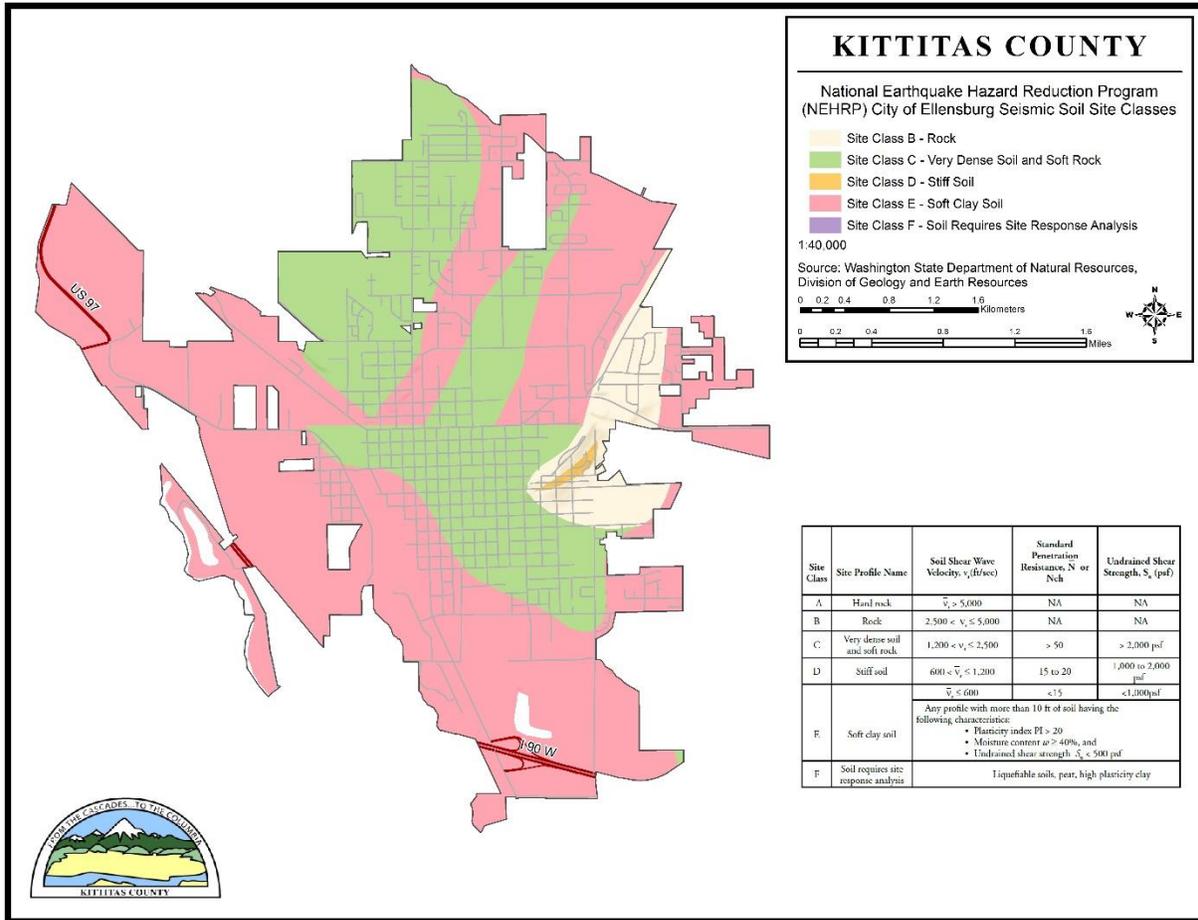


Figure 4-11. NEHRP Seismic Soil Classes for the City of Ellensburg

