

**City of Yelm Annex to the
Hazards Mitigation Plan for
the Thurston Region**

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Thurston Regional Planning Council

2016 Statistical Profile: City of Yelm			City info: (360) 458-3244 www.ci.yelm.wa.us	
Demographics	Population, 2000	3,289	<p>The word "Yelm" comes from "shelm", the Coastal Salish word which means "shimmering heat waves from the sun." Inhabited originally by members of the Nisqually Indian Tribe, the first permanent American settlers came in 1853 to join sheep farmers from the Hudson's Bay Company who were already in the area.</p> <p>With the coming of the Northern Pacific Railroad in 1873, Yelm began to prosper having found an outlet for its agricultural and forestry products.</p> <p>Its economic base was further enhanced when an irrigation company formed in 1916, making Yelm a center for production of beans, cucumbers, and berries.</p> 	
	Population, 2010	6,848		
	Population, 2016	8,480		
	Avg. Ann. Pop. Growth, 2000-2010	7.6%		
	Avg. Ann. Pop. Growth, 2010-2016	4.4%		
	Households, 2010	2,299		
	Average Household Size, 2010	2.95		
	Age Structure, 2010:			
	17 and under	2,467 36%		
	18 - 64	3,862 56%		
Housing	65 and over	519 8%		
	Median Age	29 --		
	Race and Ethnic Categories, 2010:			
	White	5,585 82%		
	Black/African American	225 3%		
	American Indian & Alaska Native	125 2%		
	Asian	159 2%		
	Native Hawaiian & Other Pacific Islander	65 1%		
	Other Race	191 3%		
	Two or More Races	498 7%		
Employment and Income	Hispanic or Latino (Of Any Race), 2010:	642 9%		
	Housing Units, 2016 Estimate:			
	Single-Family	2,350 77%		
	Multifamily	600 20%		
	Manufactured Homes	120 4%		
	Average House Sale Price, 2014	\$190,588		
	Median Household Income ¹ :		Taxable Retail Sales, 2015: \$193,696,165	
	1999 (Census 2000)	\$39,453	Total Jobs, 2014 Estimate ² : 3,835	
	2010-2014 (ACS Estimate)	\$49,658		
Development Activity	Households by Income Category, 2010-2014 ¹ :		Manufacturing 185	
	Less than \$24,999	613 25%	Construction and Utilities 150	
	\$25,000 to \$49,999	650 26%	Transportation and Warehousing 1,290	
	\$50,000 to \$74,999	507 20%	Retail 35	
	\$75,000 to \$99,999	372 15%	Services 1,170	
	\$100,000 or more	358 14%	Finance, Insurance, Real Estate 320	
	Residential Building Permits		Government 680	
	Avg. Ann. New Unit Permits 2000-'10	130	Subdivision Activity, 2015: # Appl. # Lots	
	Avg. Ann. New Unit Permits 2011-'14	111		
	Total New Unit Permits 2015	78		

Explanation: ¹Estimates based on survey data and may have a large margin of error.²Numbers may not add due to rounding.Source: TRPC, [Profile 2016](http://www.trpc.org) (www.trpc.org).

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City of Yelm Plan Development Process

Hazard Mitigation Plan Development Team

The City of Yelm Emergency Management Coordinator, Todd Stancil attended the Regional Natural Hazards Workgroup meetings on behalf of the City of Yelm and coordinated planning efforts with city staff and the City Council.

The City of Yelm Emergency Management Council (EMC) assisted in the preparation of the city's hazards mitigation plan. The EMC is made up of members from other city departments. Most members are lead workers or above, up to and including department directors.

The following staff served as the City of Yelm's hazards mitigation planning development team:

Representative	Title
Todd Stancil	Chief of Police/Emergency Management Director
Chad Bedlington	Public Works Director
Ryan Johnstone	Public Works Director
Grant Beck	Community Development Director
Gary Carlson	Building Official
Tami Merriman	Associate Planner

Hazards Mitigation Plan Development

The following activities supported the development of the City of Yelm's local hazard mitigation planning process:

Date	Location	Meeting	Action
May 30, 2013	TCEM	Executive Seminar	Disaster and Recovery
March 27, 2014	TCEM	Executive Seminar	Earthquake/Christchurch
October 20, 2014	TCEM	Executive Seminar	Hazard Mitigation Intro
March 15, 2015	TCEM	Executive Seminar	Mount Rainier Hazards
June 2015	TCEM	Management Council	Hazard Mitigation Workgroup
June 2015	Yelm P.S.B.	Building Official/PW Director	Plan Development
September 2015	Yelm High School	Public Outreach	Preparedness Expo
January 2016	Yelm P.S.B.	PW Director	Plan Development
June 2016	Yelm P.S.B.	Council Study Session	Plan Development
September 2016	Rochester M.S.	Public Outreach	Preparedness Expo
September 2016	Yelm P.S.B.	Yelm E.M. Board	Plan Finalization
December 2016	TCEM	Management Council	Hazard Mitigation group
February 2017	Social Media	Public Outreach	Plan shared on Social Media
July 2017	Yelm P.S.B.	Community Development	Plan Finalization
July 2017	Social Media	Public Outreach	Public Comment accepted
December 2017	Community Dev.	Public Outreach	Establish Path Forward

Opportunities for Public Participation

Citizens of Yelm have been encouraged to participate in the mitigation planning process on a number of occasions. In particular, the annual Emergency Preparedness Expo which among other things engages community members on hazard threats in the region, mitigation initiatives, and public feedback. In recent years the preparedness expos have been held in Tumwater, Yelm, and Rochester. The 2017 Emergency Preparedness expo was held in Olympia on Saturday, September 30, 2017

The first opportunity specific to Yelm residents for public participation occurred on June 29, 2016 at an open public Council Study Session. At this open public meeting Chief Todd Stancil briefed the council on the preliminary plan for the City of Yelm and the overall Hazards Mitigation Planning Process. This meeting and agenda are advertised and published to the public one week prior. At this meeting there were no residents that attended.

The second opportunity for public comment came on March 22, 2017 through the use of our City of Yelm Facebook page. This posting was visited and seen by more than 3,000 followers of the page. Through this process we received one comment regarding the plan.

Additional public meetings before the council in addition to public venues to encourage public participation opportunities are scheduled for winter/spring 2018.

Future Public Participation

Presentations will be made to Yelm City Council. The draft plan will be advertised through the City's various social media accounts and made available for public comment. An Open House will be held to encourage residents to review the plan and ask questions. In addition, as mitigation initiatives move forward, the public will have the opportunity to provide feedback on specific projects and project deliverables. Emphasis will be placed on gaining participation from property owners, residents, tenants, neighborhood associations, etc. who will experience the greatest potential impacts from a given project.

Integration in Plans, Policies, and Planning Mechanisms

The Hazards Mitigation Plan is closely integrated with the City's Comprehensive Plan and Emergency Disaster Plan. The Comprehensive Plan describes the City's long term visions and goals and outlines the city's policies for Land Use, Housing, Capital Facilities, Utilities, Transportation, Economic Development, and Parks and Recreation. The Capital Facilities Plan, a component of the Comprehensive Plan, is the mechanism by which the City schedules the timing, location, projected cost, and revenue sources for the capital improvements identified for implantation. These capital improvements will reflect mitigation initiatives identified in the Hazards Mitigation Plan. The 6-year finance plan for capital projects is amended annually, and is open to public comment. Integration of specific goals and policies from the Hazards Mitigation Plan for the Thurston Region to the Yelm Comprehensive Plan, and including specific mitigation measures to the Capital Facilities Plan will be forthcoming.

Community Growth and Development

Each of the aforementioned plans and the City's Municipal Codes are revised and amended as the City develops. The City's Critical Areas Code address flood plain management, and

geologically hazardous areas, the Unified Development Code address seismic resiliency by establishing design and inspection standards. Since the City of Yelm last adopted the Hazards Mitigation Plan for the Thurston Region in 2009, the City's population has reached over 8,665, an increase of over 1,800 people. Approximately 600 single family homes, and over 275 apartment units were constructed between 2010 and 2016.

