

The City of Olympia’s Annex to the Natural Hazards Mitigation Plan for the Thurston Region

Table of Contents

Title Page and Table of Contents.....	1
Adopting Resolution	3
Community Profile	5
City of Olympia Plan Development Process.....	7
City of Olympia Risk Assessment.....	11
City of Olympia Mitigation Initiatives.....	37
City of Olympia Implementation of the National Flood Insurance Program.....	53

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RESOLUTION NO. M-1741

**A RESOLUTION OF THE CITY OF OLYMPIA, WASHINGTON
ADOPTING THE “NATURAL HAZARDS MITIGATION PLAN
FOR THE THURSTON REGION.”**

WHEREAS, areas of the City of Olympia are vulnerable to the human and economic costs of natural disasters; and

WHEREAS, the City Council of the City of Olympia realizes the importance of reducing or eliminating those vulnerabilities for the overall good and welfare of the community; and

WHEREAS, the initial plan was adopted by the Olympia City Council through Resolution M-1534 dated December 9, 2003 and must be updated every five years in order to be compliant with federal statute; and

WHEREAS, the City of Olympia has been an active participant in the plan update process through the Natural Hazards Mitigation Planning Workgroup, which have established a comprehensive, coordinated planning process to eliminate or decrease these vulnerabilities; and

WHEREAS, City of Olympia staff have identified the 2003 plan elements that have been accomplished or are no longer justified and removed them from the plan; and

WHEREAS, City of Olympia staff have identified new projects, justified both existing and new projects, and prioritized all of the projects and programs needed to mitigate the vulnerabilities of the City of Olympia to the impacts of disasters; and

WHEREAS, these proposed projects and programs have been incorporated into the Second edition of the “Natural Hazards Mitigation Plan for the Thurston Region” that has been prepared and issued for consideration and implementation by the jurisdictions and organizations of Thurston County;

NOW, THEREFORE, THE OLYMPIA CITY COUNCIL DOES HEREBY RESOLVE AS FOLLOWS:

Section 1. The City of Olympia hereby accepts and approves its designated portion of the “Natural Hazards Mitigation Plan for the Thurston Region”.

Section 2. City of Olympia staff are requested and instructed to pursue available funding opportunities for implementation of the mitigation initiatives designated therein.

Section 3. The City of Olympia will, upon receipt of such funding or other necessary resources, seek to implement the proposals contained in its section of the mitigation initiatives.

Section 4. The City of Olympia will continue to participate in the updating and expansion of the "Natural Hazards Mitigation Plan for the Thurston Region" in the years ahead.

Section 5. The City of Olympia will further seek to encourage the businesses, industries, and community groups operating within and/or for the benefit of the City of Olympia to also participate in the updating and expansion of the "Natural Hazards Mitigation Plan for the Thurston Region" in the years ahead.

APPROVED AND PASSED BY THE OLYMPIA CITY COUNCIL this 2nd day of MARCH 2010.



MAYOR

ATTEST:



CITY CLERK

APPROVED AS TO FORM:



CITY ATTORNEY *ACA*

Community Profile

City of Olympia

City info: (360) 753-8447

www.ci.olympia.wa.us



City of
OLYMPIA

Demographics

Population, 1990	33,729
Population, 2000	42,514
Population, 2008	44,800
Av. Ann. Pop. Growth, 1990-2000	2.3%
Av. Ann. Pop. Growth, 2000-2008	0.7%

Households, 2000	18,670
Average Household Size, 2000	2.21

Age Structure, 2000:

19 and under	10,279	24%
20 - 64	26,563	62%
65 and over	5,672	13%
Median Age	36	--

Race and Ethnic Categories, 2000:

White	36,246	85.3%
Black/African American	805	1.9%
American Indian & Alaska Native	553	1.3%
Asian	2,473	5.8%
Native Hawaiian & Other Pacific Islander	125	0.0%
Other Race	838	2.0%
Two or More Races	1,599	3.8%
Hispanic*	1,863	4.4%

Olympia was “the black bear place” to the Coastal Salish Indian people, who inhabited the area for centuries before Edmund Sylvester and Levi Lathrop Smith became the first Americans to permanently settle there in 1846. The town, platted in 1850, was named for the nearby Olympic Mountains. Olympia became the port of entry for Puget Sound in 1851 and county seat for Thurston County, Oregon Territory in 1852. When Washington became a separate territory from Oregon in 1853, Olympia was designated as temporary Territorial Capital, and this was made permanent in 1855. It was officially incorporated in 1859.

Despite a challenge from Tumwater and West Olympia in 1861, the city has remained the county seat, with the county courthouse located in six different sites around the city. Named state capital in 1889, the city developed around the waterfront becoming a hub of commerce and government.

Housing

Housing Units, 2000:

Single-Family	10,623
Multifamily	8,228
Manufactured Homes	787

Census Median House Value, 2000	\$143,500
Average House Sale Price, 2007	\$319,933

Employment and Income

Median Household Income:

1989 (Census 1990 in 1999 \$'s)	\$35,485
1999 (Census 2000)	\$40,846

Taxable Retail Sales, 2007 \$1,879,241,735

Households by Income Category, 1999:

Less than \$14,999	3,263	17%
\$15,000 to \$24,999	2,511	13%
\$25,000 to \$49,999	5,450	29%
\$50,000 to \$74,999	3,826	20%
\$75,000 or more	3,623	19%

Total Jobs, 2003:

Manufacturing	970
Retail	9,660
Finance/Services	19,770
Federal, State, & Local Gov't	18,040
Tribal Gov't & Enterprises	<10
Other	2,580

Development Activity

Total New Permitted Residential Units, 2007:

Single-Family	85
Multifamily	64
Manufactured Homes	0
Total	149

Subdivision Activity, 2007:

	# Appl.	# Lots
Short Plat	14	48
Long Plat	2	87

Explanation: *Person of Hispanic Origin can be of any race.
Source: TRPC, Profile 2008 (www.trpc.org).

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City of Olympia Plan Development Process

Hazard Mitigation Plan Development Staff

The City of Olympia Emergency Management Coordinator, Greg Wright attended all of the Regional Natural Hazards Workgroup meetings on behalf of the City of Olympia and coordinated local planning efforts with city staff, the Planning Commission, and the City Council.

The City of Olympia, Emergency Management Committee (EMCommittee) assisted in the preparation of the city's hazard mitigation plan. The EMCommittee is made up of members from every department in the city. Most members are lead workers or above, up to and including some department directors. The Emergency Management Committee manages the City's Comprehensive Emergency Management Plan and staffs the City's Emergency Operations Center (EOC) when activated. The EOC coordinates the City response to disaster and interfaces the response with the City Council via the City Manager. In the event of policy direction needs, the EOC requests the seating of the Policy Group made up of the city Manager and the City Council. The following personnel comprise the EMCommittee:

Department/Title	Representative(s)
Emergency Management Coordinator, Assistant Fire Chief, Project Leader	Greg Wright
Associate Planner	Brett Bures
Communications Manager	Cathie Butler
Assistant Fire Chief	Pat Dale
Line of Business Manager, Operation, Public Works	Dan Daniels
Fire Chief	Larry Dibble
City Engineer	Fran Eide
City Manager	Steve Hall
Line of Business Director, Community Planning and Development	Tom Hill
Line of Business Director, Water, Public Works	Rich Hoey
Line of Business Director, Admin Services	Debbie Krumpols
Captain, Assistant Fire Marshal, Fire Department,	Kate McDonald
Commander, Police department	Steve Nelson
Director, Human Resources	Cathy Raymond
Program Manager, Parks, Arts and Recreation	Scott River
Associate Director, Parks, Arts and Recreation	Terry Rodgers
Director, Community Planning and Development	Keith Stahley
Line of Business Director, Technical services, Public Works	Debbie Sullivan
Line of Business Director, Financial, Admin services	Dean Walz
Line of Business Director, IT, Admin Services	Shawn Ward

Hazard Mitigation Plan Development

Presentations were made to the Olympia Planning Commission and the Olympia City Council during their regular meetings. The first presentation to each group included an overview of the planning process, review of the previous plan including progress made, and a discussion of the upcoming work. In August of 2009, each group received their second briefing. This briefing included the new mitigation initiatives, the status of the past initiatives and their ranking.

The following activities supported the development and review of the City of Olympia's hazard mitigation plan:

Date	Location	Activity	Subject
September 30, 2008	Olympia City Hall	Olympia City Council	Briefing on upcoming work to be done on Hazard Mitigation Plan
March 2, 2009	Olympia City Hall	Olympia Planning Commission	Presented current status of Hazard Mitigation Plan and work being done to update plan
March 12, 2009	Olympia Fire Department	Olympia Emergency Management Committee meeting	Update Mitigation Initiatives with Emergency Management Committee
July, 2009	Olympia Fire Department	Olympia Emergency Management Committee	Ranked and edited 2009 plan Mitigation Initiatives
August 11, 2009	Olympia City Hall	Olympia City Council	The City Council approved the Mitigation Initiatives and their ranking
September 14, 2009	Olympia City Hall	Olympia Planning Commission	Review of planning concept, Update on 2009 Mitigation Initiatives and ranking, Outline of actions expected to be completed for City to adopt plan
TBA	Olympia City Hall	Olympia City Council	Review of Draft Natural Hazards Mitigation Plan and Annex
TBA	Olympia City Hall	Olympia City Council	Adopt Natural Hazards Mitigation Plan and Annex

Mitigation Initiative Prioritization Process

The Olympia EMCommittee was involved in developing the mitigation initiatives for both the 2003 plan and the 2008/2009 plan update. For the plan update, the previous mitigation initiatives were reviewed for current status and relevance. After this was completed, new mitigation initiatives were considered. This process included a review of the initiatives from the other jurisdictions' earlier plans to see if there were items that would also benefit the City of Olympia. Several of these ideas were crafted into new Mitigation Initiatives for Olympia.

The EMCommittee discussed the benefits and costs of each initiative. Members provided input based on their experience with and understanding of past disaster events and the ability of the mitigation initiatives to protect public and private property. The members ranked the initiatives by consensus. This information was presented to the Olympia Planning Commission and the Olympia City Council for their review and comment. On August 11, 2009 the Olympia City Council approved the list of mitigation initiatives and their ranked order.

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City of Olympia Risk Assessment

Introduction

The risk assessment provides information about the hazards that threaten City of Olympia. This information provides the factual basis to identify and support a strategy that can effectively mitigate the effects of the hazards that threaten this jurisdiction's safety and challenge its ability to perform essential functions.

The content and structure of this plan's risk assessment was developed using the Federal Emergency Management Agency's (FEMA) 2008 "Local Multi-Hazard Mitigation Planning Guidance." Table 1 shows the Disaster Mitigation Act (DMA) Risk Assessment Planning Requirements that must be met in order for this plan to receive a "satisfactory" score. Each of these planning requirements is met through the information contained in both the regional risk assessment and in this local annex.

