

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

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RESOLUTION NO. 955

CITY OF LACEY

A RESOLUTION OF THE CITY OF LACEY, WASHINGTON adopting the “Natural Hazards Mitigation Plan for the Thurston Region”.

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

WHEREAS, the City Council of the City of Lacey 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 Lacey City Council through Resolution No. 877 on September 11, 2003 and must be updated every five years in order to be compliant with federal statute, and;

WHEREAS, the City of Lacey 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 Lacey 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 Lacey 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 Lacey 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, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF LACEY, WASHINGTON as follows:

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

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

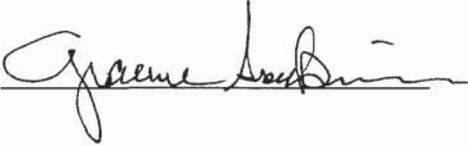
Section 3. The City of Lacey will, upon receipt of such funding or other necessary resources, seek to implement the proposals contained in its section of the mitigation initiatives, and

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

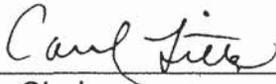
Section 5. The City of Lacey will further seek to encourage the businesses, industries, and community groups operating within and/or for the benefit of the City of Lacey to also participate in the updating and expansion of the "Natural Hazards Mitigation Plan for the Thurston Region" in the years ahead.

PASSED BY THE CITY COUNCIL OF THE CITY OF LACEY,
WASHINGTON, this 17th day of December, 2009.

CITY COUNCIL

By 

Attest:



City Clerk

Approved as to form:



City Attorney

Community Profile

City of Lacey

City info: (360) 491-3214

www.ci.lacey.wa.us

Demographics

Population, 1990	19,279
Population, 2000	31,226
Population, 2008	38,040
Av. Ann. Pop. Growth, 1990-2000	4.9%
Av. Ann. Pop. Growth, 2000-2008	2.5%

Households, 2000	12,459
Average Household Size, 2000	2.47

Age Structure, 2000:

19 and under	9,120	29%
20 - 64	17,947	57%
65 and over	4,159	13%
Median Age	34	--

Race and Ethnic Categories, 2000:

White	24,417	78.2%
Black/African American	1,490	4.8%
American Indian & Alaska Native	416	1.3%
Asian	2,423	7.8%
Native Hawaiian & Other Pacific Islander	330	1.0%
Other Race	1,006	3.2%
Two or More Races	1,474	4.7%
Hispanic*	1,843	5.9%

Housing

Housing Units, 2000:

Single-Family	7,604
Multifamily	4,546
Manufactured Homes	928

Census Median House Value, 2000	\$133,200
Average House Sale Price, 2007	\$280,692

Employment and Income

Median Household Income:

1989 (Census 1990 in 1999 \$'s)	\$37,581
1999 (Census 2000)	\$43,848

Households by Income Category, 1999:

Less than \$14,999	1,549	13%
\$15,000 to \$24,999	1,562	13%
\$25,000 to \$49,999	4,037	33%
\$50,000 to \$74,999	3,023	24%
\$75,000 or more	2,180	18%

Nisqually Indians used Lacey's prairies and lakes for thousands of years before the first Euro-American settlers arrived in the late



1840s. Lacey was first settled in 1848 by David and Elizabeth Chambers. Other families followed and in 1891, the Tacoma, Olympia, and Grays Harbor Railroad finished laying tracks through the community, now known as Woodland after the Isaac Wood Foundation Land Claim. That same year Woodland was awarded its own post office, but because a Woodland already existed in Washington, the post office took the name of "Lacey." The name likely came from an Olympia real estate speculator O.C. Lacey.

Saint Martin's College opened in 1895, and one of its Benedictine brothers, Father Sebastian Ruth's experimentation with radio transmissions in 1914 led to the beginning of Washington's first radio station (KGY) in 1922.

During the mid 1920s, resorts opened on Hicks, Long, Pattison, and Southwick Lakes, attracting visitors from all over the state. By October 1966, shopping centers were the attraction, and Lacey opened its first, then the third largest in the state. That same year Lacey incorporated to become a city.

Development Activity

Total New Permitted Residential Units, 2007:

Single-Family	663
Multifamily	362
Manufactured Homes	0
Total	1,025

Taxable Retail Sales, 2007 \$1,093,218,763

Total Jobs, 2003:

Manufacturing	400
Retail	4,240
Finance/Services	6,480
Federal, State, & Local Gov't	5,940
Tribal Gov't & Enterprises	<10
Other	1,940

Subdivision Activity, 2007:

	# Appl.	# Lots
Short Plat	6	20
Long Plat	5	540

Explanation: *Person of Hispanic Origin can be of any race.

Source: TRPC, Profile 2008 (www.trpc.org).

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City of Lacey Plan Development Process

Hazard Mitigation Plan Development Staff

Most of the following individuals are members of the City of Lacey Emergency Services Committee which functioned as the workgroup for completing the updates to the Natural Hazards Mitigation Plan. Others listed are subject matter experts or have a direct interest in the projects listed and were used to develop, prioritize, and confirm completion of the initiatives.

Department/Title	Representative(s)
Police Commander	John Suessman
Human Resources Management Analyst	Jared Burbidge
Information Services Manager	Cindy Zielinski
Public Works Management Analyst	Tom Palmateer
Community Development Senior Code Official	Wade Duffy
Lacey Fire District #3 Assistant Chief	Steve Brooks
Public Works Operations Manager	Brad Burdick
City Engineer	Roger Schoessel
Finance Accounting Manager	Pam Meredith
Water/Wastewater Maintenance Supervisor	Terry Cargil
Transportation Maintenance Supervisor	Dennis Stevens

Hazard Mitigation Plan Development

Date	Location	Activity	Subject
May 14, 2009	City Hall	Emergency Services Team Meeting	Discussed existing mitigation initiatives, revised them if necessary, and brainstormed new initiatives
June 2009	City Hall	Writing/Researching	Captured comments from Emergency Services Team and incorporated them into draft documents for review.
July 20, 2009	Maintenance Administration Center	Meeting	Met with Operations Manager and Water/Wastewater Maintenance Supervisor to discuss completion of certain mitigation initiatives
July 22, 2009	City Hall	Meeting	Met with Water Resources staff to determine scope of upcoming projects.
July 27, 2009	Maintenance Administration Center	Meeting	Met with Operations Manager and Transportation Maintenance Supervisor to review transportation related mitigation initiatives.
August 7, 2009	City Hall	Meeting	Met with Emergency Services Team and others to prioritize mitigation initiatives and finalize the list.
October, 2009	City Hall	Meeting	Presented draft plan and mitigation initiatives to General Government Committee, which is made up of three City Council members. Sought recommendation to full City Council for adoption of plan.
November, 2009	City Hall	Meeting	Presented draft plan to City Council for approval and adoption.

Mitigation Initiative Prioritization Process

The following paragraph describes the process that was used by City of Lacey staff to develop, evaluate, and prioritize the mitigation initiatives in the 2009 update to the Natural Hazards Mitigation Plan for Thurston County. The first step was to review the 2003 plan and mitigation initiatives and determine which ones had been completed or were no longer relevant. This task, along with modifying existing initiatives was performed by the City's Emergency Services Team at one of their monthly meetings. At that same meeting, ideas for new initiatives were brainstormed.

The brainstormed ideas were then developed into mitigation initiatives using the template format provided by TRPC staff. These initiatives were discussed at a series of meetings with affected departments. During those meetings some of the new initiatives were modified or eliminated, and in some cases the discussion spurred ideas for other initiatives. Once all of the affected departments had the chance to "field-truth" the initiatives the workgroup was brought together to prioritize them.

The prioritization meeting was held on August 7, 2009 with representatives from the City's Emergency Services Team, as well as representatives from the affected departments. The following criteria were used as background considerations for prioritizing the initiatives:

1. Is it a life/safety issue?
2. What is the effect on private or public property?
3. What is the economic impact?

Other factors that came into consideration were the financial realities, the number of people the initiative would impact, whether or not a project was already part of an annual work plan, and the emergent, or critical nature of the project. Each initiative was discussed in turn and compared to the others. All members of the work group were involved in the discussion and provided their opinions and arguments for each specific initiative. After each round of discussion consensus was reached by the entire group before moving on to the next initiative. After all of the initiatives were ranked, the entire list was reviewed as a whole to make sure everyone was comfortable about how the projects lined up. There was no formalized voting or tally taken, but all parties were able to agree on a ranked order that is represented in the final ranking.

Staff understands that the ranked list is subject to input and change from upper management, elected officials, and public input. It is expected that this type of input will be received during the public outreach process and during the presentation of the plan to the City Council as part of the formal adoption process. Any proposed changes will be brought back to the work group and consensus will be reached before moving the plan forward.

City of Lacey Risk Assessment

Introduction

The risk assessment provides information about the hazards that threaten City of Lacey. 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)(ii)(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.

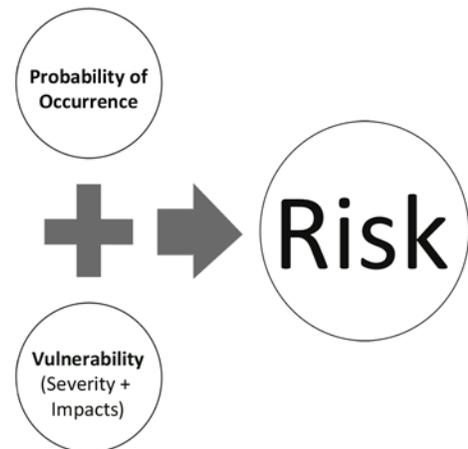


Figure 1: Risk is a subjective estimate of the combination of a hazard's probability of occurrence and a community's vulnerability.

- **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 worst 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 worst 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 the City of Lacey.

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

Local Risk Assessment

A comprehensive risk assessment of the major natural hazards that threaten the City of Lacey 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 the City of Lacey are scaled to local boundaries and are included in this section.

