



City of Berkeley  
2014 Local Hazard Mitigation Plan

First Draft

Executive Summary and Details of Actions

October 21, 2013

*Full First Draft Plan Available at [www.CityofBerkeley.info/Mitigation](http://www.CityofBerkeley.info/Mitigation)*

## Executive Summary

Berkeley is a vibrant and unique community. But every aspect of the city – its economic prosperity, social and cultural diversity, and historical character – could be dramatically altered by a serious earthquake or fire. While we cannot predict or protect ourselves against every possible hazard that may strike the community, we can anticipate many impacts and take steps to reduce the harm they will cause. We can make sure that tomorrow’s Berkeley continues to reflect our current values.

The City and community members have been working together for years to address certain aspects of the risk – such as strengthening structures, distributing disaster supply caches, and enforcing vegetation management measures to reduce fire risk. The 2004 Disaster Mitigation Plan formalized this process, ensuring that these activities continued to be explored and improved over time. Over many years, this constant focus on disasters has made Berkeley, its residents and businesses, much safer.

This 2014 Local Hazard Mitigation Plan continues this ongoing process to evaluate the risks that different hazards pose to Berkeley, and to engage the community in dialogue to identify the most important steps that the City and its partners should pursue to reduce these risks.

The federal Disaster Mitigation Act of 2000 called for all communities to prepare mitigation plans. The City adopted a plan that met the requirements of DMA 2000 on June 22, 2004. This is the 2014 update to that plan, which ensures that Berkeley will remain eligible to apply for mitigation grants before disasters, and to receive federal mitigation funding and additional State recovery funding after disasters.

### ***Risks in Berkeley***

A sound disaster resilience program must be founded on reliable information about the types and scale of damage that different hazards could cause. To develop the 2004 Disaster Mitigation plan, the City conducted detailed research on four major natural and two major “manmade” hazards present in Berkeley. These hazards were earthquake, wildland-urban interface fire, landslide, flood, hazardous materials release, and terrorism. Since that time, new maps and data depicting the extent and possible impacts from tsunami and climate change have become available. In 2011, the City added these hazards to the list.

As in 2004, earthquake and wildland-urban interface fire are the two hazards of greatest concern. These hazards have the potential for catastrophic impacts Berkeley.

### **Hazards of Greatest Concern**

#### ***Earthquake***

We do not know when the next major earthquake will strike Berkeley, the United States Geological Survey calculated that there is a 63 percent chance that a 6.7 magnitude earthquake will strike the Bay Area by 2038, and a 31 percent chance that that earthquake will occur on the Hayward/Rogers Creek Fault system, which runs directly through Berkeley.<sup>1</sup> The 1994 Northridge earthquake was also magnitude 6.7, and caused \$28 billion in losses.

A catastrophic earthquake on the Hayward Fault would cause very violent shaking and three types of ground failure in Berkeley. Liquefaction is likely in the westernmost parts of the city.

Liquefaction can destroy pavements and dislodge foundations. Surface fault rupture could occur along the Fault, causing displacements of up to several feet. Landslides are expected in the Berkeley hills during the next earthquake, particularly if the earthquake occurs during the rainy winter months. Landslide movement could range from a few inches to tens of feet; ground surface displacements as small as a few inches are enough to break typical foundations.

In a 6.9 magnitude earthquake on the Hayward Fault, the City estimates that over 600 housing units in Berkeley will be completely destroyed and 20,000 more will be damaged. One thousand to 4,000 families may need temporary shelter. Depending on the disaster scenario, one hundred people could be killed in Berkeley alone, and many more would be injured. Commercial buildings, utilities, and public roads will be disabled or destroyed. The earthquake could also spark numerous fires at a time when water systems may not be functioning. This plan estimates that building damage in Berkeley alone could exceed \$1.8 billion, out of a multi-billion dollar regional loss, with losses to business activities and infrastructure adding to this figure. Low-income housing units are expected to be damaged at a higher rate than other residences. Other types of housing, such as condominiums, may replace them when land owners rebuild. This could lead to profound demographic shifts in Berkeley.

### ***Wildland-Urban Interface Fire***

Berkeley is vulnerable to a wind-driven fire starting along the city's eastern border. The fire risk facing the people and properties in the eastern hills is compounded by the area's mountainous topography, limited water supply, minimal access and egress routes, and location, overlaid upon the Hayward Fault. Berkeley's flatlands are also exposed to a fire that spreads west from the hills. The flatlands are densely-covered with old wooden buildings housing low-income and vulnerable populations, including isolated seniors, persons with disabilities and students.

The high risk of wildland-urban interface (WUI) fire in Berkeley was clearly demonstrated in the 1991 Tunnel Fire, which destroyed 62 homes in Berkeley and more than 3,000 in Oakland. In 1923, an even more devastating fire burned through Berkeley. It began in the open lands of Wildcat Canyon to the northeast and, swept by a hot September wind, penetrated residential north Berkeley and destroyed nearly 600 structures, including homes, apartments, fraternities and sororities, a church, a fire station and a library. The fire burned downhill all the way to Shattuck Avenue in central Berkeley<sup>ii</sup>. If a fire today burned that same area, 3,000 structures would be destroyed, with losses for buildings alone exceeding \$3 billion. Destruction of contents in all of the homes and businesses burned could increase the losses by another \$600 million. Depending on the speed of the fire spread, lives of Berkeley residents could also be lost. Many established small businesses, homes, and multi-family apartment buildings, particularly student housing, would be completely destroyed, changing the character of Berkeley forever.

### **Natural Hazards of Concern**

This plan identified three additional natural hazards of concern: rainfall-induced landslide, flood, and tsunami. These hazards could cause significant damage and losses in Berkeley. However, unlike earthquake and WUI fire, their impacts are likely to be smaller, and confined to specific areas.

Berkeley has a number of deep-seated landslides that continuously move, with the rate of movement affected by rainfall and groundwater conditions. Significant localized areas of the

Berkeley hills face risk from landslide, and a major slide could endanger lives and impact scores of properties, utilities and infrastructure.

Floods also could damage property and cause significant losses in Berkeley. Flooding can occur when stormwater exceeds the capacity of a creek channel, or the capacity of the storm drain system. Creek flooding in Berkeley has the potential to affect about 675 structures, mainly in the western, industrial area of the city. It is unlikely that floodwaters will reach higher than three feet, but damages to homes, businesses, and their contents could total almost \$150 million. With few properties covered by flood insurance, these costs would be borne primarily by Berkeley residents and businesses.

Tsunamis, though rare inside the San Francisco Bay, can occur from large offshore Subduction style earthquakes around the Pacific Rim. Small, local tsunamis can also result from offshore strike-slip Faults such as parts of the San Andreas Fault of the Peninsula and the Hayward Fault through San Pablo Bay. The March 2011 Japan earthquake generated a devastating tsunami, which reached the Bay Area and caused minor damage to docks and floats in the Berkeley Marina. A larger tsunami could impact much more of Berkeley's western shores. Buildings, infrastructure, and roadways could be damaged, and debris and hazardous materials could cause post-tsunami fires. Deaths are possible if individuals choose not to evacuate hazardous areas, do not understand tsunami warnings, or are unable to evacuate.

### **Manmade Hazards of Concern**

This plan addresses climate change, hazardous materials release, and terrorism as Berkeley's three manmade hazards of concern.

Like regions across the globe, the San Francisco Bay Area is experiencing and will continue to increasingly experience the impacts of the changing climate. By 2100, average temperatures in the San Francisco Bay Area will increase up to 11° F. In 2100, Berkeley will have 6-10 additional heat waves each year, which will disproportionately impact the elderly, children under five, and the low-income community members.

Climate change will also cause additional extreme rainfall events, which will lead to more flooding. San Francisco Bay sea-levels will rise up to 55" by 2100, impacting infrastructure and community members in west Berkeley. Climate change impacts will also exacerbate the natural hazards of concern outlined in this plan. Rising sea levels will increase Berkeley's exposure to earthquake liquefaction, tsunami inundation, and flooding. Increases in precipitation and severe storms will make flooding more frequent, and will increase the landslide risk in the hills. California's water security will be reduced, and drought will become a more persistent issue.

Over the last twenty years, Berkeley has seen a more than 90 percent reduction in the number of facilities with extremely hazardous materials. The City carefully tracks hazardous materials within its borders, and works closely with companies using large amounts of potentially dangerous materials. The City has identified fifteen facilities in Berkeley with sufficiently large quantities of toxic chemicals to pose a high risk to the community. Hazardous materials also travel through Berkeley by truck and rail. Natural hazards identified in the plan could trigger the release of hazardous materials.

It is not possible to estimate the probability of a terrorist attack. Experts prioritize terrorism readiness efforts by identifying critical sites and assessing these sites' vulnerability to terrorist

attack. City officials are currently working with State and regional groups to prevent and prepare for terrorist attacks.