Table 1: Disaster Mitigation Act Risk Assessment Planning Requirements

DMA Section	Requirement
§201.6(c)(2)(i):	[The risk assessment shall include a] description of the type ... of all natural hazards that can affect the jurisdiction ...
§201.6(c)(2)(i):	[The risk assessment shall include a] description of the ... location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.
§201.6(c)(2)(ii):	[The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.
§201.6(c)(2)(ii):	[The risk assessment in all] plans approved after October 1, 2008 must also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged by floods.
§201.6(c)(2)(ii)(A):	The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas ...
§201.6(c)(2)(ii)(B):	[The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate ...
§201.6(c)(2)(ii)(C):	[The plan should describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.
§201.6(c)(2)(iii):	For multi-jurisdictional plans, the risk assessment must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

In general the Federal DMA planning requirements with the words "**shall**" and "**must**" indicate that the item is mandatory and must be included in the plan, otherwise it will not be approved by FEMA. Regulations with the word "**should**" indicate that the item is strongly recommended to be included in the plan, but its absence will not cause FEMA to disapprove the plan.

Hazard Analysis Definitions

The adjective descriptors (High, Moderate, and Low) for each hazard's probability of occurrence, vulnerability, and risk rating are consistent with the terms used in the regional assessment.

The following terms are used in this plan to analyze and summarize the risk of the hazards that threaten this jurisdiction:

Risk Rating:

An adjective description (High, Moderate, or Low) of the overall threat posed by a hazard is assessed for the next 25 years. Risk is the subjective estimate of the combination of any given hazard's probability of occurrence and vulnerability.

- **High:** There is strong potential for a disaster of major proportions during the next 25 years; or History suggests the occurrence of multiple disasters of moderate proportions during the next 25 years.
- **Moderate:** There is medium potential for a disaster of less than major proportions during the next 25 years.
- **Low:** There is little potential for a disaster during the next 25 years.

Probability of Occurrence:

An adjective description (High, Medium, or Low) of the probability of a hazard impacting the jurisdiction 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:

Vulnerability can be expressed as combination of the severity of a natural hazard's effect and its consequential impacts to the community. An adjective description (High, Medium, or Low) of the potential impact a hazard could have on the community. It considers the population, property, commerce, infrastructure and services at risk relative to the entire jurisdiction.

- **High:** The total population, property, commerce, infrastructure and services of the community are uniformly exposed to the effects of a hazard of potentially great magnitude. In a worse case scenario, there could be a disaster of major to catastrophic proportions.



Figure 1: Risk is a subjective estimate of the combination of a hazard's probability of occurrence and a community's vulnerability.

- **Moderate:** The total population, property, commerce, infrastructure, and services of the community are exposed to the effects of a hazard of moderate influence; or The total population, property, commerce, infrastructure, and services of the community 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 community are exposed to the effects of a hazard. In a worse case scenario there could be a disaster of moderate to major, though 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 worse case scenario, there could be a disaster of minor to moderate proportions.

Summary Risk Assessment

Based on the regional risk assessment and the local risk assessment in the subsequent section, the following hazards pose the greatest threat to City of Olympia:

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

Local Risk Assessment

A comprehensive risk assessment of the major natural hazards that threaten City of Olympia was developed for this plan through the regional risk assessment process described in Chapter 4.0. The regional risk assessment and its hazard profiles serve as the foundation for this jurisdiction's risk assessment. A list of all of the potential natural hazards that could impact this jurisdiction is located in Chapter 4. Chapter 4 includes six natural hazard profiles for earthquake, storm, flood, landslide, wildland fire, and volcanic events. Each profile defines the hazard and describes its effects, severity, impacts, probability of occurrence, and historical occurrences. The regional profiles describe this jurisdiction's local vulnerabilities in terms of the portion of the jurisdictions land base or service area, population, employment, dwelling units, jurisdiction-owned assets, and critical facilities that are within each hazard zone.

This section of the plan provides additional details or explains differences where this jurisdiction's risks for each hazard vary from the risks facing the entire planning area. Maps of the hazards that affect City of Olympia are scaled to local boundaries and are included in this section.

Earthquake

Severity

The City of Olympia will be affected similar to the rest of the county with one notable exception. The downtown core is composed of many older unreinforced masonry commercial buildings and the South Capitol neighborhood is composed of many brick residences or wood residences with brick chimneys. These buildings have historically suffered more damage than residential structures without brick chimneys and newer commercial construction.

Impacts

Infrastructural failures can result in loss of public and private sector services and business. Communities are likely to face communication, electricity, motor fuel, and natural gas disruptions. Structural fires are a secondary hazard from earthquake destruction. Individuals and households maybe displaced due to damaged homes. A subsequent economic downturn would likely result from major transportation disruptions and loss of revenue from suspended business and services. In the Puget Sound Region, and Olympia specifically, older unreinforced masonry structures such as buildings, walls, chimneys, and facades are vulnerable to crumbling from ground shaking. Areas with soft soils, such as downtown Olympia and adjacent neighborhoods have experienced these types of destruction during the 1949, 1965, and 2001 earthquakes.

Probability of Occurrence

The probability of an earthquake affecting the City of Olympia is identical to that of the rest of Thurston County but the concentration of buildings and population in the city may lead to increased impacts compared to the rest of the county.

Historical Occurrences and Impacts Specific to this Jurisdiction

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 the 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. Unreinforced brick masonry buildings with un-braced parapets and without wall anchors were particularly vulnerable, resulting in several collapses. In many cases, fallen brick resulted in damage to objects, such as cars and canopies, outside the building. This type of damage mirrored the damage of the 1949 Olympia earthquake.

Most buildings performed well from a life-safety standpoint, in that the limited structural damage that occurred caused no loss of life or collapse. However, the economic cost of nonstructural damage, i.e., damage to nonessential building elements, such as architectural features, ceiling failures, shifting of equipment, fallen furniture/shelving, desktop computer damage, fallen light

fixtures, and losses due to lost productivity, was high. In general, new buildings and buildings that had recently been seismically upgraded typically displayed good structural performance, but many still sustained non-structural damage. In Olympia, 27 buildings were closed immediately following the earthquake. Several of the government buildings in Olympia, including the capitol, were significantly damaged. Other state agency buildings were closed for inspection and repair. The 74 year-old capitol dome sustained a deep crack in its limestone exterior and damage to supporting columns. There were a number of other non-structural damage areas throughout the Legislative Building. Previously scheduled renovation of the building was started early to accommodate \$20 - \$22 million in earthquake repairs and seismic upgrades.

Damage to residences came in a variety of forms, from severe mudslide destruction of entire houses to breakage of replaceable personal property. The most common damage was to chimneys. FEMA records indicate that one-third of the 30,000 homes inspected by FEMA sustained chimney damage. In the City of Olympia, chimney damage in the South Capitol neighborhood was the most concentrated of anywhere in Puget Sound. The 40-80-foot depth of loosely consolidated soils and gravel found in the South Capitol neighborhood of Olympia serves as a conduit for earthquake energy that is particularly hard on single-family homes.

The 4th Avenue Bridge in Olympia was one of four bridges in the state to suffer substantial damage from the quake. Constructed in 1920 and retrofitted after the 1949 earthquake, the bridge had been scheduled for replacement even before the 2001 earthquake. The closure of the bridge severely restricted access to downtown Olympia and the City's west side. Replacing the bridge and connecting infrastructure cost \$39 million; the largest public works endeavor in the city's history. According to the State, the Deschutes Parkway in Olympia suffered the most damage of any road in the state. Waterlogged soil under the road liquefied during the shaking. Huge voids were created beneath portions of the concrete road surface. Sections of road and sidewalk buckled from the force of the earthquake. This road, a vital link between downtown Olympia, the city's west side and Tumwater, was closed to traffic for 20 months. Preliminary estimates to fix the road were put at \$7 million.

A number of landslides occurred. Most of these slides occurred in natural materials, including a 400 foot slide on the northeast side of Capitol Lake. Other slides occurred in engineered fills, particularly at locations where they spanned low-lying areas of natural soils. With the exception of transportation systems, lifeline systems generally performed well during the earthquake. Lifeline systems include water, wastewater, electrical power, communications, natural gas, and liquid fuels, and transportation systems. The impact of lifeline damage was in most cases minimal. Puget Sound Energy reported 200,000 customer power outages, and Seattle City Light reported 17,000 outages, but power was restored to most within a day. Landline and wireless communication systems were extremely overloaded immediately following the earthquake.

Only five of the state's 290 dams were found to have earthquake-related damage. One of these was the McAllister Springs Reservoir Dam, property of the City of Olympia, in Thurston County.

April 29, 1965, Federal Disaster 196: Seattle Tacoma Earthquake

A magnitude 6.5 earthquake struck the Puget Sound Region at 7:28 a.m.. The epicenter was located about 12 miles north of Tacoma at a depth of about 40 miles. In Olympia, the Union Pacific Railroad reported a hillside fill slid away from beneath a 400-foot section of a branch line just outside Olympia. Damage to the legislative building forced the closure of the legislative session. Governor Dan Evans closed the Capitol Campus and state government operations came to a standstill except for retention of key personnel and critical services. In the Temple of Justice, cracks developed in the walls of the law library; a cabinet tipped over; books scattered around the floors; pictures fell from walls. In the Legislative Building, there was a crack about 3-feet long on the inside of the inner dome of the rotunda. The 5-ton chandelier in the Capitol Building swung like a pendulum clock on its 110-foot chain in a 1-foot orbit for half an hour after the shock. The new post office was damaged considerably and ordered closed. A road around Capitol Lake, at the base of the Capitol complex, was damaged, allowing water to flow beneath the road. St. Peters Hospital reported four persons were treated for minor injuries. Damage to light fixtures and elevator shafts in the Capitol Building was about \$200,000; damage to the road and railroad was estimated at the same amount. Chimney and interior plaster damage occurred throughout Olympia, but the greatest damage occurred in the area between 15th Avenue and 20th Avenue and between Capitol Way and Cherry Street.

April 13, 1949, Olympia Earthquake

A magnitude 7.1 earthquake rattled the region at 11:55 a.m. The epicenter was located about eight miles north-northeast of Olympia. Property damage for the Puget Sound Region likely exceeded \$25 million (1949 dollars). Eight capitol buildings in Olympia were damaged with a loss of two million dollars. Two deaths occurred. Nearly all large buildings in Olympia were damaged through cracked or fallen walls and plaster. Two large smokestacks and many chimneys fell. Streets were damaged extensively. Water and gas mains were broken. A large portion of a sandy spit jutting into Puget Sound north of the city disappeared completely during the earthquake.

Summary Assessment

History suggests a high probability of occurrence of another damaging earthquake sometime in the next 25 years. With the 2001 Nisqually earthquake still fresh in the region's memory, it is important to note that it was not the largest earthquake event possible in the Puget Sound region. It is conceivable that a similar magnitude earthquake could emanate from a shallow crustal fault which would result in much greater damages. Damage from the 1949, 1965, and 2001 earthquakes indicate that an earthquake of a greater magnitude would have a catastrophic impact on the City of Olympia and Thurston County. Considering that a large population lives and works in higher risk earthquake hazard areas, the entire region has a high vulnerability rating. Accordingly, a high risk rating is assigned.