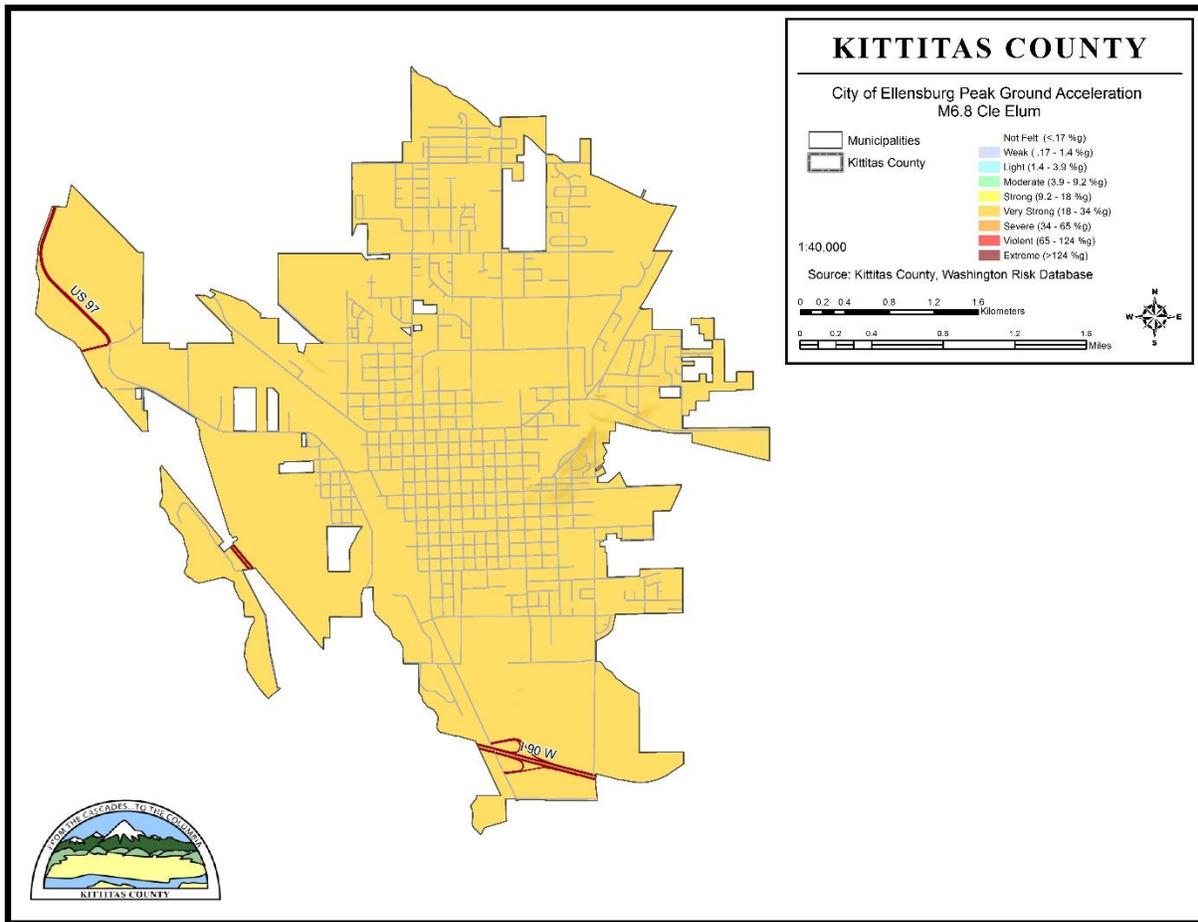
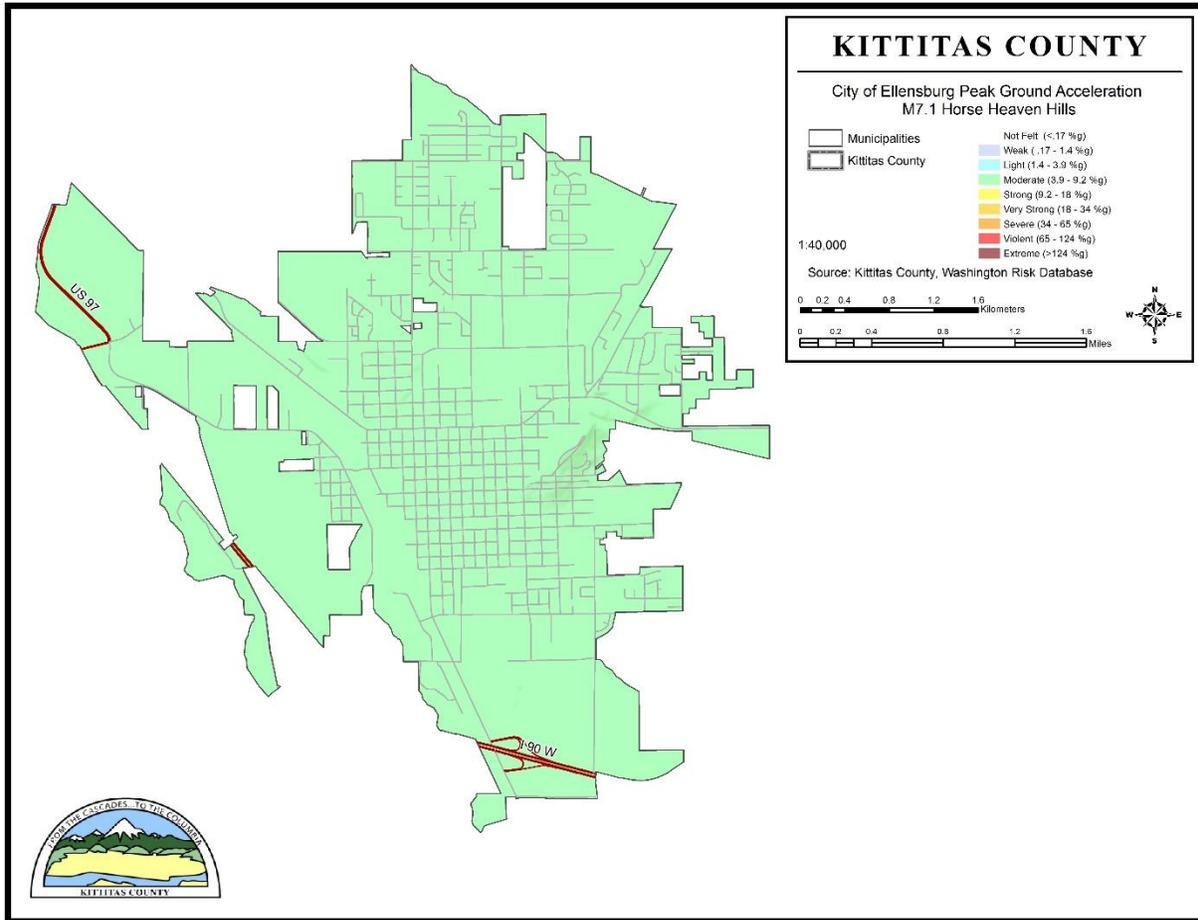