## ***Disaster Resilience***

Managing risk requires government and its partners to identify and evaluate risks, and implement and maintain policies, practices and projects to reduce those risks. Many innovative Berkeley initiatives are increasing our community's disaster resilience:

- The City has strengthened its ability to serve the community during and after disasters by seismically upgrading or replacing buildings that house critical City functions. Since 2004, Berkeley has strengthened or replaced its City Hall, all seven fire stations, all five libraries, its public works maintenance building, and its animal shelter.
- The Berkeley Unified School District, supported by voter-approved bonds, has strengthened all public schools.
- Over 90% of Berkeley's 700 unreinforced masonry buildings have been retrofitted or demolished since a City mandate began in 1991.
- Berkeley was the first city in the nation to inventory the community's soft-story buildings. The City Council has directed staff to prepare an ordinance mandating retrofit of all of these buildings.
- Berkeley has also developed innovative programs to encourage building owners to strengthen their own structures. The City has distributed over \$9 million through the Transfer Tax Rebate Program, which reduces the real estate transfer tax to building owners who perform seismic safety work.
- Four different programs contribute to vegetation management citywide, removing thousands of tons of potential fire fuels each year.
- The City enforces several programs to reduce Berkeley's fire hazard in the hills. These include strict building and fire code provisions, as well as more restrictive local amendments for new and renovated construction, along with vegetation control inspections in high-risk properties.
- The Disaster Cache Program incentivizes community-building for disaster readiness. To date, the City has awarded 87 caches of disaster response equipment to neighborhoods, congregations, and UC Berkeley Panhellenic groups that have undertaken disaster readiness activities.
- The City recently hired two positions tasked specifically with increasing disaster readiness in Berkeley's vulnerable and underserved populations.
- Berkeley's 2009 Climate Action Plan has served as a model for jurisdictions across the nation. The Climate Action Plan also guides the City's new climate adaptation strategy.

These programs, and many others, place Berkeley as a leader in disaster management. Long-term maintenance and improvements to these programs will help to protect the Berkeley community in our next disaster.

## ***Mitigation Strategy***

Berkeley aims to be a resilient community that can survive, recover from, and thrive after a disaster, while maintaining its unique character and way of life. Berkeley envisions a community in which the people, buildings, and infrastructure, in and serving Berkeley, are resilient to disasters; City government provides critical services in the immediate aftermath of a devastating event of any kind; and basic government and commercial functions resume within thirty days of a damaging earthquake or other significant event.

For many years, the City has pursued initiatives to identify and mitigate Berkeley's hazard vulnerabilities. In 2014, the City is continuing this effort: this plan outlines a five-year strategic plan to bring Berkeley closer to that vision. This plan identifies three disaster mitigation approaches to increase Berkeley's resilience:

1. The City will evaluate and strengthen all City-owned structures, particularly those needed for critical services, to ensure that the community can be served adequately after a disaster.
2. The City will establish and maintain incentive programs and standards to encourage local residents and businesses to upgrade the hazard-resistance of their own properties.
3. The City will actively engage other local and regional groups to collaboratively work towards mitigation actions that help maintain Berkeley's way of life and its ability to be fully functional after a disaster event.

This plan has four objectives for reducing disaster risk in Berkeley:

- A. Reduce the potential for loss of life, injury and economic damage to Berkeley residents and businesses from earthquakes, wildfires, landslides, floods, tsunamis, climate change, and their secondary impacts.
- B. Increase the ability of the City government to serve the community during and after hazard events by mitigating risk to key city functions such as response, recovery and rebuilding.
- C. Protect Berkeley's unique character and values from being compromised by hazard events.
- D. Encourage mitigation activities to increase the disaster resilience of institutions, private companies and lifeline systems that are essential to Berkeley's functioning.

Actions specified in the 2014 mitigation strategy were inspired by multiple elements of the City's General Plan, and specified through collaborative planning processes among City staff and key institutional partners. 2014 mitigation actions are presented in *high*, *medium*, and *low* priority categories. Generally, *high* and *medium* priority actions address Berkeley's hazards of greatest concern—earthquake and wildland-urban interface fire. *High* and *medium* priority actions can be completed in the five-year time frame covered by this strategy. Implementation of *medium* and *low* actions is dependent on outside sources of funding becoming available. Resource availability will strongly influence the pace of achievements.

**High Priority Actions:**

- Perform appropriate seismic and fire safety analysis based on current and future use for all City-owned facilities and structures.
- Implement Phase Two of the Soft-Story Retrofit Program, mandating retrofit of soft-story residences.
- Complete the ongoing program to retrofit all remaining non-complying Unreinforced Masonry (URM) buildings.
- Reduce hazard vulnerabilities in Berkeley buildings.
- Reduce fire risk in existing development through fire code updates and enforcement.
- Collect, analyze and share information with the Berkeley community about Berkeley hazards and associated risk reduction techniques.
- Ensure that the City provides leadership and coordination of the private sector, public institutions, and other public bodies in disaster mitigation.
- Work with EBMUD to ensure an adequate water supply during emergencies and disaster recovery.
- Manage and promote pedestrian evacuation routes in Fire Zones 2 and 3.
- Mitigate climate change impacts by integrating climate change research and adaptation planning into City operations and services.

**Medium Priority Actions:**

- Strengthen or replace City buildings in the identified prioritized order as funding is available.
- Develop an Energy Assurance Plan for City operations.
- Improve the disaster-resistance of the natural gas delivery system to increase public safety and to minimize damage and service disruption following a disaster.
- Rehabilitate the City's stormwater system to reduce local flooding caused by inadequate storm drainage.
- Reduce fire risk in existing development through vegetation management.
- Define and mitigate Berkeley's tsunami hazard.
- Reduce Berkeley's vulnerability to extreme heat events and associated hazards.
- Reduce Berkeley's vulnerability to severe storms and associated hazards.
- Collaborate with local, State, regional and federal partners to increase the security of Berkeley's water supply from climate change impacts.
- Maintain City participation in the National Flood Insurance Program.
- Streamline the zoning permitting process to rebuild residential and commercial structures following disasters.

**Low Priority Actions:**

- Mitigate the impacts of sea-level rise in Berkeley.
- Explore legislation to require hazardous materials stored in the flood zones to be elevated or otherwise protected from floodwaters.

Berkeley has developed effective processes to implement, track and update the status of its disaster mitigation activities. The City Manager's Office directs implementation and tracking of mitigation activities; funded actions will be inserted into departmental work plans each year.

Department heads task staff members with projects. Lead staff identified in each action will meet together at the beginning of each calendar year to address their progress on the actions that comprise Berkeley's mitigation strategy. Staff will also present progress on mitigation strategy implementation to the Disaster and Fire Safety Commission on an annual basis. Staff will conduct a complete review and update of the plan, including the hazard analysis and mitigation strategy, once every five years.

***Summary of Changes to Section 3: Hazard Analysis***

As part of the 2004 plan update, this 2014 plan includes an updated analysis of Berkeley's hazards and their potential impacts. Hazard vulnerabilities identified in Section 3 guide the mitigation strategy presented in Section 1.

**General Changes and Updates**

The 2014 plan contains numerous updates to facts, figures and descriptions. The City has incorporated the newest-available hazard data, including impact maps for particular scenarios. The City and its partners have provided additional descriptions, details and definitions to explain the science of these hazards and their potential impacts.

Advances in GIS mapping technology have enabled the City to present maps that help to visualize information. The City has overlaid multiple related hazards with Berkeley's buildings and infrastructure to demonstrate structural hazard exposure and vulnerabilities.

Institutional community partners have updated information regarding their vulnerabilities to the described hazards, as well as significant mitigation activities that they have completed, in progress, or planned for the coming five years.

Within the historical section for each hazard, the City has added information about any instances of the hazard affecting Berkeley since 2004. Throughout the plan, the City has updated 2004 financial loss estimates for inflation.

Appendix A describes Berkeley's progress on the hazard mitigation actions identified in 2004. It also identifies where and how the City incorporated select 2004 actions and activities into this 2014 plan.

**Hazards Described in the 2014 Plan**

The 2014 plan now specifically highlights Berkeley's two hazards of greatest concern as earthquake and wildland-urban interface (WUI) fire. These two hazards are underscored because of their history in Berkeley, our community's extensive exposure and many vulnerabilities to these hazards, and the cascading impacts that could result from one of these hazards.



For the first time, the plan identifies tsunami and climate change as hazards of concern.

