

## CHAPTER 23. CITY OF SHORELINE UPDATE ANNEX

### 23.1 HAZARD MITIGATION PLAN POINT OF CONTACT

**Primary Point of Contact**

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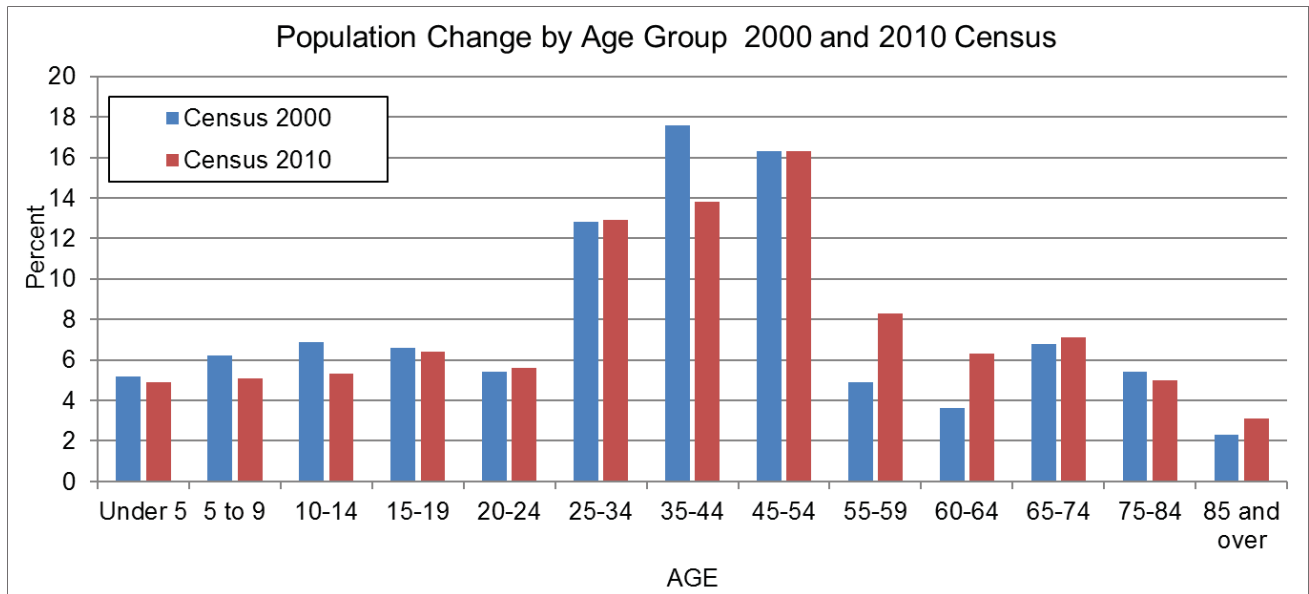
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### 23.2 JURISDICTION PROFILE

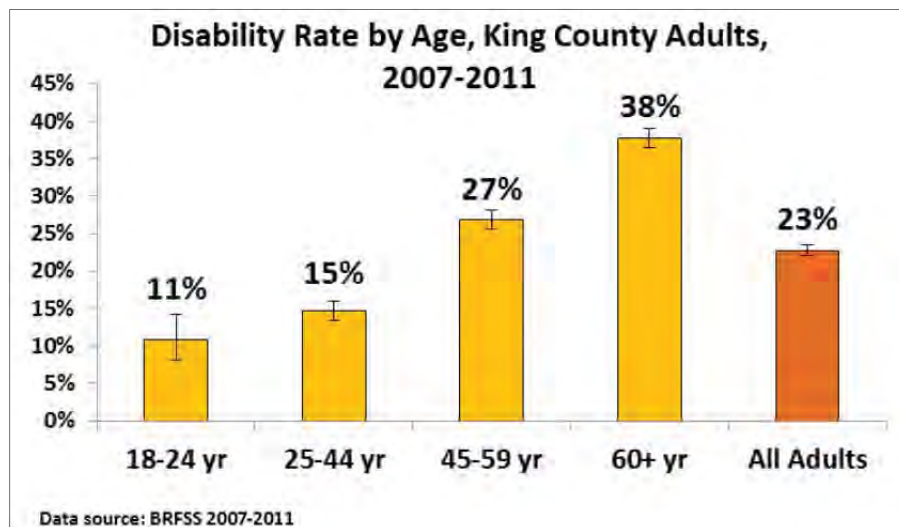
The following is a summary of key information about the jurisdiction and its history:

- **Date of Incorporation**—August 31, 1995
- **Current Population**—53,670 as of April 1, 2013 (WA OFM estimate)
- **Population Growth**—The overall population remained unchanged in total number between 2000 and 2010 with the Census 2010 total of 53,007 people. While the population did not increase during this time period, the city became older (15.2% 65 and older) and more diverse (28.6% non-white).

The under-18 population decreased 14.9%. The population 65 and over increased 4.1% with highest increase, 33.6% in the 85 and older group. Late Baby Boomers, born 1956-1964 form largest segment of Baby Boom age cohort defined as births between 1946 and 1964. Shoreline has the second highest number of people 65 and older of any city in King County.