Figure 4-12. Cle Elum Earthquake Scenario Peak Ground Acceleration for the City of Ellensburg



**Figure 4-13. Horse Heaven Hills Earthquake Scenario Peak Ground Acceleration for the City of Ellensburg**

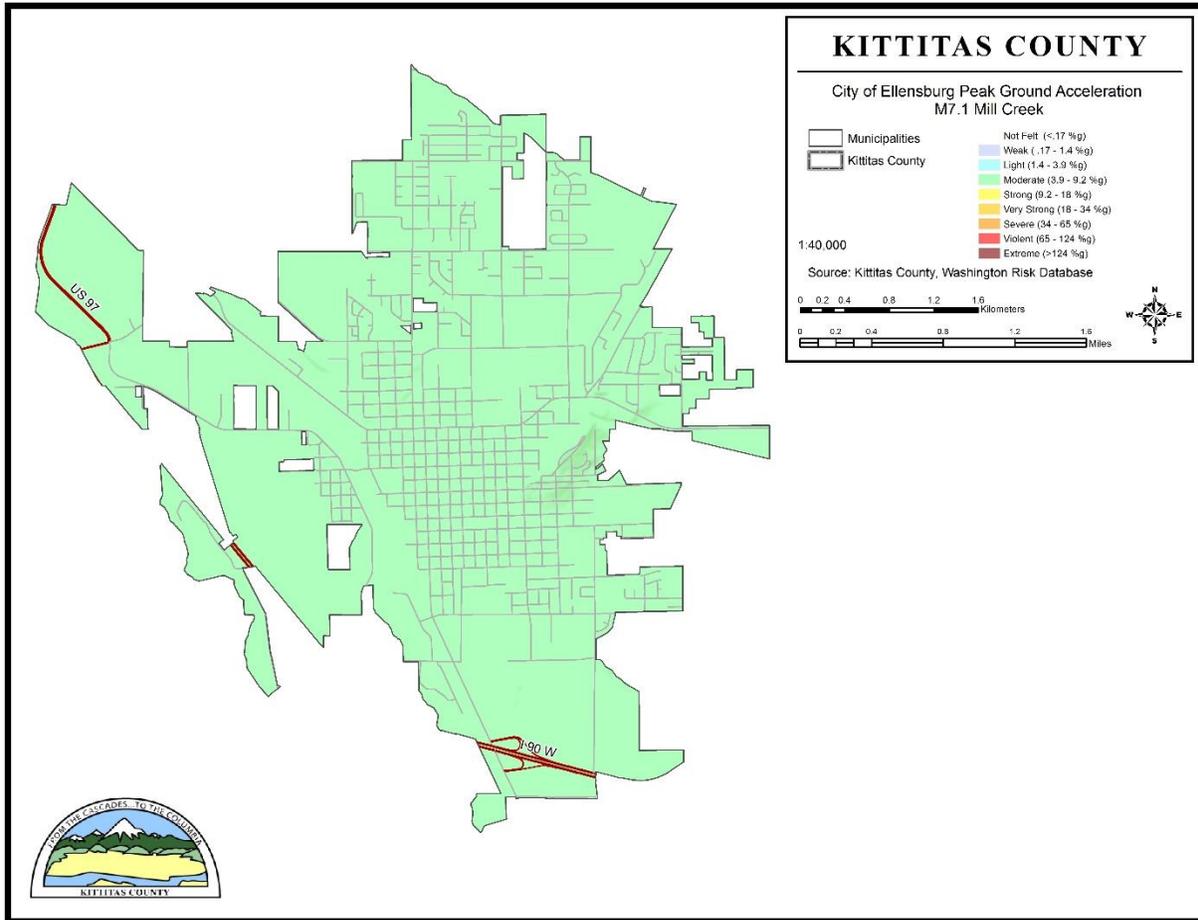


Figure 4-14. Mill Creek Earthquake Scenario Peak Ground Acceleration for the City of Ellensburg

