

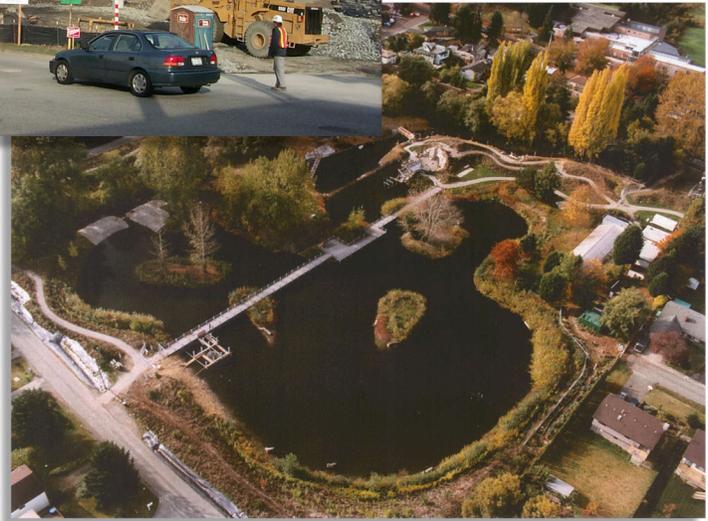
# Seattle All-Hazards Mitigation Plan



Earthquake



Landslide



Flood



City of Seattle

Seattle Police Department

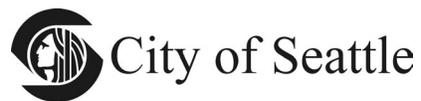
Emergency Preparedness Bureau  
Emergency Management Section





# Seattle All-Hazards Mitigation Plan

February 2004



**Seattle Police Department**  
Emergency Preparedness Bureau  
Emergency Management Section  
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**Seattle-area mitigation projects on cover:**



Photo 1: Fire Station 18 is just one City facility that has had seismic bracing installed to reduce earthquake damage.



Photo 2: This retaining wall mitigates a landslide hazard on the West side of Queen Anne hill.



Photo 3: The Meadowbrook Pond project combined the construction of a flood detention pond with the restoration of the Thornton Creek watershed habitat, as well as providing public open space. The pond helps to channel excess storm water into the drainage system.

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## Introduction

### What is Hazard Mitigation?

The Disaster Mitigation Act of 2000 defines hazard mitigation as any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards. This can include a range of actions: retrofitting buildings and bridges; adopting building codes aimed at current and planned development; business contingency planning; and educating the public about preparedness and mitigation issues.

### What's the Plan's Focus?

This Seattle All-Hazards Mitigation Plan represents the city's first comprehensive effort to describe mitigation efforts across city departments and to develop an integrated mitigation strategy. The plan emphasizes mitigation of city-owned and operated facilities and infrastructure. It also includes reference to mitigation efforts undertaken by related public, quasi-public, and private entities.

This plan emphasizes natural hazards. Efforts to determine effective strategies for managing the risk of terrorism, including work done under the Urban Areas Security Initiative (UASI), are currently underway.

The plan is intentionally written so that all stakeholders can understand more about Seattle's hazard risks and the city's mitigation strategy. As a result of reading this, we hope that readers will recognize that mitigation responsibility rests with everyone – and not just with city and other public agencies. We encourage people to do mitigation planning at every level – at home, in the workplace, and in their communities.

### How is the Plan Organized?

**Chapter 1** describes the process by which the City of Seattle developed this Hazard Mitigation Plan and who was involved in its development.

**Chapter 2** includes information about Seattle's hazard risks. This chapter contains detailed information about the conditions that affect Seattle's

vulnerability. It includes a summary of both natural and human-caused hazards that occur in Seattle. Information for this chapter was summarized from Seattle's Hazard Identification and Vulnerability Analysis (SHIVA), portions of which were updated in November 2003. The SHIVA is available under separate cover.

**Chapter 3** provides information about the city's mitigation capacity. It includes detailed information about each department responsible for structural and non-structural mitigation, inter-departmental planning groups, and both inter-jurisdictional and public/private partnerships working on mitigation issues.

**Chapter 4** sets forth the Plan's mitigation goals and objectives. It contains extensive information about mitigation-related projects currently underway or planned - and includes a method for prioritizing mitigation projects for FEMA and other outside funding. The chapter also includes recommendations for new policies and actions that would contribute to Seattle's disaster resistance.

**Chapter 5** describes the city's plan for monitoring, evaluating and updating the Hazard Mitigation Plan over a five-year period.

Figures are included at the end of each chapter.

A copy of this plan is available on the Seattle Emergency Management website at [www.cityofseattle/emergency\\_mgt](http://www.cityofseattle/emergency_mgt).



# Chapter 1

## The Planning Process

### 1.1 Background

The City of Seattle is a large, complex organization with a number of departments involved in planning for public safety, including the integrity of the city’s structures and infrastructure. Many of these departments have been integrating mitigation into their planning efforts for a number of years, although not always describing projects as “mitigation” *per se*. This plan is the city’s first comprehensive inter-departmental mitigation document drafted to date.

The process used in preparing this plan has helped educate department representatives about the depth and breadth of Seattle’s mitigation efforts across city departments and has brought the city one step closer to integrating its mitigation efforts. Those involved with plan development can now bring some of this mitigation awareness back into their own departments.

### 1.2 People Involved in Plan Development

Planning began in May 2002 when Seattle Emergency Management (SEM) solicited initial public comments about the development of a hazard mitigation plan. Attendees included representatives from the University of Washington, a geotechnical engineering firm, the Port of Seattle, private businesses and the community.

The city began its formal Hazard Mitigation Plan development in earnest in July 2003 by convening a mitigation planning work group that included representatives from key departments. Andrea Cohen, an independent consultant, facilitated plan development under the direction of Erika Lund, Seattle Emergency Management Recovery and Mitigation Coordinator.

The consultant convened and facilitated bi-weekly meetings over a six-month period with the mitigation work group participants identified below, collected relevant information from each department, oversaw SHIVA updates, and drafted the plan. SEM’s Recovery and Mitigation Coordinator reviewed all

materials, did trouble-shooting with individual departments, made formal presentations to the Disaster Management Committee and City Council representatives, and ensured the plan’s compliance with FEMA guidelines.

### Mitigation Work Group

Work group participants were:

- Craig Ladiser ..... Department of Planning & Development
- Teresa Rodriguez ..... Fleets & Facilities
- Sue Mar ..... Seattle City Light
- Bill Wolak ..... Seattle City Light
- Robin Friedman ..... Seattle Public Utilities
- Cameron Keyes ..... Finance
- Karl Stickel ..... Finance
- Jim Young ..... Seattle Department of Transportation
- Jim Ishihara ..... Parks & Recreation
- Michael Loehr ..... Seattle-King County Public Health Department
- Martin Munguia ..... City Council staff
- Erika Lund ..... Seattle Emergency Management

The work group acted as mitigation fact-finders within their departments, identifying the following:

- Vulnerabilities to buildings and infrastructure
- Recent mitigation accomplishments
- Mitigation planning processes
- Mitigation goals and policies
- Planned mitigation activities

The group also discussed issues related to the substance and process of developing the plan and updating the SHIVA.

## Seattle All-Hazards Mitigation Plan

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Sub-groups of the larger work group helped develop goals, objectives and mitigation criteria for submittal to the full work group.

### Other City Departments Consulted

We consulted other individuals in city departments on an as-needed basis, including Bill McGillin, Law Department; Alan Painter, Human Services Department; Bill Rumpf, Office of Housing; Brent Crook, Rebecca Herzfeld and Karen Gordon, Department of Neighborhoods; Bill Schrier, Dean Arnold and Jon Wiswell, Department of Information Technology; Ken Takahashi, Office of Economic Development; Ned Dunn, Seattle Center; and Pamela Hughes, Risk Management.

### Discussions with non-City Agencies

We also contacted the following people outside of city government: Steve Charvat and Elenka Jarolimek, University of Washington Emergency Management; Rich Tokarzewski, Mitigation Plan Coordinator for King County Emergency Management; Craig Weaver, USGS; Bob Wyda, Utility & Maintenance Contract Administrator in charge of Emergency Response at Seattle Housing Authority (SHA) and Barbara Berg, SHA Risk Manager; Michael Cohen, Port of Seattle; and Teresa Salmon and Ed Heller, Seattle Public Schools.

## 1.3 Public Participation

Public participation in plan development occurred in the following ways:

- ❑ Held public meetings on May 28 and October 7, 2003. Invitations were sent to people involved with the city's 13 Neighborhood Councils, Seattle Disaster Aid and Response Teams (SDART), Seattle Project Impact business and community partners, the University of Washington, and others who might be interested.

We placed a notice of the 5/28 meeting in a local newspaper. Notice of the 10/7 public meeting was placed in the Department of Neighborhoods newsletter, community centers and on city websites. We also distributed flyers about the meeting to the city's 13 Neighborhood Service Centers.

- ❑ Presented the plan to Neighborhood Council representatives on 10/27/03. Approximately 25 people attended and provided comments.
- ❑ Circulated a draft copy of the plan for external review to the following agencies:
  - Cascadia Region Earthquake Workgroup (CREW)
  - Contingency Planning and Recovery Management Group (CPARM)
  - King County Emergency Management
  - King County Public Health
  - Port of Seattle
  - Seattle Housing Authority
  - Seattle Public Schools
  - University of Washington
- ❑ Presented the plan to the Seattle City Council's Police, Fire, Courts and Technology Committee on December 3, 2003, and brought it to the same committee and full Council in February 2004 for action. These televised meetings were open to the public and advertised on the City Council website.
- ❑ Placed a draft of the Plan on the City's Emergency Management website beginning in October 2003. An e-mail link to Emergency Management staff streamlined the process for the public to provide comments.

We addressed the following concerns and questions raised by the public:

- ❑ Does the plan address global warming and water shortages? *Response: Drought is included, but global warming is outside the focus of the plan.*
- ❑ Have we included feedback from environmental organizations? *Response: Not yet, but we would be happy to send the draft to organizations the person commenting suggests. We did not receive names of suggested organizations, but in our update process, we will attempt to actively include this community.*

- ❑ Do we have a goal related to environment in the plan? *Response: Considering this and other comments, we added a goal and objectives related to environmental protection.*
- ❑ Why is Seattle's Hazard Mitigation Plan separate from King County's plan? *Response: Seattle is a stand-alone jurisdiction where disaster assistance is concerned.*



## Chapter 2

# Risk Assessment

This chapter contains the following summary information:

- ❑ Conditions affecting Seattle’s vulnerability
- ❑ Summary of the city’s most common natural and human-caused hazards according to Seattle’s Hazard Identification and Vulnerability Analysis (SHIVA)
- ❑ Ranking of the hazards and description of the assessment methodology used

A copy of the SHIVA, available under separate cover, includes detailed information about each hazard, historical occurrences, impact on communities, probability of future hazard events, and data sources.

### 2.1 Conditions Affecting Seattle’s Vulnerability

The Puget Sound Region is home to numerous islands, two dramatic mountain ranges, and many cities and towns of varying sizes. Seattle is the largest urban center and marine port in the Puget Sound Region. Its 193 miles of waterfront include 53 miles of tidal waters.

According to 2000 Census Bureau data, the city’s official population is 563,374. These numbers expand to more than 1.5 million during the weekdays since many people who work in Seattle live in surrounding areas. Both the higher day population and its greater concentration of workers in the Downtown area suggest that Seattle is more vulnerable to the impact of a major disaster occurring during the workday than it would be at any other time.

#### 2.1.1 The Natural Environment

##### Geology and Topography

Western Washington is “young” and very active in geologic terms. In the last two million years alone, the area has been glaciated at least a half dozen times. Glaciation is a process in which large sheets of ice move slowly and then melt back. When they

advance, they scrub and grind the Earth’s surface, leaving sand, gravel and silt in their wake. Polished rocks, visible grooves and ridges, and erratically placed boulders are among the observable, present day markers of our geologic history. The ground layers left by the glaciers are irregular, contributing to slope instability and landslide risk.

Acts of nature, like severe windstorms, earthquakes and volcanoes, can contribute to ground instability. But so does human activity. What we do can place undue stress on the ground and cause it to give way – or ‘fail’. Removing vegetation and changing water runoff patterns on hillsides are some of the human acts that increase the risk of slope failure.

The area’s topography was heavily modified during the last ice age when glaciers moved south, scooping out long valleys and leaving a series of long north-south running hills with steep eastern and western sides - especially in the middle and southern parts of the city. Figure 2-1 indicates the elevations of various parts of the city.

Two waterways, the Lake Washington Ship Canal and the Duwamish Waterway, divide the city internally. The Ship Canal runs east-west, separating the northern third of the city from the south. The Duwamish runs from the southern edge of the city north into Elliott Bay, dividing the southern third of the city in half - with West Seattle, South Park, and White Center on the west bank and Beacon Hill, Rainier Valley, Rainier Beach, and Mt. Baker on the east bank. Elliott Bay pushes into the middle section of the city from the West, giving it a rough hourglass shape. The narrowness of this middle area, as well as its importance as the central business district, creates a vulnerable concentration of economic activity and infrastructure. The terrain makes access to this area almost entirely dependent on several bridges. (See figure 2-2 for a map of Seattle neighborhoods.)

Seattle’s natural physical structure has historically influenced the city’s economic growth, patterns of land use, and placement of transportation routes, utility networks, and other important facilities. In

addition, several landfills, regrades and cuts have modified Seattle's natural landscape.

The geographic concentration of Seattle's economy is in itself an indicator of the city's vulnerability. Areas of the city that rest on landfill include the Duwamish Valley, Interbay, the University Village area, and Pioneer Square. Many of these areas comprise the city's major economic centers.

Unfortunately, much of the soil these centers are built on is loosely consolidated with large amounts of water suspended in it. This soil can compact and turn into mud with the consistency of quicksand during an earthquake, causing the ground under buildings to fail. While newer buildings may be engineered to reduce the impacts of liquefaction in these vulnerable areas, damaged transportation routes may prevent access. Areas of potential landslides and liquefaction are shown in figure 2-3.

Since much of Seattle's industry sits in the Duwamish Valley liquefaction zone, an event such as an earthquake could be seriously disruptive. In addition, a large portion of Seattle's workforce is employed in the downtown area, which includes Pioneer Square. The service economy of this area is vulnerable because it relies heavily on communications networks and transportation to move people, commodities, and documents in and out of this center.

### Climate

Seattle's climate is regulated by wind patterns that bring the city's weather in from the Pacific Ocean. Since air temperature is less variable over water than it is over land, Seattle does not experience dramatic seasonal changes. Although the city normally has mild summers and winters, rain between mid-October and March is a frequent occurrence.

Located in the lowlands between the Olympic and Cascade mountain ranges, the city typically traps moisture and has many overcast periods. Often the summers can be very dry with vegetation withering and water running short. Snowfall is not as frequent in Seattle as in other northern U.S. cities, but it does happen intermittently. Between 1990 and 2003, there were 22 days of snowfall totaling one inch or more (City of Seattle, Seattle Transportation, 2003).

Ironically, the climate's usual mildness leaves many city residents unprepared for many of the weather-related hazards that do strike, e.g., water shortages, windstorms, snow, and even heavy rain. Many people who think of Seattle as waterlogged are caught by surprise during water shortages. Windstorms create power failures and debris clearance problems caused by falling trees. Snowfall is infrequent, but it can paralyze the city because of the city's steep hills and lack of adequate snow removal equipment. If there is a high percentage of ice, snow can also cause power and debris problems.

Weather can hamper emergency response. If a major disaster strikes when snow is on the ground, 9-1-1 emergency responders could experience delays in reaching people in need – and in transporting the injured to hospitals, many of which are located on hills. Even rain can be an unforeseen complication. After the Northridge (California) Earthquake in 1994, many people moved out of their damaged houses and into local parks. The good weather allowed them to do this. In Seattle, they might not be so fortunate.

### Vegetation

Vegetation's presence or absence can influence landslides, windstorms, snowstorms and floods. Seattle has thick tree cover in some places that can pose a hazard during major storms. Trees can fall onto houses, power and telephone lines, and their roots can pull up underground pipelines. North Seattle has the densest tree cover in the city, followed by areas in West Seattle. It is likely that the greatest amount of debris, fallen trees and associated service disruptions could be expected in these areas.

Vegetation also exacerbates floods by blocking drainages. This occurred in Thornton Creek in 1978 (FEMA, 1994). However, the city built a retention pond at Meadowbrook in order to mitigate localized flooding problems. Since the project was completed in the late 1990s, no flooding due to creek overflow has occurred in the surrounding areas.

## 2.1.2 The Built Environment – Buildings

Seattle is a young city, but over half of its housing units were built prior to the adoption of building codes in 1949 that introduced seismic standards. Actual requirements for bolting homes to foundations were implemented in Seattle in the mid 1960's.

The majority of Seattle's housing units were constructed before the city upgraded its seismic codes in 1992 (Seattle Planning Dept., December 1992). Buildings constructed to earlier codes are generally not required to upgrade to the most recent code. Table 2-1 shows the age distribution of the housing stock. Most of the stock is wood frame construction, which generally performs well in earthquakes.

**Table 2-1. Age of Housing Stock**

Year Built	Number of Units	% of Total
Built 1990 to March 2000	24,488	9.47%
Built 1980 to 1989	23,266	9.00%
Built 1970 to 1979	25,762	9.97%
Built 1960 to 1969	31,644	12.24%
Built 1950 to 1959	36,297	14.04%
Built 1940 to 1949	32,507	12.57%
Built 1939 or earlier	84,546	32.75%
<b>All Years</b>	<b>258,510</b>	<b>100%</b>

Source: U.S. Census Bureau, Census 2000, Summary File 3 (SF 3) sample date. [Table HCT 6]

A Department of Construction and Land Use survey of the older areas of the city identified approximately 500 un-reinforced masonry apartment buildings.

### City Buildings

The city owns approximately 1,000 structures. Different departments have completed vulnerability assessments of their buildings and facilities in recent

years. Chapter 3 describes many of the individual departments' recent mitigation accomplishments.

### Buildings Serving Vulnerable Populations

The Seattle Housing Authority (SHA) is a public corporation that provides affordable housing to nearly 23,000 people in the City of Seattle. It owns and operates approximately 9,000 units of housing for low-income families, seniors and people with disabilities.

The majority of Seattle's public housing was built in the 1960's and 1970's, long before the city updated its seismic code in 1992. While the facilities are mapped, they have not been overlaid onto liquefaction zone or landslide susceptibility maps.

No SHA structures were impacted by the 1996/7 winter storms that caused landslides in many areas of the city. The Nisqually Earthquake of 2001 resulted in only minor damage to elevators in SHA high-rise buildings. These problems have now been remedied and elevators retrofitted to reflect current seismic standards.

In addition, a number of non-profit agencies provide housing and other essential services to vulnerable populations. Several shelters, food banks and community clinics that serve Seattle's homeless, low-income, mentally and physically disabled people are located in the Downtown and Pioneer Square areas.

As a result of the 2001 Nisqually Earthquake, one homeless shelter, the Compass Center, suffered significant damage. With a combination of city and federal funds, this facility will be seismically upgraded beginning in 2004.

## 2.1.3 The Built Environment – Infrastructure

Infrastructure is the city's physical and organizational skeleton. It provides the communication and utility systems residents use to sustain their daily lives, and it provides the underlying structure the local economy needs to sustain growth. Indirectly, geology and the resulting topography impact vulnerability through their effect on land use and infrastructure.

Many of Seattle's transportation and utility networks are aligned north-south with many channeled through steep hills rather than crossing over them, particularly in the north-south direction. This layout could make east-west transportation and utility networks more vulnerable to damage and hamper emergency access. This problem occurred during the winter of 1996/7 when snow on some slopes made it difficult for police and fire vehicles to travel on them.

### Bridges

Seattle's topography produces a dependence on bridges. Within the city limits, there are six bridges connecting north Seattle with the rest of the city, three bridges leading in and out of West Seattle, and two bridges crossing Lake Washington that join the middle section of the city with the Eastside. Each of these bridges can be a bottleneck during normal peak hours and could affect access to emergency services immediately following a disaster.

A large number of government services and employers are located in or near Downtown. Most of the hospitals are on First Hill east of I-5, and the Fire Department's hazardous materials team is housed in Pioneer Square. Normally, this centralization is the most efficient distribution of resources, but during an emergency some neighborhoods could be cut off from these downtown services. If the bridges were down for any reason, there would be limited capacity to get medical treatment or other emergency services to many neighborhoods.

### Networks

Seattle has many networks that need to operate normally in order to maintain the health, safety and economic functioning of those who live and work here. These include transportation, power, water, sewer, telephone, natural gas, fiber optic and cable services. Figure 2-4 shows the location of the city's water, power and sewer mainlines.