- **Population Trends**—Population growth was static during the past decade despite an almost 7% increase in the number of housing units. The population forecast produced by Washington State Office of Financial Management shows a 9.2% increase in population between 2010 and 2020 for King County. Historically Shoreline has grown at only a fraction of the King County rate, so it is likely that stagnant to slow growth in population will continue to be the pattern for the City.
- **Poverty**—The estimated poverty rate for Shoreline in 2010 was 8.3% with a margin of error of 1.1%. (Source 2006-2010 American Community Survey Five Year Estimates). The poverty rate is trending higher from the 2000 rate of 6.9%. About one in five people live on an income of twice the poverty level or less and have no cash reserves to cover unexpected costs occurring after a natural event. The highest poverty rate, 9.4% (2.7% margin of error) is for adults 65 and older.
- **Race**—The greatest change was in Black, Hispanic and some other race categories. (Source: American Community Survey, 2006-10 Five Year Estimates) Asian remains largest non-white group at 15.2% of population. White population declined by 7.29% to 71.4% of population. People of color make up 28.6% of the population compared to King County as a whole at 35.2%. The percent of people identifying as Hispanic or Latino, who may be of any race, increased from 3.9% to 6.6% of the population.
- **Disability**—People living with disabilities are significantly more likely to have difficulty responding to a hazard event than the general population. Almost one quarter of King County’s population has some type of disability and the rate increases with age. Many will require assistance during the 72 hours post disaster event, the period generally reserved for self-help (Tierney et al. 1988).



Shoreline has a Washington State Habilitation Center, six nursing homes and more than 100 adult family homes with clients requiring 24 hour care. The number of people living in “group quarters” the term the Census Bureau uses for people living in care facilities increased from 1302 people in 2000 to 1415 in 2010, an increase of 8.6%. A key problem in a natural event will be ensuring transportation access for health care workers to these facilities. The highest acuity patients in Shoreline are at Fircrest School, the Washington State Habilitation Facility.

Disabilities can vary greatly in severity and permanence, making these populations difficult to define and track. There is no “typical” disabled person, which can complicate disaster-

planning processes that attempt to incorporate them. Furthermore, disability is likely to be compounded with other vulnerabilities, such as age, economic disadvantage and ethnicity, all of which mean that housing is more likely to be substandard.

- **Linguistic Barriers**—Approximately 9.9% of Shoreline’s residents reported speaking English “less than ‘very well’ “ (Source American Community Survey, 2005 to 2007, Three Year Estimates). The largest group of languages spoken, other than English, was Asian and Pacific Island languages. Over half of those speaking Asian and Pacific Island languages reported that they speak English less than “very well.” The number of non-English speakers will have important implications for emergency managers, who must get crucial information out to all members of the population in emergency events.
- **Location and Description**—The City of Shoreline is situated in the northwestern corner of King County along the shores of Puget Sound. Shoreline is bounded by Lake Forest Park to the east, Seattle to the south, Puget Sound to the west and Snohomish County to the north. Shoreline covers 11.74 square miles and is Washington’s thirteenth most populated city with a population of about 53, 000 people.
- **Brief History**—Development patterns in the City of Shoreline were influenced by Seattle becoming King County’s commercial center. Suburban development began after the turn of the century due to expanding transportation networks. The trans-continental railroad tracks, Seattle- Everett Interurban line and the brick-surfaced North Trunk Road made it easier to travel to and from Shoreline and spurred suburban development. During the early twentieth century, Shoreline attracted some large developments and commercial centers formed around the Interurban stops. After the end of World War II (WWII), there was tremendous demand for family housing. In the 1940s, large housing developments formed and business leaders and residents began to see Shoreline as a unified region.
- In 1949, the name “Shoreline” was used for the first time and described a community running from the Puget Sound shore to the Lake Washington shore and from the Seattle City line to the Snohomish County line. The City of Shoreline was incorporated on August 31, 1995 (City of Shoreline 1997).
- **Climate**—The City of Shoreline has the temperate climate typical of Western Washington. Summers are dry with mild temperatures, and winters are rainy with occasional snow. In Shoreline, the average temperature for January is 39.7 Fahrenheit (F) and 75 Fahrenheit for the average July high (<http://www.weather.com/>). Average annual rainfall is 38.27 inches and average annual snowfall is 11.7 inches (City of Shoreline, <http://www.cityofshoreline.com/index.aspx?page=44>).
- **Governing Body Format**—Council –Manager Form of Government. The City of Shoreline is organized as a council-manager form of government. This form is the system of local government that combines the strong political leadership of elected officials in the form of a governing body, with the strong managerial experience of an appointed local government manager, or in our case the City Manager. The governing body, commonly known as the council, may also be referred to as the commission or board.

City of Shoreline City Council assumes responsibility for the adoption of this plan; the Emergency Management Coordinator will oversee its implementation.