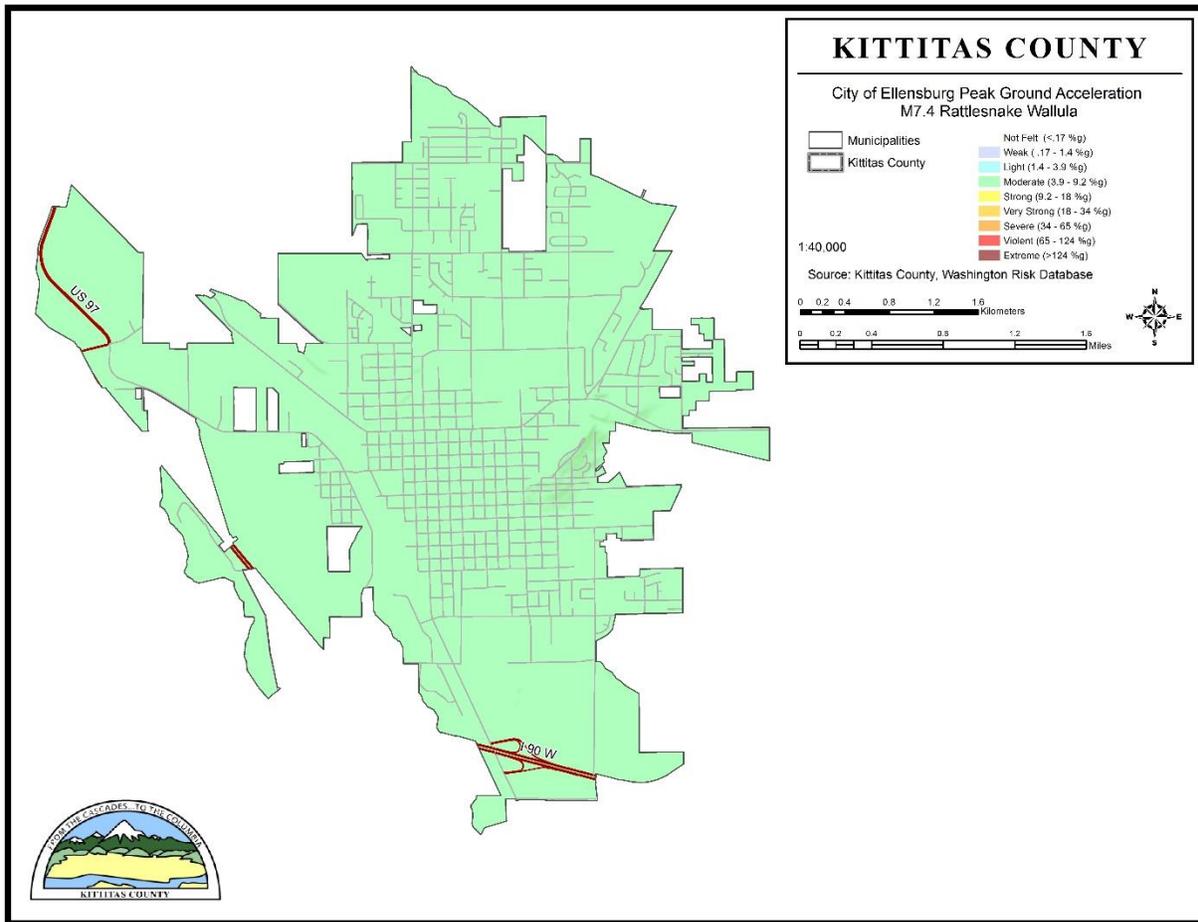


Figure 4-15. Rattlesnake Wallula Earthquake Scenario Peak Ground Acceleration for the City of Ellensburg

