
City of Seattle
2015 – 2021 All-Hazards Mitigation Plan



FEMA Approval: 2/16/2016

Prepared by:
City of Seattle
Office of Emergency Management



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MEMORANDUM OF PROMULGATION

IMPLEMENTATION AND PROMULGATION

This version of the City of Seattle All-Hazards Mitigation Plan supersedes and rescinds all previous versions of the Seattle Disaster Readiness and Response Plan.

This plan has been formally approved by the City of Seattle Disaster Management Committee, Emergency Executive Board, Mayor of the City of Seattle, and formally approved by the City Council. It is approved for promulgation as a part of the City's Comprehensive Emergency Management Plan.

In the event that any portion of this plan is held invalid by judicial or administrative ruling, such ruling shall not affect the validity of the remaining portions of this plan.

The Director of the City of Seattle Office of Emergency Management may conduct reviews and updates on a regular basis subject to approval of the Seattle Disaster Management Committee. Major revisions and recertification of any part of this plan must be approved and signed by the Mayor of the City of Seattle and adopted by the Seattle City Council.

The City of Seattle All-Hazards Mitigation Plan shall be electronically distributed to all stakeholders named in the suite of plans and be available to the public on the City of Seattle website.


Edward B. Murray
Mayor, City of Seattle

5-20-15
Date



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VISION, MISSION, AND GUIDING PRINCIPLES

In an effort to align planning documents across all phases of emergency management, the City of Seattle Office of Emergency Management has collaboratively developed a vision, mission, and guiding principles that will provide a conceptual framework for all of the plans that support the City's emergency program, including the 2015 update of the City of Seattle All-Hazards Mitigation Plan.

VISION

Disaster ready...prepared people, resilient community

MISSION

We partner with the community to prepare for, respond to, mitigate the impacts of, and recover from disasters.

GUIDING PRINCIPLES

Comprehensive: We consider and take into account all hazards, all phases, all stakeholders, and all impacts relevant to disasters.

Progressive: We anticipate future disasters and take preventive and preparatory measures to build disaster-resistant and disaster-resilient communities.

Risk-Driven: We use sound risk management principles (hazard identification, risk analysis, and impact analysis) in assigning priorities and resources.

Integrated: We ensure unity of effort among all levels of government and all elements of the community.

Collaborative: We create and sustain broad and sincere relationships among individuals and organizations to encourage trust, advocate a team atmosphere, build consensus, and facilitate communication.

Flexible: We use creative and innovative approaches in solving disaster challenges.

Professional: We value a science- and knowledge-based approach based on education, training, experience, ethical practice, public stewardship, and continuous improvement.



PLAN ADOPTION AND APPROVAL

44 CFR §201.6(c)(5) requires that the City of Seattle All-Hazards Mitigation Plan be formally adopted by the Seattle City Council. Council formally adopted the 2015 update of the Seattle All-Hazards Mitigation Plan on **December 7, 2015**. The plan adoption resolution follows.

This plan was approved by the Federal Emergency Management Agency on **February 11, 2016**. The official approval letter follows.



Barb Graff
SPD OEM Comprehensive Emergency Management Plan (CEMP) RES
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CITY OF SEATTLE
RESOLUTION 31632

A RESOLUTION related to the City’s Emergency Management Program; amending the Comprehensive Emergency Management Plan Base Plan, Emergency Operations Plan, and All-Hazards Mitigation Plan as required by Seattle Municipal Code Section 10.02.050, RCW 38.52.077, and WAC 118-30-060.

WHEREAS, Section 10.02.050 of the Seattle Municipal Code (SMC) requires that a Disaster Readiness and Response Plan be kept current, and that, under the direction of the Mayor, proposed amendments to the plan be presented to the City Council for review and approval by resolution; and

WHEREAS, Section 10.02.060 of the SMC creates a Disaster Management Committee, which periodically reviews and makes recommendations for the revision of the City’s disaster response plans consistent with chapter 38.52 RCW; and

WHEREAS, the Disaster Management Committee has formally reviewed and approved three of the five components of the Comprehensive Emergency Management Plan (CEMP) – the Base Plan, Emergency Operations Plan, and All-Hazards Mitigation Plan; and

WHEREAS, the Federal Emergency Management Agency (FEMA) has established a policy that requires recipients and potential recipients of Hazard Mitigation funding to have an All-Hazards Mitigation Plan; and

WHEREAS, FEMA’s policy requires that the City’s All-Hazards Mitigation Plan be formally adopted by City Council and submitted for approval by FEMA through the Washington Military Department; and

WHEREAS, the City’s All-Hazards Mitigation Plan is one of the suite of plans under the CEMP;
and



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1 WHEREAS, the Office of Emergency Management is responsible for coordinating the revision
2 to the City’s All-Hazards Mitigation Plan every five years; and
3 WHEREAS, the Office of Emergency Management has worked closely with representatives of
4 City departments and external partner organizations to revise the Plan; and
5 WHEREAS, the Office of Emergency Management has submitted the CEMP – Base Plan,
6 Emergency Operations Plan, and All-Hazards Mitigation Plan to the Mayor for his
7 promulgation; and
8 WHEREAS, the Mayor, in accordance with Washington Administrative Code 118-30-060(6),
9 and after careful consideration, has signified his endorsement of the CEMP – Base Plan,
10 Emergency Operations Plan, and All-Hazards Mitigation Plan by Promulgation
11 Memorandum; and
12 WHEREAS, in addition to the CEMP – Base Plan, Emergency Operations Plan, and All-Hazards
13 Mitigation Plan, the Seattle Hazard Identification and Vulnerability Analysis and Disaster
14 Recovery Framework will be presented to Council in future years as part of an effort to
15 expand the update and approval process for the City’s key Emergency Management plans
16 over a five-year period; and
17 WHEREAS, under Section 10.02.050 of the SMC, after City Council review and approval of the
18 CEMP – Base Plan, Emergency Operations Plan, and All-Hazards Mitigation Plan by
19 Resolution, the Mayor shall be authorized to exercise the powers provided by these plans;
20 NOW, THEREFORE,
21 **BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF SEATTLE, THE**
22 **MAYOR CONCURRING, THAT:**



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1 Section 1. The latest version of the Comprehensive Emergency Management Plan
2 (CEMP) – Base Plan, dated May 21, 2015, attached to this resolution as Exhibit 1, has been
3 reviewed and is approved.

4 Section 2. The latest version of the CEMP – Emergency Operations Plan, dated June 29,
5 2015, attached to this resolution as Exhibit 2, has been reviewed and is approved.

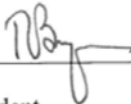
6 Section 3. The latest version of the CEMP – All-Hazards Mitigation Plan, dated May 21,
7 2015, attached to this resolution as Exhibit 3, has been reviewed and is approved.

8
9




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1 Adopted by the City Council the 7th day of December, 2015, and
2 signed by me in open session in authentication of its adoption this 7th day
3 of December, 2015.

4 
5 President _____ of the City Council

6
7 The Mayor concurred the 17th day of December, 2015.

8 
9 _____
10 Edward B. Murray, Mayor

11
12 Filed by me this 17th day of December, 2015.

13 
14 _____
15 Monica Martinez Simmons, City Clerk

16
17 (Seal)

18
19 Attachments:

- 20 Exhibit 1 – Comprehensive Emergency Management Plan – Base Plan and ESF Annexes
- 21 Exhibit 2 – Comprehensive Emergency Management Plan – Emergency Operations Plan
- 22 Exhibit 3 – Comprehensive Emergency Management Plan – All-Hazards Mitigation Plan
- 23 Exhibit 3 Appendix A – Seattle Hazard Identification and Vulnerability Analysis



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- 1 Exhibit 3 Appendix B – Plan Process Materials
- 2 Exhibit 3 Appendix C – Stakeholder Engagement
- 3 Exhibit 3 Appendix D – Mitigation Action Worksheets
- 4 Exhibit 3 Appendix E – FEMA Plan Review Tool
- 5 Exhibit 3 Appendix F – NFIP Data
- 6 Exhibit 3 Appendix G – Seismic Risk Assessment Methodology and Demonstration
- 7 Project



U.S. Department of Homeland Security
Region X
130 228th Street, SW
Bothell, WA 98021-9796



FEMA

February 11, 2016

Honorable Edward B. Murray
Mayor, City of Seattle
600 4th Avenue #7
Seattle, Washington 98104

Dear Mayor Murray:

The U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) has approved the *City of Seattle All-Hazards Mitigation Plan* as a local plan as outlined in 44 CFR Part 201. With approval of this plan, the City of Seattle is now eligible to apply for the Robert T. Stafford Disaster Relief and Emergency Assistance Act's hazard mitigation project grants through February 10, 2021.

The plan's approval provides eligibility to apply for hazard mitigation projects through your state. All requests for funding will be evaluated individually according to the specific eligibility and other requirements of the particular program under which the application is submitted. For example, a specific mitigation activity or project identified in the plan may not meet the eligibility requirements for FEMA funding, and even eligible mitigation activities are not automatically approved for FEMA funding under any of the aforementioned programs. Approved mitigation plans may be eligible for points under the National Flood Insurance Program's Community Rating System (CRS). Additional information regarding the CRS can be found at www.fema.gov/national-flood-insurance-program-community-rating-system or through your local floodplain manager.

Over the next five years, we encourage your community to follow the plan's schedule for monitoring and updating the plan, and develop further mitigation actions. The plan must be reviewed, revised as appropriate, and resubmitted for approval within five years in order to continue project grant eligibility.

If you have questions regarding your plan's approval or FEMA's mitigation grant programs, please contact, Morgan Mak, Mitigation and Recovery Strategist with Washington Emergency Management Division, at (253) 512-7000, who coordinates and administers these efforts for local entities.

www.fema.gov



Mayor Murray
February 22, 2016
Page 2

Sincerely,

A handwritten signature in blue ink that reads "Mark Carey".

Mark Carey, Director
Mitigation Division

cc: Morgan Mak, Washington Emergency Management Division

Enclosure

BH



ACKNOWLEDGEMENTS

The City of Seattle All-Hazards Mitigation Plan is an ongoing effort of the Seattle Office of Emergency Management to ensure the City's comprehensive approach to preparing for, mitigating the impacts of, responding to, and recovering from a disaster. Preparation of this document, and its continued improvement, requires participation and support from many individuals, agencies, organizations, and businesses. City departments, other agencies, and employees deserve recognition for their efforts to develop this plan.

Additionally, the City would like to acknowledge the efforts of the following key individuals and organizations for their contribution to development of this plan:

- Members of the Seattle Hazard Mitigation Work Group for investment of time and expertise in updating this plan.
- Seattle City Light for hosting the Mitigation Work Group meetings.
- Seattle Parks and Recreation for hosting the first public meeting.

Copies of this plan are available online at www.seattle.gov/emergency/publications or by request through the Seattle Office of Emergency Management Recovery and Mitigation Coordinator.

The 2015 update of the City of Seattle All-Hazards Mitigation Plan was prepared under contract by Ecology and Environment, Inc.



RECORD OF PLAN UPDATE AND APPROVAL

The City of Seattle All-Hazards Mitigation Plan is required to be updated once every five years and submitted to the City for adoption and the Federal Emergency Management Agency for approval. The City may update the plan on a more frequent basis as needed.

Date of Update	Date of City Adoption	Date of FEMA Approval
July 2009	September 14, 2009	October 14, 2009
March 2015	December 7, 2015	February 11, 2016

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ACRONYMS AND ABBREVIATIONS

ADA	Americans with Disabilities Act
ASCE	American Society of Civil Engineers
BPA	Bonneville Power Administration
CERT	Community Emergency Response Team
CIP	Capital Improvement Program
CFR	Code of Federal Regulations
City	City of Seattle
COOP	Continuity of Operations
DMC	Disaster Management Committee
DMA	Disaster Mitigation Act of 2000
DoIT	Department of Information Technology
DFIRM	Digital Flood Insurance Rate Map
DPD	Seattle Department of Planning and Development
EMAP	Emergency Management Accreditation Program
FAS	Seattle Department of Finance and Administrative Services
FEMA	Federal Emergency Management Agency
HMGP	Hazard Mitigation Grant Program
IOPE	Inclusive Outreach and Public Engagement Plan
MWG	Mitigation Work Group
NFIP	National Flood Insurance Program
OEM	Seattle Office of Emergency Management
OSE	Office of Sustainability and Environment
PDMC	Pre-Disaster Mitigation Competitive Grant Program



ROM	rough order of magnitude
SCL	Seattle City Light
SDOT	Seattle Department of Transportation
Seattle HMP	City of Seattle All-Hazards Mitigation Plan
SFD	Seattle Fire Department
SHIVA	Seattle Hazard Identification and Vulnerability Analysis
SNAP	Seattle Neighborhoods Actively Prepare
SPD	Seattle Police Department
SPU	Seattle Public Utilities
Stafford Act	Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988



Alki Beach (Photo Credit: upload.wikimedia.org)

1. INTRODUCTION

Chapter 1 describes the authorities and principles that provide the basis for the City of Seattle’s (City’s) mitigation program as well as provides a description of that organization and how the plan is organized to support it.

The City of Seattle All-Hazards Mitigation Plan (Seattle HMP) is the guiding document for the City’s hazard mitigation program. The plan’s goal is to identify the hazards of which the City is at risk and identify a comprehensive strategy for minimizing potential losses and maximizing opportunity to increase the community’s resiliency. This introductory chapter presents the authorities on which the City’s mitigation program is based, the plan’s purpose and scope, and plan organization.

1.1 Authority

The Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988 (Stafford Act), as amended by the Disaster Mitigation Act of 2000 (DMA 2000), Public Law 106-390, and its implementing Code of Federal Regulations (CFR) provisions, 44 CFR § 201, provide the legal authority for local hazard mitigation planning. The DMA 2000 requires state, local, and tribal governments to develop a hazard mitigation plan that identifies the jurisdiction’s natural hazards, risks, vulnerabilities, and mitigation strategies. The planning process requirements mandated by the Federal Emergency Management Agency (FEMA) (outlined in 44 CFR §201.6) include the following activities:

- Document the planning process.
- Provide stakeholders with an opportunity to participate.
- Conduct and document public involvement.
- Incorporate existing plans and reports.
- Discuss continued public participation and plan maintenance.
- Provide a method for monitoring, evaluating, and updating the hazard mitigation plan.

Once complete, the hazard mitigation plan must be submitted to FEMA for approval. FEMA’s approval of a hazard mitigation plan is a prerequisite for federal Hazard Mitigation Assistance grant program eligibility (outlined in 42 CFR §5165(a)).

The Seattle HMP was prepared in accordance with the requirements of the Stafford Act, as amended by the DMA 2000, and the implementing 44 CFR § 201 provisions. The City will integrate appropriate Americans with Disabilities Act (ADA) standards into mitigation projects and actions implemented as a part of the planning process. For example, alterations to existing facilities, such as seismic retrofits, will comply with all applicable federal accessibility requirements.

1.2 What is Hazard Mitigation?

Hazard mitigation is any sustained action taken to reduce or eliminate the long-term risk to human life and property posed by hazards (44 CFR §201.2). Hazard mitigation activities may be implemented prior to, during, or after an event. However, it has been demonstrated that mitigation is most effective when

based on an inclusive, comprehensive, long-term plan that is developed before a disaster occurs (2013 Washington State Enhanced Hazard Mitigation Plan).

Additionally, hazard mitigation planning is one of the five mission areas presented in the National Preparedness Goal: Mitigation, Prevention, Protection, Response, and Recovery. The Seattle HMP is an integral piece of the larger emergency management picture and is intrinsically linked to other existing plans and emergency management activities.

Figure 1-1 illustrates these five emergency management mission areas and provides highlights of the plans that exist at the local, state, and federal level to support them.

Figure 1-1 National Preparedness Goal Mission Areas and Supporting Plans



Mitigation planning is important because it not only encourages communities to become more flexible and adapt to change more easily, but it also:

- Guides mitigation activities in a coordinated and economic manner.
- Integrates mitigation into existing community plans/programs.
- Considers future growth and development trends.
- Makes a community more disaster resilient.

- Ensures eligibility for grant funding.

1.3 Purpose and Scope

1.3.1 Purpose

The Seattle HMP assesses the potential impact of the natural and human-caused hazards to the City of Seattle's (City's) communities and provides mitigation goals and strategies to reduce impacts. The Seattle HMP prioritizes the City's mitigation strategies and includes a comprehensive implementation plan. The overall purpose of the Seattle HMP is to strategically guide actions and investments in such a way as to reduce the impacts of natural and human-caused hazards on human life and property. The efforts that have contributed to the development of the Seattle HMP will lead to a safer, stronger, more survivable and resilient city. The 2015 Seattle HMP is the required five-year update to the City of Seattle All-Hazards Mitigation Plan prepared in 2009 and approved by FEMA in 2009. Keeping the Seattle HMP current is a good emergency management practice for the people of Seattle and allows the City to maintain its eligibility for state and federal mitigation funds that support the City's mitigation activities, such as:

- Seismic risk assessments.
- Seismic retrofit projects.
- Urban flooding hazard identification efforts.
- Public education efforts surrounding risks of unreinforced masonry buildings.

The City has also focused on improving interdepartmental coordination in this update to ensure that the plan meets the needs of all City departments.

1.3.2 Scope

The Seattle HMP update covers the jurisdiction of the City and its departments, with the intent of benefitting all residents, businesses, and government and nongovernmental partners. It covers all areas within the City limits, as well as City department services and assets outside the City, such as municipal watersheds and dams.

Priority elements during this update process included:

- Creating a public dialogue around protecting the people of Seattle and building the City's resilience in the face of both minor and catastrophic disaster risks. This involved implementing a public engagement strategy related to hazard mitigation that:
 - Identifies community values.
 - Allows participation and input from a broad range of City departments, local and regional agencies involved in hazard mitigation planning, businesses, residents, and community stakeholder groups.
 - Provides opportunities for the public to comment on the plan during both the drafting stage and prior to final plan approval.

- Generates public acceptance and support for the resulting plan update.
- Meets the City’s Inclusive Outreach and Public Engagement requirements.
- Developing an updated all-hazards mitigation plan that reflects the public and stakeholder input received.
- Ensuring that the process is conducted in accordance with FEMA’s Local Multi-Hazard Planning Guidance (requirements identified in Title 44 CFR Part 201.6 and Emergency Management Accreditation Program (EMAP) Standard 4.4.

1.4 City of Seattle Hazard Mitigation Program

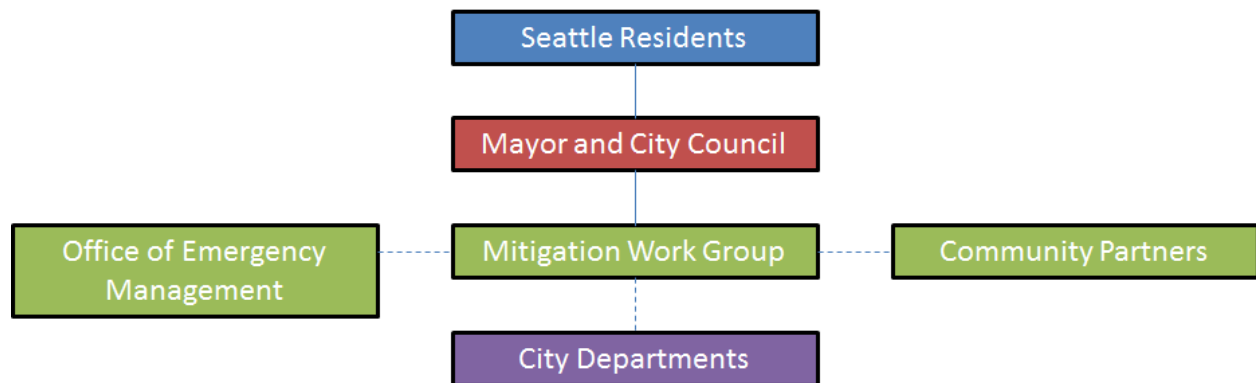
The Seattle HMP is just one aspect of the City’s comprehensive approach to hazard mitigation, which includes Seattle residents, elected leadership, City departments, and community partners.

See Chapter 7 for details on ongoing implementation of the Seattle Mitigation Program.

1.4.1 Organization

Figure 1-2 illustrates how the City organizes to ensure an engaged and collaborative approach to mitigation planning and program implementation. This organization is informally referred to in this plan as the City’s mitigation program.

Figure 1-2 City of Seattle Mitigation Program Organization



1.4.2 Roles and Responsibilities

1.4.2.1 Seattle Residents

Prepared and educated residents are a critical aspect of the City’s resiliency, and the City actively encourages its residents to actively participate in efforts to minimize vulnerability to hazards by engaging in the following activities:

- Participate in the City’s hazard mitigation program by engaging in the City’s preparedness programs. More information can be found at www.seattle.gov/emergency.
- Engage in personal and family preparedness and mitigation activities at home and at work.

1.4.2.2 Mayor and City Council

Seattle's elected leadership plays a key role in the City's mitigation program. As the City's elected representatives, they are responsible for making balanced policy decisions that enhance the City's resiliency. The Mayor and City Council perform the following activities in support of the City's mitigation program:

- Provide policy direction for the City's hazard mitigation program.
- Adopt the hazard mitigation plan.

1.4.2.3 Mitigation Work Group

The Mitigation Work Group (MWG) includes members from various City departments and key stakeholders and convenes regularly to monitor, evaluate, and implement the City's mitigation program. While one of the MWG's main purposes is to serve as the primary mechanism for City participation in updating the Seattle HMP, the City intends its role to continue throughout the planning cycle and serve as a driver for the program's success. Key roles of the MWG include:

- Support ongoing implementation of the City's hazard mitigation program.
- Provide input and technical support for update and maintenance of the Seattle HMP.

See Chapter 2 for a discussion of the role of the MWG in the 2015 update of the Seattle HMP.

1.4.2.4 Seattle Office of Emergency Management

The Seattle Office of Emergency Management (OEM) serves as the coordinating agency for the City's mitigation program. Under the direction of the OEM Director, the office facilitates mitigation activities, including updates to the Seattle HMP, and provides technical assistance to other City departments. The Director has delegated these coordination and facilitation tasks to the Recovery and Mitigation Coordinator. Key roles of OEM include:

- Facilitate the City's hazard mitigation program.
- Provide technical support to City departments regarding integration of hazard mitigation into department activities.
- Keep the Mayor and City Council apprised of the status of the City's hazard mitigation program.

1.4.2.5 Seattle Departments

The success of the City's mitigation program is dependent on mitigation being a shared endeavor across all organizational elements of the City. City departments are strongly encouraged to incorporate hazard mitigation into their plans and programs and be active participants in the City's efforts to enhance resiliency. Key roles of City departments include:

- Implement actions identified in the Seattle HMP.



- Incorporate hazard mitigation into other departmental planning efforts.
- Assign a representative to serve as a liaison to the MWG.

1.4.2.6 Community Partners

The City is committed to a collaborative mitigation program that strives to integrate with other community efforts to mitigate the impacts of hazards. While the scope of the Seattle HMP primarily includes City departments, the City will continue to look for opportunities to partner with private industry, nonprofit organizations, and community- and faith-based organizations in its mitigation program. Key roles of community partners include:

- Incorporate hazard mitigation into organizational and business activities.
- To the greatest extent possible, coordinate hazard mitigation activities with those of the City and other community partners.

See Chapter 2 for a discussion of how community partners were engaged in the 2015 update of the Seattle HMP.

1.5 Plan Organization

The 2015 update of the Seattle HMP is organized into the following sections:

- **Chapter 1 – Introduction.** Identifies the authorities on which the plan is based, describes the plan’s purpose and scope, describes how the plan is organized, and identified changes to the plan since 2009.
- **Chapter 2 – Planning Process.** Describes the process used to update the plan, including data sources and plan integration activities, outreach and engagement strategies, MWG activities, and plan development milestones.
- **Chapter 3 – Community Profile.** Provides a summary community profile for the City of Seattle including geographic, demographic, and economic characteristics that make the City unique. A full community profile is provided in the Seattle Hazard Identification and Risk Assessment document in Appendix A.
- **Chapter 4 – Hazard Identification and Vulnerability Analysis.** Contains a summary of the hazards that could potentially impact the City, including a hazard ranking table. Full hazard profiles and vulnerability assessment information is provided in the Seattle Hazard Identification and Risk Assessment document in Appendix A.
- **Chapter 5 – Capability Assessment.** Identifies the existing mitigation capabilities of City departments and highlights mitigation accomplishments over the last planning cycle.
- **Chapter 6 – Mitigation Strategy.** Provides updated goals and objectives for the City’s mitigation program and identifies a comprehensive set of prioritized mitigation actions that would contribute to the City’s resiliency.