Summary Risk Assessment for Earthquake in City of Olympia

Probability of Occurrence	Vulnerability	Risk
High	High	High

Storm

Severity

Severity information for storms in Thurston county is mirrored within the City of Olympia. It has been noted in recent severe weather events such as the December storms of 2006 and 2007 that the west side of Olympia may receive greater impact from wind and rain events than other portions of the city.

Impacts

Impacts of storms will have a similar effect on the City of Olympia as detailed in the Regional Risk Assessment.

Probability of Occurrence

The probability of storms for the City of Olympia is essentially the same as detailed in the Regional Risk Assessment.

Historical Occurrences and Impacts Specific to this Jurisdiction

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

December 12-27, 2008, Federal Disaster 1825: Severe Winter Storm

Near record snowfalls, freezing rain, and rain combined with sustained subfreezing temperatures froze the Thurston Region for a period of nearly two weeks making it one of the worst snow laden winter storms in decades. Successive snowfall over the first week resulted in 18 to 20 inch depths in the Lacey, Olympia, and Tumwater area. Depths of 36 inches were reported by some county residents at higher elevations outside of city limits. Governor Gregoire declared a state of emergency on December 24. On March 2, a Presidential Disaster Declaration was declared for 27 Area schools closed three days prior to Christmas break. Thurston County closed its offices on December 18 and 22. Other local governments and colleges also closed their offices entirely or had delayed openings or early closures due to road conditions.

On December 25, a 2500 square foot section of Capital High School's roof, on Olympia's westside, collapsed from the strain of the snow load. Overhead fire sprinklers were activated and caused water damage to parts of the school's interior including the library. A natural gas pipe rupture contributed to a week delay of the school's reopening after Christmas break. Overall repair costs may exceed \$7 million.

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

Snow followed by heavy rain and winds caused record flooding on the Chehalis River. The Deschutes and Black rivers rose above their banks. Communities experienced stream and urbanflooding and flash flood conditions in the Capital Hills and Capital Forest resulted in

washouts, landslides, and urban flooding on major intersections in Olympia's west side. See flood and landslide hazard profiles for more details on this event.

October 18, 2007 Windstorm

The Olympian reported that wind gusts of 44 mph knocked down trees and power lines across Thurston County causing scattered power outages in mostly rural areas. The City of Olympia closed its parks as an emergency measure. A power line fell on an Olympia School District bus en route to pick up students; the driver was not injured.

January 5, 2007 Windstorm

Sustained winds of 22 mph and a peak gust of 40 mph toppled trees and disrupted power for about 9,500 households in Thurston County.

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

The December 14-15 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 October 12, 1962. The Hanukkah eve storm achieved sustained winds of 36 mph and gusts of 53 mph as recorded at the Olympia Airport weather station before it lost power. KGY Radio, located on Budd Inlet, reported wind gust of 78 mph at 12:30 a.m. on the 15th.

- In the City of Olympia, 13 residences were red-tagged and six were yellow-tagged.
- The power outage affected gasoline, water, sewage and solid waste disposal facilities. City water and sewage pump stations had to be powered by generators or other means of backup power.

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

On November 6, 3.4 inches of rain fell; a 24 hour rainfall record for the day the year. The Heavy rains caused flooding of urban roads and streets throughout the Thurston Region. Preliminary damage assessments for personal and business property damage exceeded \$300,000.

January 6, 2004 Snow Storm

Six to nine inches of snow fell around Thurston County. Area schools and some businesses closed for up to three days.

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

Snow, ice, and freezing rain crippled Thurston County on December 26. 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. Downed power lines ignited four tree fires in the Tumwater Hill neighborhood. Sub-freezing temperatures and power outages persisted for over a week into early January

December 12, 1995 Windstorm

A windstorm caused widespread destruction from northern California to British Columbia. Wind gust of 57 mph rattled the Thurston Region causing widespread power outages to nearly 45,000 households and businesses. Road closures from fallen trees and limbs forced the closure of many local and state government offices and area businesses.

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 at the Olympia Airport weather station. The power outage forced the LOTT Wastewater Treatment Plant in Olympia to discharge nearly 1.3 million gallons of barely treated wastewater into Budd Inlet. Customers flooded local area stores for provisions creating shortages in batteries, candles, and bottled water.

November 14-15, 1981 Windstorms

Two back to back windstorms brought winds with peak gusts of 64 mph to the region over a two day period resulting in power outages for 60,000 households and businesses in the county. Nearly 150 boats broke loose from marinas in Budd Inlet. An estimated \$3.4 million was reported in private property damages.

Summary Assessment

The probability of storm occurrence varies, but winter storms frequently pack several hazardous elements across a period of consecutive days or weeks, therefore the overall probability of winter storm occurrence is high. The overall impacts described in both the hazard profile and the brief record of historical occurrences demonstrates that the city's vulnerability is moderate. The overall risk rating for severe winter storms is moderate.

Summary Risk Assessment for Storm in City of Olympia

Probability of Occurrence	Vulnerability	Risk
High	Moderate	Moderate

Flood

Severity

Many factors influence the severity of riverine flooding such as the pre-existing condition of the ground (saturated from previous rain, covered with snow, or frozen), the topography and size of the watershed, freezing level, and the influence of human activity on the landscape (development and logging practices). The City of Olympia experiences localized urban flooding in certain areas depending on rainfall conditions. These situations are typically noted on the west side of Olympia are tied to Storms. (See Storm section of Risk Assessment). The City of Olympia also experiences downtown flooding at Capitol Lake associated with the Deschutes River.

The Deschutes River is a 53 mile long lowland river that gives rise within Mt. Baker-Snoqualmie National Forest in north Lewis County. The river is located in the Deschutes Watershed (WRIA #13) and locally within the Budd/Deschutes Watershed. The Deschutes lies to the west of the Nisqually River and flows in a parallel pattern to the Nisqually River. The river mostly follows a natural course northwest through unincorporated Thurston County.

The Deschutes is the fastest rising and falling river in Thurston County. It respond quickly to local rainfall and runoff.² The river is significant to the region as it is within the watershed which encompasses a great majority of the land area for the cities of Lacey, Olympia, and Tumwater.

The Deschutes river flows into Capitol Lake in Olympia before flowing into southern Puget Sound at Budd Inlet. Capitol Lake is an artificial lake formed by a small dam at the north end of the lake in downtown Olympia. The dam is regulated by the Washington State Department of General Administration and exists to create a freshwater lake to complement the Capitol Campus parks and grounds. Percival Creek joins the Deschutes River in Capitol Lake's central basin, near Marathon Park, just north of Interstate 5. When the tides and lake water level conditions permit the opening of the dam's radial gate, the Deschutes River drains into Budd Inlet.

Sediments that are carried down river are slowly accumulating on the lake bottom and effectively decreasing the lake's capacity. A multi-stakeholder study has been underway to evaluate how the mouth of the Deschutes River will ultimately interface with Budd Inlet and be managed within a heavily developed urban environment. This study is evaluating the environmental, social, and economic implications for variety of long-term management alternatives. Any final decision will certainly have implications for flood management at the lowest end of the Deschutes River.

Extremely high tides combined with low atmospheric pressure, excessive runoff, or strong northerly winds, can lead to either localized or general tidal flooding in coastal areas. Spring tides, the highest tides during any month, occur with each full and new moon. When these coincide with a northerly wind piling water in south Puget Sound, tidal flooding can occur.

Severity

Tidal flooding by itself does not produce major flooding in the region. However, tidal flooding will become more severe in the second half of the 21st Century if sea level rise projections, as forecasted by climate change models, occur.

Refer to the Climate Change discussion for more information on the impacts of sea level rise in downtown Olympia and unincorporated Thurston County.

High tides influence the timing of dam water release from Capitol Lake near 5th Avenue in downtown Olympia. A protective earthen berm was constructed around the north and eastern perimeter of Heritage Park to prevent major flood waters from flowing into downtown from Capitol Lake. However, when the Deschutes River experiences major flooding and a high tide prohibits discharge of lake water into Budd Inlet, it is plausible that floodwaters could crest the lake's bank at the southeast end of the north basin and flow into downtown Olympia along the utility road between the Capitol Campus Steam Plant and Water Street.⁴

Various amounts of flooding are experienced in the downtown Olympia area when high flows on the Deschutes River coincide with high tides.

Impacts

Flood damage in downtown Olympia renders businesses unsafe for occupancy and displaces normal traffic patterns and commerce around Capitol Lake. As these floods occur mostly during the winter months, the impact of these floods on the recreating public using heritage Park along Capitol Lake is less impacting than if the flooding were to happen during other parts of the year. Typically these events resolve as soon as the tides go down and/or the river flow returns to more normal levels. The damage done to businesses and the disruption to normal patterns of traffic and commerce can last significantly longer than the actual flooding event.

A protective earthen berm was constructed around the north and eastern perimeter of Heritage Park to prevent major flood waters from flowing into downtown from Capitol Lake. However, when the Deschutes River experiences major flooding and a high tide prohibits discharge of lake water into Budd Inlet, it is plausible that floodwaters could crest the lake's bank at the southeast end of the north basin and flow into downtown Olympia along the utility road between the Capitol Campus Steam Plant and Water Street.⁴

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 41 years (1968 to 2009), the Deschutes River is likely to experience a major flood about every 4 to 4.5 years.

Overall, this data clearly indicates that the probability of occurrence of major flood events in Olympia is high.

Historical Occurrences and Impacts Specific to this Jurisdiction

A partial list of recent flooding events affecting the Thurston Region and the City of Olympia 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, making it the second worst flood level in the River’s recorded history. The heavy rains entering the sewer system in Olympia forced the LOTT Alliance to discharge 6.3 million gallons of partially treated wastewater from its Budd Inlet Sewer Treatment Plant via its emergency outfall at the Fiddlehead Marina.

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 caused major flooding throughout southwest Washington. Heavy rainfall and melting snow resulted in record flooding. The Deschutes and Black rivers also rose above their banks. The Deschutes River crested 2.75 feet above flood stage near Rainier.

Nearly ten inches of rain fell on the City of Olympia’s west side resulting in the worst urban flooding ever experienced on the City’s west side. On the morning of December 3, 2007 during the peak commute period, the west side of Olympia experienced major traffic backups for hours due to road closures. One of the highest traffic volume intersections in the region, Cooper Point Road and Black Lake Boulevard off of Highway 101, experienced major flooding resulting in permanent damage to the signal controller. Several motorists attempted to drive through the water only to become stranded and forced to abandon their vehicles. Some vehicles were eventually completely submerged. The Percival Creek Bridge on Cooper Point Road also experienced inundation forcing its closure. Several businesses on Olympia’s west side were affected by floodwaters and power outages. Puget Sound Energy turned off power as a safety precaution requiring businesses to temporarily close their doors. The Woodshed, a furniture retailer, lost their entire inventory to three feet of water. Replacement cost was estimated at \$250,000.