Chapter 3.0 of the Hazards Mitigation Plan for the Thurston Region provides detailed information on population, housing, demographics, employment, income, and land use characteristics. In addition, the hazards profiles in Chapter 4.1 through 4.6 provides hazards exposure or vulnerability data for area, population, housing, employment, and essential facilities data.

Updates

City Council will be briefed as progress is made on mitigation initiatives. As initiatives are completed, City Council will be closely involved in the review, revision, and execution of the remaining initiatives. The agendas and notices for these meetings are posted on the City's website. These meetings are open to the public and allow for additional public comment on the Hazards Mitigation Plan. The City will also work with Thurston County and Thurston Regional Planning Council on subsequent updates to the plan.

Mitigation Initiative Prioritization Process

The City of Yelm Hazards Mitigation Workgroup consisted of Todd Stancil, Yelm Police Chief and Emergency Management Director; Ryan Johnstone, Public Works Director; Gary Carlson, Building Official/Code Enforcement Officer; Grant Beck, Community Development Director; Tami Merriman, Associate Planner and Chad Bedlington, Public Works Director. During the plan development, Ryan Johnstone and Gary Carlson both ended employment with the City of Yelm. Their individual contribution was already complete prior to their departure. The group reviewed the existing mitigation initiatives and agreed to eliminate one of them based on a professional report. In addition, the group agreed to add two additional initiatives that were discussed based on their impact to the community of Yelm. The final ranking of the initiatives was sorted through an iterative, consensus-based process.

- **Life Safety.** How effective will the action protect lives and prevent injuries?
- **Property Protection.** How significant will the action be at eliminating or reducing damage to structures and infrastructure?
- **Technical.** Is the mitigation action technically feasible? Is it a long-term solution? Eliminate actions that, from a technical standpoint, will not meet the goals.
- **Political.** Does the public support the mitigation action? Is there political support?
- **Legal.** Does the community have the authority to implement the action?
- **Environmental.** What are the potential environmental impacts of the action? Will it comply with environmental regulations?
- **Social.** Will the proposed action adversely affect one segment of the population? Will the action disrupt established neighborhoods, break up voting districts, or cause the relocation of lower income people?
- **Administrative.** Does the community have the personnel and administrative capabilities

to implement the action and maintain it or will outside help be necessary?

- **Other community objectives.** Does the action advance the other community objectives, such as capital improvements, economic development, environmental quality, or open space preservation?

Y-EH-3 (Seismically retrofit downtown water tower) was removed from the initiatives based on an inspection report that was conducted in April of 2014. The report indicated that as long as the water tower was no longer holding water it was at a very low risk to suffer damage from a seismic event. Based on this removal the group decided to move Y-EH 2 (Identify funding sources to seismically retrofit publicly owned critical facilities) as priority #1. Two new initiatives were added in the form of Y-FH-1 (Upgrade Bald Hills Road to mitigate flood related damage and closures) and Y-EH-4 (103rd Street Bridge Replacement).

The prioritization of the initiatives was based on impact to the residents of the city and the cost/feasibility of completing the initiative. The workgroup agreed that this process was best to determine priority resulting in the priority submitted with the current hazards mitigation plan. The workgroup

City of Yelm Risk Assessment

Introduction

This Annex describes how the City of Yelm's risks vary from the entire planning area. Chapters 4.0 through 4.6 of the region plan address the Disaster Mitigation Act risk assessment planning requirements. The risk assessment summarizes the hazards and the risks that pose the greatest threat to Thurston County. The risk assessment includes hazard profiles that describe the hazards, their causes, sources, severity, effects and impacts, probability of occurrence, historical occurrences, geographic extent or delineation, and the portion of the population, assets, and essential facilities potentially exposed to the hazard. The information is presented for general audiences and includes figures, maps, and tables.

Hazard Analysis Definitions

The Hazards Mitigation Plan for the Thurston Region uses a subjective risk measurement process based on Thurston County's Hazard Inventory and Vulnerability Assessment or HIVA. This methodology rates elements of each hazard's risk characteristics using the descriptors high, moderate, and low. These descriptors are applied to the hazards' probability of occurrence, vulnerability, and overall risk. The following is an overview of this risk measurement model:

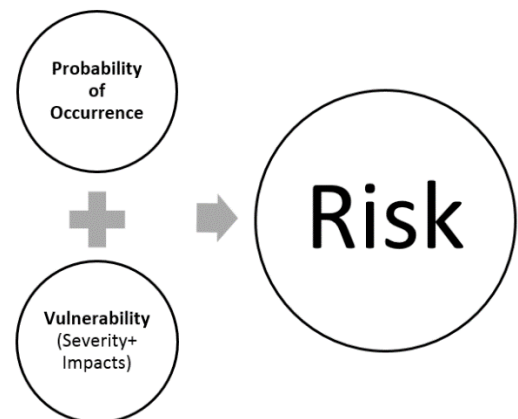
Risk Rating: A description (high, moderate, or low) of the subjective estimate of the combination of any given hazard's probability of occurrence and the region's vulnerability to the hazard.

- High – There is strong potential for a disaster of major proportions.
- Moderate – There is medium potential for a disaster of less than major proportions.
- Low – There is little potential for a disaster.

Probability of Occurrence: A description (high, moderate, or low) of the probability of a hazard impacting Thurston County within the next 25 years.

- High – There is great likelihood that a hazardous event will occur within the next 25 years.
- Moderate – There is medium likelihood that a hazardous event will occur within the next 25 years.
- Low – There is little likelihood that a hazardous event will occur within the next 25 years.

Vulnerability: A description (high, moderate, or low) of the potential impact a hazard could have on Thurston County. Vulnerability can be expressed as combination of the severity of a hazard's effect and its consequential impacts to the community. It considers the population, property, commerce, infrastructure, and services at risk relative to the entire county.



- **High** – The total population, property, commerce, infrastructure, and services of the county are uniformly exposed to the effects of a hazard of potentially great magnitude. In a worst-case scenario, there could be a disaster of major to catastrophic proportions.
- **Moderate** – The total population, property, commerce, infrastructure, and services of the county are exposed to the effects of a hazard of moderate influence; or the total population, property, commerce, infrastructure, and services of the county are exposed to the effects of a hazard of moderate influence, but not all to the same degree; or an important segment of population, property, commerce, infrastructure and services of the county are exposed to the effects of a hazard. In a worst-case scenario, a disaster could be moderate to major, but not catastrophic, proportions.
- **Low** – A limited area or segment of population, property, commerce, infrastructure, or service is exposed to the effects of a hazard. In a worst-case scenario, there could be a disaster of minor to moderate proportions.

Hazard Profiles

The regional plan includes detailed profiles of hazards that pose the greatest risk to the Thurston County. Because the regional plan treats the entire county as the planning area, the regional plan's risk assessment is the definitive risk assessment for Thurston County. Each hazard profile fulfills all the following criteria:

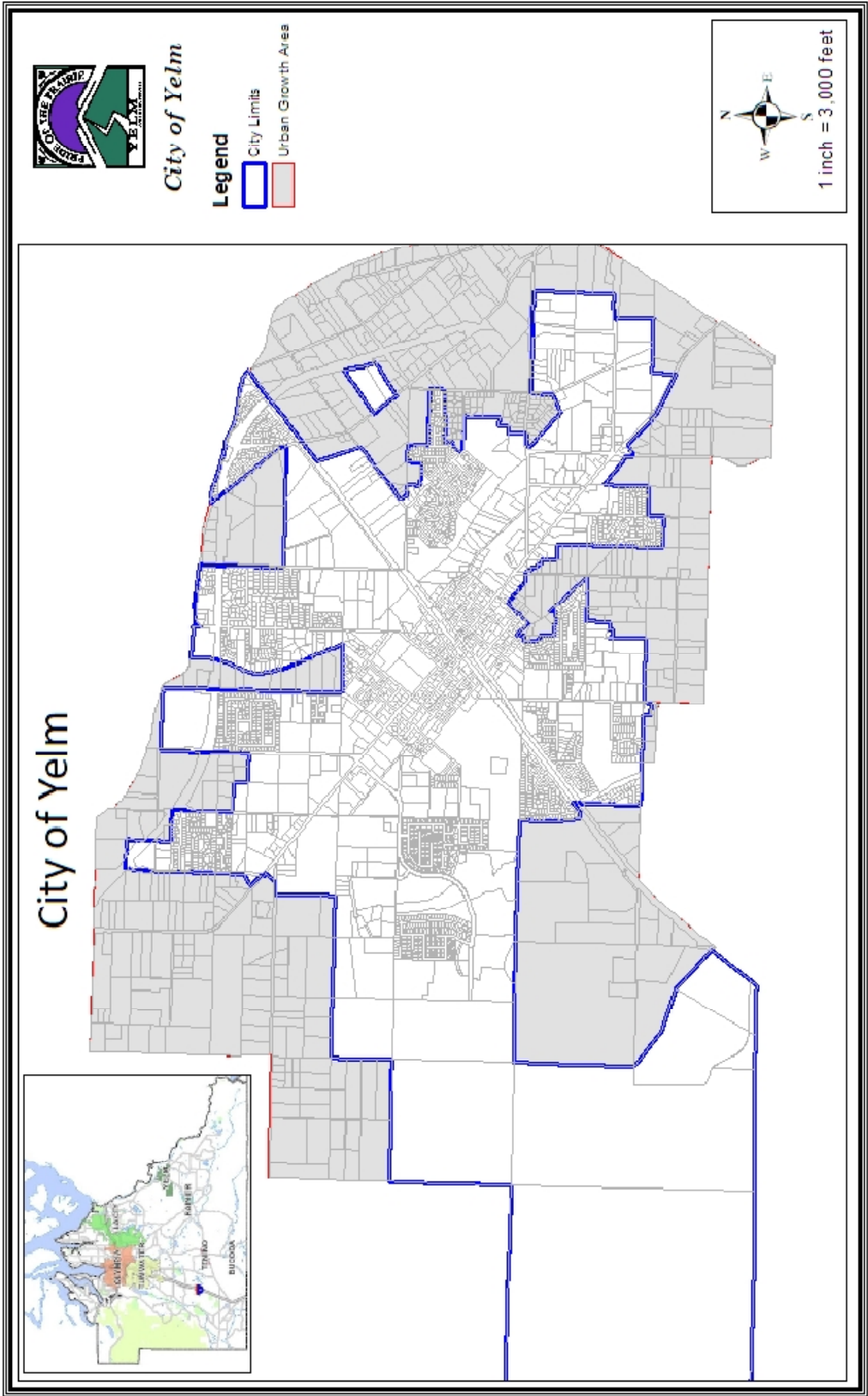
There is a high probability of the natural hazard occurring in Thurston County within the next 25 years;

1. There is the potential for significant damage to buildings and infrastructure; and/or
2. There is the potential for loss of life.
3. The following hazards meet one or more of the above criteria. Every hazard profile was evaluated and updated during the plan update process.

Summary Assessment - City of Yelm's Risks

Based on the Regional Risk Assessment and the local risk assessment in the subsequent section, the following hazards pose the greatest threat to the City of Yelm.

Hazard	Probability of Occurrence	Vulnerability	Risk
Earthquake	High	Moderate	Moderate
Storm	High	High	High
Flood	High	Low	Low
Landslide	High	Low	Low
Wildland	High	Moderate	Moderate
Volcanic	Low	Moderate	Moderate



Earthquake

In general, the severity of earthquakes for the City of Yelm is the same as described in the Regional Risk Assessment. Per the earthquake hazard map, the City of Yelm is unlikely to experience the effects of liquefaction. However, the city remains vulnerable to the effects of ground shaking. The Washington State Department of Natural Resources' Site Class Map for Thurston County shows that the city is situated on Class C soils, which have a moderate potential to amplify ground shaking near the surface.

Severity

Same as described in the Regional Risk Assessment

Impacts

In general, the effects of major earthquakes affect the City of Yelm in the same manner as described in the Regional Risk Assessment, but damage to structures is likely less severe than in other parts of the county due to the absence of soils that are prone to the effects of liquefaction. The roads and bridges leading to and from the greater Yelm vicinity could be impacted. The Nisqually River Bridge near Mckenna on State Route 507 may be vulnerable to liquefaction and amplified ground shaking. Damage to or destruction of this bridge would create both local and regional transportation disruptions.

Probability of Occurrence

History suggests a high probability of occurrence of another damaging earthquake sometime in the next 25 years. The overall probability of occurrence of a damaging earthquake is high.

Historical Occurrences and Impacts Specific to the City of Yelm

February 28, 2001, Federal Disaster 1361: Nisqually Earthquake

At 10:54 a.m. a magnitude 6.8 earthquake produced strong ground shaking across Washington State. The epicenter was located near Anderson Island, approximately 11 miles north of Olympia near the Nisqually River Delta. The focus was located nearly 33 miles underground. The depth of the earthquake minimized the intensity of the shaking and limited impact to the built environment. A federal disaster declaration was issued only one day after the event. Building damage varied throughout the region. In particular, Downtown Olympia, including many historic structures, and Seattle's historic Pioneer Square area were hit hard.

Structures within the City of Yelm performed well, with very minimal damage. There was no loss of life or collapse and very little economic cost for non-structural damage. The old city water tower, located at 2nd Street and McKenzie, was seen swaying with the roll of the quake however no damage was recorded.

Summary Assessment

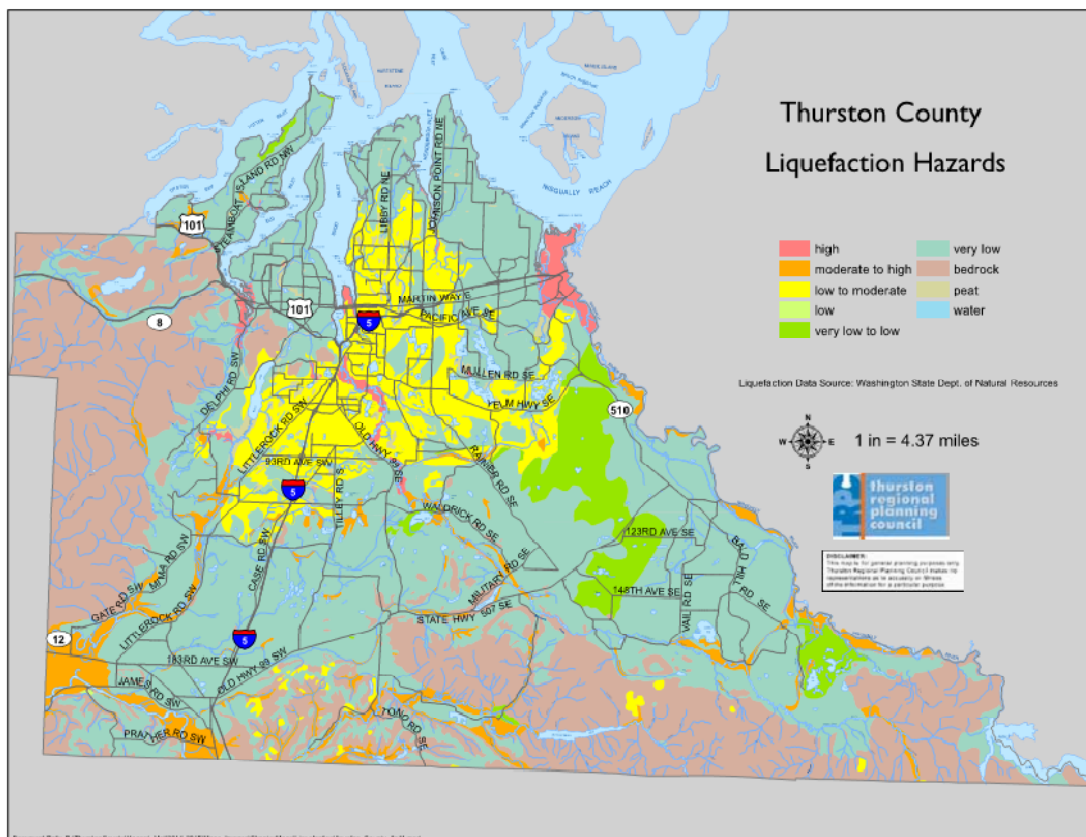
Consistent with the Regional Risk Assessment, the City of Yelm is likely to experience a major earthquake, of a similar magnitude or greater to the 2001 Nisqually Earthquake, in the next 25 years. The Nisqually Earthquake did not result in any noteworthy damage to city infrastructure or disrupt services for an extended period. A greater magnitude earthquake could cause more

destruction; therefore a moderate vulnerability rating is assigned. Due to the high probability of occurrence and moderate vulnerability, the City of Yelm has assigned a moderate risk rating to earthquake hazards.