- **Chapter 7 – Program Implementation.** Describes the City’s plan for monitoring, evaluating, and updating the Seattle HMP over the next five-year period.

1.6 What’s New in the 2015 Update?

The 2015 update of the Seattle HMP includes the following major revisions to the 2009 plan:

- As part of the City’s ongoing enhancement of its emergency program, the Seattle HMP has been aligned with the mitigation planning standards identified in the Emergency Management Accreditation Program (EMAP).
- The complete text of the updated Seattle Hazard Identification and Vulnerability Analysis is included in Appendix A.
- The plan has been expanded to include human-caused hazards.
- The plan incorporates the new Seismic Risk Assessment methodology developed by the Department of Finance and Administrative Services.
- To increase public participation for the plan update, the City conducted a community survey that resulted in over 700 responses from across the City. The results of that survey are included in Appendix C-4.
- The methodology by which mitigation actions are identified and prioritized has been updated. A revised Mitigation Action Worksheet and instructions are provided in Appendix D.

Additionally, to aid in plan review and to ensure that all FEMA planning requirements are met, text box callouts have been inserted into the plan that identify the planning element, based on FEMA’s Local Mitigation Plan Review Tool, that is addressed in that particular section of the plan. The plan also strives to make robust use of internal call outs to ensure that plan users can easily find related information. For example, in Chapter 2, which addresses the planning process, the following text box appears:

 FEMA	A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for [the City of Seattle]? (Requirement §201.6(c)(1))
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The City is also in the process of seeking accreditation through the Emergency Management Accreditation Program (EMAP). EMAP includes a series of standards related to hazard mitigation and those standards are addressed throughout the plan.


See Appendix E for the completed FEMA Local Plan Mitigation Review Tool for the Seattle HMP.



West Seattle Bridge (Photo Credit: seattletimes.com)

2. PLANNING PROCESS

Chapter 2 provides a narrative description of the planning process the City conducted to ensure that the City’s mitigation strategy was informed by input from key City departments, community partners, and the public. The process was based on principles of strategies for inclusive engagement and integration with existing planning efforts.

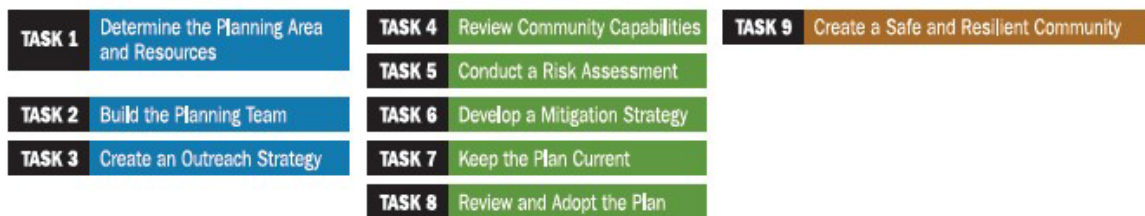
	<p>A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for [the City of Seattle]? (Requirement §201.6(c)(1))</p>
---	---

A local hazard mitigation plan’s organization is driven by the needs of the local community. While the regional FEMA offices provide review and approval of hazard mitigation plans in order for local governments to apply for mitigation project funding, there is no required format for the plan’s organization. The following guiding principles are recommended for the development of a local hazard mitigation plan:

- Focus on the mitigation strategy.
- Process is as important as the plan itself.
- Develop the plan in the way that best serves the community’s purpose and people.

FEMA recommends nine tasks for developing or updating local hazard mitigation plans. Figure 2-1 illustrates the nine recommended tasks. Tasks 1 through 3 involve the people and process involved in the all-hazards mitigation plan development or update; Tasks 4 through 8 focus on the analytical and decision steps that need to be taken; and Task 9 includes suggestions for plan implementation.

Figure 2-1 FEMA Recommended Local Mitigation Planning Tasks



Source: FEMA Local Mitigation Planning Handbook, March 2013

2.1 Planning Area

The planning area refers the geographic area covered by the plan (FEMA Local Mitigation Planning Handbook 2013). In the case of the Seattle HMP, the planning area includes all areas within the City limits, as well as City department services and assets outside the City, such as the municipal watersheds and dams.

See Figure 2-2 for a map of the planning area (not including assets outside the City).

2.2 Data Collection and Incorporation of Existing Plans

 <p>FEMA</p>	<p>A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))</p>
---	---

Data collection efforts for the Seattle HMP focused on documents pertaining to the planning area and examples of best practices in hazard mitigation planning. The primary source documents for the plan update were the 2009 Seattle HMP and the 2015 update of the Seattle Hazard Identification and Vulnerability Analysis (SHIVA). Additionally, related emergency management plans, current county and state hazard mitigation plans, and City plans with relevant hazard mitigation topics, such as stormwater management, were reviewed as part of the data collection efforts. Examples of hazard mitigation planning best practices were also reviewed for their applicability to the Seattle HMP.

2.2.1 2009 City of Seattle All-Hazards Mitigation Plan

The primary source document for this update of the Seattle HMP mitigation strategy was the 2009 version of the plan. As part of the 2015 plan update, the following actions were taken to ensure that the update reflected progress in the City’s mitigation efforts and any changes in priorities:

- Review and refinement of 2009 plan goals and objectives by the MWG.
- Update of City department mitigation capabilities.
- Update of status for all mitigation actions identified in the 2009 plan.

See Chapter 6, Table 6-5 for a review of the status of all mitigation actions identified in the 2009 Plan Update.

2.2.2 Seattle Hazard Identification and Vulnerability Analysis (SHIVA)

The SHIVA identifies Seattle’s hazards and examines their consequences to facilitate smart decisions about how best to prepare for them. The SHIVA document is the foundation for all of the City’s disaster planning and preparedness activities. The 2015 update of the Seattle HMP incorporates the most recent version of the SHIVA. The 2014 SHIVA updates the version published in 2010. It meets FEMA and EMAP requirements, both of which publish standards to guide this work and provide quality and consistency across jurisdictions. It also meets the State of Washington’s legal requirement that local governments identify and evaluate their hazards, as specified in Washington Administrative Code 118-30-070.

The following major changes were made as part of the 2014 SHIVA update:

- Added a section called “Emerging Hazards.”
- Addressed the growing threat of cyber disruption as an emerging hazard.
- Added two tables for each hazard that fill out the “Most Likely” and “Maximum Credible” scenarios.
- Added tables and charts summarizing land use, zoning, facilities, and wildlife areas in areas subject to the following natural hazards: liquefaction (part of earthquake hazard); landslides;



tsunami; seiche; flooding; urban flooding (i.e., drainage-related flooding); and post-lahar sedimentation (a volcanic hazard).

- Incorporated research published between 2010 and 2014.
- Reassessed hazards.

OEM is constantly collecting information from partners to update the SHIVA. It is updated as needed but a major review occurs at least every four years.

See Appendix A for the full text of the SHIVA.

2.2.3 Citywide Emergency Management Program Multi-Year Strategic Plan 2014–2016

This strategic plan is intended to meet the vision of the citywide emergency management effort through a multi-year strategy, in coordination with key emergency management stakeholders, to include an overarching mission, strategic goals, objectives, milestones, and an overall method of implementation. The plan includes the stated mitigation goal to “sustain and improve the citywide mitigation program that enhances the City’s capability to withstand disaster.” Mitigation-related objectives identified in the plan include the following

- Ensure that the updated SHIVA and Threat and Hazard Analysis and Risk Assessment guide the City’s planning, training, exercise, organizing and equipping, and outreach efforts.
- Maintain and improve a hazard mitigation program that recognizes priorities, activities, and processes to lessen impacts on the Seattle community.
- Identify, apply for, and leverage funding and grants for prioritized mitigation projects.

Action items identified as supporting these objectives are incorporated into this mitigation plan by reference and include, but are not limited to the following:

- Create a strategic integration of the assets management system, Capital Improvement Program, and Seattle HMP.
- Encourage the Emergency Executive Board to adopt mitigation policies.
- Integrate citywide initiatives that enhance resiliency, such as mitigation planning, the race and social justice initiative, Climate Action Plan, and Comprehensive Plan.
- Strengthen awareness of and focus on health systems/disease prevention in the mitigation program.
- Provide training to the Disaster Management Committee on the hazards identified in the SHIVA.
- Create a business outreach plan to build awareness of hazards and the cost-benefit of preparedness.
- Encourage the chambers of commerce and other business advocates to sponsor business efforts to prepare for and mitigate the impacts of hazards.

2.2.4 Washington State Enhanced Hazard Mitigation Plan

Hazard mitigation policy guidance for the State of Washington is provided in the 2013 Washington State Enhanced Hazard Mitigation Plan. This plan was approved by FEMA on October 1, 2013, and identifies hazard mitigation goals, objectives, actions, and initiatives for the Washington State government. Implementation of the policy guidance provided in the plan will reduce damage and injury caused by natural hazards. The plan meets the requirements for an Enhanced State Plan under Interim Final Rule 44 CFR parts 201.4 and 201.5, published in the Federal Register by FEMA on February 28, 2002. By meeting the requirements of the regulations, the State of Washington as well as qualified local jurisdictions and nonprofit organizations that provide like-government services are eligible to obtain federal Hazard Mitigation Assistance grants. The State of Washington can seek higher funding for the Hazard Mitigation Grant Program following a Presidential Disaster Declaration due to the enhanced portion of the plan (20 percent of federal disaster expenditures versus 15 percent with a standard plan) (Washington Military Department Emergency Management Division 2013).

The Seattle HMP was prepared in accordance with goals and objectives identified in the 2013 Washington State Enhanced Hazard Mitigation Plan.

2.2.5 Integration with Other Plans and Programs

The City has a long-standing history of hazard mitigation planning at a range of scales, including the neighborhood, city, and regional contexts. Therefore, hazard mitigation policies, plans, and programs have successfully been incorporated into various community plans and emergency management activities. Table 2-1 summarizes key programs and plans that support existing mitigation actions and the actions that were taken to ensure that they were appropriately aligned, integrated, or referenced in this plan update.

Table 2-1 Plan Review and Integration Actions

Plan/Study	Plan Alignment/Integration Action
2009 Seattle All-Hazards Mitigation Plan	Superseded by this 2015 plan update.
2014 Seattle Hazard Identification and Vulnerability Analysis (SHIVA)	Serves as the basis for the hazards identified in this plan. The full text is included in Appendix A.
Seattle Disaster Readiness and Response Plan	Reviewed to ensure consistency.
Seattle Disaster Recovery Framework (under development)	Conducted a meeting to ensure planning goals were aligned between planning projects.
Seattle’s Comprehensive Plan	Reviewed to ensure consistency. Further alignment efforts will be a focus of the next planning cycle.
Seattle Climate Action Plan	Reviewed to ensure consistency.
King County Regional Hazard Mitigation Plan	Reviewed to ensure consistency.
Washington State Enhanced Hazard Mitigation Plan	Reviewed to ensure consistency.

2.3 Coordination with Other Planning Efforts

OEM and stakeholders for the Seattle HMP update provided information and collected feedback at the following planning meetings and events:

- At the Emergency Support Function 6 – Mass Care, Housing, and Human Services meeting held on March 18, 2014, the Seattle Human Services Department provided information about the Seattle HMP update process to approximately 15 attendees and encouraged attendees to complete the online survey.
- Brochures were provided at the Communications Academy from March 22 to 23, 2014. Sixty-seven brochures were distributed to volunteer communicators (such as HAM radio operators) who assist the Emergency Operations Center during emergency situations.
- OEM provided an overview of the Seattle HMP update process at the Disaster Management Committee Meeting on March 27, 2014. Computers were available at the meeting for attendees to fill out the online survey.
- Cross coordination meetings were held on February 18, 2014, and June 25, 2014, with the Seattle HMP update and Seattle Disaster Recovery Plan teams. Several opportunities for enhancing public and stakeholder outreach between the two planning processes were identified at the meeting.

See Appendix C for a summary of these events including related documentation.

2.4 Mitigation Work Group

The MWG was convened at the start of the Seattle HMP update project to facilitate City department and agency input to the Seattle HMP update. The MWG aided in the revision of mitigation goals and objectives, identification of mitigation strategies, refinement of mitigation review criteria, and prioritization and implementation of mitigation strategies. This planning process focused on improving interdepartmental coordination to ensure that the resulting document met the needs of all City departments.

2.4.1 MWG Members

The MWG consists of members from various City departments and key stakeholders such as the Seattle Public Library, Seattle Community Colleges, Boeing Employee’s Credit Union, Seattle Public Schools, and Port of Seattle. MWG members serve as project liaisons to community groups and interests they represent. Working together, the MWG has established the following mission statement to guide its activities:

“It is the mission of the Mitigation Work Group to develop a comprehensive disaster mitigation program that 1) increases community resilience; 2) builds upon existing mitigation programs; 3) increases knowledge of all hazards to which the City is at risk; and 4) implements interim and long-term mitigation actions that maximize loss reduction.”

The members of the MWG who participated in the plan update and their associated organizations and departments are listed in Table 2-2.

Table 2-2 Mitigation Work Group Members

Name	Organization	Department
James Bush	City of Seattle	Seattle Department of Neighborhoods
Jill Crary	City of Seattle	Seattle Center
Jay Donahue	Seattle Public Library	N/A
Lawrence Eichhorn	City of Seattle	Seattle Department of Transportation
Barb Graff	City of Seattle	Seattle Office of Emergency Management
Jay M. Havner	City of Seattle	Seattle Fire Department
Vickie Huff	City of Seattle	Seattle Police Department
Elenka Jarolimek	City of Seattle	Seattle Department of Finance and Administrative Services
Jerry Koenig	City of Seattle	Seattle City Light
Betty Lunceford	Seattle Community Colleges	N/A
Erika Lund	City of Seattle	Seattle Office of Emergency Management
Mathew McBride	BECU	N/A
TJ McDonald	City of Seattle	Seattle Office of Emergency Management
Pegi McEvoy	Seattle Public Schools	N/A
Tracy Morgenstern	City of Seattle	Seattle Office of Sustainability and Environment
Laurel Nelson	City of Seattle	Seattle Office of Emergency Management
Ben Noble	City of Seattle	Seattle Budget Office
Patti Petesch	City of Seattle	Seattle Parks and Recreation
Russ Read	Port of Seattle	N/A
Sarah Sodt	City of Seattle	Seattle Department of Neighborhoods
Karl Stickel	City of Seattle	Seattle Office of Economic Development
Maureen Traxler	City of Seattle	Seattle Department of Planning and Development
Jill Watson	City of Seattle	Seattle Human Services Department
Vicki Wills	City of Seattle	Seattle Department of Information Technology
Ned Worcester	City of Seattle	Seattle Public Utilities

2.4.2 MWG Meetings

Plan issues were discussed and key deliverables were reviewed at the MWG’s formal meetings. The MWG convened for a series of five meetings over the course of the project (see Table 2-3) where representatives from key City departments and other stakeholders had the opportunity to be briefed on project status, engage with the contractors selected to assist in the plan update, and collaboratively work on plan content.

Table 2-3 Mitigation Work Group Meeting Schedule


MWG Meeting	Date	Objectives
Mitigation Work Group Meeting No. 1	February 24, 2014	Review plan process and MWG roles and responsibilities Review 2009 Seattle HMP actions Review vision statement Present Inclusive Outreach and Public Engagement Strategy
Mitigation Work Group Meeting No. 2	April 28, 2014	Present updated SHIVA Present initial public outreach and engagement results Review mitigation goals and objectives Present hazard mitigation project examples Present initial mitigation action review criteria
Mitigation Work Group Meeting No. 3	June 23, 2014	Confirm mitigation goals and objectives Present revised Mitigation Action Worksheet and case studies Develop department-specific mitigation actions
Mitigation Work Group Targeted Work Sessions	August 26, 2014	Meet with key departments to refine mitigation actions
Mitigation Work Group Meeting No. 4	September 16, 2014	Present draft Seattle HMP Confirm mitigation strategy and implementation plan
Seismic Risk Assessment Workshop	March 17, 2015	Present final Seattle HMP and conduct an educational workshop on strategies for reducing seismic risk

2.4.3 Planning Portal

Plan process and draft documents were made available to the MWG through a web-based plan portal that allowed MWG members a “one stop shop” to access information. The plan portal was made available for the project duration and included a project calendar, project team information, important links, and file management functionalities.

See Appendix B for documentation of all MWG activities.

2.5 Inclusive Outreach and Public Engagement

 <p>FEMA</p>	<p>A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))</p> <p>A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))</p>
---	--

A critical component of the Seattle HMP update effort is a robust stakeholder engagement process that provides “an opportunity for the public to comment on the plan during the drafting stage and prior to plan approval” (44 CFR §201.6).

2.5.1 Inclusive Outreach and Public Engagement Plan

To facilitate meeting this requirement, OEM developed an Inclusive Outreach and Public Engagement (IOPE) Plan and designated a public comment period in spring and fall 2014 (see Table 2-4). The IOPE Plan provides a detailed approach to how the project team would engage the public and key stakeholders in the Seattle HMP update process. In addition, the IOPE Plan is in accordance with the City’s Inclusive Outreach and Public Engagement Guide by striving for multiculturalism in project communications, with equal access and respect for all groups and creating conditions for understanding. The Seattle HMP update public engagement strategy was designed to accomplish the following objectives:

- Raise the public’s awareness so that they understand that the all-hazards mitigation plan update is happening and they are prepared to provide input at appropriate times in the process.
- Provide the opportunity for all affected communities to participate in strategy development and plan updates to promote a sense of community ownership.
- Ensure an open and transparent public involvement process that is culturally sensitive, where participants know how to access project information and provide input, are aware of how their input has been considered as part of project decisions, and are satisfied with the results even if their personal interests were not met.
- Create a project record of public input, responses, and outreach activities.

See Appendix C-1 for the full Inclusive Outreach and Public Engagement Plan.

2.5.2 Engagement Strategies

2.5.2.1 Initial Public Comment Period

An initial public comment period was held from March 25 to April 23, 2014. The public was invited to share their thoughts about what hazards concern them most and how they think the City should prioritize its activities to reduce hazard risks.

Engagement strategies included notifications sent to key stakeholders and mailing list databases that reached thousands of members of the public interested in emergency preparedness and response. OEM issued notifications to the public as well as elected officials regarding the Seattle HMP and opportunities to provide input using emails, press releases, letters, posters, brochures, and calendar postings. Social media text was also available for key stakeholders, including MWG members, who offered to notify their constituents via their own accounts and communication tools. Notifications to key stakeholders included:

- City of Seattle departments and offices.
- Neighboring communities.
- Emergency service providers.
- Transportation and transit agencies.
- Public utilities.
- Neighborhood and community organizations.
- Non-profit organization/vulnerable populations.
- School districts and higher education institutions.
- Businesses and employers.
- Tribal nations (Muckleshoot Indian Tribe, Snoqualmie Tribe, and Suquamish Tribe).
- Cultural institutions.
- State and federal regulatory agencies.
- Public health agencies.
- Weather and geological information providers.

See Appendix C-2 and C-3 for a summary of outreach and engagement activities.

2.5.2.2 Public Meeting

A public meeting was held at Rainier Community Center, which is located in one of the most diverse census tracts in the City, on April 8, 2014. This venue was chosen because it offered an opportunity for inclusive engagement from racially and culturally diverse communities in Seattle. Approximately 20 people attended the meeting and provided input on hazards of concern and hazard mitigation priorities. A community survey was also available through OEM's website (paper copies of the survey were also available at key locations, such as the Seattle Center).

At the meeting, attendees were asked, through a guided activity, to prioritize their top three hazard concerns and their top three preferences for how the City should prioritize resources to minimize hazard risks. They were also given the opportunity to complete the project survey on lap-top computers or on paper copies. Meeting attendees identified the following hazards and priorities:

- **Hazards of concern:** Attendees clearly identified earthquake as the hazard they were most concerned about. Flood, hazardous material, and active shooter incidents were also considered important hazards for which to prepare, but they scored significantly lower than earthquake.
- **Hazard mitigation priorities:** While prevention was identified as the most popular sector for allocating mitigation resources, many meeting attendees identified public education and hazard awareness as a key area to prioritize in planning efforts.

See Appendix C-2 and C-3 for a summary of the public meeting and supporting materials.

2.5.2.3 Community Survey

In addition to the strategies listed above, a community survey was conducted. The survey was designed to solicit input from Seattle residents on their perceived concern regarding various hazards and how they would like to see the City spending money to reduce vulnerability to those hazards. In total, 708 people responded to the Seattle HMP update survey. The following sections summarize key priorities and trends in the survey results.

Of the 708 people who responded to the survey, 87% identified themselves as members of the public. Respondents identified earthquakes, infrastructure/cyber incidents, and transportation incidents as the top three hazards they were most concerned about. However, the top three hazards chosen from the multiple-choice question varied somewhat by neighborhood. Notably, respondents from Downtown and Southeast Seattle identified active shooter in the top three hazards. Through open-ended questions, survey respondents also expressed concern about the structural stability of buildings and infrastructure during a natural disaster, and access to potable water, healthcare services, and electricity in a disaster's aftermath. Respondents additionally commented that a lack of hazard preparedness is itself a hazard and advocated for greater awareness among communities and businesses.

Respondents identified prevention, emergency services, and structural projects as very important categories for the allocation of mitigation resources. These priorities are reflected across all population groups and neighborhoods. Through open-ended questions, many respondents expressed approval of the work by local preparedness programs, such as Seattle Neighborhoods Actively Prepare (SNAP), Community Emergency Response Teams (CERT), and Seattle's Disaster Relief Trial (an event to showcase the potential use for bicycles to transport food and emergency relief supplies). Respondents also encouraged greater public education and awareness to help communities prepare for a potential hazard. Notably, this category was considered less important than the top three identified through the multiple-choice questions. Respondents encouraged the City to look at science-based methods to identify and mitigate hazards. Some respondents also specifically called for greater monitoring of

developers and building quality and suggested establishing no-build zones in areas prone to hazards, such as flooding.

In the multiple-choice questions, respondents ranked the Internet, public workshops/neighborhood meetings, and friends/relatives as their top three sources for hazard mitigation information. The Internet was the top choice for receiving information across population groups and neighborhoods. However, through open-ended questions, several respondents requested information sharing via resources that were not reliant on a computer. Generally, respondents felt that there is not enough publicly available information that is up-to-date and easy to understand. Some respondents suggested expanding neighborhood programs like SNAP and looking to employers to provide preparedness training for employees.

See Appendix C-4 for a full summary of survey results.

Table 2-4 Stakeholder and Public Outreach Activities Schedule

Outreach Event	Timing	Objectives
Project Kickoff	February 24, 2014	Present IOPE Plan for MWG comments and guidance to maximize effectiveness
Finalize Community Survey and Draft Notification Materials	February 24 - 28, 2014	Notification materials included website text, community calendar text, e-mail text, new release text, and social media and blog text
Finalize Notification Materials and Input Survey into SurveyMonkey	March 3 - 7, 2014	Community survey was entered into a web-based system for broad-based deployment
Coordinate Distribution of Notification Materials	March 10 - 21, 2014	Distribution activities included: <ul style="list-style-type: none"> • Share new release with OIRA for City's consolidated e-mail announcements • Send website text to City's "Ethnic Media Availability" website • Post on OEM and City websites • Post on City community events calendar • Send new release to media contact list • E-mail to the project e-mail list • E-mail to specified Listservs • E-mail text to social media outlets and blogs
Public Comment Period No. 1 (including Community Survey)	March 25 – April 23, 2014	Solicit feedback on draft development
Public Meeting No. 1	April 8, 2014	Provide an overview of mitigation planning process, solicit feedback on draft development

Outreach Event	Timing	Objectives
Public Comment Period No. 2	September 5 – October 3, 2014	Solicit public comments on pre-approval draft Seattle HMP. Distribution activities included: <ul style="list-style-type: none"> • Post updated plan and “jump start” presentation on OEM website. • Post on DPD blog • Send request for feedback to project e-mail list and specified Listservs
Project Wrap Up and Seismic Risk Assessment Workshop	March 17, 2015	Build on mitigation planning process by conducting a workshop that focusing on sharing strategies for reducing seismic risk.