On December 3, the LOTT Alliance’s Budd Inlet Sewer Treatment Plant was forced to discharge untreated wastewater into Budd Inlet due to the enormous volume of rainfall and runoff. At its peak, an estimated 1 million gallons per hour bypassed treatment processes and was sent through the emergency outfall near Fiddlehead Marina.

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

The year 1996 was the third wettest year of the 20th Century and December was especially wet, receiving over twice its normal monthly rainfall. The Deschutes River at Rainier crested at

17.01 feet, six feet over flood stage – setting the flood record. Major flooding also occurred on the Nisqually, Deschutes, Skookumchuck, and Chehalis rivers. Portions of downtown Olympia experienced urban flooding.

Summary Assessment

The history of major flooding within the Thurston Region clearly demonstrates a high probability of future occurrence. The picture is nearly identical for the City of Olympia except for the history of potential life threat. Although the vulnerability is moderate, the frequency of flooding, the potential for simultaneous flooding events, plus the historical record of recurrent flooding and cumulative costs, all lead to the assignment of a moderate risk rating.

Summary Risk Assessment for Flood in City of Olympia

Probability of Occurrence	Vulnerability	Risk
High	Moderate	Moderate

Landslide

Severity

There is no standard approach to measure the severity of a landslide. Severity can be measured in total cost of damages, impacts to transportation or utility systems, or in terms of injuries and fatalities. The severity of a landslide can also be measured in terms of its size and composition: from a thin mass of soil a few yards wide to deep-seated bedrock slides miles across. The travel rate of a landslide can range from a few inches per month to many feet per second depending on the slope, type of material, and moisture content.

Impacts

The impacts of landslide hazards in Thurston County are numerous. Landslides can injure or kill people caught in the path of rapid moving earth. No deaths have occurred from a landslide in Thurston County.

Probability of Occurrence

Landslides are rare in the City of Olympia.

Historical Occurrences and Impacts Specific to this Jurisdiction

Two small slides were reported after the 2001, Nisqually Earthquake. One slide was near the west end of the 4th avenue bridge and the second has above Capitol Lake adjacent to Capitol Way overlooking the upper end of the upper basin.

Summary Assessment

Because landslides are frequently triggered by heavy rains and are almost guaranteed to occur with destructive earthquakes, landslides are assigned a moderate probability of occurrence in Olympia. Although there are exceptions, such as the Carlyon Beach landslide, landslides tend to occur in isolated, sparsely developed areas threatening individual structures and remote sections of the transportation, energy, and communications infrastructure suggesting low vulnerability. Because of the high probability of occurrence and low vulnerability, Olympia has assigned a moderate risk rating.

Summary Risk Assessment for Landslide in City of Olympia

Probability of Occurrence	Vulnerability	Risk
Moderate	Low	Moderate

Wildland Fire

Severity

Severity of wildfire in Olympia is limited by the lack of significant urban interface areas within the city. The only exception to this are some areas on the west side of Olympia and in Watershed and Priest Point Parks.

Impacts

Wildfire in the aforementioned areas of the west side of Olympia and Watershed and Priest Point Park could have significant impacts on those specific areas. Areas of the west side of Olympia that are considered interface will continue to decline as in-filling within the city boundaries and within the Urban growth Boundaries continues to take place.

Probability of Occurrence

The probability of wildfire in the city of Olympia is significantly lower than in the Thurston Region.

Historical Occurrences and Impacts Specific to this Jurisdiction

None

Summary Assessment

The City of Olympia has a low probability of occurrence, a low vulnerability, and therefore a low risk of wildfire.

Summary Risk Assessment for Wildland Fire in City of Olympia

Probability of Occurrence	Vulnerability	Risk
High	Moderate	Moderate

Volcanic Hazards

Severity

Mount Rainier is only 22 miles from the border of south east Thurston County. With the right winds, the entire County could conceivably be blanketed with ash. The severity of the hazard would depend on the thickness of the ash deposition. The 1980 eruption of Mount St. Helens blew an ash column 15 miles into the atmosphere above the crater. Over the course of the day of the eruption, nearly 540 million tons of ash was blown by winds to the east.⁴ Fallout from the ash created complete darkness in Spokane, nearly 250 miles away; dropping one half inch of ash only a few hours after the start of the eruption. Light accumulations of ash were noted in Olympia.

Lahar flows are not anticipated to pose a direct risk to the city of Olympia as the river systems that might be affected by, and/or channel the Lahar do not enter or border the city.

Impacts

Ash fall of a quarter inch or more will reduce motorists' visibility and disrupt nearly every mode of transportation. Wet ash could create hazardous driving conditions and result in traffic injuries or fatalities. Inhalation of ash particles could cause respiratory irritation and pose more serious problems for people with asthma or other respiratory diseases, but this could be mitigated by simply avoiding exposure. Ash fall of just a few inches in depth could exceed the load capacity of some building rooftops and lead to structural failure. Failure could occur with lower depths if ash absorbed subsequent precipitation. Wet ash has been known to cause power lines to short out. Clean up and recovery would likely be the greatest cost to both the public and private sector.

Probability of Occurrence

The United States Geological Survey reports that Mount Rainier has only produced moderate quantities of ash in past eruptions. The eruption of Mount St. Helens in 1980 did deposit a scant layer of ash in Thurston County, but the fallout did not pose a significant hazard to the region. Thurston County winds prevail from the south and west, therefore ash is more likely to fall on the east side of the Cascades than the west side. If Mount Rainier or Mount St. Helens were to erupt, a resultant ash plume would require an easterly wind to deposit ash in Thurston County. The USGS calculated that the annual probability for a significant ash deposit of one centimeter or greater in Olympia is 0.01 percent. This hazard has a low probability of occurrence.

Historical Occurrences and Impacts Specific to this Jurisdiction

No significant historical impacts.

Summary Assessment

Under certain wind conditions a tephra fall could adversely affect the entire county. The effects would not pose immediate life threatening conditions to the population, but the clean up and recovery costs could be significant. Therefore the region is moderately vulnerable to a tephra fall. The probability of ash deposition is very low, so overall the risk of ash fall to the City of Olympia is low.

Summary Risk Assessment for Volcanic Events in City of Olympia

Probability of Occurrence	Vulnerability	Risk
Low	Moderate	Low

If no protective measures are taken to mitigate the effects of sea level rise, the following impacts for downtown Olympia can be expected:

- A one-foot sea level rise could result in localized flooding on some city streets and low lying structures during extreme high tides (occur once or twice a year).
- A two-foot sea level rise combined with a high tide would overwhelm some stormwater utility pipes' ability to handle run-off from storm events causing more widespread flooding. Higher sea levels could cause a reverse flow in stormwater drainage systems resulting in sea water flowing out of some street drains onto city streets.
- A three foot-rise would cause seawater to crest over some shoreline segments during extreme high tides and flood a large portion of the downtown. Higher sea levels could further lead to seawater infiltrating wastewater pipes through infiltration and flows into combined storm drains and stress the treatment capacity of the region's LOTT wastewater treatment facility.

The interim findings for sea level rise included in "HB 1303 Interim Report: A Comprehensive Assessment of the Impacts of Climate Change on the State of Washington," identifies potential impacts to the downtown Olympia waterfront. The Olympia port peninsula is built on fill at low elevations and is vulnerable to substantial flooding under a two-foot sea level rise scenario. The LOTT wastewater treatment facility and the Cascade Pole hazardous waste clean-up site are both above the coastal flood zone even at a four-foot sea level rise scenario, but the report states that these properties may be at risk from "storm surge and wind driven waves."

The City of Olympia's primary source of drinking water, McAllister Springs is at risk of salt water intrusion from a rise in sea levels. Eighty-four percent of the city's water comes from this spring located outside of city limits in northeast Thurston County, south of the Nisqually River Delta. The city is already taking steps to mitigate contamination by relocating its primary water source to a more protected location at the McAllister Wellfield site, upland from the current spring.

Projected Sea Level Rise Impacts to Low-Lying Infrastructure around Capitol Lake

Washington State Department of General Administration (GA) is responsible for the management of Capitol Lake. A study was conducted to evaluate the effects of sea level rise on low-lying infrastructure in the vicinity of Capitol Lake for both the current Lake (management) Alternative and for an Estuary Alternative, whereby the lake is converted back to an estuary. The study evaluated utilities, transportation, parks, and individual buildings and proposed mitigation measures for affected structures. The study identified the following infrastructure as vulnerable to sea level rise:

1. Deschutes Parkway, BNSF Crossing/Marathon Park Vicinity

Though this road is a State owned facility, managed by GA, it is one of the few public routes within the City of Olympia that provides connectivity between west Olympian, the County Courthouse complex and downtown. Under the Lake Alternative, this low lying section of parkway would flood during a 100-year flood event with a one-foot sea level rise. The same segment would be adversely affected by a six inch sea level rise without a flood event under the estuary scenario. Initial estimates to raise this section of the parkway with associated utility improvements would cost \$4 million for either alternative.

2. The Percival Cove Bridge, Deschutes Parkway

This bridge is part of Deschutes Parkway and is also managed by GA. Under the Estuary Alternative, the underside of the bridge would lie within the 2-year flood plain zone, and within the splash zone for high spring tides. The authors assume that the bridge superstructure would be protected with protective coatings, but no cost estimate was included in the report for this measure.