Much of Seattle's flat land is in the Duwamish Valley and Interbay, both of which are major industrial areas built on landfills. Networked infrastructure (such as electric, water, sewer, and natural gas systems) where trunk lines must cross landslide prone hillsides and liquefaction zones increases the city's vulnerability during our highest risk hazard events.

Unfortunately, networks by their very nature are vulnerable to breaks and blockages. Most are broken down into trunk and distribution lines. Trunks carry large quantities of a substance into Seattle. They connect to distribution lines that feed into smaller lines that supply product to the end users. If a break or blockage in the network occurs, service beyond the problem will stop until the service can be re-routed or the problem is solved. Furthermore, the closer the problem is to the front-end of the network the wider the disruption will be. Creating redundant systems or re-routing these networks can mitigate these problems.

### 2.1.4 Land Use

Figure 2-5 is a zoning map indicating several land use categories including: single and multi-family residential dwellings, commercial, industrial, and major institutions. Each use generates a different pattern of vulnerability. Figure 2-6 shows the city's residential population density per census tract. The highest residential densities occur in older sections north of the I-90 freeway such as Capitol Hill. Other dense areas include portions of the Denny Regrade, the south slope of Queen Anne Hill, and parts of the University District. Damage in any of these areas would probably produce greater casualties than in other parts of the city.

In 1992, the State passed the Growth Management Act in an attempt to check urban sprawl. Seattle's response to the Act has been to promote greater density in clustered "urban villages" with its comprehensive plan, *Towards a Sustainable Seattle*. Utilizing this strategy will improve the city's infrastructure and encourage development in a way that reduces the area's vulnerability to hazards.

Figure 2-7 indicates the locations of urban centers and urban villages and their relationship to liquefaction and landslide prone areas. There is a slight overlap between landslide prone areas and the extreme eastern edge of the Eastlake and South Lake Union urban villages. Liquefaction prone areas overlap with centers and villages in parts of Downtown, the U-district, South Park, Eastlake and South Lake Union.

The city's two manufacturing/industrial centers (Duwamish and Interbay) are almost entirely underlain by liquefaction zones. While the city's

goal is to increase employment in these areas, most of the new employment is expected to be fairly low density. No housing is permitted in these areas.

The Port of Seattle is a large property owner in both of the industrial centers. It is currently looking at the possibility of dense development that could include offices, housing and retail uses just west of the stadiums and at Pier 91. In both cases, such development would require changes to the Comprehensive Plan and existing zoning ordinances.

South Lake Union is an area slated for development. Plans include 12 acres designated for an innovative cultural, educational and recreational waterfront center and a large area slated for both biotech and mixed-use office space and housing. The city is planning for significant growth in this area - up to an additional 20,000 jobs and 5,000 more housing units over the next 10 to 20 years.

## Codes and Regulations

Through local zoning and building codes responsive to mitigation concerns, Seattle government has been proactive in adopting laws and regulations aimed at improving Seattle's disaster resistance.

Table 3-1 in Chapter 3 lists mitigation-related land use and building codes and policies enacted by the city's Department of Planning & Development (until recently called the Department of Design, Construction & Land Use) in recent years.

### 2.1.5 Population Demographics – Vulnerable Populations

Seattle is home to many people who could be extremely vulnerable in the event of a serious disaster – the elderly, children, people with mental and physical disabilities, and those who are limited or non-English speakers.

The map in figure 2-8 reflects 2000 U.S. Census data on where people with special needs (vulnerable populations) live in Seattle. People included in this category are the elderly, non-English speakers, people living in poverty, persons with disabilities, and people living in group quarters (such as those receiving health care in institutional settings).

Figure 2-9 indicates where recent immigrants have settled in the city. This potentially vulnerable

population often includes limited English-speakers and those with cultural practices that differ from mainstream American customs. These factors may result in communication challenges during an emergency. Providing useful preparedness and mitigation information to this population often requires additional resources of time and relevant cultural expertise to achieve.

The Battelle Institute prepared a document in 1990 using 1980 census data that analyzed special needs populations in the central part of the city according to their vulnerability to earthquakes. They found a significant relationship between the number of people who will need special attention and the number of unreinforced masonry buildings in selected city census tracts. (Bolton, 1990)

## 2.2 Seattle's Hazards

The information about Seattle's hazards is summarized from the most recently updated SHIVA, available under separate cover. In that document, readers will find considerable detail about each hazard, including its historical occurrence, impact on communities, probability of future events, and data sources.

Following the summary of each type of hazard is a probability rating of Low, Moderate, or High that characterizes the likelihood of an event occurring. The rating is based on the frequency number assigned to each hazard in Table 2-5, summary of hazard risk, which is determined by historic occurrence: 1 and 2 = Low; 3 and 4 = Moderate; and 5 = High. Note that this rating does not factor in the severity of impact.

### Aircraft Accidents

There have been three major aircraft accidents within the city involving ground casualties. The city's deadliest disaster was a plane crash that occurred in 1943, killing 32 people in the air and on the ground. Areas in the Southern Duwamish Valley are the most vulnerable. A crash could cause fatalities, fires, power outages and other disruptions.

### Probability Rating: Low

### **Civil Disorder**

Like many other American cities, Seattle has suffered from civil unrest. The most recent episodes were related to the World Trade Organization held in 1999 and the 2001 Mardi Gras celebration in Pioneer Square. Previous Seattle disorders centered on Downtown and Capitol Hill. Violence targeted against people has been rare and looting light, but fires were a significant threat. Response to large disorders could require an enormous expenditure of money and time to control.

**Probability Rating: Moderate**

### **Conflagration**

Conflagrations are rare in modern, developed cities, but could happen after an earthquake or during civil unrest. Ignitions could occur throughout the city simultaneously. A 1994 study (EQE) estimated that 80-100 fires could occur in Seattle following a large earthquake. One study estimates 80-100 fires in Seattle following a large earthquake. Such a large number of fires could overwhelm the capabilities of the Fire Department. Fires in the city's power distribution network can create large power outages.

**Probability Rating: Moderate**

### **Earthquakes**

Earthquakes are the most destructive hazard Seattle faces. Three major quakes have struck Seattle since the beginning of the century (in 1949, 1965 and 2001). Recently, geologists have found evidence of massive earthquakes off the Washington coast and along a fault (the Seattle fault) that runs through the center of the city. These findings are discussed in greater detail in the SHIVA section devoted to earthquakes. The bulk of potential damage from a major earthquake would come from building collapse, landslides, fires, land subsidence, and even a tsunami or seiche (a large oscillation in an enclosed body of water). Casualties could exceed 1,000 people and economic damage could easily run into billions of dollars.

**Probability Rating: Moderate**

### **Floods**

Seattle does not have a large flood problem within its city limits. The Duwamish has been dredged and is regulated by the Hanson Dam. Thornton and Longfellow Creeks have flooded in the past. However, Seattle Public Utilities has built control structures on both creeks. Past flooding in these areas was usually not severe and was limited to local areas.

Both Seattle City Light and Seattle Public Utilities own and operate facilities located outside of the city limits on the Cedar and Tolt Rivers, the Skagit River and the Pend Oreille River. Flooding can be a concern in these areas during times of heavy rains and extraordinary snowpack.

**Probability Rating: Moderate**

### **Hazardous Material Incidents**

A Hazardous Materials incident is generally described as the intentional or accidental release of toxic, combustible, illegal or dangerous nuclear, biological or chemical agents into the environment. Most incidents happen at fixed sites, but incidents involving transported hazardous materials are often more dangerous, since they occur in less controlled environments.

**Probability Rating: High**

### **Landslides**

Landslides are a common problem in Seattle – and are secondary to other hazards, such as earthquakes and storms. They usually develop slowly and tend to move as a unit, decreasing safety risks. Most slides are small enough that they do not create city-scale emergencies, but occasionally weather and soil conditions cause slides throughout the city within a short period of time. Slides can destroy buildings, block roads and sever lifelines. The main impacts are economic.

The city recognizes that landslides are a complex problem. Following the major slides of 1996/97, it convened an Interdepartmental Landslide Team to address this problem. In addition, USGS monitoring of rainfall and soil conditions, along

with new landslide susceptibility maps, add new accuracy to the city's predictive ability.

**Probability Rating: High**

**Snowstorms**

Once every four or five years a major storm paralyzes the city. The immobility causes economic damage and inconveniences for many. The snow can also cut power and phone lines, topple trees, and even collapse roofs. Seattle has snow removal equipment, but it must be placed on vehicles that are normally used for other purposes.

**Probability Rating: High**

**Terrorism**

In recent years, Seattle has experienced a number of terrorist incidents perpetrated by right-wing hate groups, eco-terrorist groups and others. During the November 1999 World Trade Organization (WTO) and again in 2001, suspected Earth Liberation Front eco-terrorist attacks occurred at the University of Washington's Center for Urban Horticulture. In December 1999, Ahmed Ressam was caught smuggling bomb-making material into the country through Washington State. His arrest raised fears that Seattle had become a terrorist target, although it was later determined that the actual target was Los Angeles.

The 2001 attacks on the World Trade Center and the Pentagon brought heightened awareness of the possibility that any large city like Seattle could become a target. In the aftermath of 9-1-1, Seattle has also taken the threat of bio-terrorism seriously. In addition, cyber-terrorism is an increasing threat.

**Probability Rating: Low**

**Tornadoes**

One tornado touched down in Seattle in 1962 and another struck nearby in 1969. A tornado killed six people in Vancouver, Washington. While tornadoes rarely occur in our area, the National Weather Service notes an increase in

tornado sightings – speculating that the increase may be due to a growth of the region (hence more reporting) rather than weather patterns. If this is true, tornadoes were under-reported in the past and may be more common than previously thought.

**Probability Rating: Low**

**Tsunamis and Seiches**

Tsunamis, or 'tidal waves', are the product of earthquakes or large landslides. They contain a massive amount of wave energy and travel at high speeds. When they strike land, they push water with tremendous force far inland. The generation of a tsunami is complex, but usually an earthquake must be large (magnitude 7.0 or over) and shallow to cause a dangerous tsunami. Some scientists think that an earthquake along the Seattle Fault has produced a tsunami and could do so again.

Seiches develop when an enclosed body of water is shaken. They are rare occurrences in our area. An 1891 earthquake produced an eight-foot seiche on Lake Washington, and the 1964 Alaskan quake generated seiche-caused damage around Lake Union.

**Probability Rating: Low**

**Volcanic Eruptions**

There are five active volcanoes in Washington State. All of them are too far away from the city to cause any blast effects. The most probable impact is ash. Mt. Rainier and Glacier Peak are the most likely sources. Ashfalls from Rainier's most recent eruptions have been light, but Glacier Peak's have been some of the heaviest in the Pacific Northwest. Heavy ashfall could paralyze the city, damage infrastructure, and cost millions of dollars to clean up.

**Probability Rating: Low**

**Water Shortages**

Urban water shortages result when water demand exceeds supply over an extended period. Unlike the other hazards covered in this

report, droughts are slow-onset emergencies. Seattle has a history of water shortages. The main impacts are the inconveniences of usage restrictions and economic hardship for some businesses that use large amounts of water. In 1993, Seattle Public Utilities adopted a plan to mitigate water supply problems. Water shortages are also associated with earthquake damage to water supply and distribution systems.

**Probability Rating: Moderate**

**Windstorms**

Sustained winds of 85 mph have been recorded in the Seattle area. Normally, the hilly terrain breaks up strong winds, but there are occasional strong storms that halt normal activity throughout the city. They cause widespread line damage and power outages due to toppled trees and broken limbs. The City of Seattle has programs for vegetation management that serve to mitigate damage to electrical systems during windstorms.

**Probability Rating: Moderate**

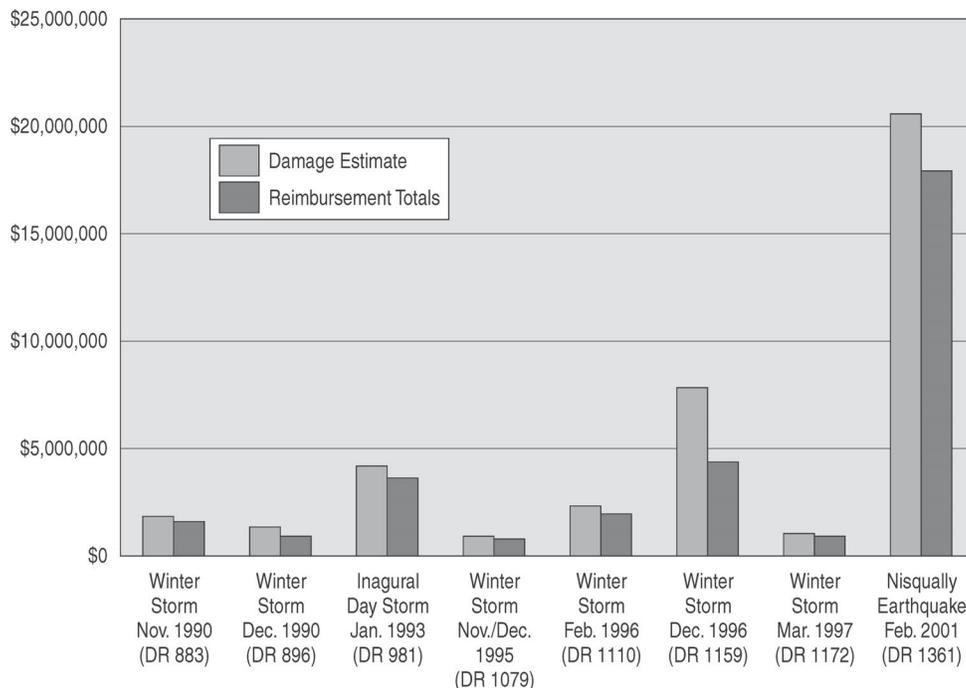
Two hazards prevalent elsewhere in the Northwest do not have specific sections devoted to them in the SHIVA: **avalanche** and **wildfire**. The threat of avalanche is not relevant to Seattle since the Olympic and Cascade mountain ranges are too distant to impact the city.

The threat of wildfire is included in the SHIVA section on conflagration and other large urban fires. In addition to wildfires, this section includes all other types of fires that can impact an urban area: namely conflagrations (large, multi-structure fires or urban brushfires), structure fires and vault fires. It indicates that Seattle has never had a large wildfire, such as occurred in Oakland and Berkeley, California in 1991, and that this is unlikely to occur due to the damp climate, vegetation and Seattle’s wind patterns.

**2.3 Presidential Disaster Declarations**

Between 1990 and 2002, Seattle had 8 presidential disaster declarations. Seven have been for winter storms. Landslides were a secondary impact of these storms.

**Table 2-2. City of Seattle FEMA & Insurance Reimbursed Disaster Damage**



The most recent declaration followed the Nisqually Earthquake in February 2001.

Table 2-2 includes response and repair costs to city-owned facilities and systems for each of these declared disasters. The figures do not include damage to arterial street structures.

## 2.4 Hazard Ranking and Methodology

The tables contained in this section (tables 2-3, 2-4 and 2-5) are taken directly from the SHIVA.

**Table 2-3. Hazard Relationships**

	Aircraft Accidents	Civil Disorders	Conflagrations (Fires)	Droughts	Earthquakes	Floods	Haz-Mat Incidents	Landslides	Snowstorms	Terrorism	Tornados	Tsumanis and Seiches	Volcanoes	Windstorms
Aircraft Accidents	■		■				■							
Civil Disorders		■	■											
Conflagrations (Fires)			■				■							
Droughts				■										
Earthquakes			■		■		■	■				■		
Floods						■	■	■						
Haz-Mat Incidents							■							
Landslides						■	■	■						
Snowstorms						■		■	■					
Terrorism	■	■					■			■				
Tornados							■				■			
Tsumanis and Seiches							■	■				■		
Volcanoes						■	■	■					■	
Windstorms						■			■					■

Table 2-3 summarizes the relationships between hazards Seattle has historically experienced. Often the primary hazard event triggers other problems, called “induced” hazards. For example, earthquakes may trigger fires, hazardous materials incidents, landslides, tsunamis and seiches. Also, winter storms can trigger landslides and power outages.

## Seattle All-Hazards Mitigation Plan

Table 2-4 summarizes the most likely (expected) and maximum credible (potential) impacts for each hazard. These numbers are based on an assessment of the qualitative research presented in the SHIVA. By their nature, they are subjective. Individual readers may draw different conclusions from the same body of evidence.

Each impact is rated on a scale of one (low) to five (high) relative to one another. The scores reflect only the damage stemming directly from the primary event itself (i.e., no induced hazards are included). To compensate, one category is set aside to express the likelihood for induced hazards. The two scores are averaged to obtain the most likely impact and the maximum credible impact.

**Table 2-4. Hazard Impacts**

	Expected Impacts											Potential Impacts										
	Area Affected	Safety	Economy	Utilities	Transportation	Structures	Social Services	Medical Services	Psychological	Secondary Impacts	Average Score	Area Affected	Safety	Economy	Utilities	Transportation	Structures	Social Services	Medical Services	Psychological	Secondary Impacts	Average Score
Aircraft Accidents	1	3	1	3	2	3	1	1	2	2	1.9	1	4	2	3	3	3	2	2	4	3	2.7
Civil Disorders	3	3	3	2	2	4	3	1	3	3	2.7	4	4	4	3	3	5	4	2	4	4	3.7
Conflagrations (Fires)	2	3	2	3	2	4	2	2	2	2	2.4	4	4	4	3	3	5	3	3	3	3	3.5
Droughts/Water Shortages	5	1	3	1	1	1	1	1	1	1	1.6	5	2	4	2	2	2	1	2	2	1	2.3
Earthquakes	5	4	5	5	4	5	4	4	3	5	4.4	5	5	5	5	5	5	5	5	5	5	5.0
Floods	2	2	2	2	2	2	1	1	1	2	1.7	3	3	3	3	3	3	2	2	2	2	2.6
Hazardous Materials	1	2	2	1	2	1	1	2	2	3	1.7	3	4	2	2	3	2	3	3	3	3	2.8
Landslides	3	2	2	3	3	3	2	1	2	2	2.3	4	4	3	4	3	3	2	2	3	3	3.1
Snowstorms	5	1	3	4	4	2	2	2	1	2	2.6	5	2	3	4	4	2	3	3	2	2	3.0
Terrorism	4	3	4	3	2	4	3	2	5	4	3.4	4	5	5	4	4	5	4	3	5	5	4.4
Tornados	1	2	1	2	1	2	1	1	1	1	1.3	1	3	2	3	3	3	2	2	3	2	2.4
Tsumanis and Seiches	3	3	4	3	4	4	3	2	2	3	3.1	3	4	4	4	4	4	3	2	4	3	3.5
Volcanic Eruptions	5	2	3	5	4	3	3	3	2	2	3.2	5	4	4	5	4	3	4	4	4	3	4.0
Windstorms	5	2	4	4	4	3	3	2	2	2	3.1	5	3	4	4	4	3	3	3	3	2	3.4

Table 2-5 summarizes Seattle’s hazard risks. The “risk score” is a final assessment of the danger Seattle faces from each hazard. It was obtained by multiplying the event frequency by the scores for expected and potential impacts. The latter two numbers were taken from the preceding table. The same caveat from that table applies to this one: the numbers in this table are a subjective assessment of qualitative data.

Please note that further analysis of the terrorist threat and vulnerability is currently on-going, which may result in a change in the assessment of its risk relative to other hazards.