- **Development Trends**—Development patterns in the City of Shoreline were influenced by Seattle becoming King County’s commercial center. The City of Shoreline is a developed city with little vacant land. Much of the vacant land cannot be developed do to environmental restrictions, such as steep slopes. The majority of new development in Shoreline is infill development and redevelopment projects. Such development is most likely to take place

along the Aurora Avenue corridor, specifically in Town Center or the Community Renewal Area of Aurora Square, or in the areas surrounding future light rail stations.

### 23.3 CAPABILITY ASSESSMENT

The assessment of the jurisdiction’s legal and regulatory capabilities is presented in Table 23-1. The assessment of the jurisdiction’s fiscal capabilities is presented in Table 23-2. The assessment of the jurisdiction’s administrative and technical capabilities is presented in Table 23-3. Information on the community’s National Flood Insurance Program (NFIP) compliance is presented in Table 23-4. Classifications under various community mitigation programs are presented in Table 23-5.

<b>TABLE 23-1. LEGAL AND REGULATORY CAPABILITY</b>					
	Local Authority	State or Federal Prohibitions	Other Jurisdictional Authority	State Mandated	Comments
<b>Codes, Ordinances &amp; Requirements</b>					
Building Code	Yes	No	No	Yes	SMC Title 15, adopted 3/3/2014
Zoning	Yes	No	No	Yes	SMC Title 20, Chapter 20.40, adopted 3/3/2014
Subdivisions	Yes	No	No	Yes	SMC Title 17, adopted 3/3/2014
Stormwater Management	Yes	No	No	Yes	SMC Title 13, Chapter 13.10, adopted 3/3/2014
Post Disaster Recovery	No	No	No	No	
Real Estate Disclosure	No	No	Yes	Yes	WA state Disclosure Law, RCW 64.06
Growth Management	Yes	No	No	Yes	City of Shoreline Comprehensive Plan, adopted 12/10/2012
Site Plan Review	Yes	No	No	No	SMC Title 20, Chapter 20.30, adopted 3/3/2014
Public Health and Safety	No	No	Yes	Yes	Seattle King County Public Health District
Environmental Protection	Yes	No	No	Yes	SMC Title 20, Chapter 20.80, adopted 3/3/2014
<b>Planning Documents</b>					
General or Comprehensive Plan	Yes	No	No	Yes	
	<i>Is the plan equipped to provide linkage to this mitigation plan?</i> Yes, Land use, environment and shorelines elements				
Floodplain or Basin Plan	No	No	No	No	
Stormwater Plan	Yes	No	No	Yes	2011 Surface Water Master Plan update

<b>TABLE 23-1. LEGAL AND REGULATORY CAPABILITY</b>					
	Local Authority	State or Federal Prohibitions	Other Jurisdictional Authority	State Mandated	Comments
Capital Improvement Plan	Yes	No	No	Yes	
<i>What types of capital facilities does the plan address?</i> City Facilities, Parks, Right Away, Surface Water Assets & Utilities <i>How often is the plan revised/updated?</i> Annually: 11/2013					
Habitat Conservation Plan	Yes	No	No	No	
Economic Development Strategic Plan	Yes	No	No	No	
Shoreline Management Plan	Yes	No	No	Yes	Shoreline master program element in Comprehensive Plan
Community Wildfire Protection Plan	No	No	No	No	
Climate Action Plan	Yes	No	No	No	Adopted Sept. 2013
<b>Response/Recovery Planning</b>					
Comprehensive Emergency Management Plan	Yes	No	No	Yes	Renewed in 2011
Threat and Hazard Identification and Risk Assessment	Yes	No	No	Yes	Renewed in 2011
Terrorism Plan	Yes	No	No	No	2004
Post-Disaster Recovery Plan	Yes	No	No	No	Adopted in 2010
Continuity of Operations Plan	Yes	No	No	No	Adopted in 2013
Public Health Plans	No	No	Yes	Yes	King County Public Health

<b>TABLE 23-2. FISCAL CAPABILITY</b>	
<b>Financial Resources</b>	<b>Accessible or Eligible to Use?</b>
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	No
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	No
Withhold Public Expenditures in Hazard-Prone Areas	No
State Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	No
Other	Real Estate Excise Tax; King County Flood Control District-Basin Opportunity Fund

<b>TABLE 23-3. ADMINISTRATIVE AND TECHNICAL CAPABILITY</b>		
<b>Staff/Personnel Resources</b>	<b>Available?</b>	<b>Department/Agency/Position</b>
Planners or engineers with knowledge of land development and land management practices	Y	Planning and Community Development/Planner and Public Works/City Engineer
Engineers or professionals trained in building or infrastructure construction practices	Y	Planning and Community Development/Building Official and Inspectors
Planners or engineers with an understanding of natural hazards	Y	Planning and Community Development/Public Works
Staff with training in benefit/cost analysis	Y	Administrative/Grants Writer
Surveyors	N	
Personnel skilled or trained in GIS applications	Y	Information Technology/GIS Specialist
Scientist familiar with natural hazards in local area	N	
Emergency manager	Y	Community Services/ Emergency Management Coordinator
Grant writers	Y	Administrative Services Division/Grant Writer