Significant changes and updates to the analysis of each hazard are described below:

#### Earthquakes (Section 3.3)

- Three new Hayward Fault earthquake scenario maps illustrate the Bay Area's exposure to seismic shaking, and Berkeley's exposure to liquefaction and seismically-triggered landslides.
- A new map overlays the areas of Berkeley potentially exposed to liquefaction, fault rupture and earthquake-induced landslides. The City has overlaid Berkeley's vulnerable structures on this base map, demonstrating where vulnerable buildings have been constructed on ground that could possibly liquefy, rupture or slide in an earthquake.
- The City addresses seismically-triggered landslides, their cause and their potential impacts in additional detail. The 2014 plan also contains a new scenario map for seismically-triggered landslide.
- The 2014 plan addresses fire following earthquake in greater detail: the plan describes significant fires resulting from past earthquakes, causes of fire following earthquake, and how earthquake impacts can impede firefighting efforts and promote fire spread. The estimated number of fires following a scenario earthquake has been updated based on new scientific research, from five ignitions to 6-12 ignitions in the first day.
- The seismic stability of City-owned and leased buildings has been updated to reflect significant retrofit efforts since 2004. (This information is provided in greater detail in *Appendix B: List of City Owned and Leased Buildings.*)
- The City has updated the plan to describe Berkeley's progress on mitigating earthquake vulnerabilities in soft-story buildings. Data gathered through the City's 2005 soft-story ordinance are used to describe the ordinance's impacts on retrofit activities, as well as the current number and locations of soft-story buildings in Berkeley.
- The City describes locations and seismic vulnerabilities to gas systems in greater detail. Pacific Gas & Electric natural gas transmission lines, and Kinder Morgan's jet fuel/diesel pipelines are overlaid on the seismic hazard planning zone map to illustrate their potential earthquake liquefaction exposure.
- Earthquake risk and loss estimates have been updated to include data from a 2008 catastrophic earthquake incident scenario. The 2008 report uses a more severe scenario earthquake than the City used to establish risk and loss estimates in 2004. The 2008 scenario also includes additional information about potential impacts to partner systems at a greater level of detail than was available for the 2004 plan.

#### Wildland-Urban Interface Fire (Section 3.4)

- This plan redefines Berkeley's 2004 "wildfire" hazard as the "wildland-urban interface" fire hazard. The "WUI" term more specifically describes the fire hazard present in the Berkeley hills, in which natural and built environments meet and intermix. This change of perspective and associated terminology aligns Berkeley's 2014 plan with the State of California Hazard Mitigation Plan.

- The 2014 plan describes the potential for a WUI fire to spread to Berkeley's flatlands, clarifying that WUI fire is a citywide concern. The 2014 plan provides additional detail on the particular vulnerabilities of Panoramic Hill residents and visitors.
- The City has provided information about Berkeley's four vegetation management programs reducing Berkeley's fire risk, and its partnership with the Berkeley Path Wanderers Association to maintain and improve the rustic paths in the hills, which also serve as pedestrian evacuation routes.

#### Rainfall-Triggered Landslide (Section 3.5)

- Rainfall-triggered landslide is addressed separately of earthquake-induced landslide. Additional information has been provided to describe rainfall-triggered landslide and debris flow, and Berkeley's exposure and vulnerabilities to historic or recent deep-seated landslides.

#### Floods (Section 3.6)

- The floods section has been rewritten for clarity. The 2014 plan also provides additional information about floods caused by storm drain overflow. Hydraulic models created in 2011 identify key intersections in Berkeley that are exposed to flooding from storm drain overflow.

#### Tsunami (Section 3.7)

- Tsunami is a newly-introduced hazard of concern for the 2014 plan. The tsunami section describes recent tsunami events and their impacts on Berkeley. It outlines the latest information about the tsunami hazard within the San Francisco Bay, and provides an inundation map showing Berkeley's tsunami exposure. The City identifies populations, businesses, roadways, City buildings and other infrastructure within the tsunami inundation zone, and discusses potential evacuation challenges.

#### Climate Change (Section 3.8)

- Climate change is a newly-introduced hazard of concern for the 2014 plan. The climate change section describes the anticipated impacts to Berkeley from climate change. It also outlines how climate change exacerbates other hazards identified in this plan. The City discusses potential impacts from sea-level rise on Berkeley's western coast, and maps areas in Berkeley that are vulnerable in 55-inch sea-level rise.

#### Hazardous Materials Release (Section 3.9)

- This plan provides greater detail regarding Berkeley's exposure and vulnerability to hazardous materials release. The City's classification system for Berkeley's hazardous materials sites is described.
- This section includes a map that visualizes sites with sufficiently large quantities of toxic chemicals to pose a high risk to the community, along with key transportation routes used for hazardous materials in Berkeley. This map also includes areas of Berkeley exposed to earthquake-induced ground failure and flooding. By layering this information, readers can visualize how Berkeley's natural hazards could cause a hazardous materials release.

## Details of Actions

Mitigation actions identified by the Berkeley community are presented in the following pages. Actions are presented per their high, medium- or low-priority designation.

The following information is provided for each action:

- *Action Title*: Short title to identify the action
- *Action*: Proposed action
- *Proposed Activities*: Specific projects or efforts that support the action
- *Related Natural Hazard(s)*: Lists hazards whose impacts would be mitigated by the action
- *Associated LHMP Objective(s)*: Mitigation objectives that the action supports
- *Related Policies from the General Plan or Climate Action Plan*: General Plan or Climate Action Plan policies that the action supports
- *Special Environmental Concerns*: Particular considerations that will be taken into account when the action is implemented
- *Lead Organization(s) and Staff Lead(s)*: City departments and divisions, along with particular City staff positions that will lead implementation of the action
- *Priority*: High, Medium or Low priority assigned to the action using criteria outlined in Appendix E: *Prioritization Structure*
- *Timeline*: Timeline and milestones to implement the action
- *Additional Resources Required*: Identifies if funding is not yet available to complete the action
- *Potential Funding Sources*: Identifies potential funding sources to complete the action. Includes all sources that could possibly fund any element of the action: staff time, vendor contracts, equipment purchase, etc. **Funding allocations are made through the Citywide budget process. Listing a specific potential funding source does not commit resources to the action.**
  - *Activity Type(s)*: If the action could be eligible for federal mitigation grant funding, identifies federally-defined activity type for grant purposes

Appendix A: *2004 Actions* documents progress on 2004 actions.

**High-Priority Actions**

<b>2014 Building Assessment</b>	<b>Perform appropriate seismic and fire safety analysis based on current and future use for all City-owned facilities and structures.</b>
Proposed Activities	<ul style="list-style-type: none"> <li>- First, complete analysis of structures supporting critical emergency response and recovery functions, and make recommendations for structural and nonstructural improvements.</li> <li>- Prioritize analysis of remaining structures based on occupancy and structure type, and make recommendations for structural and nonstructural improvements.</li> <li>- Integrate unsafe structures into a prioritized program for retrofit or replacement.</li> <li>- Develop emergency guidelines for buildings with structural deficiencies.</li> </ul>
Related Natural Hazard(s)	<p>Earthquake</p> <p>Wildland-Urban Interface Fire</p> <p>Tsunami</p> <p>Landslide</p> <p>Floods</p> <p>Climate Change</p>
Associated LHMP Objective(s)	<p>A. Reduce the potential for loss of life, injury and economic damage to Berkeley residents and businesses from earthquake, wildland-urban interface fire, landslide, flood, tsunami, climate change, and the cascading impacts of these hazards.</p> <p>B. Increase City government’s ability to serve the community during disaster response and recovery by mitigating risks to key buildings and infrastructure.</p>
Related Policies from the General Plan or Climate Action Plan	<p>General Plan Policy S-10, Action B</p> <p>General Plan Policy S-20, Actions G and H</p>
Lead Organization and Staff Lead	<p>Public Works Department: Facilities Division</p> <p>Staff Lead: Facility Maintenance Superintendent</p>
Priority	High
Timeline	Analysis of critical structures: December 2013

Additional Resources Required	<p>Analysis of remaining structures: Funding-dependent</p> <p>Emergency guideline development: Ongoing as identified</p> <p>Funding for analysis of remaining structures: Dependent upon progress of critical structure analysis</p> <p>Funding for emergency guideline development: consultant and staff time, dependent upon the number of identified buildings</p>
Potential Funding Sources	<p>Analysis of critical structures: multiple City funds</p> <p>Potential sources for other projects: City General Fund, grants, other City funds</p>