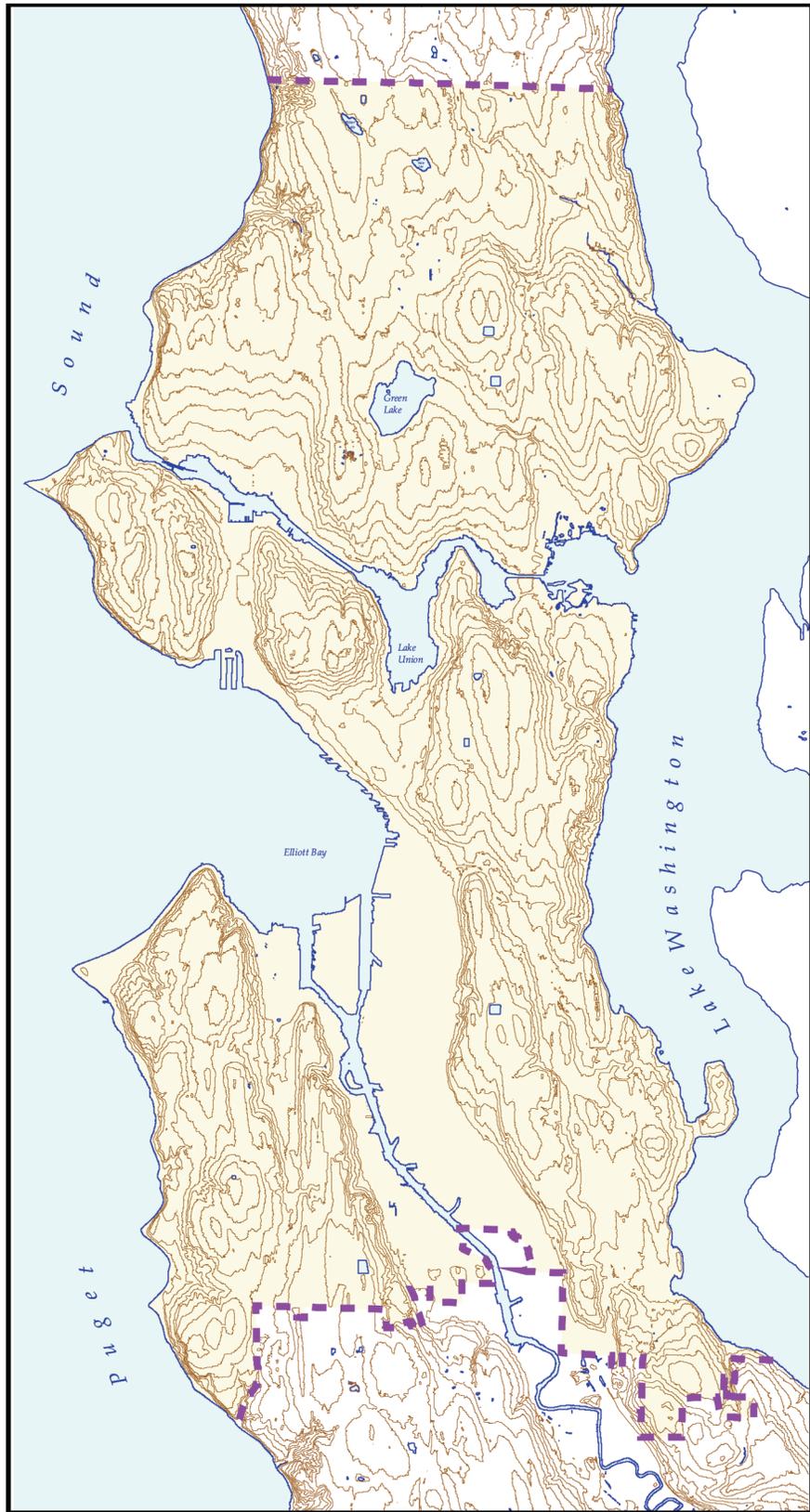
The conclusion drawn from this hazard and vulnerability analysis is that Seattle’s highest risk is for earthquakes, followed by winter storms (windstorms and snowstorms) and landslides. This analysis is consistent with the city’s history of Presidential disaster declarations (for both earthquake and winter storms).

The mitigation strategy described in Chapter 4 focuses on the top hazards identified in this analysis.

**Table 2-5. Summary of Hazard Risk in Seattle**

Hazard	Frequency	Expected Effects	Potential Effects	Risk
Earthquakes	3	4.4	5.0	66.0
Windstorms	4	3.1	3.4	42.2
Snowstorms	5	2.6	3.0	39.0
Landslides	5	2.3	3.1	35.7
Civil Disorders	3	2.7	3.7	30.0
Terrorism	2	3.4	4.4	29.9
Volcanic Eruptions	2	3.2	4.0	25.6
Conflagrations	3	2.4	3.5	25.2
Hazardous Material Incidents	5	1.7	2.8	23.8
Tsunamis/Seiches	2	3.1	3.5	21.7
Floods	4	1.7	2.6	17.7
Droughts/Water Shortages	4	1.6	2.3	14.7
Air Crashes	2	1.9	2.7	10.3
Tornadoes	1	1.3	2.4	3.1

**Figure 2-1.  
Seattle  
Topography**



Legend

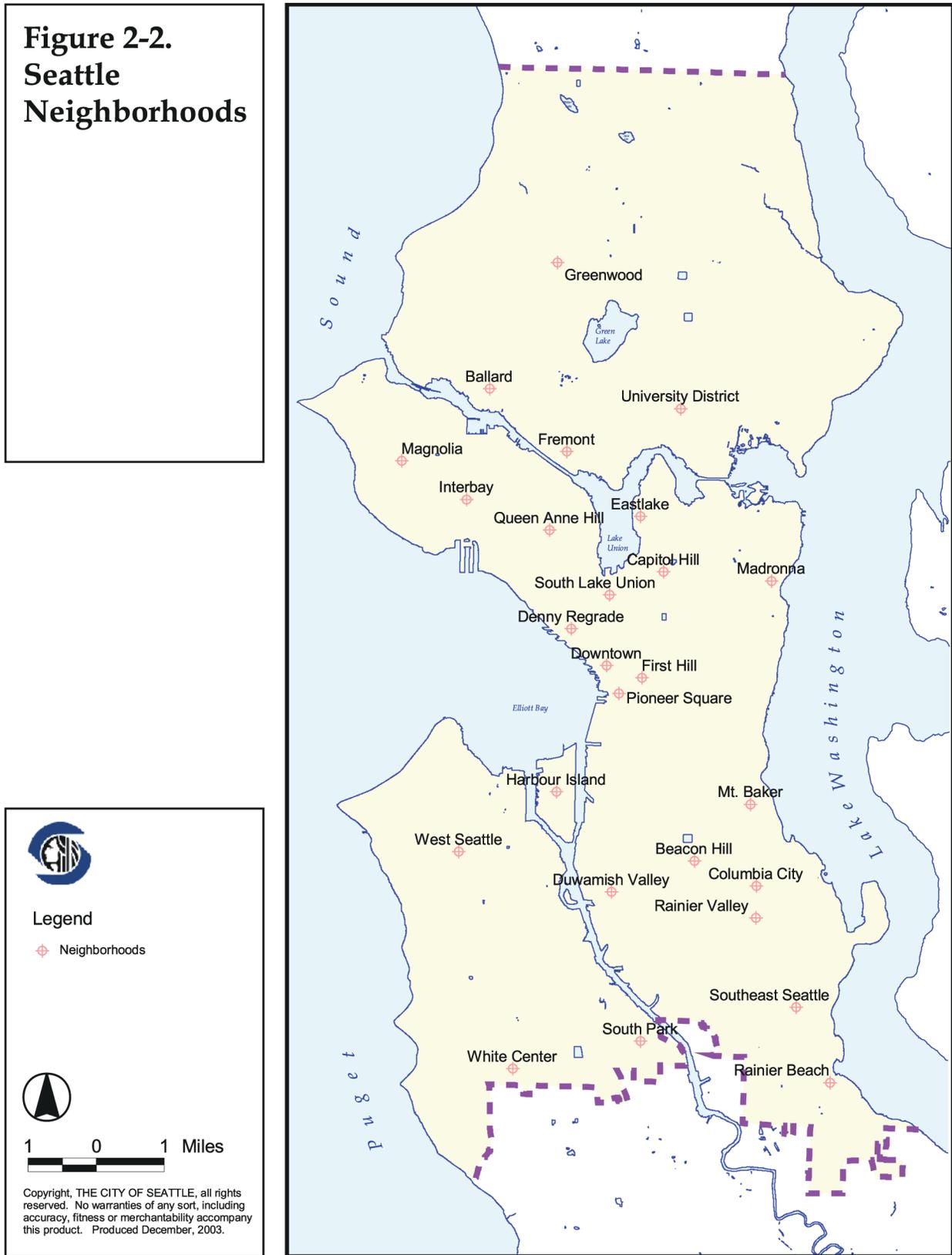
 50ft contours



1 0 1 Miles

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**Figure 2-2.  
Seattle  
Neighborhoods**



**Figure 2-3.  
Seattle  
Areas Prone to  
Liquefaction  
and Landslides**



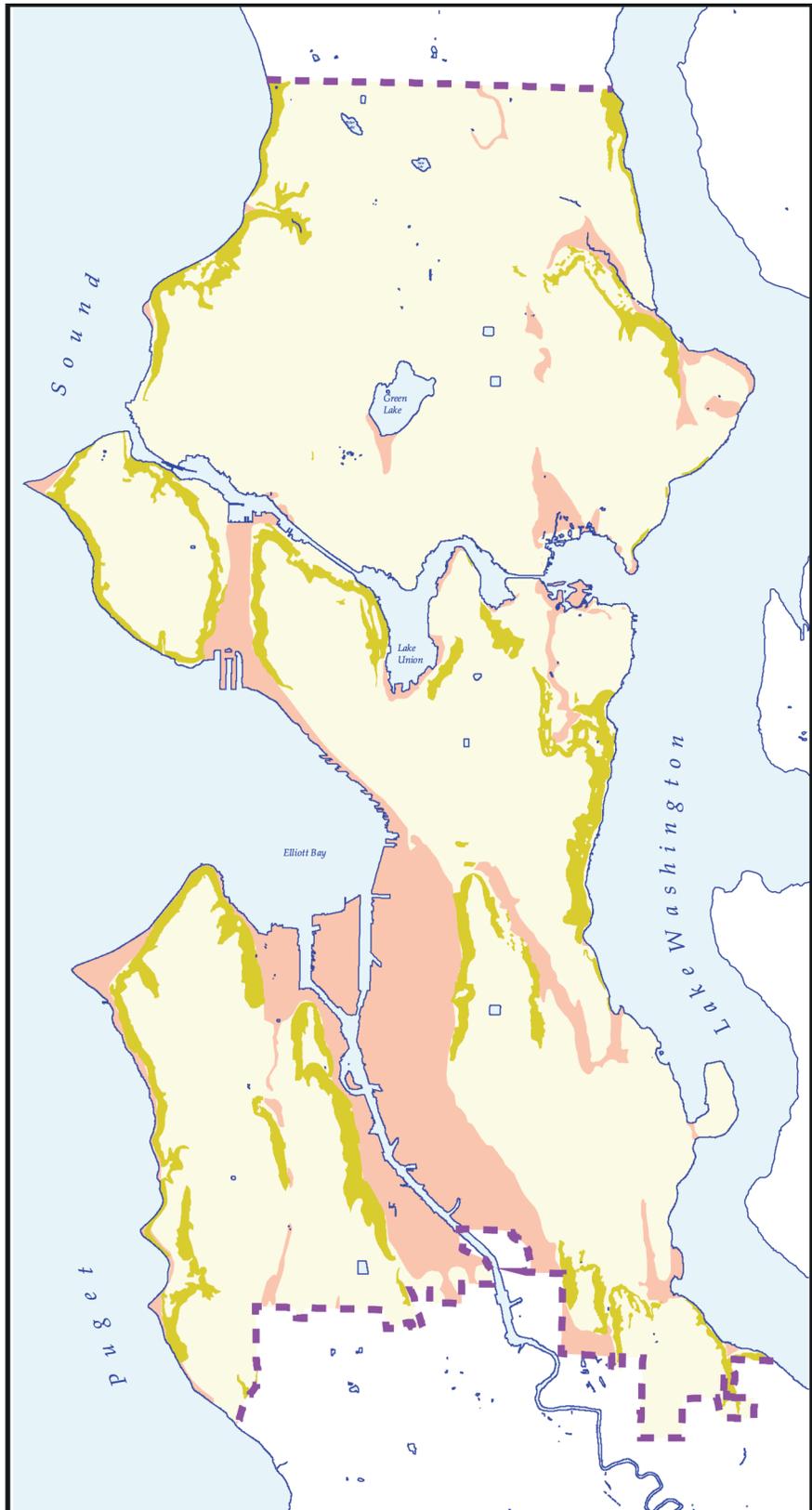
**Legend**

-  Potential Slides Area
-  Liquefaction Area



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**Figure 2-4  
Utility Mainlines**



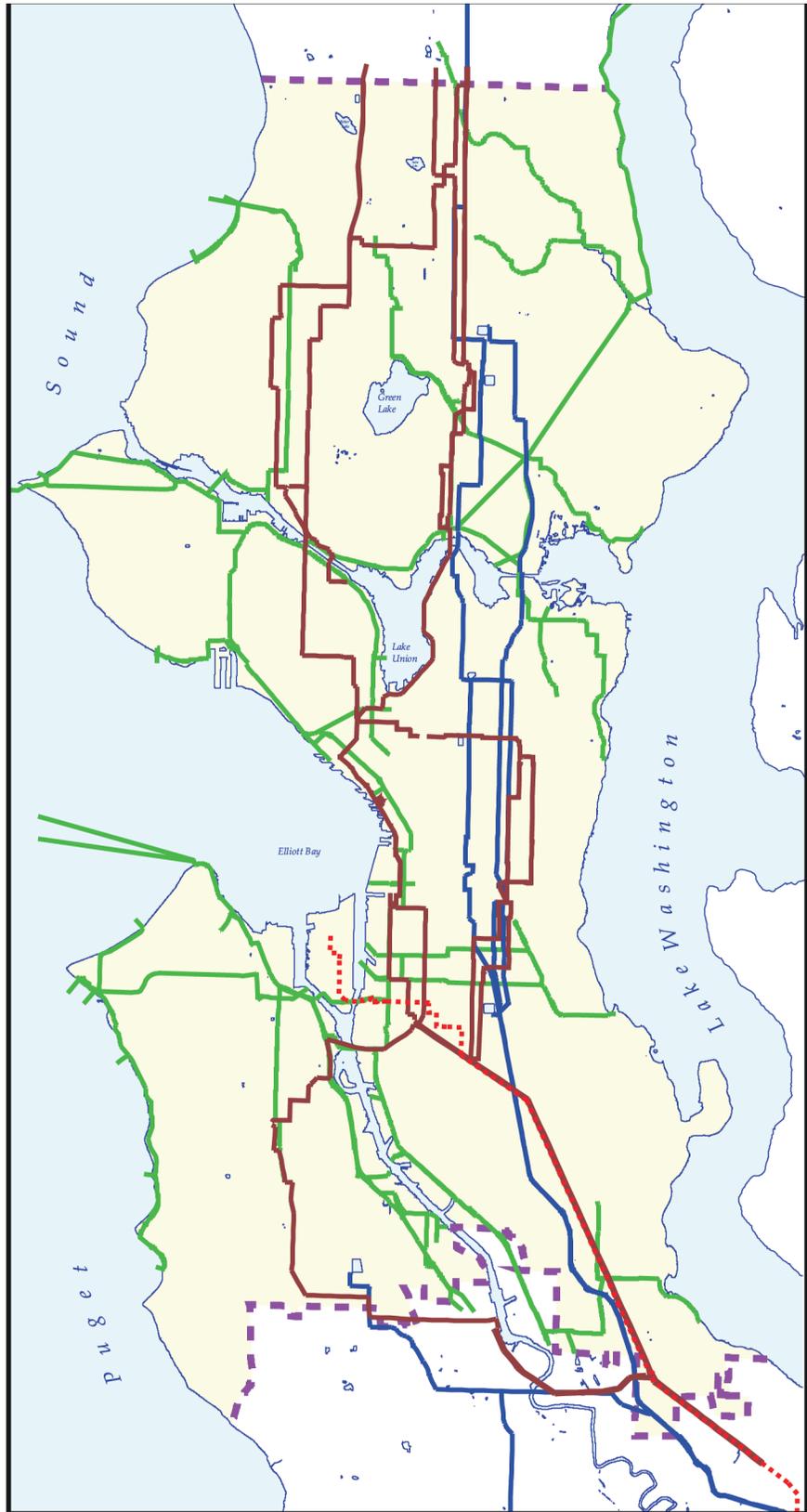
**Legend**

-  BP-Olympic Pipeline
-  City Light Transmission Lines
-  Water Supply Lines
-  Metro Wastewater Mainline

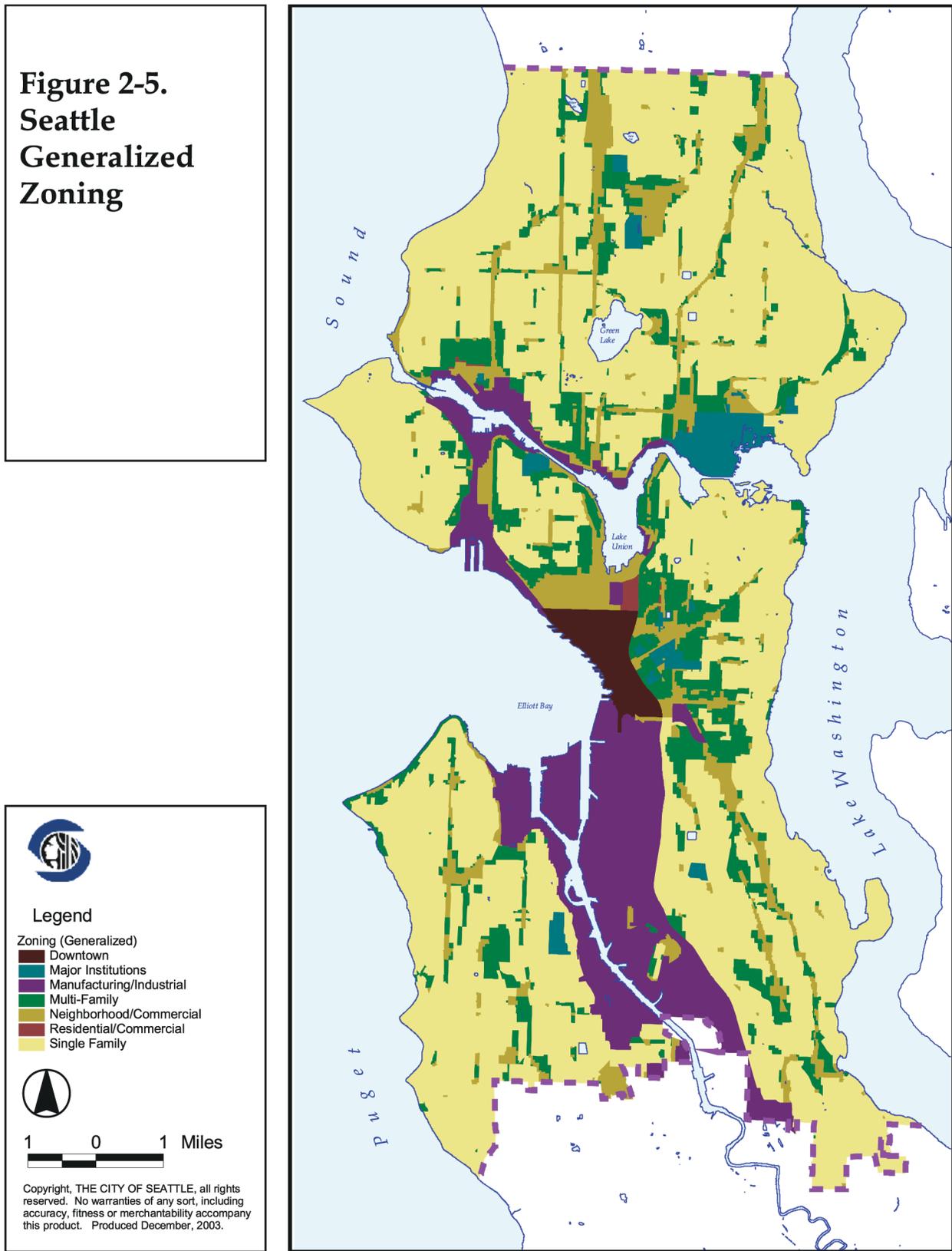


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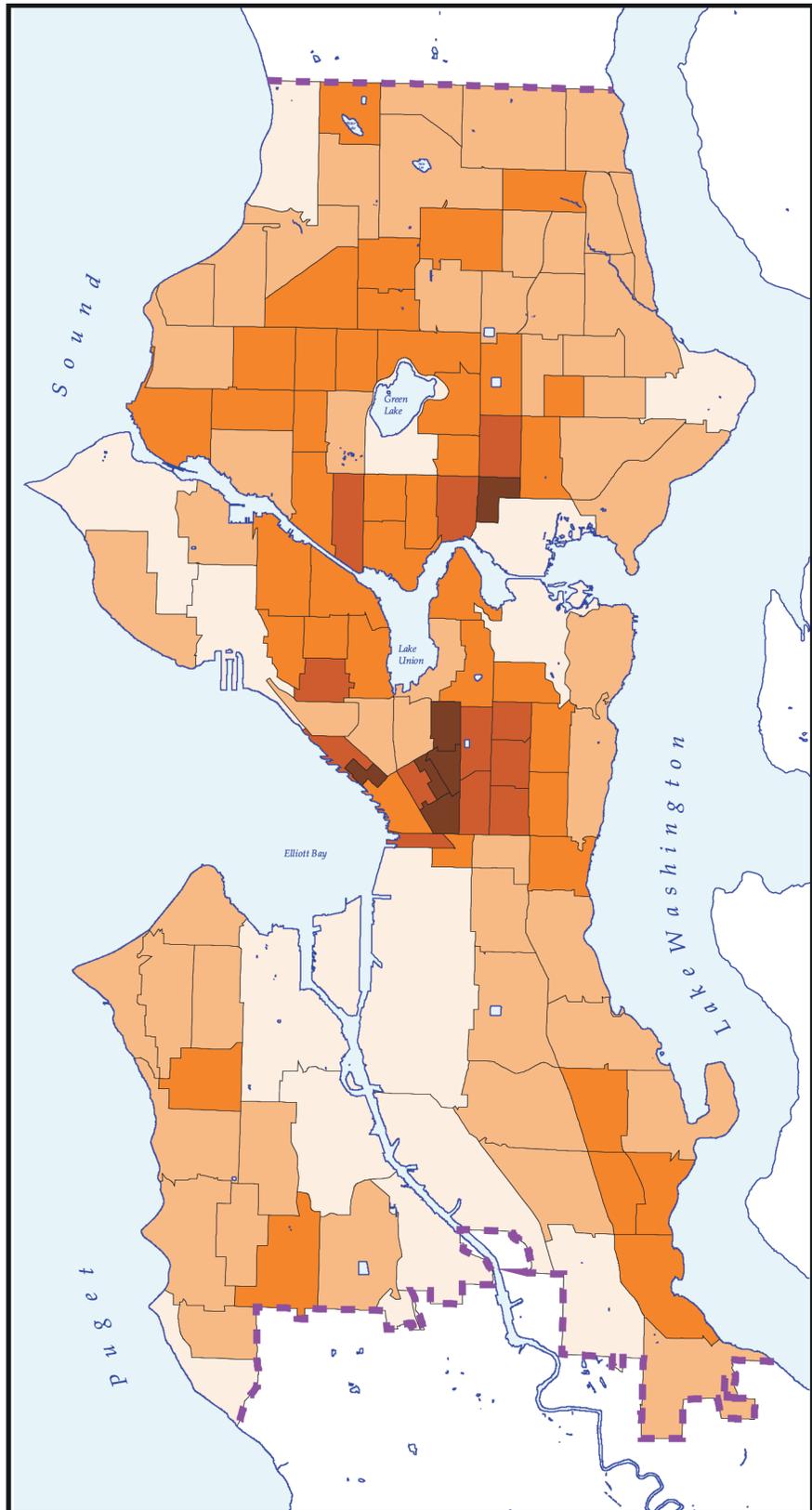
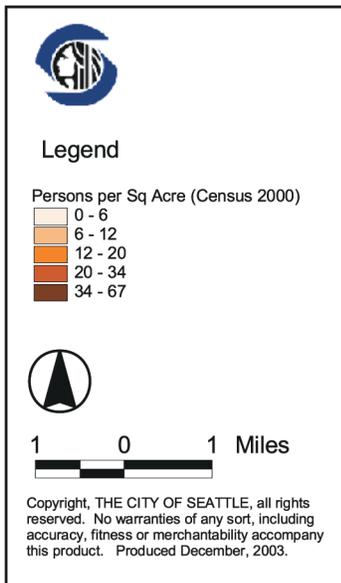