<b>TABLE 23-4. NATIONAL FLOOD INSURANCE PROGRAM COMPLIANCE</b>	
What department is responsible for floodplain management in your community?	Public Works
Who is your community’s floodplain administrator? (department/position)	PW/ Surface Water and Environmental Services Manager
Do you have any certified floodplain managers on staff in your community?	Yes
What is the date of adoption of your flood damage prevention ordinance?	8/2012
When was the most recent Community Assistance Visit or Community Assistance Contact?	Don’t know of any
To the best of your knowledge, does your community have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	No
Do your flood hazard maps adequately address the flood risk within your community? (If no, please state why)	No. We have an area that was identified years ago as a flood plain and we want to request of FEMA that that designation be removed. (It will be one of our strategies).
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	No
Does your community participate in the Community Rating System (CRS)? If so, is your community seeking to improve its CRS Classification? If not, is your community interested in joining the CRS program? Yes	No

<b>TABLE 23-5. COMMUNITY CLASSIFICATIONS</b>			
	Participating?	Classification	Date Classified
Community Rating System	No	N/A	N/A
Building Code Effectiveness Grading Schedule	Yes	2	2010
Public Protection	Yes	3	Not available
StormReady	Yes	Blue	12/2012
Firewise	No	N/A	N/A
Tsunami Ready (if applicable)	No	N/A	N/A

### 23.4 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 23-6 lists all past occurrences of natural hazards within the jurisdiction. Note: The City of Shoreline did not incorporate until 1995. Repetitive flood loss records are as follows:

- Number of FEMA-Identified Repetitive Loss Properties: 1
- Number of FEMA-Identified Severe Repetitive Loss Properties: 0
- Number of Repetitive Flood Loss/Severe Repetitive Loss Properties Known to Have Been Mitigated: 1

Type of Event	FEMA Disaster # (if applicable)	Date	Preliminary Damage Assessment
Winter Storm/Sink Hole	1671	Dec. 1996 – Feb. 1997	\$2,405,144
Earthquake	1361	Feb. 28, 2001	n/a
Severe Winter Storm	1671	Nov. 2006	n/a
Severe Winter Wind Storm	1682	Dec. 2006	\$15,549
Severe Winter Flood Storm	1734	Dec. 2007	\$437,178
Severe Winter Storm	1825	Jan. 2009	\$101,408
Winter Storm & Ice Storm	4056	Jan 16, 2012	\$10,051

### 23.5 HAZARD RISK RANKING

Table 23-7 presents the ranking of the hazards of concern. Hazard area extent and location maps are included at the end of this chapter. These maps are based on the best available data at the time of the preparation of this plan, and are considered to be adequate for planning purposes.

Rank	Hazard Type	Risk Rating Score (Probability x Impact)
1	Earthquake	48
2	Severe Winter Weather	48
3	Landslide	42
4	Severe Weather	32
5	Flood	18
6	Wildfire	16
7	Volcano	9
8	Tsunami	6
9	Dam Failure	2
10	Avalanche	0



### 23.6 STATUS OF PREVIOUS PLAN INITIATIVES

Table 23-8 summarizes the initiatives that were recommended in the previous version of the hazard mitigation plan and their implementation status at the time this update was prepared.

TABLE 23-8. PREVIOUS ACTION PLAN IMPLEMENTATION STATUS				
Action #	Action Status			Comments
	Completed	Carry Over to Plan Update	Removed; No Longer Feasible	
SH-1	✓			November 2013 Completed. Ongoing efforts in place
SH-2	✓			July 2011 Completed. Ongoing efforts in place
SH-3	✓			July 2011 Completed. Ongoing efforts in place.
SH-4	✓			All Franchise Agreements Completed by Dec. 2014.
SH-5	✓			September 2013 Completed. Ongoing efforts in place
SH-6	✓			July 2011 Completed. Ongoing efforts in place
SH-7	x		x	Bridge project completed July 2011. Police Facility completed memorandum of understanding with Fire Dept. to use their facilities for shorter needs if they lose their facility. Building a new police facility is not fiscally feasible at this time.
SH-8	✓			Meeting with impacted residence completed Oct. 2009. Flood Berm project completed Dec. 2010. Special Drainage Area designation approved by FEMA Sept. 2010 and Flood Plain map approved by FEMA in 2012.

### 23.7 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED INITIATIVES

Table 23-9 lists the initiatives that make up the jurisdiction’s hazard mitigation plan. Table 23-10 identifies the priority for each initiative. Table 23-11 summarizes the mitigation initiatives by hazard of concern and the six mitigation types.