<p><b>2014</b> <b>Soft-Story</b></p>	<p><b>Implement Phase Two of the Soft-Story Retrofit Program, mandating retrofit of soft-story residences.</b></p>
<p>Proposed Activities</p>	<ul style="list-style-type: none"> <li>- <b>Phase II, Part 1: Complete Public Review and Adopt a Mandatory Retrofit Ordinance</b></li> <li>- Pass ordinance to amend the Berkeley Municipal Code 19.39 to require owners of soft-story buildings to retrofit their buildings</li> <li>- Identify and address related zoning issues (e.g., parking elimination requirements, demolitions, etc.)</li> <li>- Outreach to impacted property owners and tenants</li> <li>- <b>Phase II, Part 2 – Implementation of Mandatory Soft-story Retrofit Ordinance</b></li> <li>- Develop and publish Framework Guidelines calibrating, delineating and detailing technical requirements to be used for building retrofits.</li> <li>- Inform impacted property owners of the requirement to retrofit their building</li> <li>- Designated project manager will:             <ul style="list-style-type: none"> <li>• Prepare handouts and correspondence</li> <li>• Respond to inquiries from owners, tenants, engineers, contractors and realtors about the mandatory program, compliance procedures and requirements</li> </ul> </li> <li>- Investigate and adopt financial, procedural, and land use incentives to facilitate retrofit.             <ul style="list-style-type: none"> <li>• The Rent Board will review requests for pass-through of capital improvement expenses for seismic retrofits. They will determine on a case-by-case basis if rent increases to tenants can be approved.</li> <li>• Explore establishment of a loan program to assist landlords who cannot access financing to retrofit their buildings.</li> </ul> </li> <li>- Review plan submittals for soft-story seismic retrofits</li> <li>- Issue permits and perform field inspections</li> <li>- Remove retrofitted buildings from the Soft-Story Inventory</li> <li>- Review appeals to accommodate unique circumstances preventing owners from meeting program requirements; consider time extensions, etc.</li> </ul>
<p>Related Natural Hazard(s)</p>	<p>Earthquake</p>
<p>Associated LHMP Objective(s)</p>	<p>A. Reduce the potential for loss of life, injury and economic damage to Berkeley residents and</p>

	<p>businesses from earthquake, wildland-urban interface fire, landslide, flood, tsunami, climate change, and the cascading impacts of these hazards.</p> <p>C. Protect Berkeley’s unique character and values from being compromised by hazard events.</p>
Related Policies from the General Plan or Climate Action Plan	<p>General Plan Policy S-20, Actions B, C, D, E, and F</p> <p>General Plan Policy S-15, Action A</p>
Special Environmental Concerns	All building upgrade activities will include efforts to minimize impacts to existing residential and commercial tenants.
Lead Organization and Staff Lead	<p>Planning Department – Building and Safety Division</p> <p>Staff Lead: Program and Administration Manager</p>
Priority	High
Timeline	<p>January 2017: Deadline for soft-story owners to submit a permit application for retrofit</p> <p>January 2019: Final deadline for soft-story retrofit completion (2 years after permit application)</p>
Additional Resources Required	Additional \$20-30k required for structural engineering firm to develop Framework Guidelines
Potential Funding Sources	<p>City General Fund</p> <p>Permit Service Center Enterprise Fund</p> <p>Rental Housing Safety Program Fund</p>

<b>2014 URM</b>	<b>Complete the ongoing program to retrofit all remaining non-complying Unreinforced Masonry (URM) buildings.</b>
Proposed Activities	<ul style="list-style-type: none"> <li>- Begin by working with owners of remaining potentially hazardous URM buildings to obtain structural analyses of their buildings and to undertake corrective mitigation measures to improve seismic resistance or to remove the buildings and replace them with safer buildings.</li> <li>- Apply available legal remedies, including but not limited to citations, to owners who fail to comply with the URM ordinance.</li> <li>- Maintain program notification to building occupants and owners.</li> </ul>
Related Natural Hazard(s)	Earthquake
Associated LHMP Objective(s)	A. Reduce the potential for loss of life, injury and economic damage to Berkeley residents and businesses from earthquake, wildland-urban interface fire, landslide, flood, tsunami, climate change, and the cascading impacts of these hazards.
Related Policies from the General Plan or Climate Action Plan	General Plan Policy S-20, Action A
Special Environmental Concerns	All building upgrade activities will include efforts to minimize impacts to existing residential and commercial tenants.
Lead Organization and Staff Lead	Planning Department - Building and Safety Division Staff Lead: Program and Administration Manager
Priority	High
Timeline	Engage all remaining URM building owners by January 2015  Complete all remaining URM retrofits/demolitions by January 2019
Additional Resources Required	No additional resources required
Potential Funding Sources	Permit Service Center Enterprise Fund Rental Housing Safety Program Fund



<b>2014 Buildings</b>	<b>Reduce hazard vulnerabilities for non-City-owned buildings throughout Berkeley.</b>
Proposed Activities	<ul style="list-style-type: none"> <li>- Periodically update and adopt the California Building Standards Code with local amendments to incorporate the latest knowledge and design standards to protect people and property against known seismic, fire, flood and landslide risks in both structural and non-structural building and site components.</li> <li>- Explain requirements and provide guidance to owners of potentially hazardous structures to facilitate retrofit.</li> </ul>
Related Natural Hazard(s)	<p>Earthquake</p> <p>Wildland-Urban Interface Fire</p> <p>Landslide</p> <p>Floods</p>
Associated LHMP Objective(s)	<p>A. Reduce the potential for loss of life, injury and economic damage to Berkeley residents and businesses from earthquake, wildland-urban interface fire, landslide, flood, tsunami, climate change, and the cascading impacts of these hazards.</p> <p>C. Protect Berkeley’s unique character and values from being compromised by hazard events.</p>
Related Policies from the General Plan or Climate Action Plan	<p>General Plan Policy S-15, Action A</p> <p>General Plan Policy S-20, Actions D and E</p>
Special Environmental Concerns	All building upgrade activities will include efforts to minimize impacts to existing residential tenants.
Lead Organization and Staff Lead	<p>Planning Department – Building and Safety Division</p> <p>Staff lead: Building Official</p>
Priority	High
Timeline	<p>Enactment of 2013 Building Code: January 1, 2014</p> <p>Enactment of 2016 Building Code: January 1, 2017</p> <p>Technical assistance: Ongoing</p>
Additional Resources Required	No additional resources required
Potential Funding Sources	Permit Service Center Enterprise Fund

<b>2014 Fire Code</b>	<b>Reduce fire risk in existing development through fire code updates and enforcement.</b>
Proposed Activities	<ul style="list-style-type: none"> <li>- Periodically update and adopt the Berkeley Fire Code with local amendments to incorporate the latest knowledge and design standards to protect people and property against known risks in both structural and non-structural building and site components.</li> <li>- Maintain Fire Department efforts to reduce fire risk through inspections: <ul style="list-style-type: none"> <li>• Annual inspections in all Fire Zones</li> <li>• Hazardous Fire Area inspections</li> <li>• Multi-unit-residential building inspections in all Fire Zones</li> </ul> </li> <li>- Create a standard for written vegetation management plans for major construction projects in Fire Zones 2 and 3.</li> </ul>
Related Natural Hazard(s)	Wildland-Urban Interface Fire
Associated LHMP Objective(s)	<p>A. Reduce the potential for loss of life, injury and economic damage to Berkeley residents and businesses from earthquake, wildland-urban interface fire, landslide, flood, tsunami, climate change, and the cascading impacts of these hazards.</p> <p>C. Protect Berkeley’s unique character and values from being compromised by hazard events.</p>
Related Policies from the General Plan or Climate Action Plan	<p>General Plan Policy S-21: Fire Preventative Design Standards, Action A</p> <p>General Plan Policy S-23: Property Maintenance, Action B</p>
Lead Organization and Staff Lead	<p>Fire Department – Division of Fire Prevention</p> <p>Staff Lead: Deputy Fire Chief (Fire Marshal)</p>
Priority	High
Timeline	<p>Fire Code Adoption: Complete by January 2014 and January 2017</p> <p>Inspections: Ongoing</p> <p>Vegetation Management Standard: 1-2 years</p>
Additional Resources Required	No additional resources required

Potential Funding Sources	City General Fund
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<b>2014 Hazard Information</b>	<b>Collect, analyze and share information with the Berkeley community about Berkeley hazards and associated risk reduction techniques.</b>
Proposed Activities	<ul style="list-style-type: none"> <li>- Track changes in hazard risk using the best-available information and tools.</li> <li>- Collect and share up-to-date hazard maps identifying areas subject to heightened risk from hazards.</li> <li>- Partner with the Association of Bay Area Governments to incorporate Berkeley’s vulnerabilities onto regionally-managed hazard maps.</li> <li>- Publicize financial and technical assistance resources for risk reduction.</li> </ul>
Related Natural Hazard(s)	<p>Earthquake</p> <p>Wildland-Urban Interface Fire</p> <p>Landslide</p> <p>Floods</p> <p>Tsunami</p> <p>Climate Change</p>
Associated LHMP Objective(s)	<ul style="list-style-type: none"> <li>A. Reduce the potential for loss of life, injury and economic damage to Berkeley residents and businesses from earthquake, wildland-urban interface fire, landslide, flood, tsunami, climate change, and the cascading impacts of these hazards.</li> <li>B. Increase City government’s ability to serve the community during disaster response and recovery by mitigating risks to key buildings and infrastructure.</li> <li>C. Protect Berkeley’s unique character and values from being compromised by hazard events.</li> <li>D. Encourage mitigation activities to increase the disaster resilience of institutions, private companies and lifeline systems that are essential to Berkeley’s functioning.</li> </ul>
Related Policies from the General Plan or Climate Action Plan	<p>General Plan Policy S-13: Hazards Identification, Action A</p> <p>General Plan Policy S-19: Risk Analysis, Action A</p> <p>Climate Action Plan: Adaptation Action A</p>