2.6 Plan Development and Review

The Seattle HMP development process was conducted according the process outlined above and described in detail in FEMA’s Local Mitigation Planning Handbook. Update of the City’s mitigation strategy was treated as the plan’s primary purpose and the plan serves as the written record of the comprehensive planning process. In addition, the Seattle HMP reflects the City’s current needs and hazard concerns. The development of the Seattle HMP update occurred over a 12-month period from December 2013 to March 2015. The plan development was conducted through a series of seven steps as detailed in Table 2-5. Many of the steps occurred concurrently. Table 2-5 also illustrates the corresponding FEMA local mitigation planning task for each Seattle HMP development milestone. The requisite State Hazard Mitigation Officer and FEMA review periods occurred during the Draft and Final HMP steps.

Table 2-5 Seattle HMP Update Milestones and Timeline

Seattle HMP Update Development Milestone	Corresponding FEMA Recommended Local Mitigation Planning Task¹	Timeline
1. Data Collection and Document Review	Task 1 – Determine the Planning Area and Resources	January 2014 – April 2014
2. Mitigation Working Group Coordination	Task 2 – Build the Planning Team	February 2014 – October 2014
3. Stakeholder Engagement and Outreach	Task 3 – Create an Outreach Strategy	February 2014 – December 2014
4. Hazard Mitigation Strategy Update	Task 4 – Review Community Capabilities Task 6 – Develop a Mitigation Strategy	April 2014 – August 2014
5. Draft Hazard Mitigation Plan ¹	Written documentation of the planning process (all tasks)	April 2014 – October 2014



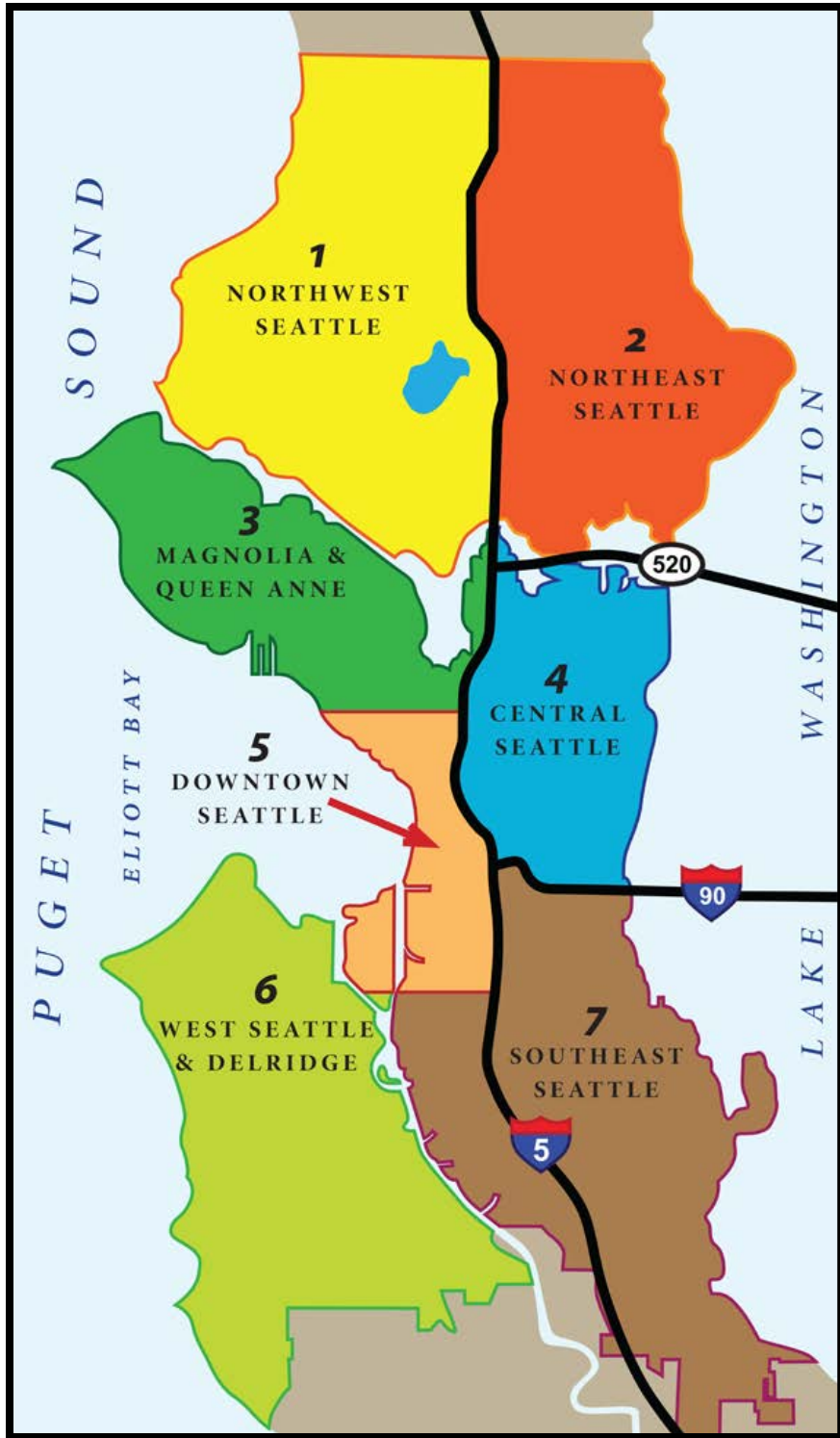
Seattle HMP Update Development Milestone	Corresponding FEMA Recommended Local Mitigation Planning Task ¹	Timeline
6. Final Hazard Mitigation Plan	Written documentation of the planning process (all tasks)	September 2014 – March 2015
7. Plan Adoption	Task 8 – Review and Adopt the Plan	[INSERT DATE]
<p>Note:</p> <p>1. Task 5 – Conduct a Risk Assessment was completed through the separate SHIVA process. Task 7- Keep the Plan Current and Task 9 – Create a Safe and Resilient Community are part of the plan implementation process.</p>		



OEM staff discuss hazards with members of the public. (Photo Credit: E & E)



Figure 2-2 Seattle HMP Planning Area



3. COMMUNITY PROFILE

Chapter 3 provides a summary of the community profile provided in full in the Seattle Hazard Identification and Vulnerability Analysis (SHIVA). The City's mitigation strategy is designed to be reflective of the unique characteristics of the community as an economic and cultural hub in the region.

Seattle is an 84-square-mile area that sits between Puget Sound to the west and Lake Washington to the east. Elliott Bay, an extension of Puget Sound, is located in the middle of the City, giving Seattle an hour-glass shape. Downtown is located in this narrow section, which results in many major transportation routes and services competing for land where there is the least space.

Terrain varies sharply throughout the City, which is mostly hills that descend toward the major water bodies. Many roadways, especially in the downtown, Capitol Hill, Beacon Hill, Queen Anne, West Seattle, and Magnolia neighborhoods have steep inclines that can become hazardous and/or impassable in slippery driving conditions. There are 193 miles of waterfront, 53 of which are tidal. The Seattle Department of Transportation (SDOT) maintains 187 bridges spanning either natural or artificial barriers, 58 of which are designated vital lifeline structures. Two floating bridges, the Evergreen Point or Albert D. Rossellini (SR-520) and Lacey V. Murrow (I-90) bridges, are the most direct vehicular corridors linking Seattle to the neighboring eastside cities of Bellevue, Kirkland, and Mercer Island.

With over 600,000 residents as of 2010, Seattle is the largest municipality in the Pacific Northwest. During workdays, the influx of commuters causes the population to grow to over 750,000. These totals do not include tourists that visit the region.

Seattle also is home to the main campuses of three major universities: the University of Washington, Seattle Pacific University, and Seattle University. In addition, the Seattle Community College system, which has a combined enrollment of 54,000, operates three campuses located in West Seattle, Capitol Hill, and Northgate. The total combined student population for all of these universities and colleges is approximately 100,000.

Seattle is a center for cultural, governmental, and economic activity. It is both a city of neighborhoods with vibrant individual identities and one of the most trade dependent cities in the United States. One in three jobs relies on international trade.

The Seattle-King County area attracts more than 8.8 million overnight visitors each year. Major venues for conferences, conventions, and special events include the Washington State Convention and Conference Center, a wide variety of local hotels, the Bell Harbor International Conference Center, CenturyLink Field Events Center, and the Seattle Center (site of the 1962 World's Fair).

The city is also home for several professional sport teams including: the Mariners at Safeco Field (seats 54,000) and the Seahawks and Sounders at CenturyLink Field (seats 67,000).

There are 23 hospitals in King County, of which 13 are located in the City. Of the 13 Seattle hospitals, one is a psychiatric hospital and two provide long-term acute care. The City is home to the only Level 1 Trauma Center for a four-state region, which also serves as a major tertiary referral area for five states in the Pacific Northwest; including pediatrics, burn, transplant, trauma, bone marrow, cancer care, and other specialties.

The number of cruise ships that use the Port of Seattle has grown in recent years. Eight major cruise lines used the Seattle facilities in 2012 and in 2011 there were 196 sailings with 885,949 passengers.


See Appendix A for the full text of the SHIVA including a more detailed community profile.



The Space Needle (Photo Credit: seattle.gov)

4. HAZARD IDENTIFICATION AND VULNERABILITY ANALYSIS

Chapter 4 contains a synopsis of the hazard profiles and risk analysis fully described in the Seattle Hazard Identification and Vulnerability Analysis (SHIVA). The SHIVA represents an effort to determine the potential impact of hazard to the people, economy, and built and natural environments of the City of Seattle.

 <p>FEMA</p>	<p>B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect [the City of Seattle]? (Requirement §201.6(c)(2)(i))</p> <p>B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for [the City of Seattle]? (Requirement §201.6(c)(2)(i))</p>
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4.1 General

The SHIVA is intended to serve as the risk assessment portion of the Seattle HMP and provides the foundation for the rest of the mitigation planning process, which focuses on identifying and prioritizing actions to reduce hazard risk. The SHIVA is intended to guide the mitigation strategy outlined in this plan and is hoped to provide insight for other City planning efforts including future updates of the Comprehensive Plan.

The SHIVA, as the City’s risk assessment, is intended to accomplish the following:

- Describe hazards. Includes a description of natural and human-caused hazards that may impact the City. Each hazard includes information on the following:
 - **Location.** What areas of the City are most likely to be impacted?
 - **Extent.** What is the expected magnitude of the hazard?
 - **Previous occurrences.** What is the history of the hazard?
 - **Probability of future events.** What is the likelihood of the hazard occurring in the future?

Additionally, the SHIVA summarizes the City’s vulnerability to identified hazards including potential impacts and losses that may result.

The 2014 update of the SHIVA replaces the version published in 2010. It meets the requirements of the Federal Emergency Management Agency (FEMA) and the Emergency Management Accreditation Program (EMAP), both of which publish standards to guide this work and provide quality and consistency across jurisdictions. It also meets the State of Washington’s legal requirement that local governments identify and evaluate their hazards, as specified in WAC 118-30-070.

See Appendix A for the full text of the SHIVA.

4.2 Hazard Summary

4.2.1 Emerging Threats

The SHIVA lists hazards that could precipitate disasters at the time of the SHIVA's publication. It is important to recognize threats whose full extent is still emerging, but will likely pose significant danger in years or decades to come. Climate change is expected to have wide ranging impacts that will intensify over decades. Historically, cyber disruption (the effects of computer outages) has been a problem. Due to the ubiquity of computer-controlled infrastructure, urban areas have greater exposure, but given the lack of past experience, judging impacts would be complicated. Emerging threats are not included in the hazard ranking table, but instead are incorporated into the identified hazards.

4.2.2 Climate Change and Sea Level Rise

Climate change, including sea level rise, is not a specific hazard. It is a broad environmental change that will affect many of our hazards and by extension many of our people and organizations. For example, sea level rise combined with larger floods may cause some areas may come untenable for living and working. Because there is a lot of natural variability in hazard events is impossible to say that any given event is caused solely by climate change, but we expect many hazard events to become more intense over the coming decades. The hazards most affected by climate change are weather related or are strongly affected by the weather: flooding, heat, water shortages, wind, snow and landslides. Even hazards that don't seem to be directly tied to climate change could intensify: disease, as new pathogens move into our area or tsunamis, as sea levels rise.

4.2.3 Cyber Disruption

Computers control most of the systems that help us live in modern, urban environments. Widespread, prolonged outages can disable critical public safety, utility and transportation systems leading to severe disruptions of everyday life and endangering public safety. This analysis treats cyber a form of infrastructure failure. The United States has not had a severe cyber disruption, but threats occur every day in the form of attempted hacks of computers that control infrastructure, cybercrime and cyber espionage. Hard work is required to prevent these threats from escalating into a major disruption.

4.3 Geophysical Hazards

4.3.1 Earthquakes

Earthquakes are Seattle's hazard of greatest concern. In the worst case, casualties could exceed 1,000 people and economic damage could soar into the billions. Damage to infrastructure could be extreme, prolonging hardships and posing major challenges for attempts at recovery.

See the SHIVA (pp. 79-101) for a detailed discussion on earthquakes including type, location, extent, previous occurrences, probability and potential impact.

4.3.2 Landslides

Landslides are common in Seattle. Landslides can kill people, destroy buildings, block roads, and sever lifelines. The City of Seattle maps its landslide prone areas and specifies special building requirements in these areas. Winter storms can trigger large numbers of landslides.

See the SHIVA (pp. 103-116) for a detailed discussion on landslides including type, location, extent, previous occurrences, probability and potential impact.

4.3.3 Volcanic Hazards

Mudflows (from Mt. Rainier) and ashfall (from multiple sources) are Seattle's greatest volcanic hazards. There is no evidence that a mudflow has ever reached Seattle. It is likely that following a mudflow, rain and erosion would wash debris down the Duwamish River to Elliott Bay. Ashfall is unlikely in Seattle because regional weather patterns tend to carry ash east of the Cascades, but weather patterns are not a guarantee. If the wind is blowing in Seattle's direction on the day of an eruption, Seattle would experience major transportation and health impacts.

See the SHIVA (pp. 117-133) for a detailed discussion on volcanic hazards including type, location, extent, previous occurrences, probability and potential impact.

4.3.4 Tsunamis and Seiches

Tsunamis are a rare but potentially catastrophic hazard in Seattle. Tsunamis that originate in the Pacific Ocean do not pose a major threat to Seattle. The most dangerous tsunamis are generated in Puget Sound by earthquakes or landslides. A tsunami generated inside Elliott Bay could inundate areas up to a mile inland in the area surrounding Elliott Bay. Seiches are standing waves (i.e., they move vertically) that can occur enclosed water bodies during earthquakes; most seiches cause limited damage. Lake Union is especially prone to seiches where wave heights could reach 6 feet. Magnitudes in other water bodies are less understood.

See the SHIVA (pp. 135-152) for a detailed discussion on tsunamis and seiches including type, location, extent, previous occurrences, probability and potential impact.

4.4 Biological Hazards

4.4.1 Disease

Diseases, especially new influenza strains, have the potential to be Seattle's most deadly hazard. Potential consequences of disease include casualties running into the thousands, overwhelmed providers, no mutual aid assistance, contaminated water, degraded critical services, and closure of public facilities for long periods of time.

See the SHIVA (pp. 153-158) for a detailed discussion on biological hazards (including bio-terrorism) including type, location, extent, previous occurrences, probability and potential impact.

4.5 Intentional Hazards

4.5.1 Social Unrest

Social unrest includes riots, civil disorder, strikes, and mass civil disobedience. Seattle is the central stage for political and social activity in the Puget Sound region and the hub of the region's social activities. This condition makes social unrest more likely to occur in Seattle than elsewhere in the region. Incidents can shut down large areas of the City, lead to fatalities and injuries, and cause property damage. Most incidents occur in the downtown area and on Capitol Hill.

See the SHIVA (pp. 161-169) for a detailed discussion on social unrest including type, location, extent, previous occurrences, probability and potential impact.

4.5.2 Terrorism

The Puget Sound region has active far-right and eco-terrorist groups. Seattle has had a major arson fire linked to eco-terrorism. More recently, plots with ties to Islamic extremism have been prevented, the most serious of which was a plan to attack a military recruiting center. Seattle actively plans for terrorism events, such as chemical, biological, nuclear, radiological, explosive, and cyber methods.

See the SHIVA (pp. 171-177) for a detailed discussion on terrorism including type, location, extent, previous occurrences, probability and potential impact.

4.5.3 Active Shooter Incidents

Seattle has had several high profile mass shootings. Mass shootings seem to be on the rise even though overall rates of violence are decreasing. Most attacks are carried out by a single attacker in a single location, but more complex attacks have been launched by terrorist groups. Enclosed public spaces, such as schools, are frequent targets of mass shootings.

4.6 Transportation and Infrastructure Hazards

4.6.1 Transportation Incidents

Seattle is a hub for land, sea, and air transportation and has an inherent exposure to accidents. Transportation accidents are usually limited in geographic scope but can cause high fatalities, fires, hazardous materials incidents, power outages, transportation network disruptions, environmental degradation, and infrastructure failures. Historically, some of Seattle's deadliest disasters have been transportation accidents.

See the SHIVA (pp. 185-193) for a detailed discussion on social unrest including type, location, extent, previous occurrences, probability and potential impact.

4.6.2 Fires

Seattle's many high-rise structures, busy port, underground electrical network, and an increasing number of oil trains contribute to a high and varied risk of fire. Seattle does not have a large urban-

wildland interface and better fire codes and enforcement have reduced the number of large structural fires. A large amount of oil is shipped through the heart of Seattle by rail, which poses a risk of fire. Fire is also a major secondary hazard; for example, earthquakes can cause fires that kill more people than the ground shaking itself.

See the SHIVA (pp. 195-203) for a detailed discussion on fires including type, location, extent, previous occurrences, probability and potential impact.

4.6.3 Hazardous Material Incidents

Seattle is a regional industrial center and major transportation hub with increased exposure to hazardous materials incidents that release toxic chemical, combustible, nuclear, or biological agents into the environment. Seattle has not had any truly disastrous hazardous materials incidents, but has had several incidents involving fuel tanker explosions on the freeways and a fire at a University of Washington biology lab.

See the SHIVA (pp. 205-213) for a detailed discussion on hazardous materials incidents including type, location, extent, previous occurrences, probability and potential impact.

4.6.4 Infrastructure Failures

Seattle depends on its buildings, bridges, dams, and utilities. Structural failure can lead to loss of life and major hardship. Computers help operate most infrastructure today and technology failure can lead to infrastructure failure or “cyber disruption.” The consequences of bridge collapse are high due to the central role bridges play in Seattle’s transportation network.

See the SHIVA (pp. 215-227) for a detailed discussion on infrastructure failures including type, location, extent, previous occurrences, probability and potential impact.

4.6.5 Power Outages

Since urban areas depend on power, widespread, multi-day outages, especially in winter, have serious consequences for public health, safety, and the economy. Seattle runs its own electric utility, Seattle City Light, which maintains its own generation, transmission, and distribution system and supplies half the power Seattle uses. The other half is purchased and reaches Seattle through the Bonneville Power Administration (BPA) network. The biggest risk to Seattle is a failure of the BPA system during the winter.

4.7 Weather and Climate Hazards

4.7.1 Excessive Heat

The National Weather Service ranks Seattle 15th among major urban regions for excessive heat risk. Seattle will probably have more excessive heat events in the future. Heat waves have killed thousands in other regions. While the general population may not have a problem adjusting to excessive heat, some populations (i.e., the elderly, isolated, and poor) may be more vulnerable.

4.7.2 Flooding

Seattle has three kinds of floods: coastal, riverine, and urban. Unlike many cities, Seattle does not have a major riverine flood hazard. Seattle's flooding is often caused by "atmospheric rivers" that happen when the jet stream brings moist air up from the tropics causing high rain volume that overwhelms the drainage system and causes urban flooding. When storms occur during high tides (king tides), coastal areas and low-lying areas can flood. Recent strong storms suggest Seattle may see more intense rainfall in the future. The rivers south of Seattle have several dams; their failure could cause flooding in the South Park area.

4.7.3 Snow, Ice, and Extreme Cold

Seattle's winter weather is generally mild, but snowfall can accumulate. The consequences are especially severe if the snow lingers for several days or triggers secondary hazards like power outages. Seattle has a heightened vulnerability to snow and ice storms due to its hilly topography. Although the City's snow removal capability is proportioned for the majority of winter storm events, during extreme winter weather with large accumulations of snow, resources can quickly become overwhelmed with potential mobility impacts to life safety response, medical services, vulnerable populations, and the service economy.

See the SHIVA (pp. 255-262) for a detailed discussion on snow, ice, and extreme cold including type, location, extent, previous occurrences, probability and potential impact.

4.7.4 Water Shortages

Water shortages occur during summers that follow low-snow winters because nearly all of Seattle's water comes from melting snow in the Cascades. Water shortages can cause reduced salmon stream flows and trigger usage restrictions, causing hardship for residents and businesses. Shortages also mean less water is available for electricity generation; therefore, more expensive power must be purchased from outside the region. Water shortages can also be caused by main breaks, which are usually localized and of short duration, but could be prolonged if caused by another hazard, such as an earthquake.

See the SHIVA (pp. 263-270) for a detailed discussion on water shortages including type, location, extent, previous occurrences, probability and potential impact.

4.7.5 Windstorms

Windstorms cause power outages, structural damage, transportation blockages, and coastal flooding. Fall and winter are the most common times for windstorms, but occasional out-of-season storms are the most dangerous. Falling trees account for most damage during windstorms. Windstorms often accompany other weather hazards, including landslides, urban flooding, snow, and extreme cold producing complex emergencies. Sustained winds of 85 miles per hour were recorded in the Seattle area in 1993 and 2006. Seattle's most damaging storm was Columbus Day Storm in 1962.



4. Hazard Identification and Vulnerability Analysis

See the SHIVA (pp. 271-279) for a detailed discussion on windstorms including type, location, extent, previous occurrences, probability and potential impact.

4.8 SHIVA Scoring Methodology

SHIVA ranking sums two hazard scenario scores: 1) the disaster the City will probably get, and 2) the biggest disaster within reason that the City could get (plus a small “future emphasis” value that measures the amount of time that will be spent on the hazard). Each scenario’s score is the product of the three metrics ranked 1 (low) to 5 (high): 1) consequences, 2) frequency, and 3) likelihood for spawning secondary hazards.

Any hazard on Table 4-1 could cause a disaster for the City. Rankings explicitly declare expectations about the frequency, direct consequences, and cascading effects (e.g., an earthquake causes a tsunami) of the disaster we think a hazard will probably cause (i.e., most likely scenario) and could cause in the most extreme case within reason (maximum credible scenario). SHIVA uses a formula that ranks twelve criteria measuring consequences (e.g., health effects) on a scale of 1 (low) to 5 (high). These 12 are averaged to obtain a base score. The average is multiplied by a frequency score (ranked 1 to 5) and a cascading effects score (ranked 1 to 5) to obtain a scenario score. The hazard ranking is the sum of the two scenario scores plus a “future emphasis” value that measures whether more time will be spent, less time will be spent, or about the same amount of time will be spent on the hazard. Each criterion is tied to a specific metric, for example, a frequency score of 3 means that the hazard has a 1 in 100 chance of causing a disaster similar to the given scenario each year. The best available science is used to rank hazards whenever possible, but the process is inherently subjective. Frequency and cascading effects are multipliers, so they have a major influence on the final score. These rankings do not measure cumulative risk (i.e., the City’s chances of being impacted by a hazard in any way).

4.9 Risk-Driven Planning

OEM uses hazard identification, risk analysis, and impact analysis as the basis for all plan development, including the Seattle HMP. The mitigation strategy presented in Chapter 6 of this plan is based on the principles of maximizing loss reduction and the data presented in the SHIVA provides the City with the data necessary to identify goals, objectives, and actions that will be most effective. Some concepts in the SHIVA that were key considerations in developing the 2015 update of the Seattle HMP include:

- Earthquakes are Seattle’s top hazard. No other hazard has the combination of likelihood and potential destructiveness.
- Seattle is a hub for land, sea and air transportation giving it an inherent exposure to accidents.
- Seattle is vulnerable to bridge collapse due to central role they play in Seattle’s transportation network. Failure of multiple bridges could result in “islandization” of the community.

See Appendix A for the full text of the SHIVA including a more detailed risk assessment.



