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EXECUTIVE SUMMARY

Background
The Federal Mitigation Act of 2000 mandates that mitigation plans be accomplished for all public agencies and updated on a five-year cycle. The City of Mercer Island’s initial Hazard Mitigation Plan was completed in October 2004. This 2009 plan updates the 2004 plan. Failure to have an approved Mitigation Plan will deny jurisdictions the ability to access federal (FEMA) funding following a disaster.

Also, the Disaster Mitigation Act of 2000 (DMA 2000), amending the Stafford Disaster Relief Act, requires applicants for post disaster grants under the Hazard Mitigation Grant Program (HMGP) to adopt an approved Comprehensive Hazard Mitigation Plan prior to the declared disaster. This requirement will pertain to all disasters that are declared after November 2004.

Plan Preparation Process
The City of Mercer Island was awarded a grant by the State of Washington Emergency Management Division (EMD) to fund preparation of this Hazard Mitigation Plan Update. The 2009 Plan update preparation was conducted by Roth Hill, LLC at the direction of the City, which was led by Glenn Boettcher, Maintenance Director and Jennifer Franklin, Mercer Island Emergency Preparedness Officer. The foundation for this Plan was the 2004 Hazard Mitigation Plan that was approved in October of that same year. The hazard assessment and vulnerability portions of this Plan were prepared initially by the EMO of the Mercer Island Police Department, for the City of Mercer Island Hazard Identification and Vulnerability Assessment (HIVA), dated September 2003. The City provided staff time for data acquisition and GIS mapping and the University of Washington also provided maps showing more detailed information about landslide, erosion, and seismic hazards within the City.

Plan Elements
In accordance with Federal Emergency Management Act (FEMA) requirements, the Plan has the following elements:

Planning Process
The City is required by 44 CFR &201.6(d)(3) to review and revise this plan and resubmit it for approval within 5 years of it being originally adopted. The plan was first developed in 2004 and this 2009 update is the first update. For the 2009 update, the planning team reviewed each section of the document to determine whether the section was needed to be updated based on new requirements or new information and changes were made when necessary and documented in this chapter.

Hazard Identification
The hazards within the City of Mercer Island were identified and characterized. This section is based on the City of Mercer Island HIVA and modified when needed. Mercer Island’s key hazards are: landslide and erosion, seismic (ground motion, landslide, and liquefaction), severe storms and urban/wildland interface fire.

Risk Assessment
Each hazard was evaluated and profiled in relation to underlying assets (infrastructure, as well as land use patterns that represent public and private development. The potential for repetitive losses was assessed.

Mitigation Goals
Three key goals to reduce future damage related to key hazards were identified by the TAC:

- Goal #1: Maintain reliability of Mercer Island infrastructure
Goal #2: Minimize susceptibility to cascading effects of key hazards

Goal #3: Require permit applicants to incorporate Best Available Science (BAS) and All Known and Reasonable Technology (AKART) in development proposals to accomplish Hazard Mitigation Plan goals for consistency with elements of the Comprehensive Plan and other regulations intended to reduce losses from hazards

Mitigation Strategy

The 2004 Plan focused on specific construction projects as the mitigation strategy. The 2009 Plan Update approaches the strategy differently, with a focus on programs rather than specific projects. An example of a 2009 proposed program is to “Rehabilitate Damaged Storm Culverts,” while a specific construction project for the 2004 Plan was to “Stabilize the Basin 29 watercourse and ravine.” The new method allows for more flexible responses by the City as individual project priorities change as identified in the City’s Comprehensive Basin Review and Watercourse Monitoring Plan.

The new method for categorizing these programs has been produced for the 2009 Plan update and is based on funding sources. For example, the program “Replace Aging Watermains,” which is funded through the water budget, will not compete for funding with the program, “Rehabilitate Damaged Storm Culverts,” which is funded through the Storm and Surface Water Utility.

Update

According to FEMA the Plan must be updated within five years of adoption. This 2009 Plan Update is updating the 2004 Plan.
Chapter 1 - PLANNING PROCESS

1.1 Description of Process

1.1.1 Plan Preparation
The 2009 Plan update preparation was conducted by Roth Hill LLC at the direction of the City, which was led by Glenn Boettcher, Maintenance Director and Jennifer Franklin, Mercer Island Emergency Preparedness Officer. Those involved in the Plan Update are listed below in Table 1-1, Matrix of Personnel. The foundation for this Plan was the 2004 Hazard Mitigation Plan prepared by GeoEngineers that was approved in October of that same year. The hazard assessment and vulnerability portions of this Plan were prepared initially by the Mercer Island EMO, Department of Public Safety, for the City of Mercer Island Hazard Identification and Vulnerability Assessment (HIVA), dated September 2003. The City provided staff time for data acquisition and GIS mapping and the University of Washington also provided maps showing more detailed information about landslide, erosion, and seismic hazards within the City. Definitions, acronyms and references for this Plan are provided at the end of this chapter.

*Table 1-1 Matrix of Personnel Involved in the 2009 Plan Update*

<table>
<thead>
<tr>
<th>Name</th>
<th>Agency</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glenn Boettcher</td>
<td>City of Mercer Island</td>
<td>Maintenance Director</td>
</tr>
<tr>
<td>Jennifer Franklin</td>
<td>City of Mercer Island</td>
<td>Emergency Preparedness Officer</td>
</tr>
<tr>
<td>Patrick Yamashita</td>
<td>City of Mercer Island</td>
<td>City Engineer</td>
</tr>
<tr>
<td>Terry Smith</td>
<td>City of Mercer Island</td>
<td>Utilities Operations Manager</td>
</tr>
<tr>
<td>Leah Llamas</td>
<td>City of Mercer Island</td>
<td>GIS Analyst</td>
</tr>
<tr>
<td>Pam Cobley</td>
<td>Roth Hill, LLC</td>
<td>Consultant – Project Manager</td>
</tr>
<tr>
<td>Paul Weller</td>
<td>Roth Hill, LLC</td>
<td>Consultant - Planner</td>
</tr>
<tr>
<td>Scott Goss</td>
<td>Roth Hill, LLC</td>
<td>Consultant – Planner</td>
</tr>
</tbody>
</table>

1.1.2 Plan Development
This document is a local mitigation plan led by the City of Mercer Island’s Maintenance Department. The 2004 plan development process consisted of the HIVA which was completed in September 2003 by the City of Mercer Island. The HIVA was edited to focus on natural hazards and used in this Plan as the basis for Risk Assessment. The City of Mercer Island was provided with funds to update this plan in 2009. The updating consisted of analyzing each section of the plan and revising it to include any hazard events that affected the City, new facilities that increase the City’s vulnerability, and or any other new information deemed important to be included. The hazards identified in the prior plan still pose a threat to the community and no additional hazard has been discovered, however there has been actions during this time to reduce the vulnerability to the City and those projects are discussed in this plan. Also, better information has been discovered from 2004 to 2009 to help the City prepare for the foreseen hazards and that is discussed.
The City Technical Advisory Committee (TAC) that was convened in its original configuration during the preparation of the 2004 Plan was not formally convened during the preparation of this update. However, regular team meetings with a variety of City staff and Roth Hill ensured the City's involvement and oversight of the planning process. This was a critical piece to help in the preparation of this update.

1.1.3 Plan Update
The City is required by 44 CFR &201.6(d)(3) to review and revise this plan and resubmit it for approval within 5 years of it being originally adopted. The plan was first developed in 2004 and this 2009 update is the first update. From 2004 to 2009, the TAC convened annually by the Maintenance Department to review the progress of this plan and the TAC provided City-wide coordination by the updating of various comprehensive plans and the City's Comprehensive Emergency Management Plan. Also from 2004 to 2009, public involvement occurred annually through presentations given at the Utility Board and the Planning Commission meetings. The notification of these meetings was advertised in the Mercer Island Reporter.

There were several meetings that occurred between the consultant and the City staff to accurately update the plan. On May 19, 2009 Roth Hill and the City (Glenn Boettcher and Jennifer Franklin) met to discuss the updating process, identify new key facilities and infrastructure added since last plan. In this meeting, hazard events that occurred between 2004 and 2009 were discussed. On October 21, 2009 Roth Hill and the City (Glenn Boettcher, Jennifer Franklin, Patrick Yamashita, and Terry Smith) met to discuss the mitigation strategies and goals. Projects selected for the 2004 Plan were reviewed to determine their status. New goals, policies, and strategies were determined for the 2009 Updated Plan.

For the 2009 update, the planning team reviewed each section of the document to determine whether the section was needed to be updated based on new requirements or new information. The changes made to each section are provided below in Table 1-2 Matrices of Changes.

Table 1-2 Matrices of Changes

<table>
<thead>
<tr>
<th>Chapter 1 - Planning Process</th>
<th>Documentation of the Planning Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>According to FEMA regulations, the updated Planning Process section must include a review and analysis of each section of the plan and a discussion of whether each section was revised as part of the update process. This requirement is being revised in this section.</td>
<td>The updated plan includes a summary of how the community was kept involved during the plan maintenance process over the past five years.</td>
</tr>
<tr>
<td>The updated plan includes the current general description of the jurisdiction which includes socio-economic, historic, and geographic profiles. – [Not Required]</td>
<td>This chapter how includes the &quot;Definitions, Acronyms and Resources&quot; which was in the Appendix A in the 2004 Plan.</td>
</tr>
</tbody>
</table>
Chapter 2 - Risk Assessment

Mercer Island Profile
Demographic data and economic information has been updated to reflect Mercer Island’s current state.

Hazard Identification
The updated section includes a new key natural hazards – localized flooding

Hazards have been removed for the 2009 update which includes pipeline failure, water storage facility, and shortage. These hazards have been determined to be a result of a man-made hazard and not a natural hazard.

The hazards identified in the 2004 plan still pose a threat to the community.

Profiles of Key Natural Hazards
This updated section will include all occurrences of hazards identified in the previously approved plan along with the new hazard, localized flooding. Also, the updated plan will include any new occurrences of hazards within the past five years.

The methodology used in ranking the risk of the hazards was updated to be more practical. The 2004 Plan ranks the hazards on a scale of low, moderate, or high. The 2009 Plan Update uses a ranking of 1 through 10 for each hazard’s probability-of-occurrence and the area’s vulnerability or impact in the event of the hazard. The numbers were then multiplied with each other and converted to a percentage.

Additional information has been added to the earthquake history and probability of occurrence section. This data was found at the Washington State Hazard Mitigation Plan.

Vulnerability Assessment
The updated section includes any significant changes to the City’s overall vulnerability. The 2004 plan did not include an inventory of existing structures located in hazard areas and the updated plan will not include any either, but will however provide a zoning map to illustrate existing and potential development areas.

Buildings that house special high-risk populations are considered and included on a map in this update.

Completed mitigation actions that reduced the overall vulnerability are discussed in this chapter.

Addressing Repetitive Loss Properties - After October 1, 2008, all local mitigation plans approved by FEMA must address repetitive loss structures in the risk assessment by describing the types and estimate the numbers of repetitive loss properties located in identified flood hazard areas. A repetitive loss property is a property which two or more losses of at least $1,000 each have been paid under the National Flood Insurance Program (NFIP) within any 10-year period since 1978. The City of Mercer Island has one repetitive loss structure located in the southeast section of the Island. The residential structure was damaged in 1980 and 1984 with a total payment of $11,700.
Chapter 3 - Mitigation Strategy

Local Hazard Mitigation Goals

The updated section will include an analysis of how the 2004 goals were effective and if they are still valid. The goals provided in the previous plan were re-evaluated and minor revisions were made to reflect new City’s goals and policies.

Identification and Analysis of Mitigation Actions

This section includes the mitigation actions that have been accomplished since the 2004 plan and discusses any new actions. A table has been produced and is included in this section that illustrates the status of each of the mitigation actions from the 2004 Plan. Roth Hill Engineering and the City met to determine and rank the new 2009 mitigation actions which are also included in a table in this plan.

1.1.4 Public Involvement

2004 Plan – Public Involvement

The public involvement for the 2004 plan was carried out to ensure that public input was included in the process. Public input was requested at public meetings and by posting the draft Plan on the City website. The Utility Board and Planning Commission public meetings were advertised in the “Mercer Island Reporter” as a comprehensive Emergency Management agenda to include hazard mitigation. All citizens, participants of the Neighborhood Preparedness Program (NPP) members, local businesses and others were given the opportunity to be involved.

2009 Plan – Public Involvement

From 2004 to 2009, public involvement occurred annually through presentations given at the Utility Board and various other board and commission meetings.

The notifications for these meetings were advertised in the Mercer Island Reporter, which would allow for local businesses and neighbors to be involved. These public meetings are summarized below.

Public Meetings

- Mercer Island invited members of the public to comment on the Plan March 9 and July 13, 2010, at Utility Board Meetings. The public was asked to comment on the changes to the previous Plan as part of the updating process. No members of the public chose to attend either meeting. The City posted information about these meetings on their website and notification was sent out in the Mercer Island Reporter. In addition, the Plan was posted on the City’s website on June 7, 2010, and the public was invited to comment for several weeks. No comments were received.