Earthquake

Severity

The issue of earthquake severity for the City of Lacey is not much different than the rest of Thurston County which is described in great detail in Chapter 4: Risk Assessment. Since earthquake severity is dependent upon the source of the quake, ground moisture content, depth, and duration, the amount of damage will depend if the quake is crustal, subduction, or deep in the Juan de Fuca plate. The most recent and proximate earthquakes were deep (The 1949, 1965, and 2001 earthquakes all emanated from this zone). The 2001 Nisqually earthquake's focus was located about 32 miles deep below its epicenter on Anderson Island and measured 6.8 on the Richter Scale.

Impacts

Depending on the type and depth of the earthquake, ground moisture content, and duration of the shaking, impacts would probably include failed buildings, bridges, fallen trees, fallen utility poles, and other structures which could trap or bury people causing injury and death. Damage to infrastructure such as roads, bridges, rail lines, runways, and almost all types of utilities is certain. Infrastructure failures can result in short and long-term loss of public and private sector services and business. Costs of repairs could be unprecedented and delay the restoration of services.

In a major crustal earthquake of magnitude 6.7 or greater, The City of Lacey is likely to face communication, electricity, motor fuel, natural gas, water, and sewer disruptions. Structural fires are a secondary hazard from earthquake destruction. Individuals and households may be 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.

Fortunately, due to modern building codes and construction practices, the City of Lacey is not vulnerable to some of the impacts that threaten older communities in the Puget Sound Region. These communities have unreinforced masonry structures such as buildings, walls, chimneys, and facades that are vulnerable to crumbling from ground shaking. The City of Lacey also has fewer areas with soft soils that are subject to liquefaction.

Fire fighters, police, public works, and other safety and emergency personnel can quickly become extended with response and recovery operations. Transportation disruptions will hinder emergency response to remote or hard to reach areas, potentially for a long period of time. Building and structural inspections will become priorities for public works and development services personnel which will disrupt their other day to day operations. Following is a list of freeway overpasses and railroad trestles that would severely limit the City's response efforts if they were damaged or destroyed:

- Chehalis Western Bike Trail
- Sleater-Kinney
- College Street
- I-5 over Martin-Way
- Carpenter Road

Marvin Road
 Meridian Road

Rail Road Over passes:

Rainier Road south of Yelm Highway
 Yelm Highway at Train Tracks
 Mullen Road at Afflerbaugh overpass

Based on TRPC surveys of steep slopes and liquefaction hazards in the City’s 10,549 acres, 37% of the land mass and 56% of the population are in “low to moderate” to “high” liquefaction susceptibility hazard areas. The same survey estimates that 67% of the residential dwellings are located in the same hazard areas.

Probability of Occurrence

Past events suggest that a destructive event reoccurs about every 26 years. Therefore, the overall probability of occurrence of a damaging earthquake is “high”.

Historical Occurrences and Impacts Specific to this Jurisdiction

At 10:54 am on February 28, 2001 a magnitude 6.8 earthquake produced strong ground shaking across Washington State. The epicenter was located near Anderson Island north of the Nisqually River Delta. The focus was located nearly 33 miles underground. Thurston County was among the hardest hit counties in the State, with most damages reported in the Olympia and Tumwater areas. Even though it is closer to the epicenter, the City of Lacey did not incur as much reportable damage, however the asphalt on Afferbaugh Road and the parking lot at the Animal Shelter cracked which required repair. Damage to private properties included a few chimneys that fell down and trees that fell over onto houses and/or power lines.

Summary Assessment

History suggests a high probability of occurrence of another damaging earthquake sometime in the next 25 years. It is important to note that the 2001 Nisqually earthquake was not the largest 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 damage, producing catastrophic impacts upon the Thurston County area.

Summary Risk Assessment for Earthquake in the City of Lacey

Probability of Occurrence	Vulnerability	Risk
High	High	High

Storm

Severity

Severe weather events are the most frequent source of natural disasters for the City of Lacey. Between 1962 and 2009, 19 of the 23 Presidential Disaster Declarations in Thurston County were attributed to damage resulting from the effects of winter storms. While the most damaging historical weather events in Thurston County were a result of flooding, this type of hazard is almost non-existent within the City, therefore severe storms rank highest on the list of hazards to be mitigated.

High winds, heavy rain, heavy snow, freezing rain, tornados, hail and lightning all impact the City of Lacey. Each element poses a threat at varying degrees. The severity of each is summarized below:

1. High Winds/Windstorms: 59 windstorms have buffeted the City since 1953; nine produced peak gusts over 58 mph, the most powerful being the Columbus Day storm in 1962.
2. Heavy Rain: The City of Lacey is moderately vulnerable to localized stormwater flooding as a result of heavy rains between November and February.
3. Freezing Rain: The overall region is susceptible to the effects of an ice storm. The 1996 event resulted in ice accumulations of $\frac{1}{4}$ to $\frac{3}{4}$ inch thick on surfaces.
4. Heavy Snow: while the average annual snowfall for the county is only 18 inches between mid-November and mid-March, since 1948 six major heavy snow events have occurred in the county. Record accumulated snowfall was during December 1968-January 1969 with a total of 81.5 inches. In December, 2008 a presidential disaster declaration followed two separate snowfall events that rendered the City of Lacey immobile for a week and a half.
5. Tornado: No deaths or injuries have resulted from tornados in Thurston County. Four small tornados have been reported in the county (generally southern area) since 1950, none producing any significant damage or life hazard.
6. Hail: Most hail storms in the City produce small non-destructive hail.
7. Lightning: Records indicate that lightning storms are most likely to occur in the City from April through September, and are of a short-lived localized nature.

Impacts

High winds, heavy rain, heavy snow, freezing rain, tornados, hail and lightning all impact the City of Lacey. Each element poses a threat to impact the City in varying degrees, as summarized below:

1. High Winds/Windstorms: The City of Lacey is vulnerable to high winds due to climatic conditions. The greatest impact is from falling trees & limbs that can cause widespread power outages and debris management issues. There have historically been few injuries and/or fatalities, but roadways have been blocked, which limits the access of emergency services, and

citizens get stranded without power or telephone for days at a time. Damage to both private and public facilities have caused economic hardship and environmental resources have been damaged.

2. Heavy Rain: the City of Lacey is mostly urban and therefore heavy rains are most impactful when storm drainage systems and associated infiltration ponds become overwhelmed. This is most common in the Fall when leaves and debris clog storm drain grates which can lead to backed up water over roadways and into private properties. Due to the Storm water utility fund, City maintenance staff have generally been able to keep the stormwater conveyance system clear and capital improvements have resolved many of the problematic areas prone to localized flooding. Therefore there have been fewer injuries, a minimal amount of private properties damaged, and fewer environmental resources damaged as a result.
3. Freezing Rain: Freezing rain can produce debilitating effects in the City of Lacey. As was learned in the 1996 event, utility lines, tree branches, road signs, and traffic signals were brought down or snapped. Roads and other transportation corridors were covered in a sheet of ice, causing emergency services to have limited response capability. Telecommunications and power lines were out for up to a week and local stocks of food and water were beginning to become scarce.
4. Heavy Snow: Blizzard conditions can cause powerline, tree limbs and structures to fail due to the weight of snowload; safe transportation can grind to a halt (reducing or eliminating response capabilities) and create widespread power outages. These resulting conditions can also produce consumer shortages due to the inability of freight carriers to deliver goods. Heavy snowfall is mostly impactful when the City's limited snow removal equipment can't keep roads open for public access and emergency services. This was evidenced during the December, 2008 snow events that caused roads to be impassable for many days before City crews and snow plows could get them open.
5. Tornado: The effects of a tornado can be extremely destructive during a short period of time in a very localized setting.
6. Hail: The effects of hail can be destructive during a short period of time in a very localized setting.
7. Lightning: While there are no documented lightning fatalities in Thurston County, the district has documented two cases of lightning related injuries since 1989, both of a serious nature. Lightning can also cause fires, however, none are documented to have caused any fires in the district.

Probability of Occurrence

High winds, heavy rain, heavy snow, freezing rain, tornados, hail and lightning all impact the City of Lacey. Each element poses a threat in varying degrees, the probability of occurrence of each is summarized below:

1. High Winds/Windstorms: Thurston County has a high wind reoccurrence rate of 175% (high) with at least 18 notable Pacific Northwest cyclones impacting the area in the last 25 years, thus, the probability of occurrence is “high”.
2. Heavy Rain: The annual probability of occurrence is “high”.
3. Freezing Rain: The annual probability of occurrence is “low”, with only one major event in the county in the past 50 years.
4. Heavy Snow: Between the period of 1948-1994, 23 heavy snow events experienced in Thurston County indicate “high” probability of snow exceeding 12 inches within the next 25 years.
5. Tornado: The annual probability of occurrence is “low”.
6. Hail: The annual probability of occurrence is “low”.
7. Lightning: The annual probability of occurrence is “moderate”.

Historical Occurrences and Impacts Specific to this Jurisdiction

The effects of severe storms to the City of Lacey has generally been somewhat less than other parts of the county due to the geographic location of the City away from major rivers and flood plains. The most recent and most damaging events have been as a result of wind and snow storms (December 14, 2006, December, 2008). During these events, the primary concerns were keeping roadways clear for utility crews, emergency service vehicles, and the general public. The City of Lacey has implemented emergency power supplies (generators) to its facilities in order to minimize the effects of power outages for supplying water and pumping sewer for their customers. Pre-event staffing, emergency pre-planning, and preparation have helped mitigate the impacts of storms.

Summary Assessment

The high reoccurrence rate of Pacific Northwest storms, the record of historical damage and the repetitive response & recovery costs (regionally and county wide) associated with these destructive events make the City of Lacey highly vulnerable to storm events. Thus the overall risk rating for severe storms is “high”.