Lead Organization and Staff Lead	Fire Department – Office of Emergency Services Lead Staff: Emergency Services Coordinator Office of Energy and Sustainable Development (Climate Change Hazards) Lead Staff: Climate Action Coordinator
Priority	High
Timeline	Ongoing
Additional Resources Required	No additional resources required
Potential Funding Sources	General Fund Measure GG Special Revenue Fund

<p><b>2014 Partnerships</b></p>	<p><b>Ensure that the City provides leadership and coordinate with the private sector, public institutions, and other public bodies in disaster mitigation.</b></p>
<p>Proposed Activities</p>	<ul style="list-style-type: none"> <li>- Support and encourage efforts undertaken by key lifeline providers to plan for and finance seismic retrofit and other disaster-resistance measures, including:             <ul style="list-style-type: none"> <li>• Utility providers</li> <li>• Transportation agencies</li> <li>• Communication providers</li> <li>• Healthcare facilities</li> </ul> </li> <li>- Coordinate with and encourage mitigation actions of:             <ul style="list-style-type: none"> <li>• Institutions serving the Berkeley community</li> <li>• Berkeley organizations and nonprofits</li> <li>• Other partners whose actions affect the Berkeley community</li> </ul> </li> </ul>
<p>Related Natural Hazard(s)</p>	<p>Earthquake Wildland-Urban Interface Fire Landslide Floods Tsunami Climate Change</p>
<p>Associated LHMP Objective(s)</p>	<ul style="list-style-type: none"> <li>A. Reduce the potential for loss of life, injury and economic damage to Berkeley residents and businesses from earthquake, wildland-urban interface fire, landslide, flood, tsunami, climate change, and the cascading impacts of these hazards.</li> <li>B. Increase City government’s ability to serve the community during disaster response and recovery by mitigating risks to key buildings and infrastructure.</li> <li>C. Protect Berkeley’s unique character and values from being compromised by hazard events.</li> <li>D. Encourage mitigation activities to increase the disaster resilience of institutions, private companies and lifeline systems that are essential to Berkeley’s functioning</li> </ul>
<p>Related Policies from the General Plan or Climate Action Plan</p>	<p>General Plan Policy S-5 The City’s Role in Leadership and Coordination, Actions A and B General Plan Policy S-12 Utility and Transportation Systems, Action A</p>

Lead Organization and Staff Lead	City Manager’s Office (Advocacy) Staff Lead: Deputy City Manager Fire Department – Office of Emergency Services (Coordination) Staff Lead: Office of Emergency Services Captain
Priority	High
Timeline	Ongoing
Additional Resources Required	To be determined
Potential Funding Sources	City General Fund Measure GG Special Revenue Fund

<b>2014 EBMUD</b>	<b>Work with EBMUD to ensure an adequate water supply during emergencies and disaster recovery.</b>
Proposed Activities	<ul style="list-style-type: none"> <li>- Coordinate with EBMUD regarding plans to install a new 48-inch pipeline parallel to the existing north-south water main in 2015-2016.</li> <li>- Explore project approaches with EBMUD to expedite replacement of problem pipelines in Berkeley neighborhoods exposed to wildland-urban interface fire and seismic ground failure.</li> <li>- Coordinate with EBMUD to ensure that pipeline replacement projects and upgrades are coordinated with the City's five-year street paving program.</li> </ul>
Related Natural Hazard(s)	<p>Earthquake</p> <p>Wildland-Urban Interface Fire</p>
Associated LHMP Objective(s)	<p>A. Reduce the potential for loss of life, injury and economic damage to Berkeley residents and businesses from earthquake, wildland-urban interface fire, landslide, flood, tsunami, climate change, and the cascading impacts of these hazards.</p> <p>D. Encourage mitigation activities to increase the disaster resilience of institutions, private companies and lifeline systems that are essential to Berkeley's functioning.</p>
Related Policies from the General Plan or Climate Action Plan	General Plan Policy S-12: Utility and Transportation Systems, Action A
Special Environmental Concerns	All activities occurring in biologically sensitive areas will include measures to protect sensitive habitats and species.
Lead Organization and Staff Lead	<p>Department of Public Works – Engineering Division</p> <p>Staff Lead: City Engineer</p>
Priority	High
Timeline	Ongoing
Additional Resources Required	No additional funding required
Potential Funding Sources	<p>City General Fund and Other City Funds</p> <p>Pre-Disaster Mitigation Grant Program (PDM)</p> <p>Hazard Mitigation Grant Program (HMGP)</p>

Activity Type(s)	Mitigation: Infrastructure Retrofit
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<b>2014 Hills Evacuation</b>	<b>Manage and promote pedestrian evacuation routes in Fire Zones 2 and 3.</b>
Proposed Activities	<ul style="list-style-type: none"> <li>- Ensure that all public pathways are maintained to provide safe and accessible pedestrian evacuation routes from the hill areas.</li> <li>- Update City maps of all emergency access and evacuation routes to include pedestrian pathways.</li> <li>- Coordinate with UC Berkeley and Berkeley Lab to ensure that evacuation route options account for paths on UC and Berkeley Lab property.</li> <li>- Publicize up-to-date maps of all emergency access and evacuation routes.</li> </ul>
Related Natural Hazard(s)	<p>Earthquake</p> <p>Wildland-Urban Interface Fire</p>
Associated LHMP Objective(s)	A. Reduce the potential for loss of life, injury and economic damage to Berkeley residents and businesses from earthquake, wildland-urban interface fire, landslide, flood, tsunami, climate change, and the cascading impacts of these hazards.
Related Policies from the General Plan or Climate Action Plan	<p>General Plan Policy S-1 Response Planning, Action B</p> <p>General Plan Policy S-22 Fire Fighting Infrastructure, Action A</p> <p>General Plan Policy T-28 Emergency Access, Actions B and C</p>
Special Environmental Concerns	All activities occurring in biologically sensitive areas will include measures to protect sensitive habitats and species.
Lead Organization and Staff Lead	<p>Department of Public Works – Engineering Division (Maintenance)</p> <p style="padding-left: 40px;">Public Works Staff Lead: Associate Civil Engineer</p> <p style="padding-left: 40px;">Information Technology GIS Division (Mapping)</p> <p style="padding-left: 40px;">IT Staff Lead: GIS Coordinator</p> <p style="padding-left: 40px;">Fire Department Office of Emergency Services (Outreach)</p> <p style="padding-left: 40px;">Fire-OES Staff Lead: Emergency Services Coordinator</p>
Priority	High
Timeline	<p>Maintenance: Ongoing</p> <p>Mapping: 1 year to include pathways in public maps, then</p>

	ongoing updates
	Publicizing Maps: Ongoing
Additional Resources Required	No additional resources required
Potential Funding Sources	City General Fund
	Measure GG Special Revenue Fund

<b>2014</b>	<b>Mitigate climate change impacts by integrating climate change research and adaptation planning into City operations and services.</b>
<b>Climate Change Integration</b>	
Proposed Activities	<ul style="list-style-type: none"> <li>- Determine staffing needs to monitor research and oversee integration of climate change adaptation into City operations and services</li> <li>- Develop and implement a process to integrate adaptation planning into City operations. Activities include: <ul style="list-style-type: none"> <li>• Integrate climate change adaptation actions into the Citywide Work Plan</li> <li>• Integrate climate change adaptation considerations into templates for staff reports to City Council and City Commissions</li> <li>• Train City staff on the basic science and impacts of climate change and on climate adaptation strategies</li> <li>• Develop a staff recognition and award program to encourage staff to integrate climate change considerations into City projects and programs</li> </ul> </li> </ul>
Related Natural Hazard(s)	Climate Change
Associated LHMP Objective(s)	A. Reduce the potential for loss of life, injury and economic damage to Berkeley residents and businesses from earthquake, wildland-urban interface fire, landslide, flood, tsunami, climate change, and the cascading impacts of these hazards.
Related Policies from the General Plan or Climate Action Plan	<ul style="list-style-type: none"> <li>• Climate Action Plan – Adaptation, Goal 1A</li> <li>• Climate Action Plan – Community Outreach and Empowerment, Goal 1A</li> <li>• Climate Action Plan – Implementation, Monitoring and Reporting, Goals 2, 3 and 4</li> </ul>
Lead Organization and Staff Lead	<p>City Manager’s Office through Sustainability Working Group (Process Management)</p> <p>Staff Lead: Deputy City Manager</p> <p>Planning Department – Office of Energy and Sustainable Development (Support)</p> <p>Staff Lead: Climate Action Coordinator</p>
Priority	Medium
Timeline	Staffing: 2-3 years