The planning process has been designed to build on existing plans and resources. Public involvement meeting notes with agenda and legal notice are provided in Appendix B. A Summary of Attachments for Public Involvement is included in Appendix B.

1.1.5 Coordination

Because of its status as an island serving primarily a suburban population, it is mandatory that Mercer Island coordinates with surrounding jurisdictions for services and mutual aid. For example, water lines owned by Seattle Public Utilities come to the island via the I-90 East Channel Bridge which is maintained by the Washington State Department of Transportation (WSDOT). The primary sewer pumping stations are maintained by King County and the City. The other entities (utilities, state and county) have been briefed and consulted during the Plan preparation process to accomplish consistency with others’ priorities.
1.1.6 Integrating Plan Goals with Existing City Documents

Planning and/or facilities documents for the City were reviewed for this Plan with regard to sections that apply to the key hazards. In particular, the applicable sections were reviewed for reference to (1) goals and policies and (2) mitigation strategies that may be proposed to protect key City facilities including infrastructure, as well as public and private development, from the hazards. The main Plan goals are:

- Maintain reliability of Mercer Island’s infrastructure.
- Minimize susceptibility to cascading effects of key hazards.
- Require permit applicants to incorporate Best Available Science (BAS) and All Known and Reasonable Technology (AKART) in development proposals to accomplish Hazard Mitigation Plan goals for consistency with elements of the Comprehensive Plan and other regulations intended to reduce losses from hazards.

The documents reviewed for this Hazard Mitigation Plan were:

- City of Mercer Island Comprehensive Water System Plan – 2008
- Comprehensive Basin Review and Watercourse Monitoring Plan - 2008
- City of Mercer Island HIVA – 2003
- Title 19 (Mercer Island City Code [MICC]), Unified Land Development Code, 2009.
- City of Mercer Island 2005-2006 Biennial Budget Capital Improvements Program (CIP)

Section 3.1 indicates Plan goals and policies relative to the related Comprehensive Plan element or other City planning documents (i.e., Information Technology Plan or Critical Areas Code [Title 19 MICC]). Section 3.2 lays out the strategies for the 2009 Plan Update. The strategy was approached differently with a focus on programs rather than specific projects while the 2004 Plan focused on specific construction projects as the mitigation strategy. An example of a 2009 proposed program is to “Rehabilitate Damaged Storm Culverts,” while a specific construction project for the 2004 Plan was to “Stabilize the Basin 29 watercourse and ravine.” The new method allows for more flexible responses by the City as individual project priorities change. The City has completed a Vulnerability Assessment of the Mercer Island Water System. Recommendations in that Plan are integrated with this Hazard Mitigation Plan as much as possible. An Emergency Well, the highest priority project identified by the Vulnerability Assessment, was completed in spring 2010.

1.2 Plan Organization

This Plan’s organization and contents are as follows:

Chapter 1 – Planning Process
Description of Planning Process
Plan Organization
Definitions, Acronyms, Resources

Chapter 2 – Risk Assessment
Hazard Assessment
Vulnerability Assessment
Tables 2-1 through 2-5
Attached - Tables 2-6 through 2-9 (Not Included in Public Document)
Attached – Hazards Maps 1 through 8 (Not Included in Public Document)

Chapter 3 – Mitigation Strategies
Goals and Objectives
Mitigation Strategies

Chapter 4 - Plan Implementation and Maintenance
Plan Adoption
Monitoring, Evaluating and Updating the Plan

APPENDICES
Appendix A  Public Involvement

1.3 Definitions, Acronyms, and Resources

1.3.1 Definitions
ABANDONED UNDERGROUND MINE – Any large excavation in the earth formerly used to extract ore, coal, or mineral, which is no longer in production.
ACCESS CONTROL POINTS – Road intersections or other logistically viable points on the relocation and food control boundaries which enable law enforcement and other emergency workers to maintain access control of the respective area(s). It involves the deployment of vehicles, barricades, or other measures to deny access to a particular area.
AVALANCHE – A mass of sliding snow, ice, earth, and rock that grows and collects additional material as it descends.
CHEMICAL AGENT (LETHAL) – A chemical substance that is intended for use in military operations to kill, seriously injure, or incapacitate a person through its physiological effects. Excluded from consideration are riot control agents, chemical herbicides, smoke, and flame.
CHEMICAL HAZARD – The release of toxic agents into the atmosphere that can harm population, animals, and food supplies.
CIVIL DISTURBANCE – Any incident that disrupts a community where intervention is required to maintain public safety.
DAM FAILURE – The uncontrolled release of impounded water resulting in downstream flooding, which can affect life and property.
DISASTER – An event expected or unexpected, in which a community’s available, pertinent resources are expended; or the need for resources exceeds availability; and in which a community undergoes severe danger; incurring losses so that the social or economic structure of the community is disrupted; and the fulfillment of some or all of the community’s essential functions are prevented.
DROUGHT – A condition of climatic dryness that is severe enough to reduce soil moisture and water and snow levels below the minimum necessary for sustaining plant, animal, and economic systems.
EARTHQUAKE – The shaking of the ground caused by an abrupt shift of rock along a fracture in the earth, called a fault.

EMERGENCY – An event, expected or unexpected, involving shortages of time and resources; that places life, property, or the environment, in danger; that requires response beyond routine incident response resources.

EMERGENCY MANAGEMENT or COMPREHENSIVE EMERGENCY MANAGEMENT – The preparation for and the carrying out of all emergency functions, other than functions for which the military forces are primarily responsible, to mitigate, prepare for, respond to, and recover from emergencies and disasters, and to aid victims suffering from injury or damage, resulting from disasters caused by all hazards, whether natural or technological, and to provide support for search and rescue operations for persons and property in distress.

EMERGENCY OPERATIONS CENTER (EOC) – A designated site from which government officials can coordinate emergency operations in support of on-scene responders.

EMERGENCY PLANNING ZONES (EPZs) – The areas for which emergency plans are made to assure that prompt and effective action can be taken to protect the public in the event of a radiological or chemical emergency. In Washington State the first zone is the plume exposure emergency planning zone with an approximate radius of ten miles from the nuclear power plant or chemical depot. The second zone is the ingestion exposure EPZ with an approximate radius of 50 miles. Immediate Response Zone (IRZ) and Protective Action Zone (PAZ) are zones associated with nuclear and chemical storage facilities.

FAULT – An abrupt shift of rock along a fracture in the earth.

FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) – Agency created in 1979 to provide a single point of accountability for all federal activities related to disaster mitigation and emergency preparedness, response, and recovery. Federal Emergency Management Agency manages the President’s Disaster Relief Fund and coordinates the disaster assistance activities of all federal agencies in the event of a Presidential Disaster Declaration.

FIXED NUCLEAR FACILITY (FNF) – One of a variety of complexes, in which fissionable fuel is stored or utilized for such functions as electrical power generation, or testing and manufacturing fuels and materials.

FLOOD – An inundation of dry land with water. Types of floods in Washington State are primarily river, surface water, flash, and tidal.

FOREST FIRE – The uncontrolled destruction of forested lands by wildfires caused by natural or human-made events. Wildfires occur primarily in undeveloped areas characterized by forest lands.

HANFORD SITE – A 560 square mile complex, located north of the city of Richland, Washington, under the direction of the U.S. Department of Energy.

HAZARDOUS MATERIALS – Materials, which, because of their chemical, physical, or biological nature, pose a potential risk to life, health, or property when released.

IMMEDIATE RESPONSE ZONE – The six-mile area surrounding the chemical surrounding the chemical storage area at the Umatilla Chemical Depot.

INGESTION EXPOSURE PATHWAY – When human beings are exposed to radioactive or hazardous materials from a facility through consumption of water and food stuffs, including dairy products. Emergency planning and protective actions are designed in part, to eliminate or reduce to the minimum exposures due to ingestion of contaminated materials in the area surrounding a facility.

LAHAR – Hot rock and gas melts snow and ice, creating surges of water that eroded and mixed with loose rock and debris, also known as a mudflow.

LANDSLIDE – Landslide is the sliding movement of masses of loosened rock and soil down a hillside or slope.
LAVA – Molten rock that flows onto the earth’s surface.

LOCAL EMERGENCY PLANNING COMMITTEE (LEPC) – The planning body designated by the Superfund Amendments and Reauthorization Act, Title III legislation as the planning body for preparing local hazardous materials plans.

MAGMA – Molten material beneath or within the earth’s crust from which igneous rock is formed.

MAJOR DISASTER – As defined in federal law, is any hurricane, tornado, storm, flood, high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, drought, fire, explosion, or other technological or human caused catastrophe in any part of the United States which, in the determination of the President, causes damage of sufficient severity and magnitude to warrant major disaster assistance... in alleviating the damage, loss, hardship, or suffering caused thereby.

MARINE SAFETY ZONE (MSZ) – A Chemical Stockpile Emergency Preparedness Program designated 12-mile stretch of the Columbia River.

MITIGATION – Actions taken to eliminate or reduce the degree of long-term risk to human life, property, and the environment from natural and technological hazards. Mitigation assumes our communities are exposed to risks whether or not an emergency occurs. Mitigation measures include, but are not limited to, building codes, disaster insurance, hazard information systems, land use management, hazard analysis, land acquisition, monitoring and inspection, public education, research, relocation, risk mapping, safety codes, statues and ordinances, tax incentives and disincentives, equipment or computer tie downs, and stocking emergency supplies.

PIPELINES – Transportation arteries carrying liquid and gaseous fuels.

PREPAREDNESS – Actions taken in advance of an emergency to develop operational capabilities and facilitate an effective response in the event an emergency occurs. Preparedness measures include, but are not limited to, continuity of government, emergency alert systems, emergency communications, emergency operations centers, emergency operations plans, emergency public information materials, exercise of plans, mutual aid agreements, resource management, training response personnel, and warning systems.

PRESIDENTIAL DECLARATION – Formal declaration by the President that an Emergency or Major Disaster exists based upon the request for such a declaration by the Governor and with the verification of Federal Emergency Management Agency preliminary damage assessments.

PROTECTIVE ACTION ZONE (PAZ) – An area from the Immediate Response Zone to 20 miles from the Umatilla Chemical Depot.

PYROCLASTIC FLOW – Hot avalanches of lava fragments and gas formed by the collapse of thick lava flows and eruption columns.

RADIOLOGICAL HAZARD – The uncontrolled release of radioactive material that can harm people or damage the environment.

RECOVERY

a. Activity to return vital life support systems to minimum operating standards and long-term activity designed to return life to normal or improved levels, including some form of economic viability. Recovery measures include, but are not limited to, crisis counseling, damage assessment, debris clearance, decontamination, disaster application centers, disaster insurance payments, disaster loans and grants, disaster unemployment assistance, public information, reassessment of emergency plans, reconstruction, temporary housing, and full-scale business resumption.

b. The extrication, packaging, and transport of the body of a person killed in a search and rescue incident.

RESPONSE – Actions taken immediately before, during, or directly after an emergency occurs, to save lives, minimize damage to property and the environment, and enhance the effectiveness of recovery.
measures include, but are not limited to, emergency plan activation, emergency alert system activation, emergency instructions to the public, emergency medical assistance, staffing the emergency operations center, public official alerting, reception and care, shelter and evacuation, search and rescue, resource mobilization, and warning systems activation.

SEICHE – Standing waves in an enclosed or partially enclosed body of water.

SEVERE STORM – An atmospheric disturbance manifested in strong winds, tornadoes, rain, snow, or other precipitation, and often accompanied by thunder or lightning.

SUBDUCTION ZONE – A convergent boundary between an oceanic plate and a continental plate.

TEPHRA – Clastic volcanic material.

TERRORISM – The unlawful use of force or violence against persons or property to intimidate or coerce a government or civilian population, in furtherance of political or social objectives.

TORNADO – A localized violently destructive windstorm occurring over land and characterized by a long funnel-shaped cloud that extends to the ground.

TSUNAMI – A series of traveling ocean waves of long length generated by earthquakes, volcanic eruptions, and landslides occurring below the ocean floor.

UMATILLA CHEMICAL DEPOT (UMCD) – A United States Army ordnance storage facility located in northeastern Oregon formerly known as Umatilla Depot Activity (UMDA). The Depot has been operated since 1942 as a storage site for conventional Army ammunition, bombs, artillery shells, and landmines. It is now a storage site for unitary and binary chemical weapons and agents.

URBAN FIRE – Urban fire occurs primarily in cities or towns with the potential to rapidly spread to adjoining structures.

VOLCANO – A vent in the earth's crust through which molten rock, rock fragments, gases, and ashes are ejected from the earth's interior.