**Figure 2-5.  
Seattle  
Generalized  
Zoning**



**Figure 2-6.  
Seattle  
Residential  
Population  
Density**

Source: U.S. Census Bureau, Census 2000



**Figure 2-7.  
Urban Villages and Centers with  
Liquefaction and  
Landslide Prone  
Areas**



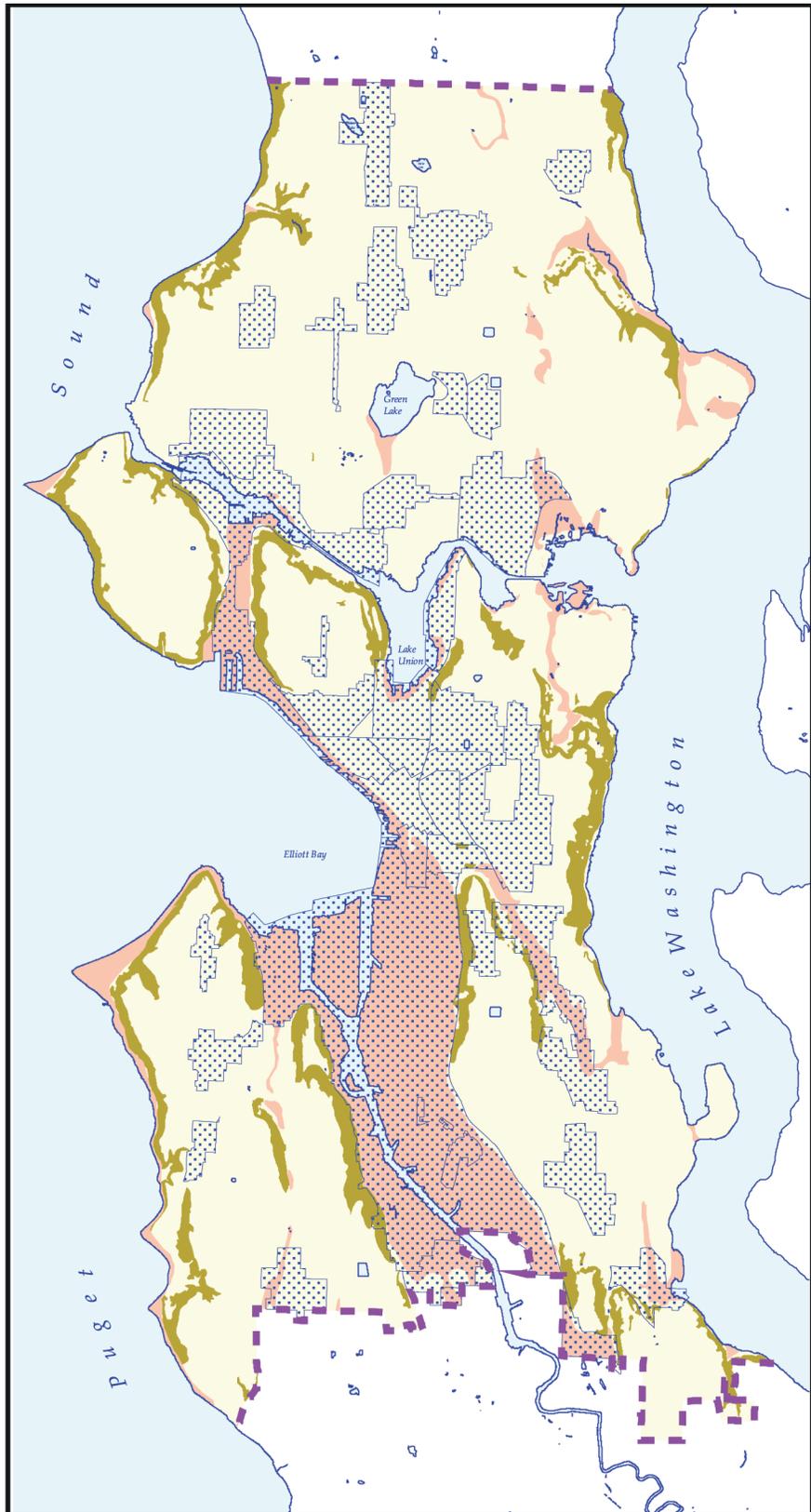
Legend

-  Urban Villages and Centers
-  Liquefaction Area
-  Potential Slides Area



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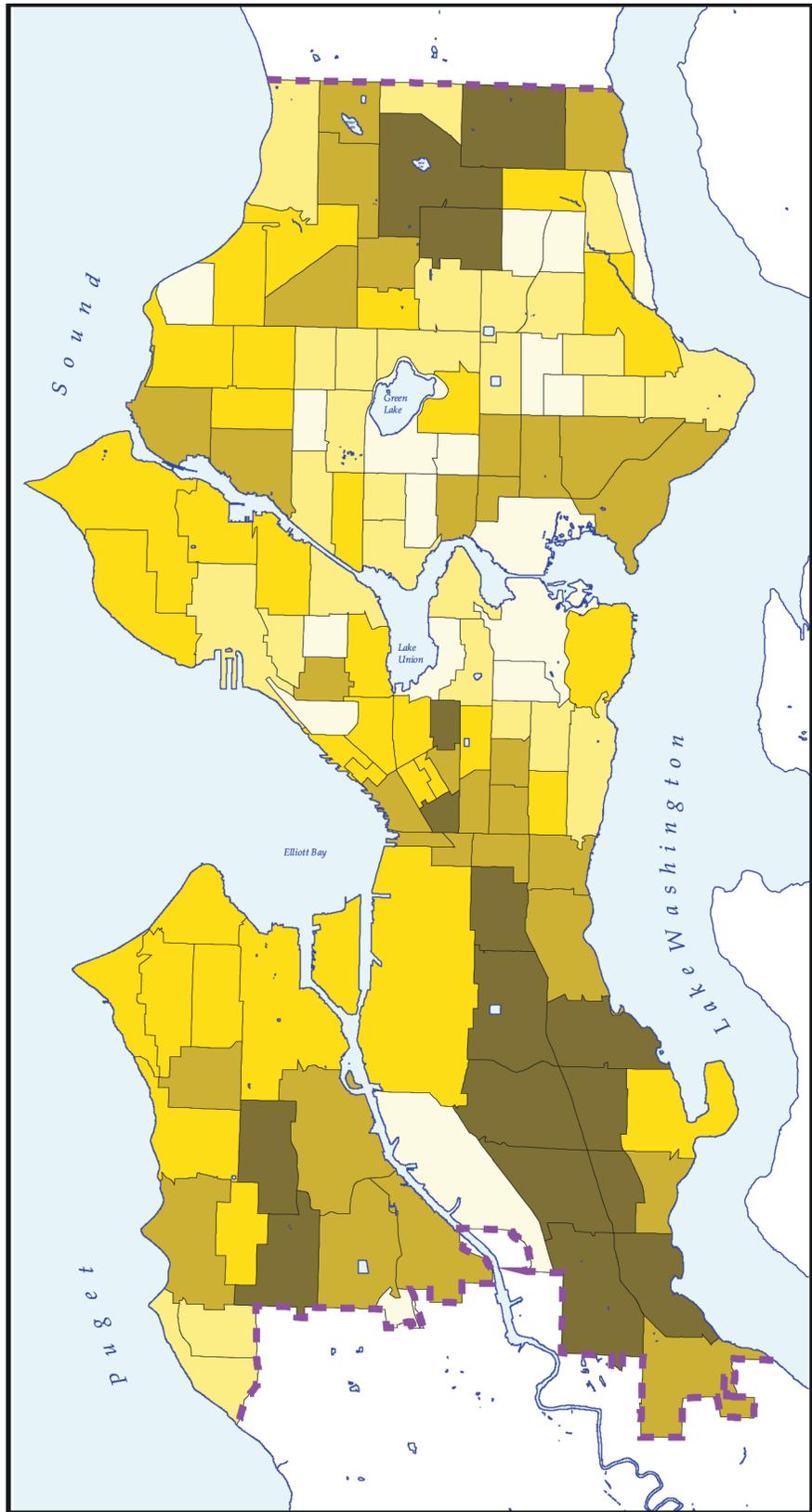
### Figure 2-8. Count of Special Needs

Shown is a count of conditions that make people more vulnerable to disaster. These are:

1. Age (over 65)
2. Disability
3. Institutionalized
4. Below poverty level
5. Linguistically isolated

A person can be counted more than once.

Source: U.S. Census Bureau, Census 2000



#### Legend

Count of Special Needs	
0 - 991	
991 - 1709	
1709 - 2560	
2560 - 4109	
4109 - 7647	



1 0 1 Miles

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**Figure 2-9.  
Recent Immigrant  
Settlement  
Patterns.**

Count of foreign-born persons entering  
the U.S. between 1995 and 2000.

Source: U.S. Census Bureau, Census 2000



**Legend**

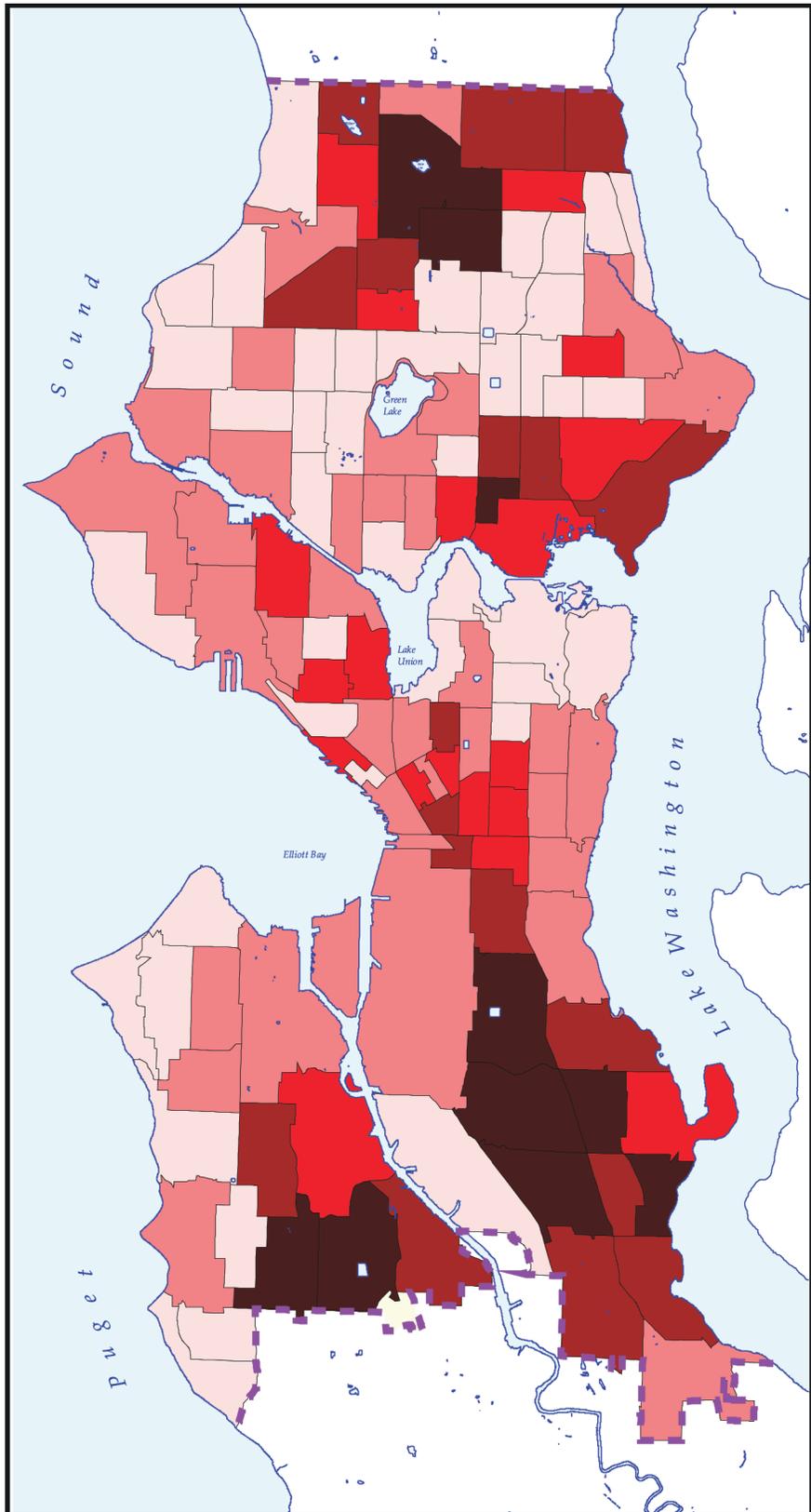
Persons Entering U.S. between 1995 and 2000

Lightest Red	18 - 78
Light Red	79 - 175
Red	176 - 312
Dark Red	313 - 508
Dark Red	509 - 802



1 0 1 Miles

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## Chapter 3

# Seattle's Mitigation Capacity

The City of Seattle has a long history of commitment to citywide and regional hazard mitigation planning aimed at reducing the city's vulnerability to disaster-induced harm. For the purpose of this plan, we distinguish two primary types of mitigation: structural (e.g. physical modifications to buildings, bridges, other infrastructure) and non-structural (e.g. codes, regulations). However, we also include training and public information as important mitigation strategies.

Mitigation success depends on a partnership between government, the private sector and individuals. We are committed to educating all who live and work here about our hazard risks and steps they can take to reduce their vulnerability. We encourage readers to check the Seattle Emergency Management website [www.cityofseattle/emergency\\_mgt](http://www.cityofseattle/emergency_mgt) for more information.

This chapter contains details about city departments charged with maintaining the integrity of Seattle's built environment, as well as other departments that address the housing and service needs of the city's vulnerable populations. Departments are listed alphabetically. Depending upon information available from each department, the chapter covers:

- Department purpose
- Planning mechanisms, priority-setting processes and hazard impact
- Recent mitigation-related accomplishments

In addition, the chapter includes information about interdepartmental planning, inter-jurisdictional public/private partnerships, and related mitigation planning efforts in other organizations.

We have attempted to capture the main policies, programs and projects that make up the city's mitigation capacity. Subsequent updates of the plan will incorporate new activities identified as having mitigation benefits.

### 3.1 City Department Mitigation Planning

This section includes detailed information about departments within city government involved in

mitigation-related activities. It reflects each department's unique structure and priorities.

#### Emergency Management

Seattle Emergency Management is a section of the Seattle Police Department's Emergency Preparedness Bureau devoted to citywide disaster preparedness, response, recovery and mitigation. It places a strong emphasis on individual and community preparedness, and provides a key liaison function between the city and its state and federal emergency management counterparts.

Emergency Management has the following functions:

- Maintains the city's Command Center
- Develops and updates the city's Disaster Readiness and Response Plan
- Educates the public
- Coordinates citywide mitigation projects and manages outside mitigation funding
- Manages citywide disaster recovery process
- Plans and runs emergency exercises
- Directs Seattle Project Impact and SDART programs
- Trains city staff on mitigation, response and recovery issues

#### Special Mitigation Highlights

**Mitigation of City Facilities.** The Mitigation Unit oversees the application for and management of State/FEMA funds for mitigation projects. It also encourages city departments to integrate mitigation into post-disaster recovery projects.

**Seattle Project Impact.** This is a public-private partnership whose overall goal is to make our communities more resistant to the damaging effects of disasters. The Project encourages people to take action before a disaster occurs through initiatives promoting safer homes, schools, businesses, and better earthquake and landslide hazard mapping (see section 3.3 for more detail).

**Seattle Disaster Aid & Response Teams (SDART).** This is the City of Seattle's all-hazard personal and neighborhood preparedness program. Its primary goal is to help people prepare to be self-sufficient for the three days following a serious disaster, when 9-1-1 emergency responders – police, fire, and medical personnel – may not be available. SDART also provides non-structural mitigation education as part of their neighborhood training.

Currently, there are nearly 400 SDART groups in the city. Many of these groups self-mobilized immediately following the 2001 Nisqually Earthquake. A number of neighborhood plans include requests for expansion of SDART, indicating that the program's value is widely recognized.

### Recent Mitigation Accomplishments

Between 1995 and 2003, SEM successfully applied for more than \$4.6 million dollars in State/FEMA mitigation funds. These grant funds have helped pay for projects such as the Alki Landslide Mitigation Project, the Emergency Operations Center retrofit, and numerous bridge retrofits.

### Finance

The Department of Finance is responsible for city budgeting, debt management, financial policies and overall financial controls.

### Planning

Through the **Capital Improvement Program (CIP)**, the department allocates existing funds and anticipated revenues to rehabilitate, restore, improve and add to the city's capital facilities. The six-year CIP, updated annually, covers a range of capital improvement projects.

This document, prepared by the Department of Finance based on submissions from city departments, is approved by the Mayor and then submitted to the City Council for adoption, along with the city's annual budget. The CIP does not appropriate funds, but rather functions as a budgeting tool, supporting the actual appropriations that are made through adoption of the budget. The CIP is consistent with the city's Comprehensive Plan and includes information required by the state's Growth Management Act.

Criteria used in selecting capital priorities and projects include preservation of existing facilities, investment in facilities that support the Comprehensive Plan, implementation of neighborhood plans, support for economic development, leveraging of external funding sources, and consistency with the city's debt policies.

In making investments in city facilities or infrastructure, Seattle tries to balance three goals:

- Rehabilitation or restoration of existing facilities to avoid the higher costs of deferred maintenance and to meet regulatory requirements
- Improvement of existing facilities to meet growing demand or to improve efficiency
- Development of new facilities to provide additional services (i.e., new requirements imposed by regulations)

Many, but not all, hazard mitigation projects undertaken by individual departments are integrated into the city's CIP (see Chapter 4.2).

An **Asset Preservation Study** exists that catalogues all of the city's capital facilities and calculates their replacement value. The four departments involved in the study (Fleets & Facilities, Library, Parks and Recreation and Seattle Center) are responsible for a total of 6.9 million square feet of building space, 2.6 million square feet of parking space, and 240 million square feet of grounds (primarily green space) and work yards. These assets have a replacement value of approximately \$5 billion (2003 figure). Study recommendations are being implemented over the next three biennia.