<b>TABLE 23-9. HAZARD MITIGATION ACTION PLAN MATRIX</b>							
Applies to new or existing assets	Hazards Mitigated	Objectives Met	Lead Agency	Estimated Cost	Sources of Funding	Timeline	Included in Previous Plan?
<p><b>SH-1</b>—Continue to maintain compliance and good standing under the National Flood Insurance Program. This will be accomplished through the implementation of floodplain management programs that, at a minimum, will meet the minimum requirements of the NFIP, which include the following:</p> <ul style="list-style-type: none"> <li>• Enforcement of the adopted flood damage prevention ordinance,</li> <li>• Participating in floodplain identification and mapping updates, and</li> <li>• Providing public assistance/information on floodplain requirements and impacts</li> </ul>							
New and existing	Flood	2,4,10,12	Public Works	Low	Surface Water Utility Fund	Ongoing	No
<p><b>SH-2</b>—The City of Shoreline City Hall facility, which is approximately 4 years old, doesn't have an alternate power supply. The City will be researching funding opportunities and will endeavor to have an alternative power supply in place by 2016.</p>							
New	All Hazards	1, 3	Central Services	700,000.	CIP and other	2016	No
<p><b>SH-3</b>—Continue to do public education outreach to our neighborhoods using the Map Your Neighborhood” tool so ensure communities can take care of themselves and those who live around them during a disaster event.</p> <ul style="list-style-type: none"> <li>• Work with the Neighborhood Associations</li> <li>• Utilize CERT members to assist in this outreach</li> <li>• Use materials from the “What to Do to Make it Through” and “Take Winter by Storm” Campaigns.</li> <li>• Identify those homes within the neighborhoods that have vulnerable or isolated populations living in them, specifically the Adult Family Homes and Boarding Homes.</li> <li>• Utilize Social Media and Emergency Alert Systems to communicate preparedness and emergency messaging</li> </ul>							
Existing	All Hazards	6, 8, 11	Community Services Division	Low	General and Grant funds	Ongoing	Yes
<p><b>SH-4</b>—Continue to ensure operational readiness of the Emergency Operations Center and establish the backup EOC in a new location at the Washington State Public Health Lab.</p> <ul style="list-style-type: none"> <li>• Identify technologies that will support communications internally and externally at the EOC</li> <li>• Reduce the noise level in the EOC by moving the Communications Team to a new location and researching sound proofing technologies.</li> <li>• Establish a floor plan, communications plan, and technology issues for the back-up EOC</li> <li>• Activate the EOC at least once a year for an exercise and activate the back-up EOC once it is established at least every 2 years.</li> </ul>							
New and Existing	All Hazards	1, 3	Community Services Division	Med	General and Grant Funds	EOC by end of 2015 and back- up EOC by mid-2016	No

**TABLE 23-9.  
HAZARD MITIGATION ACTION PLAN MATRIX**

Applies to new or existing assets	Hazards Mitigated	Objectives Met	Lead Agency	Estimated Cost	Sources of Funding	Timeline	Included in Previous Plan?
<p><b>SH-5</b>—Salt Water Park Pedestrian Bridge Repair – replacing the decking and improving the structural integrity of the only access to Richmond Salt Water Beach Park. This bridge is the only way to access the beach and it crosses the Burlington Northern Railroad lines.</p> <ul style="list-style-type: none"> <li>• Provides safe crossing for public access to the beach</li> <li>• Provides safe access for first responders to fight fires on the steep slopes and provide for rescue operations associated with medical emergencies and landslides.</li> </ul>							
New and Existing	All Hazards	1, 3, 5	Parks	300,000.	CIP	2015	No
<p><b>SH-6</b>—Storm water pipe replacement program – replace aging storm water infrastructure throughout the city.</p>							
Existing	Flooding, Earthquake	1	Public Works	5.28 million	Surface Water Utility	2019	No
<p><b>SH-7</b>—Surface Water Basin Planning – identify drainage, water quality, and habitat issues within specific drainage basins, and prioritize mitigation strategies.</p>							
New and Existing	Flooding, Severe Weather	1, 5, 7, 8, 12	Public Works	730,000.	Surface Water Utility	2016	No
<p><b>SH-8</b>—City of Shoreline will consider participating with Community Rating Systems for communities who participate in the National Flood Insurance Program (NFIP).</p>							
Excising	Flooding	6, 8	Public Works	Low	General Fund	2016	No
<p><b>SH-9</b>—Study the feasibility of replacing the aging Hidden Lake bridge on 10th Ave NW that is built on a ravine as its structural sufficiency rating is at a point that will require replacement soon. We will need to seek opportunities for funding the project.</p>							
Existing	Earthquake, Landslide	1, 5, 8	Public Works	150,000.	Roads Capital	2015	No
<p><b>SH-10</b>—Begin implementing strategies identified in the City of Shoreline Climate Action Plan.</p> <ul style="list-style-type: none"> <li>• Through the new water utility, consider rate structures or incentives for customers to encourage water conservation</li> <li>• Utilize zoning and permitting methods to concentrate new growth in proximity of services and transit.</li> <li>• Identify opportunities for habitat improvements to reduce the urban heat island effect and support carbon sequestration in City open spaces.</li> </ul>							
New and Existing	All Hazards	1, 2, 4, 6, 10, 12	Public Works & Planning	High	Funding unknown	2019	No
<p><b>SH-11</b>—Require new development to be designed and constructed to reduce or eliminate flood damage by requiring use of Low Impact Development techniques as required under the existing City Code.</p>							
Existing	Flooding	2, 4, 10, 12	Planning & Public Works	Low	General Fund	Ongoing	No