Summary Risk Assessment for Earthquake for the City of Yelm

Hazard	Probability of Occurrence	Vulnerability	Risk
Earthquake	High	Moderate	Moderate

Map 4.1.1 Liquefaction Hazards, Thurston County



Severe Weather

Severity

Similar to the regional assessment with the exception of wind events. Being in the southeast portion of Thurston County, the city is vulnerable to the winds coming through the Chehalis Gap. Although not a frequent event, these particular winds can and often exceed the stated wind projections on many wind events. In regards to the Chehalis Gap, the terrain from the southwestern area of Yelm magnifies the focus of wind storm events. When a surface low tracks further to the south than the usual Vancouver Island track, wind tends to flow through the Chehalis Gap which flows eventually to the City of Yelm and areas south. In the past, the National Weather Service has issued wind advisories and/or warnings specific to our area. This is very specific to the track of the surface low.

Impacts

In general, the effects of storm are the same as described in the Regional Risk Assessment.

Probability of Occurrence

Like the regional assessment, except for the wind events as described above, the frequency of wind events is the same as the region wide risk assessment. It is common for the Yelm area to experience increased wind events as compared to the rest of the county.

Historical Occurrences and Impacts Specific to City of Yelm

Several notable storms have impacted the City of Yelm and the Thurston Region over the last few decades.

January 14, 2012 – January 23, 2012, Major Disaster Declaration DR-4056, Severe Weather

Heavy snow followed by a significant ice storm crippled the City of Yelm and surrounding areas. Power was out for multiple days; grocery stores were empty and without power, and all fueling stations in the City of Yelm were shut down due to lack of power or no fuel. A significant amount of property damage occurred due to falling trees and power lines due to excessive amounts of ice. The ice event was limited to the south and east portions of Thurston County.

December 14-15, 2006 “The Hanukkah Eve Storm” Federal Disaster 1682: Severe Winter Storm, Landslides, and Mudslides

The December 14-15, 2006, storm included snow, rain, and high winds. The windstorm may have produced the most damaging winds to hit the Pacific Northwest since the Columbus Day Storm of 1962. The Hanukkah Eve Storm achieved winds in excess of 70 mph over SE Thurston County and particular the “Chehalis Gap”. There were a significant number of trees damaged or downed to include power lines and poles. Power was out for several days within the city and more than a week just outside. Emergency shelters were opened at our local schools for multiple residents.

November 2-11, 2006 Federal Disaster 1671: Severe Winter Storm, Flooding, Landslides, and Mudslides

On November 6, 2006, 3.4 inches of rain fell; a 24 hour rainfall record for the day of the year.

The heavy rains caused significant flooding termed “once in a hundred years” to the areas in and around the City of Yelm. Yelm Creek swelled over its banks causing multiple streets to be closed for several days. The flow of the Nisqually River produced flood levels never seen before and evacuations along the lower end of the river were extensive. The bridge leading to Pierce County on State Route 507 had to be closed for several hours due to the high water flow. Economic and transportation impacts were significant to our region.

December/January 1996/1997 Federal Disaster 1159, Ice, Wind, Snow, Landslides, and Flooding

Snow, ice, and freezing rain crippled Thurston County on December 26, 1996. This storm produced the worst freezing rain event to hit the south Puget Sound region in decades. 53,000 electric customers lost power due to snapped power lines and downed trees. Sub-freezing temperatures and power outages persisted for over a week into early January 1997.

January 20, 1993 Inaugural Day Windstorm, Federal Disaster 981, Windstorm

The most powerful windstorm to hit Western Washington since the 1962 Columbus Day Storm caused nearly 130 million in damages state wide, resulted in five deaths, and destroyed 52 residential units statewide. Winds reached gusts of 55 mph and higher around the Yelm area. Customers flooded local stores for provisions creating shortages in batteries, candles, and bottled water.

Summary Assessment

Summary Risk Assessment for Storm for City of Yelm

Hazard	Probability of Occurrence	Vulnerability	Risk
Storm	High	High	High



Flood

Severity

During the Nisqually floods of 1996, the City of Yelm experienced high groundwater and extensive urban flooding due to runoff and the swelling of Yelm Creek that runs through the middle of the city. Since that time, the city has taken measures to ensure that does not occur again. The creek has been dredged and the path of flow has been improved. The city has experienced little urban street flooding since 1996.

Impacts

Same as regional assessment. The Nisqually River flows just outside city limits; however the City of Yelm first responders will be the first there to assist. The Yelm Canal, operated by the City of Centralia, borders the city limits and an overflow event could impact homes within the city limits. If the Nisqually River rises to a level which would require the closure of the Mckenna bridge, traffic flow to and from the city would be significantly impacted.

Probability of Occurrence

Riverine floods are the most common form of flooding in Thurston County. Several flood events have occurred on Thurston County Rivers which have exceeded the 100 year flood event. Based on the history of the last 48 years (1968 to 2016), the Deschutes River is likely to experience a major flood every 4 to 5 years.

Historical Occurrences and Impacts Specific to the City of Yelm

A partial list of recent flooding events affecting the Thurston Region and the City of Yelm includes:

January 6-16, 2009, Federal Disaster 1817: Severe Winter Storms, Landslides, Mudslides, and Flooding

A “Pineapple Express” rainstorm raised temperatures and dropped heavy rains throughout Western Washington following one of the worst Pacific Northwest snow storms in decades. Severe flooding occurred throughout Western Washington. The Chehalis, Skookumchuck, Deschutes, Nisqually, and Black Rivers all experienced major flooding on January 8, 2009, making it the second worst flood level in the River’s recorded history.

December 1-7, 2007, Federal Disaster 1734: Severe Winter Storms, Flooding, Landslides, and Mudslides

Snow followed by a “Pineapple Express” on December 2 and 3, 2007, caused major flooding throughout SW Washington. Heavy rainfall and melting snow resulted in record flooding. The Deschutes River crested at 2.75 feet above flood stage near Rainier.

December 1996 (Federal Disaster 1159) to February 1997 Winter Storm and Flooding

1996 was the third wettest year of the 20th Century and December was especially wet, receiving over twice its normal rainfall for the month. The Deschutes River at Rainier crested at 17.01 feet, six feet above flood stage, setting a flood record. Major flooding also occurred on the Nisqually, Skookumchuck, and Chehalis Rivers.

The City of Yelm first responders were directly involved with massive evacuations in the lower Nisqually in the area known as the Nisqually Pines. Residents who have lived there for more than 40 years had never see the water so much across the lower main road. During this event the water was measured at more than 4 feet over the road. At its peak, Tacoma Power was releasing more than 46,000 cubic feet per second for fear of a dam failure. Major flooding occurs when the flow reaches 17,000 cubic feet. The major impact to the City of Yelm was the closure or state routes leading to and from the city.