	Work Plan Integration: 1 year
	Council/Commission Report Integration: 1 year
	Funding Mechanisms: 2-3 years
	Staff Training: 2-3 years
Additional Resources Required	To be determined
Potential Funding Sources	City General Fund
	Permit Service Center Enterprise Fund

**Medium-Priority Actions**

<b>2014</b>	<b>Strengthen or replace City buildings in the identified prioritized order as funding is available.</b>
<b>Strengthen and Replace City Buildings</b>	
Proposed Activities	<ul style="list-style-type: none"> <li>- Seismically strengthen 2180 Milvia Civic Center</li> <li>- Replace the Center Street Garage</li> <li>- Seek funding to seismically strengthen or replace additional City buildings in a prioritized order</li> </ul>
Related Natural Hazard(s)	<p>Earthquake</p> <p>Wildland-Urban Interface Fire</p> <p>Tsunami</p> <p>Landslide</p> <p>Floods</p> <p>Climate Change</p>
Associated LHMP Objective(s)	<p>A. Reduce the potential for loss of life, injury and economic damage to Berkeley residents and businesses from earthquake, wildland-urban interface fire, landslide, flood, tsunami, climate change, and the cascading impacts of these hazards.</p> <p>B. Increase City government’s ability to serve the community during disaster response and recovery by mitigating risks to key buildings and infrastructure.</p>
Related Policies from the General Plan or Climate Action Plan	General Plan Policy S-20, Action H
Special Environmental Concerns	All construction activities recommended in this action will preserve historic character of buildings, take measures to control air quality and limit noise during construction.
Lead Organization and Staff Lead	Public Works Department – Engineering Division Staff Lead: Supervising Civil Engineer
Priority	Medium
Timeline	2180 Milvia Civic Center retrofit by 2019 Center Street Garage replacement by 2019 Funding identification: Ongoing
Additional	2180 Milvia Civic Center retrofit: \$1 million

Resources Required	Center Street Garage replacement: \$30 million (est.) Old City Hall retrofit: \$30 million Veterans Memorial Building retrofit: \$20 million
Potential Funding Sources	Legislative Pre-Disaster Mitigation grant funding Pre-Disaster Mitigation Grant Program (PDM) Hazard Mitigation Grant Program (HMGP) General Fund City-Issued Bonds
Activity Type(s)	Mitigation: Structural Retrofitting of existing buildings Mitigation: Nonstructural retrofitting of existing buildings and facilities

<b>2014</b>	<b>Develop an Energy Assurance Plan for City operations.</b>
<b>Energy Assurance</b>	
Proposed Activities	<ul style="list-style-type: none"> <li>- Develop a plan to assist the City of Berkeley to prepare for, respond to, and recover from disasters that include energy emergencies.</li> <li>- Identify the key City facilities that support emergency operations</li> <li>- Estimate those facilities’ energy supply and demand during emergencies to assess those facilities’ vulnerabilities to power loss.</li> <li>- Identify actions to mitigate those vulnerabilities (e.g., photovoltaic-supplemented emergency generation, energy efficiency activities, and/or mobile charging stations).</li> <li>- Integrate energy assurance actions into Citywide planning processes.</li> </ul>
Related Natural Hazard(s)	<p>Earthquake</p> <p>Wildland-Urban Interface Fire</p> <p>Landslide</p> <p>Floods</p> <p>Tsunami</p> <p>Climate Change</p>
Associated LHMP Objective(s)	<p>A. Reduce the potential for loss of life, injury and economic damage to Berkeley residents and businesses from earthquake, wildland-urban interface fire, landslide, flood, tsunami, climate change, and the cascading impacts of these hazards.</p> <p>B. Increase City government’s ability to serve the community during disaster response and recovery by mitigating risks to key buildings and infrastructure.</p>
Related Policies from the General Plan or Climate Action Plan	<p>General Plan - Disaster Preparedness and Safety Element: Objective 1</p> <p>General Plan Policy S-8: Continuity of Operations</p> <p>Climate Action Plan – Chapter 4, Goal 5: Increase Energy Efficiency and Renewable Energy Use in Public Buildings – Policies 5a and 5b</p>
Lead Organization and Staff Lead	<p>Fire Department – Office of Emergency Services (Plan Development and Gap Analysis)</p> <p>Staff Lead: Emergency Services Coordinator</p>

	<p>Planning Department – Office of Energy and Sustainable Development (Energy Profile)</p> <p>Staff Lead: Sustainability Outreach Specialist</p> <p>Department of Public Works – Facilities Division (City Infrastructure)</p> <p>Staff Lead: Facility Maintenance Superintendent</p>
Priority	Medium
Timeline	<p>Plan Development: 1 year</p> <p>Project implementation: To be determined</p>
Additional Resources Required	<p>No additional resources required to develop plan.</p> <p>Resources required to implement plan proposals is to be determined.</p>
Potential Funding Sources	<p>City General Fund</p> <p>Measure GG Special Revenue Fund</p> <p>Various State funds</p>



<b>2014 Gas Safety</b>	<b>Improve the disaster-resistance of the natural gas delivery system to increase public safety and to minimize damage and service disruption following a disaster.</b>
Proposed Activities	<ul style="list-style-type: none"> <li>- Work with the Public Utilities Commission, utilities, and oil companies to strengthen, relocate, or otherwise safeguard natural gas and other pipelines where they extend through areas of high liquefaction potential, cross potentially active faults, or traverse potential landslide areas, or areas that may settle differentially during an earthquake.</li> <li>- Establish a program to provide free automatic gas shutoff valves to community members who attend disaster readiness training. Provide subsidized permit fee waivers for low-income homeowners.</li> </ul>
Related Natural Hazard(s)	<p>Earthquake</p> <p>Wildland-Urban Interface Fire</p> <p>Landslide</p> <p>Tsunami</p>
Associated LHMP Objective(s)	<p>A. Reduce the potential for loss of life, injury and economic damage to Berkeley residents and businesses from earthquake, wildland-urban interface fire, landslide, flood, tsunami, climate change, and the cascading impacts of these hazards.</p> <p>D. Encourage mitigation activities to increase the disaster resilience of institutions, private companies and lifeline systems that are essential to Berkeley's functioning.</p>
Related Policies from the General Plan or Climate Action Plan	General Plan Policy S-12, Action C
Special Environmental Concerns	All activities occurring in biologically sensitive areas will include measures to protect sensitive habitats and species.
Lead Organization and Staff Lead	<p>Fire Department – Office of Emergency Services</p> <p>Staff Lead: Office of Emergency Services Captain (Coordination)</p> <p>Staff Lead: Associate Management Analyst (Shutoff Valve Program)</p>
Priority	Medium

Timeline	Coordination: Ongoing Gas Valve Shutoff Program: July 2014
Additional Resources Required	No additional resources required
Potential Funding Sources	City General Fund Measure GG Special Revenue Fund

<b>2014 Stormwater System</b>	<b>Rehabilitate the City’s stormwater system to reduce local flooding caused by inadequate storm drainage.</b>
Proposed Activities	<ul style="list-style-type: none"> <li>- Complete the hydraulic analysis of watersheds in the city to predict areas of insufficient capacity.</li> <li>- Seek funding to perform system capacity and disaster resistance improvements.</li> </ul>
Related Natural Hazard(s)	<p>Earthquake</p> <p>Floods</p> <p>Landslide</p> <p>Tsunami</p> <p>Climate Change</p>
Associated LHMP Objective(s)	A. Reduce the potential for loss of life, injury and economic damage to Berkeley residents and businesses from earthquake, wildland-urban interface fire, landslide, flood, tsunami, climate change, and the cascading impacts of these hazards.
Related Policies from the General Plan or Climate Action Plan	General Plan Policy S-26, Actions B and C
Special Environmental Concerns	Any non-emergency construction work on the storm drain system will take steps to minimize impacts to riparian habitat.
Lead Organization and Staff Lead	Public Works Department – Engineering Division Staff Lead: Associate Civil Engineer
Priority	Medium
Timeline	Complete the hydraulic analysis: funding-dependent System improvements: funding-dependent
Additional Resources Required	Complete the hydraulic analysis: \$200,000 System improvements: \$208 million
Potential Funding Sources	City General Fund, bonds Urban Greening Project Grants (Prop. 84) Stormwater–Flooding Management Projects Grants (Prop. 1E) Pre-Disaster Mitigation Grant Program (PDM) Hazard Mitigation Grant Program (HMGP)