3. Burlington Northern Santa Fe (BNSF) Railroad Company Railroad Trestle

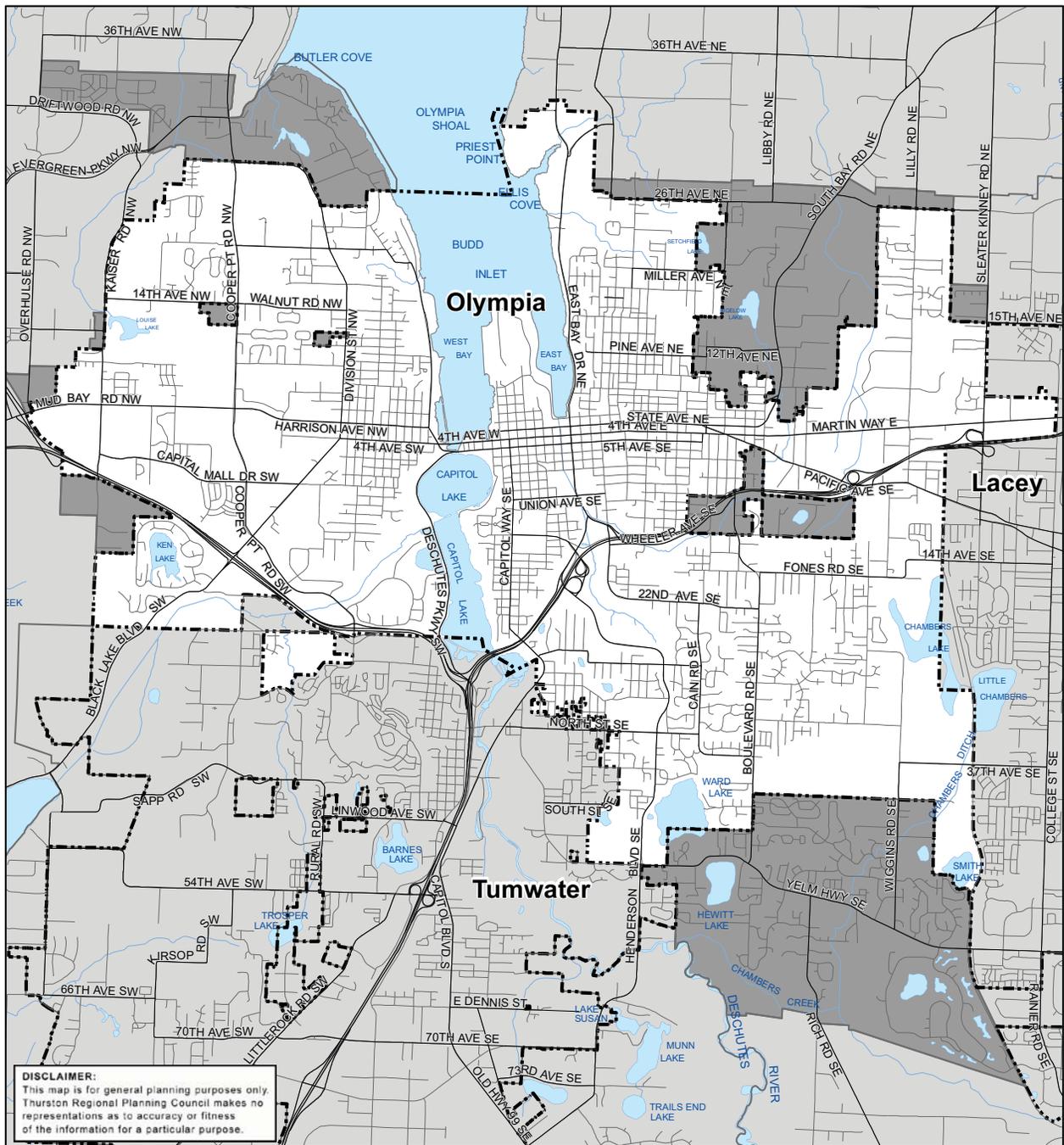
This railroad bridge is critical for connecting freight customers in the Mottman Industrial area, in the City of Tumwater, with rail service to the mainline or the Port of Olympia. BNSF owns this structure, but Tacoma Rail provides rail service along this route. Under the Lake Alternative, the twenty-five year flood elevation reaches within one foot of the top of the railroad tracks with a one- to two-foot elevation in sea-level rise (2 feet above the 100-year floodplain elevation is preferred). Under the Estuary Alternative, this flood elevation is reached with a sea level rise between six inches and one-foot. The initial cost estimates to replace the trestle, and provide transition tracks on both ends of the bridge to meet existing tracks, is \$8 million to \$9 million for either alternative. The study's authors assume the bridge would be rebuilt when sea level reaches a point where it threatens the bridge's operations. The authors also assume that the railroad tracks that cross Deschutes Parkway would be reconstructed the same time that Deschutes Parkway is elevated.

4. Capitol Lake Vicinity Parks

Marathon and Capitol Lake Interpretive State Parks, managed by GA, and Tumwater Historical Park, owned by the City of Tumwater, are all currently vulnerable to episodic flooding whether or not sea level rise increases under either management alternative. Occasional flooding of the trails in these parks may be acceptable. The parking and the restroom at Marathon Park could be afforded protection from sea level rise flood risks by a perimeter dike when conditions necessitate mitigation. Initial cost estimates for this measure is around \$100,000. The Old Broomhouse on the east bank of the south basin of Capitol Lake lies within the 100-year flood plain. This structure will be vulnerable to increased flood risk from a one- to two foot sea level rise. Should this building ever be restored for public and or private use, the study's authors recommend protecting the structure with a perimeter dike. Initial cost estimates for this measure is \$500,000.

Summary Risk Assessment for Climate Change in the City of Olympia

Probability of Occurrence	Vulnerability	Risk
Unknown	High	Unknown



DISCLAIMER:
 This map is for general planning purposes only. Thurston Regional Planning Council makes no representations as to accuracy or fitness of the information for a particular purpose.

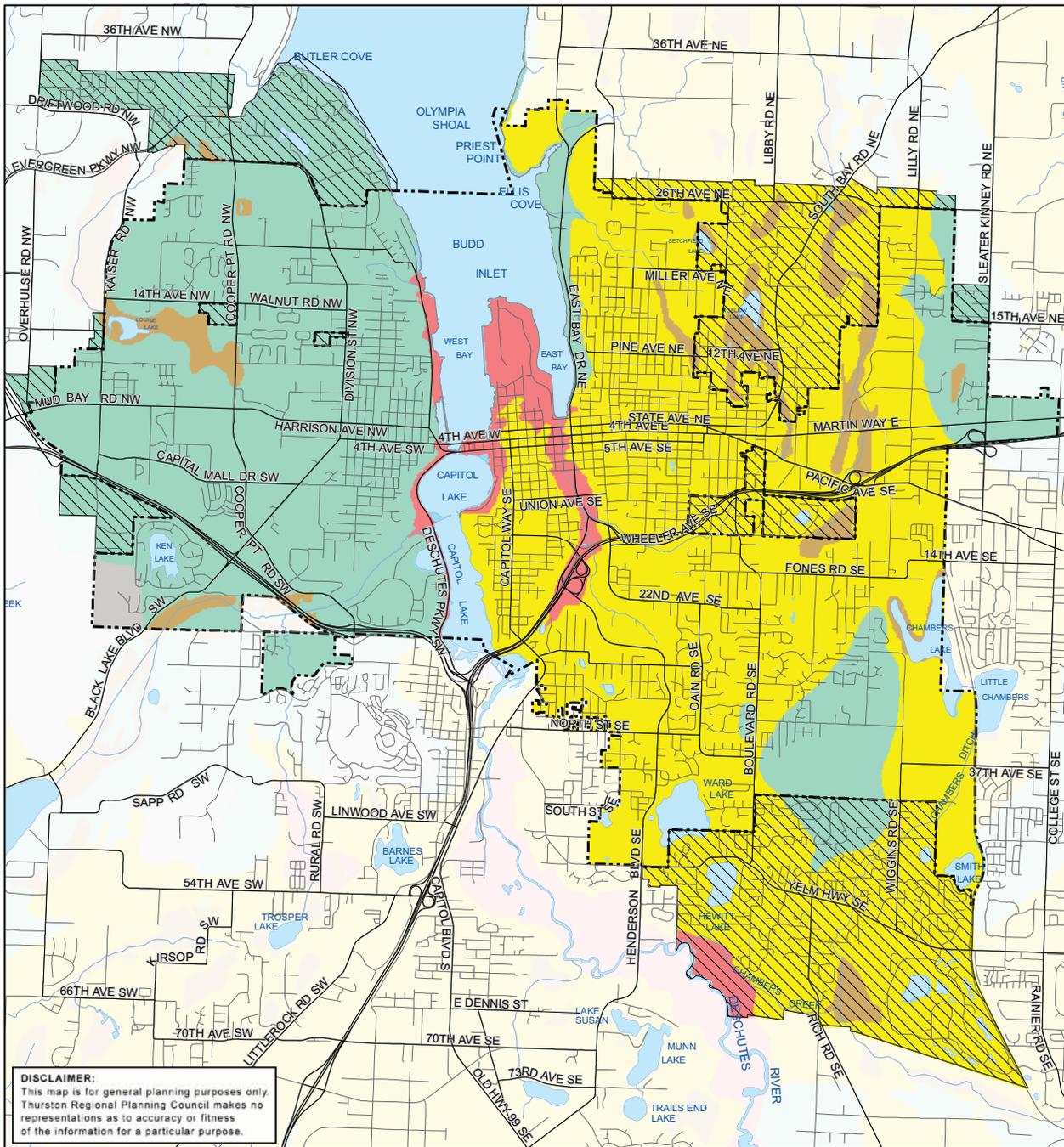


City of Olympia

- City of Olympia
- City Limits
- Urban Growth Boundary



Printing Date: April 24, 2009
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City of Olympia Liquefaction Hazards



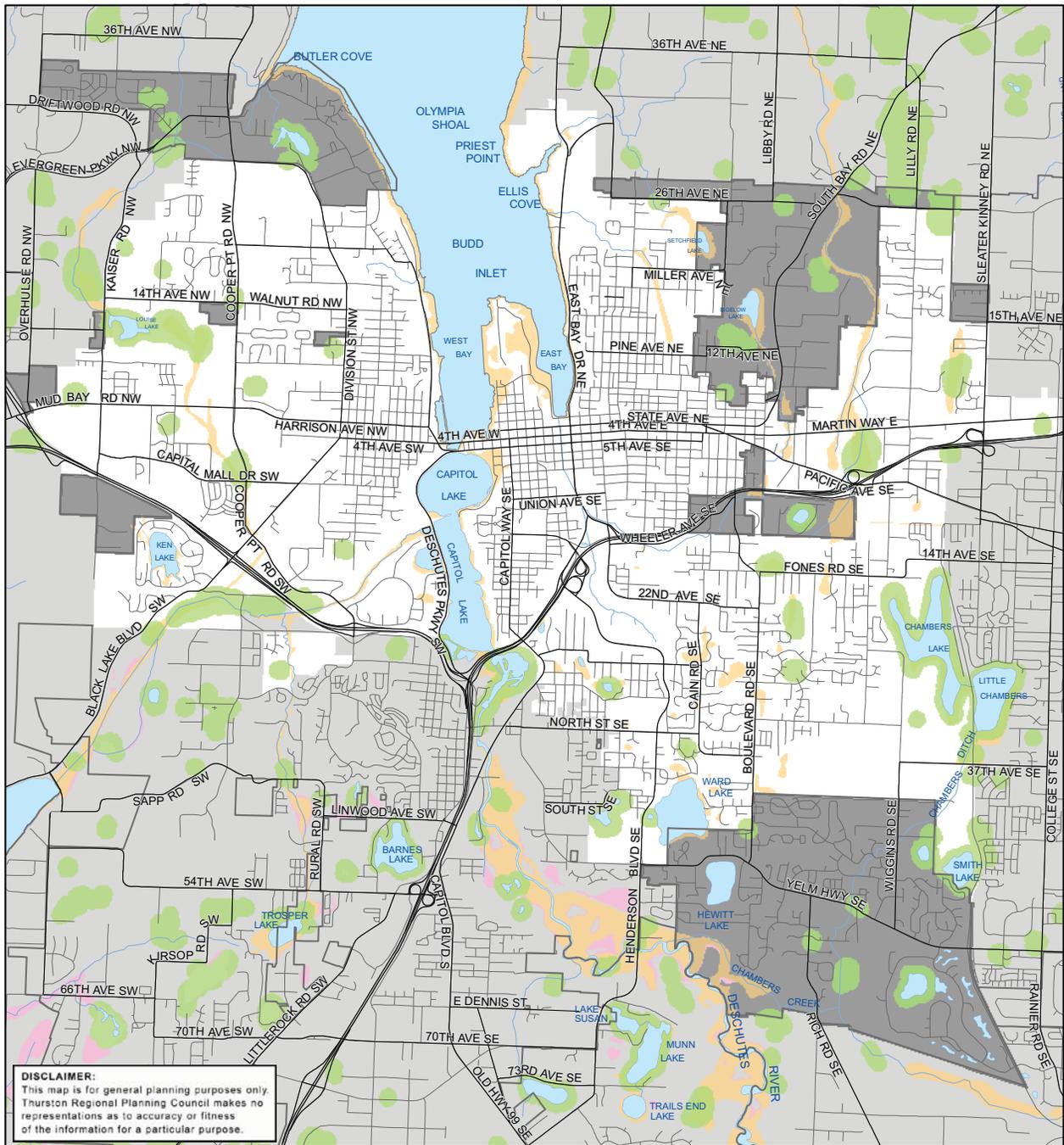
- Urban Growth Boundary
- City Limits

- high
- moderate to high
- low to moderate
- low
- very low to low
- very low
- bedrock
- peat
- water