4. Hazard Identification and Vulnerability Analysis

Table 4-1 Hazard Ranking Table

	Most Likely Scenario														Maximum Credible Scenario														Future Emphasis	Combined Ranking			
	Geographic Scope	Duration	Health Effects	Displacement	Economy	Environment	Structures	Transportation	Critical Services	Confidence in Govt	Base Score	Frequency (F)	Cascading Effects (CE)	Multiplier (F + CE)	Subtotal	Geographic Scope	Duration	Health Effects	Displacement	Economy	Environment	Structures	Transportation	Critical Services	Confidence in Govt	Base Score	Frequency (F)	Cascading Effects (CE)			Multiplier (F + CE)	Subtotal	
Earthquakes	5	2	2	2	2	2	3	2	2	1	2.3	4	4	8	18.4	5	4	5	5	5	5	5	5	5	5	5	4.9	2	5	7	34.3	3	55.7
Snow & Ice Storm	5	3	1	2	2	1	2	2	2	1	2.1	5	2	7	14.7	5	4	2	3	3	2	2	4	3	3	3.1	3	3	6	18.6	5	38.3	
Infrastructure / Cyber	1	2	1	2	2	2	2	2	2	3	1.9	5	2	7	13.3	5	4	2	5	4	3	1	4	4	3	3.5	1	4	5	17.5	5	35.8	
Windstorms	5	1	2	2	2	2	2	2	2	1	2.1	5	1	6	12.6	5	2	2	3	3	3	3	4	4	3	3.2	2	4	6	19.2	3	34.8	
Power Outages	3	2	2	2	2	1	1	2	2	1	1.8	5	2	7	12.6	5	4	2	4	3	1	2	3	3	5	3.2	3	3	6	19.2	3	34.8	
Terrorism	1	1	2	2	2	2	2	2	1	3	1.8	4	2	6	10.8	4	3	5	5	5	5	5	5	5	5	4.7	1	3	4	18.8	5	34.6	
Disease Outbreaks	5	5	4	1	2	1	1	1	1	1	2.2	4	1	5	11.0	5	5	5	5	4	1	1	3	3	3	3.5	3	2	5	17.5	5	33.5	
Flooding / Atmo. River	5	2	1	2	2	2	2	2	1	1	2.0	5	1	6	12.0	5	4	2	4	3	2	3	4	3	3	3.3	2	3	5	16.5	5	33.5	
Excessive Heat Events	5	3	2	2	2	1	1	2	1	1	2.0	5	1	6	12.0	5	4	4	4	3	2	1	3	3	3	3.2	3	2	5	16	5	33.0	
Fires	2	2	2	5	1	2	1	2	2	1	2.0	4	2	6	12.0	2	4	4	3	3	2	2	4	2	3	2.9	2	4	6	17.4	3	32.4	
Tsunamis and Seiches	3	2	2	3	3	2	3	2	1	1	2.2	2	2	4	8.8	4	2	4	5	4	3	3	3	3	3	3.4	2	4	6	20.4	3	32.2	
Landslides	4	3	1	2	1	2	3	2	1	1	2.0	5	1	6	12.0	3	3	3	3	2	3	3	3	2	3	2.8	2	4	6	16.8	3	31.8	
Transport Incidents	1	1	3	2	1	1	2	2	1	1	1.5	5	2	7	10.5	3	2	4	3	2	2	2	3	2	3	2.6	2	5	7	18.2	3	31.7	
Water Shortages	5	5	1	2	2	2	2	1	3	1	2.4	5	2	7	16.8	5	5	1	3	3	3	2	1	3	3	2.9	2	2	4	11.6	3	31.4	
Social Unrest	3	1	2	4	1	1	2	2	1	3	2.0	5	2	7	14.0	5	3	3	5	3	1	3	2	2	5	3.2	2	2	4	12.8	3	29.8	
HazMat Incidents	3	1	2	4	2	2	2	2	2	1	2.1	3	2	5	10.5	3	3	2	2	3	4	2	3	2	5	2.9	1	3	4	11.6	3	25.1	
Volcano Hazards	2	5	1	4	3	2	3	2	3	1	2.6	2	1	3	7.8	5	5	1	2	3	2	4	4	2	1	2.9	1	3	4	11.6	3	22.4	
Active Shooter	2	2	2	1	1	1	1	1	1	1	1.3	4	1	5	6.5	4	2	3	3	2	1	2	4	4	3	2.8	2	1	3	8.4	5	19.9	

5. CAPABILITY ASSESSMENT

Chapter 5 identifies the City’s existing mitigation capabilities. These are the plans and policies, programs, and projects that are currently in place to reduce the City’s vulnerability to hazards. It also includes key mitigation accomplishments that have been completed since the last plan update in 2009. As mitigation actions identified in the City’s mitigation strategy (Chapter 6) are completed, they become new mitigation capabilities.

 <p>FEMA</p>	<p>C1. Does the Plan document each [City department’s] existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))</p>
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5.1 General

The City of Seattle has a long history of commitment to neighborhood, citywide, and regional hazard mitigation planning. Existing hazard mitigation authorities, policies, plans, programs, and resources have reduced impacts from hazards. Where possible, City departments will leverage existing programs to implement mitigation actions (see Chapter 6). Utilizing existing authorities, policies, plans, and programs will provide the best value to the City of Seattle and build on programs already supported by Seattle communities and policymakers.

This chapter identifies planning and regulatory, administrative and technical, financial, education, and outreach capabilities to mitigate hazards; describes recent mitigation accomplishments; and identifies the City’s participation in the National Flood Insurance Program (NFIP) in accordance with the Disaster Mitigation Act (see 44 CFR § 201.6(c)(3)). Seattle hazard mitigation capabilities include the following:

- **Plans and Regulations.** Plans, policies, codes, and ordinances that prevent and reduce the impacts of hazards. Examples of plans and regulations include Seattle’s Comprehensive Plan, the City of Seattle Stormwater Management Plan, the Seattle Building Code, and the Seattle Environmentally Critical Areas Code.
- **Administrative and Technical.** Staff, their skills, and tools that can be used for mitigation planning. Examples of administrative and technical capabilities include Seattle Department of Planning and Development dedicated staff to building code enforcement and the OEM – SHIVA.
- **Financial.** Funding resources that can be utilized for hazard mitigation. Examples of financial capabilities include the Seattle Capital Improvement Program, the Fire Facilities and Emergency Response Levy, and federal funding programs such as the Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation Competitive Grant Program (PDMC).
- **Education and Outreach.** Education and outreach used to communicate hazard-related information and increase community preparedness and resiliency. Examples of education and outreach include SNAP, the 3 to Get Ready education campaign, and the Home Retrofit Program.

Capability Highlight Elliott Bay Seawall Project

The City of Seattle is replacing the aging, failing seawall along the waterfront and improving the lost nearshore environment. The existing seawall has protected Seattle's waterfront for more than 70 years, but time and a harsh marine environment have weakened the structure. Cracks within the face of the wall allow salt water and marine borers, called gribbles, to infiltrate and eat away the timber support. As the tide recedes through cracks in the wall, it carries with it fill soil that results in dangerous voids underneath Alaskan Way.

The new seawall will be built to current seismic standards and is designed to last more than 75 years. Improvements include stabilizing the existing soil behind the seawall face, as well as moving the seawall 10-15 feet eastward to accommodate construction and create additional space for habitat.

The Seawall Project is designed to maintain flexibility for future opportunities. All surface features west of the restored sidewalk will be built in their final state at the completion of the seawall project. Elements east of the sidewalk, such as the roadway, will be restored in an interim condition and then redesigned and rebuilt as part of the Waterfront Seattle Program.

For more information see www.waterfrontseattle.org.

The new seawall project will:

- Protect public safety.
- Meet current seismic standards.
- Consider the impact of climate change on sea level.
- Improve the salmon migration corridor.
- Last more than 75 years.
- Act as the foundation of Seattle's future waterfront.



Photo Credit: seattlehotelassociation.org

Capability Highlight

Seismic Risk Assessment Methodology and Demonstration Project

The City of Seattle, using a grant funded through FEMA's Pre-Disaster Mitigation Grant Program, recently completed a seismic risk assessment for a representative set of City-owned buildings as a demonstration project. This effort was intended to be a systematic, efficient, and cost-effective risk assessment methodology that could be applied not only to city-owned buildings, but also to other public, nonprofit, and private buildings. The City's goal was to develop a practical screening methodology that can be utilized citywide to evaluate seismic risks, prioritize mitigation actions, and reduce seismic risk over time. A more detailed explanation of the process follows.

The assessment followed six steps:

- 1) Develop exclusion from further study.
- 2) Pre-screen candidate structures using criteria established in Step 2.
- 3) Perform seismic evaluations (based on ASCE 31-03¹) and rough order of magnitude (ROM) cost estimates for candidate structures that passed the pre-screening process in Step 3.
- 4) Based on the results of Step 4, select candidate structures for more detailed seismic evaluations (based on ASCE 31-03 and ASCE 41-06²) and preliminary cost estimates.
- 5) Prioritize retrofits based on evaluation results.

This study has helped the City of Seattle by developing a methodology to evaluate seismic risks, prioritize mitigation actions, and reduce seismic risk over time. By breaking down the process of assessing the risk of facilities into six steps, the methodology can be reapplied to the remainder of the buildings in the department's portfolio. It may also be applied to facilities in other City departments, other public agencies, and nonprofit and private buildings.

An important issue that was identified by going through this process was the need to more closely evaluate the seismic performance objectives from the first step of the methodology. The technical definitions of the performance objectives should be more closely aligned with the organization's performance expectations of the facility after a seismic event occurs. One key component of this is to properly educate the decision makers on the real-world implications of one performance level over another. This is important not just to manage expectations of performance, but also because the performance level can have significant cost impacts on the actual retrofit, as well as the assessment itself.

This study has provided the City of Seattle the long-term benefit of identifying specific gaps between how our facilities will perform during a seismic event in their current condition and how we expect them to perform. The Phase 1 and Phase 2 reports explicitly determine what actions are needed to mitigate these gaps. Having this information will allow the City of Seattle to plan for seismic upgrades and provides the framework to determine other facilities in our portfolio that require seismic assessments. This will allow the City to identify steps needed to meet expectations of performance and continue to serve the constituents of the City when an event does occur.

See Appendix G for additional details on the City's Seismic Risk Assessment Methodology and Demonstration Project.

¹ American Society of Civil Engineers, ASCE 31-03 Seismic Evaluation of Existing Buildings

² American Society of Civil Engineers, ASCE 41-06, Seismic Rehabilitation of Existing Buildings

5.2 FEMA Funded Hazard Mitigation Projects

Table 5-1 identifies FEMA-funded hazard mitigation projects conducted in the City of Seattle from 1995 to 2014.

Table 5-1 FEMA Funded Hazard Mitigation Projects 1999-2014

Project	Funding Source	Award Date	Award Total	Lead Department	Status
Duwamish Head Stabilization Project	HMGP - DR 1159	Mar-99	\$2,187,500	SPU [DWU]	Completed - Won engineering award!
North Queen Anne Dr. Bridge Seismic Retrofit	HMGP - DR 1361	Aug-02	\$1,200,000	SDOT	Completed
Low Income Home Seismic Retrofit	HMGP - DR 1361	Jan-03	\$1,000,000	SPD/OEM	Completed
Mitigation Plan Development	HMGP - DR 1361	Oct-03	\$100,000	SPD/OEM	Completed
South Lake Union Armory Building Seismic Retrofit	PDMC 2005	Nov-05	\$713,229	Parks	Completed
Gas Shut Off Valve Project	HMGP - DR 1671	Sep-08	\$200,000	FFD	Completed
Queen Anne Community Center Seismic Retrofit	HMGP - DR 1671	Aug-08	\$ 780,000	Parks	Completed
Post Alley Areaway Seismic Retrofit	HMGP - DR 1682	Oct-10	\$589,055	SDOT	Completed
Urban Flood Hazard Identification Project	HMGP - DR 1817 & 1825 5% Funding	Nov-10	\$208,500	SPU	Completed
Jefferson Community Center Seismic Retrofit	HMGP - DR 1817 and 1825	May-11	\$1,371,198	Parks	Completed
Mitigation Plan Update and Seismic Assessment	PDMC 2011	Nov-11	\$379,220	OEM & FFD	Project underway
URM Public Education and Outreach	HMGP Dr 4056 5% Funding	Jul-12	\$71,905	DPD	Project underway

Source: City of Seattle Office of Emergency Management

Jefferson Community Center (Photo Credit: www.seattle.gov)



5.3 Department-Specific Capabilities

5.3.1 Administration, Finance, and Facilities

5.3.1.1 Finance and Administrative Services

The Seattle Department of Finance and Administrative Services (FAS) has the most diverse set of responsibilities of any City department. FAS combines the functions from the former Fleets and Facilities Department and the former Department of Executive Administration with the revenue forecasting, debt management, and tax policy functions that were previously performed by the former Department of Finance. It also transfers the Department of Neighborhood's Customer Service Bureau to the newly created "Office of Constituent Services," which is housed within FAS. As a result, the department provides a variety of services to City departments and the public, including citywide operational responsibilities for accounting, payroll, licensing, revenue collection and processing, animal services, weights and measures, treasury activities, purchasing, construction and consultant contracting, risk management, the City's financial management and personnel data systems, and management of City real estate, buildings, and vehicles, as well as construction and renovation of fire stations as part of the Fire Facilities and Emergency Response Levy Program (www.seattle.gov).

Existing Mitigation Capabilities – Finance and Administrative Services

Capability	Capability Type	Description	Key Accomplishments (2009-2015)	Hazard Mitigated
2014-2019 Capital Improvement Program (CIP)	Financial	The CIP, prepared by the Department of Finance and Administrative Services, allocates funds to rehabilitate, restore, improve, and add to the City's capital facilities.	<ul style="list-style-type: none"> The CIP identifies investments for projects that mitigate hazards. Select mitigation projects completed with CIP funding are noted below under the appropriate department. 	All Hazards
Insurance	Financial	The City maintains an insurance program for all City property, purchases, and policy revisions.	<ul style="list-style-type: none"> City property has been insured through an outside carrier since 1998. The insurance program covers more than 1,000 City-owned structures from all hazards (including acts of terrorism, earthquakes, and flood). 	All Hazards

Existing Mitigation Capabilities – Finance and Administrative Services

Capability	Capability Type	Description	Key Accomplishments (2009-2015)	Hazard Mitigated
Facilities and Emergency Response Program (Fire Facilities and Emergency Response Levy)	Financial	In November 2003, 69 percent of people voting in Seattle approved the Fire Facilities and Emergency Response Levy. The levy provided \$167 million to enable the Seattle Fire Department to be more resilient in dealing with crisis situations, especially those that could damage critical department assets and disrupt emergency operations.	<p>The following actions were performed under this levy:</p> <ul style="list-style-type: none"> ▪ Upgraded or replaced the City's 33 fire stations ▪ Renovated the Chief Seattle Fireboat and purchased two new fire boats ▪ Purchased emergency generators to provide auxiliary power to six community centers ▪ Established emergency caches to support 3,500 people in a disaster ▪ Installed hardened fire hydrants installed at the City's nine reservoirs ▪ Built a new state-of-the-art Emergency Operations Center that matches International Building Code essential facility structural standard and security enhancements ▪ Built a new Joint Training Facility ▪ Increased fire department capabilities to draw water from Puget Sound or other close by water reservoirs should hydrants or water distribution lines become inoperable 	All Hazards
Facility Assessments	Technical	These assessments evaluated various types of structures, including libraries, parks facilities, municipal buildings, and fire and police stations, as well as non-structural components to best direct City efforts and resources. These studies were used to determine structural mitigation projects completed as part of the CIP, as well as to advocate for the Facilities and Emergency Response Program (Fire Facilities and Emergency Response Levy).	<ul style="list-style-type: none"> ▪ Ongoing action. 	All Hazards



Existing Mitigation Capabilities – Finance and Administrative Services

Capability	Capability Type	Description	Key Accomplishments (2009-2015)	Hazard Mitigated
Pre-Disaster Mitigation Planning and Seismic Risk Assessment	Planning and Technical	Demonstration project for pre-disaster seismic readiness.	<p>The department developed a systematic efficient and cost-effective risk assessment methodology that could be applied not only to City-owned buildings but also to other public, nonprofit, and private buildings. A demonstration project was completed for:</p> <ul style="list-style-type: none"> ▪ Airport Way Center Building B - FAS Shops ▪ Airport Way Center Building E - Water Quality Lab ▪ Charles Street Fire Garage ▪ Charles Street Vehicle Maintenance ▪ Charles Street Traffic Meter Shop ▪ Charles Street Seattle Department of Transportation (SDOT) Engineering ▪ Charles Street Tire Shop ▪ Haller Lake Vehicle Maintenance ▪ Seattle Police Department (SPD) Harbor Patrol Office ▪ Sunny Jim SDOT Sign Shop ▪ Seattle Fire Department (SFD) Headquarters ▪ SPD South Precinct 	Earthquake

5.3.1.2 Department of Information Technology

The Department of Information Technology (DoIT) manages the City's information technology infrastructure and performs strategic information technology planning. DoIT coordinates strategic technology direction for the City by developing common standards, architectures, and business solutions to deliver City services more efficiently and effectively; builds and operates the City's corporate communications and computing assets, which include the City's telephone, radio, and email systems, networks, and servers; and oversees development of the Democracy Portal, a project to improve the City's government access television station and its accompanying web site by providing new programming, live Web streaming of City Council meetings, live "webcasting" and interactive services that allow residents to access government information and contact decision makers (www.seattle.gov).

Existing Mitigation Capabilities – Department of Information Technology

Capability	Capability Type	Description	Key Accomplishments (2009-2015)	Hazard Mitigated
Puget Sound Regional Interoperability Committee	Technical	This committee plans interoperable infrastructure initiatives across King, Pierce, and Snohomish counties.	<ul style="list-style-type: none"> Tri-County Regional Interoperability, which links the radios from King County, Snohomish County, Tacoma, and the Port of Seattle with conventional radio in Pierce County, Washington State Patrol, and the Federal Integrated Wireless Network Tactical Interoperable Communications Plan 	All Hazards
Regional Communications Board	Administrative	This board governs the King County public safety radio network.	<ul style="list-style-type: none"> The Department of Information Technology operates a portion of the radio network system, including nine radio sites and 6,000 800-megahertz public safety radios that link every police and fire agency in the County, as well as Seattle Public Utilities 	All Hazards
Capital Improvement	Financial	The CIP, prepared by the Department of Finance and Administrative Services, allocates funds to rehabilitate, restore, improve, and add to the City's capital facilities.	<p>CIP Projects for the Department of Information Technology include:</p> <ul style="list-style-type: none"> Replacement of two old radio towers in Northeast and West Seattle 	Earthquake

5.3.1.3 Office of Sustainability and Environment

The Office of Sustainability and Environment delivers cutting-edge policies and effective programs to address Seattle's environmental challenges while creating vibrant communities and building shared prosperity. OSE collaborates with City departments, business partners, nonprofit and community-based organizations, and learning institutions to develop and implement initiatives in the following areas: climate protection, buildings and energy, urban forestry, green stormwater infrastructure, and food policy.

Existing Mitigation Capabilities - Office of Sustainability and Environment

Capability	Capability Type	Description	Key Accomplishments (2009-2015)	Hazard Mitigated
Seattle Climate Action Plan	Planning and Administrative	The Seattle Climate Action Plan (CAP) provides a coordinated strategy of short- and long-term City actions to reduce GHG emissions while also supporting other community goals, including building vibrant neighborhoods, fostering economic prosperity, and enhancing social equity. The CAP focuses on road transportation, building energy, and waste as well as actions that will increase our community's resilience to the likely impacts of climate change.	<ul style="list-style-type: none"> Ongoing program 	Climate Change, All Hazards
Citywide Climate Change Preparedness Strategy	Planning and Administrative	OSE is leading an interdepartmental process to help the City prepare for a changing climate and the resulting economic, infrastructure, health, and other community impacts. The Strategy will include actions to integrate consideration of climate change into decision making and planning processes and identify mitigation and adaptation actions to enhance the resilience of City services and infrastructure.	<ul style="list-style-type: none"> This strategy is currently under development and is expected to be complete by June 2015 	Climate Change

5.3.2 Arts, Culture, and Recreation

5.3.2.1 Department of Parks and Recreation

Seattle’s Department of Parks and Recreation works with all City residents to be good stewards of the environment and to provide safe, welcoming opportunities to play, learn, contemplate, and build community. Seattle Parks and Recreation manages 400 parks and open areas in its approximately 6,200-acre park system. This includes 224 parks, 185 athletic fields, 112 neighborhood play areas, nine swimming beaches, 18 fishing piers, four golf courses, and 22 miles of boulevards. Other Department of Parks and Recreation facilities include 151 outdoor tennis courts, 24 community centers, eight indoor and two outdoor swimming pools, 27 wading pools, a nationally recognized Rose Garden, and the Seattle Aquarium. The Woodland Park Zoological Society operates the zoo with financial support from the City (www.seattle.gov).

Existing Mitigation Capabilities - Department of Parks and Recreation

Capability	Capability Type	Description	Key Accomplishments (2009-2015)	Hazard Mitigated
Major Maintenance Plan (MMP)	Planning	This plan sets forth actions to keep the Department of Parks and Recreation’s assets in safe and operable condition and to maintain a Tier 1 sheltering system.	<p>Recent mitigation projects completed under the MMP include:</p> <ul style="list-style-type: none"> ▪ Queen Anne Community Center seismic retrofit ▪ Jefferson Community Center seismic retrofit, including installation of emergency generator ▪ Providing maintenance and upgrades of 26 primary shelter sites <ul style="list-style-type: none"> ○ Electronic upgrade of Bitter Lake, Delridge, Garfield, Meadowbrook, Queen Anne, and Rainier Beach community centers to accept generators (paid for by the Fire Facilities and Emergency Response Levy) ○ Conducted emergency shelter operations training for community center coordinators 	All Hazards
Capital Improvement	Financial	The CIP, prepared by the Department of Finance and Administrative Services, allocates funds to rehabilitate, restore, improve, and add to the City’s capital facilities.	<p>CIP Projects for the Department of Parks and Recreation include:</p> <ul style="list-style-type: none"> ▪ Electrical System Replacement Program 	Utility Failure

5.3.2.2 Seattle Center

Seattle Center is a valued civic asset with community roots that reach back in time to native tribes and pioneers. Today, more than 10 million people visit the 74-acre campus each year. Seventy-eight percent of Seattle residents visit Seattle Center an average of nine times a year for one of the 5,400 free public performances, retreat in the 22 acres of landscaped gardens and fountains, or visit one of the 21 cultural, educational and sports organizations that call Seattle Center home (www.seattle.gov).

Existing Mitigation Capabilities – Seattle Center

Capability	Capability Type	Description	Key Accomplishments (2009-2015)	Hazard Mitigated
Capital Improvement	Financial	The CIP, prepared by the Department of Finance and Administrative Services, allocates funds to rehabilitate, restore, improve, and add to the City's capital facilities.	<p>CIP Projects for Seattle Center include:</p> <ul style="list-style-type: none"> ▪ Seismic related roof project for assorted buildings: Playhouse, Armory, Park Place, Seattle Center Pavilion ▪ Deferred Major Maintenance Project for Seattle Center monorail –trains made more robust and work done to guideway (concrete repairs, misalignment) to make trains more reliable including emergencies <p>In 2015 Seattle Center will be conducting facility condition assessments of all major facilities. Future mitigation projects will come from these assessments.</p>	All Hazards

5.3.3 Health and Human Services

5.3.3.1 Public Health – Seattle & King County

Public Health – Seattle & King County provides public health services for the City, including services for children and youth, persons with chronic disease, and communicable diseases; immunization services; environmental health services; public health emergency preparedness; emergency medical services; violence and injury prevention services; a medical examiner; nutrition support services; and tobacco prevention programs.

Existing Mitigation Capabilities – Public Health – Seattle & King County

Capability	Capability Type	Description	Key Accomplishments (2009-2015)	Hazard Mitigated
Health Code and other codes	Regulatory	Public Health has legal authority: Code of the King County Board of Health. Updated 2013 King County Code Title 12: Public Peace, Safety, and Morals.	<ul style="list-style-type: none"> Board of Health Code was updated in 2013. 	
Emergency Program	Planning, Administrative	Public Health maintains plans: King County Public Health Operational Master Plan, approved 2007 ESF 8 of CEMP Basic Plan: Health, Medical, and Mortuary Services. Public Health has a designated emergency manager and section to handle emergency management. Public Health has a training and exercise program to support the general public's health and safety by training Public Health staff on their role in an emergency and disaster. Public Health has a well-developed risk communication plan.	<ul style="list-style-type: none"> Response plan was updated in 2012. Public Health has responded to a number of emergencies since 2009, including H1N1 and winter weather events. These responses tested response capabilities and enabled improvement of plans and development of mitigation strategies. Plans updated include communicable disease and epidemiology, pandemic influenza, environmental health, isolation and quarantine, fatality management, alternate care facility and family assistance center. 	
Vulnerable Populations Action Team		The Vulnerable Populations Action Team (VPAT) works to ensure that not one community is disproportionately impacted in a disaster	<ul style="list-style-type: none"> Achievements includes over 10 community trainings so that community based organizations are more resilient, partnerships with faith-based organizations on community sheltering projects, two conferences with over 300 attendees with Snohomish and Pierce County to support cross-border coordination, and the translation of numerous community messages. 	