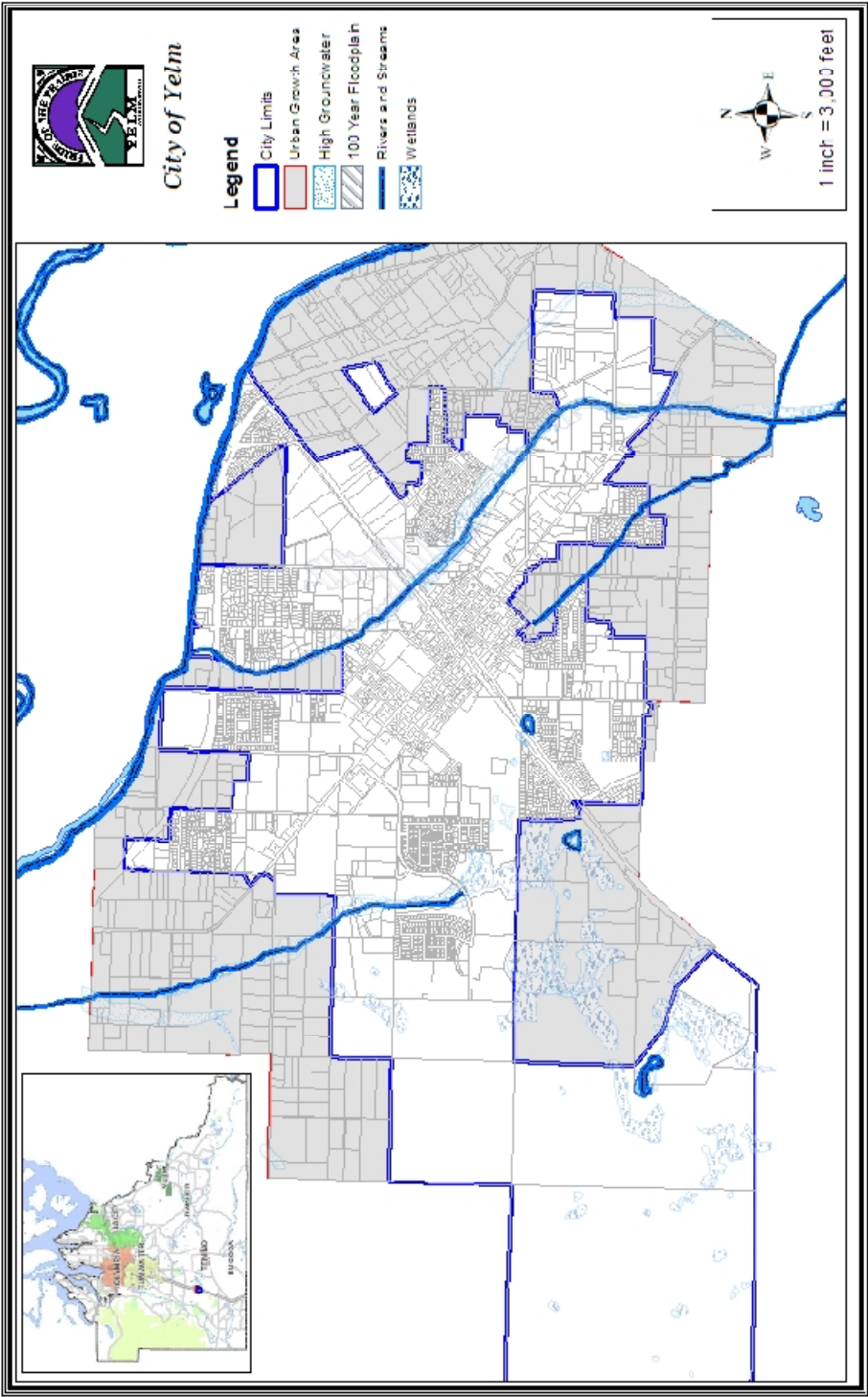
Summary Assessment

Summary Risk Assessment for Flood for City of Yelm

Hazard	Probability of Occurrence	Vulnerability	Risk
Flood	Moderate	Low	Low



City of Yelm Flood Hazards



Landslide

Severity

The City of Yelm has experienced few landslides of any significance. Because the City of Yelm is built on a prairie, the city is rarely affected by landslide events.

Impacts

Landslides produce negligible impacts to the city.

Probability of Occurrence

Probability of occurrences in the City of Yelm are low due to the terrain.

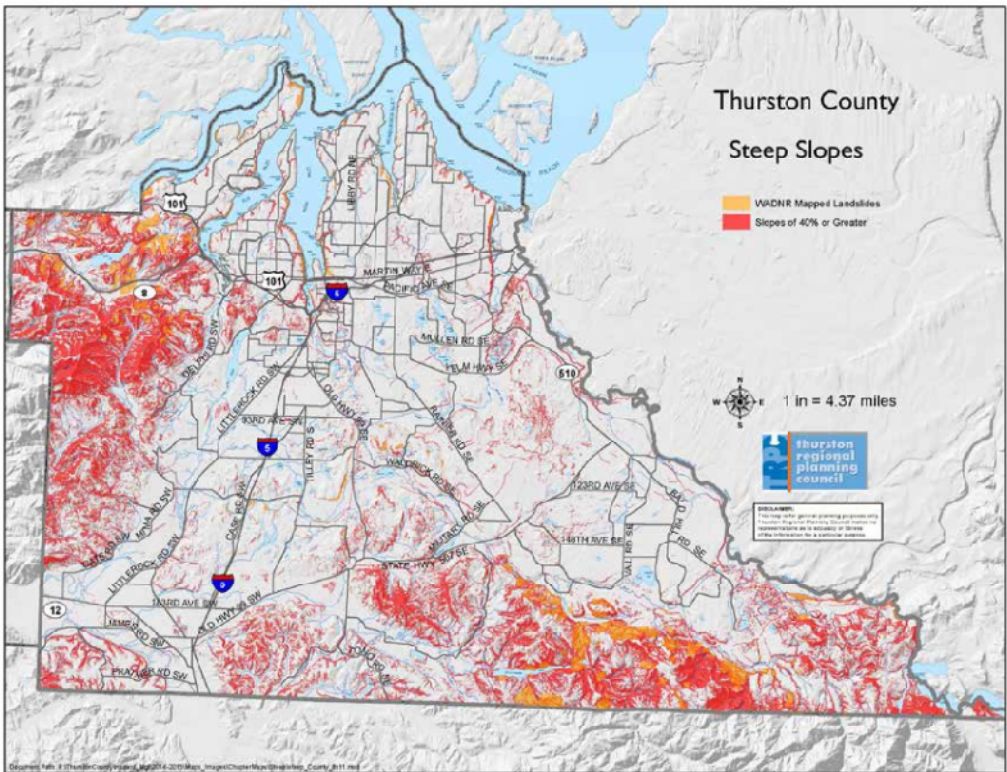
Historical Occurrences and Impacts Specific to the City of Yelm

There are no historic landslide incidents documented within the city.

Summary Assessment

Summary Risk Assessment for Landslide for the City of Yelm

Hazard	Probability of Occurrence	Vulnerability	Risk
Landslide	Low	Low	Low



Map 4.4.1: Steep Slopes

Wildland Fire

Severity

Same as described in the Regional Risk Assessment.

Impacts

Same as described in the Regional Risk Assessment.

Probability of Occurrence

Same as described in the Regional Risk Assessment.