1 0.5 0 1 Miles

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City of Olympia Flood Hazards

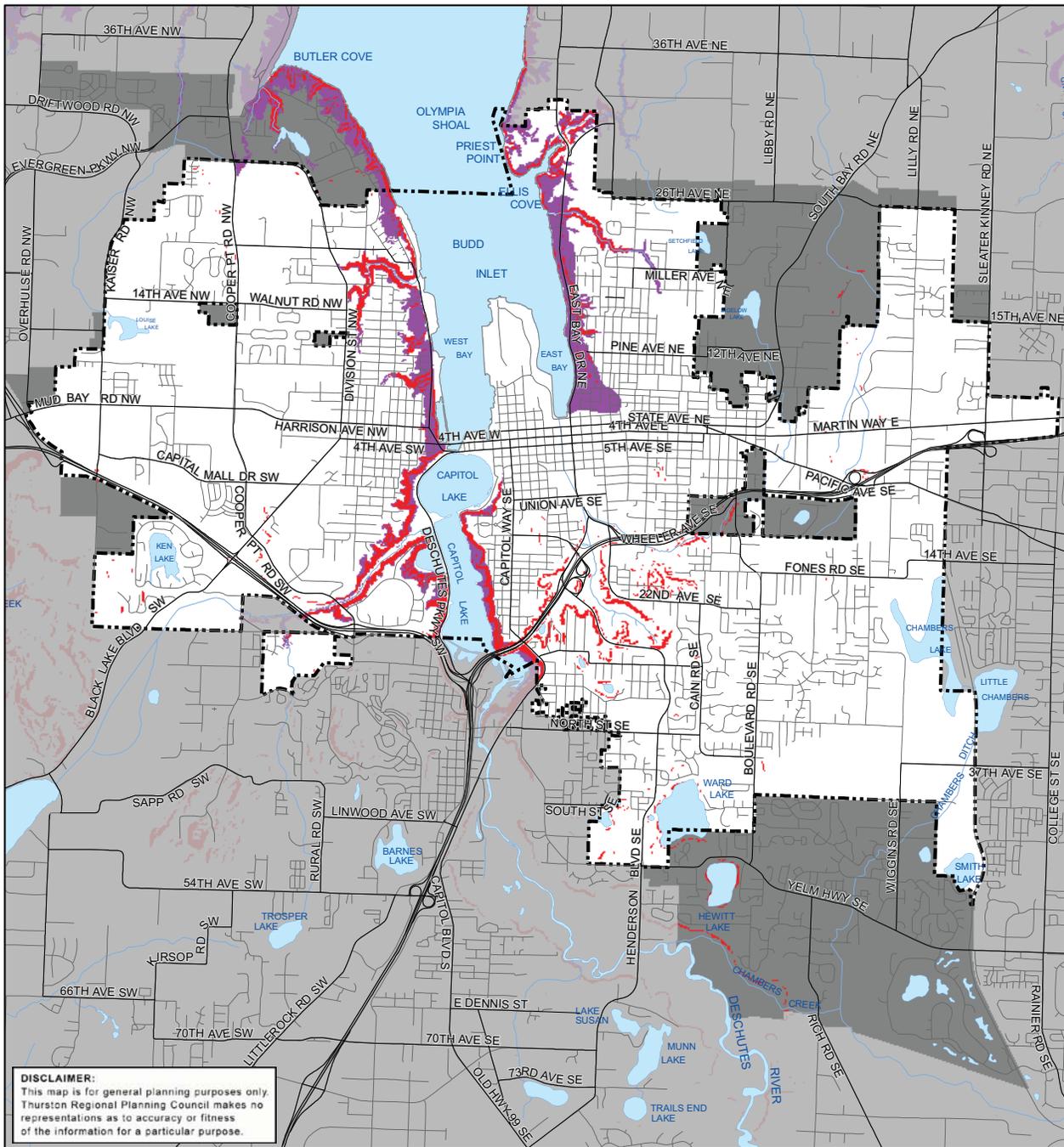


- High Groundwater Flooding
- 100 Year Floodplain
- 500 Year Floodplain
- Urban Growth Boundary
- City of Olympia



1 0.5 0 1 Miles

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City of Olympia Steep Slopes

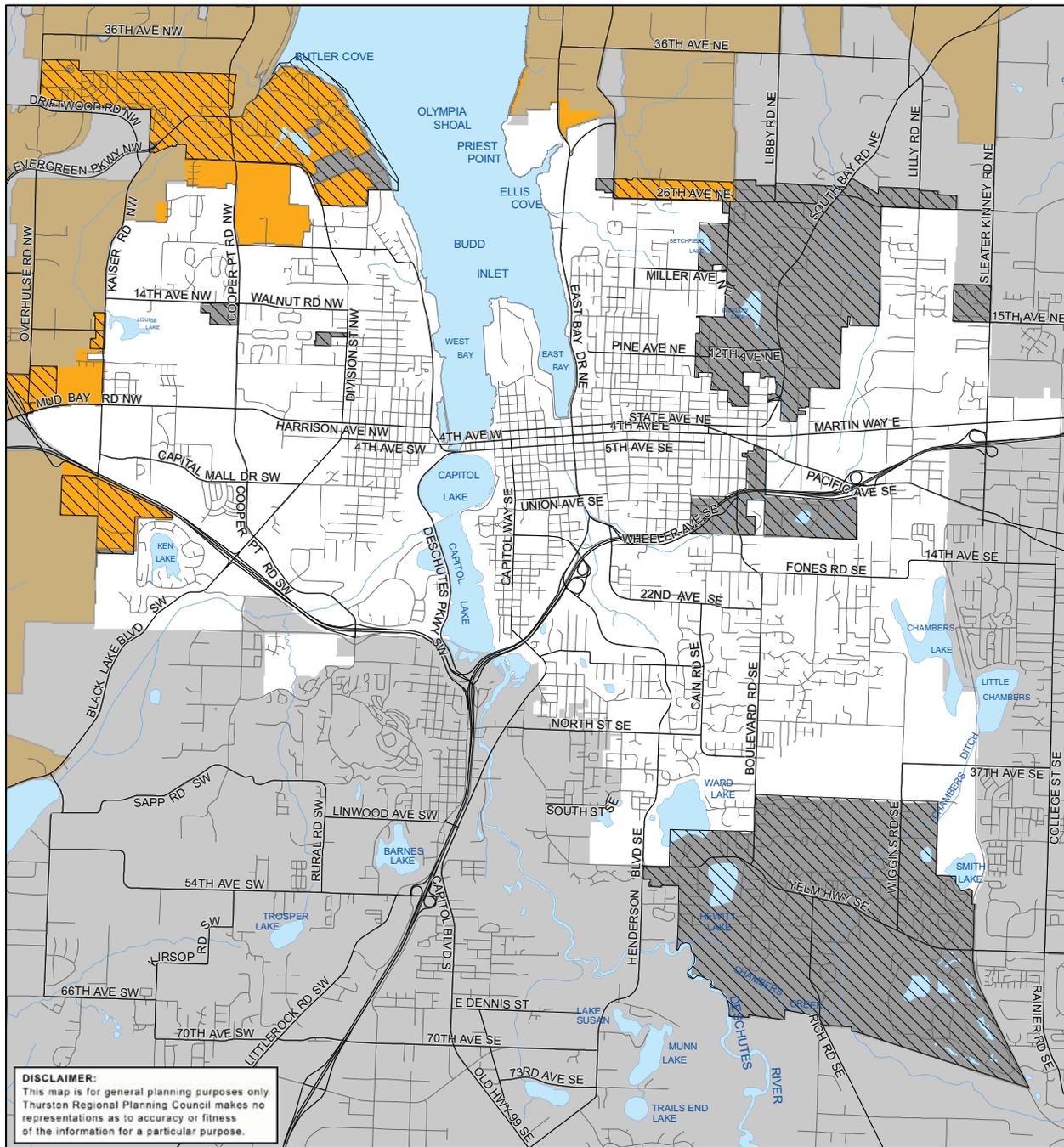


- Slopes Over 40%
- Coastal Landslide Hazards
- City Limits
- Urban Growth Boundary



Printing Date: March 11, 2009
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City of Olympia Wildfire Hazard Areas

- Wildfire Hazard Areas
- City Limits
- Urban Growth Boundary

1 0.5 0 1 Miles

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City of Olympia Mitigation Initiatives

Current Adopted Mitigation Initiatives

Current Mitigation Initiatives consist of actions that have not yet begun or require additional work. They consist of new initiatives identified by the City of Olympia during the plan update process. They also consist of existing initiatives that were carried over in their original form from the first edition of this plan or other plans, or modified from their original form to reflect present needs.

Priority	I.D. Number	Category	Action	Status
1 of 9	OLY-FH 1	Hazard Preparedness	Place flood elevation poles and staff gauges along Capitol Lake	Existing
2 of 9	OLY-MH 1	Hazard Preparedness	Upgrade Olympia's VHF radio system	Modified
3 of 9	OLY-MH 3	Critical Facilities Replacement/Retrofit	Add a backup generator to Olympia Center	New
4 of 9	OLY-SH 2	Plan Coordination and Implementation	Improve the capabilities of managing debris from severe winter storm events	New
5 of 9	OLY-MH 4	Data Collection and Mapping	Continue to refine the list of the region's critical facilities and jurisdictional asset data, geocode these locations, and update their financial value	New
6 of 9	OLY-VH 1	Plan Coordination and Implementation	Develop a volcano hazard plan for the City of Olympia	New
7 of 9	OLY-FH 4	Plan Coordination and Implementation	Plan and identify strategies to mitigate the adverse effects of sea level rise	New
8 of 9	OLY-EH 1	Critical Facilities Replacement/Retrofit	Undertake seismic retrofit of critical facilities and infrastructure in the city	Existing
9 of 9	OLY-SH 1	Critical Facilities Replacement/Retrofit	Replace the existing overhead utility lines throughout the City of Olympia	Existing

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 five 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 Olympia's adopted mitigation strategy. These initiatives are not ranked as they are no longer relevant.