WILDLAND-URBAN INTERFACE FIRE – Uncontrolled destruction of forests, brush, field crops, parks and grasslands caused by nature or humans.
1.3.2 Acronyms

ARC – American Red Cross
CEMP – Comprehensive Emergency Management Plan
CSEPP – Chemical Stockpile Emergency Preparedness Program
EMD – Washington Military Department, Emergency Management Division
EOC – Emergency Operations Center
EPZ – Emergency Planning Zone
FBI – Federal Bureau of Investigation
FEMA – Federal Emergency Management Agency
FNF – Fixed Nuclear Facility
HIVA – Hazard Identification and Vulnerability Assessment
IRZ – Immediate Response Zone
MSZ – Marine Safety Zone
PAZ – Protective Action Zone
PG&E – Puget Sound Gas and Electric
PZ – Precautionary Zone
REET – Real Estate Excise Tax
ROW – Right of Way
TAR – Tone Alert Radio
UMCD – Umatilla Chemical Depot
Chapter 2 - RISK ASSESSMENT

2.1 Hazard Assessment
The City of Mercer Island has experienced impacts from natural hazards that have been well documented. For example, the island has suffered extensive damage from landslides as a result from earthquakes and heavy rains. Following the 1965 earthquake, over five large landslides impeded major roadways around the island for a period of two months. In addition, the 2001 Nisqually Earthquake caused damage to numerous structures and the 2006 wind storm caused power outage in the southern section of the City for up to 7 days.

The purpose of the hazard assessment is to define where impacts from natural hazards occur and the characteristics of natural hazards. Underlying geologic conditions or the natural setting has a significant influence on the location and severity of damage. On Mercer Island, the consequences of the damage also are dependent on the geography, especially considering that the City is located on an island, and where human development and transportation facilities are located relative to geographic features.

2.1.1 Mercer Island Profile
Mercer Island is shown in the figure below.

![Figure 1 - Mercer Island](image)

**Geography**
At just over five miles long, two miles wide, and 6.2 square miles of land area Mercer Island lies in the southern section of Lake Washington east of the City of Seattle and west of the City of Bellevue.

**Mercer Island**
There are several exits from I-90 to Mercer Island with four main roads on the island. Island Crest Way runs north/south down the middle of the island. West Mercer Way follows the shoreline from the north/south on the west side of the island with steep slopes, ravines and gullies. East Mercer Way follows the shoreline from the north/south on the east side of the island. North Mercer Way follows the shoreline from the east/west on the north side of the island.
History

Settlement of the island by non-Native Americans began in the late 1870’s. The island is named after one of the three pioneering Mercer brothers from Illinois, all of whom had great influence in the Seattle area. Although none of the brothers lived on Mercer Island, they would often hunt and explore throughout the island’s secluded forests. The early settlers traveled by rowboats to the neighboring community of Seattle to pick up necessities. An occasional tramp steamer would drop off items that were too large to transport by rowboat.

Because of the inconveniences of island living, settlement lagged until C.C. Calkins platted the town of East Seattle, having purchased 160 acres; nearly three percent (3%) of the island’s total acreage. In 1891 he built a luxurious resort on the western side of the island, which spurred the building of a ferry dock, and small steamers began to make regular trips. This availability of transportation attracted more residents. Ferry travel continued until July 2, 1940 when the floating bridge from Mercer Island to Seattle was opened.

Economy

Mercer Island is primarily a single-family residential community with 3,804 acres of residential land use. A commercial business district and multi-family dwellings are concentrated at the northern end just off I-90. However, the northern end on the other side of I-90 is also a single-family residential community as well as being the site of the Luther Burbank Park. The island has much to offer in terms of recreational activity. It features quiet, wooded neighborhoods with views of Seattle, Bellevue, Mount Rainier, and the Cascade and Olympic Mountains. Mercer Island parks boast 467 acres of parklands and open spaces feature ball fields, extensive bike trails and picnic areas. In addition, there are more than 150 miles of marked walking trails.

People are attracted to Mercer Island because of its urban-rural character and island community; and its proximity to Seattle and Bellevue with their cultural, employment and shopping venues. The metro bus system via I-90 links Mercer Island to Seattle and Bellevue. On clear days residents enjoy views of snow-capped Mount Rainier to the southeast and the Olympic Mountains to the west. The bridge linking Mercer Island to Seattle is the renowned multi-lane Mercer Island Floating Bridges. The East Channel Bridge links the island to Bellevue, the State’s third most populous city.

Today, eight lanes of Interstate 90 connect Mercer Island with Seattle and Bellevue. It includes two side-by-side floating bridges that link Seattle and Mercer Island.

To meet the everyday needs, two commercial areas serve Mercer Island residents. The Central Business District is centered on the north end of the island south of I-90, and a smaller business district on the south end. Mercer Island businesses provide jobs for 4,300 people.

The central business district is a 76-acre bowl-shaped area that includes the Island’s main post office, the main Fire Station 91, medical and dental offices, drug stores, restaurants and coffee shops, apartment houses and condos, service stations, a bookstore, several retirement homes, two supermarkets, office buildings, and banks.

The south end Village is just across the road from Pioneer Park with 120 acres of woods and trails, including horse trails. The Village includes several businesses: a post office, gasoline station, retail and service businesses. It also includes a Park ’n Ride for metro bus commuters. Abutting the Village is Mercer Island’s second fire station: Fire Station 92 (South Fire Station).

The largest employers are Farmers Insurance Group, Mercer Island School District, the City of Mercer Island, and New World Life Insurance which is the headquarters for the Pacific Northwest.

The two largest office complexes built in 1987 are the Island’s Corporate Center with 103,000 square feet and the John Hancock building with 35,850 square feet. The number of building permits has generally increased, up forty percent (40%) from 1993 – 2003.
Demographics
The 2000 US Census states Mercer Island has 22,036 people living in approximately 6.2 square miles. The 2007 US Census estimates that 23,894 people live on the island. This represents a population increase of 5.9% from 1990 to 2000, and an increase of 8.4% from 2000 to 2007.

Mercer Island Quick Facts:
- 2008 Official Population as Determined by Washington State: 22,650
- 2007 US Census Bureau American Community Survey
- Total Island Population: 23,894
- Island Population Over Age 18: 17,494
- Total Number of Island Housing Units: 9,418
- Owner-Occupied: 7184
- Renter-Occupied: 2108
- 2007 Average Island Household Size: 2.53
- 2007 Median Household Income: $115,864
- Population Change from 1990 to 2000: +1,220

The population of Mercer Island is relatively homogenous compared with other parts of the state; 81.5% of the population is white with 11% Asian. Mercer Island also enjoys a relatively high median family income; in 2007 the median family income was $115,864. Median housing values from the 2007 estimates are $878,600. Future population projections are 25,000 by 2015. The water storage capacity is 8 million gallons with 120 miles of lines. There are more than 98 miles of sewer main lines. The storm system components include 54 miles of storm drains, 10 miles of private storm drains, 2,664 public catch basins, and 537 private catch basins. The road system includes over 75 miles of public roads.¹

2.1.2 Hazard Identification

2.1.2.1 Introduction
The Federal Emergency Management Act (FEMA) document Local Multi-Hazard Mitigation Planning Guidance (2008) under the Disaster Mitigation Act (DMA) 2000 only addresses natural hazards, not human-induced hazards. Therefore, this Plan is for natural hazard mitigation only. Wildland/urban interface fire may be started by natural processes and is included.

Two levels of hazards have initially been identified: 1) major hazards that occur in Washington State and 2) key hazards that are of particular concern to Mercer Island.

Based on a review of the critical areas available as GIS layers from the City, the following key hazards were identified: landslide and erosion, and earthquake. The Maintenance Director and Principal Planner confirmed that the City also considers other hazards to be key, based on past damages and vulnerability, tsunamis and seiches which are wave-induced hazards related to seismic activity, severe storms (wind, rain and snow), localized flooding, and urban fires. Localized flooding is a new hazard that has been added for the 2009 update and is different than normal flooding. It is usually induced by plugged drains, poor drainage, or a landslide or erosion. Table 2-9 describes the key natural hazards, and indicates how and why the key natural hazards were identified. The hazards included on Table 2-9 are:

- Landslide and Erosion
- Earthquake

¹ City of Mercer Island Demographics
- Tsunami/Seiche
- Severe Storms
- Localized Flooding
- Urban Fire

City staff provided the identity and locations of their key public facilities and infrastructure. The City GIS department provided maps of the infrastructure, critical facilities and land uses, as previously published in the City’s Comprehensive Plan and HIVA.

2.1.2.2 Major Hazards
The Washington State HIVA (2008) identifies the major hazards present in Washington State. Of those, the natural hazards include the following:

- Avalanche
- Drought
- Earthquake
- Flood and Riverine Processes
- Landslide and Erosion
- Severe Local Storm
- Tsunami
- Volcano
- Wild land Fire

As discussed in Section 2.1.2.1, key natural hazards in the City include some of the hazards in the Washington State HIVA list of major hazards. The rationale for not selecting the following major hazards in Washington as key hazards in Mercer Island is provided below.

Avalanche
An avalanche is a mass of loosened snow or ice that suddenly and swiftly slides down a mountain, often growing as it descends. An avalanche collects additional material such as mud, rocks, trees and debris as it slides (King County Regional Hazard Mitigation Plan, September 19, 2003). Avalanches could not impact Mercer Island and are, therefore, not considered a potential hazard within the study area.

Drought
Drought is a condition of climatic dryness that causes a reduction in soil moisture and water below the threshold necessary to sustain plant, human and animal life. Drought can affect industry, agriculture and individual consumers. The ability to fight fires may be affected. Additionally, hydroelectric power generation is impacted, potentially creating power shortages and temporary outages (King County, 2001 [Emergency Preparedness]). In a drought, the reduction of the amount of available water in reservoirs intensifies the debate over water allocation. Mercer Island water is dependent upon the snow pack from the Cascade Mountains. Weather pattern changes and lack of snowfall in the mountain regions may increase the likelihood of future water conservation measures. The City of Mercer Island has a contract with Seattle Public Utilities and receives 100% of its water through contracted negotiation. Since 1958, 2003 was the seasonal driest summer on record. However, (1) the economic base is not agricultural or industrial; and (2) no prior losses have been reported as a result of drought. Therefore, drought is not considered a key hazard within the study area.
Volcano

Potential volcanic sources in western Washington include the large composite volcanoes of the Cascade Range: Mount St. Helens, Mount Rainier, Glacier Peak and Mount Baker. Many minor volcanic centers also are scattered throughout the Cascade Range. It is unlikely that activity at any existing or newly formed volcanic vent will affect the study area. Because of the long distance (approximately 60 miles) to the nearest volcanic center, the only anticipated impacts to the study area from volcanic activity would be related to airfall volcanic ash. King County was included in the May 1980 presidentially declared Mt. St. Helens eruption. Mercer Island was affected in 1980 by ash fall which caused some damage to internal combustion engines, transportation problems due to reduced visibility, and was a general nuisance. There was also an economic impact resulting from the closure of Interstate-5 (I-5). The damage was a result of ash fall and was minimal. Volcanoes are not considered a potential key hazard for the study area.

2.2 Profiles of Key Natural Hazards

2.2.1 Understanding Risk Ratings

The basis of this section comes from the City of Mercer Island HIVA, 2003, with additional information on hazards included when the HIVA did not provide sufficient data. Also, development has occurred since 2003, which has been taken into account in the analysis.

To make the analysis more useful, a ranking of 1 through 10 was used for the probability-of-occurrence of each hazard and the City’s vulnerability in the event of the hazard. This type of ranking is different than the 2004 Plan, which ranks the hazards on a scale of low, moderate, or high. The probability ranking is assigned on the probability of a hazard occurring. The vulnerability ranking is assigned based on the estimated level of impact the hazard would inflict upon the City. The risk factor is calculated by multiplying the probability ranking with the impact ranking and dividing by one hundred. This shows a combination of the probability and risk, and this rating will help focus the emergency management program on the events with the greatest potential risk.

<table>
<thead>
<tr>
<th>Category</th>
<th>Probability</th>
<th>Impact</th>
<th>Hazard Category Risk Factor (Probability x Impact / 100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earthquake</td>
<td>6</td>
<td>9</td>
<td>0.54</td>
</tr>
<tr>
<td>Severe Storm</td>
<td>9</td>
<td>5</td>
<td>0.45</td>
</tr>
<tr>
<td>Landslide and Erosion</td>
<td>9</td>
<td>3</td>
<td>0.27</td>
</tr>
<tr>
<td>Tsunami/Seiche</td>
<td>3</td>
<td>5</td>
<td>0.15</td>
</tr>
<tr>
<td>Localized Flooding</td>
<td>3</td>
<td>1</td>
<td>0.03</td>
</tr>
<tr>
<td>Urban Fire</td>
<td>1</td>
<td>2</td>
<td>0.02</td>
</tr>
</tbody>
</table>

In the 2004 Plan the flood hazard was categorized as a low probability and vulnerability giving it a low risk rating. The 2009 analysis is helpful because quantifies this rating with a numerical factor. For the 2009 update, the flood hazard risk factor is listed as 0.03, shown in the Table 2-1. The earthquake hazard has a risk rating of 0.54 which is from a probability of 6 and a vulnerability of 9. The 2004 plan gave the earthquake hazard a high probability and vulnerability which led to a high risk rating.
Table 2-10 summarizes the disaster history of the key natural hazard events on Mercer Island, locations of assets, likelihood of probability, vulnerability potential and the risk rating of each hazard. The next sections summarize previous damage claims and the probability of future occurrences. Previous damage claims are summarized in Table 2-11.