5.3.3.2 Human Services Department

The Seattle Human Services Department is creating a comprehensive and integrated human services system to significantly reduce or end homelessness, hunger, and violence; and improve the health and well-being of everyone in the Seattle region. The Human Services Department funds and operates programs and services that meet the basic needs of the most vulnerable people in our community - families and individuals with low incomes, children, domestic violence victims, seniors, and persons with disabilities (www.seattle.gov).

Existing Mitigation Capabilities - Human Services Department

Capability	Capability Type	Description	Key Accomplishments (2009-2015)	Hazard Mitigated
Aging Disability Services (ADS)	Planning, Administrative, Education and Outreach	ADS prepares clients and home care agencies in Seattle and King County to be ready in case of a disaster.	<p>ADS has performed the following actions:</p> <ul style="list-style-type: none"> ▪ Participated in earthquake exercise (October 2010), in NDMS Patient Reception Plan exercise (October 2012), Vulnerable Populations Disaster Conference (2013) and FEMA E0930: Integrated Emergency Management Course (August 2013). ▪ Identified criteria for high risk clients and maintain list with semi-annual updates. ▪ Basic disaster response plan with home care agency directors ▪ Provision of home care training, emergency preparedness fliers, safety kits, and emergency food supplies for agencies and clients in the Green River Valley (2009). 	All Hazards



5.3.4 Neighborhoods and Planning

5.3.4.1 Department of Neighborhoods

The Seattle Department of Neighborhoods provides resources and opportunities for community members to build strong communities and improve their quality of life. With more than 180 neighborhoods in the city, the department plays a key role in helping neighbors develop a stronger sense of place, build closer ties, and engage with their communities and city government (www.seattle.gov).

Existing Mitigation Capabilities - Department of Neighborhoods

Capability	Capability Type	Description	Key Accomplishments (2009-2015)	Hazard Mitigated
Historic Preservation Program	Regulatory	The Historic Preservation Program is responsible for the designation and protection of more than 350 historic structures, sites, object, and vessels; and eight historic districts.	<ul style="list-style-type: none"> A number of historic buildings have undergone, or are in the process of undergoing, seismic renovation from damage sustained during the Nisqually earthquake. 	Earthquake
Neighborhood Plan Implementation Program	Planning and Regulatory	This program helps neighborhoods identify actions needed to enhance communities and meet the needs of the Growth Management Act.	<ul style="list-style-type: none"> This program has developed seven approved neighborhood plans with hazard mitigation proposals. 	All Hazards
Neighborhood Matching Fund Grants Program	Financial	This program grants funds for community initiated projects that may be used for the development and implementation of Disaster Response Plans and projects focused on emergency preparedness.	<ul style="list-style-type: none"> Emergency Preparedness was added in 2009–2010 as a Project Sub-Type to assist developing emergency response strategies. 	All Hazards

5.3.4.2 Department of Planning and Development

The Seattle Department of Planning and Development (DPD) develops, administers and enforces standards for land use, design, construction, and housing within the Seattle city limits. DPD is also responsible for long-range planning, including Seattle's Comprehensive Plan and related projects-transportation improvements, neighborhood business revitalization, and downtown and waterfront planning (www.seattle.gov).

Existing Mitigation Capabilities - Department of Planning and Development

Capability	Capability Type	Description	Key Accomplishments (2009-2015)	Hazard Mitigated
Seattle Unreinforced Masonry Retrofit Policy (in development)	Regulatory	This policy is under development to mitigate the risks associated with Unreinforced Masonry (URM) structures in the City.	<p>The following committees have been convened to help with policy development:</p> <ul style="list-style-type: none"> URM Technical Committee – public advisory committee provided recommended technical standards for policy (Proposed Standards [2010]). URM Policy Committee – public advisory committee drafting recommendations for a citywide retrofit policy, produced the URM Study Report (2012) and a Benefit Cost Analysis of implementing policy recommendations (2014). 	Earthquakes
Emergency Response and Recovery Roles	Administrative	The Department of Planning and Development provide rapid assessment of damaged buildings following earthquakes.	<p>Emergency Response and Recovery roles include:</p> <ul style="list-style-type: none"> Conduct Applied Technology Council (ACT) 20 Assessments. Staff Post-Earthquake Inspections. 	Earthquake
Environmentally Critical Areas Code	Regulatory	The Environmentally Critical Areas Code (ECA) governs areas of Seattle that provide critical environmental functions. For example, wetlands can protect water quality and provide fish and wildlife habitat. The ECA code also addresses areas that represent particular challenges for development due to geologic or other natural conditions. The goal of the ECA regulations, (Seattle Municipal Code [SMC] Chapter 25.09) is to effectively protect these areas and to protect public safety, while allowing reasonable development.	<p>Specific hazard-related areas identified include:</p> <ul style="list-style-type: none"> Geologic hazard areas including landslide-prone areas, liquefaction-prone areas, peat-settlement-prone areas, seismic hazard areas, and volcanic hazard areas. Flood-prone areas. 	Earthquakes Flood Landslides Volcanic Hazards



Capability	Capability Type	Description	Key Accomplishments (2009-2015)	Hazard Mitigated
Floodplain Management	Regulatory	The Department of Planning and Development manages the City's National Flood Insurance Program (NFIP).	<p>The City has established and maintained eligibility in the Regular Phase of the NFIP since 1977.</p> <ul style="list-style-type: none"> This department maintains a National Flood Insurance rate map for properties identified as flood prone. These Digital Flood Insurance Rate Maps (DFIRMs) were last updated on May 16, 1995. Seattle Municipal Code Chapter 25.06, as amended by Council Bill Number 114503 (2003), is the floodplain management chapter; it was reviewed and found to be fully compliant with the NFIP and State floodplain management regulations on August 12, 2008. The most recent Community Assistance Visit by the Washington State Department of Ecology was conducted on August 6, 2008. The City was certified as a participant in good standing in the NFIP. 	Flood
Codes, Regulations, Rules, and Memos	Regulatory	This department develops, adopts, and enforces codes, ordinances, and policies that regulate construction activities of new and existing buildings. The selected codes, regulations, rules, and memos mitigate damage caused by natural disasters.	Key mitigation rules, memos, codes, and policies for which the department is responsible including Directors Rules, Client Assistance Memos, Seattle Building Code, Seattle Municipal Code, and other policy provisions.	All Hazards
Landslide Awareness Program	Education and Outreach	Conduct public outreach with the intent of providing expert advice for property owners to manage landslide-prone areas.	<p>Program activities for the last planning cycle included:</p> <ul style="list-style-type: none"> Developed educational brochures. Conducted public meetings. Updated the online steep slope area GIS information to reflect actual site contours. Updated the known landslide GIS information with slide information collected each year in WebEOC. 	Landslide

5.3.5 Public Safety

5.3.5.1 Seattle Fire Department

The Seattle Fire Department (SFD) has 33 fire stations located throughout the City. SFD deploys engine companies, ladder companies, and aid and medic units to mitigate loss of life and property resulting from fires, medical emergencies, and other disasters. SFD also has units for hazardous materials responses, marine responses, and high-angle and confined-space rescues. In addition, SFD provides leadership and members to several disaster response teams: Puget Sound Urban Search and Rescue, Metropolitan Medical Response System, and wildland firefighting. SFD's fire prevention efforts include: fire code enforcement; inspections and plan reviews of fire and life safety systems in buildings; public-education programs; regulation of hazardous materials storage and processes; and regulation of public assemblies.

The Financial and Administrative Services Department manages the construction, maintenance, and mitigation of all SFD facilities.

Existing Mitigation Capabilities Seattle Fire Department

Capability	Capability Type	Description	Key Accomplishments (2009-2015)	Hazard Mitigated
Fire Marshal's Office	Regulatory	The Fire Marshal's Office (FMO) administers the SFD fire prevention program to provide a reasonable level of life safety and property protection from the hazards of fires, explosions, and dangerous conditions, including releases of hazardous materials for Seattle's residents, workers, and visitors.	<ul style="list-style-type: none"> From 2009 to 2014 approximately 4,500 facilities that store, dispense, use or handle hazardous materials were inspected annually by the SFD Operations Division; the FMO processed approximately 500 new hazardous materials operational permit applications annually during the same period. Additionally, the FMO inspected approximately 2,000 temporary hazardous activities annually primarily related to hot work (i.e., cutting, welding, and roofing operations). 	Fire, Hazardous Materials Release



Existing Mitigation Capabilities Seattle Fire Department

Capability	Capability Type	Description	Key Accomplishments (2009-2015)	Hazard Mitigated
Local Emergency Planning Committee (LEPC)	Planning	This inter-jurisdictional public/private mitigation partnership is managed by the SFD and addresses hazardous materials issues.	<ul style="list-style-type: none"> ▪ The City of Seattle LEPC last met on June 4, 2014, for the Semi-Annual LEPC meeting. ▪ The City of Seattle LEPC works closely with stakeholders and the SFD Fire Marshal's Office Hazardous Materials Section to Pre-Plan for both permitted and non-permitted hazardous materials. 	Hazardous Materials Release
Capital Improvement	Financial	The CIP, prepared by the Department of Finance and Administrative Services, allocates funds to rehabilitate, restore, improve, and add to the City's capital facilities.	<p>CIP Projects for the Fire Department include:</p> <ul style="list-style-type: none"> ▪ Replace Fire Station 5 on the Seawall. ▪ Fire Station 14 Seismic Retrofit. 	Earthquake

5.3.5.2 Seattle Police Department

The Seattle Police Department’s (SPD) primary mission is to prevent crime; enforce the law; and support quality public safety by delivering respectful, professional, and dependable police services. SPD is specifically charged with the enforcement of Title 11 (City of Seattle Traffic Code), Title 12 (City of Seattle Criminal Code), Revised Code of Washington Title 9A (Criminal Code), and statutes in Washington Code 9 (specified sections dealing with Criminal Law). Consistent with its mission, SPD has lead agency responsibility for all criminal investigations, to include civil disorder, bomb threats, and terrorism incidents as codified in Article VI of the Seattle City Charter. SPD operates within a framework that divides the city into five geographical areas called "precincts." These precincts define east, west, north, south, and southwest patrol areas, with a police station in each.

Existing Mitigation Capabilities - Seattle Police Department

Capability	Capability Type	Description	Key Accomplishments (2009-2015)	Hazard Mitigated
Incident Management Team	Technical/Operational	The SPD participates in the regional multi-discipline Type 3 Incident Management Team. The SPD maintains a cadre of personnel to effectively manage major incidents or disasters and conducts regular training and exercises.	<ul style="list-style-type: none"> Ongoing capability. 	All Hazards
Washington State Fusion Center	Administrative	The SPD staged representatives with the Washington State Fusion Center to ensure interagency communication and collaboration in preparedness, prevention, and response efforts as they relate to Critical Infrastructure and Key Resources. The mission of the fusion center is to support public safety and homeland security missions.	<ul style="list-style-type: none"> Ongoing program. 	Terrorism
Capital Improvement	Financial	The CIP, prepared by the Department of Finance and Administrative Services, allocates funds to rehabilitate, restore, improve, and add to the City’s capital facilities.	CIP Projects for the Police Department include: <ul style="list-style-type: none"> New West and Southwest Police Precinct facilities built to meet current seismic standards. 	Earthquake

5.3.5.3 Office of Emergency Management

The Seattle Office of Emergency Management (OEM) is responsible for managing and coordinating the City’s resources and responsibilities in dealing with all aspects of emergencies. Its basic mission is devoted to citywide disaster preparedness, response, recovery, and mitigation. It places a strong emphasis on individual and community preparedness and provides a key liaison function between the city and its state and federal emergency management counterparts.

Existing Mitigation Capabilities - Office of Emergency Management

Capability	Capability Type	Description	Key Accomplishments (2009-2015)	Hazard Mitigated
Neighborhood and Individual Preparedness Programs	Education, and Outreach	These programs provide all-hazard preparedness information and training to Seattle’s diverse communities, individuals, families, neighborhoods, businesses, schools, and community-based organizations. Programs include Seattle Neighborhoods Actively Prepare (SNAP), the OEM website, Community Emergency Hubs, and Education Campaigns.	<ul style="list-style-type: none"> Ongoing programs. 	All Hazards
Home Seismic Retrofit Program	Education and Outreach	This free training program promotes home seismic retrofit within Seattle and the region. Introductory class covers how individuals can perform the retrofit themselves, as well as consumer education on working with trained contractors. A course is offered in coordination with Seattle’s Department of Planning and Development (DPD), which developed a set of standardized plan sets, issues permits, and performs inspections.	<ul style="list-style-type: none"> Over the past five years, home seismic retrofit classes have been consistently well-attended, averaging 25 to 40 attendees per class. Classes are offered six to 10 times a year in libraries throughout Seattle. Seattle DPD issues an estimated 100 seismic retrofit permits a year. 	Earthquakes



Existing Mitigation Capabilities - Office of Emergency Management

Capability	Capability Type	Description	Key Accomplishments (2009-2015)	Hazard Mitigated
Seattle Hazard Identification and Vulnerability Assessment (SHIVA)	Technical	The SHIVA is updated every four years; it identifies Seattle's hazards and examines their consequences. This assessment is the foundation for the City's disaster planning and preparedness activities.	<ul style="list-style-type: none"> The SHIVA was updated in 2014. 	All Hazards
Hazard Mitigation Grant Funding	Planning and Administrative	OEM manages the process of applying for and administering State/FEMA Mitigation grants on behalf of the City.	<ul style="list-style-type: none"> Between 2009 and 2014, the City was awarded approximately \$3.4 million in grant funding for mitigation projects. 	All Hazards
Comprehensive Emergency Plans	Planning	OEM maintains a suite of plans that guide the city in its mitigation of, response to, and recovery from a disaster. These include: <ul style="list-style-type: none"> Seattle All-Hazards Mitigation Plan Seattle Comprehensive Emergency Management Plan Seattle Disaster Recovery Framework 	<ul style="list-style-type: none"> Phase One of the Seattle Disaster Recovery Planning effort was completed in 2013. The development of a full recovery plan is underway and is expected to be completed in 2015. 	All Hazards

5.3.6 Utilities and Transportation

5.3.6.1 Seattle City Light

Seattle City Light (SCL) was created in 1902 to provide affordable, reliable, and environmentally sound electric power to the City of Seattle and neighboring suburbs. Owned by the community it serves, Seattle City Light is a nationally recognized leader in energy efficiency, renewable resource development, and environmental stewardship. Seattle City Light provides electric power to more than 360,000 residential, business, and industrial customers. Its service area of 131.3 square miles includes the City of Seattle, areas north of Seattle, including the city of Shoreline and parts of Lake Forest Park, and areas south of Seattle, including the cities of Burien, Tukwila, and SeaTac. (www.seattle.gov)

Existing Mitigation Capabilities - Seattle City Light

Capability	Capability Type	Description	Key Accomplishments (2009-2015)	Hazard Mitigated
Mitigation Policy	Planning and Administrative	It is Seattle City Light's policy to conduct structural mitigation, security, and non-structural mitigation projects as facility upgrades are made.	<ul style="list-style-type: none"> Created the Disaster Recovery and Business Continuity Planning (Information Technology Division) Installed a fail-over redundancy system with backup at an off-site location for data systems. 	All Hazards
Dam Safety Program	Planning and Administrative	The Dam Safety Program involves the coordination, monitoring, and oversight of activities for six major dams to reduce the risk and impacts from dam failure due to natural and man-made hazards.	<ul style="list-style-type: none"> Vulnerability and threat assessments for the Skagit and Boundary Hydroelectric Projects and the Cedar Falls/Tolt dams. Skagit Spillway Gate seismic strengthening at Ross and Diablo dams. Hillside and slope stabilization at Boundary, Diablo, and Ross dams. Equipment installation and monitoring to detect dam movement, measure high flows, and dam failure at Cedar Falls and Boundary dams. Annual dam safety inspections by the Federal Energy Regulatory Commission (FERC). Procedures for dam inspections following events Emergency Action Plans for facilities. Annual update/tests of emergency procedures. 	All Hazards
Capital Improvement	Financial	The CIP, prepared by the Department of Finance and Administrative Services, allocates funds to rehabilitate, restore, improve, and add to the City's capital facilities.	<p>CIP Projects for Seattle City Light include:</p> <ul style="list-style-type: none"> Completed a joint assessment project for the Cedar Falls/Tolt Dams. 	Earthquake

5.3.6.2 Seattle Public Utilities

Seattle Public Utilities (SPU) is comprised of three major direct-service providing utilities: water, drainage and wastewater, and solid waste. The water utility provides more than 1.3 million customers in King County with a reliable water supply; the drainage and wastewater utility collects and disposes of sewage and storm water; and the solid waste utility collects and disposes of recycling, yard waste, and residential and commercial garbage. All three utilities strive to operate in a cost-effective, innovative, and environmentally responsible manner. SPU also houses the engineering services line of business, which serves both City departments and outside agencies, providing efficient, customer-oriented engineering services that assist clients with replacing, improving, and expanding facilities with the least possible disruption to the community. (www.seattle.gov)

Existing Mitigation Capabilities - Seattle Public Utilities

Capability	Capability Type	Description	Key Accomplishments (2009-2015)	Hazard Mitigated
General Planning	Planning, Administrative and Technical	SPU assesses and mitigates hazard risks to minimize disruptions to water supply, sewer, drainage and solid waste services provided to 1.3 million customers in the City of Seattle and surrounding communities.	<ul style="list-style-type: none"> ▪ The SPU general planning function is responsible for: <ul style="list-style-type: none"> ○ Department-specific Hazard Identification and Vulnerability Plan ○ Department-specific Disaster Response and Recovery Plan ○ Comprehensive Drainage Plan - addresses flood protection and habitat enhancements ○ Debris Management Plan ○ Operation Response Center (24-hour dispatch) – backup at North Operations Center ○ Information Technology backup servers ○ Critical records vault ○ Water System Modeling – determines effects and business losses from water interruption due to earthquakes and fire ○ Employee preparedness programs, including: Annual field crew trainings and a Continuity of Operations Plan Exercise (September 2014). 	All Hazards



Existing Mitigation Capabilities - Seattle Public Utilities

Capability	Capability Type	Description	Key Accomplishments (2009-2015)	Hazard Mitigated
Stormwater Management Program	Regulatory	SPU manages storm water, water quality programs, and drainage-related capital projects. This program is required under the National Pollution Discharge Elimination System and establishes policies and procedures to reduce pollutants from City-owned or -maintained lands.	<ul style="list-style-type: none"> ▪ Established the Spill Kit incentive program. ▪ Revised storm water code (2009) and Directors Rule to protect against flooding, pollution, landslides, and erosion. ▪ Performed Structural Storm Water control projects, including <ul style="list-style-type: none"> ○ Midvale & 107th Drainage Project. 	Flood



Existing Mitigation Capabilities - Seattle Public Utilities

Capability	Capability Type	Description	Key Accomplishments (2009-2015)	Hazard Mitigated
Seismic Mitigation Program	Administrative, Technical and Financial	<p>The Seismic Mitigation Program is based on a 1990 Cygna study of the seismic vulnerability of Seattle’s public utilities water system tanks, pump stations, treatment facilities, gatehouses, the Control Works, and select transmission pipelines.</p> <p>Subsequent studies and projects have resulted in the seismic upgrade/mitigation of many facilities and improvements in seismic emergency preparedness and response.</p> <p>Since the Cygna study was completed, the scientific community’s understanding of the seismology in the Puget Sound region has significantly increased the earthquake risk to SPU facilities. Additionally, earthquakes such as those in Kobe, Northridge and Christchurch reemphasized how vulnerable water systems can be to seismic events.</p> <p>SPU is building upon SPU’s previous seismic program work and the current understanding of Puget Sound earthquake risks and lessons learned from recent earthquakes to evaluate the seismic vulnerability of individual facilities, estimate the overall water system response to different earthquake scenarios and develop planning level mitigation measures and cost estimates.</p>	<p>This program has performed the following actions:</p> <ul style="list-style-type: none"> ▪ 2003 seismic upgrades to critical facilities: Control Works, Operations and Control Center Warehouse, and several elevated tanks, standpipes, and pump stations. ▪ Seismic studies of town water storage facilities: Tolt, Lake Youngs, and Landsburg dams. ▪ 2000 Seattle Landslide Study. ▪ Drainage pipe inspection in landslide-prone areas. ▪ Developed Emergency Response Information Center Staff. ▪ Capitalized hazard mitigation fund to protect public facilities in landslide prone areas. ▪ Strengthened pipes in West Seattle, SODO, Cedar River Pipe Lines at Ginger Creek, Tolt PL No. 1 bridge, and Mercer Island backup pipe on I-90 bridge. ▪ Strengthened tanks, sandpipes, and buildings throughout the City. 	Earthquake, Landslide



Existing Mitigation Capabilities - Seattle Public Utilities

Capability	Capability Type	Description	Key Accomplishments (2009-2015)	Hazard Mitigated
Backbone Pipeline Program	Planning, Technical and Administrative	This program addresses the vulnerability of Seattle Public Utilities transmission pipelines that transport water from the treatment plants to and between the in-town reservoirs and gate houses, and critical distribution pipelines.	<ul style="list-style-type: none"> ▪ Installed and updated valves to isolate some water tanks and reservoirs to prevent water from draining through broken pipelines. ▪ Using flex hose to bridge broken mains or extend to areas without sufficient water pressure to fight fires. ▪ Established policy to include seismic vulnerability when making decisions on pipeline and facility replacement. ▪ Seismically hardened hydrants that draw directly from eight reservoirs. ▪ Installed emergency water distribution systems, including more than 5,000 portable pipelines and six bivet and manifold systems to provide temporary water service. ▪ Cedar River Pipeline Improvements and Upgrades – Improved the supports under aboveground sections of Cedar River Pipelines 1, 2, and 3 in Tiffany Park in Renton to increase the likelihood of the pipelines remaining operational after a larger earthquake. ▪ Watermain replacement program includes seismic resistant pipes and fittings as mains are upgraded or replaced. ▪ Full water-system seismic study is anticipated to be conducted in 2015 or 2016. 	Earthquake
Dam Safety Program	Planning and Administrative	Seattle Public Utilities monitors 14 dams to ensure safe operation of reservoirs and storm water detention systems.	<ul style="list-style-type: none"> ▪ 2006 Lake Youngs Outlet Dam Failure Warning System. ▪ 2009 Tolt Dam Failure Warning System Upgrade. ▪ Critical Infrastructure Protection – security enhancements at Seattle Public Utilities facilities. ▪ Development of plans and procedures to safeguard those at risk from potential flooding. ▪ Lake Youngs Inlet Dam built as backup to Cascades Dam. ▪ Tolt intake tower, walkway, and reservoir outlet valve control. ▪ Strategic asset management plans for major dams. 	Flood, Dam Failure