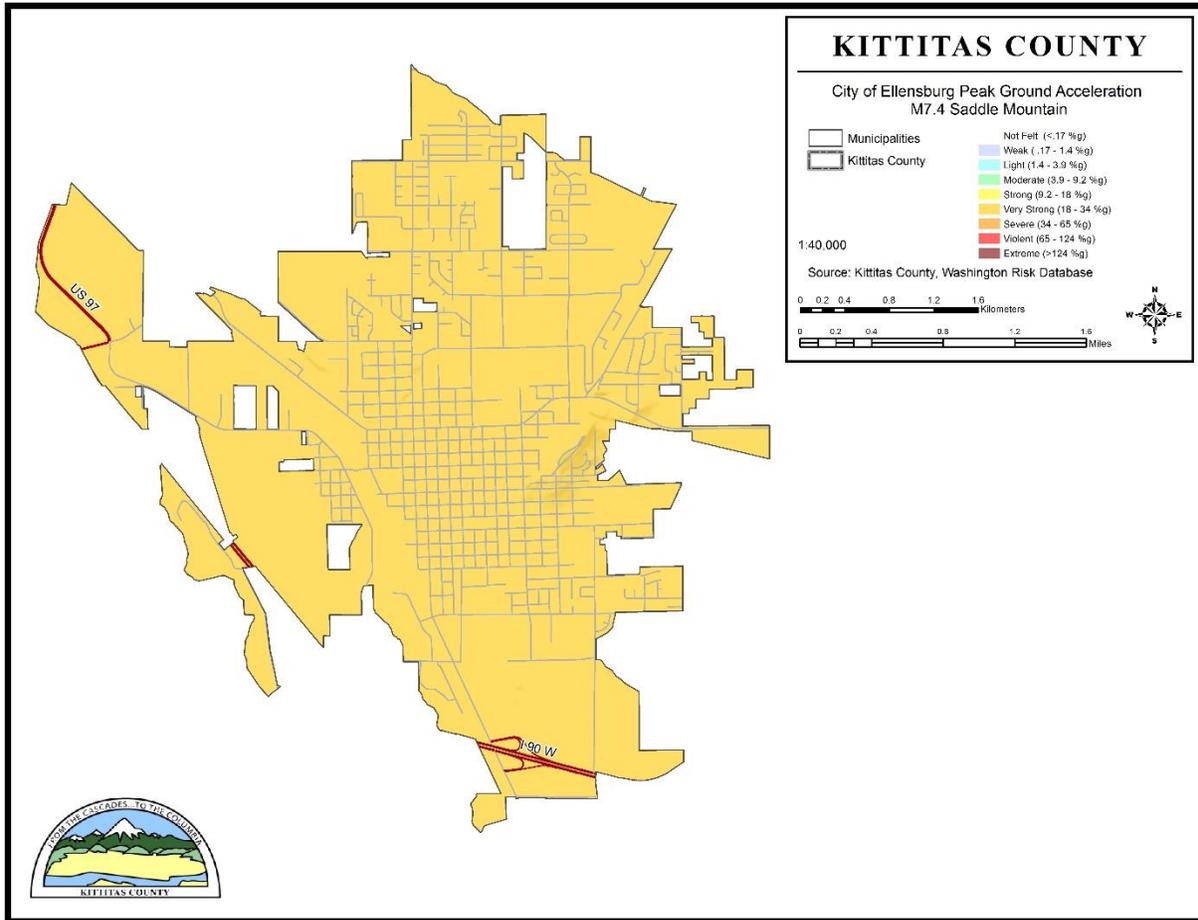


Figure 4-16. Saddle Mountain Earthquake Scenario Peak Ground Acceleration for the City of Ellensburg