Historical Occurrences and Impacts Specific to City of Yelm

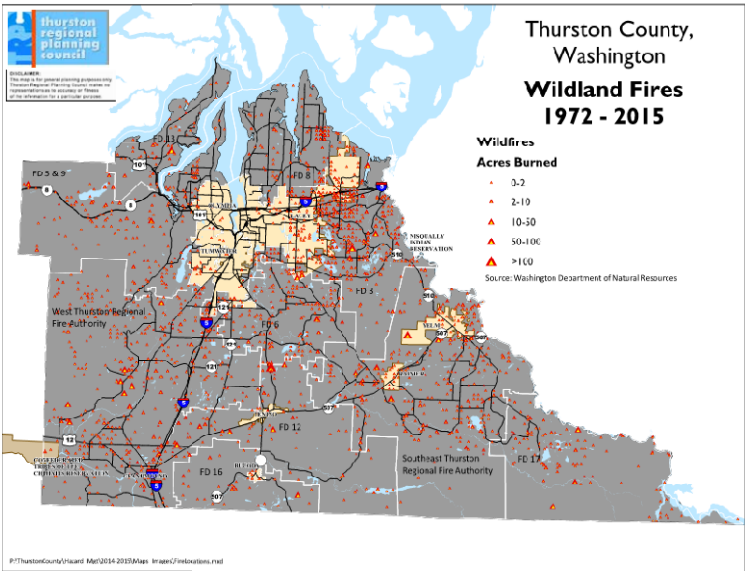
In recent history, there have been few incidents of wildland fire within the city limits. During extended periods of dryness and high heat, the city has experienced sporadic grass fires caused by discarded lit cigarettes. Minor damage resulted from each of these instances. No structural damage has been reported.

Summary Assessment

The City of Yelm is surrounded by prairies with tall grasses and trees. This acts as primary fuel for a wildland fire, similar to the Regional Risk assessment.

Summary Risk Assessment for Wildland Fire for the City of Yelm

Hazard	Probability of Occurrence	Vulnerability	Risk
Wildland	High	Moderate	Moderate



Volcanic Hazards

Severity

Same as described in the Regional Risk Assessment.

Impacts

In a Lahar event the City of Yelm could experience indirect impacts, although the most significant impacts would occur outside of the city limits. Should a Lahar event flow down the Nisqually River and a need to close the Nisqually River Bridge, the impact to traffic flow in and out of the city will be significant.

Probability of Occurrence

Same as described in the Regional Risk Assessment.

Historical Occurrences and Impacts Specific to the City of Yelm

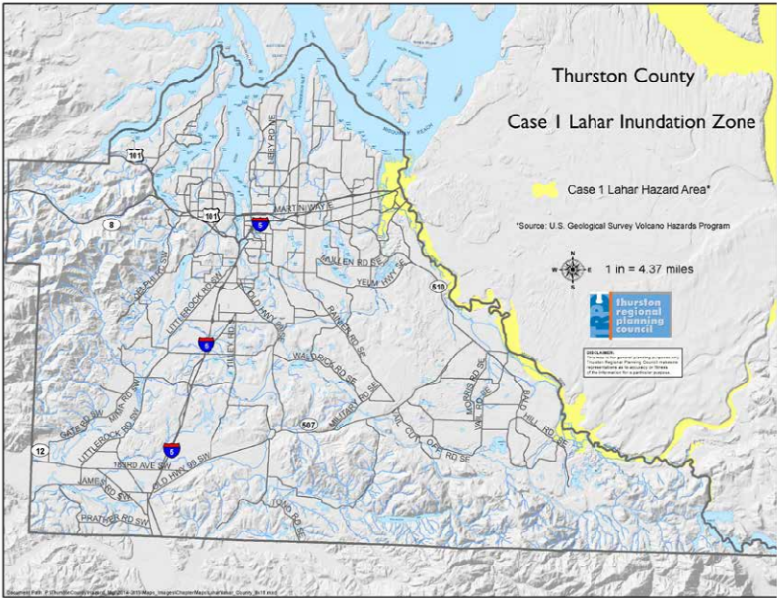
Same as described in the Regional Risk Assessment.

Summary Assessment

Consistent with the regional risk assessment. Although a low possibility of occurrence, the overall risk is moderate due to the proximity of the Nisqually River to the City of Yelm.

Summary Risk Assessment for Volcanic Events for City of Yelm

Hazard	Probability of Occurrence	Vulnerability	Risk
Volcanic Event	Low	Moderate	Moderate



Map 4.6.2: Inundation Zone for Case 1 Lahar Thurston County, Washington

Mitigation Initiatives – Adopted

The adopted mitigation initiatives are the City of Yelm’s specific actions for mitigating losses and protecting life and property. They consist of initiatives that carried over from the previous plan and new initiatives that were identified during the plan update process. Yelm’s adopted initiatives were reviewed and updated by the development team.

Priority	ID Number	Category	Action	Status
1 of 3	Y-EH 2	Hazard Damage Reduction	Perform seismic retrofits to the city’s critical facilities listed in the City of Yelm Emergency Disaster Plan	Existing
2 of 3	Y-FH 1	Hazard Damage Reduction	Upgrade Bald Hills Road to mitigate flood related damage and closures	New
3 of 3	Y-EH 4	Hazard Damage Reduction	103rd Street Bridge Replacement	New

Hazard Category Codes are as follows:

EH=Earthquake Hazard; FH=Flood Hazard; LH=Landslide Hazard; MH=Multi Hazard; SH=Storm Hazard; WH=Wildland Fire Hazard; and VH=Volcanic Hazard.

Completed or Removed Mitigation Initiatives

Initiatives that were completed in the last 5 years are included in this plan to provide evidence of progress made. These initiatives are no longer relevant and no longer part of the City of Yelm’s adopted mitigation strategy. These initiatives are not ranked as they are no longer relevant.

Priority	ID Number	Category	Action	Status
	Y-EH 3	Hazard Reduction	Analysis/Inspection determined tank is not in need of seismic retrofit	Removed

Priority: 1 of 3

Status: Existing

Y-EH 2: Perform seismic retrofits to the city's critical facilities listed in the City of Yelm Emergency Disaster Plan.

Hazard Addressed: Earthquake Hazard

Category: Hazard Damage Reduction

Rationale: Critical facilities will play a major role in the response and recovery phases of a disaster and community assistance will be dependent on these facilities being able to operate.

Relates to Plan Goal(s) and Objectives: 2C, 2D, 3B, 3C, 8C

Implementer: Yelm Public Works

Estimated Cost: \$332,500.00

Time Period: 2017-2021

Funding Source: City of Yelm Tax Revenue

Source and Date: 2003 Natural Hazards Mitigation Plan for the Thurston Region

Adopted Plan Number: Y-EH 2

Reference Page: V-279

Initiative and Implementation Status: The only critical facility listed in the Emergency Operations Manual not to current code is the Yelm City Hall. This is a 4,000-square foot building that has been through multiple remodels within the past fifteen years. All other critical facilities have been built within the past 10 years and therefore are structurally sound. The new estimate would be the amount necessary to retrofit the Yelm City Hall.

Priority: 2 of 3

Status: New

Y-FH 1: Upgrade Bald Hills Road to mitigate flood related damage and closures.

Hazard Addressed: Flood Hazard

Category: Hazard Damage Reduction

Rationale: Bald Hill Road is a primary traffic carrying facility in the Yelm area. Weekday traffic is approximately 5,144 vehicles per day entering the City of Yelm along this route. The existing roadway is in poor condition and does not provide adequate access to commercial and residential properties along the route. Further, the roadway profile is such that the road is frequently flooded in the winter creating a serious hazard to the public. Upgrades to the existing facility are needed to accommodate current and future traffic usage and eliminate the flooding issue.

Relates to Plan Goal(s) and Objectives: 2A, 3A, 4A, 4B,

Implementer: City of Yelm Public Works

Estimated Cost: \$2.4 million

Time Period: 2018

Funding Source: City of Yelm General Fund Budget

Source and Date: N/A

Adopted Plan Number: Y-FH-1

Reference Page: N/A

Initiative and Implementation Status: New Initiative. This project is listed under the City of Yelm Transportation Improvement Plan. Not securely funded at this time.

Priority: 3 of 3

Status: New

Y-EH 4: 103rd Street Bridge Replacement.