Existing Mitigation Capabilities - Seattle Public Utilities

Capability	Capability Type	Description	Key Accomplishments (2009-2015)	Hazard Mitigated
Landslide Awareness Program	Education and Outreach	Annual public meetings with the intent of providing an all-encompassing range of expert advice for property owners to manage landslide-prone areas. In coordination with the Department of Planning and Development.	<ul style="list-style-type: none"> Developed educational brochures. 	Landslide
Climate Change Adaptation Program	Planning and Administrative	SPU is committed to understanding and preparing for the impacts that climate change will have on the infrastructure and essential services, and to reduce contribution by: 1) Assessing potential impacts to the water supply, drainage, and wastewater systems, and tidally influenced infrastructure, and integrating this information into the decision-making process; 2) Collaborating with the science community and water utilities locally, nationally, and internationally to enhance knowledge of potential climate change impacts and capacity to prepare; 3) Engaging in federal initiatives, including the National Climate Assessment, and other water sector and climate research collaborative efforts; and 4) Calculating and verifying the amount of heat-trapping greenhouse gases emitted	<p>Assessments of potential climate change impacts by SPU include:</p> <ul style="list-style-type: none"> Repeated scientific study of hydrology and water supply, as well as water demand. Mapping of exposure to sea-level rise. Determining the sensitivity of drainage and wastewater systems to extreme precipitation events. <p>Measures to reduce vulnerability could also include:</p> <ul style="list-style-type: none"> Physical modifications to structures. Changing the way infrastructure is operated to reflect changing conditions. Embedding climate information into asset management decision-making tools. Incentivizing changes in water consumption behavior. Developing early-warning systems for urban flooding. Amending or implementing new codes and policies. 	Climate Change
Capital Improvement	Financial	The CIP, prepared by the Department of Finance and Administrative Services, allocates funds to rehabilitate, restore, improve, and add to the City's capital facilities.	<p>CIP Projects for SPU include:</p> <ul style="list-style-type: none"> South Recycling Disposal Station Household Hazardous Waste Relocation. 	Hazardous Materials

5.3.6.3 Department of Transportation

SDOT develops, maintains, and operates a transportation system that promotes the mobility of people and goods, and enhances the quality of life, environment, and economy of Seattle. In June 2002, SDOT was created by combining transportation planning from the former Strategic Planning Office with the former Seattle Transportation Department to bring a more comprehensive approach to transportation service delivery. A major element of SDOT's creation was the establishment of the Policy, Planning, and Major Projects division, which is charged with transportation system planning and providing increased control and influence over major projects under construction in Seattle. (www.seattle.gov)

Existing Mitigation Capabilities – Seattle Department of Transportation

Capability	Capability Type	Description	Key Accomplishments (2009-2015)	Hazard Mitigated
Bridging the Gap	Financial	This voter-approved transportation levy is dedicated to seismically retrofitting bridges.	<ul style="list-style-type: none"> ▪ The following retrofits have been completed: ▪ Albro over Airport Way ▪ Fauntleroy Express Way ▪ Ballard Bridge ▪ 4th Avenue, Jackson to Airport Way ▪ 2nd Avenue Extension ▪ Airport, 4th Avenue to 5th Avenue ▪ South Jackson Street, 4th Avenue to 5th Avenue 	Earthquake
Transportation Strategic Plan Update	Planning	This plan identifies actions to accomplish policies in the Comprehensive Plan and Puget Sound Regional Council's Destination 2030 Plan.	<ul style="list-style-type: none"> ▪ Identified transportation projects necessary for Seattle's growth management in the PSRC 2040 Plan ▪ Developed the SDOT Action Agenda which identified emergency response as a core principle and established specific measurement goals for annual emergency preparedness training, bridge seismic retrofit and distribution of the SDOT's Winter Weather brochure 	All Hazards



Existing Mitigation Capabilities – Seattle Department of Transportation

Capability	Capability Type	Description	Key Accomplishments (2009-2015)	Hazard Mitigated
Aging Infrastructure Replacement Program	Planning and Administrative	This program identifies aging structures and targets them for upgrade and/or replacement.	Structures targeted by the program include: <ul style="list-style-type: none"> Spokane Street Viaduct, Alaskan Way Viaduct, and Seawall – draft design work to replace the seawall adjacent to the Alaskan Way Viaduct Retaining Wall Replacement – identification and repair of retaining walls throughout the City to reduce hazards to adjoining sidewalks or roads. Westlake Ave N. and Rainier Ave S. are two location that have had recent work performed. 	Structure Failure, Landslide, Earthquake
Landslide Mitigation Program	Planning, Administrative and Technical	This program analyses, identifies, and directs funds through the CIP towards improvements in landslide-prone areas throughout the City. A full-time senior civil/geotechnical engineer manages the Landslide Mitigation Program and conducts studies to identify high priority arterial streets for landslide hazards, maintains a system to track ongoing clean-up and maintenance costs associated with slide area, and develops draft standards for tailoring streets and drainage in residential areas.	<ul style="list-style-type: none"> Conducted right-of-way landslide repair projects, including: <ul style="list-style-type: none"> Soldier Pile Wall at 110 block Lakeside Ave S Rock Buttress at Highland Pkwy & Othello St Soldier Pile wall at 10400 block 47 Ave SW Soldier Pile wall at 222 Lake Dell Ave Rock Buttress at 1 Ave S & Olson Pl SW Rock Buttress at 1400 block NW Woodbine Way Soldier pile wall at 9700 block Rainier Ave S Soldier pile wall at 2700 block Westlake Ave N Soldier pile and reinforced earth wall at 8700 block Golden Garden Dr NW Patten Place Landslide Repair Rock Buttress at NE 95 & Sandpoint Way Re-construction of roadway with reinforced subgrade at 9800 block 21 Ave NW Slope repair and reconstruction of roadway at 825 NW Northwood Road 	Landslide



Existing Mitigation Capabilities – Seattle Department of Transportation

Capability	Capability Type	Description	Key Accomplishments (2009-2015)	Hazard Mitigated
Areaways Program	Administrative and Technical	This program identifies and implements mitigation projects for areaways that reduce risks to City facilities and the general public. Areaways are usable space, generally in the street right-of-way, constructed under sidewalks, and between the building foundation and the street wall.	<p>This program has performed the following actions:</p> <ul style="list-style-type: none"> ▪ Monitoring Program – An extensive monitoring system has been installed in the most critical areaways in the Pioneer Square District ▪ Inspection – Condition inspection was performed on areaways in the International District. This inspection provides an important benchmark for determining deterioration <ul style="list-style-type: none"> Reconstruction – Successfully rebuilt Areaway on Post Ave. between Yesler Way and Columbia St. 	Structure Failure
Capital Improvement	Financial	The CIP, prepared by the Department of Finance and Administrative Services, allocates funds to rehabilitate, restore, improve, and add to the City's capital facilities.	<p>CIP Projects for the SDOT include:</p> <ul style="list-style-type: none"> ▪ Post Alley Seismic Retrofit. ▪ King Street Station Seismic Retrofit. ▪ Landslide Mitigation Projects. 	Earthquake

5.4 Continuity of Operations Planning

One notable city-wide planning capability is the requirement that all City departments maintain Continuity of Operations (COOP) plans. These plans play a key role in mitigating the impacts of hazards by ensuring that departments are planning to minimize the potential disruption to their essential functions that may result from a disaster. Key plan information includes:

- Identification of department essential functions.
- Identification of alternate facilities that can be used if the department’s normal facility is damaged or uninhabitable.
- Establishment of recovery time objectives for essential functions.
- Assignment of roles and responsibilities for continuity operations.

COOP plans are a vital part of the basic foundation that supports the City’s response to and recovery from disasters. Without them, work following a major event is made much more difficult and chaotic. With them our efforts in restoring services and bringing a sense of normalcy to the City will happen quicker and minimize the long term impacts that disasters have on communities.

5.5 Coordination with Community Partners

The City of Seattle is not alone in its efforts to create a more resilient community through hazard mitigation and will actively pursue strategies to ensure effective coordination and integration with the private sector, both for-profit and not-for-profit, including the County’s critical infrastructure, key resources, other business and industry components, and not-for-profit organizations (sometimes called nongovernmental organizations (NGOs), including those serving special needs populations, engaged in mitigation activities. These efforts are ongoing and the City has proactively identified enhanced coordination with community partners as a mitigation action in this update of the plan (OEM-1).

Table 5-2 identifies some of these key partners by sector.


Table 5-2 Community Partners	
Education Seattle Public Schools Seattle Colleges University of Washington Seattle University Seattle Pacific University	Business and Industry Greater Seattle Business Association Seattle Chambers of Commerce Port of Seattle Local Businesses ³

³ The 10 biggest employers in the Seattle Area are: 1) Boeing, 2) Microsoft, 3) University of Washington, 4) Amazon, 5) Weyerhaeuser, 6) Group Health Cooperative, 7) Fred Meyer, 8) Bank of America, 9) Qwest Communications, and 10) Nordstrom. Source: <http://seattle.about.com/od/largecompanies/a/topseattleemployers.htm>

Finance Area Financial Institutions	Healthcare Area Hospitals and Healthcare Facilities
Private Utilities Puget Sound Energy Seattle Steam Telecommunications Providers	Transportation Burlington Northern Santa Fe Railroad King County Metro Seattle-Tacoma International Airport Sound Transit Washington State Ferries

5.6 National Flood Insurance Program Participation

Though not one of its highest risk hazards, the City of Seattle is committed to reducing its vulnerability to flooding and the following section describes the City’s participation in the National Flood Insurance Program (NFIP) including a program for continued compliance.

 FEMA	<p>B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))</p> <p>C2. Does the Plan address each jurisdiction’s participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3))</p>
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5.6.1 Floodplain Management Program

The City regulates construction and development in areas identified as flood-prone to protect life and property. The primary regulatory tools are the Floodplain Development Ordinance (FDO) and the Environmentally Critical Areas (ECA) Ordinance (see Section 5.3.4.2 for more information on this capability). The FDO regulates areas designated as 100 year floodplain, which fall along Thornton, Pipers and Longfellow Creeks in North Seattle, in the South Park area along the Duwamish Waterway, and along the coastline of the Puget Sound. These identified “Special Flood Hazard Areas” are included in FEMA’s Flood Insurance Rate Maps (FIRMs). Beyond these areas, the City has begun regulating newly-identified areas determined by Seattle Public Utilities to be prone to urban flooding. These areas are regulated under the ECA Ordinance, and in 2014, the FDO was formally amended to make clear that regulation extends to these newly mapped areas (Ordinance 12447).

The Department of Planning and Development manages the City’s participation in NFIP. The City has established and maintained eligibility in the Regular Phase of the NFIP since 1977. Activities the City conducts to ensure ongoing compliance with the program include:

- This department maintains an NFIP rate map for properties identified as flood prone. These Digital Flood Insurance Rate Maps (DFIRMs) were last updated May 16, 1995.



- Seattle Municipal Code Chapter 25.06, as amended by Council Bill Number 114503 (2003), is the floodplain management chapter; it was reviewed and found to be fully compliant with the NFIP and State floodplain management regulations on August 12, 2008.
- The most recent Community Assistance Visit by the Washington State Department of Ecology was conducted on August 6, 2008. The City was certified as a participant in good standing in the NFIP.
- The City reviewed and provided feedback to FEMA on proposed revised FIRMs covering Seattle, expected to go into effect in 2016.
- NFIP participation is managed by a staff Certified Floodplain Manager.

5.6.2 Repetitive Loss Structures

Within the Seattle city limits, there are currently no properties identified as Repetitive Loss and only one property identified as Severe Repetitive Loss according to NFIP criteria. This property is a residential structure located just outside of the special flood hazard area delineated in the FIRM, but does lie within the flood-prone area mapped by Seattle Public Utilities.

See Appendix F of this plan for more information on the City's participation in the NFIP Program.



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6. MITIGATION STRATEGY

6.1 General

Chapter 6 describes the City of Seattle’s mitigation strategy which is the primary focus of the City’s mitigation planning efforts. This strategy represents the blueprint for the approach chosen by the City to reduce or prevent losses flowing from hazards identified in the SHIVA.

The strategy is made up of three main required components: mitigation goals and objectives, mitigation actions, and a mitigation action plan for implementation (see Figure 6-1). These components provide the framework to identify, prioritize, and implement actions to reduce risk from hazards.

Figure 6-1 Mitigation Strategy Process



6.1.1 Maximizing Loss Reduction

While this mitigation strategy is meant to be comprehensive in nature and address all hazards identified in the SHIVA, the City also recognizes that there are some hazards that pose greater risk to the community in terms of potential losses both in terms of impact to life and to property and the environment. In the City of Seattle’s case, the hazard identified as having the potential for the greatest impact to life and property is earthquake. This focus on reducing the City’s vulnerability to seismic events is due to following drivers:


- Earthquakes are Seattle’s top hazard with the highest combination of likelihood and potential destructiveness.
- Seattle’s built environment, which includes vulnerable building types such as unreinforced masonry buildings, creates an increased risk.

As noted in Chapter 5, one of the City’s new efforts to reduce vulnerability to seismic risk is the ongoing Seismic Assessment Methodology and Demonstration Project. This project, sponsored by the Department of Finance and Administrative Services, provides the City with a framework to identify facilities at risk and support decision making regarding seismic rehabilitation projects. The mitigation strategy outlined in this chapter includes a number of actions that derive from this project and it will continue to inform the City’s approach to mitigating its seismic risks.

See Appendix G for additional details on the City’s Seismic Risk Assessment Methodology and Demonstration Project.

In addition to a focus on areas of greatest loss, the planning process includes tracking of repetitive loss. Although Seattle does not have a large exposure to repetitive losses due to river flooding, as many communities do (see Section 5.6 on National Flood Insurance Program), as part of the annual review process the City will revisit and address any recurring loss trends that emerge across all hazards.

6.2 Mitigation Goals


 <p>FEMA</p>	<p>C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))</p>
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Mitigation goals are intended to represent what the City seeks to achieve through mitigation plan implementation. The goals are general guidelines and provide a framework for identification of more detailed objectives and actions. The MWG reviewed the goals and objectives from the 2009 plan update and refined them for the 2015 update to reflect the City’s continually improving emergency management program. Goals were added that focus on protection of natural and cultural resources and collaborative and integrated mitigation planning. The goals and objectives were refined to align with Emergency Management Accreditation Program standards, and to reflect the City’s vision of a resilient community as the end result of its activities across all phases of emergency management.

The City has identified the following goals for the 2015 update of the Seattle HMP:

- **GOAL 1:** Protect life and safety and promote community resiliency.
- **GOAL 2:** Safeguard critical infrastructure and ensure continuity of service.
- **GOAL 3:** Protect public and private property.
- **GOAL 4:** Protect the natural environment and cultural and historic resources.
- **GOAL 5:** Ensure a resilient economy.
- **GOAL 6:** Promote a collaborative and integrated mitigation program.

6.3 Mitigation Actions

 <p>FEMA</p>	<p>C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for the [City of Seattle] being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure ? (Requirement §201.6(c)(3)(ii))</p>
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A mitigation action is a specific action, project, activity, or process taken to reduce or eliminate long-term risk to people and property from hazards and their impacts. Implementation of mitigation actions helps achieve the City’s mitigation goals and reduce vulnerability to threats and hazard identified in the plan. Mitigation plan regulations require the City to identify and analyze a comprehensive range of specific mitigation actions and projects to reduce the impacts identified in the City’s risk assessment.

See Appendix A for the full text of the SHIVA.

6.3.1 Review of 2009 Hazard Mitigation Actions

As part of the mitigation strategy update, all mitigation actions identified in the 2009 plan were evaluated to determine what the status of the action was and whether any ongoing or incomplete actions should be included as actions in the 2015 plan update.

See Table 6-5 for an overview of the status of all actions from the 2009 plan update.

6.3.2 2015 Mitigation Actions

In order to achieve the mitigation goals identified above, the City has identified a comprehensive series of mitigation objectives and supporting actions that are focused on reducing vulnerability and maximizing loss reduction. The actions can typically be broken out into the following types of activities:

- **Plans and Regulations.** Regulatory actions or planning processes that result in reducing vulnerability to hazards.
- **Assessments and Studies.** Actions taken to better understand the potential impacts of identified hazards. An example would be seismic studies of City facilities.
- **Infrastructure/Capital Projects.** Actions taken to modify existing buildings or structures to protect them from a hazard.
- **Non-Structural Mitigation Measures.** Physical actions taken that don't include structural modifications. An example would be efforts to secure furniture or installation of backup generators.
- **Natural Systems Protection.** Actions that, in addition to minimizing hazard losses, preserve or restore the functions of natural systems.
- **Education and Awareness.** Actions taken to inform and educate residents, elected officials, and property owners about hazards and potential ways to mitigate them.
- **Preparedness and Response.** Actions that protect people and property during and immediately after a disaster or hazard event.

All mitigation actions identified in the plan are addressed in the Mitigation Implementation Plan provided in section 6.5. The actions include both interim- and long-term strategies for reducing vulnerability to hazard and are characterized as such in the 'life of action' column of the implementation plan.

6.3.3 2015 Mitigation Actions by Goal

GOAL 1: Protect life and safety and promote community resiliency.

Types of contributing actions to this goal include actions that:

- Conduct inclusive education and outreach activities to raise public awareness of hazards and how they can better prepare and partner with the City in reducing vulnerability.



- Partner with agencies serving vulnerable populations to minimize harm in the event of an emergency.
- Enhance the City’s emergency response capabilities.

The City has identified the following objectives and mitigation actions to support Goal 1:

Objective 1.1. Conduct hazard specific public outreach to vulnerable areas.

- **OEM-2.** Tailor public education messaging to emphasize earthquake preparedness and mitigation in programs delivered in liquefaction-prone areas of the city and on the OEM website.
- **P&R-3.** Identify illicit/improper drainage systems by private residents, impacting steep slope areas (in conjunction with SDOT and SPU).

Objective 1.2: Reduce the possibility of damages and losses resulting from disease/pandemic hazards.

- **OEM-3.** Strengthen awareness of and focus on health systems/disease prevention in the mitigation program.

Objective 1.3: Promote community resiliency through a comprehensive approach to preparing for the impacts of a changing climate.

- **OSE-1.** Develop Climate Preparedness Strategy.

Objective 1.4: Increase the resiliency of the City’s food system.

- **HSD-1.** Increase the quantity and quality of food available through the emergency food system for people at risk for food insecurity. Through the 3-year investment period work with selected agencies to increase coordination, efficiency and resiliency of the food system.

Objective 1.5: Enhance the City’s response capacity.

- **SPU-4.** Create a comprehensive emergency plan for maintaining and restoring essential services in emergencies.

GOAL 2: Safeguard critical infrastructure and ensure continuity of service.

Types of contributing actions to this goal include actions that:

- Protect critical City facilities and services and promote reliability and continuity of lifeline systems.
- Consider known hazards when siting new facilities and systems.
- Create redundancies for critical systems including water, sewer, digital data, power, and communications.
- Utilize and formalize best practices for protecting systems and networks.

The City has identified the following objectives and mitigation actions to support Goal 2:

Objective 2.1. Ensure system redundancies and backup power are available to support key City functions.

- **FAS-3.** Continue the Emergency Generator Program.⁴
- **SC-1.** Design and install a dedicated power supply and emergency generator and transfer switch in the Seattle Central Armory.
- **SC-2.** Conduct an electrical assessment/study to determine the best options for installing generators for in key facilities.
- **SCL-6.** Provide seismically designed storage racks for critical parts and supplies.
- **SCL-11.** Preposition supplies needed for restoration efforts at secure locations.
- **SCL-12.** Retrofit electrical transmission towers in Snohomish County against landslide damage.

Objective 2.2. Ensure protection of the City's information technology infrastructure.

- **DoIT-1.** Upgrade essential network routers, firewalls, and switches for City of Seattle information technology systems.
- **DoIT-2.** Add upgrades to SONET as necessary to improve capacity of existing fiber optic network.
- **DoIT-3.** Upgrade telecommunications systems: Time Division Multiplexing (TDM network) to VoIP/Multimedia Communications in City's systems.
- **DoIT-4.** Create a citywide next generation data center site and a secondary alternate data center site for the City of Seattle.
- **DoIT-5.** Implement controls on City owned desktop systems that enforce policy and prohibit installation of non-approved applications.
- **DoIT-6.** Implement technology for the detection of command and control computer traffic for compromised desktop systems.
- **DoIT-7.** Implement technology to routinely inventory installed, non-Microsoft applications to determine to the extent to which upgrade or patching is required. Transition the information to operations for patch/upgrade of the systems.

GOAL 3: Protect public and private property.

Types of contributing actions to this goal include actions that:

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

⁴ Program actions may include supply and maintain emergency generators and fuel at critical FAS owned facilities. Inventory fixed emergency generators at FAS owned facilities, manage emergency generator preventative maintenance program, conduct annual testing, assess and mitigate gaps in critical facilities without fixed generators or with insufficient back-up power, maintain service contract for emergency generator support, repair and rolling stock.



- Educate public officials, developers, realtors, contractors, building owners, and the general public about hazard risks and building requirements.
- Promote appropriate mitigation of all public and privately owned property within the City’s jurisdiction.
- Incorporate effective mitigation strategies into the City’s Capital Improvement Projects.
- Promote post-disaster mitigation as part of repair and recovery with a focus on building back better.

The City has identified the following objectives and mitigation actions to support Goal 3:

Objective 3.1: Reduce the possibility of damages and losses to City facilities and infrastructure from earthquakes and other geo-physical hazards.

- **FAS-2.** Seismic upgrade of Charles Street – Fleets Vehicle Maintenance.⁵
- **FAS-5.** Seismic upgrade of South Precinct.⁶
- **FAS-6.** Complete ASCE 31-03 Tier 2 seismic studies on (10) critical FAS facilities.⁷
- **P&R-1.** Assessment and seismic retrofit of the North Shops (Densmore).
- **P&R-2.** Conduct an assessment of remaining Parks Community Centers and pools for seismic retrofit and other renovations needed for service as secondary emergency shelters.
- **SCL-1.** SCL Systems Operations Center seismic retrofit design.
- **SCL-2.** Seismic review of vaults and substations to update 1993 study.
- **SCL-3.** Substation seismic upgrade.⁸
- **SCL-12.** Install impact recorders at substations.
- **SDOT-1.** Bridge Seismic Retrofit Phase III.
- **SPU-1.** Develop a plan to protect the drinking water system from earthquakes.

Objective 3.2: Reduce the possibility of earthquake-related damages and casualties due to Unreinforced Masonry Buildings.

- **DPD-1.** Prepare comprehensive list of unreinforced masonry buildings.
- **DPD-3.** Identify City-owned unreinforced masonry buildings.

Objective 3.3: Reduce the possibility of damages and losses resulting from weather hazards.

⁵ The seismic risk assessment that was recently completed in January 2014 performed an ASCE 31-03 Tier 1 and Tier 2 study on the Charles Street – Fleets Vehicle Maintenance facility.

⁶ The seismic risk assessment that was recently completed in January 2014 performed an ASCE 31-03 Tier 1 and Tier 2 study on the South Precinct.

⁷ 1) Charles Street – Tire Shop, 2) Charles Street – Fire Garage, 3) Sunny Jim Warehouse, 4) Charles Street – SDOT Engineering, 5) Charles Street – Traffic Meter Shop, 6) Harbor Patrol Office, 7) Fire Headquarters, 8) Airport Way Ctr B, 9) Airport Way Ctr E, 10) HLF FAS Vehicle Maintenance Bldg. The seismic risk assessment that was recently completed in January 2014 performed ASCE 31-03 Tier 1 studies on (10) critical FAS facilities. A Tier 2 study should be completed prior to beginning the design and construction of a capital project.

⁸ The facility previously used at Seattle Center for these purposes is no longer available so this facility is now in use, but the roof is currently leaking and a partial assessment by FAS identified these other needs.



- **SC-2.** Reroof and make minor electrical, plumbing and storage improvements to the Seattle Center Pavilion to allow it to be used for sheltering purposes in inclement weather and other hazard conditions.⁹
- **SCL-4.** Hazard tree mitigation (vegetation management) near SCL Right-of-Way.
- **SPU-2.** Improve Thornton Creek Confluence to reduce upstream flooding and downstream flows.
- **SPU-3.** Accelerate flooding and sewer backup prevention projects in the Broadview and South Park neighborhoods.
- **SPU-5.** Prepare for water supply and utility system threats that may occur from climate change.

Objective 3.4: Reduce the possibility of damages and losses resulting from transportation and infrastructure hazards.

- **SCL-9.** Map cell towers and identify feeders.
- **SCL-13.** Conduct study of downstream consequences from dams to update and improve inundation maps.
- **SDOT-7.** Separation of rail and arterial right-of-way for S. Lander Street Grade.
- **SDOT-2.** Conduct a Transportation Operations Center implementation assessment to combine the Traffic Management Center (TMC), dispatch, construction coordination, customer inquiry and call center, and emergency operations functions into a 24/7 work center.
- **SDOT-3.** Traffic Management Center (TMC) expansion to 24/7 operations (TMC expansion construction, FTE).
- **SDOT-4.** Conduct a security threat assessment of the Seattle rail corridor to identify risk associated with new volume of oil train movement.
- **SDOT-6.** Conduct a Seattle earthquake damage spot arterial repair planning/exercise.

Objective 3.5: Reduce the possibility of damages and losses resulting from intentional acts of destruction.