**TABLE 23-9.  
HAZARD MITIGATION ACTION PLAN MATRIX**

Applies to new or existing assets	Hazards Mitigated	Objectives Met	Lead Agency	Estimated Cost	Sources of Funding	Timeline	Included in Previous Plan?
<b>SH-12</b> —Implement updated international building and residential codes.							
New	Flooding, Earthquake	2, 7, 10	Planning	Low	General Fund	2016	No
<b>SH-13</b> —Where appropriate, support retrofitting, purchase, or relocation of structures located in hazard-prone areas to protect structures from future damage, with properties with exposure to repetitive losses as a priority.							
Existing	All Hazards	5,7,9	Planning & Public Works	High	FEMA Grant funding, local match	Long-term	No
<b>SH-14</b> —Continue to support the county-wide initiatives identified in this plan.							
New and Existing	All Hazards	4,6,11,12,13, 14, 15	City	Low	General Fund	Short term	No
<b>SH-15</b> —Actively participate in the plan maintenance strategy identified in this plan.							
New and Existing	All Hazards	4,6,11,12,13, 14, 15	King County OEM City of Shoreline	Low	General fund	Short term	No
<b>SH-16</b> - Integrate the Mitigation Plan findings into planning and regulatory documents and programs.							
New and existing	All	2,10	Planning	Low	Local Budget	Short Term	No

**TABLE 23-10.  
MITIGATION STRATEGY PRIORITY SCHEDULE**

Initiative #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Priority <sup>a</sup>
SH-1	4	High	Low	Yes	No	Yes	High
SH-2	2	High	Medium	Yes	No	Yes	High
SH-3	3	High	Low	Yes	Yes	Yes	Med
SH-4	2	Medium	Medium	Yes	Yes	Yes	Med
SH-5	3	High	Medium	Yes	No	Yes	High
SH-6	1	High	High	Yes	Yes	Yes	High
SH-7	5	High	Medium	Yes	Yes	Yes	High
SH-8	2	Med	Low	Yes	No	Yes	Med
SH-9	3	High	Low	Yes	Yes	Yes	Med
SH-10	6	High	High	Yes	Yes	No	High
SH-11	4	High	Low	Yes	No	Yes	High
SH-12	3	High	Low	Yes	No	Yes	High
SH-13	3	High	High	Yes	Yes	No	Medium
SH-14	7	Medium	Low	Yes	No	Yes	High
SH-15	7	Low	Low	Yes	Yes	Yes	High
SH-16	2	Medium	Low	Yes	No	Yes	High

a. See Introduction for explanation of priorities.

**TABLE 23-11.  
ANALYSIS OF MITIGATION INITIATIVES**

Hazard Type	Initiative Addressing Hazard, by Mitigation Type <sup>a</sup>					
	1. Prevention	2. Property Protection	3. Public Education and Awareness	4. Natural Resource Protection	5. Emergency Services	6. Structural Projects
Avalanche	--	--	--	--	--	--
Dam Failure	15,16	5,13	3,14	10	2,4	
Earthquake	12,15,16	5,6,9,13	3,14	10	2,4	
Flood	1,7,8,11,12,15,16	1,5,6,8,9,13	1,3,8,14	1,8,10	1,2,4,8	
Landslide	15,16	5,13	3,14	10	2,4	
Severe Weather	7,15,16	5,13	3,14	10	2,4	
Severe Winter Weather	15,16	5,13	3,14	10	2,4	
Tsunami	15,16	5,13	3,14	10	2,4	
Volcano	15,16	5,13	3,14	10	2,4	
Wildfire	15,16	5,13	3,14	10	2,4	

a. See Introduction for explanation of mitigation types.

### 23.8 FUTURE NEEDS TO BETTER UNDERSTAND RISK/ VULNERABILITY

Apply future climate science and related regional weather events to potential revision of hazard mitigation strategies and implementation.

Point Wells is an area just north of the City of Shoreline in unincorporated Snohomish County. The area is not currently within the incorporated borders of Shoreline; however, the only access is through the City and it is served by Shoreline's wastewater agency, Ronald Wastewater. The City is assuming that in the next few years, the Shoreline Fire Department and Shoreline Police will serve as mutual aid agencies to the Snohomish County Sheriff for this area, as they are often the closest fire and law enforcement agencies. The area is currently occupied by an asphalt company and used for petroleum storage, but it may be redeveloped into a mixed-use community. The city's Office of Emergency Management has worked with the police and fire departments and the current company to address response to that area by agencies on both sides of the county line. There has been a high degree of community interest in this area and it is possible that it will eventually be annexed by Shoreline. Figure 23-1 shows the NEHRP soil classification for the area of interest.