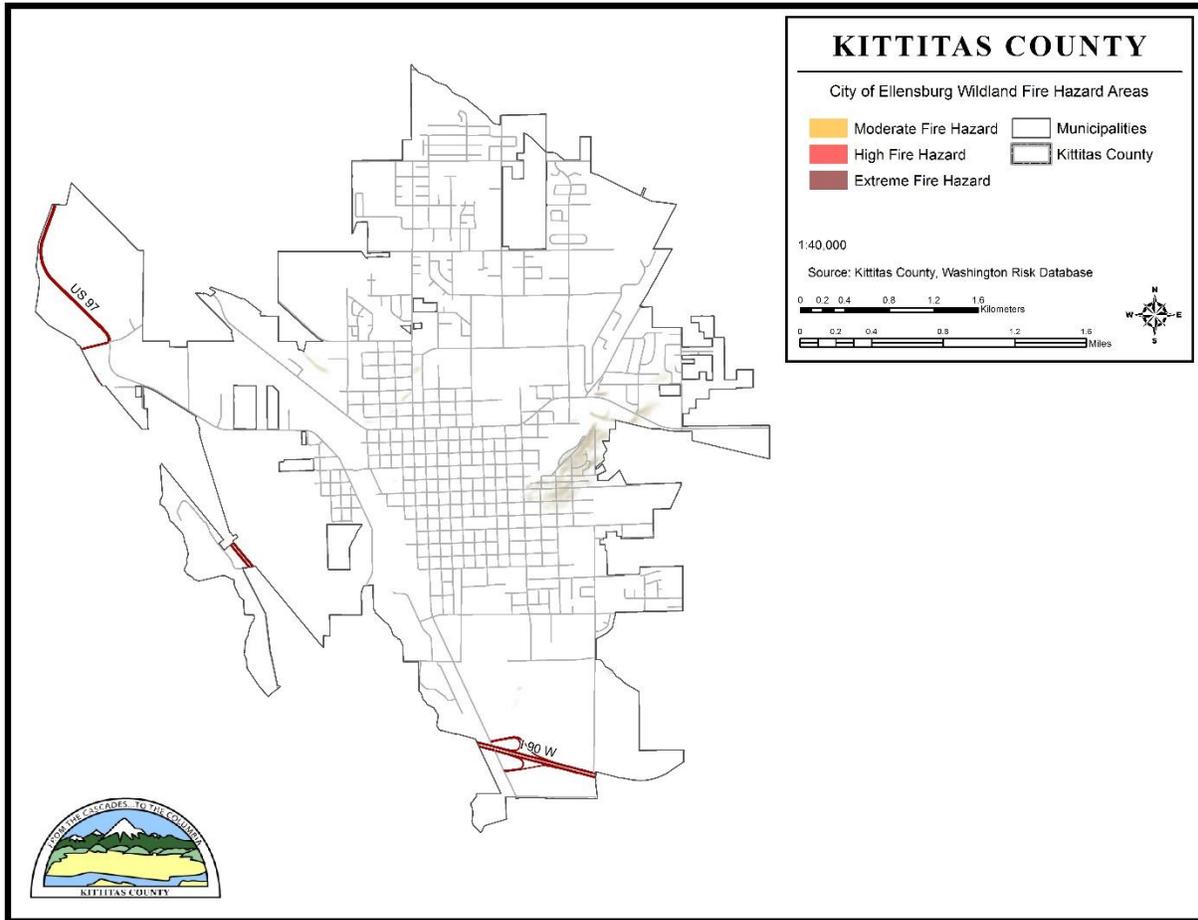


Figure 4-17. Ellensburg Wildland Fire Hazard Areas