- **SDOT-5.** Implement Seattle rail corridor access control measures (fencing, security cameras, and improved right-of-way management).

Objective 3.6: Ensure that City building codes reflect the latest standards in seismic safety.

- **DPD-2.** Update Seattle structural codes to current standards.

GOAL 4: Protect the natural environment and cultural and historic resources.

Types of contributing actions to this goal include actions that:

⁹ 1) the Central Utility Plant which needs to be in operation to provide heating and cooling to add campus facilities; 2) the Fisher Pavilion, designated for sheltering; 3) the Exhibition Hall, designated for sheltering and emergency medical facility; and 4) the Seattle Center Pavilion, designated for sheltering and already in use as a cold weather shelter. From this study, specific implementation projects can be proposed at a later date.



- Develop hazard mitigation policies and actions that protect the environment.
- Promote mitigation of historic buildings and key cultural assets.

The City has identified the following objectives and mitigation actions to support Goal 4:

Objective 4.1: Determine the earthquake vulnerability of historic landmarked properties.

- **DON-1.** Conduct survey of landmarks/historic district resources that have had seismic upgrades/life safety upgrades.

Objective 4.2: Reduce the use of, or minimize the impacts of the use of potentially hazardous substances in City operations.

- **SCL-10.** Remove/sample PCB transformers.

GOAL 5: Ensure a resilient economy.

Types of contributing actions to this goal include actions that:

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

The City has identified the following objectives and mitigation actions to support Goal 5:

Objective 5.1. Collaborate with local business to promote hazard mitigation.

- **OEM-4.** Encourage the chambers of commerce and other business advocates to sponsor business efforts to prepare for and mitigate the impacts of hazards.

GOAL 6: Promote a collaborative and integrated mitigation program.

Types of contributing actions to this goal include actions that:

- Incorporate hazard mitigation elements into other City planning efforts, as appropriate.
- Build on existing and identify potential new, inter-jurisdictional and multi-jurisdictional mitigation efforts.

The City has identified the following objectives and mitigation actions to support Goal 6:

Objective 6.1: Incorporate hazard mitigation into other City plans and programs.

- **FAS-1.** Develop analytical tools to support the asset planning program.¹⁰
- **FAS-4.** Investigate and perform feasibility studies of new technologies for hazard mitigation.¹¹
- **FAS-7.** Conduct a workshop to share methodology and lessons learned from the seismic risk assessment demonstration project with other departments and building owners.¹²

Objective 6.2. Engage external partners in the City’s mitigation planning process.

- **OEM-1.** Identify opportunities for integration of community partners into the City’s mitigation planning program.

6.3.4 2015 Mitigation Actions by Hazard

The actions identified in the 2015 update of the Seattle HMP are intended to address natural, technological and human-caused hazards. Table 6-1 illustrates the comprehensive nature of the plan by identifying which actions mitigate the hazards identified in the SHIVA.

Table 6-1 2015 Mitigation Actions by Hazard

SHIVA Hazard*	Related Mitigation Actions
All Hazards	OEM-1, OEM-4, SPU-4, SDOT-2, SDOT-3, HSD-1
Earthquakes	DON-1, DPD-1, DPD-2, DPD-3, FAS-1, FAS-2, FAS-4, FAS-5, FAS-6, FAS-7, OEM-2, P&R-1, P&R-2, P&R-3, SPU-1, SC-1, SC-3, SCL-1, SCL-2, SCL-3, SCL-5, SCL-6, SCL-8, SCL-9, SCL-10, SDOT-1, SDOT-6, DoIT-1, DoIT-2, DoIT-3, DoIT-4
Snow and Ice Storms	DPD-2, SC-3, SCL-4, SCL-8, SCL-9, SCL-10, OSE-1, SPU-5
Infrastructure/Cyber	SCL-11, SDOT-4, SDOT-5, SDOT-6, DoIT-1, DoIT-2, DoIT-3, DoIT-4, DoIT-5, DoIT-6, DoIT-7
Windstorms	DPD-2, SCL-4, SCL-8, SCL-10, OSE-1, SPU-5
Power Outages	DPD-2, FAS-3, P&R-3, SC-1, SC-2, SCL-4, SCL-8, SCL-10, SCL-12, OSE-1
Terrorism	SDOT-4, SDOT-5, SDOT-7, DoIT-6, DoIT-7
Disease Outbreaks	OEM-3, OSE-1
Flooding	DPD-2, P&R-3, SPU-2, SPU-3, SCL-11, OSE-1, SPU-5
Excessive Heat Events	SC-3, OSE-1, SPU-5
Fires	DON-1, DPD-2, SCL-4, SDOT-5, SDOT-6, SPU-5

¹⁰ Tools include, but are not limited to: 1) Reconciliation between the previous critical facility index (CFI) and the newly developed facility mission criticality index (FMCII); 2) Analyses of risk-based prioritization for normal operations, seismic/hazard scenarios, and resource conservation projects; and 3) Methodology to assess gaps in current facility data to identify areas that require additional studies and assessments.

¹¹ Example includes cost-benefit analysis of installing an early earthquake warning system into critical facilities as an investment by FAS to protect critical infrastructure, or by the tenant department to protect occupants and operations.

¹² The seismic risk assessment that was recently completed in January 2014 was intended to be used as a demonstration project for a methodology that can be used by other departments and building owners. This can also be used as an education tool to clarify the scope included and excluded with a seismic assessment, e.g. superstructure but not building contents.

SHIVA Hazard*	Related Mitigation Actions
Tsunamis and Seiches	DPD-2
Landslides	DPD-2, P&R-3, SCL-4, SCL-12
Transportation Incidents	SDOT-4, SDOT-5, SDOT-7
Water Shortages	SPU-1, SPU-5, OSE-1
Social Unrest	SDOT-5
Hazardous Materials Incidents	DPD-2, SC-1, SDOT-4, SDOT-5, SDOT-7
Volcanic Hazards	<i>See All Hazards</i>
Active Shooter	SDOT-5

**Hazards listed in order of ranking in SHIVA*

6.4 Evaluating and Prioritizing Mitigation Actions

Once mitigation actions were identified, the MWG, and other key stakeholders went through the exercise of evaluating and prioritizing each action to determine which actions are most suitable for the City to implement. A Mitigation Action Worksheet was developed for each action that included the following information:

- Description of the action.
- Action status.
- Type of action.
- Mitigation goals supported by the action.
- Lead and supporting departments.
- Timeline for implementation and expected life of the action.
- Hazards addressed by the action.
- Anticipated cost and funding source.

A complete Mitigation Implementation Plan is provided in Table 6-4.

See Appendix D-1 for a sample worksheet, Appendix D-2 for worksheet instructions, and Appendix D-3 completed worksheets for all actions identified in the plan.

6.4.1 STAPLEE Analysis

In addition to the information developed above, each action was self-evaluated using STAPLEE criteria as described in Table 6-2. Evaluators were asked to rate each STAPLEE criteria to come up with a total score that determined the relative suitability of each action.

Table 6-2 STAPLEE Criteria

STAPLEE Criteria	Evaluation Rating
S: Is it Socially acceptable?	Definitely YES = 3 Maybe YES = 2 Probably NO = 1 Definitely NO = 0
T: Is it Technically feasible and potentially successful?	
A: Does the responsible agency/department have the Administrative capacity to execute this action?	
P: Is it Politically acceptable?	
L: Is there Legal authority to implement?	
E: Is it Economically beneficial?	
E: Will the project have either a neutral or positive impact on the natural Environment? (score a 3 if positive impact, 2 if neutral impact)	
Will historic structures or key cultural resources be saved or protected?	
Could it be implemented quickly?	

6.4.2 Mitigation Effectiveness Analysis

In addition to the STAPLEE analysis, MWG members were asked to rate the effectiveness of each action as described in Table 6-3.

Table 6-3 Mitigation Effectiveness Criteria

STAPLEE Criteria	Evaluation Rating
Will the implemented action result in lives saved?	High = 5 Medium = 3 Low = 1
Will the implemented action result in a reduction of disaster damage?	High = 5 Medium = 3 Low = 1


The combined STAPLEE and Mitigation Effectiveness Score for each mitigation action identified in this plan will serve as one of the tools the City uses in prioritizing what mitigation actions it wishes to pursue during the next planning cycle. Of course, actions may also become a higher priority based on available funding, emerging hazards, or because they align with priorities identified in other planning efforts.



STAPLEE scores can range from a low of 0 to a high of 27. Mitigation effectiveness scores can run from a low of 2 to a high of 10. Combined, mitigation strategies can score within a range of 0 to 37 points.

FEMA regulations do not require a formal cost-benefit analysis for hazard mitigation plans; however, a formal cost-benefit analysis of mitigation measures is required in order to be approved for Hazard Mitigation Grant Program funding. Therefore, a more formal cost-benefit analysis will be conducted as a component of any future mitigation grant applications.

6.5 2015-2020 Mitigation Implementation Plan

	C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by [the City of Seattle]? (Requirement §201.6(c)(3)(iii))
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The mitigation implementation plan lays the groundwork for how the mitigation plan will be incorporated into existing planning mechanisms and how the mitigation actions will be prioritized, implemented, and administered by the City. The implementation plan includes both short-term strategies that focus on planning and assessment activities, and long-term strategies that will result in ongoing capability or structural projects to reduce vulnerability to hazards.

See Appendix D-2 for Mitigation Action Worksheet instructions and Appendix D-3 for completed Mitigation Action Worksheets for each action listed in Table 6-4.

Table 6-4 2015-2020 Mitigation Implementation Plan (by Department)

Action No.	Mitigation Action	Action Status	Type of Action	Goals Supported	Lead Department	Supporting Departments	Timeline	Life of Action	Hazards Addressed	Anticipated Cost	Funding Available?	Funding Source	STAPLEE Score	Mitigation Effectiveness Score	TOTAL SCORE
Department of Information Technology (DoIT)															
DoIT-1	Upgrade essential network routers, firewalls, and switches for City of Seattle information technology systems.	Ongoing	Infrastructure/Capital Project	Critical Infrastructure Protection Property Protection	DoIT	N/A	1-3 years	Long-term	Earthquakes Infrastructure/ Cyber	Unknown	Yes	Existing Budget	25	6	31
DoIT-2	Add upgrades to SONET as necessary to improve capacity of existing fiber optic network.	Ongoing	Infrastructure/Capital Project	Critical Infrastructure Protection Property Protection	DoIT	N/A	3-5 years	Long-term	Earthquakes Infrastructure/ Cyber	Unknown	Yes	Existing Budget	25	6	31
DoIT-3	Upgrade telecommunications systems: Time Division Multiplexing (TDM network) to VoIP/Multimedia Communications in City's systems.	Ongoing	Infrastructure/Capital Project	Critical Infrastructure Protection Property Protection	DoIT	N/A	3-5 years	Long-term	Earthquakes Infrastructure/ Cyber	Unknown	Yes	Existing Budget	25	6	31
DoIT-4	Creation of citywide next generation data center site and a secondary alternate data center site for the City of Seattle.	Ongoing	Infrastructure/Capital Project	Critical Infrastructure Protection Property Protection	DoIT	N/A	1-3 years	Long-term	Earthquakes Infrastructure/ Cyber	Unknown	Yes	Existing Budget	25	6	31
DoIT-5	Implement controls on City owned desktop systems that enforce policy and prohibit installation of non-approved applications.	Ongoing	Infrastructure/Capital Project	Critical Infrastructure Protection Property Protection	DoIT	N/A	1-3 years	Long-term	Infrastructure/ Cyber	Unknown	Yes	Existing Budget	25	6	31

Table 6-4 2015-2020 Mitigation Implementation Plan (by Department)

Action No.	Mitigation Action	Action Status	Type of Action	Goals Supported	Lead Department	Supporting Departments	Timeline	Life of Action	Hazards Addressed	Anticipated Cost	Funding Available?	Funding Source	STAPLEE Score	Mitigation Effectiveness Score	TOTAL SCORE
DoIT-6	Implement technology for the detection of command and control computer traffic for compromised desktop systems.	Ongoing	Infrastructure/Capital Project	Critical Infrastructure Protection Property Protection	DoIT	N/A	1-3 years	Long-term	Infrastructure/Cyber Terrorism	Unknown	Yes	Existing Budget	25	6	31
DoIT-7	Implement technology to routinely inventory installed, non-Microsoft applications to determine to the extent to which upgrade or patching is required. Transition the information to operations for patch/upgrade of the systems.	Ongoing	Infrastructure/Capital Project	Critical Infrastructure Protection Property Protection	DoIT	N/A	1-3 years	Long-term	Infrastructure/Cyber Terrorism	Unknown	Yes	Existing Budget	25	6	31
Department of Neighborhoods (DON)															
DON-1	Conduct survey of landmarks/historic district resources that have had seismic upgrades/life safety upgrades	New	Assessments and Studies	Life and Safety Property Protection Natural Resource Protection Resilient Economy	DON	DPD	1-3 years	Short-term (interim)	Earthquakes Fires	Unknown	No	Unknown	20	6	26
Department of Planning and Development (DPD)															
DPD-1	Prepare comprehensive list of unreinforced masonry buildings	Ongoing	Assessments and Studies	Life and Safety Property Protection Resilient Economy	DPD	OEM DON	1-3 years	Short-term (interim)	Earthquakes	1 FTE for 2 years + interns+ DPD management and supervision	Anticipated	2015-15 budget	22	6	28
DPD-2	Update Seattle structural codes to current standards	New	Plans and Regulations	Life and Safety Critical Infrastructure Protection Property Protection Resilient Economy	DPD	N/A	1-3 years	Long-term	Earthquakes Fires Floods HazMat Incidents Landslides Power Outages Snow and Ice Storms Tsunami/Seiches Wind Storms	Included in budget as regular operating cost	Yes	Existing Budget	25	8	33

Table 6-4 2015-2020 Mitigation Implementation Plan (by Department)

Action No.	Mitigation Action	Action Status	Type of Action	Goals Supported	Lead Department	Supporting Departments	Timeline	Life of Action	Hazards Addressed	Anticipated Cost	Funding Available?	Funding Source	STAPLEE Score	Mitigation Effectiveness Score	TOTAL SCORE
DPD-3	Identify City-owned unreinforced masonry buildings.	New	Assessments and Studies	Property Protection Integrated Planning	DPD	N/A	1-3 years	Short-term (interim)	Earthquakes	Unknown	Anticipated	Existing Budget	22	4	26
Facilities and Administrative Services (FAS)															
FAS-1	Develop analytical tools to support the asset planning program.	New	Plans and Regulations	Critical Infrastructure Protection, Property Protection	FAS	N/A	<1 year	Short-term (interim)	Earthquakes	Unknown	Yes	Existing budget	21	6	27
FAS-2	Seismic upgrade of Charles Street – Fleets Vehicle Maintenance.	Ongoing	Infrastructure/Capital Project	Life and Safety, Critical Infrastructure Protection, Property Protection	FAS	SPD	3-5 years	Long-term	Earthquakes	\$3,600,000 (engineer's estimate in 2014 dollars)	No	Unknown	17	10	27
FAS-3	Continue the Emergency Generator Program.	Ongoing	Infrastructure/Capital Project, Preparedness and Response	Critical Infrastructure Protection, Property Protection	FAS	N/A	3-5 years	Long-term	Power Outages	Unknown	Yes	Existing Budget	19	6	25
FAS-4	Investigate and perform feasibility studies of new technologies for hazard mitigation.	New	Assessments and Studies	Critical Infrastructure Protection, Property Protection	FAS	N/A	1-3 years	Short-term (interim)	Earthquakes	Unknown	No	Unknown	20	2	22
FAS-5	Seismic upgrade of South Precinct.	Ongoing	Infrastructure/Capital Project	Life and Safety, Critical Infrastructure Protection, Property Protection	FAS	SPD	3-5 years	Long-term	Earthquakes	\$1,550,000 (engineer's estimate in 2014 dollars)	No	Unknown	17	10	27
FAS-6	Complete ASCE 31-03 Tier 2 seismic studies on (10) critical FAS facilities	Ongoing	Assessments and Studies	Critical Infrastructure Protection, Property Protection	FAS	N/A	1-3 years	Short-term (interim)	Earthquakes	ROM of \$50-\$100K	No	Unknown	19	6	25
FAS-7	Conduct a workshop to share methodology and lessons learned from the seismic risk assessment demonstration project with other departments and building owners	New	Education and Awareness	Life and Safety, Critical Infrastructure Protection, Property Protection, Integrated Planning	FAS OEM	N/A	<1 year	Short-term (interim)	Earthquakes	Unknown	Anticipated	Existing budget	23	6	29
Human Services Department (HSD)															

Table 6-4 2015-2020 Mitigation Implementation Plan (by Department)

Action No.	Mitigation Action	Action Status	Type of Action	Goals Supported	Lead Department	Supporting Departments	Timeline	Life of Action	Hazards Addressed	Anticipated Cost	Funding Available?	Funding Source	STAPLEE Score	Mitigation Effectiveness Score	TOTAL SCORE
HSD-1	Increase the quantity and quality of food available through the emergency food system for people at risk for food insecurity. Through the 3-year investment period work with selected agencies to increase coordination, efficiency and resiliency of the food system.	Ongoing	Plans and Regulations	Life and Safety Resilient Economy Integrated Planning	HSD	N/A	1-3 years	Long-Term	All Hazards	\$3.126 million/year	Yes	Existing budget	20	7	27
Office of Emergency Management (OEM)															
OEM-1	Identify opportunities for integration of community partners into the City's mitigation planning program	New	Education and Awareness	Integrated Planning	OEM	TBD	3-5 years	Short-term (interim)	All Hazards	Unknown	No	Unknown	19	2	21
OEM-2	Tailor public education messaging to emphasize earthquake preparedness and mitigation in programs delivered in liquefaction-prone areas of the city and on the OEM website.	New	Education and Awareness	Life and Safety Resilient Economy	OEM	DPD and others TBD	1-3 years	Short-term (interim)	Earthquakes	Unknown	No	Unknown	19	6	25
OEM-3	Strengthen awareness of and focus on health systems/disease prevention in the mitigation program.	New	Education and Awareness	Integrated Planning	OEM, Public Health – Seattle/King County	N/A	1-3 years	Short Term (interim)	Disease Outbreaks	Unknown	No	Unknown	18	2	20

Table 6-4 2015-2020 Mitigation Implementation Plan (by Department)

Action No.	Mitigation Action	Action Status	Type of Action	Goals Supported	Lead Department	Supporting Departments	Timeline	Life of Action	Hazards Addressed	Anticipated Cost	Funding Available?	Funding Source	STAPLEE Score	Mitigation Effectiveness Score	TOTAL SCORE
OEM-4	Encourage the chambers of commerce and other business advocates to sponsor business efforts to prepare for and mitigate the impacts of hazards. (Ref: City-wide Emergency Management Multi-Year Strategic Plan 2015 – 2017 Action Item 6.c.2.)	New	Education and Awareness	Resilient Economy	OEM, OED	N/A	1-3 years	Short-Term (interim)	All Hazards	Unknown	No	Unknown	18	3	21
Office of Sustainability & Environment (OSE)															
OSE-1	Develop Climate Preparedness Strategy	New	Plans and Regulations	Critical Infrastructure Protection Property Protection Natural Resource Protection Resilient Economy	OSE	N/A	<1 year	Short- and Long-term strategies	Disease Outbreaks Excessive Heat Floods Landslides Power Outages Snow and Ice Storms Water Shortages Wind Storms	Unknown	Yes	Existing Budget	25	3	30
Parks & Recreation (P & R)															
P&R-1	Assessment and seismic retrofit of the North Shops (Densmore)	New	Infrastructure/Capital Project	Life and Safety, Critical Infrastructure Protection Property Protection	Parks and Recreation	N/A	3-5 years	Short-term (interim)	Earthquakes	\$2,000,000	No	Bond/Levy	17	7	24
P&R-2	Conduct an assessment of remaining Parks Community Centers and pools for seismic retrofit and other renovations needed for service as secondary emergency shelters.	New	Assessments and Studies	Life and Safety, Critical Infrastructure Protection, Property Protection	Parks and Recreation	N/A	<1 year	Short-term (interim)	Earthquakes	\$80,000	No	Grant/ Bond/Levy (CIP through General Fund and other grant funding)	21	2	23

Table 6-4 2015-2020 Mitigation Implementation Plan (by Department)

Action No.	Mitigation Action	Action Status	Type of Action	Goals Supported	Lead Department	Supporting Departments	Timeline	Life of Action	Hazards Addressed	Anticipated Cost	Funding Available?	Funding Source	STAPLEE Score	Mitigation Effectiveness Score	TOTAL SCORE
P&R-3	Identify illicit/improper drainage systems by private residents, impacting steep slope areas (in conjunction with SDOT and SPU).	Ongoing	Plans and Regulations Education and Awareness	Life and Safety, Natural Resource Protection	Parks and Recreation	DPD/SPU/SDOT	1-3 years	Short-term (interim)	Earthquakes Floods Landslides Power Outages	\$50,000 (program development) + FTE for enforcement	No	Existing Budget/Grant	25 (23 for enforcement)	2 (8 for enforcement)	27 (31 for enforcement)
Seattle Center (SC)															
SC-1	Design and install a dedicated power supply and emergency generator and transfer switch in the Seattle Central Armory	New	Non-Structural Physical Project	Life and Safety, Critical Infrastructure Protection, Property Protection, Resilient Economy, Integrated Planning	Seattle Center DoIT	N/A	1-3 years	Long-term	Earthquakes HazMat Incidents Power Outages	Unknown	No	Unknown	25	8	33
SC-2	Conduct an electrical assessment/study to determine the best options for installing generators for in key facilities.	New	Assessments and Studies	Life and Safety, Critical Infrastructure Protection, Property Protection, Resilient Economy, Integrated Planning	Seattle Center	N/A	<1 year	Short-term (interim)	All Hazards	\$60,000 (\$15,000/facility)	No	Unknown	25	6	31
SC-3	Reroof and make minor electrical, plumbing and storage improvements to the Seattle Center Pavilion to allow it to be used for sheltering purposes in inclement weather and other hazard conditions.	New	Infrastructure/Capital Project Preparedness and Response	Life and Safety, Resilient Economy, Integrated Planning	Seattle Center	N/A	<1 year	Long-term	Earthquakes, Excessive Heat, Snow and Ice Storms	\$517,000	No	Unknown	25	6	31
Seattle City Light (SCL)															
SCL-1	SCL Systems Operations Center seismic retrofit design	Ongoing	Infrastructure/Capital Project	Critical Infrastructure Protection, Property Protection, Resilient Economy	SCL	N/A	1-3 years	Long-term	Earthquakes	\$200,000 for redesign, \$2.5 million for construction	Anticipated	Existing budget Grant	22	6	28

Table 6-4 2015-2020 Mitigation Implementation Plan (by Department)

Action No.	Mitigation Action	Action Status	Type of Action	Goals Supported	Lead Department	Supporting Departments	Timeline	Life of Action	Hazards Addressed	Anticipated Cost	Funding Available?	Funding Source	STAPLEE Score	Mitigation Effectiveness Score	TOTAL SCORE
SCL-2	Seismic review of vaults and substations to update 1993 study	Ongoing	Assessments and Studies	Critical Infrastructure Protection, Property Protection	SCL	N/A	1-3 years	Short-term (interim)	Earthquakes	\$200,000	Anticipated	Existing budget	21	4	25
SCL-3	Substation seismic upgrade	Ongoing	Infrastructure/Capital Project	Critical Infrastructure Protection, Property Protection, Resilient Economy	SCL	N/A	3-5 years	Long-term	Earthquakes	Scalable – There are 14 substations to retrofit and the most recent cost about \$600k. Some will cost more since they have more transformers to retrofit.	Anticipated	Existing Budget Grant	23	6	29
SCL-4	Hazard tree mitigation (vegetation management) near SCL Right-of-Way	Ongoing	Non-Structural Physical Project	Critical Infrastructure Protection, Property Protection, Resilient Economy	SCL	N/A	Ongoing	Long-term	Fires Landslides Power Outages Snow and Ice Storms Wind Storms	\$1 million per year	Yes	Existing budget	23	4	27
SCL-5	Provide seismically designed storage racks for critical parts and supplies	Ongoing	Non-Structural Physical Project	Critical Infrastructure Protection, Property Protection	SCL	N/A	1-3 years	Long-term	Earthquakes	Unknown	No	Unknown	22	4	26
SCL-6	Secure tall furniture at SCL facilities	Ongoing	Non-Structural Physical Project	Life and Safety, Property Protection	SCL	N/A	<1 year	Long-term	Earthquakes	\$100,000	Yes	Existing budget (no/minimal cost)	23	6	29
SCL-7	Map cell towers and identify feeders	Ongoing	Assessments and Studies	Critical Infrastructure Protection, Resilient Economy, Integrated Planning	SCL	N/A	1-3 years	Long-term	Earthquakes, Power Outages, Snow and Ice Storms, Wind Storms	No/minimal cost	Yes	No/minimal cost	21	2	23
SCL-8	Remove/sample PCB transformers	Ongoing	Natural Systems Protection	Critical Infrastructure Protection, Natural Resource Protection	SCL	N/A	3-5 years	Long-term	Earthquakes, Snow and Ice Storms, Wind Storms	Unknown	Anticipated	Existing Budget Grant	22	2	24
SCL-9	Preposition supplies needed for restoration efforts at secure locations	Ongoing	Preparedness and Response	Critical Infrastructure Protection, Resilient Economy	SCL	N/A	1-3 years	Short-Term (interim)	Earthquakes, Power Outages, Snow and Ice Storms, Wind Storms	Unknown	No	Grant	22	2	24
SCL-10	Install impact recorders at substations	Ongoing	Infrastructure/Capital Project (non-structural)	Critical Infrastructure Protection	SCL	N/A	<1 year	Long-term	Earthquakes	Unknown	No	Grant	21	2	23