### Fire Department

The Seattle Fire Department provides fire suppression, rescue and emergency medical services to Seattle's culturally diverse population. The Fire Department also manages and supports its own **Local Emergency Planning Commission (LEPC)** to address hazardous materials issues, the requirements of which are mandated under the Superfund Amendments and Reauthorization Act (SARA) Title III of 1986. (See Section 3.3 Inter-jurisdictional Partnerships for more details.)

The Fire Prevention Division of the Seattle Fire Department, commonly referred to as the **Fire**

**Marshal's Office**, provides the leadership and inspection services to help prevent fires, explosions and release of hazardous materials and to assure fire and life safety for Seattle's residents, workers and visitors.

The **Hazardous Materials Section** of the Fire Marshal's Office provides inspection services for the storage and use of flammable and combustible liquids and other hazardous materials and processes as required by the Seattle Fire Code and Administrative Rules.

The Fleets and Facilities Department manages the construction, maintenance and mitigation of all Fire Department facilities.

### Fleets and Facilities

The Fleets and Facilities Department (FFD) manages and operates the city's vehicle and equipment fleets and buildings so that city business can be performed safely, efficiently and in an environmentally sensitive way.

The department manages and maintains 111 separate buildings. These include 6 office buildings and 2 parking garages in the downtown Civic Center, a network of 35 fire stations and fire support facilities, 5 police precincts and police support facilities, and 5 major complexes of shops and yards. The 111 buildings also include a number of special-purpose facilities, such as senior centers, neighborhood service centers, and the Animal Shelter. In addition to owned facilities, FFD also leases and manages space in about 20 buildings, primarily small office spaces and large warehouses.

The department conducts three separate lines of business to provide services to city policymakers, departments, and employees.

The **Fleets** line of business centrally manages the city's vehicle and equipment operations in order to enhance timely, cost effective, and high quality replacement of vehicles, maintenance, fueling, and short-term transportation.

The **Facilities** line of business provides strategic planning and management of the city's real estate assets, built environments, and graphic and print services so city staff and citizens can work in and use facilities that engender civic trust.

The **Administration** line of business provides executive leadership, budget preparation, financial and operational analysis, accounting services and human resource services to strategically allocate resources and maintain productive and professional Fleets and Facilities work environments.

### Planning

The department's **Capital Improvement Program** includes structural mitigation projects performed following Seismic Evaluation Studies completed in the early to mid 1990's. These studies evaluated various types of structures, including libraries, parks facilities, municipal buildings, and fire and police stations. The studies evaluated non-structural components as well. They include:

- ❑ Facilities Screening Studies by EQE, 1993: selected branch libraries, Seattle Central Facilities, Dept. of Parks & Recreation facilities, and Dept. of Administrative Services
- ❑ Studies of Non-Structural Components at City Light, Seattle Public Libraries, Seattle Parks and Recreation and the Seattle Center by EQE in 1992 and 1993
- ❑ Detailed Seismic Evaluations of numerous city buildings, substations, service shops, community centers, libraries, police and fire stations, the Seattle Aquarium, and Sunny Jim warehouse by EQE, completed between 1992 and 1995
- ❑ Detailed seismic evaluations, recommendations and cost estimates by Schreiber & Lane of Fire Stations 8-10, 16, 18, 20, 24 and 41, completed in 1996
- ❑ Detailed seismic evaluations, recommendations and cost estimates by Coughlin Porter Lundeen of Fire Stations 2, 11, 13, 26-30, 32, 36-37 completed in 1996
- ❑ Passage of a \$167.2 Levy that provides for seismic retrofitting of 20 fire stations and rebuilds 12 others to seismic standards

### Recent Mitigation Accomplishments

Many of the structures identified and evaluated have since been mitigated; others are either in process or are planned – and are listed in Chapter 4.2.

## Seattle All-Hazards Mitigation Plan

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- ❑ The two most visible examples of recently mitigated buildings that provide critical city services are the Municipal Building and the Public Safety Building. Both buildings were seismically unsound and have since been rebuilt in compliance with current seismic code.
- ❑ Seismic retrofit of the Duwamish police facility is already funded and is nearing completion.

### Housing

The Seattle Office of Housing (OH) invests in and promotes the development and preservation of affordable housing that offers opportunity for individuals, families and communities to thrive.

### Impact of Nisqually Earthquake

A survey conducted by OH following the Nisqually Earthquake revealed that a number of downtown buildings owned by non-profits that house vulnerable populations sustained damage. The event impacted 3,299 units and caused an estimated nearly \$8 million in damage.

### Human Services

The Human Services Department's (HSD) mission is to find and fund solutions for human needs so that low-income, vulnerable residents in greater Seattle can live and thrive. The Department contracts with more than 230 community-based organizations to provide services to these populations.

### Actions Resulting from Nisqually Earthquake

Following the February 2001 Nisqually Earthquake, HSD met with an ad hoc planning group to discuss issues related to disaster response for vulnerable King County residents with special medical issues, including the homebound frail elderly. Subsequently, HSD provided disaster response training for Aging & Disability Services' case managers.

### Information Technology

The Department of Information Technology (DoIT) is charged with building and operating the city's corporate information technology, telecommunications and computing assets through a number of programs. These programs include the 800 megahertz public safety radio network, the city's tele-

phone network, the City's data communications (computer) network, the connection to the Internet, the 24/7 data center, the city's website and the Seattle Channel, a public television channel.

### Planning

- ❑ DoIT has an Information Technology Agenda, which is a strategic plan keyed to the Mayor's stated priorities and vision. This plan addresses IT needs and projects for the city as whole, and is developed with the IT management in all of the major city departments.
- ❑ The DoIT capital improvement program includes a number of information technology infrastructure improvement projects financed in a variety of ways, including bond funding and collection of funds from the city's other departments.
- ❑ DoIT participates in several regional groups to jointly plan enhancements to the IT infrastructure. These include the Regional Communications Board (RCB), which governs the King-County-wide public safety radio network. The entire network has 28 radio sites and about 14,000 radios used by every police and fire agency in King County. Seattle operates a portion of this network – 7 radio sites and about 4,400 radios. Another group is the fiber-partners, a consortium of public agencies such as the city, county, state, and federal governments, Seattle Schools, Community Colleges, the University of Washington and others. This group plans enhancements to the existing fiber optic cable network in Seattle. DoIT is the lead agency for construction and extensions of this network.

### Recent Mitigation Accomplishments

DoIT has made a number of improvements to information technology systems and infrastructure that mitigate the city's vulnerability to disasters. Recent improvements include:

- ❑ Construction of about 160 miles of fiber optic cable linking various government facilities in the City of Seattle and nearby suburbs. This plant is owned and operated by the DoIT on behalf of the fiber partners (see Planning above). It is the central cable plant used for operation of other networks, e.g. the city's private telephone network, the radio network and the data commu-

nications (computer) network. The same fiber optic cable plant is used by other government agencies for their own networks.

- ❑ Implementation and continuous improvement of a public safety 800 megahertz trunked radio network in King County. This network was authorized by King County voters in a special levy in 1992 and was implemented in 1995. It links every police and fire agency in the County, plus other related agencies such as Seattle Public Utilities. The present network is composed of 28 sites and over 14,000 radios (Seattle’s portion is 7 sites and 4,400 radios). The radio network is the primary method used by the police, fire and public utilities departments to dispatch their field units to citizens requesting services, as well as for emergencies and disasters. Many enhancements are in progress or planned, including a \$4.1 million upgrade of the network controllers and software.
- ❑ Implementation and continuous improvement of a private telephone network for city government, linking about 300 city business sites, composed of about 11,000 telephone lines, with related services such as 8,000 voicemail boxes and interactive response systems. The telephone network is the primary method citizens use to contact their government and the main communications method used by city departments to coordinate their internal responses to both day-to-day work and disasters. DoIT is completing a \$1.5 million upgrade of telephone switches in this network.
- ❑ Construction of a \$2.3 million data center and consolidated server room with state-of-the-art HVAC, electrical power, fire suppression and security. This facility was constructed in lieu of eight separate facilities proposed by departments. DoIT operates this facility on a 24 hour-a-day, 7 day-a-week basis.
- ❑ Implementation of “uniform data service (UDS)” in the downtown core civic campus. UDS is a switched computer network providing “computer dial down” for about 3,000 desktop and server computers on the campus. It replaces a hodge-podge of older networking equipment.
- ❑ Enhancement of the “Seattle Channel”. The Seattle Channel is the city government’s televi-

sion station, broadcast to Comcast cable television viewers and streamed live over the Internet. DoIT has recently re-branded the Seattle Channel, built an enhanced web site to supplement it, and has begun live broadcasting of City Council meetings and other programming. The Seattle Channel is a primary method used by city government to help prepare citizens to confront disasters and terrorism.

- ❑ City government website – *www.seattle.gov* or *www.cityofseattle.net*. The city’s award-winning website is used by every city department to provide information to citizens regarding normal government business and disaster preparedness.

## Neighborhoods

Department of Neighborhoods (DON) currently has two programs directly relevant to mitigation: Historic Preservation and Neighborhood Plan Implementation.

- ❑ Seattle’s **Historic Preservation Program** is responsible for the designation and protection of more than 230 historic structures, sites, objects, and vessels, as well as seven historic districts scattered throughout Seattle.
- ❑ In 1999, the City Council finished the approval process for 38 neighborhood plans created by nearly 20,000 citizens. The plans identify actions needed to ensure that each neighborhood will continue to thrive and improve as Seattle grows over the next 20 years in ways that meet our commitments under the State’s Growth Management Act. Seven of these plans currently include hazard mitigation-related proposals and are reflected in Chapter 4 of this Plan.

## Impact of Nisqually Earthquake

Several historic business buildings were affected in Pioneer Square and the International District; however, chimneys on a number of residential historical properties were damaged as well. Many privately owned historic buildings had been retrofitted prior to the earthquake. As a result, those buildings suffered little or no damage. A number of historic buildings are currently undergoing renovation that includes seismic upgrades.

### Parks & Recreation

The Department of Parks & Recreation's mission includes being good environmental stewards and providing safe, welcoming places for people to play, learn, contemplate and build community.

Several Parks Department Community Centers are designed as Tier 1 Congregate Shelter Sites that provide critical services during an emergency. These include: Bitter Lake, Delridge, Garfield, Meadowbrook, Queen Anne and Rainier Beach. These facilities are electrically wired to accept a portable generator to serve lighting in key areas, kitchen refrigerators, and other critical circuits.

### Planning

The Department has a 6-year **Major Maintenance Plan** (MMP) that compiles all major known maintenance needs required to keep the Parks Department's assets in safe and operable condition. Its current operating document covers 2003-2008. Part 1 of the MMP describes the Plan and includes lists of projects; Part 2 contains detailed project descriptions.

EQE Consultants completed a seismic assessment study of Parks facilities in 94/95. In addition, Parks in-house staff conducted a landslide assessment study for Parks-owned property in 1999. This study information became part of the Interdepartmental Landslide Hazard Mitigation Program described in Chapter 3.2.

The following process was used to prioritize projects in the current MMP:

- ❑ In-house experts reviewed the earlier MMP to eliminate projects that were completed and to add new projects.
- ❑ Each of the seven Parks geographic and city-wide divisions prioritized the remaining projects and selected the top 30 most needed projects in their districts.
- ❑ The remaining 200 projects across divisional lines were ranked according to a priority ranking system. Criteria included: division priorities; facility integrity; identified in an existing plan; safety; and urgency.
- ❑ Points were totaled and projects were re-ranked.

- ❑ The Parks Project Steering Committee (Directors and Parks Superintendent) and City Neighborhood Councils reviewed the projects.
- ❑ The Department funded its top 50 projects.

### Recent Mitigation Accomplishments

- ❑ Slide Mitigation Projects at Kinnear Park, Lake Washington Blvd., Magnolia Blvd., and Aurora Ave.

### Planning and Development (previously known as Design, Construction and Land Use - DCLU)

The Department of Planning and Development (DPD) develops, administers, and enforces standards for land use, design, construction, and housing within the city limits.

### Planning

The department is responsible for several plans and planning processes relevant to hazard mitigation:

- ❑ Seattle's Comprehensive Plan, *Toward a Sustainable Seattle*, is a 20-year policy plan designed to articulate a vision of how Seattle will grow in ways that sustain its citizens' values. The city first adopted the Plan in 1994 in response to the state Growth Management Act of 1990. The plan addresses neighborhood planning issues, coordinating regional policy, and analyzing Census data.

This plan involves considerable opportunity for public participation through community meetings and posting on the city's website.

- ❑ Area Planning & Urban Design. This effort coordinates community priorities with major development projects. It includes Seattle's City Design Office, the "Central Waterfront Plan" and other waterfront connection programs.
- ❑ Seattle Planning Commission. This 15-member citizen group includes an engineer or architect, an urban planner, ethnic minority members, and citizens active in neighborhood and community affairs. The group advises the Mayor, City Council and city departments on broad planning goals, policies and plans for the physical development of the city.

The Comprehensive Plan and its vision frame the Commission’s work for Seattle into the 21st Century. The Commission engages citizens in planning and working to reach the Plan’s goals. The role of the Commission is:

- ❑ To foster community participation in support of quality urban planning and design
- ❑ Advise city decision-makers on broad planning policies and goals, and on major planning projects and issues
- ❑ Educate leaders and citizens to promote excellence in planning, particularly at the intersection of urban design, preservation, art and architecture
- ❑ Advocate for planning decisions that support the health and vitality of the community

### Development

DPD develops, adopts, and enforces codes, ordinances, and policies that regulate construction activities, both for new and existing buildings. These regulations have the effect of mitigating damage caused by natural disasters.

- ❑ Seattle Building Code – based on the Uniform Building Code promulgated by the International Conference of Building Officials (now the International Codes Council), this is the primary tool for mitigating damage from earthquakes, snowstorms, and windstorms. New buildings constructed in compliance with this code are expected to be serviceable after most events and remain standing after a major event. For existing buildings, the code requires an owner who is substantially renovating a building to commission a seismic investigation, which may lead to a requirement to upgrade the earthquake resistance of the building.
- ❑ Seattle Project Impact – DPD helped develop Seattle Project Impact’s standards for encouraging seismic retrofits of single-family homes. The Department also provides expedited permitting services for these retrofit projects.
- ❑ Seismic Repair Policies – the Nisqually Earthquake in February 2001 prompted DPD to adopt policies for repairing damage caused by the earthquake. The policies in effect require

upgrades of the most damage-prone building elements (parapets and chimneys), with the expectation that damage to these elements in the next earthquake should be greatly reduced. Other policies trigger upgrades to structures that were more heavily damaged in the earthquake.

### Disaster Management

DPD participated in the Interdepartmental Landslide Team described in Chapter 3.2.

### Recent Mitigation - Mapping Projects

As a result of the interdepartmental landslide effort referred to in section 3.2 of this chapter, DPD developed maps of 1,400 reported slides, planning level descriptions, and cost estimates at 50 sites where the city could undertake stabilization measures to protect utilities and public safety. DPD uses the updated maps to regulate steep slopes under the Environmental Critical Areas (ECA) Ordinance.

In addition, DPD and SPU jointly funded development of a soils layer with the University of Washington and USGS. Now nearing completion, this layer enhances the city’s ability to plan infrastructure, as well as improve the way the city regulates private property.

### Risk Management

The Risk Management Division of the Department of Executive Administration manages the insurance program for all city property, including purchasing coverage and making policy revisions.

The city has insured its property through an outside carrier since 1998; prior to that, it was self-insured. The insurance program covers all city-owned structures within and outside the city limits, and includes more than 1,000 structures. Seattle’s current policy covers all-risk (including acts of terrorism), earthquake and flood. Deductible levels can change with each policy revision, but the trend is towards higher deductibles. The 2003-2004 minimum deductible for all types of hazards is \$500,000 per structure.

### Seattle Center

Seattle Center is the fourth largest visitor destination in the United States, attracting more than ten

million visitors per year to its 74-acre campus and hosting over 5,000 arts, sporting, educational, and cultural events. It is the home of the Seattle Opera, Pacific Northwest Ballet, three major theater companies, two professional basketball teams, the Seattle Thunderbirds ice hockey team, the Seattle Sounders soccer team, the Children's Museum, the Fun Forest Amusement Park, and The Center School, a small public high school. The grounds and buildings host festivals, concerts, conferences, and exhibitions throughout the year. Seattle Center is also a major urban park with lawns, gardens, fountains, and a variety of open spaces throughout the campus.

There are 24 buildings, two parking garages and five surface parking lots, a skateboard park, and an outdoor public basketball court on the Seattle Center grounds. Also part of the campus, but privately owned and operated, are the Space Needle, the Pacific Science Center, and the Experience Music Project (EMP). The nation's only publicly owned monorail carries more than two million riders each year between Seattle Center and downtown Seattle. The Monorail is owned by the city and operated by a private contractor.

### Planning

Seattle Center has conducted a number of seismic studies over the last 5-10 years. In addition, the Center developed a new Emergency Response Plan following the 2001 Nisqually Earthquake.

### Recent Mitigation Accomplishments

- ❑ Seismic retrofit of Opera House
- ❑ Removal of retaining wall on Kreielsheimer Site
- ❑ Phase I seismic improvements in Center House as part of construction of Center School (small public high school in Center House)
- ❑ Replacement of seismically unsound Flag Pavilion
- ❑ Replacement of Central Utility Plant and elimination of hazardous materials in old chillers
- ❑ Stormwater management – construction of detention systems as part of construction projects at McCaw Hall, Fisher Pavilion, Central Utility Plant, 5th Ave. Parking Lot, and Key Arena

## Seattle City Light

Seattle City Light (SCL) is in business to provide excellent energy services to its customers. It serves a population of almost 700,000 people living in a 130 square mile area, including the City of Seattle and several adjoining jurisdictions.

### Planning

Seattle City Light considers system reliability, safety, cost effectiveness, regulatory compliance, environmental impacts, and customer service when prioritizing and evaluating annual capital and maintenance projects. Projects are proposed and approved as part of the Department's annual budget and capital improvement planning processes. Tools used for evaluating projects include, but are not limited to, studies, load forecasts, rate forecasting estimates, economic models, etc.

### Recent Mitigation Accomplishments

**System Reliability.** Reliability is a key factor considered in evaluating and approving capital and maintenance projects and activities. SCL has ongoing projects and programs that are focused on preserving the integrity of its electrical system. Many of these projects result in the installation and/or construction of protective equipment and systems that mitigate potential damage to our electrical system from natural and manmade hazards. Examples are: protection devices, fire protection systems, and looped communication systems.

There are also systems and practices that allow remote control of key facilities and equipment during emergencies and back up generation and power resources, both owned and contracted, that can be activated to minimize operational interruptions and failures or damage. Mitigation accomplishments are included throughout this section.

### Structural Mitigation

- ❑ Boundary Rehabilitation Program. Comprehensive, programmatic rehabilitation of major equipment and auxiliary systems to improve plant reliability, operating life, best practices in the industry, new technology and licensing requirements.
- ❑ Turbine Runner Overhauls. These projects refurbish existing generators by replacing or

refurbishing worn components and installing new turbine runners to increase efficiency, operational flexibility and reliability.

- ❑ **Ross and Diablo Fire Protection Systems Modifications.** Installation of a refrigerated carbon dioxide storage tank to protect generators, oil rooms, and the station service rooms and advanced smoke detection system for early warning of fire at the control, relay and communication rooms.
- ❑ **Substation and Network Improvements.** Improvements are made to substation buildings, ancillary facilities (e.g., vaults and conduits, cables and feeders, etc.) and other electrical structures to enhance system reliability, to comply with regulatory requirements, and to maintain safe work environments.
- ❑ **Relay Improvements.** Improvements are made to metering, control and relay systems that serve substations and transmission systems to enhance reliability.
- ❑ **Communication.** The construction of fiber rings to City Light facilities to create a secure digital communications network and upgrading communication systems infrastructure consisting of fiber optic cable, digital microwave, or conventional radio systems. These systems are critical for operation, command and control of the electrical system and to dispatch crews that support these systems.
- ❑ **Transmission Reliability.** This project includes engineering and construction to improve or maintain reliability of our transmission systems through re-builds, replacement and/or relocation of infrastructure.
- ❑ **Network Maintenance Hold and Vault Rebuild.** Field surveys are performed to assess conditions and record condition of Network vaults and maintenance holes in the downtown and First Hill areas (underground electrical network). Current data facilitates service restoration during emergencies or system failures.
- ❑ **Metro Direct Current (DC) Cables.** Relocation of Metro DC cables from City Light maintenance holes and vaults to separate and isolate two electric systems that have uncoordinated protec-

tion schemes. Separation minimizes the potential for the loss of one system due to a catastrophic failure of the second system.

- ❑ **North 26 kV Conversions.** This project replaces all 4 kV electrical equipment in the distribution system with more efficient and reliable 26 kV electrical equipment.
- ❑ **North Capacity Additions.** This project replaces old line segments, rotten and damaged poles and adds or renovates underground facilities from the substations to the customer's property lines to enhance capacity to maintain system reliability.