Summary Risk Assessment for Storm in the City of Lacey

Probability of Occurrence	Vulnerability	Risk
High	High	High

Flood

Severity

The City of Lacey is mostly at risk of “urban” flooding, which results when stormwater runoff exceeds the capacity of natural or infrastructural drainage systems. There is also a history of elevated lake levels that impact a limited number of private dwellings adjacent to Hick’s Lake. Although many hydrologic factors come into play, the lake level is primarily regulated by an outlet pipe that runs through private property - which also makes this localized flooding risk an “infrastructure” problem. Riverine, groundwater, and tidal flooding has not historically been a significant problem in the City of Lacey. The severity of localized “urban” flooding is minimal because City utility crews can usually respond to correct the condition on a temporary basis, and then capital improvements can be made to permanently correct the problem.

In 2008 the City annexed an area along Rainier Road that was a historical flooding problem in the County. The flooding is a result of a drainage ditch along the Burlington Northern Santa Fe Railroad grade that becomes overwhelmed under certain rainfall conditions and flows onto Rainier Road, a major North-South transportation corridor for Thurston County residents. In the winter of 2008, three private properties were impacted when city crews diverted water from the roadway into their yards.

Impacts

The risk for floods in the City of Lacey is minor with little or no health safety impact, few properties destroyed and/or damaged, and minimal environmental resources damaged. Based on TRPC surveys of flooding hazards in the City’s 10,550 acres, 14% of the land mass and 6% of the population is in a flood hazard area. The same survey estimates that 5% of the residential dwellings are located in hazard zones. All but one of the City’s buildings and infrastructure (wells, liftstations, parks, and roads) are located outside of historical or potential flooding hazard zones. Historically, the known impacts of localized urban storm water or groundwater flooding have been seen at homes with basements flooded, inundated septic-drainfield systems and flooded underground utility vaults.

Probability of Occurrence

Although urban flooding is difficult to predict, the frequency of occurrence is diminishing due to capital improvements and storm water utility maintenance practices. Since the early 1990’s, all of the City’s untreated storm water outfalls to surface water bodies have been retrofitted with holding ponds and infiltration galleries. The streets and storm water divisions of the Public Works Operations Division also are proactive in keeping catch basins and conveyance pipes clean and free of blockages. All of these management efforts keep the probability of occurrence of localized urban flooding low. Threats to these efforts include a growing population and related storm water infrastructure, reduced budgets due to economic forces, and future annexations of problematic areas that are currently outside the City’s incorporated limits.

Historical Occurrences and Impacts Specific to this Jurisdiction

Flooding events have not presented a significant impact to the City and the delivery of its services to the community. Most flood related services are of an emergency nature, clearing leaf debris off of catch basin grates, pumping water out of overwhelmed storm water ponds, and providing assistance in pumping out flooded basements.

Summary Assessment

While the history of Thurston County clearly demonstrates a high probability of future occurrence, the severity and impact to the City of Lacey are “low”.

Summary Risk Assessment for Flood in the City of Lacey

Probability of Occurrence	Vulnerability	Risk
Moderate	Low	Low

Landslide

Severity

Landslides are the movement of rock, soil or other debris down a slope. Factors that contribute to landslides include erosion, earthquakes, volcanic eruptions, increased land bearing loads, hydrologic (water) factors, human modifications to land structures, removal of lateral & underlying support, increased lateral pressures and regional tilting. In the City of Lacey there are some areas of steep slopes that may be vulnerable to risk, but they are relatively insignificant since they comprise only .5% of the City's land area.

Impacts

Based on TRPC surveys of landslide hazards in the City, only 1% of the population is in a landslide hazard area. The same survey estimates that 1% of the residential dwellings are located in hazard zones. All of the City's buildings and infrastructure lie outside of the landslide hazard zones. Historically, the known impacts of landslides in the City have been minimal

Probability of Occurrence

Based on historical precedent, the incidence of landslides are concurrent with winter storms, flooding and earthquakes. The majority of landslides in the region are triggered by heavy precipitation. While significant landslides have occurred in nearby areas (Carlyon Beach, Hunter Point), there have been no recent notable landslides causing injuries or damage to personal property in the City. Based on geologic information, the probability for occurrence is "moderate".

Historical Occurrences and Impacts Specific to this Jurisdiction

Landslide events have not presented a significant impact to the City or the delivery of its services to the community.

Summary Assessment

In the City, landslides tend to occur in isolated, sparsely developed areas with minimal impact on individual structures, transportation networks and power/communications infrastructures; this would indicate a "low" risk rating.

Summary Risk Assessment for Landslide in the City of Lacey

Probability of Occurrence	Vulnerability	Risk
Moderate	Low	Low

Wildland Fire

Severity

The biggest risk to the City in regards to wildland fires are the neighborhoods that lie in the Wildland/urban interface. There are also large tracts of land within the City's incorporated boundary - such as the property owned by St. Martin's University and the associated Abby that are at some risk for wildland fire.

Sources and factors in wildland fires include fuel loading & types, weather conditions and terrain. In turn, the severity of a fire is influenced by soil conditions present, slope of the land, the type & moisture content of vegetation present, accessibility of fire suppression resources to the fire and the size when discovered/reported and subsequently attacked by the initial responders.

The number, size and severity of wildfires in the City in the past several years is hard to discern since the City contracts with Lacey Fire District #3. Any reporting of wildfires that have occurred within the City are combined with the numbers of fires in the Fire District as a whole. That being said, the number of wildland fires in the City have been affected by the growing residential community (less wildlands, quicker reporting of fires, home-owner intervention), implementation & enforcement of open burning regulations and upgraded training & equipping of emergency responders.

Impacts

The biggest impact of wildland fire to the City are damage to private residences, commercial properties, and industrial buildings in the wildland/urban interface. Based on TRPC surveys of wildland fire hazards in the City, only 2.2 acres - or 0% of the City's 10,550 acres and 0% of the population is in a wildfire hazard area. The same survey estimates that 0% of the residential dwellings are located in hazard zones. The information used by the TRPC for this evaluation was provided by the DNR based upon statistical formulae rather than empirical data.

Probability of Occurrence

The documented record of wildland fires in Thurston County suggest that approximately 97% of future wildfires will be 5 acres or less; the region can expect at least one fire exceeding 100 acres over the next 25 years. A warmer and drier future climate may create more suitable conditions for more frequent or larger wildfires. Although there is a "high" probability of reoccurrence in the county, because of the urban nature of the City, the probability is "low" for wildland fires.

Historical Occurrences and Impacts Specific to this Jurisdiction

In the recent past, only a few brush fires in open space tracts and dried up stormwater ponds have created wildland fire hazards to the City of Lacey. Based on this and the urban nature of the City, vulnerability and overall risk is estimated to be "low".

Summary Assessment

In the City, wildland fires may occur in the remaining isolated, sparsely developed areas or are of a nature where they are quickly reported and suppressed with minimal impact on life safety, individual structures, transportation networks, and power/communications infrastructures. All told, this would indicate a “low” overall risk rating.

Summary Risk Assessment for Wildland Fire in the City of Lacey

Probability of Occurrence	Vulnerability	Risk
Low	Low	Low

Volcanic Hazards

Severity

There are 5 major Cascade volcanoes in Washington State: Mount Baker, Glacier Peak, Mount Rainier, Mount St. Helens and Mount Adams. In the last 4,000 years, 11 Cascade volcanoes have erupted an estimated 100 times. The last major eruption was of Mount St. Helens on May 18, 1980. An explosive eruption could create an ash plume that could conceivably deposit ash all across Thurston County and could trigger large debris and mudflows, known as “lahars”, down glacial river valleys like the Nisqually. The two most likely hazards to affect Thurston County are tephra (volcanic dust & rock fragments as a result of an explosion) and lahar.

Since the risk of landslides in the City is low, the potential impact from them during a volcanic event is also low. While the location & geography of the City do not indicate any hazard for lahars (in Thurston County it lies mainly in the Nisqually River plain), it could potentially be quickly exposed to tephra during a volcanic event.

In regards to tephra, the 1980 eruption of Mt. St. Helens might be the best guide to estimate the effects of the tephra hazard. The size and quantity of material deposited at Yakima may most closely compare to what we might expect should the tephra come our way.

Maps suggest that a lahar would have a similar impact throughout the hazard area. It would seem likely that a Lahar would be much more violent nearer the source. Near Mt. Rainier, the surge would be more pronounced, the channel more confined (faster flow), and the debris size much larger. As it approaches Puget Sound, the flow may slow and widen out. Hazards from large boulders in the flow would seem minimal however the accumulated volume of water may represent an increased risk of flood damage (especially in the case of dam failures).

Impacts

Ash fall of a ¼ inch or more would reduce motorist visibility and disrupt nearly every mode of transportation due to both reduction of visibility and contamination for air-breathing engines. The ash would also effect persons with respiratory problems. Large accumulations or wet ash could cause load bearing problems for structures, trees and utility lines, causing collapses and power/communications outages. The ability of the City to respond to emergency incidents, keep roadways passable, and provide water and sewer services to its citizens could be complicated or reduced. Clean-up and recovery would likely be the greatest cost to both the public and private sector. Other concerns include the risk of fire if the ash were hot enough to initiate burning, limitations on air and other means of transportation and subsequent supply shortages, and the impact on surface water supplies, such as McAllister Springs.

The City of Lacey has a well that provides water services to part of the lahar hazard area in the Nisqually River valley. Although the customers are not Lacey citizens and the area is not in the City’s urban growth area, the City would strive to protect the water source and provide water to its customers.

Probability of Occurrence

The US Geological Survey reports that Mount Rainier has only produced moderate quantities of ash in past eruptions; Mount St. Helens 1980 eruption deposited only a scant layer of ash in Thurston County. Because the prevailing winds blow from the south & west, it is likely most ash from a Cascade Range eruption be blown east away from Thurston County, with little (less than .02%) chance of winds blowing it into the county. Therefore, there is a “low” probability of occurrence in the county and therefore the City of Lacey.