Activity Type(s)	Mitigation: Infrastructure Retrofit
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<b>2014 Vegetation Management</b>	<b>Reduce fire risk in existing development through vegetation management.</b>
Proposed Activities	<ul style="list-style-type: none"> <li>- Maintain Fire Fuel Chipper Program</li> <li>- Maintain Fire Fuel Abatement Program on Public Land</li> <li>- Maintain Fire Fuel Debris Bin Program</li> <li>- Maintain Weekly Curbside Plant Debris Collection</li> </ul>
Related Natural Hazard(s)	Wildland-Urban Interface Fire
Associated LHMP Objective(s)	A. Reduce the potential for loss of life, injury and economic damage to Berkeley residents and businesses from earthquake, wildland-urban interface fire, landslide, flood, tsunami, climate change, and the cascading impacts of these hazards.
Related Policies from the General Plan or Climate Action Plan	General Plan Policy S-23, Action A.
Special Environmental Concerns	All activities occurring in biologically sensitive areas will include measures to protect sensitive habitats and species.
Lead Organization and Staff Lead	<p>Department of Parks Recreation and Waterfront – Parks Division</p> <p style="padding-left: 40px;">Fire Fuel Chipper Program Staff Lead: Senior Forestry Supervisor</p> <p style="padding-left: 40px;">Fire Fuel Abatement Program on Public Land Staff Lead: Senior Landscape Supervisor</p> <p>Department of Public Works – Zero Waste Division (Fire Fuel Debris Bin Program and Weekly Curbside Plant Debris Collection)</p> <p style="padding-left: 40px;">Staff Lead: Zero Waste Manager</p>
Priority	Medium
Timeline	Ongoing
Additional Resources Required	<p>Fire Fuel Chipper Program: Additional resources required, amount to be determined</p> <p>Fire Fuel Abatement Program on Public Land: Additional resources required, amount to be determined</p> <p>Fire Fuel Debris Bin Program and Weekly Curbside Plant Debris Collection: No additional resources required</p>

Potential Funding Sources	City General Fund Refuse Fee City Parks Tax Fund 450 Pre-Disaster Mitigation Grant Program (PDM) Hazard Mitigation Grant Program (HMGP)
Activity Type(s)	Mitigation: Hazardous Fuels Reduction

<b>2014</b>	<b>Define and mitigate Berkeley’s tsunami hazard.</b>
<b>Tsunami</b>	
Proposed Activities	<ul style="list-style-type: none"> <li>- Collaborate with the California Office of Emergency Services to define Berkeley’s different areas of inundation for different tsunami scenarios.</li> <li>- Collaborate with the California Office of Emergency Services, the California Geological Survey, and the Federal Emergency Management Agency to document and implement potential tsunami hazard mitigation measures for Berkeley’s maritime communities.</li> </ul>
Related Natural Hazard(s)	Tsunami
Associated LHMP Objective(s)	A. Reduce the potential for loss of life, injury and economic damage to Berkeley residents and businesses from earthquake, wildland-urban interface fire, landslide, flood, tsunami, climate change, and the cascading impacts of these hazards.
Related Policies from the General Plan or Climate Action Plan	<p>General Plan Policy S-13: Hazards Identification</p> <p>General Plan Policy S-19: Risk Analysis, Action A</p>
Special Environmental Concerns	All activities occurring in biologically sensitive areas will include measures to protect sensitive habitats and species.
Lead Organization and Staff Lead	<p>Fire Department – Office of Emergency Services (Scenarios)</p> <p style="padding-left: 40px;">Staff Lead: Emergency Services Coordinator</p> <p>Parks, Recreation and Waterfront Department – Marina Division (Mitigation Measures)</p> <p style="padding-left: 40px;">Staff Lead: Waterfront Manager</p>
Priority	Medium
Timeline	<p>Scenarios: 2 years</p> <p>Mitigation Measures: To be determined</p>
Additional Resources Required	<p>Scenarios: No additional resources required</p> <p>Mitigation Measures: To be determined</p>
Potential Funding Sources	<p>City General Fund</p> <p>Measure GG Special Revenue Fund</p>

<b>2014 Extreme Heat</b>	<b>Reduce Berkeley’s vulnerability to extreme heat events and associated hazards.</b>
Proposed Activities	<ul style="list-style-type: none"> <li>- Monitor and support regional and State-level efforts to forecast the impact of climate change on temperatures and incidence of extreme heat events in Berkeley and the region, and integrate extreme heat event readiness into City operations and services.</li> <li>- Create and maintain shading by sustaining municipal tree planting efforts and continuing to maintain the health of existing trees.</li> <li>- Continue to implement energy efficiency ordinances for existing residential and commercial buildings to improve building comfort, including in extreme weather conditions, and to reduce energy use.</li> </ul>
Related Natural Hazard(s)	Climate Change
Associated LHMP Objective(s)	A. Reduce the potential for loss of life, injury and economic damage to Berkeley residents and businesses from earthquake, wildland-urban interface fire, landslide, flood, tsunami, climate change, and the cascading impacts of these hazards.
Related Policies from the General Plan or Climate Action Plan	Climate Action Plan - Adaptation Goal 1, Policy D General Plan Policy EM-29: Street and Park Trees
Lead Organization and Staff Lead	<p>Planning Department – Office of Energy and Sustainable Development (Monitor Impacts)</p> <p style="padding-left: 40px;">Staff Lead: Climate Action Coordinator</p> <p>Department of Parks, Recreation and Waterfront – Parks Division (Tree Planting)</p> <p style="padding-left: 40px;">Staff Lead: Parks Superintendent</p>
Priority	Medium
Timeline	Other Activities: Ongoing
Additional Resources Required	<p>Scientific monitoring: No additional resources required</p> <p>Tree planting: Dependent on State Grant</p>
Potential Funding Sources	<p>City General Fund</p> <p>State Grant</p> <p>City Parks Tax Fund 450</p>



<p><b>2014</b> <b>Severe Storms</b></p>	<p><b>Reduce Berkeley’s vulnerability to severe storms and associated hazards.</b></p>
<p>Proposed Activities</p>	<ul style="list-style-type: none"> <li>- Support and monitor research on climate change impacts on local rainfall patterns and incidences of severe storms.</li> <li>- Integrate considerations of severe storms into City operations and services:             <ul style="list-style-type: none"> <li>• Use development review to ensure that new development does not contribute to an increase in flood potential.</li> <li>• Complete the hydraulic analysis of watersheds in the city to predict areas of insufficient capacity.</li> <li>• Design public improvements such as streets, parks and plazas, for retention and infiltration of stormwater by diverting urban runoff to bio-filtration systems such as greenscapes.</li> <li>• Continue to encourage use of permeable surfaces and other techniques as appropriate in both greenscape and hardscape areas for retention and infiltration of stormwater.</li> <li>• Continue to encourage the development of green roofs by providing local outreach and guidelines consistent with the Building Code.</li> </ul> </li> </ul>
<p>Related Natural Hazard(s)</p>	<p>Climate Change</p>
<p>Associated LHMP Objective(s)</p>	<p>A. Reduce the potential for loss of life, injury and economic damage to Berkeley residents and businesses from earthquake, wildland-urban interface fire, landslide, flood, tsunami, climate change, and the cascading impacts of these hazards.</p>
<p>Related Policies from the General Plan or Climate Action Plan</p>	<p>Climate Action Plan - Adaptation Goal 1, Policy C General Plan Policy S-27 New Development</p>
<p>Special Environmental Concerns</p>	<p>Public infrastructure improvements will utilize appropriate environmental review processes.</p>
<p>Lead Organization and Staff Lead</p>	<p>Planning Department – Office of Energy and Sustainable Development</p> <p>Staff Lead: Climate Action Coordinator (Monitor Research)</p> <p>Staff Lead: Sustainability Outreach Specialist (Green Roof outreach)</p>

	<p>Planning Department – Land Use Planning Division (Development Review)</p> <p>Staff Lead: Division Director</p> <p>Department of Public Works – Engineering Division (Watershed Management Plan, Permeable Surfaces, Public Improvements)</p> <p>Staff Lead: Supervising Civil Engineer</p>
Priority	Medium
Timeline	Ongoing
Additional Resources Required	To be determined
Potential Funding Sources	<p>City General Fund</p> <p>Permit Service Center Enterprise Fund</p> <p>Measure M Bond Funds</p> <p>Pre-Disaster Mitigation Grant Program (PDM)</p> <p>Hazard Mitigation Grant Program (HMGP)</p>
Activity Type(s)	Mitigation: Infrastructure Retrofit