#### *Non-structural Mitigation*

- ❑ **Network Control Systems.** Design for a networked based control system at Boundary, including interface with security systems.
- ❑ **SCL 230 kV Reliability Loop.** Preliminary engineering and system analyses are underway to determine the optimal transmission improvements for increased capacity and reliability of regional and local City Light transmission systems.

**Dam Safety Program.** The overall goal of SCL's Dam Safety Program is to protect the public from risks from dam failure due to natural and manmade hazards. SCL's Dam Safety Program coordinates, monitors and oversees activities for six major dams to enhance compliance with federal and state license requirements related to power, water supply, recreation, environmental and flood control functions.

#### *Structural Mitigation*

- ❑ **Skagit spillway gate seismic strengthening at Ross and Diablo**
- ❑ **Rock Fall Mitigation and Stabilization Projects-** Both Skagit and Boundary have experienced recent rock falls causing damage to infrastructure and jeopardizing the safety of workers and visitors. Projects at Boundary, Diablo and Ross Dams were completed to stabilize hillsides and slopes. Stabilization included the installation of shields and high impact fencing to mitigate the potential for rock falls resulting from natural hazards.

## Seattle All-Hazards Mitigation Plan

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### *Non-structural Mitigation*

- Oversee the design, installation and monitoring of equipment that can detect dam movement, instruments that detect and measure high flows, alarms for dam failure, and other such hazards. Recent projects include the following:
  - Cedar Falls Dam Failure Detection System
  - Cedar Falls Dam Remote Closing System for Intake System
  - Dam movement monitoring system at Boundary
- Daily visual dam safety inspections by on site personnel
- Annual dam safety inspections by FERC or periodic inspections by the State Department of Ecology
- Inspections following disasters such as earthquakes, rockfalls, major flooding, or terrorist activities that result in potential harm to infrastructure
- Studies to identify Peak Maximum Flows and charts that define areas that may be inundated in the event of dam failure at maximum flow
- Emergency Action Plans for all generation facilities that outline call out procedures for key emergency responders that should be followed in the event of a dam failure
- Annual update/tests of emergency procedures for all projects

### **Emergency Back up Systems**

#### *Structural Mitigation*

- Back up Control. In 2003, SCL developed a back-up location for the System Control Center in the event that the existing site is not operational or accessible. The System Control Center controls and monitors SCL's generation, transmission and distribution systems and can remotely operate critical systems and coordinate and dispatch field crews to respond to system emergencies.
- Recent installation of a fail-over redundancy system with backup at an off-site location for

data systems designed so that servers with critical systems and users would automatically be pointed to this backup system if primary systems failed.

- New emergency generator installed at the Boundary forebay.

### **Security**

#### *Structural Mitigation*

In the past several years, security improvements have been made at generation plants to reduce the potential for terrorism, other criminal acts or trespass.

- Skagit and Boundary Security System Improvements. Automated gates, fences, jersey barriers, security systems for surveillance and detection have been installed at key locations.

#### *Non-structural Mitigation*

- Vulnerability and Threat Assessments
  - Seattle City Light is in the process of conducting vulnerability and threat assessments for the Skagit and Boundary Hydroelectric Projects in conjunction with state, local and federal law enforcement agencies. These assessments will help identify security issues and shape plans for improved security at these locations to enhance the safety of the public, downstream communities, SCL's workforce, and SCL's infrastructure.
  - A joint assessment project was completed in conjunction with Seattle Public Utilities for the Cedar Falls/Tolt Dams.

### **Seismic Mitigation**

#### *Structural Mitigation*

- Seismic upgrades to facilities aimed at correcting structural deficiencies are accomplished as facility upgrades are made.

### **Future Activities**

- Disaster Recovery/Business Continuity. SCL's Information Technology Division (ITD) is studying disaster recovery needs for all IT

systems. ITD has developed a proposal to hire an outside firm to prepare a business resumption plan for IT systems. The contract should be issued later this year.

- SCL submitted a proposal via the city's Urban Area Security Initiatives grant to conduct vulnerability assessments for major substations that serve Seattle City Light's customers. If grant funds are received during the fall of 2003 as projected, SCL will initiate efforts to begin assessments this year.

## Seattle Public Utilities

Seattle Public Utilities (SPU) provides more than 1.3 million customers in King County with a reliable water supply, as well as essential sewer, drainage, and solid waste services for the City of Seattle. To deliver these basic services, SPU relies on a system of pipes, reservoirs, and disposal and recycling stations. SPU's Capital Improvement Projects focus on natural drainage systems, water, drainage in public spaces, sewer systems, and garbage and recycling services.

### Planning

SPU has its own **Hazard Identification and Vulnerability Plan**, which it has incorporated into its Disaster Response & Recovery Plan. Along with SDOT, DPD and Parks, SPU is part of the Interdepartmental Landslide Team. Its landslide mitigation priorities are reflected in the Landslide Team's projects.

SPU has a **Comprehensive Drainage Plan** that guides the department's management of stormwater, drainage and run off. The plan addresses flood protection, habitat enhancement and water quality, among other issues. The 2004 Comprehensive Drainage Plan update will chart a 20-year course for drainage projects and program direction.

SPU has a **seismic mitigation program**. In 1990, Cygna Energy Services completed a study on the seismic vulnerability of SPU's water system tanks, pump stations, treatment facilities, gatehouses, the Control Works and a few important transmission pipeline locations. These facilities were prioritized and upgrades were planned and designed for those facilities found to be vulnerable.

SPU also recognized its large inventory of highly vulnerable cast iron pipe and extensive regions of liquefiable soils. The Loma Prieta, Northridge and Kobe earthquakes demonstrated how quickly and extensively pipeline breaks could reduce water pressure and result in substantial economic losses. However, SPU determined that wholesale pipe replacement was not a practical seismic mitigation solution.

Because water facilities act together as a system, their interaction must be considered to address each facility's contribution to system performance. The backbone pipeline program was initiated in 2002 to take a systemic approach to address the seismic vulnerability of SPU's water pipelines, develop a seismically rugged backbone pipeline system that could deliver water between the in-town reservoirs, and determine cost effective measures to mitigate earthquake effects on water system operation. The backbone pipeline program is currently (Fall 2003) in the analysis phase. Some of the mitigation options that will be considered are:

- Seismic upgrade of those facilities found to be vulnerable in the 1990 Cygna study that have not already been upgraded
- Using valves to isolate one reservoir of dual reservoirs that serve the same area so that water is prevented from draining through broken pipelines
- Installing hardware and/or developing procedures (to enhance alternate source of fire suppression water is available) to isolate areas of significant pipeline damage so these areas do not drain the system
- Using flex hose to bridge broken mains and/or extend into areas without sufficient water pressure to fight fires
- Including seismic vulnerability as a consideration of resource management decisions on pipeline and facility replacement
- Using more stringent pipeline design standards through the normal pipeline replacement program so the system will become much more seismically rugged over time

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- ❑ Developing/modifying existing system emergency operating strategies and emergency planning and preparedness

### Recent Mitigation Accomplishments

- ❑ As of Fall 2003, critical facilities such as the Control Works, Operations and Control Center Warehouse, and several elevated tanks, standpipes and pump stations have been seismically upgraded. Separate studies were conducted and upgrades implemented for the in-town reservoirs, the Tolt, Lake Youngs and Landsburg dams.
- ❑ Hired the geotechnical engineering firm of Shannon & Wilson, Inc. to conduct a Seattle Landslide Study in November 1997; they completed the study in March 2000. One product of the study was a prioritized list of engineering projects in identified Stability Improvement Areas where landslides have historically occurred that share somewhat similar geologic and groundwater conditions. (see Section 3.2 on the Interdepartmental Landslide Team.)
- ❑ Located and mapped all ditches and culverts in GIS, so there is a record of these informal systems in order to regulate and design in steep slope areas.
- ❑ Hired a contractor to inspect all drainage pipes in landslide prone areas and are making necessary repairs.
- ❑ Hired staff to coordinate public reports of landslides with staff who can respond, including customer service representatives who staff the Emergency Response Information Center.
- ❑ Holds annual landslide response workshops each fall with seven departments to better coordinate emergency response and review specific departmental capabilities.
- ❑ Increased the Drainage Fee in 1999 to better control storm water runoff.
- ❑ Capitalized hazard mitigation fund to protect public facilities in 1999-2000. Some of these funds were used to implement the following mitigation projects: Hillcrest/58th SW, Marine View Drive North, Marine View Drive/47th Ave

SW, 47th Ave SW Gabion Wall, Garfield Landslide, Aurora Emergency Repair, 3000 block of W. Galer St, SW Admiral Way/SW Hinds St., California Way SW/Ferry Ave. SW, Lake Washington Blvd. /46th Ave S., and numerous small spot slope and drainage repairs in landslide prone areas.

- ❑ Worked with SPU and Parks to establish a citywide landslide prioritization criteria matrix for prioritized landslide mitigation projects. Using this matrix, the team identified four high priority landslide sites: Burke Gilman (e.g. 41st NE), Lakeside Pl NE, SW Admiral Way, Golden Gardens NW. SDOT will complete soil studies and begin preliminary design work for two of the sites this year (41st Ave NE and Lakeside PL NE), if SPU and Parks support the proposal.

### Transportation

Seattle Department of Transportation (SDOT) is charged with creating and maintaining a safe, reliable transportation system that enhances Seattle's neighborhoods, environment and economy. Its Planning and Major Projects (PMP) Division is responsible for long-range transportation planning, developing transportation policy for the City of Seattle, and managing major transportation projects such as the Alaskan Way Viaduct/Seawall, Sound Transit, Translake Washington (SR-520) and the Monorail.

SDOT has a number of on-going mitigation-related programs:

- ❑ The **Retaining Wall Replacement Program** identifies retaining walls throughout the city that require repair or reconstruction, and makes the necessary repairs to reduce interference with adjoining sidewalks or roadways.
- ❑ The **Hazard Mitigation Program for Landslide Mitigation Projects** funds the ongoing analysis of areas throughout the city that are landslide prone and pose a risk of damage to or from public property. The project also contributes to funding the construction of landslide prevention improvements.
- ❑ The **Areaways Program** constructs appropriate mitigation projects for areaways that reduce risks

to city facilities and the general public from natural disasters. Areaways are usable space, generally in the street right-of-way, constructed under sidewalks between the building foundation and the street wall. Many areaways in the Pioneer Square District are old and in poor condition, and may present hazards to the traveling public, public and private utilities, and adjacent building owners and occupants. Improving these areaways is an action included in the South Downtown Strategic Plan. SDOT identifies the areaways that require repair and, based on feasibility and cost assessment, either repairs them or fills them with lightweight concrete in order to reduce risks to pedestrians and property.

- ❑ **Olympic Pipeline** - SDOT, the Fire Department, the Mayor’s office and other departments are coordinating an effort to negotiate a new franchise agreement with Olympic Pipeline that would allow the company to continue transporting liquid fuel through Seattle. The previous agreement expired in 2000. The city is currently protected by an Indemnity Agreement.

The pipeline spur, called the Seattle lateral, runs primarily through the Seattle City Light Transmission Line right of way for 12.5 miles from Renton to Harbor Island. The lateral is used to transport approximately 9 million gallons of petroleum fuel per week.

Remembering the tragic pipeline explosion that occurred in Bellingham in June of 1999, public safety is a paramount concern for the city. The city is currently in the process of learning more about petroleum pipelines, the safety issues involved and preparing for an emergency. As the lateral runs through neighborhoods, businesses, and schools, the ultimate goal is to keep Seattle citizens safe.

**Planning**

SDOT has a Transportation Strategic Plan that addresses the operation and maintenance of the city’s \$7.6 billion transportation infrastructure – a system that includes 142 bridges, 586 retaining walls and 5 seawalls.

In 2001, an outside consulting firm reviewed the department’s Capital Improvement Program (CIP)

to look for opportunities to improve project development and delivery.

In 1999, SDOT Landslide Management began working with SPU, Parks and DPD to develop a citywide landslide mitigation program. This interdepartmental team’s efforts are described more fully in Chapter 3.2. SDOT hired a full-time senior civil/geotechnical engineer to manage its Landslide Mitigation Program.

**Recent Mitigation Accomplishments – Landslides**

Since the landslides of 1996/7, SDOT has done the following:

- ❑ Hired a consultant in 1999 to conduct several studies: a) Retaining Wall Drainage Inventory Study; b) Retaining Wall Inspection Services; and c) Landslide Risk Assessment on Arterial Streets. Based on the results of the Landslide Risk Assessment study, the consultant identified 24 arterial streets as high priority sites. In the summer of 2000, the consultant conducted in-depth site reconnaissance along those 24 arterial streets and identified various street segments as High, Moderate and Low hazard segments.
- ❑ In an attempt to look for opportunities to have joint landslide mitigation projects with multi-departmental interests, SDOT compared priority locations for various departments. SDOT prioritized sites in 2 phases: first along arterial streets where the risks were greatest; and more recently along non-arterial streets based on internally developed criteria. The known landslide sites along non-arterial streets were taken from SDOT’s Landslide Event List during the last four years in which slope movements and public concerns were reported. SPU and Parks identified priority locations on both arterial and non-arterial streets.
- ❑ Developed a system to track ongoing clean-up and maintenance costs associated with slide areas. Costs will be tracked on a block-by-block basis. These costs will then be used to conduct a “benefit/cost” analysis for individual sites, which will help in selecting the most cost-effective improvement projects.

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- Developed draft standards for tailored street and drainage for residential streets.

### Recent Mitigation Accomplishments – Earthquakes

As a result of increased public and governmental concern resulting from the 1989 Loma Prieta Earthquake in Northern California, the Seattle City Council appropriated funding to analyze and prioritize the city's bridges for seismic retrofit needs. The last project in this particular seismic retrofit program was completed in 2000. Bridges in the following areas were seismically retrofitted:

- Haller Lake/Greenwood/Blue Ridge
- Ballard
- University District
- Fremont
- Eastlake
- Magnolia/Queen Anne
- Downtown Seattle
- Beacon Hill
- Greater Duwamish
- West Seattle
- Southeast Seattle

### 3.2 Interdepartmental Mitigation Planning

In recent years, a number of interdepartmental groups have met to focus on mitigation for both natural and human-caused disasters, including the following:

#### Interdepartmental Landslide Program

During the winter of 1996/97, heavy snow and rains caused more than 300 landslides citywide, resulting in over \$30 million in damages. In an effort to be proactive in mitigating the effects of future landslides, the City Council adopted the **City Landslide Policies** directing city departments to develop a program to address landslide risks.

An Interdepartmental Landslide Team was formed to continue the work of protecting public infrastruc-

ture in landslide-prone areas. The team, consisting of representatives from Seattle Public Utilities (SPU), Seattle Department of Transportation (SDOT), Seattle Department of Parks and Recreation and the Department of Design, Construction and Land Use (DCLU), first met in 1997.

### Recent Mitigation Accomplishments

Under the landslide program, a number of initiatives have been undertaken, including the following:

- Mapped 1,400 reported slides (Seattle Landslide Study of 2001), wrote planning level descriptions, and developed cost estimates for stabilizing slopes needed to protect utilities and public safety at 50 sites.
- Contributed funding for the University of Washington and USGS to develop GIS soils layers.
- Sponsored 12 public educational workshops on landslide hazards and mitigation, attended by 950 members of the public. Fewer than 10% were repeat attendees. Technical experts representing the city and geotechnical, landscaping and contractor professional organizations provided information and answered questions at these meetings.
- Hired outside engineers to investigate drainage complaints and code violations in landslide prone areas.
- Developed policies for hillsides to enhance uniform administration of the Environmental Critical Areas, building codes and utility standards to promote slope stability.
- Developed and distributed educational brochures.
- Developed goals, objectives and a criticality matrix for prioritizing future projects. These criteria include mobility, criticality and vulnerability of city facilities, natural features and human influence.
- Completed a study that maps all recorded landslides since the late 1800's, updated the landslide prone areas critical areas maps, and describes the causes of landslides in Seattle.
- Identified 63 projects with construction estimates of \$37 million that would protect city facilities or reduce the city's landslide risks. SPU, SDOT and

Parks agreed in principle to move forward with four joint landslide projects.

- ❑ Established a citywide landslide prioritization criteria matrix for prioritized landslide mitigation projects. Using this matrix, the team identified four high priority landslide sites: Burke Gilman (e.g. 41st NE), Lakeside Pl. NE, SW Admiral Way, Golden Gardens NW.

### Urban Areas Security Initiative

Beginning in 2003, two Urban Areas Security Initiative (UASI) work groups began meeting to develop plans and priorities for allocation of nearly \$30 million in federal Homeland Security dollars to make our area better prepared to deal with acts of terrorism. The UASI work includes assessments of key sites and systems, identification of vulnerabilities, formulation of a strategy to mitigate the vulnerabilities, and then funding the mitigation through homeland security grants.

### 3.3 Inter-jurisdictional and Public/Private Mitigation Partnerships

#### Local Emergency Planning Committee

The Seattle Local Emergency Planning Committee (LEPC) was set up in 2002 to foster a working relationship between private industry and public agencies in addressing hazardous materials issues. In addition to promoting public awareness and industry reporting, the LEPC takes a cooperative approach toward the prevention and preparation for hazardous materials releases. Seattle's LEPC is managed by the Fire Department.

In addition to city personnel, LEPC membership includes representatives from the Washington State DOT, Washington State Department of Ecology, Seattle/King County Public Health, Harborview Hospital, Port of Seattle, Boeing, Burlington Northern Sante Fe Railway, Bank of America and a member of the public.

#### Seattle Project Impact

In 1998, Seattle received FEMA funding for a two-year pilot project focused on mitigation. This project reflects a public-private partnership composed of

educators, businesses, government agencies, and non-profit agency representatives. Its four-fold focus includes: home retrofitting; school retrofitting; business disaster mitigation; and earthquake and landslide hazard mapping.

While Seattle Project Impact resides administratively within Seattle Emergency Management, the project has worked with 19 neighboring jurisdictions to implement similar programs.

The Project's numerous programs have charted major accomplishments.

#### Home Retrofit

- ❑ More than 2,700 homeowners attended the Home Retrofit classes
- ❑ 500+ permits to perform seismic home retrofit work approved
- ❑ Several thousand copies of the Home Retrofit Series distributed to homeowners and available online
- ❑ More than 400 builders, contractors, engineers and architects completed Professional Home Retrofit training at the University of Washington
- ❑ The city's Office of Housing approved grants for 25 low-to-moderate income homeowner retrofits.

#### Hazard Mapping

Seattle Project Impact provides a forum for deliberation and coordination among government agencies, private partners and educational institutions in producing the following:

- ❑ Maps that integrate existing landslide records with data about historical rainfall and geotechnical soils properties of Seattle's landslide-prone areas
- ❑ Three-dimensional geologic map of the Puget Sound area that incorporates complex structural relations beneath the surface with ground motion data

#### Business Mitigation

- ❑ Development of Disaster Resistant Business (DRB) Toolkit

### School Retrofit

Non-structural mitigation includes the following:

- Removal of overhead hazards at 46 public schools (surpassing the Project's goal of 35)
- Completion of a Non-structural Protection Guide
- Non-structural mitigation (e.g. tying down computers and other equipment, bolting shelves, strapping TVs, and bracing machinery) at 9 schools
- Installation of automatic gas shutoff valves at 2 schools

### Ad hoc Human Services Planning Group

Following the Nisqually Earthquake, an ad hoc planning group met in July 2001 to discuss issues related to disaster response for vulnerable King County residents with special medical issues. City of Seattle and Seattle-King County Public Health staff convened the meeting at the request of an inter-jurisdictional earthquake debriefing group. Participants included representatives of Seattle's Human Services Department, the American Red Cross, a Pioneer Square neighborhood clinic, and several people from the Public Health Department.

The populations discussed were the homebound frail elderly, homeless people living in shelters and transitional housing programs, and people who are "marginally" housed, for example, in low-income housing for formerly homeless people, many of whom have chronic health and/or psychiatric conditions.

The group briefly reviewed the current protocols for mass sheltering in the event of a disaster and acknowledged the need to better address the medical issues of vulnerable populations who might become displaced. They also recommended a number of actions, some of which are included in Chapter 4.2.

### Port-to-Port Transportation Corridor Earthquake Vulnerability Study

This study, reflecting a King-Pierce Project Impact partnership, involved numerous jurisdictions in an investigation of the seismic vulnerabilities of the

Central Puget Sound Region's transportation network. The study area included the main transportation routes of I-5, Highways 99 running north-south through Seattle. Due to insufficient resources, the study did not include assessment of any major bridge structures. The economic impact studied only one earthquake scenario – a deep earthquake centered under the City of SeaTac.

This effort marked a "first" in bringing together transportation planners from many jurisdictions to engage in joint contingency planning.