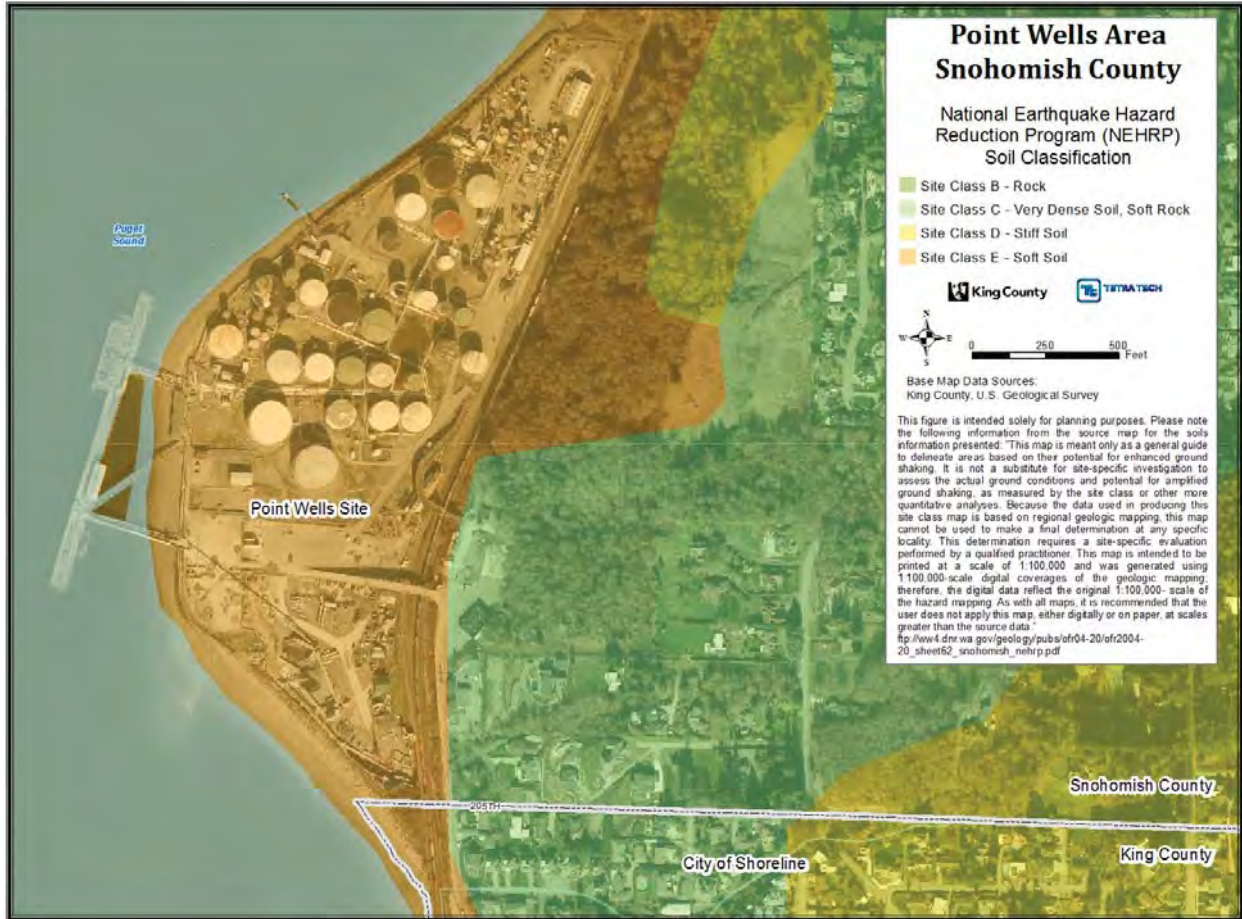


Figure 23-1. Point Wells Soil Classifications

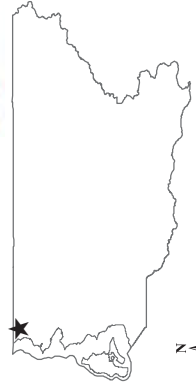
# CITY OF SHORELINE

## Critical Facilities and Infrastructure

- Critical Facilities
- Government Function
- HazMat
- Medical Care
- Protective Function
- Schools
- Other Facility
- Critical Infrastructure
- Bridges
- Communications
- Dams
- Water Supply
- Power
- Transportation
- Wastewater

Locations are approximate.

Base Map Data Sources:  
King County, U.S. Geological Survey





# CITY OF SHORELINE

## Liquefaction Susceptibility

Susceptible		Not Susceptible	
High	Bedrock	Moderate to High	Peat
Moderate to High	Peat	Moderate	Water
Moderate	Water	Low to Moderate	Ice
Low to Moderate	Ice	Low	
Low		Very Low to Low	
Very Low to Low		Very Low	

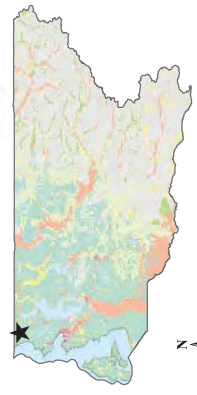
Liquefaction data provided by the Washington State Department of Natural Resources, Division of Geology and Earth Resources. Data is based solely on surficial geology published at a scale of 1:100,000.

A liquefaction susceptibility map provides an estimate of the likelihood that soil will liquefy as a result of earthquake shaking. This type of map depicts the relative susceptibility in a range that varies from very low to high. Areas underlain by bedrock or peat are mapped separately as these earth materials are not liquefiable, although peat deposits may be subject to permanent ground deformation caused by earthquake shaking.