2.2.2 Earthquake

2.2.2.1 Hazard

An earthquake is a naturally induced shaking of the ground. Earthquakes are caused by the fracture and sliding of rock within the earth’s crust. The earth’s crust is divided into eight major pieces (or plates) and many minor plates. These plates are constantly moving, very slowly, over the surface of the globe. As these plates move, stresses are built up in areas where the plates come into contact with each other. Mercer Island can be vulnerable to three types of earthquakes: deep plate from Juan de Fuca (Oceanic) sinking below the shallow North American (Continental) Plate, shallow earthquakes that include the Seattle Fault upon which Mercer Island sits, and subduction off the coast (Cascadia). Mercer Island’s earthquake hazard areas are shown in Map 3.

Shallow Earthquakes. Shallow (crustal) earthquakes occur within the North America plate. This type of earthquake has occurred throughout Washington, and most parts of Oregon. These earthquakes are primarily shallow with depths of less than 30 Kilometers (<15 miles) and less than 8 in magnitude. This type of earthquake is of the most concern to Mercer Island because shallow earthquakes on the Seattle Fault could be centered beneath Mercer Island.

Deep Earthquakes. Deep earthquakes occur within the subducting Juan de Fuca Plate as it bends beneath the continental plate. These deep earthquakes are approximately 25 – 100 kilometers (approximately 30 miles or greater) in depth with magnitudes up to 7.52 and could last 15 – 30 seconds of strong shaking. Due to their depth, aftershocks are typically not felt in association with these earthquakes.2 Subduction Earthquakes. Subduction earthquakes occur along the Cascadia Subduction Zone, as a direct result of the convergence of the Juan de Fuca plate beneath the continental plate. It lies 50 miles offshore and extends from the middle of Vancouver Island in British Columbia in a southerly direction past Washington and Oregon stretching to Northern California. Although no large earthquakes have occurred along the offshore Cascadia Subduction Zone since historic records began in 1790, similar subduction zones worldwide do produce "great" earthquakes – magnitude 8 plus and 20 miles or less in depth. A subduction earthquake would be centered off the coast of Washington and Oregon where the plates converge. Such earthquakes typically have a minute or more of strong ground shaking, and are quickly followed by damaging tsunamis and numerous large aftershocks.

2.2.2.2 History and Probability of Occurrence

Each year over one thousand earthquakes are recorded in Washington State. Fifteen to twenty of these earthquakes are strong enough to be felt. According to the Washington State Hazard Mitigation Plan in 2008, since 1900, there have been five earthquakes in the Puget Sound basin with measured or estimated magnitude of 6 or larger, and one of magnitude 7. The probability of future occurrence for earthquakes similar to the 1965 magnitude 6.5 Seattle-Tacoma event and the 2001 magnitude 6.8 Nisqually event is about once every 35 years. The approximate recurrence rate for earthquakes similar to the 1949 magnitude 7.1 Olympia earthquake is once every 110 years.

Deep earthquakes within the Juan de Fuca plate are believed to occur every 30 years. They generally last 15-30 seconds and have the potential of reaching 7.5 on the Richter scale. Three caused significant damage in western Washington, the 1949 Olympia (magnitude 7.1, 54 km deep), the 1965 Seattle-Tacoma (magnitude 6.5, 57 km

2 USGS www.ess.washington.edu/SEIS/PNSN/Cascadia EQs.pdf
The most recent, the 2001 Nisqually Earthquake measuring 6.8 was a deep earthquake originating thirty miles below the surface of Nisqually National Forest near Olympia. It caused significant damage throughout the King County Region. For Mercer Island, FEMA’s Disaster Housing Assistance Program distributed $163,814 to 147 applicants and the Individual & Family Grant Program distributed $2,567 to 16 applicants. The City’s FEMA reimbursement for damages totaled over $10,000. A significant loss for Mercer Island was the King County sewer line that connects to the sewer pump station located at the south end of the island. This line failure dumped approximately 200,000–300,000 gallons of raw sewage into Lake Washington.

Table 2-2 Historical Events – Earthquake

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>February 28, 2001</td>
<td>Off southern tip of Mercer Island</td>
<td>Nisqually Earthquake: King County sewer line failure.</td>
</tr>
<tr>
<td>February 28, 2001</td>
<td>Mercer Island</td>
<td>Nisqually Earthquake: Disaster Housing Assistance 147 Applicants received $163,814; Individual &amp; Family Grant Program, 16 Applications totaling $2,567.</td>
</tr>
<tr>
<td>February 28, 2001</td>
<td>Mercer Island: East Mercer Way: 4500 to 4700 Block, 6500 Block and 700 feet south</td>
<td>Ground settlement and lateral movement of paved roadway (est. $80,000 - $100,000 at 4700 block).</td>
</tr>
<tr>
<td>February 28, 2001</td>
<td>Mercer Island: 8251 Avalon Place</td>
<td>Water main break.</td>
</tr>
</tbody>
</table>

Shallow earthquakes occurred in 1872 (magnitude 6.8 – 7.3) in the North Cascades, 1918 (magnitude 7.0) Vancouver Island, and 1946 (magnitude 7.4) Vancouver Island. Additionally, recent studies have found geologic evidence for large (magnitude 7 or more) shallow earthquakes along the Seattle Fault 1,100 years ago within the central Puget Sound Basin. Massive block landslides into Lake Washington, marsh subsidence and tsunami deposits at West Point in Seattle, tsunami deposits at Cultus Bay on Whidbey Island, and large rock avalanches on the southeastern Olympic Peninsula have all been dated to approximately 1,100 years ago. To improve its understanding of this hazard, the City contracted with the Pacific Northwest Center for Geologic Mapping Studies at the University of Washington to develop the first contemporary and detailed map of the Island’s geology in 2006. This map is used continuously in utility capital project planning and various private development processes.

Subduction earthquakes are very large, “great” quakes of magnitude 8 or larger that result when the oceanic and continental plate’s rupture, with 1 – 3 minutes shaking expected. These earthquakes occur every 300 – 500

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4 Mercer Island Emergency Management Office
5 University of Washington Seismology Lab, Earthquake Hazards in Washington and Oregon, May 13, 1994
years. In 1700, 300 years ago, the most recent Cascadia Subduction Zone earthquake sent a tsunami as far as Japan. The Alaskan earthquake of 1964 was a 9.2 earthquake and shook for nearly six minutes.

2.2.3 Severe Storm

2.2.3.1 Hazard
Destructive storms come in several varieties: wind, rain, ice, snow and a combination. Nearly all destructive local storms occur from November through April when the jet stream is over the United States west coast and Pacific low-pressure systems are more frequent. The trajectory of these lows determines their effect locally. The more southerly storms bring heavy rains while the more northerly ones bring cold air and a potential for snow and ice. Any winter storm, regardless of its trajectory, can pack high winds. Generally, winds above 30 miles per hour can cause widespread damage and those above 50 miles per hour can be disastrous. High winds of short duration, such as tornados and strong gusts from thunderstorms, can also be destructive though generally not as widespread.

2.2.3.2 History and Probability of Occurrence
Since 1972, King County has dealt with the impact of over sixteen severe storms. The majority of these were combination events with high winds, heavy rain, snow or ice, and subsequent flooding. The probability of a severe storm occurring every year is approximately 50 percent. Map 6 shows the area on Mercer Island which has high potential for wind damage.

King County has reported three tornadoes all of which were in the decade of the 1960’s. Tornado funnel shaped clouds generally affect areas of three-quarters of a mile wide and 16 miles long. Tornadoes are produced by strong thunderstorms that generate damaging hail, heavy rain, and wind. The storms occurrences were in the months of September, August, and December. There were no deaths associated with the storms and in total one person was injured. The tornado ratings were F0 (winds from 40 – 72 mph), F1 (winds from 73 – 112 mph), and F3 (winds from 158 – 206 mph) for the three separate events. Small funnel clouds have been seen in the local area of Puget Sound. Due to these sightings there is the possibility of impact on Mercer Island in the future.

Recent storms of major impact, other than flooding, include the January 1993 Inaugural Day Storm, the Windstorm of December 1995, and the Ice and Windstorm of December 1996. In 2002, the island suffered two major windstorms requiring massive cleanup. Debris collection sites were open for over a week and crews removed an excess of two (2) tons of tree limbs and other foliage. The most recent severe storm occurred in December of 2006 where snow and heavy winds hit the island, causing power outages, road damage, and debris throughout the City which necessitated a large amount of cleanup.

Table 2-3 Historical Events – Severe Storms

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>December 2006&lt;sup&gt;MIR&lt;/sup&gt;</td>
<td>Various Locations</td>
<td>Power outages from 6 to 7 days. City estimates to have spent $75,000 on cleanup. MIR</td>
</tr>
<tr>
<td>December 2003&lt;sup&gt;MIR&lt;/sup&gt;</td>
<td>Mercer Island</td>
<td>Wind Storm. 2,300 residents without power. Trees toppled onto powerline and roads at southeast portion of island.</td>
</tr>
<tr>
<td>December 27, 2002&lt;sup&gt;PSE&lt;/sup&gt;</td>
<td>Mercer Island</td>
<td>Wind Storm. Three circuits out for over a day.</td>
</tr>
<tr>
<td>2002</td>
<td>Mercer Island</td>
<td>Power outages and downed trees; debris removal was in excess of 2 tons.</td>
</tr>
<tr>
<td>February 2001&lt;sup&gt;MIR&lt;/sup&gt;</td>
<td>Mercer Island</td>
<td>Snowstorm. Downed trees; power and phone lines; power loss to 50.</td>
</tr>
</tbody>
</table>

<sup>6</sup> Information is from the Mercer Island Emergency Management Office unless otherwise noted
### 2.2.4 Landslide and Erosion

#### 2.2.4.1 Hazard
Landslides are the release of rock, soil, or other debris and its subsequent movement down a slope or hillside. They are generally caused or controlled by a combination of geology, topography, weather and hydrology and...
can be influenced by development practices. Landslides vary greatly in size and composition: from a thin mass of soil a few yards wide to deep-seated bedrock slides miles across. The travel rate of a landslide can range from a few inches per month to many feet per second depending on the slope, type of material, and moisture content.\(^8\) Erosion is an inclusive term for wearing away and removal of soil or rock material by the effects of running water and wind.

Geologic hazard – unstable slopes are defined by the City of Mercer Island as any slope steeper than 30 percent. Mercer Island’s erosion hazard areas are shown in Map 2; the landslide hazard areas are shown in Map 4. Geologic mapping of the area has nomenclature that has evolved over the last four decades (Waldron, 1962; Yount et al., 1993; Washington State Department of Natural Resources [DNR], 2002). The areas of predominant geologic hazard coincide with areas underlain by low permeability silt and clay either interbedded or overlain by more permeable sand and/or gravel. The silt and clay unit with interbedded sand and gravel is more recently referred to as “transitional beds” (DNR, 2002). The predominant overllying sand and/or gravel is referred to as advance glacial outwash. Along the east side of Mercer Island, recessional glacial outwash is present as a thin layer over the transitional beds and portions of the advance outwash. The contact between the recessional outwash and underlying deposits typically is inclined.

![Figure 2 - Many roadways within Mercer Island traverse steep slopes](image)

The City of Mercer Island reports an inventory of over 75 landslides within the city limits. The city also has identified some of the significant landslide events which are shown in the table. Between landslide events, soil redevelops and/or soil from upslope erosion, sloughing and creep can result in accumulation of material. Once the soil is thick enough and groundwater levels increase from direct precipitation, inflow from surface water run-off, or melt from rain-on-snow, a landslide may recur. Slide planes occur between the following units: (1) between transitional bed layers; (2) at the base of the advance outwash, at the contact with the underlying silt/clay; and (3) at the contact between the recessional outwash and underlying transitional beds. After the rain-on-snow event in 1996/1997, numerous landslides occurred in the city limits. Many of these failures were underlain by silt/clay. According to GeoEngineers several of these landslides were triggered by soil saturation resulting from surface water run-off and infiltration of water from the melting snow and one event was exacerbated by a plugged storm drain system.

\(^8\) City of Mercer Island, Development Services Group (DSG)
2.2.4.2 History and Probability of Occurrence
Mercer Island has a history of landslides. The largest documented landslide occurred after the 1965 earthquake. During a two-year time period large sections of roadway collapsed in various places at different times. The sections hardest hit were at the southern end of the island along East Mercer Way and West Mercer Way, including residential homes and roadways.