Historical Occurrences and Impacts Specific to this Jurisdiction

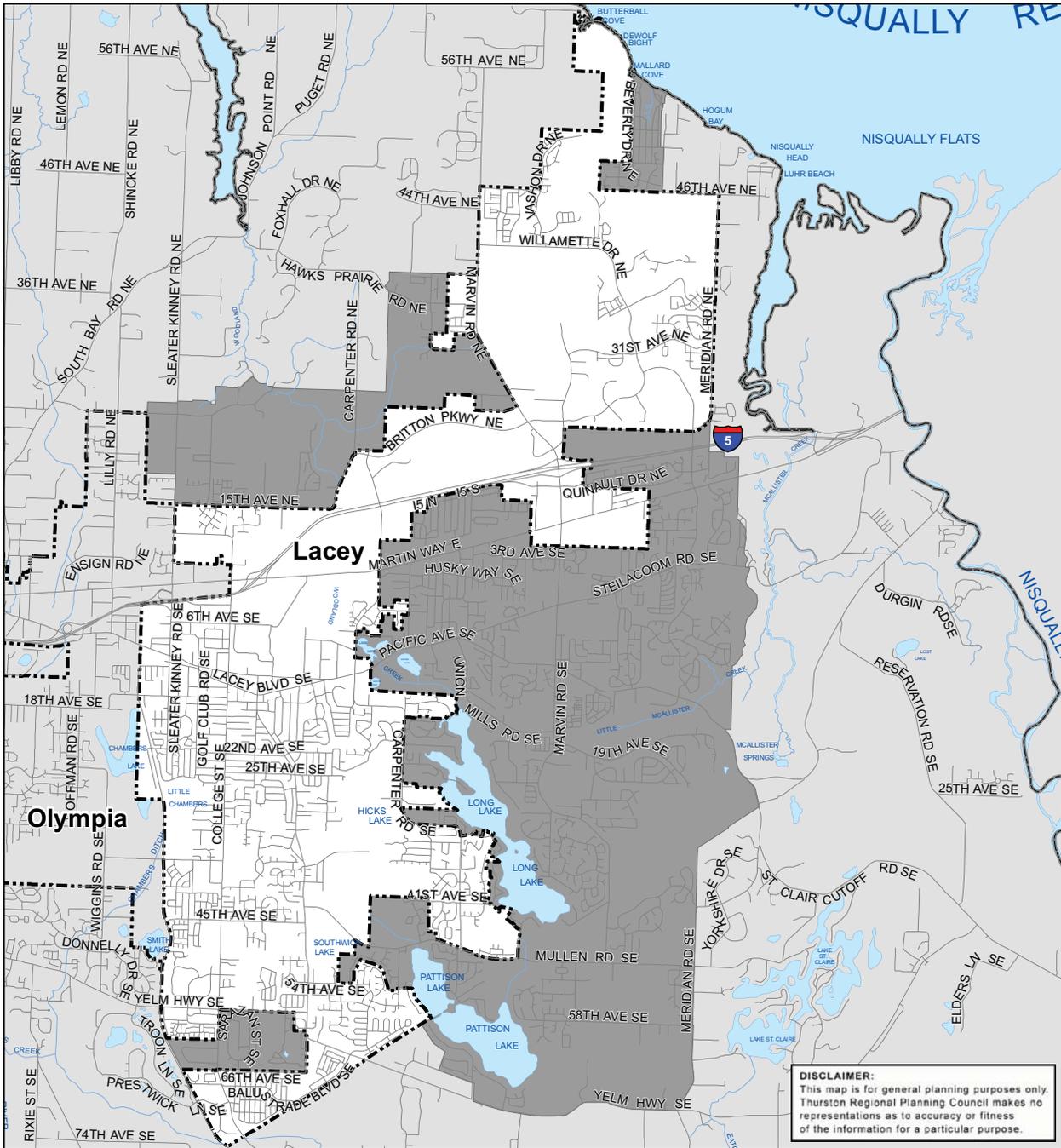
No known historical precedence in the City of Lacey.

Summary Assessment

Under certain conditions, tephra could fall within the City, but the effects would not pose immediate life threatening conditions. The clean-up and recovery costs could be significant as well as the impact to regional transportation and supply chains, emergency services, and public health. Therefore, the City is “moderately” vulnerable to volcanic activity

Summary Risk Assessment for Volcanic Events in the City of Lacey

Probability of Occurrence	Vulnerability	Risk
Low	Moderate	Moderate



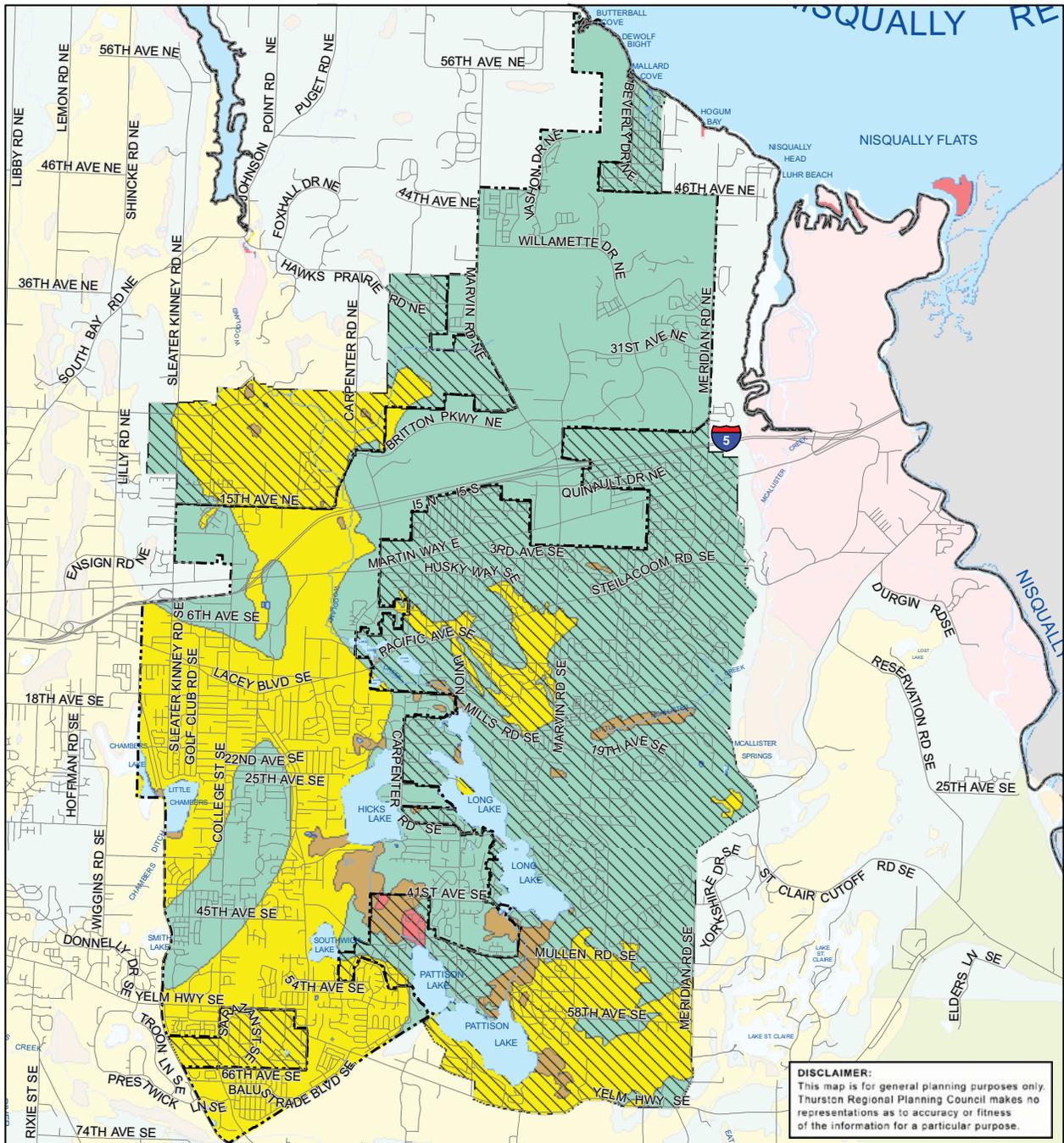
Printing Date: April 24, 2009
File: P:\ThurstonCounty\Hazard_Mgt\HazardMit08\Maps_Images\Chapter_Maps\VicinityMaps\Lacey