Puget Sound



Base Map Data Sources:  
King County, U.S. Geological Survey



# CITY OF SHORELINE

## National Earthquake Hazard Reduction Program (NEHRP) Soil Classification

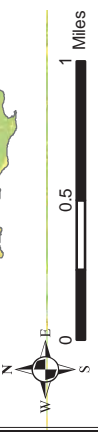
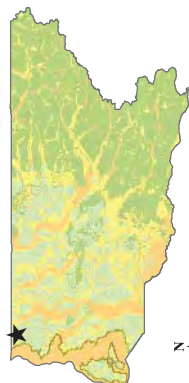
- Site Class B - Rock
- Site Class C - Very Dense Soil, Soft Rock
- Site Class D - Stiff Soil
- Site Class E - Soft Soil

Soil classification data provided by Washington State Department of Natural Resources, Geology and Earth Resources Division.

The dataset identifies site classes for approximately 33,000 polygons derived from the geologic map of Washington. The methodology chosen for developing the site class map required the construction of a database of shear wave velocity measurements. This database was created by compiling shear wave velocity data from published and unpublished sources, and through the collection of a large number of shear wave velocity measurements from seismic refraction surveys conducted for this project. All of these sources of data were then analyzed using the chosen methodologies to produce the statewide site class maps.



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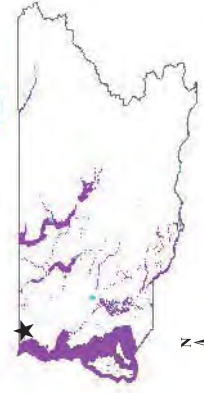
## FEMA DFIRM Flood Hazard Areas

-  Floodway
-  1 Percent Annual Flood Hazard
-  0.2 Percent Annual Flood Hazard

Flood hazard areas as depicted on draft FEMA Digital Flood Insurance Rate Maps (DFIRM).

The 1 percent annual flood hazard is commonly referred to as the 100 year floodplain. The 0.2 percent annual flood hazard is commonly referred to as the 500 year floodplain.

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# CITY OF SHORELINE

## Landslide Hazard Areas

### All Hazard Areas

The landslide hazard areas shown have been merged from three assessments for use for planning purposes:

WA DNR Landslide Areas data provided by the Washington State Department of Natural Resources, Division of Geology and Earth Resources. This dataset contains 1:24,000-scale polygons defining the extent of mapped landslides in the state of Washington, compiled chiefly from pre-existing landslide databases created in different divisions of the Washington State Department of Natural Resources to meet a variety of purposes.

King County Slide Areas - Landslide areas are areas subject to severe landslide risk identified in the Sensitive Areas Ordinance as:

- A. Any area with a combination of:
  1. Slopes greater than 15 %
  2. Impermeable soils (typically silt and clay) frequently interbedded with granular soils (predominantly sand and gravel)
  3. Springs or groundwater seepage.
- B. Any area that has shown movement during the Holocene epoch ( from 10,000 years ago to present), or that is underlain by mass wastage debris of that epoch.
- C. Any area potentially unstable as a result of rapid stream incision, stream bank erosion or undercutting by wave action.
- D. Any area that shows evidence of, or is at risk from, snow avalanches.
- E. Any area located on an alluvial fan, presently subject to or potentially subject to inundation by debris flows or deposition of stream-transported deposits.

#### Slope/Soils Analysis:

1. Areas of slope greater than 40%. Slope determined using a DEM generated from 2002 LIDAR data. Slope data provided by King County DNRP.
2. Areas of Qf (alluvial fans), Qls (discrete landslides), and Omw (colluvium and the cumulative debris from small indistinct landslides that accumulate on and at the base of unstable slopes) soils as identified in surface geology data provided by King County DNRP.

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# CITY OF SHORELINE

## 2008 LANDFIRE Fire Behavior Fuel Model

Anderson 13 Fuel Classes

Burnable Non-Burnable

- |   |        |   |             |
|---|--------|---|-------------|
| ■ | FBFM1  | ■ | Developed   |
| ■ | FBFM2  | ■ | Agriculture |
| ■ | FBFM3  | ■ | Water       |
| ■ | FBFM5  | ■ | Barren      |
| ■ | FBFM6  |   |             |
| ■ | FBFM8  |   |             |
| ■ | FBFM9  |   |             |
| ■ | FBFM10 |   |             |
| ■ | FBFM11 |   |             |

Fuel Class data (LANDFIRE REFRESH 2008 (fl.1.1.0)) provided by the Wildland Fire Science, Earth Resources Observation and Science Center, U.S. Geological Survey. The LANDFIRE fuel data describe the composition and characteristics of both surface fuel and canopy fuel. Thirteen typical surface fuel arrangements or "collections of fuel properties" (Anderson 1982) were described to serve as input for Rothermel's mathematical surface fire behavior and spread model (Rothermel 1972). These fire behavior fuel models represent distinct distributions of fuel loadings found among surface fuel components (live and dead), size classes and fuel types. The fuel models are described by the most common fire carrying fuel type (grass, brush, timber litter or slash), loading and surface area-to-volume ratio by size class and component, fuelbed depth and moisture of extinction.

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King County, U.S. Geological Survey