During and following most major rain events, there are several slides along the roadways. These slides are usually minor causing roads to be closed only for a few hours or days. A total of seventy-five (75) slides have been recorded. Three percent (3%) of the island has steep slopes and thirty-seven (37%) a potential slide hazard.9

Table 2-4 Historical Events – Landslide10

<table>
<thead>
<tr>
<th>Date</th>
<th>Location (Mercer Island)</th>
<th>Damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>December 2006</td>
<td>Various Locations</td>
<td>Several slides occurred during the severe storm</td>
</tr>
<tr>
<td>March 1997</td>
<td>Various Locations</td>
<td>11 minor slides were reported due to heavy rains.</td>
</tr>
<tr>
<td>January 1997</td>
<td>Various Locations</td>
<td>Seven landslides after rains caused over one million dollars in damage.</td>
</tr>
<tr>
<td>November 1996</td>
<td>Mercer Island</td>
<td>Landslide exposed storm drain and trail.</td>
</tr>
<tr>
<td>April 1991</td>
<td>81st and 82nd Ave</td>
<td>Landslide after heavy rains.</td>
</tr>
<tr>
<td>January 1990</td>
<td>SE 72nd</td>
<td>Landslide after heavy rains.</td>
</tr>
<tr>
<td>January 1986</td>
<td>Forest Ave</td>
<td>Multi-family housing structure.</td>
</tr>
<tr>
<td>1965 – 1967</td>
<td>West Mercer Way between Lakeview Lane and SE 76th St</td>
<td>½ lane of roadway failed.</td>
</tr>
</tbody>
</table>

9 Slope Hazards, GIS Map from City of Mercer Island
10 Information from Mercer Island Emergency Management Office unless otherwise noted

MIR Mercer Island Reporter verified by Mercer Island Emergency Management Office
DSG Mercer Island, Development Services Group
11 Events between 1965 and 1967 occurred within two years after the 1965 Earthquake
2.2.5 Tsunami/Seiche

2.2.5.1 Hazard
A tsunami is a sea wave of extremely long length generated by a seismic disturbance (earthquake, volcanic eruption or debris slide) below or on the ocean floor. Tsunamis can be very destructive to coastal areas and can occur anytime. A seiche is an oscillating wave on the surface of a lake or landlocked bay; caused by atmospheric or seismic disturbances. Lands bordering lakes are impacted similar to a bathtub effect, with varying degrees of extremely high and extremely low water levels within a very short period of time.

2.2.5.2 History and Probability of Occurrence
Research has shown Washington’s Pacific coast has been threatened by tsunamis; there is a known record in recent history of tsunami activity in Lake Washington during the 2001 Nisqually Earthquake. A strong earthquake below Puget Sound could cause damaging waves to impact the island. A seiche could potentially cause damage by its destructive wave action to docks along the shores of the island and I-90 Bridge. The winter of 1993 seiche action closed the I-90 Bridge; waves literally covered the bridge breaking over the retaining walls.

Table 2-5 Historical Events – Tsunami/Seiche

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>February 28, 2001</td>
<td>Lake Washington</td>
<td>Experienced seiche activity after 2001 Nisqually Earthquake</td>
</tr>
<tr>
<td>Winter 1993</td>
<td>Lake Washington affected I-90 Bridge.</td>
<td>Seiche action from wind storm closed I-90 Bridge</td>
</tr>
<tr>
<td>April 1964</td>
<td>Lake Washington</td>
<td>Alaskan earthquake caused damage to areas around the lake</td>
</tr>
<tr>
<td>~903 BC</td>
<td>Lake Washington</td>
<td>Evidence of a tsunami wave caused by landslide</td>
</tr>
</tbody>
</table>

2.2.6 Localized Flooding

2.2.6.1 Hazard
Generally there are three types of flooding specific to Mercer Island: stream building floods, drainage sub basin overflows, and flooding from large water main breaks.

1. Stream building floods: occur because of prolonged heavy rainfall. Actual duration and rainfall amounts needed to cause flooding depend on the initial condition of the stream, groundwater conditions, and runoff conditions.

2. Drainage sub basin: A manmade earth basin, generally 50 – 100 feet in diameter. Used as an overflow for prolonged heavy rainfall.

3. Large water main failures: A pipeline generally over 10 inches in diameter.

2.2.6.2 History and Probability of Occurrence
Floods do not commonly affect Mercer Island. The Federal Emergency Management Agency (FEMA) on June 30, 1997 classified the community as Zone C (minimal flood hazard). Mercer Island can experience two or three days of rainfall averaging 2 – 5 inches per day for stream building type of flooding to occur. Actual duration and rainfall amounts needed to cause flooding depend on the initial condition of the stream, groundwater conditions, and runoff conditions. Historically flooding has occurred due to overflow of sub basins, pipeline failure and gully runoff from small streams.

Although there is low possibility of flooding, Mercer Island does participate in the National Flood Insurance Program. According to FEMA, after October 1, 2008 all local mitigation plans approved by FEMA must address repetitive loss structures in the risk assessment by describing the types and estimate the numbers of repetitive

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12 FEMA Region 10 Tsunami Department
loss properties located in identified flood hazard areas. A repetitive loss property is a property which two or more losses of at least $1,000 each have been paid under the National Flood Insurance Program (NFIP) within any 10-year period since 1978. The City of Mercer Island has one repetitive loss structure located in the southeast section of the Island. The residential structure was damaged in 1980 and 1984 with a total payment of $11,700.

2.2.7 Urban Fire

![Figure 3 - Much of Mercer Island contains dense forest cover interspersed with residential development](image)

2.2.7.1 Hazard
Mercer Island may experience two types of fire threats: structure fires and wild land-urban interface fires.

Structure Fires: Typically are not island-wide emergencies except when the fire can potentially spread to adjoining structures.

Wild land-Urban Interface Fires: Wild land fires are the uncontrolled destruction of forests, brush, field crops and grasslands caused by nature or humans. Urban fires may start at the wild land-urban interface from a wild land fire, or start from human causes within the urban area. Wild land-urban interface fires occur where “combustible vegetation meets combustible structures” and therefore combine the hazards associated with both forest/parks and structure fires. Most fire fighters are trained to fight either wildfires or structure fires. Interface fires require both skills. Wild land-urban interface fire can destroy vegetation, which can make slopes vulnerable to erosion.

2.2.6.2 History and Probability of Occurrence
In Washington State, thirty-eight percent (38%) of identified structure fires occur where people live and seventy-five percent (75%) of all fire deaths occur in homes. People are more at risk from a fire where they feel safest, where they live. The leading causes of residential fires in Washington State are from heat from improperly operating electrical equipment, matches or lighters, electrical short-circuit or arc, and heat from wood/paper fueled equipment.

Heat from improperly operating electrical equipment includes electric stoves, electric heaters, and other electrical appliances. Cooking is a leading cause of residential fires and home heating is the second leading cause, as reported to the United States Fire Administration\(^{14}\) through the National Incident Reporting System\(^{15}\). In Washington State, more than 24 percent of residential fires start in the kitchen cooking area. Fires caused by home heating are usually caused by portable space heaters. In Washington State, fires from wood or paper fueled equipment are also significant. The chimney is the third leading area of fire origin.

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\(^{13}\) United States Fire Administration


\(^{15}\) [http://www.usfa.fema.gov/nfdc/nfirs.htm](http://www.usfa.fema.gov/nfdc/nfirs.htm)
Of the homes where fire deaths occurred, seventy-five percent (75%) had smoke detectors. However, only ten percent (10%) were known to be working. Despite the presence of working smoke detectors, ten fatalities occurred because elderly, disabled, mentally handicapped, and alcohol-impaired citizens were unable to escape fires in their homes. Mercer Island incurred at least 24 structural fires in 2003.

Mercer Island includes over 475 acres of park and open-space lands scattered across the community. The majority of these areas are heavily treed, with little or no maintenance. There is rarely a buffer between residences and open space or dense vegetation. Structural fires may result in adjacent wild land fires; therefore, although to date Mercer Island has not experienced a wild land-urban interface fire, there is a high probability of wild land-urban interface fires occurring on Mercer Island.

2.3 Vulnerability Assessment

2.3.1 Overview

In the 2003 HIVA, the City of Mercer Island EMO developed the methodology to establish vulnerability: “an adjective description (high, medium or low) of the potential impact a hazard could have on the City of Mercer Island. It is the ratio of population, property, commerce, infrastructure and services at risk, relative to the entire City.” Although not based on quantitative data, generally a widespread degree of previous damage with high cost would result in a hazard with a high vulnerability. The relative degrees of vulnerability of Mercer Island key facilities with respect to key natural hazards are summarized in Table 2-10.

Key City facilities of the original plan were identified by the TAC, and included the North and South Fire Stations, City Hall, Police Department, and certain utilities such water reservoirs, pump stations and water lines. The key City facilities are shown on Map 1. New facilities since 2004 include a new lakeline sewer replacement, a new well, a Wide Area Rapid Notification (WARN) system, trucks for purification, Luther Burbank park, Community Center – Shelter Site.

Many locations in the City are vulnerable to multiple hazards, which heighten the probability that assets in the area will be affected by a hazard-based event.

2.3.1 Potential Impact of Hazards

The basis for the following sections is from the HIVA (City of Mercer Island, 2003) and has been modified where deemed necessary.

2.3.1.1 Earthquake – Potential Impact and Vulnerability

Evidence from high resolution seismic reflection photographs show land course changes under and within 4 km of the I-90 and East Channel bridges. The fault is a surface transversal fault line and spans an area through Mercer Island with a width of approximately 5 km\(^1\). During the 2001 Nisqually Earthquake the bottom of the lake was disrupted causing the lake to cloud for a period of 20 minutes or more\(^2\).

Time, location, magnitude and depth of an earthquake will greatly affect the vulnerability of Mercer Island to earthquake damage. The portion of land on the island that is soft, including sandy, clay-like and artificial fills making it susceptible to ground shaking are the north central section west of Island Crest Way to the waterfront, the eastern edge of East Mercer Way along the waterfront of Lake Washington and a narrow band surrounding the island shoreline. These designated areas have potential liquefiable-based soil type and ground surface settlement due to earthquake induced ground motions.

Building materials and construction significantly influence the impact of an earthquake on a structure; masonry structures that are not reinforced are the most vulnerable while wood frame structures typically perform well in

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\(^1\) Cascadia Regional Earthquake Workgroup web site www.crew.org
\(^2\) Mercer Island Marine Patrol
earthquakes. Additionally, individual buildings have different natural frequencies of vibration that depend on their height and structural design, amplification may affect some buildings more than others. Strong shaking is a hazard both near the epicenter of an earthquake and in areas where amplification occurs.

The effects of an earthquake could also vary widely by the buildings and infrastructure first damaged. Damage to buildings that house emergency services such as fire stations, medical clinics and hospitals (located off the island) could lessen emergency response capabilities. Breaks in the street and bridge network can also impair the delivery of emergency services.

The potential coexistence of other secondary disasters with earthquakes, such as fires, hazardous materials releases, ground failures, landslides, liquefaction, tsunamis and seiches add to the difficulty in predicting losses.

Secondary Impacts from Earthquake

Many secondary natural hazards may be triggered by an earthquake, including:

- Liquefaction and subsidence of soils
- Landslides impacting transportation, other public infrastructure, other public and private development
- Seiche or sloshing water impacting shoreline developments and facilities
- Fires from gas pipeline ruptures
- The severity of soil-related natural hazards and ground failure phenomena often depends on status of groundwater, rainy seasons and drought conditions

Potential hazards related to an earthquake event include:

- People stranded if transportation or other lifeline networks fail. Mercer Island may be unsupported if the disaster is region-wide
- Chimneys, bricks, unsupported fascia, trees, displacement of homes, bridges, and non-reinforced structures
- Elevated concrete or brick walkways
- Cracks in roads could cause accidents.

Potential systems vulnerabilities include:

- Business interruption and resulting losses in sales, wages, and profits
- Impacts to local economy if economic processes break down

2.3.1.2 Storms — Potential Impact and Vulnerability

The entire island is vulnerable to the effects of a storm. Lifeline infrastructure may be compromised such as limited access to roads, power and communications. Widespread business interruption and economic losses would be expected. The southern end of the island is more susceptible to high winds due to the lack of natural barriers. High winds can cause widespread damage to trees and power lines and interrupt transportation, communications, and power distribution. Prolonged heavy rains cause the ground to be saturated, and streams to rise, and often results in landslides and falling trees. The 2000-2001 installation of tree wire power lines has decreased daily outages.¹⁸

Ice storms occur when rain falls from a warm atmospheric layer into a cold one near the ground. The rain freezes on contact with cold objects including the ground, trees, structures, and power lines, causing roofs to collapse and power lines to break.

Snow storms primarily impact the transportation system and the availability or timing of public safety services, stranding residents for up to several days. Snow accumulations can also cause roofs to collapse. Snow

¹⁸ Puget Sound Energy
accompanied by high winds is a blizzard which can affect visibility, cause large drifts and strand residents for up to several days. Melting snow adds to river loading and can turn an otherwise benign situation into a local disaster.

Tornadoes may strike anywhere on Mercer Island and could traverse across the island and produce a limited damage path. Unlike storms in the Midwest of the country, Pacific Northwest tornadoes tend to be weaker, less destructive, and much less frequent.

Each type of storm when in combination with any secondary failures or if accompanied by freezing temperatures can exacerbate a storm’s impact. Isolated residents without power are more likely to use wood fires to stay warm or to cook, possibly resulting in an increase of fire hazards. Residents without food or water may attempt to use impassable roads and thereby increase the number of potential rescues.