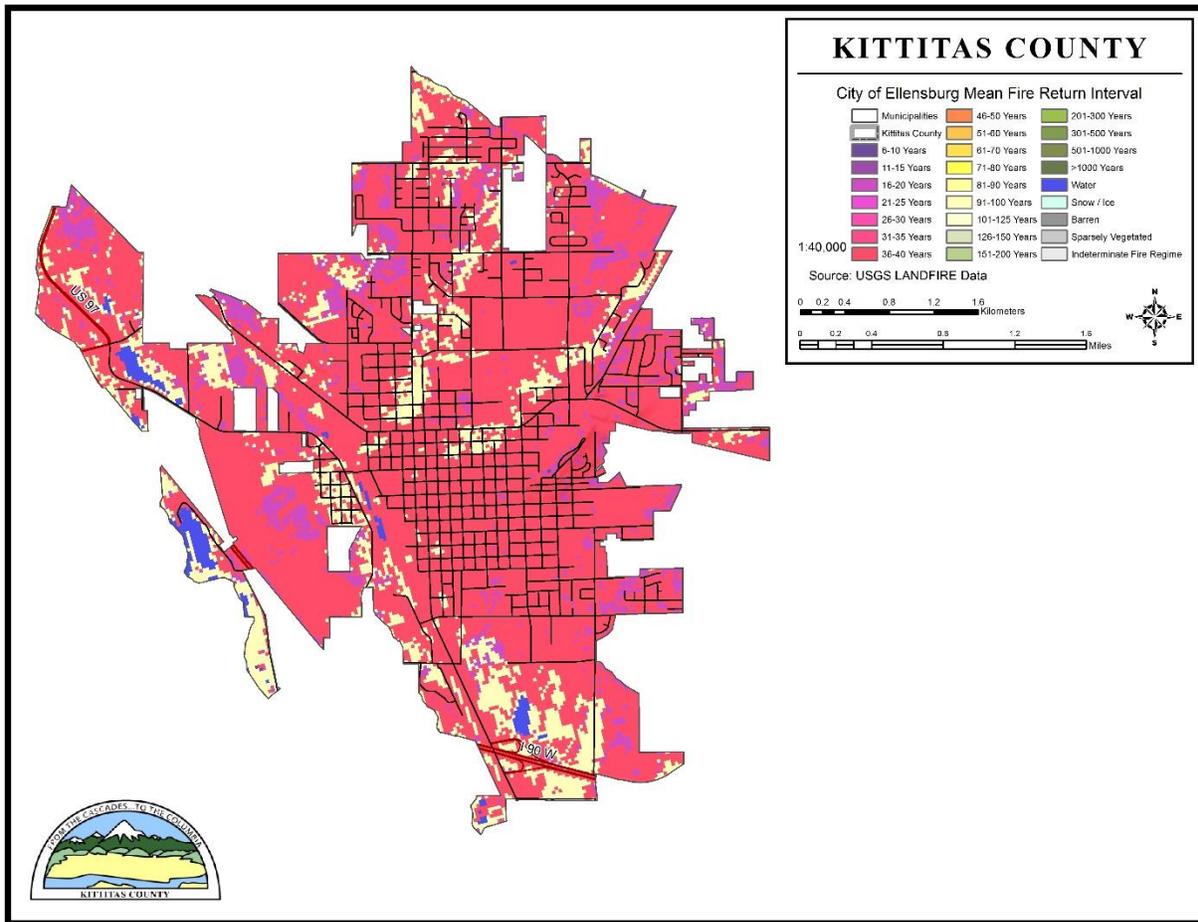


Figure 4-18. Ellensburg Mean Fire Return Interval