I.D. Number	Category	Action	Status
OLY-FH 3	Plan Coordination and Implementation	Adopt development regulations for high groundwater areas	Completed
OLY-MH 2	Critical Facilities Replacement/Retrofit	Undertake seismic and windstorm retrofits for the KGY radio complex and its associated structures and antenna so that they can provide county wide communications point for the Emergency Alert System (EAS)	Removed
OLY-FH 2	Public Information	Prepare a public information program which focuses on the consequences of floods.	Removed
OLY-LH 1	Plan Coordination and Implementation	Protect the roads and buildings along Lakeridge Drive and the east side of Capitol Lake from Landslides	Removed

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.

Priority: 1 of 9**Status: Existing****Hazard Addressed: Flood Hazard****Category: Hazard Preparedness****OLY-FH 1: Place flood elevation poles and staff gauges along Capitol Lake.**

Rationale: Site gauges are an essential part of flood preparedness. Capitol Lake does not currently have any water level indicators useful for predicting flooding in downtown Olympia. We currently gauge the water level of the lake by noting the water level on the steps on the east margin of the lake.

Relates to Plan Goal(s) and Objectives: 5A, 8A**Implementer:** City of Olympia Emergency Management**Estimated Cost:** \$1000**Time Period:** 2010-2015**Funding Source:** unknown**Source and Date:** 2003 Natural Hazards Mitigation Plan for the Thurston Region**Adopted Plan Number:** OLY-FH 1**Reference Page:** V-71

Initiative and Implementation Status: Changes to the Heritage Park area of Capitol Lake by the City of Olympia and the State of Washington, General Administration, have made the determination of water levels easier but an actual gauge has still not been installed. City and GA have discussed the possibility of completing this initiative before the next winter storm season begins. The city was presented with a rare opportunity to place one gauge during the summer of 2009 when the lake was drawn down for other construction. One water level site gauge was placed adjacent to the steps on the east margin of the lake to the southwest of the intersection of 7th and Water streets. The efficacy of this gauge will be evaluated during the 2009-2010 winter storm season to see if this gauge is sufficient for future flood planning and response activities.

Priority: 2 of 9**Status: Modified****Hazard Addressed: Multi Hazard****Category: Hazard Preparedness****OLY-MH 1: Upgrade Olympia's VHF radio system.**

Rationale: Currently the city is on an older wide band system for Public Works and Fire. New technology is using narrow bands to allow more entities to talk in a given band. Upgrading will allow for better equipment, more usable channels and more secure communications. Simultaneous to the upgrade should be a system of redundancy in the system.

Relates to Plan Goal(s) and Objectives: 3C**Implementer:** City of Olympia Emergency Management**Estimated Cost:** \$300,000**Time Period:** 2010-2015**Funding Source:** unknown**Source and Date:** 2003 Natural Hazards Mitigation Plan for the Thurston Region**Adopted Plan Number:** OLY-MH 1**Reference Page:** V-79

Initiative and Implementation Status: Currently the city is on an older wide band VHF system for Public Works, Police and Fire. Newer technology is available that may be better suited for use in Olympia and Thurston County. (Any radio solution for the city must work with the rest of the county emergency response radios, CAPCOM). At a minimum, the Federal Communication Commission requires that all radio users convert to narrow band radios by 2013. (This date has been moved several times but it will eventually be a requirement). All radios that have been added or replaced over the past 5 years have been narrow band compliant, but other radios remain to be changed out. Any system that is chosen should meet all Federal requirements with interoperability and P2 compliance being held as baseline standards. The solution should not be limited to a compliant VHF system only, but rather all possible solutions including other bands and internet protocol systems should be considered for Olympia and Thurston County.

Priority: 3 of 9 Status: New

Hazard Addressed: Multi Hazard

Category: Critical Facilities Replacement / Retrofit

OLY-MH 3: Add a back-up generator to the Olympia Center.

Rationale: Electrical power at the Olympia Center provides immediate and recovery support in the event of a disaster. The center hosts senior citizens each weekday including a meals program on site, a meals on wheels program, and other social services. Loss of power forces these seniors out into a disaster environment that can quickly make them part of the problem further taxing resources. The center also is available for sheltering use and has been used as a warming center. These functions are only possible with an emergency generator when the power is out.

Relates to Plan Goal(s) and Objectives: 3C, 4D

Implementer: City of Olympia Parks, Arts, and Recreation Department.

Estimated Cost: \$150,000

Time Period: 2010-2015

Funding Source: Unknown

Source and Date: New

Adopted Plan Number: N/A

Reference Page: N/A

Initiative and Implementation Status: New initiative

Priority: 4 of 9**Status: New****Hazard Addressed: Severe Storm Hazard****Category: Plan Coordination and Implementation****OLY-SH 2: Improve the capabilities of managing debris from severe winter storm events.**

Rationale: Since it is difficult to predict damage from a storm throughout the Thurston region, (e.g. 1993 Inaugural Day Wind Storm, the 1996 Ice Storm, or the Hanukkah Eve Storm of 2006), this initiative would help City of Olympia and utility providers to better manage the “clean up” efforts. Olympia Public Works will need to work to develop a debris management strategy that interfaces well with the county wide debris management mitigation CW-SH1. Since other than for vegetative recycling, all local communities contribute a final common waste stream at the regional waste management facility.

Relates to Plan Goal(s) and Objectives: 4D**Implementer: City of Olympia Public Works****Estimated Cost: unknown****Time Period: 2010-2015****Funding Source: unknown****Source and Date: new****Adopted Plan Number: new****Reference Page: N/A****Initiative and Implementation Status: new initiative**

Priority: 5 of 9**Status: New****Hazard Addressed: Multi Hazard****Category: Data Collection and Mapping****OLY-MH 4: Continue to refine the list of the region's critical facilities and jurisdictional asset data, geocode these locations, and update their financial value.**

Rationale: Olympia continues to grow and critical infrastructure information changes. The maintenance of an accurate and comprehensive critical infrastructure database can serve a variety of essential operational and planning functions in the region.

Relates to Plan Goal(s) and Objectives: 2A**Implementer:** City of Olympia Emergency Management**Estimated Cost:** \$2,000**Time Period:** 2010-2015**Funding Source:** Unknown**Source and Date:** New**Adopted Plan Number:** N/A**Reference Page:** N/A**Initiative and Implementation Status:** New initiative

Priority: 6 of 9**Status: New****Hazard Addressed: Volcanic Hazard****Category: Plan Coordination and Implementation****OLY-VH 1: Develop a volcano hazard plan for the City of Olympia.**

Rationale: Volcanic hazards have yet to be thoroughly addressed for the City of Olympia. Undertake a study to determine such hazards to the city and incorporate these findings and recommendations into the city CEMP.

Relates to Plan Goal(s) and Objectives: 2A**Implementer:** City of Olympia Emergency Management**Estimated Cost:** \$2,000**Time Period:** 2010-2015**Funding Source:** Unknown**Source and Date:** New**Adopted Plan Number:** New**Reference Page:** N/A**Initiative and Implementation Status:** New initiative

Priority: 7 of 9**Status: New****Hazard Addressed: Flood Hazard****Category: Plan Coordination and Implementation****OLY-FH 4: Plan and identify strategies to mitigate the adverse effects of sea level rise.**

Rationale: Olympia will experience effects of sea level rise should climate change projections transpire as described in Chapter 4.7. There is much uncertainty regarding the extent and severity of sea level rise as projected for South Sound Waters. More research and planning are required to understand potential impacts and the best approaches to mitigate or reduce potential losses. Results of these findings should be incorporated into City of Olympia planning documents within the city departments such as Public Works and Community Planning and Development and in response documents such as the Comprehensive Emergency Management Plan.

Relates to Plan Goal(s) and Objectives: 5A, 6A**Implementer:** City of Olympia Public Works and Community Planning and Development**Estimated Cost:** Unknown**Time Period:** 2010-2015**Funding Source:** Unknown**Source and Date:** New**Adopted Plan Number:** N/A**Reference Page:** N/A**Initiative and Implementation Status:** New initiative

Priority: 8 of 9**Status: Existing****Hazard Addressed: Earthquake Hazard****Category: Critical Facilities Replacement/Retrofit****OLY-EH 1: Undertake seismic retrofit of critical facilities and infrastructure in the city.**

Rationale: Critical infrastructure points within the city are facilities or structures that will be important in the response and recovery following a disaster. These include City Hall and the co-located jail; city owned water pump stations, sewer lift stations, and associated piping networks; and 5th Avenue Bridge and dam. City Hall is critical in maintaining the seat of government; the water and sewer distribution networks are critical for providing a safe and healthy environment for living after an event. The bridge and dam are critical in maintaining downtown traffic flow important to employment and sales within the city.

Relates to Plan Goal(s) and Objectives: 3B, 3C, 3F**Implementer:** Olympia Public Works**Estimated Cost:** \$10 million**Time Period:** 2010-2015**Funding Source:** unknown**Source and Date:** 2003 Natural Hazards Mitigation Plan for the Thurston Region**Adopted Plan Number:** OLY-EH 1**Reference Page:** V-69

Initiative and Implementation Status: This initiative was number 5 of 8 in the 2003 plan. Olympia is building a new City Hall but other buildings critical to operations of the city and the old City Hall need this retrofit.

Priority: 9 of 9**Status: Existing****Hazard Addressed: Severe Storm Hazard****Category: Critical Facilities Replacement/Retrofit****OLY-SH 1: Replace the existing overhead utility lines throughout the City of Olympia.**

Rationale: Loss of services to the citizens, specifically power, phones and cable has a damaging effect on the wellbeing of our citizens following a natural disaster. Loss of power can affect heating at critical times of the year and some of our residents require power to operate critical medical equipment in their homes. Telephone lines are crucial in the community's ability to request assistance after a disaster. Cable, while often considered a comfort item can also be utilized as an effective tool to provide the citizens with critical survival information following a disaster. This project would be completed in two phases, phase one to include the downtown core, phase two would be the remainder of the city.

Relates to Plan Goal(s) and Objectives: 7C**Implementer:** City of Olympia Public Works and Community Planning and Development (original)**Estimated Cost:** \$249 million**Time Period:** 2010-2015**Funding Source:** development infrastructure upgrade funds / other unknown**Source and Date:** 2003 Natural Hazards Mitigation Plan for the Thurston Region**Adopted Plan Number:** OLY-SH 1**Reference Page:** V-83**Initiative and Implementation Status:** Some progress has been made on this initiative by replacements in the downtown core.