Costs associated with destructive storms can be significant. The ice and wind storms of December 1996 cost King County $1 million in non-flood related costs, primarily due to large amounts of debris and damage to the road system; caused power outages to nearly one-half of the population for several days, required the expenditure of nearly $10 million by Puget Sound Energy to make repairs to the power distribution system; and resulted in an estimated $3 million in uninsured losses to private property. Similar costs were incurred as a result of the Inaugural Day Storm in 1993.¹⁹

Mercer Island experienced six to seven days of power outage from the impact of the 2006 storm. City emergency expenditures were estimated to be $75,000 for cleanup.

Secondary Impacts from Severe Storms may include:

- Local flooding and landslides
- Eagle or Osprey nests damaged
- Waste water overflows
- Pipeline failures

Potential hazards related to severe storms include:

- Inclement weather affecting people
- People traversing or working on Mercer Island stranded and in need of shelter
- Winter storms creating icy roads and walkways
- Falling trees and debris from high winds impacting homes, businesses
- Power and communication line outages
- Snow accumulations could cause roofs to collapse

Potential systems vulnerabilities include:

- Business interruption and resulting losses in sales, wages, and profits
- Impacts to local economy if economic processes break down

### 2.3.1.3 Landslides – Potential Impact and Vulnerability

The State of Washington rates landslide losses second to flood losses for the state as a whole with the Puget Sound basin having the greatest vulnerability. This is because of increased population density and development on and below bluffs and slopes.

Historically, landslides on Mercer Island have had localized major impact and as development continues in high risk areas, vulnerability may increase. The greatest risk is to individual residential structures on or below bluffs or slopes, roads, pipelines, and electrical and communications distribution lines. One potentially high-risk area is

¹⁹ King County HIVA
along the SE 40th Street where many of the main lines run. Mercer Island continues to experience landslides on a seasonal basis due to heavy winter rains.

Landslides are also a secondary hazard to earthquakes (e.g. 2001 Nisqually Earthquake), severe storms and high rain fall preceded by a cold spell. The identification of areas susceptible to land sliding is necessary to support grading, building, foundation design, housing density, and other sustainable land development regulations in reducing the risk of property damage and personal injury.

Secondary Impacts from Landslides
Secondary environmental hazards may include:

- Loss or damage of natural habitat impacting streams and animals

Potential hazards related to landslides include:

- Loss or damage of homes, private property, public buildings and commercial enterprises
- Lifelines and infrastructure may be blocked or damaged

Potential systems vulnerabilities include:

- Business interruption and resulting losses in sales, wages, and profits
- Impacts to local economy if economic processes break down

2.3.1.4 Wave-Induced Hazards – Potential Impact and Vulnerability
The greatest local impact would be to the land areas immediately adjacent to Lake Washington. High wave action could cause physical damage to Mercer Island residences, approximately 645 boat docks, gas and water pipelines (on the northeast side of the island), sewer pump stations and the connecting King County sewer lines, and the I-90 Bridge.

Secondary Impacts from Seiche
Secondary environmental hazards may include:

- Shoreline vegetation and habitat damaged or destroyed

Potential hazards related to a seiche include:

- Up to 645 boats docks dislodged or damaged
- Gas and water pipelines damaged
- Up to 18 sewer pump stations damaged or completely destroyed
- I-90 Bridges damaged or unusable for transportation vehicles
- Water supply interruption

Potential systems vulnerabilities include:

- Highways and marine transportation system damage
- Business interruption and resulting losses in sales, wages, and profits
- Impacts to local economy if economic processes break down

2.3.1.5 Floods – Potential Impact and Vulnerability
As noted, minimal flood plains are found on the island. The greatest potential is with high water content in the soil causing landslides. Other vulnerabilities are the drainage sub basins. If breaks occur in the sub basin, homes could become damaged. Residential housing can also be flooded due to the close proximity of culverts, catch basins and drainage systems overflowing.

Secondary environmental hazards may include:
- Landslides and soil movement

Potential systems vulnerabilities include:

- Obstructed and damaged access routes
- Impairment of transportation around impacted area

2.3.1.6 Urban Fire – Potential Impact and Vulnerability

Mercer Island Fire Station

Landscaping in Mercer Island often encourages the planning and growth of combustible vegetation immediately surrounding structures, all of which would be vulnerable to fire. As mentioned in the hazard identification, the potential for fire to start and spread is high in the heavily treed areas of Mercer Island. The majority of the land in and adjacent to these vegetated areas is residential uses interspersed with the trees and brush. Such uses tend not to have sprinkler systems.

Secondary Impacts from Urban Fire

Secondary environmental hazards may include:

- Poor Air Quality
- Possible destruction of the local habitat including parks and trails
- Land and soil erosion due to loss of foliage
- Landslides and mudslides due to loss of foliage

Potential hazards related to an urban fire include:

- Possible destruction of buildings and homes

Potential systems vulnerabilities include:

- Business interruption or loss, and resulting losses in sales, wages, and profits
- Impacts to local economy if economic processes break down
Chapter 3 - MITIGATION STRATEGIES

3.1 Goals and Objectives

3.1.1 Development of Policies
The following three goals and implementing policies were identified for this Plan, based originally on discussions during the 2004 TAC meetings. They have been revised by the Consultant and the City to reflect the City’s current vision:

Goal #1 – Maintain reliability of Mercer Island infrastructure

Policy #1
The road system for Mercer Island is critical; maintain reliability and redundancy of transportation routes on Mercer Island during and after hazard events. The City shall review the roadway network to identify reasons for failure during hazard events. For example, malfunction of storm water conveyance due to inadequate culvert capacity, blockage, or failure may lead to failure or breakage of storm water lines, possibly leading to flooding and landslide damage to roads. Mitigation projects shall be prioritized to reduce road system susceptibility to damage.

Related Comprehensive Plan Element: Transportation; Utilities

Policy #2
Begin long-range planning to build a second emergency well following completion of the City’s first emergency well in 2010. It appears that Mercer Island has sufficient water storage to meet demand up to anticipated build out in the year 2020. It is, however, not certain that there will be sufficient capacity for both drinking and fire fighting in the event of a major disaster, such as an earthquake, especially if the disaster occurs during periods of peak demand.

Related Comprehensive Plan Element: Utilities

Policy #3
Maximize reliability of the storm water system during and after hazard events. This policy is linked with Policy #1. Evaluate the locations of required repairs after recent disasters. These or similar locations may be susceptible to damage in future events. Proper control of surface water, including installation of redundant systems, and maintenance of the storm water conveyance system can be an effective way to reduce input of additional water onto slopes that are in a marginally stable state. Identifying areas of landslides related to road drainage features, especially those that recur on a regular basis can be an effective way to reduce landslide hazard and future losses.

Related Comprehensive Plan Element: Utilities
Policy #4
Complete a comprehensive update of Mercer Island’s sewer code that addresses critical issues in improving the reliability of the system. The City shall identify the sections of the code that are outdated and replace with updated information. The most vulnerable section of the primary sewer line along Mercer Island’s northwest shoreline has a history of failure due to aging pipe material and is being replaced in 2009-2010. Failure of the sewer system would have significant consequences for water quality and could impact public health and safety.

Related Comprehensive Plan Element: Utilities

Goal #2 – Minimize susceptibility to cascading effects of key hazards

Policy #5
To minimize threat of conflagration from fire spreading, provide for efficient and effective emergency response capabilities from the Fire Department during and after a hazard event. The South Fire Station is tentatively scheduled to be replaced in 2012, and will have the same capabilities as it currently does (1 pumper, 1 aid car and 1 midi pumper all cross-staffed). The current pumpers (Maxi and Midi) were both replaced with new apparatus in 2008. Fire Response is designed to be handled by MIFD crews for the first hour and augmented through Mutual Aid Agreements within Zone 1. Open transportation routes are required for adequate response. Adequate volume of stored water is required for effective response.

Related Comprehensive Plan Element: Capital Facilities, Transportation, Utilities

Policy #6
The primary effects of disasters (damage to building and facilities) will be magnified if property owners and managers are not able to rely on prompt service from the City. Core technological functions of the City and businesses must remain operational during and after a disaster. After a disaster it is critical that City operations be fully functioning. Business continuity planning will also reduce potential losses in the event of a disaster.

Related Plan: Information Technology (IT) Plan

Policy #7
In partnership with Puget Sound Energy, identify projects that will reduce both the number of electrical outages and duration of those outages on Mercer Island.

Goal #3 – Require permit applicants to incorporate Best Available Science (BAS) and All Known and Reasonable Technology (AKART) in development proposals to accomplish Hazard Mitigation Plan goals for consistency with elements of the Comprehensive Plan and other regulations intended to reduce losses from hazards

Policy #8
Improve the City’s ability to utilize BAS as the basis for decision making to reduce seismic vulnerability. The Seattle Fault extends east-west through Mercer Island. An earthquake on the Seattle Fault could result in very high Peak Ground Accelerations, with the potential for major damage. Development proposals should incorporate BAS to reduce potential damage to structures and sites.

Related Comprehensive Plan Element/GMA: Land Use and Critical Areas; Updated Hazard Maps; Unified Land Development Code
Policy #9
Minimize vulnerability of public and private property and facilities from risks associated with landslide hazards. Nearly the entire periphery of Mercer Island is mapped as a landslide hazard area. The specific characteristics of the landslide hazard have been identified in moderate detail through the work of the Pacific Northwest Center for Geologic Mapping Studies at the University of Washington. Densities of residences and infrastructure are relatively high in these areas. New development should be designed and constructed to effectively mitigate for landslide hazards and properly control the expected changes in surface water runoff that may contribute to instability.

Related Comprehensive Plan Element/GMA: Land Use and Critical Areas; Unified Land Development Code

Policy #10
Update City maps, codes and policies to stay current with Best Available Science (BAS) concerning potential hazards. New information is continually being generated regarding the hazards present on Mercer Island. For example, the Seattle Fault is the subject of much field and academic research, with new data and maps being made public. This type of new information should be used to revise maps and codes to improve public knowledge of hazards and potential mitigation.

Related Comprehensive Plan Element/GMA: Land Use and Critical Areas; Unified Land Development Code

3.2 Mitigation Strategies

3.2.1 Methodology to Identify Mitigation Strategies

The first step in development of mitigation strategies was to review current local regulations and hazards-related planning in relation to the goals for the Hazard Mitigation Plan stated above. The review focused on key hazards and identified strategies that were already in place and what was needed to mitigate for potential hazards. The next step was to develop a list of the projects that mitigated these potential hazards that were not addressed.

To accomplish this, the City met with the TAC on March 29, 2004 and developed a project list for the 2004 Plan. For the Plan update, the City met with consultants from Roth Hill Engineering on October 21, 2009 to identify projects that were completed from the 2004 Plan, new projects based on the above goals, and ongoing projects. This meeting also implemented a new method for categorizing and ranking projects.

3.2.2 Prioritization Methodology
The 2004 Plan focused on specific construction projects as the mitigation strategy. The 2009 Plan Update approaches the strategy differently, with a focus on programs rather than specific projects. An example of a 2009 proposed program is to “Rehabilitate Damaged Storm Culverts,” while a specific construction project for the 2004 Plan was to “Stabilize the Basin 29 watercourse and ravine.” The new method allows for more flexible responses by the City as individual project priorities change.
The new method for categorizing these programs has been produced for the 2009 Plan update and is based on funding sources. For example, the program “Replace Aging Watermains,” which is funded through the WaterFund, will not compete for funding with the program, “Rehabilitate Damaged Storm Culverts,” which is funded through the Storm and Surface Water Fund.

The funds represented in the Plan include:

- Stormwater fund
- Water fund
- City General Fund
- Sewer fund

### 3.2.3 2004 Plan – Mitigation Strategies

In the 2004 Plan, Mercer Island identified 15 mitigation measures and categorized them into three different types as listed below. The projects were selected by City participants to maximize potential benefits in relation to costs.

- Type I: Establish Basin Area Stabilization Planning and Tracking Structure, Programmatic Assessment
- Type II: Plan Coordination and Education
- Type III: Construction and Acquisition

Eight of the projects that were proposed provided active construction and acquisition mitigation. These projects tended to cost more than the other types of mitigation measures, but corrected previously identified, highly vulnerable critical facilities or sites. The costs of repair for all of the construction projects exceeded the costs of studies, the benefits accrued in terms of avoiding further damage, and/or the possibility of lawsuits, exceeded the construction costs. Four of the construction-related projects were for basin stabilization in vulnerable watercourses and ravines.

Seven of the 15 projects are completed, and three are ongoing programs that will continue in the 2009 Plan Update. Table 3-1 is provided that illustrates the status of the 2004 project and if the project is continued in the 2009 Plan Update, the Program name is provided.