Hazard Addressed: Earthquake Hazard

Category: Hazard Damage Reduction

Rationale: The current bridge over Yelm Creek is approaching 100 years old. The results from the last inspection completed by Thurston County Public Works in 2015 indicated that the abutments at each end of the structure are cracking and failing. The structure has also suffered damage from vehicle strikes. Since 103rd Ave SE is a major route through the City for both local traffic, commuters, and freight traffic, the roadway approaches are settling further exacerbating the issues with the structure itself. Seasonal high flow events in Yelm Creek at times nearly overtop the structure creating a flooding hazard. If a large seismic event occurs, it is possible that this structure could fail eliminating a major route through the City. This project will replace the current structure and repair the existing roadway approaches.

Relates to Plan Goal(s) and Objectives: 2A, 3A, 4A, 4B

Implementer: City of Yelm Public Works

Estimated Cost: \$700,000

Time Period: 2018

Funding Source: City of Yelm General Fund Budget

Source and Date: N/A

Adopted Plan Number: Y-EH-4

Reference Page: N/A

Initiative and Implementation Status: New Initiative. This project is listed in the City of Yelm Transportation Improvement Plan. Not securely funded at this time.

Priority: N/A**Status:** Completed**Y-EH 3:** Seismically retrofit the downtown water tower, located at Washington and 2nd St.**Hazard Addressed:** Earthquake Hazard**Category:** Hazard Damage Reduction

Rationale: The downtown water tower, located at 2nd and Washington in the city limits of Yelm, is an elevated tank that was built in 1946 with a capacity of 50,000 gallons and is approximately 130 feet tall. The tank is currently not in service and has not been in use for several years. The tank is supported on four built-up columns that are laterally braced with other built up truss members as well as tie rods for cross bracing. It is a landmark that most long time Yelm residents don't want to see go. During the earthquake in 2001 the water tower experienced no damage however was witnessed swaying from side to side rather significantly. Since 2001 the City of Yelm has built a new police station which also serves as the SE Thurston County Emergency Operations Center. The new police station is located directly next to the downtown water tower and is directly in the extreme hazard zone as identified in the City of Yelm Emergency Operations Manual. In addition to the police department there are four residential structures identified in the extreme hazard zone in the case of a structural collapse. Outside of buildings the downtown water tower sits only feet from the city wellheads which are housed in a concrete structure next to the water tower. Should these wellheads be affected by a structural collapse the entire City of Yelm would be without water for an extended period.

Relates to Plan Goal(s) and Objectives: 2D, 3C, 5E, 7B**Implementer:** City of Yelm water utility.**Estimated Cost:** \$150,000.00/Actual completion cost: \$0**Time Period:** Completed**Funding Source:** N/A**Source and Date:** 2003 Natural Hazards Mitigation Plan**Adopted Plan Number:** Y-EH 3**Reference Page:** 25

Initiative and Implementation Status: A water tower/tank inspection conducted in April of 2014 resulted in the following conclusions: As long as the tank remains empty, the likelihood of failure due to a seismic event is very low. The seismic load transmitted to the tank is based on the operational weight of the structure. Without the 50,000 gallons of water in the tank, the weight of the structure is relatively low, therefore, the resulting seismic forces would also be minimal.

City of Yelm Participation in the National Flood Insurance Program

Introduction

All Local Mitigation Plans approved by FEMA after October 1, 2008 must describe each jurisdiction's participation in the NFIP and must identify, analyze and prioritize actions related to continued compliance with the NFIP. Basic compliance NFIP actions could include, but are not limited to:

- Adoption and enforcement of floodplain management requirements, including regulating all and substantially improved construction in Special Flood Hazard Areas (SFHAs)
- Floodplain identification and mapping, including any local requests for map updates, if needed; or
- Description of community assistance and monitoring activities.

Summary of Yelm National Flood Insurance Program Premiums, Policies and Claims					
Date of Entry Initial FIRM Effective Date	Policies In-Force	Insurance In-Force	Written Premium In-Force	Claims Since 1978	Total Payments
6/16/1999	18	\$4,303,100	\$9,586	2	\$7,602

The City of Yelm has participated in the National Flood Insurance Program (NFIP) since 1999. Presently, there are no repetitive loss properties within the City of Yelm.

Flood Plans, Ordinances, and Regulations

On August 10, 2005 the City of Yelm Washington adopted Ordinance Number 833 which updates the Yelm Critical Areas Code, Chapter 18.21 Yelm Municipal Code. A requirement of the Growth Management Act, as amended by the Washington Legislature, is that jurisdictions required to plan under the GMA update their Critical Areas Codes to utilize best available science. Prior to adoption of the Ordinance Number 833 the Yelm Community Development Department and the Planning Commission had been working towards an updated Critical Areas Code.

The purpose of this revised chapter is to designate and classify ecologically sensitive and hazardous areas and to protect these areas and their functions and values, while also allowing for reasonable use of private property.

This chapter is to implement the goals, policies, guidelines, and requirements of the Yelm comprehensive plan and the Growth Management Act, Chapter 36.70A RCW.

Critical areas provide a variety of valuable and beneficial biological and physical functions that benefit the city and its residents, and/or may pose a threat to human safety or to public and private property.

By limiting development and alteration of critical areas, this chapter seeks to:

- Protect members of the public and public resources and facilities from injury, loss of life, or property damage due to landslides and steep slope failures, erosion, seismic events,

- volcanic eruptions, or flooding;
- b. Maintain healthy, functioning ecosystems through the protection of unique, fragile, and valuable elements of the environment, including ground and surface waters, wetlands, and fish and wildlife and their habitats, and to conserve the biodiversity of plant and animal species;
- c. Direct activities not dependent on critical areas resources to less ecologically sensitive sites and mitigate unavoidable impacts to critical areas by regulating alterations in and adjacent to critical areas; and
- d. Prevent cumulative adverse environmental impacts to water quality, wetlands, and fish and wildlife habitat, and the overall net loss of wetlands, frequently flooded areas, and habitat conservation areas.

The regulations of this chapter are intended to protect critical areas in accordance with the Growth Management Act and through the application of the best available science, as determined according to WAC 365-195-900 through 365-195-925, and in consultation with state and federal agencies and other qualified professionals.

Section 18.21.080 YMC addresses frequently flooded areas. The designation of areas frequently flooded includes areas Identified on the Flood Insurance Map(s) and areas mapped by Thurston County as high ground water flood hazard areas. The Flood Insurance Maps and high ground water maps were adopted by reference, declared part of this Chapter, and are available for public review at the City.

When base flood elevation data is not available (A and V zones), the administrator shall obtain, review, and reasonably utilize any base flood elevation and floodway data available from a federal, state, or other official source, in order to administer this Chapter.

Where base flood elevation data is provided through the Flood Insurance Study or required through Section 18.21.080 YMC, the administrator shall obtain and record the flood elevation certificates of all new or substantially improved structures, and whether or not the structure contains a basement. The administrator shall also maintain for public inspection all records of floodplain hazards, certificates of flood proofing, and flood elevation data.

Performance Standards - General Requirements. The following standards shall be adhered to in all frequently flooded areas, except as otherwise provide for in Section 18.21.080 YMC.

1. Approval of Work in a Frequently Flooded Area. Prior to any clearing, grading, dumping, drilling, dredging, filling, or the construction or reconstruction of any structure, the City shall have approved through the underlying permit or through approval of a critical areas report that the standards for development within a frequently flooded area have been met.
2. No activity within a frequently flooded area shall increase the base flood elevation.

Performance Standards - General Requirements in FEMA designated 100 year floodplain.

1. Structures Shall Be Located Outside the Floodplain. All structures, utilities, and other improvements shall be located on the buildable portion of the site out of the floodplain unless there is no buildable site area out of the floodplain. For sites with no buildable

area out of the floodplain, structures, utilities, and other improvements shall be placed on the highest land on the site, oriented parallel to flow rather than perpendicular, and sited as far from the watercourse and other critical areas as possible. If the administrator detects any evidence of active hyporheic exchange on a site, the development shall be located to minimize disruption of such exchange.