Priority: N/A**Status: Completed****Hazard Addressed: Flood Hazard****Category: Plan Coordination and Implementation****OLY-FH 3: Adopt development regulations for high groundwater areas.**

Rationale: Identifying areas for control of development in areas prone to high ground water will prevent reoccurring problems.

Relates to Plan Goal(s) and Objectives: 6B**Implementer:** Olympia Community Planning and Development (original)**Estimated Cost:** unknown**Time Period:** 2004-2008 (original)**Funding Source:** N/A**Source and Date:** 2003 Natural Hazards Mitigation Plan for the Thurston Region**Adopted Plan Number:** OLY-FH 3**Reference Page:** V-75

Initiative and Implementation Status: This was initiative number 8 of 8 in the 2003 plan. This initiative was completed by the City of Olympia. See City of Olympia, Storm Water Manual, adopted/amended November 2009 and International Building Codes, adopted by City of Olympia in 2006.

Priority: N/A**Status: Removed****Hazard Addressed: Multi Hazard****Category: Critical Facilities Replacement/Retrofit**

OLY-MH 2: Undertake seismic and windstorm retrofits for the KGY radio complex and its associated structures and antenna so that they can provide county wide communications point for the Emergency Alert System (EAS).

Rationale: KGY is the area's primary warning point for the EAS system. The building is situated on pilings along the edge of Budd Inlet in a mapped liquefaction area. Strengthening this facility to withstand an earthquake will help keep our EAS point in operation following a disaster at a time when they would be most needed.

Relates to Plan Goal(s) and Objectives: 7C**Implementer:** City of Olympia Emergency Management (original)**Estimated Cost:** N/ A**Time Period:** 2004-2008 (original)**Funding Source:** N/A**Source and Date:** 2003 Natural Hazards Mitigation Plan for the Thurston Region**Adopted Plan Number:** OLY-MH 2**Reference Page:** V-81

Initiative and Implementation Status: This initiative was number 2 of 8 in the 2003 plan. This initiative has been completed when KGY began this project on their own due to business needs at their Port of Olympia location.

Priority: N/A**Status: Removed****Hazard Addressed: Flood Hazard****Category: Public Information****OLY-FH 2: Prepare a public information program which focuses on the consequences of floods.**

Rationale: This public information packet would be tailored to the individual river system with a separate packet for high groundwater areas. Discussion should be included about the costs and impacts caused by scalping gravel bars or dredging rivers to control flooding.

Relates to Plan Goal(s) and Objectives: 8A**Implementer:** Olympia Emergency Management (original)**Estimated Cost:** unknown**Time Period:** 2004-2008 (original)**Funding Source:** N/A**Source and Date:** 2003 Natural Hazards Mitigation Plan for the Thurston Region**Adopted Plan Number:** OLY-FH 2**Reference Page:** V-73

Initiative and Implementation Status: This initiative was number 3 of 8 in the 2003 plan. This initiative is removed; changes at Capitol Lake have lessened the need for this item. These changes include a berm as part of the construction of Heritage Park by the Washington State Department of General Administration, and a storm water valve installed by the City of Olympia. Public Information that is currently provided at the county level better fits the Olympia need now.

Priority: N/A**Status: Removed****Hazard Addressed: Landslide Hazard****Category: Plan Coordination and Implementation****OLY-LH 1: Protect the roads and buildings along Lakeridge Drive and the east side of Capitol Lake from landslide hazards.**

Rationale: These areas have topographical features conducive to slides. The area along Lakeridge Drive and an uninhabited slope on the east side of Capitol Lake have a history of slides. Consider assuring that protective vegetation remains in place along the east side of the lake and consider installing structural measures for control of slides on the Lakeridge Drive side.

Relates to Plan Goal(s) and Objectives: 3B**Implementer:** Olympia Community Planning and Development (original)**Estimated Cost:** N/A**Time Period:** 2004-2008 (original)**Funding Source:** N/A**Source and Date:** 2003 Natural Hazards Mitigation Plan for the Thurston Region**Adopted Plan Number:** OLY-LH 1**Reference Page:** V-77

Initiative and Implementation Status: This initiative was number 7 of 8 in the 2003 plan. This initiative is removed. The City has adopted guidelines that will protect the areas in question. See Title 18.32, Olympia Municipal Code, Environmental Policy and Protection, adopted 2006.

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City of Olympia Implementation of 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.

Requirement §201.6(c)(3)(ii):	[The mitigation strategy] must also address the jurisdiction’s participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.
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National Flood Insurance Program Participation

Summary of National Flood Insurance Program Premiums, Policies, and Claims

Community	Total	Number of Policies			Total	Total	Total Paid	Repetitive	Severe
	Premium	V Zone	A Zone	Total	Coverage	Since 1978	Since 1978	Losses	Losses
Bucoda	\$55,051	0	64	74	\$10,033,700	42	\$249,262	0	0
Lacey	\$4,652	0	0	14	\$3,871,000	3	\$8,088	0	0
Olympia	\$90,555	0	31	82	\$25,265,400	16	\$347,006	0	0
Rainier	\$326	0	0	1	\$280,000	0	\$0	0	0
Tenino	\$1,327	0	0	4	\$633,700	7	\$105,233	0	0
Tumwater	\$2,707	0	0	6	\$1,482,000	2	\$12,515	0	0
Yelm	\$17,617	0	11	28	\$7,313,400	2	\$7,603	0	0
Thurston County	\$316,352	3	281	663	\$141,785,400	215	\$3,389,280	10	0
County Total :	\$488,587	3	387	872	\$190,664,600	287	\$4,118,987	10	0

Source: FEMA NFIP Insurance Report, Washington, May 5, 2009.

The City of Olympia has actively participated in the National Flood Insurance Program (NFIP) since 1981. The City of Olympia continues to participate in the NFIP because it is integral to current and future flood mitigation efforts. In addition, the hazard mitigation strategy is based upon continued participation and compliance with the National Flood Insurance.

Flood Plans, Ordinances, and Regulations

Portions of the City of Olympia are located within the 100-year floodplain. In addition, portions of the City are located within a designated floodway or are located in a coastal high-hazard V zone.

The City of Olympia has a strong framework of policies and laws that help reduce property damage due to floods as well as protecting the natural functions of floodplains. Beginning with the Olympia Comprehensive Plan, which contains the following Goal, Objective and Policies that pertain to floodplains:

ENV 5.1 Direct development to those areas best suited for it. Limit development in areas with geological instability, frequent flooding, high habitat values, or steep slopes.

ENV 5.2* Enforce regulations which minimize damage due to landslide, seismic hazards, erosion, or flooding.

ENV 5.3 Enforce regulations that protect the general public against avoidable losses from flooding. Developments proposed within flood hazard areas must meet the requirements of the City of Olympia Floodplain Management Ordinance.

The City of Olympia Codes as they pertain to restrictions to building in the floodplain includes: Olympia Municipal Chapter 16.70 Development in Flood Hazard Areas and is part of the City's Building Code. It includes the following intent and purpose:

16.70.010 - Purpose and Objectives

A. Authorization

The Legislature of the State of Washington has delegated the responsibility to local governmental units to adopt regulations designed to promote the public health, safety, and general welfare of its citizenry. Therefore, the City Of Olympia, does ordain as follows:

B. Findings of Fact.

1. The flood hazard areas of the City of Olympia are subject to periodic inundation which results in loss of life and property, health, and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety, and general welfare.

2. These flood losses are caused by the cumulative effect of obstructions in areas of special flood hazards which increase flood heights and velocities, and when inadequately anchored, damage uses in other areas. Uses that are inadequately flood proofed, elevated, or otherwise protected from flood damage also contribute to the flood loss.

C. Statement of Purpose.

It is the purpose of this ordinance to promote the public health, safety, and general welfare; reduce the annual cost of flood insurance; and minimize public and private losses due to flood conditions in specific areas by provisions designed:

1. To protect human life and health;
2. To minimize expenditure of public money and costly flood control projects;
3. To minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
4. To minimize prolonged business interruptions;
5. To minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, streets, and bridges located in areas of special flood hazard;
6. To help maintain a stable tax base by providing for the sound use and development of areas of special flood hazard so as to minimize future flood blight areas;
7. To ensure that potential buyers are notified that property is in an area of special flood hazard;
8. To ensure that those who occupy the areas of special flood hazard assume responsibility for their actions.

D. Methods of Reducing Flood Losses.

In order to accomplish its purposes, this ordinance includes methods and provisions for:

1. Restricting or prohibiting uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or in flood heights or velocities;
2. Requiring that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;
3. Controlling the alteration of natural flood plains, stream channels, and natural protective barriers, which help accommodate or channel flood waters;
4. . Controlling filling, grading, dredging, and other development which may increase flood damage; and
5. Preventing or regulating the construction of flood barriers that unnaturally divert floodwaters or may increase flood hazards in other areas.

The City of Olympia Flood Mitigation Activities

The following activities are carried out as part of our participation in the NFIP in an effort to further reduce the effects of flooding.

1. Elevation Certificates: City of Olympia maintains elevation certificates for new and substantially improved buildings. Copies of elevation certificates are made available upon request.
2. Map Information: City of Olympia furnishes flood zone information from the community's latest Flood Insurance Rate Map (F.I.R.M.), annually publicizes the service and maintains records.
3. Hazard Disclosure: City of Olympia recognizes the disclosure requirements of the State of Washington disclosure law.
4. Flood Protection Information: Documents relating to floodplain management and locally pertinent flood issues are available throughout the Timberline Regional Library system.
5. Flood Protection Assistance: City of Olympia provides technical advice and assistance to interested property owners and annually publicizes the service.
6. Additional Flood Data: City of Olympia maintains a high-level restrictive floodway and floodplain standard and uses the flood of record elevations when applying its regulations.
7. Higher Regulatory Standards: City of Olympia enforces regulations that require freeboard for new construction and substantial improvement, protection of critical facilities, natural and beneficial functions, other higher regulatory standards, land development criteria and state mandated regulatory standards.
8. Flood Data Maintenance: City of Olympia has established and maintains a system of elevation reference marks and maintains copies of all previous F.I.R.M. maps and Flood Insurance Study Reports.
9. Stormwater Management: The State of Washington has instituted a Clean Water Program and the County has adopted the Department of Ecology's Stormwater Manual for Puget Sound. The County enforces regulations for stormwater management, freeboard in non-special flood hazard area zones, soil and erosion control and water quality.
10. Flood Warning Program: City of Olympia provides a program for timely identification of impending flood threats, disseminating warnings to appropriate floodplain residents and coordinating flood response activities.

For additional information regarding the City of Olympia's participation in the National Flood Insurance Program, please contact: Thomas Hill, City of Olympia Floodplain Management Administrator, Building Official, 360.753.8314.