**Table 3-1 City of Mercer Island Hazard Mitigation Plan 2004 Project Status**

<table>
<thead>
<tr>
<th>2004 Number</th>
<th>2004 Project Name</th>
<th>Project Status</th>
<th>2009 Project Name (if continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Reference the policies in section III.1.1 into the designated Comprehensive Plan Elements</td>
<td>Ongoing</td>
<td>Incorporate Hazard Mitigation policies into City Comprehensive Plan</td>
</tr>
<tr>
<td>2</td>
<td>Perform flow monitoring and modeling in watercourses where property damage occurs during major storm events, such as East Mercer Way. Prioritize problems identified and prepare project scopes and budgets.</td>
<td>Ongoing</td>
<td>Develop/Maintain Watercourse CIP list</td>
</tr>
<tr>
<td>3</td>
<td>Build new storage to improve the City’s ability to provide water during a major disaster that occurs during peak-demand conditions. Conduct an analysis to identify alternative storage options, including well(s), reservoir, or other. Conduct the siting evaluation for a new water storage facility, using knowledge of hazard areas as one criterion, and develop a funding strategy to create new storage.</td>
<td>Completed</td>
<td></td>
</tr>
</tbody>
</table>
## Mitigation Strategies

<table>
<thead>
<tr>
<th>2004 Number</th>
<th>2004 Project Name</th>
<th>Project Status</th>
<th>2009 Project Name (if continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Stabilize the Basin 29 watercourse and ravine.</td>
<td>Completed</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Stabilize the Basin 26 watercourse and ravine.</td>
<td>Completed</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Stabilize the Basin 45b watercourse and ravine.</td>
<td>Completed</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Stabilize the Basin 46a watercourse and ravine.</td>
<td>Completed</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Slip-line four aging and damaged East Mercer Way culverts.</td>
<td>Completed 7 rehabilitation projects</td>
<td>Rehabilitate damaged storm culverts</td>
</tr>
<tr>
<td>9</td>
<td>Develop a facility plan for the Fire Division’s operations and ability to respond to a key hazard event. Alternative means to achieve objectives may include the upgrade or decommissioning of the South Fire Station, implementing a portable pumping system and identification of new water sources or storage opportunities. Study and upgrade of the fleet to maintain the current response abilities of the Fire Division.</td>
<td>Four new trucks have been added. Facility plan is in process - City council to make the decision.</td>
<td>3 of the 4 new trucks are still to be delivered</td>
</tr>
<tr>
<td>10</td>
<td>To reduce fire ignitions and fuel sources, implement a FireWise Program to reduce ignition and fire spread. The FireWise Program stresses vegetation management, as well as implementation of buffers and education. Fire-resistant construction techniques, including roof materials, will be specified for new construction.</td>
<td>Ongoing</td>
<td>Firewise Program</td>
</tr>
<tr>
<td>11</td>
<td>The City already has implemented a variety of cost-effective measures to “harden” it’s IT systems. The City now needs to create and implement a Business Continuity Plan.</td>
<td>Ongoing</td>
<td>IT Systems Continuity</td>
</tr>
<tr>
<td>12</td>
<td>Create a GIS layer for the Comprehensive Plan that defines the presumed location of the Seattle Fault and other geohazards on Mercer Island.</td>
<td>Completed</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Update the Critical Areas Code with BAS to address the newest information about landslide and seismic vulnerability of Mercer Island. This information can then be used to guide siting and design of new construction.</td>
<td>Completed</td>
<td>Ongoing</td>
</tr>
<tr>
<td>14</td>
<td>Undertake open space acquisition in critical areas after failure within the critical area (especially from landslides).</td>
<td>Not Completed</td>
<td>Program Discontinued</td>
</tr>
<tr>
<td>15</td>
<td>Replace fuel tanks for sewer pumping stations because when sewage pumping stations fail during an earthquake, environmental damage is significant (e.g., contamination of Lake Washington). The City should establish and fund a comprehensive preventative maintenance and replacement program for the back-up generators for the 18 pump stations serving Mercer Island’s sewage collection system.</td>
<td>Ongoing</td>
<td>Sewer generator replacement program</td>
</tr>
</tbody>
</table>
3.2.4 2009 Plan Update – Mitigation Strategies

For the 2009 Plan update, Mercer Island elected to use a different approach to categorizing their programs. They determined that categorizing the programs by funding sources was the better fit as projects from different departments would not be competing for the same funding.

The selected projects for the 2009 Plan Update are presented in Table 3-2. The table lists the project number, name, location of impact, schedule, potential funding source, department responsible for implementation and the hazard it addresses.

**Table 3-2 2009 Plan Update Program Mitigation Strategies**

<table>
<thead>
<tr>
<th>2009 Plan Program Number</th>
<th>Project Name</th>
<th>Location</th>
<th>Schedule</th>
<th>Potential Funding Source</th>
<th>Department Responsible for Implementation</th>
<th>Hazard Category Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Incorporate Hazard Mitigation policies into City Comprehensive Plan</td>
<td>City-wide</td>
<td>2010-2011</td>
<td>General Fund</td>
<td>Police (Emergency Management)</td>
<td>all</td>
</tr>
<tr>
<td>2</td>
<td>Develop/Maintain Watercourse CIP list</td>
<td>City-wide</td>
<td>biannual</td>
<td>Stormwater</td>
<td>Development Services (City Engineer)</td>
<td>Localized Flooding/Landslide and Erosion</td>
</tr>
<tr>
<td>3</td>
<td>Rehabilitate damaged storm culverts</td>
<td>system-wide</td>
<td>annual</td>
<td>Stormwater</td>
<td>Maintenance</td>
<td>Localized Flooding/Landslide and Erosion</td>
</tr>
<tr>
<td>4</td>
<td>Large Ravine/Watercourse Projects</td>
<td>system-wide</td>
<td>biannual</td>
<td>Stormwater</td>
<td>Maintenance</td>
<td>Localized Flooding/Landslide and Erosion</td>
</tr>
<tr>
<td>5</td>
<td>Small Ravine/Watercourse Projects</td>
<td>system-wide</td>
<td>annual</td>
<td>Stormwater</td>
<td>Maintenance</td>
<td>Localized Flooding/Landslide and Erosion</td>
</tr>
<tr>
<td>6</td>
<td>Replace aging watermains</td>
<td>system-wide</td>
<td>annual</td>
<td>Water</td>
<td>Maintenance</td>
<td>Earthquake/Landslide and Erosion</td>
</tr>
<tr>
<td>7</td>
<td>Sewer generator replacement program</td>
<td>system-wide</td>
<td>annual</td>
<td>Sewer</td>
<td>Maintenance</td>
<td>Severe Storm/tsunami/seiche</td>
</tr>
<tr>
<td>8</td>
<td>Sewer rehab/replace</td>
<td>system-wide</td>
<td>annual</td>
<td>Sewer</td>
<td>Maintenance</td>
<td>Earthquake</td>
</tr>
<tr>
<td>9</td>
<td>Emergency Program</td>
<td>City-wide</td>
<td>annual</td>
<td>General Fund</td>
<td>Police (Emergency Management)</td>
<td>All</td>
</tr>
<tr>
<td>10</td>
<td>IT Systems Continuity</td>
<td>City-wide</td>
<td>annual</td>
<td>General Fund</td>
<td>Information and Geographic Services</td>
<td>Earthquake</td>
</tr>
<tr>
<td>11</td>
<td>Firewise</td>
<td>system-wide</td>
<td>unfunded</td>
<td>General Fund</td>
<td>Fire</td>
<td>Urban Fire</td>
</tr>
</tbody>
</table>

The first project listed above is “Incorporate the Hazard Mitigation policies into the City Comprehensive Plan.” This corresponds to the first project listed in the 2004 Plan. By continually coordinating policies with the Comprehensive Plan, Mercer Island believes that the entire community would receive the maximum benefits of
the hazard mitigation measures. The additional costs above and beyond ongoing levels of effort by existing staff were deemed by the City to be negligible and/or have been provided to the City via grants. Benefits were determined to be significant as shown in the Table 3.3. Also, by continually coordinating the policies with the comprehensive plan, new buildings and infrastructure will be analyzed to assure these assets are being protected from hazards.

A major portion of the projects mitigate flooding and landslide hazards through the stormwater funding category. Completing these programs can potentially reduce the damage for the entire city. The development and maintenance of the Watercourse CIP list will provide a basis for prioritization of future projects to be implemented by the City of Mercer Island. These projects either may benefit a smaller area, such as residents along East or West Mercer Way, or they could benefit the entire city, e.g., through sufficient water detention. Furthermore, the plan coordination and education projects all reduce the likelihood of cascading effects. Both categories will result in long-term potential benefits through improved construction quality in the future.

Replacing aging water mains is among the top priorities for the City’s water utility. There is a significant amount of asbestos cement (AC) water main scheduled to be replaced with ductile iron (DI).

Emergency operations program upgrades are necessary to respond effectively to a hazard event. Upgrades to the existing communications and shelter infrastructure and the purchase of additional communications equipment for the Emergency Operations Center (EOC) are part of this program.

Two programs are funded through the sewer department; each addressing different hazards. The Sewer generator replacement program addresses electrical power reliability for the lift stations near the water that are likely to be affected by severe storms. The Sewer rehab/replacement program upgrades pipes for improved reliability. The Sewer Lake Line Replacement Project is removing the most vulnerable section of the Island’s primary line, which is located in Lake Washington.

The firewise program is a continuation from a program in the 2004 Plan. The objective is to reduce fire ignitions and fuel sources by stressing vegetation management, implementation of buffers, and providing fire education to the residents. Fire-resistant construction techniques, including roof materials, will be specified for new construction.

3.2.4.1 National Flood Insurance Program

Although there is low possibility of flooding, Mercer Island does participate in the National Flood Insurance Program. According to FEMA, after October 1, 2008 all local mitigation plans approved by FEMA must address repetitive loss structures in the risk assessment by describing the types and estimate the numbers of repetitive loss properties located in identified flood hazard areas. A repetitive loss property is a property which two or more losses of at least $1,000 each have been paid under the National Flood Insurance Program (NFIP) within any 10-year period since 1978. The City of Mercer Island has one repetitive loss structure located in the southeast section of the Island. The residential structure was damaged in 1980 and 1984 with a total payment of $11,700.

Flood zones are geographic areas that the FEMA has defined according to varying levels of flood risk. These zones are depicted on a community’s Flood Insurance Rate Map (FIRM) or Flood Hazard Boundary Map. Each zone reflects the severity or type of flooding in the area. Mercer Island initially identified their FIRM map in May 1995.

Mercer Island is categorized with a Flood Zone C designation. This indicates that the City may have ponding and local drainage problems but does not warrant a detailed study or designation as base floodplain. As shown above in Table 3-2, the City has identified four programs that will address localized drainage problems:

- Develop/Maintain Watercourse CIP List
- Rehabilitate damaged storm culverts
Large Ravine/Watercourse Projects

Small Ravine/Watercourse Projects

As shown in Table 3-2, there is a department or staff identified that is responsible for the administration of these programs. The City Engineer is the responsible staff to develop the CIP, which will include developing/maintaining the water course CIP list. The department responsible for implementing the remaining three programs is the maintenance department.

3.2.5 Cost-Benefit Analysis of Mitigation Measures

For the 2004 Plan, the projects were ranked by priority of high, medium or low and only included high and medium rated projects into the Plan. For the 2009 Plan update, each program was provided a calculated ranking based on its cost benefit analysis from zero to one hundred. Programs were then ranked against each other within their funding source department. Below is the step by step process to perform the benefit/cost analysis. Table 3-3 shows each project ranked within category based on the cost to benefit analysis shown below.

The ranking methodology was based on the following cost/benefit analysis procedure:

- Step 1: Determine the program costs avoided, which are the estimated costs avoided by mitigating the hazard prior to the occurrence of the hazard event. [Provide by the City]
- Step 2: Determine the percent of risk reduction. This is the estimated percentage the program will reduce the risk. [Determined by City and Consultant] This suggests that if a project was implemented the project won’t reduce all the risk associated with a hazard. For example, if an AC water main is replaced with a DI water main, there still remains a possibility that an earthquake will damage the DI water main, even though the risk is significantly reduced.
- Step 3: Multiply the outcome of step one (project costs avoided) with the remaining percentage of risk (one minus percent of risk reduction). This produces the Cost at Risk after Mitigation. This means that if a project was implemented there still remains a probability that the project won’t reduce all the risk associated with a hazard. For example, if an AC water main is replaced with a DI water main, there still remains a possibility that an earthquake will damage the DI water main, even though the risk is significantly reduced.
- Step 4: Calculate the benefit by subtracting the outcome of step three (costs still at risk after mitigation) from the outcome of step one (project costs avoided).
- Step 5: Calculate the benefit to cost ratio by dividing the total program cost by the outcome of step four (benefit).
### Table 3-3 Cost / Benefit Analysis Ranking by Category