City of Lacey

- City of Lacey
- City Limits
- Urban Growth Boundary

1 0.5 0 1 Miles

Thurston County, WA



City of Lacey Liquefaction Hazards

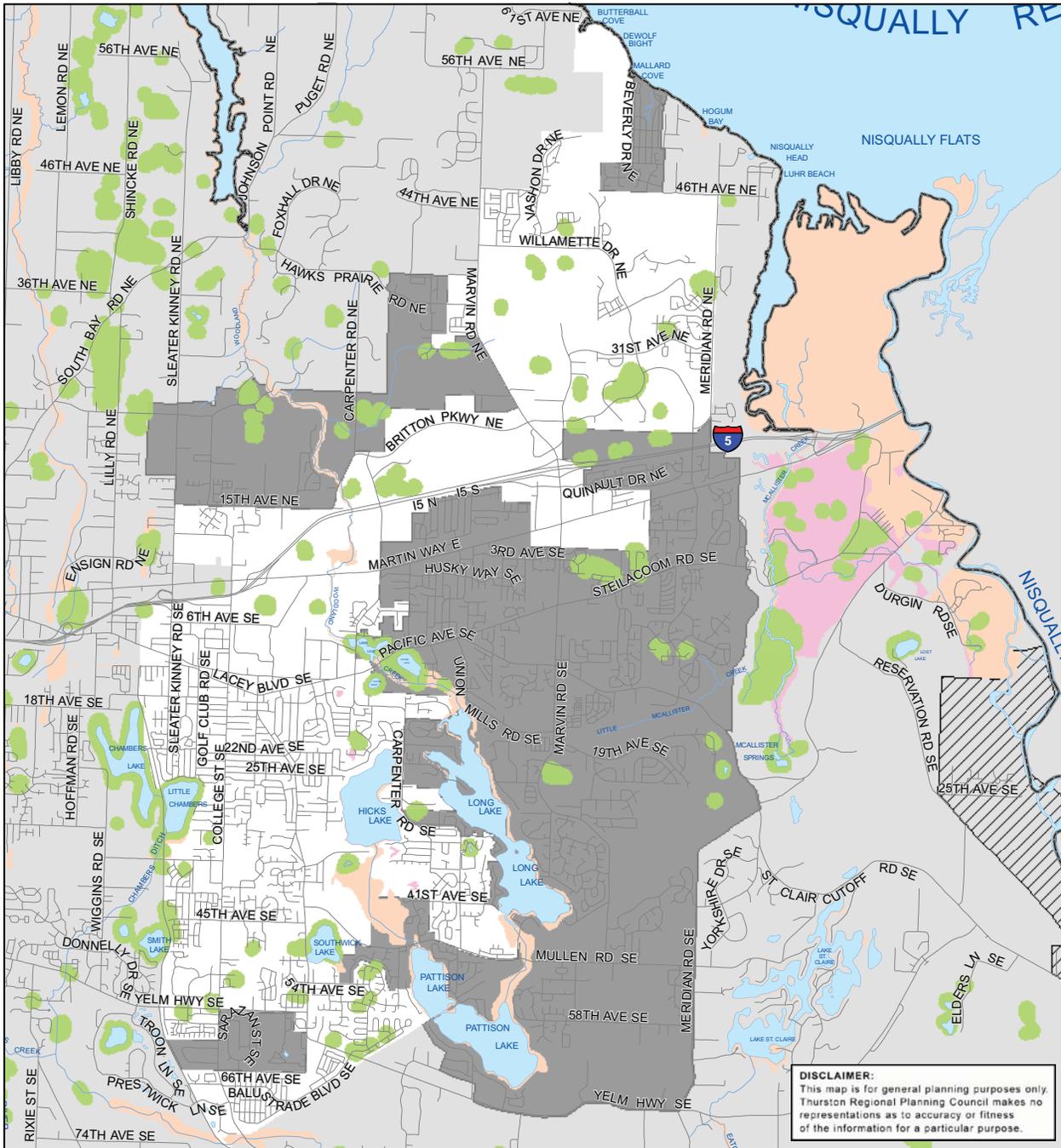


City Limits
Urban Growth Boundary

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



Printing Date: March 10, 2009
File: P:\ThurstonCounty\Hazard_Mgt\HazardMit08\Maps_Images\Chapter_Maps\liq_lacey_8x11.mxd



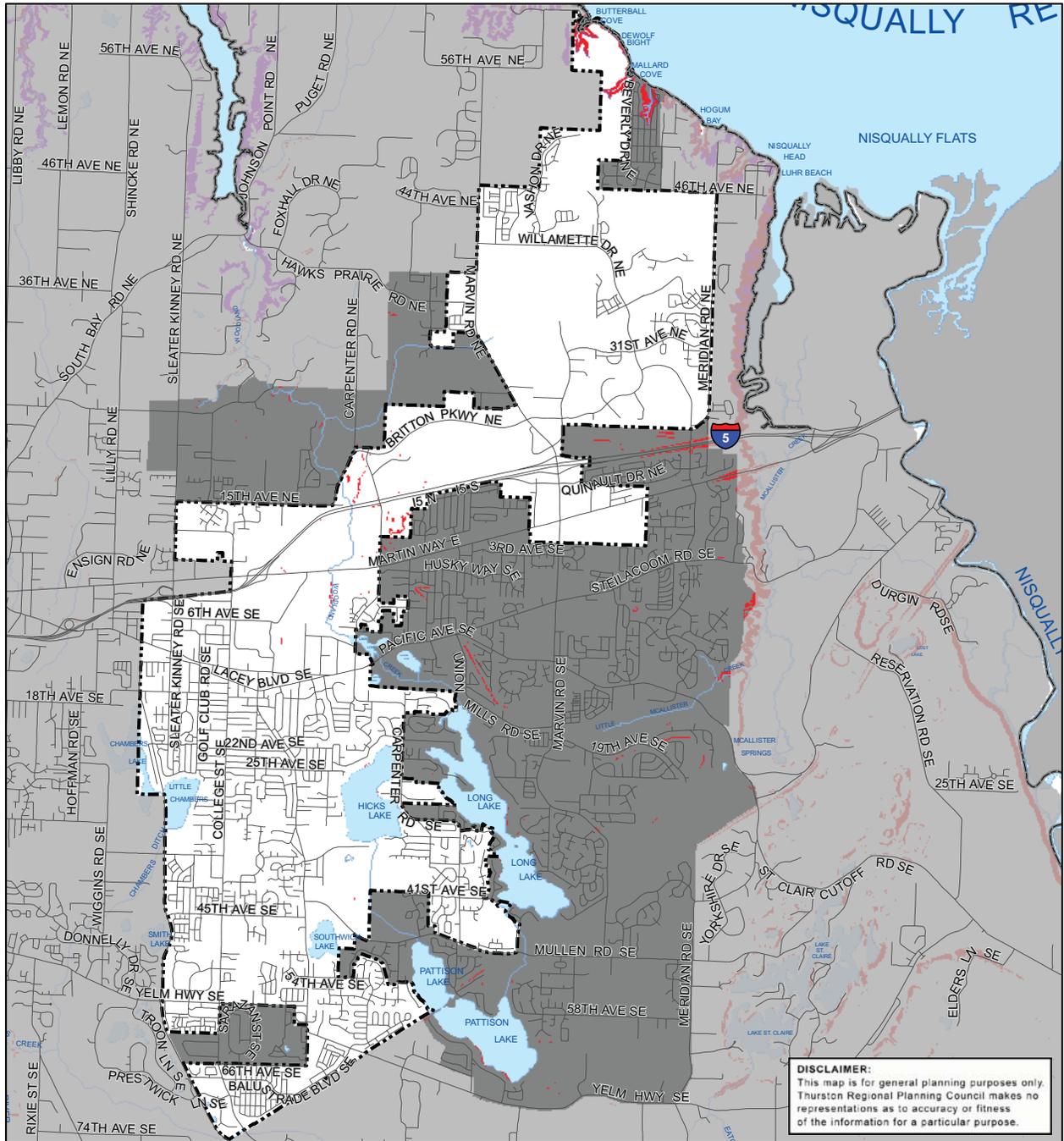
DISCLAIMER:
 This map is for general planning purposes only. Thurston Regional Planning Council makes no representations as to accuracy or fitness of the information for a particular purpose.

City of Lacey Flood Hazards

	High Groundwater Flooding		City Limits
	100 Year Floodplain		Nisqually Indian Reservation
	500 Year Floodplain		Urban Growth Boundary

Printing Date: February 19, 2009
 File: P:\ThurstonCounty\Hazard_Mgt\HazardMit08\Maps_Images\Chapter_Maps\flood_lacey_8x11.mxd

1 0.5 0 1 Miles



City of Lacey Steep Slopes

■ Slopes Over 40%

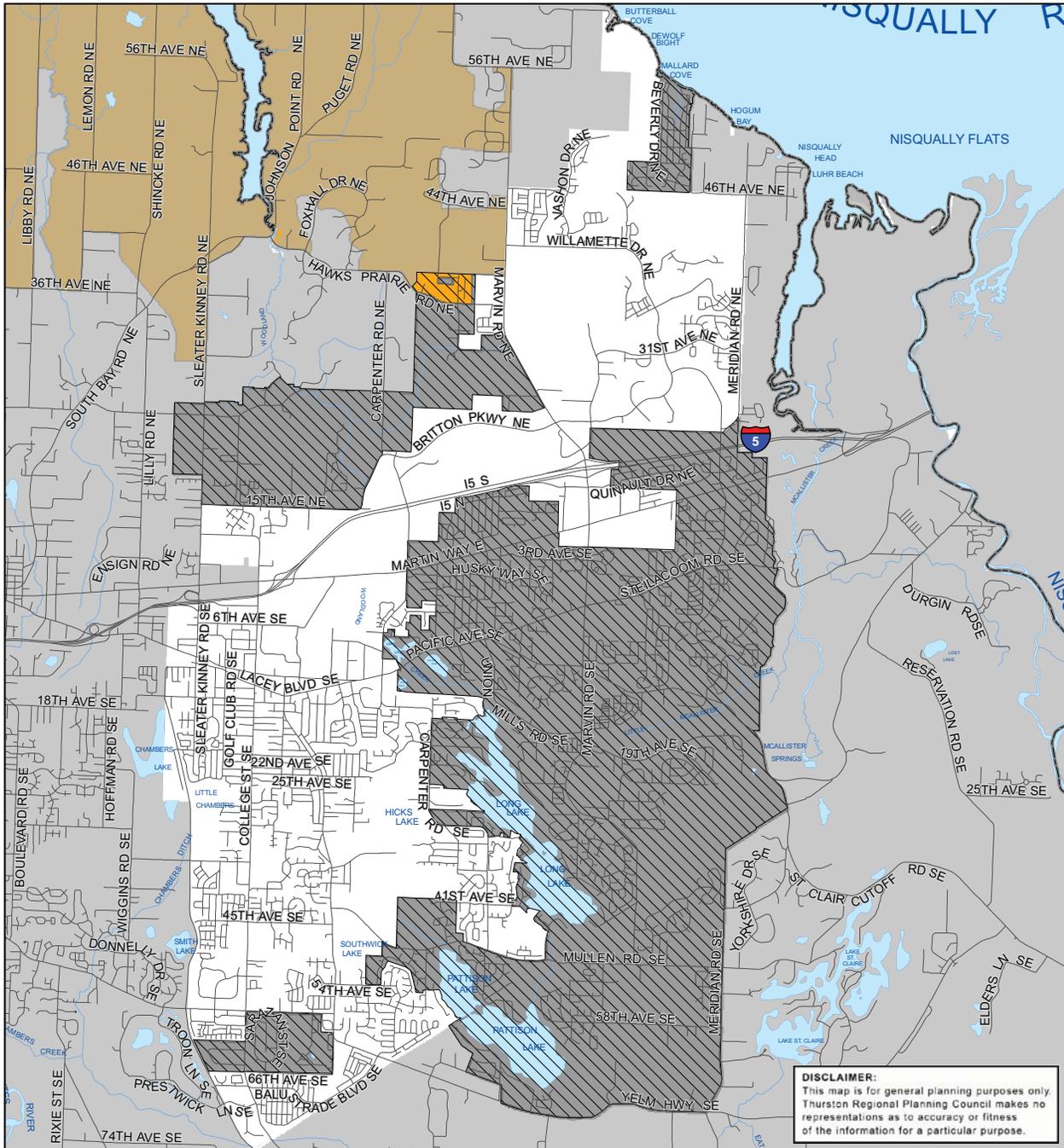
■ Coastal Landslide Hazards

City Limits

Urban Growth Boundary

1 0.5 0 1 Miles

Printing Date: March 18, 2009
 File: P:\ThurstonCounty\Hazard_Mgt\HazardM08\Maps_Images\Chapter_Maps\Steep_Maps\steep_lacey_8x11.mxd