2. **Methods That Minimize Flood Damage.** All new construction and substantial improvements shall be constructed using flood resistant materials and using methods and practices that minimize flood damage.
3. **Utility Protection.** Electrical, heating, ventilation, plumbing, air-conditioning equipment, and other service facilities shall be designed and/or otherwise elevated or located so as to prevent water from entering or accumulating within the components during conditions of flooding.
4. **Elevation Certificate Following Construction.** Following construction of a structure within the floodplain where the base flood elevation is provided, the applicant shall obtain an elevation certificate that records the elevation of the lowest floor. The elevation certificate shall be completed by a surveyor or engineer licensed in the state of Washington and shall be submitted to the City for recording.
5. **Anchoring**
 - a. **Anchoring Requirement.** All new construction and substantial improvements within the floodplain shall be anchored to prevent flotation, collapse, or lateral movement of the structure.
 - b. **Manufactured Homes.** All manufactured homes placed within the floodplain must be anchored to prevent flotation, collapse, or lateral movement and shall be installed using methods and practices that minimize flood damage. Anchoring methods may include, but are not limited to, use of over-the-top or frame ties to ground anchors.
6. **Fill and Grading.** Fill and grading with the floodplain shall only occur after a determination that the fill or grading will not block side channels, inhibit channel migration, increase the base flood elevation, or be within a channel migration zone.

Performance Standards - Specific Uses in the FEMA Designated 100 year floodplain. Specific uses shall adhere to the following relevant standards, in addition to the general standards.

1. **Divisions of Land.**
 - a. All new divisions of land, including subdivisions, short subdivisions, boundary line adjustments, binding site plans, and master planned communities shall not create any building lot for commercial or residential purposes with any portion within the floodplain.
 - b. Floodplain areas shall be dedicated as open space.
 - c. No infrastructure required for the subdivision with the exception of utility transport lines identified by the appropriate utility capital facilities plan shall be located within the floodplain.
 - d. Subdivisions and short subdivisions shall be designed to minimize or eliminate flood damage and impacts to floodplain functions and values. Public utilities and facilities that are installed as part of such subdivisions, such as sewer, gas, electrical, and water systems, shall be located and constructed to also minimize flood damage and

- impacts to floodplain functions and values. Subdivisions should be designed using natural features of the landscape and should not incorporate flood protection changes.
- e. Subdivisions and short subdivisions shall have adequate natural surface water drainage to reduce exposure to flood hazards; and
 - f. Subdivisions and short subdivisions shall show the 100-year floodplain, floodway, and channel migration zone on the preliminary and final plat and short plat maps and designate such areas as "no build," when applicable.
2. Utilities
 - a. Infiltration of Flood Waters. All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the systems.
 - b. Sanitary Sewage Systems. New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters.
 - c. On-Site Waste Disposal Systems. On-site waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding. New on-site sewage disposal systems are prohibited within the floodplain.
 3. Residential Construction on lots created prior to 1999.
 - a. Must be Above Base Flood Elevation. New construction and substantial improvement of any residential structure shall have the lowest floor, including basement, elevated one (1) foot or more above the base flood elevation.
 - b. Areas Below the Lowest Floor. Fully enclosed areas below the lowest floor that are subject to flooding shall only be allowed when designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must either be certified by a registered professional engineer or architect or must meet or exceed the following minimum criteria:
 - i. A minimum of two (2) openings having a total net area of not less than one (1) square inch for every square foot of enclosed area subject to flooding shall be provided;
 - ii. The bottom of all openings shall be no higher than one (1) foot above grade; and
 - iii. Openings may be equipped with screens, louvers, or other coverings or devices provided that they permit the automatic entry and exit of floodwaters.
 - c. Manufactured Homes Must be Elevated. All manufactured homes to be placed or substantially improved shall be elevated on a permanent foundation such that the lowest floor of the manufactured home is elevated one (1) foot or more above the base flood elevation and be securely anchored to an adequately anchored foundation system to resist flotation, collapse, and lateral movement.
 4. Nonresidential Construction on lots created prior to 1999.
 - a. Above Base Flood Elevation. New construction and substantial improvement of any commercial, industrial, or other nonresidential structure shall either have the lowest floor, including basement, elevated one foot (1) or more above the base flood elevation, or, together with attendant utility and sanitary facilities, shall:

- i. Be floodproofed so that below one (1) foot or more above the base flood level the structure is watertight with walls substantially impermeable to the passage of water;
 - ii. Have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy; and
 - iii. Be certified by a registered professional engineer or architect that the design and methods of construction are in accordance with accepted standards of practice for meeting provisions of this Subsection based on their development and/or review of the structural design, specifications, and plans.
- b. Areas Below the Lowest Floor. Fully enclosed areas below the lowest floor that are not floodproofed shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must either be certified by a registered professional engineer or architect, or must meet or exceed the following minimum criteria:
 - i. A minimum of two (2) openings having a total net area of not less than one (1) square inch for every square foot of enclosed area subject to flooding shall be provided;
 - ii. The bottom of all openings shall be no higher than one (1) foot above grade; and
 - iii. Openings may be equipped with screens, louvers, or other coverings or devices provided that they permit the automatic entry and exit of floodwaters.

Performance Standards - General requirements in High Ground Water Hazard Areas.

1. Flood elevations. The base flood elevation for high ground water flood hazard areas corresponds to the elevation of the outer edge of the high ground water flood hazard area.
2. Delineation of the base flood elevation. Applicants shall submit to the approval authority hydrologic and hydrogeologic studies as necessary to delineate the high ground water flood hazard area and the base flood elevation.
3. No development shall locate within fifty feet, measured on a horizontal plane, from the outer edge of the high ground water hazard area or extending to a ground elevation two feet above the base flood elevation, whichever is less.
4. The bottom of any infiltration facility for stormwater discharge shall be located at least 6 feet above the base flood elevation.

Uses and Activities Prohibited From Frequently Flooded Areas

1. Critical Facilities. Critical facilities are prohibited from frequently flooded areas to prevent damage to such facilities, to avoid costs that will be incurred by the public, and to maintain functionality of such facilities during flood events. If such a prohibition is unreasonable, an allowance for critical facilities in frequently flooded areas with the following specific conditions:
 - a. Construction of new critical facilities shall be permissible within frequently flooded areas if no feasible alternative site is available.
 - b. Critical facilities constructed within frequently flooded areas shall have the lowest

- floor elevated three (3) feet or more above the level of the base flood elevation (100-year flood)c. Flood proofing and sealing measures must be taken to ensure that toxic substances will not be displaced by or released into flood waters.
- c. Flood proofing and sealing measures must be taken to ensure that toxic substances will not be displaced by or released into flood waters
 - d. Access routes elevated to or above the level of the base flood elevation shall be provided to all critical facilities to the extent possible.
- 2. Wells Used for Potable Water. Water wells shall be located on high ground and are prohibited from being within the floodway.
 - 3. On-site Sewage Disposal Systems. Onsite sewage disposal systems are prohibited from the floodway, the channel migration zone, and the 100-year floodplain elevation.

On January 19, 2006, the Washington State Department of Ecology conducted a Community Assistance Visit during which Ecology audited Yelm's regulations for development within the floodplain as well as the process the Community Development Department utilizes to ensure that development is consistent with these adopted regulations.

The Department of Ecology found that Yelm's flood damage prevention regulations, as codified are "significantly compliant with the rules established under 44 CFR". The Code did need to be updated, however, the City should address several deficiencies which are 'primarily minor in scope - word changes, definitions, etc.'

Significantly, the Department of Ecology noted that 'a tour of the floodplains within the City did not result in identification of any specific development cases which would trigger a request for additional information'. This, it could be assumed, is a good reflection as to the thoroughness of the reviews performed by your permitting staff.' It is notable that the field inspection was conducted during the week of January 19, 2006, during a significant flood event.

After review and approval of the proposed amendments by the Washington State Department of Ecology, Ordinance 849 amended the Frequently Flooded Areas Chapter to conform to the Washington State Department of Ecology model Flood Damage Prevention Code.