### 3.4 Mitigation Planning in Other Organizations

The following entities are not part of City of Seattle government.

#### Seattle Public Schools

Seattle Public Schools (SPS), a public entity governed by a board of directors, has 96 sites. All facilities have had some form of structural upgrading. Since 1988, 33 structures either have been rebuilt or substantially remodeled up to the current seismic building code. Another 14 currently are funded in major capital programs. Many of these campuses have multiple buildings; therefore, any one campus would be in compliance with code at the time buildings were remodeled or, in the case of portables, when last relocated. SPS incorporates new technological developments in structural strengthening or new code requirements whenever it does complete or substantial remodeling.

SPS' non-structural retrofits are mentioned above under **Seattle Project Impact** accomplishments.

#### Seattle Housing Authority

The Seattle Housing Authority (SHA) is a public corporation governed by a seven-member citizen commission. SHA provides affordable housing to nearly 23,000 people in the City of Seattle. It houses low-income residents, primarily the elderly and mentally-disabled people, in both high-rise and low-rise structures.

The 1996/7 winter storms that caused landslides in many parts of the city did not impact any SHA-managed buildings. SHA high-rise buildings did not fare as well during the 2001 Nisqually Earthquake;

however, the damage suffered was not structural. Numerous building elevators broke down because at the time the structures were built, no code requiring seismic protection for elevators with the use of counter weights existed. All of the elevators were quickly repaired and retrofitted following the earthquake. One building in Pioneer Square, the Morrison Hotel, was damaged during the earthquake. SHA no longer manages that building.

### University of Washington

The University of Washington (UW) is the oldest and largest public institution of higher education in the Pacific Northwest. The Seattle campus, covering 693 acres, is the largest of the UW's three campuses. It encompasses seventeen schools and colleges and serves in excess of 37,000 students, has 20,000 faculty and staff, and hosts approximately 5,000 visitors.

The recently established UW Emergency Management Office is preparing a Comprehensive Hazard Mitigation Plan, updating the Emergency Response Management Plan and developing a business continuity/resumption plan. This will enable the UW to resume normal education, research and public service operations as quickly as possible following a major disaster.

The UW started seismic strengthening of its older facilities more than 10 years ago with a study by the Earthquake Readiness Advisory Committee (ERAC) that established an orderly protocol for structural and nonstructural retrofitting of campus buildings. The Department of Environmental, Health & Safety at the University maintains a comprehensive fire safety program for the campus.

In the event of a major regional disaster, a Pre-Entry Assessment Team has been established as an on-campus resource to assess building safety with respect to chemical hazards prior to search and rescue efforts. The UW Student Affairs Committee on Emergency Training (SACET) is responsible for developing, recommending and implementing a series of broadly based educational programs for students and Student Affairs staff on personal emergency preparedness.

In addition to internal activities, the University manages the following:

- ❑ UW Medical Center, Harborview Medical Center and neighborhood clinics, providing medical care in the states of Washington, Alaska, Idaho, Montana and Wyoming.
- ❑ Pacific Northwest Seismograph Network (PNSN), collecting and analyzing data in order to provide rapid and accurate information on earthquakes and volcanic activity in Washington and Oregon.
- ❑ The Northwest Atmospheric Modeling System (MM5), one of the highest resolution operational weather prediction systems in the U.S. It provides 72-hour forecasts on the World Wide Web for Pacific Northwest (Washington, Oregon, Idaho) weather, and is produced twice daily at the University of Washington.
- ❑ Institute for Hazard Mitigation Planning and Research, an interdisciplinary academic institute dedicated to exploring ways to integrate hazard mitigation principles into a wide range of crisis, disaster, and risk management opportunities.

### Cascadia Region Earthquake Workgroup

Cascadia Region Earthquake Workgroup (CREW) is a coalition of private and public representatives working together to improve the ability of Cascadia Region communities to reduce the effects of earthquake events.

CREW's goals are to:

- ❑ Promote efforts to reduce the loss of life and property
- ❑ Conduct education efforts to motivate key decision makers to reduce risks associated with earthquakes
- ❑ Foster productive linkages between scientists, critical infrastructure providers, businesses and governmental agencies in order to improve the viability of communities after an earthquake event

## Seattle All-Hazards Mitigation Plan

**Table 3-1 Disaster Mitigation Land Use Codes, Regulations and Rules Adopted by Seattle Department of Planning and Development**

<b>Codes, Regulations, Rules, Memos</b>	<b>Purpose</b>	<b>Date Adopted</b>
Directors Rule 2-87 Requirements for Permitting Construction in Potential Slide Areas	Provides mitigation requirements for projects constructed in potential slide areas.	1987
Floodplain Development Ordinance Seattle Municipal Code Chapter 25.06	This chapter regulates development in areas of special flood hazard in accordance with standards established by the National Flood Insurance Program and the Washington State Department of Ecology.	1989
Seattle Municipal Code Chapter 25.09	Regulations for environmentally critical areas.	1992
Seattle Amendments to Chapter 18 of the UBC	Requires evaluation of slope instability due to earthquakes.	1993
Directors Rule 32-96 Seismic Survey and Report Requirements	Allows FEMA 178 or Uniform Code for Building Conservation (UCBC) evaluations of existing buildings.	1996
Seattle Amendments to Chapter 34 of the Uniform Building Code	Requires all substantially altered buildings to be seismically retrofitted.	1997
Directors Rule 3-97 Requirements for Permitting Development in Environmentally Critical Areas	The purpose of this rule is to clarify and interpret Ordinance Number 118539, which became effective April 1, 1997. This Ordinance was adopted after the winter '96 and spring '97 storms and subsequent landslides.	1997
Adoption of Chapter 16 of 1997 Uniform Building Code (UBC)	Regulations for the seismic design of new buildings.	1997
Voluntary Home Retrofit program developed as part of Seattle Project Impact	Pre-designed plans for bracing homes against earthquake damage available for qualified residential structures. Expedited permitting process.	1999
Policy Repair of Earthquake-damaged Buildings	For repair and strengthening of buildings damaged in an earthquake.	2001
Directors Rule 15-2001 Update of Environmentally Rules, Memos Critical Areas Mapping	Updates mapping where enhanced data is now available.	2001

Codes, Regulations, Rules, Memos	Purpose	Date Adopted
Directors Rule 8-2002 Alteration and Repair of Unreinforced Masonry Chimneys	Requires strengthening of altered and repaired chimneys in response to Nisqually Earthquake of 2/01.	2002
Client Assistance Memo 324	Identifies actual and potential signs of landslide and erosion damage and provides solutions for property owners.	2002
Client Assistance Memo (CAM) 314 Seattle Building Code Requirements for Existing Buildings that Undergo Substantial Alterations	Provides clarifying criteria used in defining substantial alterations.	2002
Revised Voluntary Home Retrofit program developed as part of Seattle Project Impact	Pre-designed plans for bracing homes against earthquake damage available for qualified residential structures. Expedited permitting process.	2003
Adoption of 2003 IBC (International Building Code)	Adopts the most current regulations for seismic design of new buildings.	Scheduled 7/1/04
Policy to approve code alternate requests for use of more current FEMA documents	Encourages use of newer FEMA documents 310, 273, 274 and 356 for evaluation and retrofit of existing buildings.	Ongoing



## Chapter 4

# Mitigation Strategy

This chapter sets forth the Plan’s mitigation goals, objectives, strategy for prioritizing projects, and current and proposed mitigation actions. These actions place particular emphasis on new and existing buildings and infrastructure; however, the chapter includes reference to other mitigation efforts as well.

### 4.1 Goals and Objectives

The city’s Hazard Mitigation Work Group developed and recommended the following vision statement, goals and objectives. The goals and objectives reflect concerns identified in Washington State’s Hazard Mitigation Strategy (published in January 2000) and in many of the planning and policy documents already adopted by individual departments.

*Vision: To reduce the vulnerability of Seattle’s people, businesses, communities, and built and natural environment to the effects of a natural or human-caused disaster.*

#### Goal 1. Protect public health and safety

##### Objectives:

- A. Partner with agencies serving vulnerable populations to minimize harm in the event of an emergency
- B. Promote disaster contingency planning and facility safety among institutions that provide essential services such as food, clothing, shelter and health care to vulnerable populations
- C. Educate individuals and communities about disaster preparedness and mitigation
- D. Improve disaster warning systems

#### Goal 2. Safeguard critical public facilities and infrastructure

##### Objectives:

- A. Implement mitigation programs that protect critical city facilities and services and promote reliability of lifeline systems to minimize impacts from hazards, to maintain operations, and to expedite recovery in an emergency
- B. Consider known hazards when siting new facilities and systems
- C. Create redundancies for critical networks such as water, sewer, digital data, power and communications
- D. Formalize best practices for protecting systems and networks

#### Goal 3. Protect public and private property

##### Objectives:

- A. Adopt and enforce public policies to minimize impacts of development and enhance safe construction in high hazard areas
- B. Integrate new hazard and risk information into building codes and land use planning mechanisms

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- C. Educate public officials, developers, realtors, contractors, building owners and the general public about hazard risks and building requirements
- D. Promote appropriate mitigation of all public and privately-owned property within the city's jurisdiction including, but not limited to, residential units, commercial structures, educational institutions, health care facilities, stadiums, and infrastructure systems
- E. Incorporate effective mitigation strategies into the city's Capital Improvement Projects
- F. Promote mitigation of historic buildings
- G. Promote post-disaster mitigation as part of repair and recovery

### **Goal 4. Maintain Seattle's economic vitality**

#### **Objectives:**

- A. Partner with private sector, including small businesses, to promote structural and non-structural hazard mitigation as part of standard business practice
- B. Educate businesses about contingency planning citywide, targeting small businesses and those located in high risk areas
- C. Partner with private sector to promote employee education about disaster preparedness while on the job and at home

### **Goal 5. Promote preservation of the natural environment**

#### **Objectives:**

- A. Consider the secondary effects of disasters, such as hazardous waste and hazardous materials spills, when planning and developing mitigation projects
- B. Use environmentally and conservation friendly materials in mitigation projects whenever possible and economically feasible

## 4.2 Mitigation Strategy Components

The City’s Mitigation Strategy consists of four parts:

- ❑ Part 1: Long-term directions
- ❑ Part 2: Proposed planning and policy actions
- ❑ Part 3: Proposed capital project actions
- ❑ Part 4: Current and planned capital projects

All of the strategies included in this section relate directly to the identified goals and objectives listed

above. They also reflect the city’s top-ranked hazard risks: earthquakes and landslides. A number of strategies reflect an all hazards approach.

### Part 1: Long-term Directions

Table 4-1 includes possible directions for future consideration that could ultimately result in greater visibility and heightened priority for mitigation projects across city departments. Action on some of these items may not be possible due to budgetary or other constraints.

**Table 4-1. Long-term Directions**

	Proposal	Rationale
1	Integrate Hazard Mitigation into the City’s Comprehensive Plan	The Comprehensive Plan provides the basis for all current and future development. As such, it is an ideal place to include mitigation goals and objectives.
2	City departments should include hazard mitigation as a criterion for internally evaluating projects as part of their annual capital planning process	Departments are currently working on mitigation projects, although the projects may be characterized as maintenance, repair or capital improvements rather than as “mitigation.” This proposal would help raise awareness about mitigation within city departments. This, in turn, could help match projects with appropriate mitigation funding sources in the future.
3	Promote inter-departmental hazard planning efforts, such as those initiated around seismic and landslide issues	It is important to harness expertise across departments to ensure that complex projects are well conceived and wisely implemented.
4	Departments should integrate mitigation into repair and recovery planning and projects	Disasters provide an opportunity for departments to think about mitigation. However, mitigation actions should be considered proactively as well. When buildings and infrastructure are being substantially rehabilitated or repaired is an excellent time to consider strengthening or retrofitting structures or networks. Doing these projects before a serious event occurs can avoid costly re-work in the future.

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### Part 2: Proposed Planning & Policy Actions

Parts 2 & 3 of this chapter include proposed planning, policy and capital project actions that in many cases have no funding sources identified. For obvious reasons, timelines are dependent upon securing of funding. If and when funds become available, more concrete timelines will be determined.

The items listed below suggest actions that could help integrate mitigation into existing city policy and planning mechanisms and assessments to improve our understanding of vulnerabilities. This list is in the beginning stages of development and will be regularly updated.

<b>Action Item #:</b>	<b>A-1</b>
<b>Action:</b>	<b>Incorporate environmentally critical areas policies into Comprehensive Plan</b>
<b>Mitigation Goal:</b>	Protect public and private property
<b>Mitigation Purpose:</b>	Integrate new hazard and risk information into land use planning mechanisms
<b>Relevant Hazard:</b>	Landslides
<b>How Identified:</b>	Planning & Development
<b>Status/Timeline:</b>	In draft form for 2004 plan update
<b>Responsible Dept.:</b>	Planning & Development
<b>Funding Source:</b>	N/A – no cost
<b>Action Item #:</b>	<b>A-2</b>
<b>Action:</b>	<b>City Council to adopt most current regulations for seismic design of new buildings (2003 International Building Code - IBC)</b>
<b>Mitigation Goal:</b>	Protect public and private property
<b>Mitigation Purpose:</b>	Enhance seismic safety of all new buildings
<b>Relevant Hazard:</b>	Landslides
<b>How Identified:</b>	Planning & Development
<b>Status/Timeline:</b>	Slated for adoption in July 2004
<b>Responsible Dept.:</b>	Planning & Development
<b>Funding Source:</b>	N/A – no cost
<b>Action Item #:</b>	<b>A-3</b>
<b>Action:</b>	<b>Conduct vulnerability analysis of shelters and traditional housing serving vulnerable populations.</b>
<b>Mitigation Goal:</b>	Protect public and private property and public health and safety
<b>Mitigation Purpose:</b>	Promote appropriate mitigation of all property
<b>Relevant Hazard:</b>	Earthquakes
<b>How Identified:</b>	Ad hoc committee initiated post-Nisqually
<b>Status/Timeline:</b>	Staff resources currently unavailable – implement by 2009
<b>Responsible Dept.:</b>	HSD/Public Health
<b>Funding Source:</b>	No funding identified. Seek grant funding from FEMA mitigation grant programs or other outside source.

**Action Item #:** A-4  
**Action:** Provide contingency planning technical assistance for agencies serving vulnerable populations.  
**Mitigation Goal:** Protect public health and safety  
**Mitigation Purpose:** Promote disaster preparedness for programs serving vulnerable populations  
**Relevant Hazard:** All hazards  
**How Identified:** Ad hoc committee initiated post-Nisqually  
**Status/Timeline:** Staff resources currently unavailable – implement by 2005  
**Responsible Dept.:** HSD/Public Health  
**Funding Source:** No funding identified. Seek grant funding from FEMA mitigation grant programs or other outside source.

**Action Item #:** A-5  
**Action:** Complete study cataloging Seattle’s unreinforced masonry buildings  
**Mitigation Goal:** Protect public and private property  
**Mitigation Purpose:** Promote appropriate mitigation of all property  
**Relevant Hazard:** Earthquake  
**How Identified:** SHIVA/Planning & Development  
**Status/Timeline:** Partially completed. On hold due to lack of funds - complete by 2006.  
**Responsible Dept.:** Planning & Development  
**Funding Source:** No funding identified. Seek grant funding from FEMA mitigation grant programs, USGS or other outside source.

**Action Item #:** A-6  
**Action:** Update city hazard maps with new liquefaction, earthquake-triggered landslide, and urban seismic ground motion data from USGS  
**Mitigation Goal:** Protect public and private property  
**Mitigation Purpose:** Ensure the city is integrating the most recent scientific data into its maps  
**Relevant Hazard:** Earthquakes  
**How Identified:** SHIVA consultant  
**Status/Timeline:** Long term – implement by 2006  
**Responsible Dept.:** /DPD  
**Funding Source:** N/A

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<b>Action Item #:</b>	<b>A-7</b>
<b>Action:</b>	<b>Update Seattle Hazard Identification &amp; Vulnerability Analysis (SHIVA)</b>
<b>Mitigation Goal:</b>	All
<b>Mitigation Purpose:</b>	Ensure the city continues to have an up-to-date comprehensive risk assessment document on which to base its mitigation planning
<b>Relevant Hazard:</b>	All hazards
<b>How Identified:</b>	SEM
<b>Status/Timeline:</b>	Partial update completed for Plan; complete full update by 2007
<b>Responsible Dept.:</b>	SEM
<b>Funding Source:</b>	No funding identified.

### 3: Proposed Capital Project Actions

The action items listed below reflect capital mitigation projects already identified by departments for which there is no current funding. This list is in the beginning stages of development and will be regularly updated.

<b>Action Item #:</b>	<b>B-1</b>
<b>Action:</b>	<b>Complete the four landslide mitigation projects identified and prioritized by the city's interdepartmental landslide team.</b>
<b>Mitigation Goal:</b>	Protect public and private property
<b>Mitigation Purpose:</b>	Mitigate sites vulnerable to landslide damage
<b>Relevant Hazard:</b>	Landslides
<b>How Identified:</b>	Interdepartmental landslide team
<b>Status/Timeline:</b>	Interdepartmental team should meet and determine funding splits for projects - 2004
<b>Responsible Dept.:</b>	SDOT, SPU, Parks. UW might be interested in partnering on this project.
<b>Funding Source:</b>	Some City funds may become available. Seek grant funding from FEMA mitigation grant programs or other outside source as needed.

<b>Action Item #:</b>	<b>B-2</b>
<b>Action:</b>	<b>Complete seismic upgrade of Queen Anne Community Center. This is a Tier 1 Congregate Shelter Site.</b>
<b>Mitigation Goal:</b>	Safeguard critical public facilities and infrastructure
<b>Mitigation Purpose:</b>	Enhance seismic safety of all structures serving as congregate shelter sites
<b>Relevant Hazard:</b>	Earthquakes, All Hazards
<b>How Identified:</b>	Parks Department
<b>Status/Timeline:</b>	Need to heighten priority for this project within Parks Department – 2004
<b>Responsible Dept.:</b>	Parks Department
<b>Funding Source:</b>	No funding identified. Seek grant funding from FEMA mitigation grant programs or other outside source.

**Action Item #:** B-3  
**Action:** Seismically retrofit or rebuild to current seismic standards 32 fire stations and emergency facilities and support other fire mitigation projects  
**Mitigation Goal:** Safeguard critical public facilities and infrastructure  
**Mitigation Purpose:** Enhance safety of fire and police stations  
**Relevant Hazard:** Earthquakes  
**How Identified:** Fleets & Facilities Dept. (FFD)  
**Status/Timeline:** This action has received voter approval for a \$167.2 million Bond Issue – construction to begin in 2004 and be completed by 2014  
**Responsible Dept.:** FFD  
**Funding Source:** Funding may become available through Bond Issue. Seek grant funding from FEMA mitigation grant programs or other outside source as needed.

**Action Item #:** B-4  
**Action:** Implement Phase II Bridge Seismic Retrofits.  
**Mitigation Goal:** Safeguard critical public facilities and infrastructure  
**Mitigation Purpose:** Enhance bridge safety  
**Relevant Hazard:** Earthquakes  
**How Identified:** SDOT  
**Status/Timeline:** No funding currently available – complete by 2009  
**Responsible Dept.:** SDOT  
**Funding Source:** No funding identified. Seek grant funding from FEMA mitigation grant programs, Federal Highways/WSDOT, or other outside source.

**Action Item #:** B-5  
**Action:** Areaways Restoration  
**Mitigation Goal:** Protect public and private property  
**Mitigation Purpose:** Enhance areaways safety. Areaways are usable space constructed under sidewalks between the building foundation and the street wall.  
**Relevant Hazard:** Earthquake  
**How Identified:** SDOT  
**Status/Timeline:** Two areaways have been completely restored and several have been partially filled. Dependent upon ongoing funding, appropriate mitigation techniques will be pursued on a case-by-case analysis through 2009.  
**Responsible Dept.:** SDOT  
**Funding Source:** Some funding available through CIP process. Seek grant funding from FEMA mitigation grant programs or other outside source as needed.

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<b>Action Item #:</b>	<b>B-6</b>
<b>Action:</b>	<b>Rebuild Emma Schmitz Seawall to prevent bank erosion and improve seismic strength</b>
<b>Mitigation Goal:</b>	Safeguard critical public facilities and infrastructure
<b>Mitigation Purpose:</b>	Enhance building & infrastructure safety
<b>Relevant Hazard:</b>	Earthquakes, Erosion
<b>How Identified:</b>	Parks
<b>Status/Timeline:</b>	Project in design. Anticipate beginning construction in 2004.
<b>Responsible Dept.:</b>	Parks
<b>Funding Source:</b>	Design funded by U.S. Army Corps of Engineers. Construction funds will be sought from federal Flood Control Act Section 14 competitive grant funds. (City match will be required.)