City of Lacey Wildfire Hazard Area



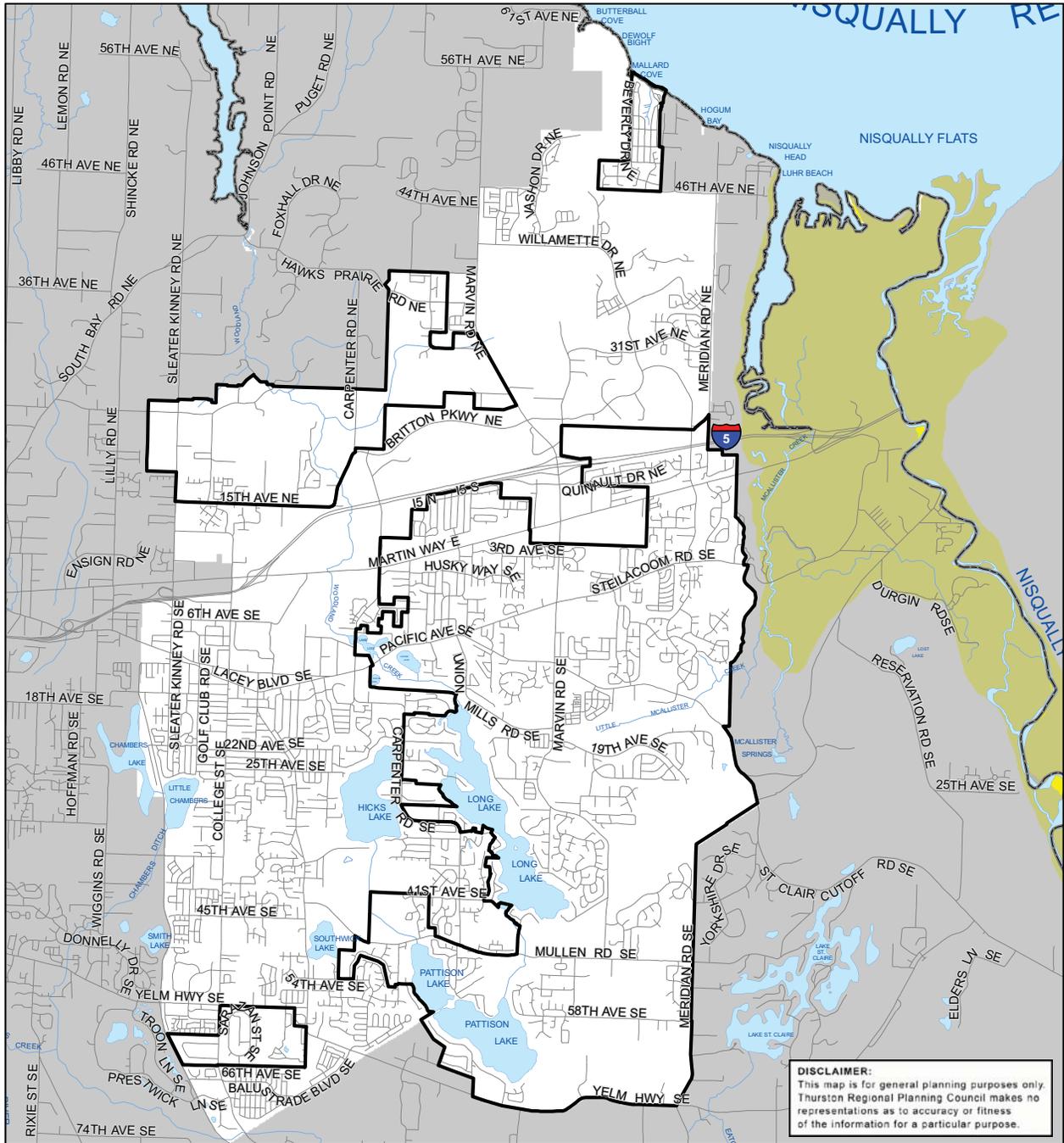
- Wildfire Hazard Areas
- City Limits
- Urban Growth Boundary



1 0.5 0 1 Miles



Printing Date: March 20, 2009
File: P:\ThurstonCounty\Hazard_Mgt\HazardMit08\Maps_Images\Chapter_Maps\Wildfire_Maps\Fire_lacey_8x11.mxd



City of Lacey Case I Lahar Inundation Zone



- Urban Growth Boundary
- Case I Lahar Boundary



1 0.5 0 1 Miles

Printing Date: March 24, 2009
File: P:\ThurstonCounty\Hazard Mgt\HazardMit08\Maps Images\Chapter Maps\Lahar Maps\lahar_lacey_8x11.mxd

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City of Lacey 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 Lacey 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 15	L-EH 2	Critical Facilities Replacement/ Retrofit	Pursue seismic upgrades to water facilities that do not meet current seismic codes.	Modified
2 of 15	L-EH 4	Hazard Damage Reduction	Replace the shut off valve at the Union Mills Reservoir that will enable the water storage facility to be isolated in the case of a water line break or other damage.	New
3 of 15	L-MH 8	Hazard Damage Reduction	Retrofit the City's alarm system for wastewater lift station facilities and convert them from older, analog technology to modern digital components.	New
4 of 15	L-EH 1	Plan Coordination and Implementation	Continue funding the water line replacement program to ensure water supply lines are constantly being upgraded.	Existing
5 of 15	L-MH 9	Hazard Preparedness	Develop a system for secure off-site, "real-time" storage of data from City computers and networks.	New
6 of 15	L-FH 5	Hazard Damage Reduction	Evaluate the flood prone area of Rainier Road SE near the BNSF railroad trestle and determine solutions to prevent future flooding events.	New
7 of 15	L-MH 7	Hazard Preparedness	Purchase and install backup generators to provide power to the remaining sewer lift stations that do not currently have permanently mounted standby generators.	New
8 of 15	L-MH 5	Hazard Damage Reduction	Develop policy regarding private contractors removing debris and/or snow on public streets.	New
9 of 15	L-EH 3	Hazard Damage Reduction	Reduce hazards inside the City of Lacey facilities to prevent property damage and enhance ability to recover and respond after an earthquake.	Existing
10 of 15	L-MH 3	Hazard Preparedness	Develop public and private partnerships to foster natural hazard mitigation program coordination and collaboration.	Existing
11 of 15	L-FH 2	Plan Coordination and Implementation	Encourage and educate the public on the purchase of flood insurance.	Modified
12 of 15	L-FH 1	Data Collection and Mapping	Identify and map public and private properties in the 100-year floodplain.	Modified
13 of 15	L-FH 4	Hazard Damage Reduction	Establish a program whereby sand and sandbags are stored by the City and made available to the public in anticipation of minor flooding during the winter. The bags would be made available to the general public if their property was in danger of being flooded.	New
14 of 15	L-MH 6	Public Information	Purchase communications system that will enable the City to broadcast information to a very localized and specific geographical area, such as road closures, water outages, and other utility information.	New
15 of 15	L-MH 10	Hazard Damage Reduction/ Public Information	Evaluate and purchase an internet based communications system that will enable City resources to be called-out in response to disasters or emergencies as well as send out announcements and warnings to the public.	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 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 Lacey adopted mitigation strategy. These initiatives are not ranked as they are no longer relevant.

I.D. Number	Category	Action	Status
L-MH 4	Critical Facilities Replacement/Retrofit	Enhance and upgrade the alternate Emergency Operations Center located at the Lacey Maintenance Administration Building.	Completed
L-MH 1	Hazard Preparedness	Develop and maintain a Comprehensive Operations Response plan to enable quicker, more coordinated response after a disaster.	Completed
L-FH 3	Hazard Preparedness	Develop emergency response plans for wells 19a and 19c which are located in the Nisqually Valley.	Completed
L-MH 2	Public Information	Develop, enhance, and implement education programs aimed at mitigating natural hazards, and reducing the risk to citizens, public agencies, private property owners, businesses, and schools.	Completed

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 15**Status: Modified****Hazard Addressed: Earthquake Hazard****Category: Critical Facilities Replacement/Retrofit****L-EH 2: Pursue seismic upgrades to water facilities that do not meet current seismic codes**

Rationale: Ensures that Lacey's water storage capability will not be severely impacted during a seismic event. Inspection and potential retrofits may be needed at the Union Mills Reservoir, Judd Hill Reservoir, Steilacoom Reservoir, and Nisqually Reservoir with seismic anchors.

Relates to Plan Goal(s) and Objectives: 7B**Implementer:** City of Lacey water utility.**Estimated Cost:** Unknown**Time Period:** 2010 - 2014**Funding Source:** Lacey water utility matched with potential grant funding.**Source and Date:** 2003 Natural Hazards Mitigation Plan, 2003 Water Comprehensive Plan (City of Lacey)**Adopted Plan Number:** L-EH-2**Reference Page:** V-49 (NHMP), 9-14 (WCP)

Initiative and Implementation Status: Study is planned to evaluate current water reservoirs and determine what seismic upgrades are required, if any. Wastewater facilities were eliminated from this mitigation initiative since they do not pose the same risk as large water storage reservoirs.