Table 6-4 2015-2020 Mitigation Implementation Plan (by Department)

Action No.	Mitigation Action	Action Status	Type of Action	Goals Supported	Lead Department	Supporting Departments	Timeline	Life of Action	Hazards Addressed	Anticipated Cost	Funding Available?	Funding Source	STAPLEE Score	Mitigation Effectiveness Score	TOTAL SCORE
SCL-11	Conduct study of downstream consequences from dams to update and improve inundation maps	Ongoing	Assessments and Studies	Life and Safety, Property Protection, Natural Resource Protection	SCL	N/A	1-3 years	Short-Term (interim)	Floods, Infrastructure/ Cyber	\$500,000	No	Grant	23	10	33
SCL-12	Retrofit electrical transmission towers in Snohomish County against landslide damage.	Existing	Infrastructure/Capital Project	Critical Infrastructure Protection Resilient Economy	SCL	N/A	1-3 years	Long-term	Landslides Power Outages	\$450,000	Anticipated	Existing Budget/Grant Funding	22	6	28
Department of Transportation (SDOT)															
SDOT-1	Bridge Seismic Retrofit Phase III	Ongoing	Infrastructure/Capital Project	Life and Safety Critical Infrastructure Protection Property Protection Resilient Economy	SDOT	N/A	3-5 years	Long-term	Earthquakes	\$60 million	No	Bond/Levy (part of next Bridging the Gap Levy)	26	10	36
SDOT-2	Conduct a Transportation Operations Center implementation assessment to combine the Traffic Management Center (TMC), dispatch, construction coordination, customer inquiry and call center, and emergency operations functions into a 24/7 work center.	New	Assessments and Studies	Life and Safety Critical Infrastructure Protection Property Protection Resilient Economy	SDOT	N/A	<1 year	Long-term	All Hazards	\$200,000	Yes	Existing Budget	24	10	34
SDOT-3	Traffic Management Center (TMC) expansion to 24/7 operations (TMC expansion construction, FTE).	New	Infrastructure/Capital Project Preparedness and Response	Life and Safety Critical Infrastructure Protection Property Protection Resilient Economy Integrated Planning	SDOT	N/A	1-3 years	Long-term	All Hazards	Unknown	No	Grant/Bond/Levy	23	10	33

Table 6-4 2015-2020 Mitigation Implementation Plan (by Department)

Action No.	Mitigation Action	Action Status	Type of Action	Goals Supported	Lead Department	Supporting Departments	Timeline	Life of Action	Hazards Addressed	Anticipated Cost	Funding Available?	Funding Source	STAPLEE Score	Mitigation Effectiveness Score	TOTAL SCORE
SDOT-4	Conduct a security threat assessment of the Seattle rail corridor to identify risk associated with new volume of oil train movement.	New	Assessments and Studies	Life and Safety Critical Infrastructure Protection Property Protection Resilient Economy Integrated Planning	SDOT	DHS, FRA, BNSF	1-3 years	Short-Term (interim)	HazMat Incidents Infrastructure/ Cyber Terrorism Transportation Accident	\$200,000	No	Grant	23	6	29
SDOT-5	Implement Seattle rail corridor access control measures (fencing, security cameras, improved right of way management).	New	Non-Structural Physical Project	Life and Safety Critical Infrastructure Protection Property Protection Resilient Economy Integrated Planning	SDOT	DHS, FRA, BNSF	1-3 years	Long-term	Active Shooter Civil Disorder Fires HazMat Incidents Infrastructure/ Cyber Terrorism Transportation Incident	\$10 million	No	Grant	21	6	27
SDOT-6	Conduct a Seattle earthquake damage spot arterial repair planning/exercise.	New	Preparedness and Response	Life and Safety Critical Infrastructure Protection Property Protection Resilient Economy Integrated Planning	SDOT	SPU, SCL, P&R	1-3 years	Short-Term (interim)	Earthquakes Fires Infrastructure/ Cyber	\$80,000 (planning and exercise)	No	Grant	25	2	27
SDOT-7	Separation of rail and arterial right-of-way for S. Lander Street Grade.	New	Infrastructure/Capital Project	Life and Safety Critical Infrastructure Protection Property Protection Resilient Economy	SDOT	N/A	3-5 years	Long-Term	HazMat Incidents Terrorism Transportation Incident	\$180-200 million	No	Grant/Bond/Levy	17	6	23
Seattle Public Utilities (SPU)															
SPU-1	Develop a plan to protect the drinking water system from earthquakes	New	Plans and Regulations	Critical Infrastructure Protection Natural Resource Protection	SPU	N/A	1-3 years	Short-term (interim)	Earthquakes	\$934,000	Anticipated	Existing Budget	20	5	25
SPU-2	Improve Thornton Creek Confluence to reduce upstream flooding and downstream flows	New	Infrastructure/Capital Project Natural Systems Protection	Critical Infrastructure Protection Natural Resource Protection	SPU	N/A	1-3 years	Short-term (interim)	Flooding	Unknown	Yes	Existing Budget	24	3	27

Table 6-4 2015-2020 Mitigation Implementation Plan (by Department)

Action No.	Mitigation Action	Action Status	Type of Action	Goals Supported	Lead Department	Supporting Departments	Timeline	Life of Action	Hazards Addressed	Anticipated Cost	Funding Available?	Funding Source	STAPLEE Score	Mitigation Effectiveness Score	TOTAL SCORE
SPU-3	Accelerate flooding and sewer backup prevention projects in the Broadview and South Park neighborhoods	New	Infrastructure/Capital Project	Critical Infrastructure Protection Natural Resource Protection Integrated Planning	SPU	N/A	3-5 years	Long-term	Flooding	\$20,000,000	Anticipated	Existing Budget	22	4	26
SPU-4	Create a comprehensive emergency plan for maintaining and restoring essential services in emergencies	New	Plans and Regulations	Life and Safety, Critical Infrastructure Protection Integrated Planning	SPU	N/A	1-3 years	Short-term (interim)	All Hazards	\$482,000	Yes	Existing Budget	22	4	26
SPU-5	Prepare for water supply and utility system threats that may occur from climate change	New	Plans and Regulations Natural Systems Protection Preparedness and Response	Critical Infrastructure Protection, Natural Resource Protection Integrated Planning	SPU	OSE	3-5 years	Long-term	Excessive Heat Fires Floods Snow and Ice Storms Water Shortages Wind Storms	\$5,218,000	TBD	TBD	TBD	TBD	TBD

Table 6-5 Status of 2009 Mitigation Actions

2009 Mitigation Action	Type of Action	Responsible Department	Status	Comments
Long-Term Directions				
1. Integrate Hazard Mitigation into the City's Comprehensive Plan	Long-Term Directions	DPD	Incomplete	DPD has proposed an action item (DPD-2) to explore incorporating mitigation into the Comprehensive Plan.
2. City departments should include hazard mitigation as a criterion for internally evaluating projects as part of their annual capital planning processes	Long-Term Directions	All	Ongoing	SCL: Completed DoIT: Part of operational planning FAS: As part of the newly implemented asset planning program, a risk-based prioritization method is one criteria being utilized to evaluate projects.
3. Promote interdepartmental hazard planning efforts, such as those initiated around seismic and landslide issues	Long-Term Directions	All	Ongoing	Parks: Participates when invited. SCL: Completed SDOT: SDOT is collaborating with other departments as needed Public Health - Our participation in SWG is an example of interdepartmental hazard planning. Another is our Green River flood planning with both Public Health and other King County and community agencies (although we have not worked with HSD on this specifically). FAS: The seismic risk assessment that was recently completed in January 2014 is intended to be used as a demonstration project for a methodology that can be used by other departments and building owners.

Table 6-5 Status of 2009 Mitigation Actions

2009 Mitigation Action	Type of Action	Responsible Department	Status	Comments
4. Departments should integrate mitigation into repair and recovery planning and projects	Long-Term Directions	All	Ongoing	<p>Parks: Doing this with FEMA reimbursed projects.</p> <p>SCL: Completed</p> <p>SDOT: SDOT is evaluating opportunities when possible to integrate mitigation into repair and rehabilitation projects.</p> <p>FAS: Seismic upgrades of some facilities per the recommendations of the recently completed seismic risk assessment study are planned within the next 2 to 4 years.</p> <p>DPD: Seattle Building Code requires buildings being substantially renovated or repaired to have seismic upgrade to current standards for existing buildings. DPD and OEM are exploring whether to require unreinforced masonry buildings to have seismic retrofits.</p> <p>OEM: Encourages city departments to request approval of mitigation elements with FEMA-funded repair projects.</p>
Planning and Policy Actions				
A-1. Conduct vulnerability analysis of shelters and traditional housing serving vulnerable populations	Planning and Policy	HSD, Public Health	N/A	No progress – unfunded.
A-2. Provide contingency planning technical assistance for agencies serving the general public and vulnerable populations	Planning and Policy	HSD, Public Health	Ongoing	None at this time.
A-3. Complete study cataloging Seattle's unreinforced masonry buildings	Planning and Policy	DPD	Complete	Sidewalk survey is complete. If URM program proceeds, a more comprehensive inventory may be compiled.
A-4. Update city hazard maps with new liquefaction, earthquake-triggered landslide, seismic ground motion and tsunami/seiche inundation data from USGS, and NFIP flood mapping – particularly as it relates to urban flooding	Planning and Policy	SPU/DPD	Ongoing	SPU/DPD: Seattle Urban Flooding Identification Project is complete. Mapping of the surface water assets is continuing of the rest of the City. Completion expected in 6 years.



Table 6-5 Status of 2009 Mitigation Actions

2009 Mitigation Action	Type of Action	Responsible Department	Status	Comments
A-5. Use SPU records, technical data and GIS to create maps that capture the boundaries of recent localized flooding along the Thornton, Pipers and Longfellow Creek basins, to include other problem areas such as Densmore, Aurora/Licton Springs, Midvale, Southpark, etc.	Planning and Policy	SPU	Complete	None at this time.
A-6. Update Seattle Hazard Identification and Vulnerability Analysis (SHIVA)	Planning and Policy	OEM	Complete	None at this time.
Proposed Capital Projects				
B-1. Complete the four landslide mitigation projects identified and prioritized by the city's interdepartmental landslide team.	Proposed Capital Projects	SDOT, SPU, Parks	Ongoing	None at this time.
B-2. Complete seismic upgrade of Queen Anne Community Center. This is a Tier 1 Congregate Shelter Site.	Proposed Capital Projects	Parks and Recreation	Complete	None at this time.
B-3. Seismically upgrade 6 community centers that have been designated as Tier 1 Congregate Care Facilities	Proposed Capital Projects	Parks and Recreation	Complete	Jefferson Community Center has undergone Seismic Retrofit
B-4. Seismically retrofit or rebuild to current seismic standards 32 fire stations and emergency facilities and support other fire mitigation projects	Proposed Capital Projects	FAS	Ongoing	The Fire Facilities & Emergency Response Levy program started in 2004 and is funding to "upgrade, renovate or replace 32 neighborhood fire stations," among a few other scope items. The levy will end in 2015 and is when all the planned seismic upgrade projects will be completed.
B-5. Implement phase II Bridge Seismic Retrofits	Proposed Capital Projects	SDOT	Incomplete	None at this time.
B-6. Areaways Restoration	Proposed Capital Projects	SDOT	Complete	Post-Alley Seismic retrofit completed.

Table 6-5 Status of 2009 Mitigation Actions

2009 Mitigation Action	Type of Action	Responsible Department	Status	Comments
B-7. Rebuild Emma Schmitz and Viaduct Seawalls to halt deterioration and improve resistance to erosion and earthquakes	Proposed Capital Projects	SDOT	Ongoing	Parks: Emma Schmitz/Alki Seawall is in final stages of study. Approval is expected by the federal government for design/construction by USACE by mid-year.
B-8. Build out alternate data center site to support City of Seattle Continuity Plans for critical city IT systems	Proposed Capital Projects	DoIT	Incomplete	Expected completion date of 2015.
B-9. Implement technology to routinely inventory installed non-Microsoft applications to determine counter measures to cyber attacks	Proposed Capital Projects	DoIT	Ongoing	None at this time.
Current/Planned Capital Projects				
1. Build a retaining wall along Ferry Ave SW, remove slide debris, and place quarry sprouts on slope	Current/Planned Capital Projects	SDOT	Complete	None at this time.
2. Geotechnical study and long term landslide monitoring for 6300-6500 Blocks of Beach Dr SW	Current/Planned Capital Projects	SDOT	Complete	None at this time.
3. Hazard Mitigation Program – Areaways	Current/Planned Capital Projects	SDOT	Ongoing	Post-Alley Seismic retrofit completed
4. Seismically retrofit bridges (Prevent catastrophic collapse from ground shaking)	Current/Planned Capital Projects	SDOT	Ongoing	Phase II seismic retrofit program is near completion with Ballard Bridge being the last bridge on the list with an anticipated completion date by the end of summer 2014; SDOT is also currently planning a Phase III Bridge Seismic Retrofit Program, which is currently unfunded.
5. Replace downtown Elliott Bay Seawall (Prevent erosion and subsidence)	Current/Planned Capital Projects	SDOT	Ongoing	In construction. The project construction phase began Nov 2013 with an estimated completion date of 2016.
6. Seismic Upgrade – Pipeline backbone system	Current/Planned Capital Projects	SPU - Water	Ongoing	Included in SPU-1 in the 2015 Mitigation Strategy.



Table 6-5 Status of 2009 Mitigation Actions

2009 Mitigation Action	Type of Action	Responsible Department	Status	Comments
7. Seismic Upgrade – Volunteer Park Sandpipe	Current/Planned Capital Projects	SPU - Water	Ongoing	Currently under plan review.
8. Seismic Upgrade – Pump Station Buildings 6-B & 6-C	Current/Planned Capital Projects	SPU - Water	TBD	None at this time.
9. Comprehensive Retrofit/BMP Program	Current/Planned Capital Projects	SPU - Drainage and Wastewater	TBD	None at this time.
10. Seismic Upgrade – Building Package 6E	Current/Planned Capital Projects	SPU - Water	TBD	None at this time.
11. Seismic Upgrade – Lake Youngs Upgrade Package 6D	Current/Planned Capital Projects	SPU - Water	TBD	None at this time.
12. Construct lids to cover W Seattle and Maple Leaf reservoirs	Current/Planned Capital Projects	SPU - Water	Complete.	None at this time.
13. Emergency Generators	Current/Planned Capital Projects	FAS	Ongoing	A list of facilities with emergency generators is available through Facility Operations/Asset Planning and Support. Other studies are currently ongoing for adding emergency generators at two additional facilities.
14. Gas Valve Retrofit	Current/Planned Capital Projects	FAS	Complete	The seismic gas valve project was fully completed in January of 2010. The project consisted of the installation of seismic, emergency shut-off valves for 40 City facilities.
15. Continue retrofitting Fire Stations	Current/Planned Capital Projects	FAS	Ongoing	The Fire Facilities & Emergency Response Levy program started in 2004 and is funding to “upgrade, renovate or replace 32 neighborhood fire stations,” among a few other scope items. The levy will end in 2015 and is when all the planned seismic upgrade projects will be completed.
16. Ross Dam – Abutment Rock Stabilization	Current/Planned Capital Projects	SCL	Completed	None at this time.
17. Automated Meter Reading	Current/Planned Capital Projects	SCL	Ongoing	Scheduled completion in 2017.



Table 6-5 Status of 2009 Mitigation Actions

2009 Mitigation Action	Type of Action	Responsible Department	Status	Comments
18. Underground Residential Distribution Rebuild	Current/Planned Capital Projects	SCL	Ongoing	None at this time.
19. Utility Relocation due to Alaskan Way Viaduct and Seawall replacement	Current/Planned Capital Projects	SCL	Ongoing	Scheduled completion in 2016.
20. Construct a new substation in the N downtown	Current/Planned Capital Projects	SCL	Ongoing	Scheduled completion in 2016.
21. Design and construct a second tunnel at George Dam	Current/Planned Capital Projects	SCL	Canceled	Canceled, determined to be cost prohibitive to tunnel through granite.
22. Add next generation switches to support progress for standards towards P25 compliance three county system	Current/Planned Capital Projects	DoIT	Completed	Completed in May 2012.
23. Upgrade essential network routers, firewalls and switches	Current/Planned Capital Projects	DoIT	Ongoing	Operational Planning.
24. Add upgrades to SONET necessary to improve capacity of existing fiber optic	Current/Planned Capital Projects	DoIT	Ongoing	Operational Planning - upgrades every 5 years.
25. Upgrade moving Time Division Multiplexing (TDM) network to VoIP/Multimedia Communications in City's systems	Current/Planned Capital Projects	DoIT	Incomplete	2019 completion date.
26. Creation of citywide alternate site locations to be used during times of emergencies or disasters	Current/Planned Capital Projects	DoIT	Ongoing	FAS Lead.
27. Implement controls on desktop systems that enforce policy and prohibit installation of non-approved applications	Current/Planned Capital Projects	DoIT	Ongoing	Included in ongoing operational planning.

Table 6-5 Status of 2009 Mitigation Actions

2009 Mitigation Action	Type of Action	Responsible Department	Status	Comments
28. Implement technology to routinely inventory installed, non-Microsoft applications to determine to the extent to which upgrade or patching is required. Transition the information to operations for patch/upgrade	Current/Planned Capital Projects	DoIT	Ongoing	Included in ongoing operational planning.
29. Implement technology for the detection of command and control computer traffic for compromised desktop systems	Current/Planned Capital Projects	DoIT	Ongoing	Included in ongoing operational planning.
30. Complete Hazard Mitigation Risk Assessment	Current/Planned Capital Projects	FAS	Complete	Results currently being incorporated into the Seattle HMP and other planning documents.
31. Development of a Contingency Planning Toolkit for small businesses	Current/Planned Capital Projects	OEM, EMD	Complete	None at this time.
32. Educate public about preparedness and disaster response (The Seattle Neighborhoods Actively Prepare (SNAP) program is successor to Seattle Disaster Aid and Response Team (SDART))	Current/Planned Capital Projects	OEM	Ongoing	None at this time.
33. Advancing the City's green initiatives to protect the environment and the health of the community	Current/Planned Capital Projects	SPU, Fleets and Facilities, Parks, OSE	Ongoing	FAS: Green initiatives include the Resource Conservation Management Plan to support the 20% by 2020 energy reduction goal.



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7. PROGRAM IMPLEMENTATION

Chapter 7 provides an overview of the overall strategy for plan maintenance and outlines the method and schedule for monitoring, updating, and evaluating the plan. The chapter also discusses incorporating the plan into existing planning mechanisms and how to address continued public involvement.

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

7.1 Plan Adoption


 <p>FEMA</p>	<p>E1. Does the Plan include documentation that the plan has been formally adopted by the [Seattle City Council]? (Requirement §201.6(c)(5))</p>
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44 CFR §201.6(c)(5) requires that the Seattle HMP be formally adopted by the Seattle City Council. Council formally adopted the 2015 update of the Seattle HMP on **December 7, 2015**.

This plan was approved by FEMA on **February 11, 2016**.

See the front matter of this plan for adoption and approval materials.

7.2 Plan Monitoring and Evaluation

 <p>FEMA</p>	<p>A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))</p>
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7.2.1 Annual Review

OEM is responsible for coordinating annual review of the Seattle HMP and making appropriate revisions. On an annual basis, OEM will convene the MWG to conduct a comprehensive review of the plan to ensure that all information is current. The review and update process follows:

The MWG will meet to consider:

- Progress made on plan recommendations during the previous 12 months.
- Mitigation accomplishments in projects, programs, and policies.
- Actual losses avoided by implementation of mitigation actions.
- Status of mitigation projects included on the City’s Capital Improvement Program (CIP) list.
- Emerging disaster damage trends and repetitive losses.



- Identification of new mitigation needs.
- Cancellation of planned initiatives, and the justification for doing so.
- Changes in membership to the MWG.

OEM will request input from other departments and outside entities not represented on the MWG on issues listed above. A special effort will be made to gather information on non-capital projects and programs important to mitigation. The results of the annual review will be compiled into an Annual Mitigation Status Report that will be made available to key stakeholders and the public.

7.2.2 Following a Major Disaster

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

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

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

7.2.3 Formal Plan Update

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

- Conduct regular reviews of the plan as described above and incorporate feedback from those reviews into the planning document.
- Hold public meeting and initiate meetings with identified groups of interested parties and outside organizations to gain input and feedback.
- Integrate relevant feedback and circulate revised plan to MWG for approval.
- Seek DMC Plan review and comment and integrate DMC recommendations into the plan.
- Submit Plan to the Mayor for approval and the City Council for adoption by resolution.
- Submit the revised plan to FEMA via the Washington State Hazard Mitigation Officer.

It is anticipated that the next full update of this plan will take place in 2019 for the planning period of 2019 through 2023.

7.2.4 Mitigation Action Status and Tracking Loss Reduction

All Departments are tasked with tracking the ongoing status of those mitigation actions for which they are the lead. Departments should track the following:

- Project progress including status of project funding and ongoing needs.
- Actual losses mitigated by project implementation.
- Project needs that may be addressed in the next mitigation planning cycle.

7.3 Incorporation of Existing Planning Mechanisms

As part of OEM’s day-to-day plan monitoring efforts, it will coordinate with departments that have jurisdiction over mitigation action implementation areas to incorporate the plan into standard policies and procedures as well as long-term planning documents and budgets.

Short-term governmental operation changes that address and consider hazard mitigation may include updates to job descriptions, work plans, site reviews, and staff training. Long-term changes may include revisions to existing comprehensive plans, capital improvement plans, zoning and building codes, permitting, and other planning tools.

OEM will also work with departments to include mitigation projects in annual budgets, rather than relying solely upon grant programs, and integrate hazard mitigation in future land use and strategic planning.

7.4 Continued Public Involvement

	<p>A5. Is there discussion of how the [City of Seattle] will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))</p>
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Public involvement is a key component of the plan implementation and update process. As described above, the City will prepare and make available via the internet an Annual Mitigation Status Report providing an update on the implementation of the current mitigation plan. This report, along with specific reports for each mitigation measure being implemented and all stakeholder comments received, will be assessed to make improvements in the plan update released every five years.

In addition to the ongoing input collected and compiled throughout implementation of the previous plan, the MWG, as mentioned above, will review aspects of the draft update plan. Comments received from the public will also be considered and incorporated where appropriate into annual updates of the plan.



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2015 - 2021 Seattle All-Hazards Mitigation Plan

RECORD OF CHANGES

Change Number	Section	Date of Change	Individual Making Change	Description of Change
1	Appendix C-4 Stakeholder Engagement	7/31/2015	Erika Lund	Removed private e-mail addresses in community survey report
2	5.6 – National Flood Insurance Program (NFIP)	7/31/2015	Erika Lund	Per State review, added information about the City’s floodplain management program

APPROVALS AND ADOPTIONS RECORD

Approval/Adoption Body	Date of Action	Notes
Disaster Management Committee (DMC)	10/23/2014	
Mayor, City of Seattle	5/20/2015	
Seattle City Council	12/7/2015	Resolution # 31632
Federal Emergency Management Agency (FEMA)	2/16/2016	