**Part 4: Current/Planned Capital Projects**

For the past 10-15 years, many city departments have been doing mitigation planning, although not always referring to their projects formally as “mitigation.” Most often, project descriptions refer to increasing building and infrastructure safety and/or reliability. In many cases, these actions also reduce the city’s vulnerability to the impact of natural hazards.

The projects identified in Table 4-2 (located at end of chapter) were derived primarily from the city’s Capital Improvement Program (CIP) and are either partially or fully funded. Some projects appear because grant proposals for implementation have already been submitted.

Information about each project includes:

- Mitigation goals
- Mitigation purpose
- Timeframe for completion
- How the project is funded
- Department responsible
- Hazards the action will help mitigate

The actions identified have been through an internal planning, prioritizing and decision-making process. Most departments use some type of benefit/cost analysis in determining their project priorities.

**4.3 Prioritizing Mitigation Measures**

The Mitigation Work Group faced the challenge of designing a system that reflected the plan’s goals and objectives in a way that could be simple and practical to use. The process by which the group eventually adopted the priority ranking system shown in Table 4-3 began with looking at two tools: one used by the Interdepartmental Landslide Team developed with the help of outside consultants (referred to in Chapter 3.1), and the other used by Seattle Emergency Management for its own informal priority-setting. After the initial draft was completed, the work group made additional changes. Departments have not yet begun to use this tool.

Seattle Emergency Management, as the unit charged with citywide disaster preparedness, response, recovery and mitigation, will use the mitigation priority-setting tool adopted as part of this plan in conjunction with the city’s Mitigation Work Group. This tool will help guide decision-making for outside funding. See Section 4.4 for further information about how this tool may be used by individual departments.

**Benefit-cost Considerations**

This Mitigation Priority Ranking Tool includes a criterion requiring benefit-cost consideration. Most departments currently use some type of cost-benefit or cost-effectiveness analysis in determining their internal capital project priorities; however methods are tailored to the type of service or facilities they manage. Where possible, Seattle Emergency Management will use FEMA’s benefit-cost analysis when considering projects for outside funding.

**4.4 Strategy Implementation**

Hazard mitigation grant funding from FEMA and the state has historically followed natural disasters as part of the recovery phase. However, recent changes that make some mitigation funding available outside of the recovery process encourage a more proactive strategy. Part of our mitigation strategy is to establish a mitigation work group that will meet on a regularly scheduled basis. The group’s initial activities are defined below. Chapter 5 indicates how this group will be involvement in maintaining the plan.

**Step 1. Select Work Group Representatives**

Departments will identify representatives for inclusion in the interdepartmental Mitigation Work Group to be convened by Seattle Emergency Management. This Mitigation Work Group will consist of representatives from the following city departments:

- Finance
- Fleets & Facilities
- Information Technology (DoIT)
- Parks & Recreation
- Planning & Development

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- Seattle City Light
- Seattle Public Utilities (SPU)
- Transportation (SDOT)

### *Representatives' responsibilities:*

- Act as liaison between department and SEM for the purpose of implementing the Plan's mitigation strategy
- Serve as department's liaison to SEM for the purpose of updating and maintaining the Hazard Mitigation Plan (see Chapter 5 on Plan Maintenance)
- Other activities as specified by each department

*Timeframe: Representatives identified by March 2004*

### **Step 2. Identify High Priority Mitigation Projects**

SEM will ask departments to identify and prioritize their top mitigation projects. These will be integrated into the action lists contained in this chapter.

The project lists will provide an excellent starting point for SEM and departments to use when seeking mitigation funding from FEMA and other outside sources.

*Timeframe: June 2004*

### **Step 3. Convene Meeting – Annually or Following Major Disaster**

*Responsibilities: See activities specified in Chapter 5*

*Timeframe: By March 2005 and every year thereafter*

Table 4-2. CURRENT/PLANNED MITIGATION PROJECTS

Mitigation Goals	Mitigation Purpose	Mitigation Actions	Status	Funding /Other support	Responsible Department	Relevant Hazards
Protect critical public facilities and infrastructure	Strengthen bridges providing access to critical areas and services	<b>Seismically retrofit Queen Anne Bridge</b>	Construction to be completed in 2004	FEMA/City funds	SDOT	Earthquake
	Strengthen bridges providing access to critical areas and services	<b>Seismically retrofit Fremont Bridge – (approaches to bridge are cracked and deteriorated)</b>	Construction could begin in 2005		SDOT	Earthquake
	Strengthen bridges providing access to critical areas and services	<b>Rebuild Magnolia Bridge</b> (deemed not cost-effective to do seismic retrofit)	EIS scheduled for completion by end of 2004	Congressional appropriation administered through FHWA and WSDOT	SDOT	Earthquake All Hazards
	Study options for retrofitting or replacing Viaduct infrastructure	<b>Seawall &amp; Viaduct Study</b>		Washington State DOT	SDOT	Earthquake
	Prevent bank erosion and seismic upgrades	<b>Rebuild Emma Schmitz Seawall</b>	Repairs in design	U.S. Army Corps of Engineers	Parks/SDOT	Earthquake Erosion
	Strengthen structures housing non-profit facilities that provide essential services	<b>Seismic upgrade of Compass Center, a non-profit that runs homeless shelters</b>	Rehab will start in 2004	Currently funded through combination of public sources:	OED involved in securing funding	Earthquake
	Strengthen critical infrastructure	<b>Seismic Upgrade of Tolt Screenhouse</b>	In process	Currently funded	SPU - Water	Earthquake
	Strengthen critical infrastructure/networks	<b>Seismic Upgrade – Pipeline backbone system</b>	In process	Currently funded	SPU - Water	Earthquake

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Mitigation Goals	Mitigation Purpose	Mitigation Actions	Status	Funding /Other support	Responsible Department	Relevant Hazards
	Protect water supply	Seismic Upgrade Barton Standpipe	In process	Currently funded	SPU- Water	Earthquake
	Protect water supply	Seismic Upgrade – Queen Anne Tank 1 & 2	In process	Currently funded	SPU- Water	Earthquake
	Protect water supply	Seismic Upgrade – Landsburg Tank	In process	Currently funded	SPU- Water	Earthquake
	Protect water supply	Seismic Upgrade – Myrtle Tanks #1 and #2	In process	Currently funded	SPU- Water	Earthquake
	Protect water supply	Seismic Upgrade – Maple Leaf Tank	In process	Currently funded	SPU- Water	Earthquake
	Protect water supply	Seismic Upgrade – Beverly Park Tank	In process	Currently funded	SPU- Water	Earthquake
	Protect water supply	Seismic Upgrade – Volunteer Park Standpipe	In process	Currently funded	SPU- Water	Earthquake
	Protect water supply	Seismic Upgrade – Pump Station Buildings 6-B & 6-C	In process	Currently funded	SPU- Water	Earthquake
	Protect water supply	Cedar Moraine Improvements	In process	Currently funded	SPU- Water	Earthquake
	Protect water supply	Seismic Upgrade – West Seattle Pipeline	In process	Currently funded	SPU- Water	Earthquake
	Protect infrastructure from landslide damage	Landslide-Prone Area Program (C300302)	In process	Currently funded	SPU – Drainage & Wastewater	Landslide
	Protect infrastructure from earthquake damage	Comprehensive Retrofit/ BMP Program	In process	Currently funded	SPU – Drainage & Wastewater	Earthquake

Mitigation Goals	Mitigation Purpose	Mitigation Actions	Status	Funding /Other support	Responsible Department	Relevant Hazards
	Protect infrastructure from landslide damage	Atlas Pl. SW & SW Juneau Landslide Mitigation (C300344)	In process	Currently funded	SPU – Drainage & Wastewater	Landslide
	Protect infrastructure from landslide damage	Lake Dell/33 E Landslide Mitigation (C301352)	In process	Currently funded	SPU – Drainage & Wastewater	Landslide
	Protect infrastructure from landslide damage	SW Jacobsen & Alaska Ave. SW Landslide Mitigation (C301353)	In process	Currently funded	SPU – Drainage & Wastewater	Landslide
	Protect infrastructure from landslide damage	Burke Gilman/NE 144th Landslide Mitigation (C301355)	In process	Currently funded	SPU – Drainage & Wastewater	Landslide
	Protect infrastructure from landslide damage	Rainier Beach/S Perry Landslide (C302353)	In process	Funded?	SPU – Drainage & Wastewater	Landslide
	Protect infrastructure from landslide damage	Marine View Drive Landslide Mitigation – North (C399321)	In process	Currently funded	SPU – Drainage & Wastewater	Landslide
	Protect infrastructure from landslide damage	Snoqualmie River Bank Stabilization	In process	Currently funded	SPU – Water	Landslide
	Protect water supply	Seismic Upgrade – Cedar River Pipeline at Ginger Creek	In process	Currently funded	SPU – Water	Earthquake
	Protect water supply	Seismic Upgrade – Foy Standpipe	In process	Currently funded	SPU – Water	Earthquake

# Seattle All-Hazards Mitigation Plan

Mitigation Goals	Mitigation Purpose	Mitigation Actions	Status	Funding /Other support	Responsible Department	Relevant Hazards
	Protect water supply	Seismic Upgrade – Building Package 6E	In process	Currently funded	SPU –Water	Earthquake
	Protect water supply	Seismic Upgrade – Lake Youngs Upgrade Package 6D	In process	Currently funded	SPU –Water	Earthquake
	Retrofit or fill areaways	Hazard Mitigation Program – Areaways	In process	Washington State DOT	SDOT	Earthquake
	Seismically retrofit bridges	Bridge Seismic Retrofit – Phase II (TC365810)	In process	Currently funded	SDOT	Earthquake
		Ross Dam – Abutment Rock Stabilization (ID 6241)	In process	Currently funded	Seattle City Light	Landslide Earthquake
	Create redundancies for critical networks	Emergency Generators	In process Completion date?	Currently funded	Fleets & Facilities	All hazards
	Provide power for critical computer systems and centers	Install emergency generator in Key Tower	In process Complete mid-2004	Bonds (DoIT operating fund)	DoIT	All hazards
	Insure survivability of the public safety radio network	Upgrade radio network from Motorola Smartzone Version 2.0.3 to Version 4.1	In process, Complete mid-2004	Radio network reserve (DoIT operating fund)	DoIT	All hazards
	Insure survivability of the public safety radio network	Upgrade Capitol Hill radio site to withstand both earthquake and explosions.	In process Complete mid-2004	Radio network reserve (DoIT operating fund)	DoIT	All hazards, emphasis on homeland security and earthquake
	Improve computer network communications	Upgrade essential network routers and switches	In progress, Complete late 2003	DoIT CIP	DoIT	All hazards

Mitigation Goals	Mitigation Purpose	Mitigation Actions	Status	Funding /Other support	Responsible Department	Relevant Hazards
	Improve telephone, radio and data network computers	Upgrade SONET network to improve capacity of existing fiber optic cable network	In progress, Complete late 2003	DoIT CIP	DoIT	All hazards
	Improve telephone network	Upgrade telephone switches to latest version (release 25) of X.11 operating system – includes hardware upgrades	In progress, Complete late 2003	DoIT CIP	DoIT	All hazards
	Improve critical communications facilities	Extend fiber optic cable network in Seattle and King County	Continuous	DoIT operating fund, reimbursed by other agencies	DoIT	All hazards
	Insure survivability of the public safety radio network	Upgrade microwave system north-King-County loop	Planned; grant submitted	Federal radio interoperability grant	DoIT	All hazards
	Insure survivability of the public safety radio network	Add video and access controls to radio network sites	Planned; grant submission to occur late 2003	Homeland security grant funds (UASI)	DoIT	All hazards, emphasis on intrusion detection
	Protect computer systems from cyberattack	Install software to detect cyberattacks via the Internet or similar electronic means	Planned; grant submission to occur late 2003	Homeland security grant funds (UASI)	DoIT	Terrorism (cyber attack)
	Inform public of emergent events	Install “outdialing” telephone system for notification of citizens during emergencies or disasters	Planned; grant submission to occur late 2003	Homeland Security grant funds (UASI)	DoIT	All hazards, emphasis on terrorism

# Seattle All-Hazards Mitigation Plan

Mitigation Goals	Mitigation Purpose	Mitigation Actions	Status	Funding /Other support	Responsible Department	Relevant Hazards
Protect public and private property	Mitigate landslide prone areas identified by interdepartmental landslide group	Golden Gardens, Burke Gilman/40th, Admiral Way/36th, Lakeside Place	Work to be completed by 2008. SDOT will complete soil studies and begin preliminary design work for 2 sites this year if SPU and Parks support the proposal.	City funds; Admiral Way project prioritized by Interdepartmental Landslide Group and in Admiral Neighborhood Plan	SPU/DOT	Landslide
	Mitigate landslide-prone area	Galer Street Slide Repair	In process	City funds	SPU	Landslide
	Improve seismic safety	Sand Point Building 47 seismic upgrade	In construction	Community Center Levy funds/in Department Plan	Parks	Earthquake
		Sand Point Building 30 seismic upgrade	In construction	Community Center Levy funds/in Department Plan	Parks	Earthquake
	Assess potential risk	Complete Hazard Mitigation Risk Assessment	In process	City funds	Parks	All hazards
	Enhance safety of private dwellings	Seismically retrofit homes of low- income homeowners	In process	FEMA	HSD & SEM	Earthquake
Maintain Seattle's economic vitality	Promote businesses awareness about disaster contingency planning	Development of a Contin- gency Planning Toolkit for small businesses	Currently being developed	City funds	SEM/ Seattle Project Impact	All Hazards
Protect public health and safety	Educate public about preparedness and disaster response	Expand SDART (Seattle Disaster Aid & Response Teams) program to new neighborhoods	On-going - There are now 372 SDART groups located throughout the City	City funds	SEM	All Hazards

Table 4-3. Mitigation Priority Ranking

	Project Criteria	Weighting	Score			Total Points (weight X score)
			(1-3 points possible) Low	(4-6 points possible) Medium	(7-9 points possible) High	
1.	Public health and safety (potential for causing injury or death)	4	No people harmed	Fewer than 25 people affected	More than 25 people affected	
2	Cost-benefit – comparison of the mitigation project's costs and benefits (whenever possible, attempt to use FEMA's criteria for FEMA funding requests)	3	No cost-benefit analysis completed or weak case presented of benefits outweighing costs	Moderately strong case demonstrated (i.e. greater than 1:1)	Excellent case (i.e. greater than 2:1)	
3	Criticality of infrastructure, building or network	3	Facility or system not deemed critical	Facility or system moderately important to lifeline services	Critical to provision of lifeline services	
4.	Vulnerability of facility/system/function	3	Not located in vulnerable area or system not likely to be impacted	Moderate vulnerability	High vulnerability	
5.	Level of Target Hazard Risk (frequency and impact)	3	Hazard Risk score below 20 in SHIVA	Hazard Risk score in SHIVA of 20-35	Hazard Risk score in SHIVA above 35 or multiple hazards addressed	
6.	Economic impact (if project not completed)	2	Minimal impact on business or city services or related jurisdiction	Moderate impact on business or city services or related jurisdiction	High impact on business or city services or related jurisdiction	
7.	Public involvement	2	No public hearings held	Prioritized by department with public involvement	Included in neighborhood plan	
<b>TOTAL POINTS</b>						

Additional factors to consider (please note other compelling reasons why you think this project should be funded (e.g. legal liability, social or environmental impact, high visibility):



## Chapter 5

# Plan Maintenance

This plan is intended to be a “living” document that will help inform all interested parties about the city’s natural hazard mitigation policies and projects. It will be reviewed and updated on a regular basis. And, as mentioned in an earlier chapter, the mitigation strategy identified will act as a guide for City of Seattle departments in determining projects for which to seek FEMA and other mitigation funds from outside sources.

### 5.1 Annual Review

Seattle Emergency Management (SEM) will oversee an annual Plan review to make sure that all information is current. The review and update process follows:

1. The Mitigation Work Group will meet to consider:
  - Progress made on plan recommendations during the previous 12 months
  - Mitigation accomplishments in projects, programs and policies
  - Status of mitigation projects included on the city’s Capital Improvement Program (CIP) list
  - New mitigation needs identified
  - Cancellation of planned initiatives, and the justification for doing so
  - Changes in membership to the Work Group
2. SEM will request input from other departments and outside entities not represented on the Work Group on issues listed above. A special effort will be made to gather information on non-capital projects and programs important to mitigation. These departments include the city’s Human Services Department, Office of Housing and the Department of Neighborhoods.
3. SEM will make “minor” changes to the Plan – such as updates to the CIP - without seeking outside approval.

4. “Major” changes – those related to new policies or recommended projects - will go through a more formal review process that may, at the discretion of the Emergency Management Director, be submitted to the DMC (described in Chapter 4) for final approval.
5. To allow for on-going public input, SEM will post the plan permanently on the Emergency Management website along with contact information that will encourage people to submit questions or comments.

### 5.2 Following a Major Disaster

Within 2 months of a major disaster warranting a Presidential Disaster Declaration, and as determined necessary for a smaller event, SEM will convene the Work Group. Because recovery is a long process and the full impact of a disaster may not be known for many months, this initial meeting may be followed by additional meetings over time.

The annual update process described above will also be used following a major disaster. However, post-disaster deliberations will also consider the following:

- “Lessons Learned” from the disaster, and what new initiatives should be added to the plan to help reduce the likelihood of similar damage in the future
- Follow-up needed on items relevant to mitigation from any After Action reports produced by the City
- Integration of mitigation into the recovery process

### 5.3 5-Year Update

Every five years, the plan will be re-submitted for adoption to the City Council. Prior to this, Seattle Emergency Management will use the following process to make sure that all relevant parties are involved:

## Seattle All-Hazards Mitigation Plan

1. Follow steps 1 and 2 above.
2. Incorporate all relevant issues raised via the forums identified.
3. Hold public meeting and initiate meetings with identified groups of interested parties and outside organizations to gain input and feedback.
4. Integrate relevant feedback and circulate revised plan to Mitigation Work Group for approval.
5. Seek Disaster Management Committee (DMC) Plan review and comment.
6. Integrate recommendations into the plan.
7. Submit Plan to the City Council for adoption by resolution.
8. Submit revised Plan to FEMA via the Washington State Hazard Mitigation Officer.

Seattle Emergency Management Mitigation Coordinator will oversee the following Hazard Mitigation Plan Monitoring and Update Schedule:

### Plan Monitoring and Update Schedule 2005-2009

Date	Action
March 2004	Identify Mitigation Work Group Representatives
March 2005	Convene Mitigation Work Group
	Seek input of ancillary departments
	Integrate "minor" changes
June 2005	Submit "major" changes to DMC for review.
March 2006	Convene Mitigation Work Group
	Seek input of ancillary other departments
	Integrate "minor" changes
June 2006	Submit "major" changes to DMC for review.
March 2007	Convene Mitigation Work Group
	Seek input of ancillary departments
	Integrate "minor" changes
June 2007	Submit "major" changes to DMC for review.
March 2008	Convene Mitigation Work Group
	Seek input of ancillary departments
	Integrate "minor" changes
June 2008	Submit "major" changes to DMC for review.
	Convene Mitigation Work Group
	Seek input of ancillary departments
	Integrate all changes
	Public Meeting
	Approve by Council Resolution
September 2009	Submit 5-year Plan Update to state/FEMA



**Seattle All-Hazards Mitigation Plan**

J. Mullen/M. Quinn  
D/2003 ord-reso/mitigation plan reso  
1/13/04  
version #3a

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Section 2. The City also approves such minor alterations to the Plan approved in Section 1 as are requested by the State of Washington, Military Department, or FEMA and are determined by the Mayor and Chief of Police to be in the best interests of the City.

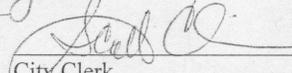
Adopted by the City Council the 9<sup>th</sup> day of February, 2004, and signed by me in open session in authentication of its adoption this 9<sup>th</sup> day of February, 2004.

  
\_\_\_\_\_  
President \_\_\_\_\_ of the City Council

THE MAYOR CONCURRING:

  
\_\_\_\_\_  
Gregory J. Nickels, Mayor

Filed by me this 18<sup>th</sup> day of February, 2004.

  
\_\_\_\_\_  
City Clerk

(Seal)

Exhibit 1: Seattle All-Hazards Mitigation Plan dated December 18, 2003



## **Appendix B: Plan Distribution List**

### **City of Seattle**

Mayor's Office  
City Council  
Disaster Management Committee – Emergency Support Function Coordinators  
Department of Information Technology  
Department of Planning and Development  
Finance Department  
Fleets and Facilities  
Parks and Recreation Department  
Seattle City Light  
Seattle Department of Transportation  
Seattle Police Department  
Seattle Public Libraries  
Seattle Public Utilities

### **Other Organizations**

Federal Emergency Management Agency, Region 10  
King County Emergency Management  
Port of Seattle  
Seattle-King County Public Health  
Seattle Housing Authority  
Seattle Public Schools  
University of Washington  
Washington State Military Department – Emergency Management Division,  
Hazard Mitigation Section