Priority: 2 of 15**Status: New****Hazard Addressed: Earthquake Hazard****Category: Hazard Damage Reduction****L-EH 4: Replace the shut off valve at the Union Mills Reservoir that will enable the water storage facility to be isolated in the case of a water line break or other damage.****Rationale:** Enables city forces to shut off the water supply line leading from reservoir into the City system. Currently the valve is malfunctioning and cannot be turned off. Inability to turn off the water source could lead to property damage to surrounding homes, businesses, and infrastructure.**Relates to Plan Goal(s) and Objectives: 7B****Implementer:** City of Lacey Emergency Management and Public Works Operations**Estimated Cost:** \$450,000**Time Period:** 2010 - 2014**Funding Source:** City of Lacey Utility funds and/or grant funds**Source and Date:** N/A**Adopted Plan Number:** N/A**Reference Page:** N/A**Initiative and Implementation Status:** New

Priority: 3 of 15**Status: New****Hazard Addressed: Multi Hazard**
Category: Hazard Damage Reduction**L-MH 8: Retrofit the City's alarm system for wastewater liftstation facilities and convert them from older, analog technology to modern digital components.****Rationale:** Enables city forces to be alerted when liftstations are at or near capacity so they can respond in an organized and timely fashion. Prioritized response would lead to prevention of property damage, environmental contamination, and related expenses.**Relates to Plan Goal(s) and Objectives: 7B****Implementer:** City of Lacey Emergency Management and Public Works Operations**Estimated Cost:** \$300,000**Time Period:** 2010 - 2014**Funding Source:** City of Lacey Utility funds and/or grant funds**Source and Date:** N/A**Adopted Plan Number:** N/A**Reference Page:** N/A**Initiative and Implementation Status:** New

Priority: 4 of 15**Status: Existing****Hazard Addressed: Earthquake Hazard****Category: Critical Facilities Replacement/Retrofit****L-EH 1: Continue funding the water line replacement program to ensure water supply lines are constantly being upgraded.**

Rationale: Ensures that the City infrastructure for water delivery is continuously being replaced and built to current seismic codes. Enables flexible joints or other seismic upgrades to be included as part of the water system upgrades, where necessary.

Relates to Plan Goal(s) and Objectives: 4B**Implementer:** City of Lacey water utility.**Estimated Cost:** \$660,000 annually**Time Period:** Annually - 2010 - 2015**Funding Source:** Water Utility fund.**Source and Date:** City of Lacey Capital Facilities Plan (2001-2020)**Adopted Plan Number:** Water 16

Reference Page: Refers to the identifiers of the initiative within the adopted document. If not applicable, please enter N/A.

Initiative and Implementation Status: This program is budgeted every year by the Lacey City council and it is anticipated that it will continue to be funded. This is an existing initiative that gets completed each year but is carried over to the next planning cycle.

Priority: 5 of 15

Status: New

Hazard Addressed: Multi Hazard

Category: Hazard Preparedness

L-MH 9: Develop a system for secure off-site, “real-time” storage of data from City computers and networks.

Rationale: The system would mimic the City’s current network structure and files would be backed up instantly as they are created or modified. The backup servers would be located in a hardened secure site that could be accessed remotely or in person by Information Services staff. Having the backups will enable the City to recover more quickly and efficiently after a major disaster.

Relates to Plan Goal(s) and Objectives: 4B

Implementer: City of Lacey Information Services Department

Estimated Cost: Unknown

Time Period: 2010 - 2014

Funding Source: City of Lacey General Fund budget

Source and Date: N/A

Adopted Plan Number: N/A

Reference Page: N/A

Initiative and Implementation Status: New

Priority: 6 of 15**Status: New****Hazard Addressed: Flood Hazard**
Category: Hazard Damage Reduction**L-FH 5: Evaluate the flood prone area of Rainier Road SE near the BNSF railroad trestle and determine solutions to prevent future flooding events.****Rationale:** Potential solutions may include property buyout, culvert replacement, curb and gutter installation, and road grade changes. The area is problematic due to the fixed elevation of the BNSF railroad grade. Three properties along College Street are at risk of flooding. This area was annexed into the City in 2008.**Relates to Plan Goal(s) and Objectives: 7A****Implementer:** City of Lacey Emergency Management and Public Works Engineering**Estimated Cost:** \$500,000 - \$1,000,000**Time Period:** 2010 - 2014**Funding Source:** City of Lacey General Fund budget and/or grant funds**Source and Date:** N/A**Adopted Plan Number:** N/A**Reference Page:** N/A**Initiative and Implementation Status:** New

Priority: 7 of 15**Status: New****Hazard Addressed: Multi Hazard**
Category: Hazard Preparedness**L-MH 7: Purchase and install backup generators to provide power to the remaining sewer lift stations that do not currently have permanently mounted standby generators.****Rationale:** Most water facilities have been constructed or retrofitted with emergency standby generators to provide power to the pumps and controls during power outages. There are some remaining sewer lift stations that have not been retrofitted with generators.**Relates to Plan Goal(s) and Objectives:** 7B**Implementer:** City of Lacey Emergency Management and Public Works Operations Division**Estimated Cost:** \$50,000 - \$1,000,000 depending on the number of generators installed**Time Period:** 2010 - 2014**Funding Source:** City of Lacey General Fund budget and/or utility funds (for facilities in the utilities)**Source and Date:** N/A**Adopted Plan Number:** N/A**Reference Page:** N/A**Initiative and Implementation Status:** New

Priority: 8 of 15**Status: New****Hazard Addressed: Multi Hazard**
Category: Hazard Damage Reduction**L-MH 5: Develop policy regarding private contractors removing debris and/or snow on public streets.****Rationale:** During a disaster when streets are blocked and utility and emergency service agencies need to get through, City forces may be utilized entirely by those agencies leaving other road clearing activities lower on the priority list. With a policy in place, private companies or local homeowners associations may contract to perform lower priority road clearing activities.**Relates to Plan Goal(s) and Objectives:** 1B, 3G**Implementer:** City of Lacey Emergency Management and Public Works Operations Division**Estimated Cost:** Unknown**Time Period:** 2010 - 2014**Funding Source:** City of Lacey General Fund budget**Source and Date:** N/A**Adopted Plan Number:** N/A**Reference Page:** N/A**Initiative and Implementation Status:** New

Priority: 9 of 15**Status: Existing****Hazard Addressed:****Category:****L-EH 3: Reduce hazards inside of City facilities to prevent property damage and enhance ability to recover and respond after an earthquake.**

Rationale: This initiative includes activities such as strapping down computers, CRT's, bookcases, shelving units, and other office and operating supplies and equipment. This will minimize the amount of property damage, increase ability to respond and recover, and reduce the risk of personal injury from falling and projectile objects

Relates to Plan Goal(s) and Objectives: 7C**Implementer:** City of Lacey Emergency Management**Estimated Cost:** Unknown. Will vary based on size and extent of project**Time Period:** 2010 - 2014**Funding Source:** City of Lacey General Fund budget**Source and Date:** 2003 Natural Hazards Mitigation Plan**Adopted Plan Number:** L-EH-3**Reference Page:** V-51**Initiative and Implementation Status:** Ongoing potential project that has not been initiated yet.

Priority: 10 of 15**Status: Modified****Hazard Addressed: Multi Hazard****Category: Hazard Preparedness****L-MH 3: Develop public and private partnerships to foster natural hazard mitigation program coordination and collaboration.****Rationale:** Ensures coordination between public and private sector organizations to share information and resources during the response and recovery phase of any incident.**Relates to Plan Goal(s) and Objectives:** 4A, 7C**Implementer:** City of Lacey Emergency Management**Estimated Cost:** Unknown**Time Period:** 2010 - 2014**Funding Source:** City of Lacey General Fund budget**Source and Date:** 2003 Natural Hazards Mitigation Plan**Adopted Plan Number:** L-MH-3**Reference Page:** V-63**Initiative and Implementation Status:** Some preliminary discussions have occurred between the City and a few local businesses regarding continuity of business plans and coordination between tenants of a strip mall for response and recovery, but no formalized process or program has been developed yet.

Priority: 11 of 15**Status: Modified****Hazard Addressed: Flood Hazard****Category: Public Information**

L-FH 2: Include information in public outreach materials and presentations that flood insurance is typically NOT included in homeowner's insurance policies and that it is incumbent on the consumer to request this coverage over and above the standard policy limits.

Rationale: This will enable Lacey residents to better understand the limits of their insurance policies and can then lead to an informed decision regarding the purchase of flood insurance depending on each individual's circumstance.

Relates to Plan Goal(s) and Objectives: 6E**Implementer:** City of Lacey**Estimated Cost:** Unknown**Time Period:** 2010 - 2014**Funding Source:** City of Lacey General Fund budget**Source and Date:** 2003 Natural Hazards Mitigation Plan**Adopted Plan Number:** L-FH-2**Reference Page:** V-55

Initiative and Implementation Status: Although the risk of riverine, palustrine, and coastal flooding is remote in the City of Lacey, some homeowners may live near a lake or wetland and may want to consider purchasing additional flood insurance. Including this information in our public outreach materials will enable homeowners to make a more informed decision on whether or not flood insurance is necessary for their home's location.

Priority: 12 of 15**Status: Modified****Hazard Addressed: Earthquake Hazard****Category: Hazard Damage Reduction****L-FH 1: Identify and map public and private properties in the 100-year floodplain**

Rationale: Knowing what properties lay in the 100-year floodplain will enable City officials to plan for and enact a response to flooding events in Lacey.

Relates to Plan Goal(s) and Objectives: 2A

Implementer: City of Lacey Emergency Management, Information Services, and Community Development Departments

Estimated Cost: \$1,000**Time Period:** 2010 - 2014**Funding Source:** City of Lacey General Fund budget**Source and Date:** 2003 Natural Hazards Mitigation Plan**Adopted Plan Number:** L-FH-1**Reference Page:** V-53

Initiative and Implementation Status: Ongoing potential project that has not been initiated yet. This task will be easier to accomplish due to the hiring of a GIS mapping technician in the Information Services Department.