<table>
<thead>
<tr>
<th>2009 Program Name</th>
<th>Total Project Cost</th>
<th>Project Costs Avoided - Estimated Cost of Damage Avoided by Program</th>
<th>Percent of Risk Reduction</th>
<th>Costs still at Risk after Mitigation</th>
<th>Benefit (Risk Reduction - $ or total costs avoided)</th>
<th>Benefit to Cost ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incorporate Hazard Mitigation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>policies into City Comprehensive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Develop/Maintain Watercourse</td>
<td>$50,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>CIP list</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rehabilitate damaged storm</td>
<td>$20,000</td>
<td>$2,000,000</td>
<td>80</td>
<td>$400,000</td>
<td>$1,600,000</td>
<td>80</td>
</tr>
<tr>
<td>culverts</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large Ravine/Watercourse Projects</td>
<td>$1,000,000</td>
<td>$350,000</td>
<td>80</td>
<td>$70,000</td>
<td>$280,000</td>
<td>0.3</td>
</tr>
<tr>
<td>Small Ravine/Watercourse Projects</td>
<td>$150,000</td>
<td>$25,000</td>
<td>80</td>
<td>$5,000</td>
<td>$20,000</td>
<td>0.1</td>
</tr>
<tr>
<td>Replace aging watermains</td>
<td>$997,000</td>
<td>$5,000</td>
<td>95</td>
<td>$250</td>
<td>$4,750</td>
<td>0.005</td>
</tr>
<tr>
<td>Sewer generator replacement program</td>
<td>$50,000</td>
<td>$500,000</td>
<td>70</td>
<td>$150,000</td>
<td>$350,000</td>
<td>7</td>
</tr>
<tr>
<td>Sewer rehab/replace</td>
<td>$500,000</td>
<td>$250,000</td>
<td>50</td>
<td>$125,000</td>
<td>$125,000</td>
<td>0.3</td>
</tr>
<tr>
<td>Emergency Program</td>
<td>$50,000</td>
<td>$5,000,000</td>
<td>50</td>
<td>$2,500,000</td>
<td>$2,500,000</td>
<td>50</td>
</tr>
<tr>
<td>IT Systems Continuity</td>
<td>$75,000</td>
<td>$400,000</td>
<td>80</td>
<td>$80,000</td>
<td>$320,000</td>
<td>4.3</td>
</tr>
<tr>
<td>Firewise</td>
<td>$100,000</td>
<td>$1,000,000</td>
<td>30</td>
<td>$700,000</td>
<td>$300,000</td>
<td>3</td>
</tr>
</tbody>
</table>

For a specific project, within one of the above programs, requesting FEMA funds for an actual construction-related project, a detailed cost-benefit analysis will be prepared and submitted in accordance with FEMA guidelines, such as Office of Management and Budget (OMB) Circular A-94 or whatever is current at the time of application.
Chapter 4 - PLAN IMPLEMENTATION AND MAINTENANCE

4.1 Plan Adoption

4.1.1 Adoption
This document will be adopted by the City Council by resolution (see Appendix B, Item 4). A copy of the confirmation of adoption of the Plan will be provided in Appendix B after Plan approval is granted by State EMD and FEMA. Plan policies also will be referenced into appropriate Comprehensive Plan elements in the 2005 Comprehensive Plan update.

4.1.2 Incorporation into Other Plans
The Hazard Mitigation Plan will be referenced in the Comprehensive Plan when it is updated again. The responsible person for the incorporation is the project manager for the Comprehensive Plan, Principal Planner. The Planning Commission will review the Comprehensive Plan update, and the City Council will approve the final update adoption. After incorporation of a reference or possible policies into the Comprehensive Plan update, it will be the responsibility of the Emergency Management staff, the Maintenance/Engineering staff and City Planning staff to insure elements of the Comprehensive Plan and Hazard Mitigation Plan are followed.

4.2 Monitoring, Evaluating and Updating the Plan

4.2.1 Monitoring and Evaluating the Plan
The Maintenance Department will be responsible for monitoring and evaluating the Plan. This Plan will be reviewed annually and modified as needed. Additionally, the Plan will be reviewed after a natural hazard event has occurred. In both cases, a debrief will occur to determine if the Plan is performing as expected and meeting the anticipated goals. If modifications or revisions are deemed necessary, the Plan will be updated. Table 4-1 shown below is a checklist / matrix that can be used annually and after each hazard event occurs to assess the changes and evaluate the Plan.

Annually, the Maintenance Department will review any new information from the comprehensive emergency management program, capital improvement program, and comprehensive plan to determine if strategies need to be adjusted.
### Table 4-1 Monitoring Checklist

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Location</th>
<th>Extent</th>
<th>Description of Vulnerability for each hazard</th>
<th>Impact for each Hazard</th>
<th>Comprehensive Range of Actions and Projects for each hazard?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earthquake</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Severe Storm</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Landslide and Erosion</td>
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<td></td>
</tr>
<tr>
<td>Tsunami/Seiche</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Localized Flooding</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban Fire</td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>
4.2.2 Updating the Plan

The Maintenance Department will be responsible for updating the Plan, which will need to be updated again in 2014. During the five year update cycle, the maintenance department will review the hazards to determine if any new hazards need to be addressed. The State EMD and FEMA must approve of the Plan every five years after Plan adoption. In accordance with goals and elements identified in section 3.1.1 of this document, the City of Mercer Island Land Development Code [Critical Areas Ordinance], as well as the CIP and Comprehensive Water System Plan updates, are additional planning mechanisms that will become available for incorporating recommendations of this Plan.

City-wide coordination will continue through the Maintenance Department. If necessary, members on the TAC will be convened which will include representatives of City Departments that will provide a comprehensive view of city plans and operations?

4.2.3 Public Involvement

Public involvement is a vital component in preparing an effective hazard mitigation plan. With this in mind, the City took steps to encourage neighboring jurisdictions, elected officials, and private citizens to contribute to the Plan development. During the Plan development several Utility Board Meetings included information on the Plan. These meetings are open to the public and provide an opportunity for interested parties to contribute to the development of the Plan.

As mentioned in the Planning Process chapter public involvement took place in the creation of this Plan.

- Mercer Island held public meetings on March 9 and July 13, 2010, at Utility Board Meetings for the public to have an opportunity to comment on the changes to the previous Plan as part of the updating process. No members of the public chose to attend either hearing. The City posted information about these meetings on their website and notification was sent out in the Mercer Island Reporter.

The City will continue to provide the public with information and updates on the Plan as changes or modifications are made. Notification of future public meetings on the update of the Hazard Mitigation Plan will be advertised in the Mercer Island Reporter (local newspaper). The Maintenance Department will be responsible for providing prior notification of the Utility Board meetings to the newspaper, and the Department of Development Services will be responsible for providing prior notification of the Planning Commission meetings to the newspaper.

Continued involvement will be through annual presentation of the implementation progress at the Utility Board and the Planning Commission meetings. The meeting dates and agenda are published prior to each meeting on the City website and posted locally in the Mercer Island Reporter. The public is invited to attend the meetings and will be asked at the meetings to provide oral or written feedback to the Maintenance Department.

A copy of the Plan, as updated, will be made available to the public at the Maintenance Department and through the Emergency Manager. This availability will be regularly announced in conjunction with the agenda of the Planning Commission and Utility Board meetings at which the implementation progress is presented. The Plan also will be available for the public on the City’s website. The “Maps” portion of this Plan are exempt from disclosure under RCW Section 42.56.420. Feedback by the public to the Maintenance Department will be encouraged in a statement placed where the Plan is posted on the City website that includes contact numbers (e-mail and telephone) for the Maintenance Department.
Appendix A –

Public Involvement Documents
Utility Board

For Meeting of 3/9/2010
7:00 PM to 9:00 PM
Mercer Island Library

Board Members: Robert Sexton, Chairman, David Laub, Vice Chairman, Benjamin Levie, Joel Massmann, Callie Ridolfi, Glynda Steiner
Council Liaison: Steve Litzow
Staff: Glenn Boettcher, Maintenance Director
       Chip Corder, Finance Director
       Francie Lake, Deputy Finance Director
       Patrick Yamashita, City Engineer
       Anne Tonella-Howe, Assistant City Engineer
       Terry Smith, Utilities Operations Manager
       Terry Winkel, Recording Secretary

Agenda topics

7:00 PM   Approve Minutes   All
7:10 PM   Hazard Mitigation Plan Update   All
7:30 PM   Emergency Well Review & Site Visit   All
8:30 PM   2010 Work Plan   All
8:40 PM   Project Updates   All

Transmitted via Email: Jan 12, 2010 Meeting Minutes
                       2010 Work Plan

Next Meeting: 4/13/2010
CALL TO ORDER:

Robert Sexton, Chairman, called to order the regular meeting of the Utility Board at 7:05 p.m. in the Mercer Island Library, 4400 88th Ave. SE, Mercer Island, WA.

ROLL CALL:

Board Members Robert Sexton, Chairman, David Laub, Vice Chairman, Callie Ridolfi, Glynda Steiner, Joel Massmann and Council Liaison Steve Litzow were present. Board Member Ben Levie was absent.

Staff Members Glenn Boettcher, Rona Lin, Anne Tonella-Howe, Terry Smith and Terry Winkel were present.

MINUTES:

The Minutes of the January 12, 2010 meeting were approved.

APPEARANCES:

Jennifer Franklin

REGULAR BUSINESS:

Hazard Mitigation Plan Update

Glenn advised the Board that the Hazard Mitigation Plan is required to be updated every 6 years to maintain the City's eligibility for FEMA funding; federal funding is paying for the update of the Plan. Goals and objectives are reviewed and prioritized and mitigation projects identified. Public involvement and outreach is under way. A draft of the Plan will be presented to the State this spring.

2010 Work Plan

The June Utility Board meeting will also include discussion regarding the City's long-range rate strategy for the three utilities, identifying goals and reviewing philosophy.

Project Updates

Sewer Lake Line

Anne advised that Pump Station 4 is almost complete. The project is on schedule & on budget. Some contingency monies have been used for change orders. Side sewer connections, the next phase of the project, may be the most complicated. A public information campaign for residents who will be affected will begin in May.
Emergency Well Review & Site Visit

Glenn advised the Board that the City is preparing a document discussing the reliability of the well in a major seismic event. The document will soon be made available to the Board and the broader community. It will also be offered for publication in the MI Reporter.

Jennifer Franklin advised that volunteer training for Emergency Well operations is scheduled for April 17 at the Well site.

Rona reported that project is on schedule, with initial startup on February 18. Distribution sites are currently being installed at the Well site by the Maintenance Department’s Utility Team. Well water testing will be done monthly as required by the State Department of Health.

The Utility Board walked to the Emergency Well site for a tour. Terry Smith explained how the system works and specific features. Jennifer talked about the different functions of the volunteer groups. The Board discussed the need for City staff to be in charge of the site in an emergency. Rona advised the Board that City staff is preparing a well operations manual in conjunction with the project’s consulting engineer.

OFF AGENDA

None.

NEXT MEETING: April 13, 2010

ADJOURNMENT: 8:50 p.m.

Terry Winkel
Recording Secretary
Hazard Mitigation planning is defined as the on-going process of identifying known hazards, assessing hazard vulnerability and determining risk, prioritizing and developing strategies to determine how to reduce or eliminate the loss of life or property damage resulting from natural and human-caused hazards, and proposing a variety of possible projects based on these terms.

Having a Hazard Mitigation Plan in place will serve the City of Mercer Island well. Many benefits include saving lives, protecting property, creating a safer community, and enhancing economic security.

A local mitigation plan is the representation of the jurisdiction's commitment to reduce risks from hazards, and serving as a guide for decision makers as they commit resources to reduce the effects of natural hazards and man-made disasters.

Your comments are requested in our partnership of preparedness and creating a more disaster resistant community.

Please submit your comments and any feedback to Jennifer Franklin, Emergency Preparedness Officer at 206.275.7905 or jennifer.franklin@mercergov.org or Glenn Boettcher, Maintenance Director at 206.275.7802 or glenn.boettcher@mercergov.org.

2010 Update

In 2010 the City of Mercer Island will be updating the Hazard Mitigation Plan.

The Utility Board is now seeking comments on the City of Mercer Island 2004 Hazard Mitigation Plan. The Utility Board will be discussing updates to the plan at their March 9, 2010 meeting at 7:30 pm in the Mercer Island City Council Chambers (9611 SE 36th Street). To view the 2004 Hazard Mitigation Plan, click on the links below.

Comments can be submitted in writing to Glenn Boettcher, Maintenance Director at 9611 SE 36th Street, Mercer Island, WA 98040, by email at glenn.boettcher@mercergov.org, or at the March 9, 2010 Utility Board meeting.
STATE OF WASHINGTON, COUNTY OF KING
AFFIDAVIT OF PUBLICATION

PUBLIC NOTICE
Linda M Mills, being first duly sworn on oath that she is the Legal Advertising Representative of the

Mercer Island Reporter

a weekly newspaper, which newspaper is a legal newspaper of general circulation and is now and has been for more than six months prior to the date of publication hereinafter referred to, published in the English language continuously as a weekly newspaper in King County, Washington. The Mercer Island Reporter has been approved as a Legal Newspaper by order of the Superior Court of the State of Washington for King County.
The notice in the exact form annexed was published in regular issues of the Mercer Island Reporter (and not in supplement form) which was regularly distributed to its subscribers during the below stated period. The annexed notice, a:

Public Notice

was published on February 24, 2010 and March 3, 2010.

The full amount of the fee charged for said foregoing publication is the sum of $88.40.

Linda M. Mills
Legal Advertising Representative, Mercer Island Reporter
Subscribed and sworn to me this 3rd day of March, 2010.

Kathy Dalseg, Notary Public for the State of Washington, Residing in Covington, Washington
P. O. Number:
Appendix B –
Approval Documents
City Approval Resolution – To Be Inserted Later
FEMA Approval Letter – To Be Inserted Later
Appendix C - Figures

(Not to be included in Public Document)