<b>2014</b>	<b>Collaborate with local, State, regional and federal partners to increase the security of Berkeley’s water supply from climate change impacts.</b>
<b>Water Security</b>	
Proposed Activities	<ul style="list-style-type: none"> <li>- Support efforts by the U.S. Forest Service and its partners to improve water security through restoration of the Headwaters Forest and Mokelumne River.</li> <li>- Encourage water recycling and gray water use through the distribution of outreach materials and local guidelines that are consistent with the Building Code.</li> <li>- Encourage the use of water conservation technologies and techniques in the design of new buildings and landscapes, such as waterless urinals and cisterns, through the development of local guidelines that are consistent with the Building Code.</li> <li>- Partner with East Bay Municipal Utility District (EBMUD) to provide and market incentives for residents, businesses and institutions to conserve water.</li> <li>- Partner with agencies such as EBMUD and StopWaste.org to encourage private property owners and public agencies (including the City government) to use sustainable landscaping techniques that require less water and energy to maintain.</li> </ul>
Related Natural Hazard(s)	Climate Change
Associated LHMP Objective(s)	<p>A. Reduce the potential for loss of life, injury and economic damage to Berkeley residents and businesses from earthquake, wildland-urban interface fire, landslide, flood, tsunami, climate change, and the cascading impacts of these hazards.</p> <p>D. Encourage mitigation activities to increase the disaster resilience of institutions, private companies and lifeline systems that are essential to Berkeley’s functioning.</p>
Related Policies from the General Plan or Climate Action Plan	<p>Climate Action Plan - Adaptation Goal 1, Policy B</p> <p>General Plan Policy EM-25: Groundwater</p> <p>General Plan Policy EM-26: Water Conservation</p> <p>General Plan Policy EM-31: Landscaping</p>
Lead Organization and Staff Lead	<p>City Manager’s Office via Sustainability Working Group (Partner Support)</p> <p>Staff Lead: Deputy City Manager</p>

	<p>Planning Department – Office of Energy and Sustainable Development</p> <p>Staff Lead: Climate Action Coordinator (Community Awareness)</p> <p>Staff Lead: Sustainability Outreach Specialist (Water Recycling/Incentives)</p> <p>Staff Lead: Sustainability Coordinator (Guidelines and Landscaping)</p>
Priority	Medium
Timeline	Ongoing
Additional Resources Required	No additional resources required
Potential Funding Sources	City General Fund Permit Service Center Enterprise Fund

<b>2014 NFIP</b>	<b>Maintain City participation in the National Flood Insurance Program.</b>
Proposed Activities	<ul style="list-style-type: none"> <li>- Continue to update and revise flood maps for the City.</li> <li>- Continue to incorporate FEMA guidelines and suggested activities into City plans and procedures for managing flood hazards.</li> </ul>
Related Natural Hazard(s)	Floods
Associated LHMP Objective(s)	<p>A. Reduce the potential for loss of life, injury and economic damage to Berkeley residents and businesses from earthquake, wildland-urban interface fire, landslide, flood, tsunami, climate change, and the cascading impacts of these hazards.</p> <p>B. Increase City government’s ability to serve the community during disaster response and recovery by mitigating risks to key buildings and infrastructure.</p> <p>D. Encourage mitigation activities to increase the disaster resilience of institutions, private companies and lifeline systems that are essential to Berkeley’s functioning.</p>
Related Policies from the General Plan or Climate Action Plan	General Plan Policy S-28 Flood Insurance, Actions B and C
Special Environmental Concerns	<p>All activities occurring in biologically sensitive areas will include measures to protect sensitive habitats and species.</p> <p>Any non-emergency construction work on the storm drain system will take steps to minimize impacts to riparian habitat.</p>
Lead Organization and Staff Lead	Public Works – Engineering Division Staff Lead: Supervising Civil Engineer
Priority	Medium
Timeline	Ongoing
Additional Resources Required	No additional resources required
Potential Funding Sources	



<b>2014</b>	<b>Streamline the zoning permitting process to rebuild residential and commercial structures following disasters.</b>
<b>Streamline Rebuild</b>	
Proposed Activities	<ul style="list-style-type: none"> <li>- Adopt a Zoning Amendment to BMC 23C.04.100 that streamlines the Zoning permitting process to allow industrial and commercial buildings, and multiple-family dwellings to rebuild by right following disasters.</li> <li>- Develop a process and information required for residential and commercial property owners to document their buildings' current conditions, to enable them to rebuild by right (in conformity with current applicable codes, specifications and standards) following disasters.</li> </ul>
Related Natural Hazard(s)	<p>Earthquake</p> <p>Wildland-Urban Interface Fire</p> <p>Landslide</p> <p>Floods</p> <p>Tsunami</p>
Associated LHMP Objective(s)	C. Protect Berkeley's unique character and values from being compromised by hazard events
Related Policies from the General Plan or Climate Action Plan	<p>General Plan Policy LU-26: Neighborhood Commercial Areas</p> <p>General Plan Policy LU-27: Avenue Commercial Areas</p> <p>General Plan S-9: Pre-Event Planning, Action B</p>
Lead Organization and Staff Lead	<p>Planning Department – Land Use Planning Division</p> <p>Staff Lead: Division Director</p>
Priority	Medium
Timeline	1 year
Additional Resources Required	To be determined
Potential Funding Sources	<p>City General Fund</p> <p>Permit Service Center Enterprise Fund</p>

**Low-Priority Actions**

<b>2014</b>	<b>Mitigate the impacts of sea-level rise in Berkeley.</b>
<b>Sea-Level Rise</b>	
Proposed Activities	<ul style="list-style-type: none"> <li>- Monitor and participate in regional and State-level research on projected sea-level rise in Berkeley and the region.</li> <li>- Develop guidelines, regulations, and development review procedures to protect new and existing public and private developments and infrastructure from floods due to expected sea-level rise.</li> </ul>
Related Natural Hazard(s)	Climate Change
Associated LHMP Objective(s)	A. Reduce the potential for loss of life, injury and economic damage to Berkeley residents and businesses from earthquake, wildland-urban interface fire, landslide, flood, tsunami, climate change, and the cascading impacts of these hazards.
Related Policies from the General Plan or Climate Action Plan	<p>Climate Action Plan, Adaptation Policy C</p> <p>General Plan Goal 6: Make Berkeley a disaster-resistant community that can survive, recover from, and thrive after a disaster – Utilize Disaster-Resistant Land Use Planning</p> <p>General Plan Policy S-27: New Development</p> <p>General Plan Policy S-14: Land Use Regulation, Action E</p>
Special Environmental Concerns	Policy changes to development regulations in areas exposed to sea-level rise will take steps to minimize impacts to coastal habitat.
Lead Organization and Staff Lead	<p>Planning Department – Office of Energy and Sustainable Development (Monitor Research/Integrate Considerations)</p> <p style="padding-left: 40px;">Staff Lead: Climate Action Coordinator</p> <p>Planning Department – Land Use Planning Division (Development Regulations)</p> <p style="padding-left: 40px;">Staff Lead: Division Director</p>
Priority	Low
Timeline	To be determined
Additional Resources Required	To be determined
Potential Funding Sources	City General Fund



Permit Service Center Enterprise Fund

<b>2014 HazMat Floods</b>	<b>Explore local legislation to require hazardous materials stored in the flood zones to be elevated or otherwise protected from floodwaters.</b>
Proposed Activities:	<ul style="list-style-type: none"> <li>- Conduct cost/benefit evaluation to determine if hazardous materials should be elevated/protected in existing development in flood hazard zones: <ul style="list-style-type: none"> <li>• Assess potential impacts from hazardous materials release due to flooding</li> <li>• Consult with federal, State and regional partners to identify legislative best practices and lessons learned</li> <li>• Work with Berkeley Building Official to identify engineering solutions and potential permitting requirements for hazardous materials</li> <li>• Identify potential costs to hazardous materials owners</li> </ul> </li> <li>- If cost/benefit evaluation is positive, work with City Manager’s Office and City Council to determine and implement path forward.</li> <li>- If cost/benefit is not positive, consider alternative methods of compliance such relocation or modification of business activities.</li> </ul>
Related Natural Hazard(s)	Floods Climate Change
Associated LHMP Objective(s)	A. Reduce the potential for loss of life, injury and economic damage to Berkeley residents and businesses from earthquake, wildland-urban interface fire, landslide, flood, tsunami, climate change, and the cascading impacts of these hazards.
Related Policies from the General Plan or Climate Action Plan	General Plan Policy S-13 Hazards Identification, Action A
Special Environmental Concerns:	All activities occurring in biologically sensitive areas will include measures to protect sensitive habitats and species.
Lead Organization and Staff Lead:	Planning Department – Toxics Management Division Staff Lead: Hazardous Materials Specialist II
Priority:	Low
Timeline:	Complete assessment of existing legislation: January 2014 Complete Cost-benefit evaluation for assessment by City

Manager's Office: To be determined	
Additional Resources Required:	To be determined
Potential Funding Sources:	Existing Certified Unified Program Agency (CUPA) Funding for emergency planning.

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### Executive Summary

<sup>i</sup> Analyses by the US Geologic Survey (USGS) and California Earthquake Prediction Evaluation Council: <http://pubs.usgs.gov/fs/2008/3027/fs2008-3027.pdf>

<sup>ii</sup> City of Berkeley. *Fire Hazard Mitigation Plan*. February 25, 1992.