Priority: 13 of 15**Status: New****Hazard Addressed: Flood Hazard****Category: Hazard Damage Reduction**

L-FH 4: Establish a program whereby sand and sandbags are stored by the City and made available to the public in anticipation of minor flooding during the winter. The bags would be made available to the general public if their property was in danger of being flooded.

Rationale: During minor flooding events, property damage can be minimized by the placement of sandbags by the public. Since it is often initially unclear who is responsible for causing the flooding, it is in the City's best interest to provide citizens a resource to mitigate the damage. That way, if it is determined to be the City's responsibility the damage would not be as severe. The bags could also be used as a back up for City storm water crews if they run out of their own bags during large rain events.

Relates to Plan Goal(s) and Objectives: 4D, 8A

Implementer: City of Lacey Emergency Management and Public Works Operations Division

Estimated Cost: \$2,000

Time Period: 2010 - 2014

Funding Source: City of Lacey General Fund budget

Source and Date: N/A

Adopted Plan Number: N/A

Reference Page: N/A

Initiative and Implementation Status: New

Priority: 14 of 15**Status: New****Hazard Addressed: Multi Hazard****Category: Public Information**

L-MH 6: Purchase a portable radio station that will enable the City to broadcast information to a very localized and specific geographical area, such as road closures, water outages, and other utility information.

Rationale: During disasters, the ability to communicate to the public is vital. With the assistance of a portable FM radio station transmitter, City officials could announce roads closed, utility restoration status, emergency shelter locations, and aid centers. Citizens would only need to know the frequency of the broadcasts and then they could tune in for more information.

Relates to Plan Goal(s) and Objectives: 5B**Implementer:** City of Lacey Emergency Management and Public Works Operations Division**Estimated Cost:** \$25,000**Time Period:** 2010 - 2014**Funding Source:** City of Lacey General Fund budget**Source and Date:** N/A**Adopted Plan Number:** N/A**Reference Page:** N/A**Initiative and Implementation Status:** New

Priority: 15 of 15**Status: New****Hazard Addressed: Multi Hazard**
Category: Hazard Damage Reduction**L-MH 10: Evaluate and purchase an internet based communications system that will enable City resources to be called-out in response to disasters or emergencies as well as send out announcements and warnings to the public.****Rationale:** In addition to being used as a call out system for City staff, it would also be used to send out pre-recorded messages to large blocks of residents in specific geographic areas. These messages can be sent to a variety of devices as dictated by the end users. Announcements such as shelter in place, water service interruptions, and disaster assistance instructions can be sent out based on the situation at hand.**Relates to Plan Goal(s) and Objectives: 3A****Implementer:** City of Lacey Information Services Department**Estimated Cost:** Unknown**Time Period:** 2010 - 2014**Funding Source:** City of Lacey General Fund budget**Source and Date:** N/A**Adopted Plan Number:** N/A**Reference Page:** N/A**Initiative and Implementation Status:** New

Priority: N/A**Status: Completed****Hazard Addressed: Multi Hazard****Category: Critical Facilities Replacement/Retrofit****L-MH 4: Enhance and upgrade the alternate Emergency Operations Center located at the Lacey Maintenance Administration Building.**

Rationale: Ensures coordination between public and private sector organizations to share information and resources during the response and recovery phase of any incident. Provides an alternate location for coordination in case the primary EOC is rendered useless.

Relates to Plan Goal(s) and Objectives: 3B, 4C**Implementer:** City of Lacey Emergency Management & Public Works Operations**Estimated Cost:** \$3,000 - \$10,000**Time Period:** 2010 - 2014**Funding Source:** City of Lacey General Fund budget**Source and Date:** 2003 Natural Hazards Mitigation Plan**Adopted Plan Number:** L-MH-4**Reference Page:** V-65

Initiative and Implementation Status: A space for the alternate EOC has been identified at the Maintenance Administration Center (Shop) in the main conference room and a new standby generator has been purchased and installed. Phones, portable radios, a laptop computer, and a projector are available at the shop and plans and procedures are in place to move these pieces of equipment into the room upon activation. Two tasks that are in process include upgrading the City's radio system for more reliable communication and installing a cable connection in order to monitor local television broadcasts.

Priority: N/A**Status: Completed****Hazard Addressed: Multi Hazard****Category: Hazard Preparedness****L-MH 1: Develop and maintain a comprehensive operations response plan to enable quicker, more coordinated response after a disaster.**

Rationale: The plan would include specific task checklists, updated resource lists, fuel management plan, and staffing plans and procedures. This would enable the city operations staff to work from pre-determined checklists and plans creating more efficient and timely response and recovery from any disaster or catastrophe

Relates to Plan Goal(s) and Objectives: 4A**Implementer:** City of Lacey Operations Division.**Estimated Cost:** \$10,000 annually**Time Period:** Annually - 2005 - 2006**Funding Source:** General Fund**Source and Date:** 2003 Natural Hazards Mitigation Plan**Adopted Plan Number:** L-MH-1**Reference Page:** V-59

Initiative and Implementation Status: This plan has been written and is followed by Operations Division staff and is therefore completed. Periodic updates to the plan will be made as resources, staffing, and response protocols change.

Priority: N/A**Status: Completed****Hazard Addressed: Flood Hazard****Category: Hazard Preparedness****L-FH 3: Develop emergency response plans for wells 19a and 19c which are located in the Nisqually and are prone to flooding.**

Rationale: Enables city personnel to respond in a quicker, more organized manner thereby reducing damage and potential property loss. These wells are no longer the primary source of potable water to customers in the Nisqually Valley, but are still important enough to warrant protection during a flood event.

Relates to Plan Goal(s) and Objectives: 4B**Implementer:** City of Lacey Emergency Management and Public Works Operations Division**Estimated Cost:** \$2,000**Time Period:** 2010 - 2014**Funding Source:** City of Lacey General Fund budget**Source and Date:** 2003 Natural Hazards Mitigation Plan**Adopted Plan Number:** L-FH-3**Reference Page:** V-57

Initiative and Implementation Status: The pumps at each wellhead have been retrofitted with “snorkel” type tubes with openings that are elevated above the historical high water mark. This enables the pumps to work even if the wellhouse floods. Water utility staff know that when flooding is predicted in the Nisqually Valley that they must check the tubes to ensure a tight seal in preparation for the event.

Priority: N/A**Status: Completed****Hazard Addressed: Multi Hazard****Category: Public Information**

L-MH 2: Develop, enhance, and implement public education programs aimed at mitigating natural hazards and reducing the risk to citizens, public agencies, private property owners, businesses, and schools.

Rationale: Increases the public's awareness and understanding of disaster mitigation, planning, response, and recovery. This will enable the City to receive support for Emergency preparedness activities, respond quicker and more efficiently during an event, and reduce property damage and other potential losses.

Relates to Plan Goal(s) and Objectives: 1B, 8A

Implementer: City of Lacey Emergency Management

Estimated Cost: \$4,000

Time Period: 2010 - 2014

Funding Source: City of Lacey General Fund budget

Source and Date: 2003 Natural Hazards Mitigation Plan

Adopted Plan Number: L-MH-2

Reference Page: V-61

Initiative and Implementation Status: For the last five years the City has either hosted or cosponsored an emergency preparedness event featuring speakers, vendors, informational booths, and informational handouts. The event grew in size and scale when the City partnered with Thurston County Emergency Management to cosponsor the event, which attracted over 1,200 people the last couple of years. Typically costs are shared, with Lacey contributing close to \$3,000 towards facility and/or equipment rental for the event. Other public education includes making presentations to community groups and distributing packets of printed materials upon request. Although it is classified as "completed" this mitigation initiative will continue to be implemented annually.

City of Lacey 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 [The mitigation strategy] must also address the jurisdiction's participation in §201.6(c)(3)(ii): the NFIP, and continued compliance with NFIP requirements, as appropriate.

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 Lacey has actively participated in the National Flood Insurance Program (NFIP) since 1980. The City's Flood Hazard Prevention Ordinance was most recently updated in 2006 in response to a review and community assistance visit from the Department of Ecology which identified minor changes which were needed within the ordinance for continued compliance with the NFIP. The City of Lacey Flood Insurance Rate Maps are dated July 16, 1980. Flood hazard data from these maps has been incorporated into the City's GIS database.

The City's flood hazard is limited. Citywide there are only 14 total flood policies, none of which are for structures located with a mapped floodplain. The City's losses are also substantially limited; there have only been 3 insurance claims since the City joined the NFIP in 1980, resulting in approximately \$8,000 in insurance payouts.

Flood Plans, Ordinances, and Regulations

The City's flood ordinance is found in LMC 14.34 "Flood Hazard Prevention." This ordinance meets or exceeds all of the minimum standards required by the National Flood Insurance Program. The flood hazard prevention ordinance pertains to building and construction standards required for development within the designated floodplains. While the flood hazard prevention ordinance provides standards for potential structures within the floodplain, the City's other critical areas ordinances limit to a large degree any development with the designated floodplain. The floodplains identified on the Flood Insurance Rate Maps provided by FEMA for the City of Lacey generally correspond with wetlands and or wetland buffers, stream habitat buffers, or other critical areas located with the City. Lacey Municipal Code 14.28 'Wetlands Protection' and LMC 14.33 'Habitat Conservation Areas Protected' restrict development from occurring within wetlands and their buffers, and within the critical habitat areas of streams; these additional codes have essentially limited any development that has occurred in the City of Lacey within the FEMA designated floodplains. The City also had procedures for review of any development proposed to take place within the floodplain. Any development that is proposed within the floodplain is reviewed for compliance during the building permit process by the City of Lacey Building Official.

As stated above the City of Lacey's flood hazard is limited. With the wetlands protection and the habitat conservation areas ordinances, the City is able to direct development away from the mapped floodplains; and with the flood hazard prevention ordinance in place, the City is able to protect any development that cannot be directed outside of the flood hazard areas. With these regulations and review procedures in place, the City of Lacey maintains compliance with the requirements of the National Flood Insurance Program.

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